

NPIC  
Technical Services Group  
Research & Engineering Division

10 May 1971

REPORT ON THE FY-72 R&D PLANNING CONFERENCE

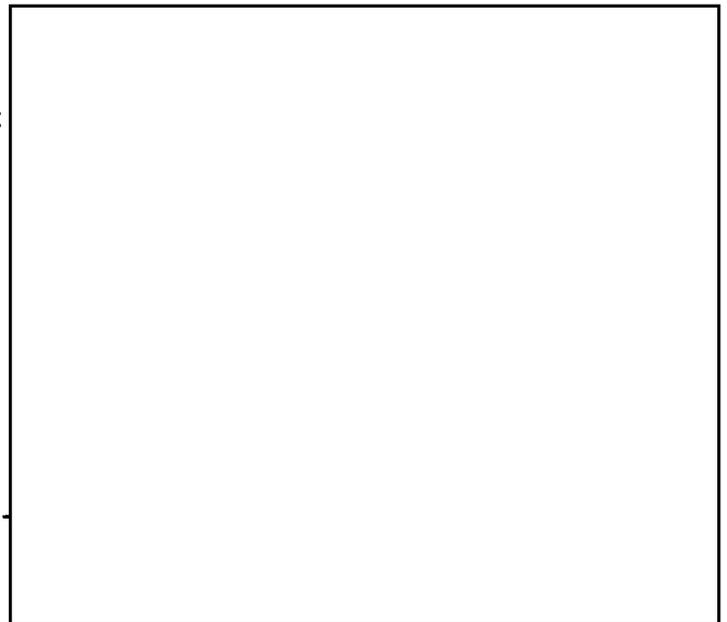
24-26 February 1971

25X1

Submitted by:

Approved by:

Approved by:



NPIC  
Technical Services Group  
Research & Engineering Division

10 May 1971

Report on the FY-72 R&D Planning Conference

Table of Contents

INTRODUCTION:

- i - iii. Initiating Memoranda
- iv. Agenda
- v. List of Attendees

PART I: Narrative of the Requirements Input Session

PART II: Preliminary FY-72 R&D Project List

NPIC/TSG/RED-20-71

5 FEB  
1971

MEMORANDUM FOR: Chief, Technical Services Group, NPIC

SUBJECT : FY-72 R&D Planning Conference

*JWC*  
*5 Feb*

1. RED proposes to convene the subject conference at the [redacted] on 24-26 February. The primary purpose of the conference is to provide RED managers with an opportunity to devote concerted effort toward the preparation of the FY-72 R&D Program. Consequently, the primary attendees will be the Chief, Deputy, Special Assistant, and Branch Chiefs, RED.

25X1

2. In order to be sure that the forthcoming FY-72 R&D Plan is responsive to the Center's R&D needs, we also propose to invite representatives from appropriate elements of the Center to attend the first day and brief the conference on their respective R&D requirements.

3. With your approval, and prior to making final arrangements for this conference, we suggest that this plan be discussed with [redacted] for his comments and support.

25X1

[redacted]

25X1

Chief, Research & Engineering Division, TSG

Distribution:

- Original - Addressee
- 1 - TSG/RED
- 2 - TSG/RED/SA

NPIC/TSG/RED-26-71  
17 February 1971

MEMORANDUM FOR: Distribution List

SUBJECT : FY-72 R&D Planning Conference

1. The subject planning conference is being convened by RED with approval by the Executive Director at the [redacted] during the period 24-26 February 1971.

25X1

2. In order to collect and coordinate the requirements for the FY-72 R&D program, representatives from other Center components are requested to attend the first day to present their respective R&D needs. One representative from each of the following components is requested.

- a. PPBS
- b. SS
- c. IEG
- d. PSG
- e. TSG/APSD
- f. TSG/ESD
- g. IAS

3. These representatives are requested to arrive at the [redacted] by 1800 hours on 23 February in time for supper and to depart after supper on the evening of 24 February. Their respective R&D requirements will be presented through informal briefings during the day of 24 February.

25X1

4. Names of each of the representatives should be telephoned to [redacted] no later than COB Monday, 22 February 1971. Similarly, any questions regarding the subject conference should be addressed to him.

25X1

[redacted]

25X1

Chief, Research & Engineering Division, TSG

Distribution:

- 1 - ExDir/NPIC
- 1 - NPIC/PPBS
- 1 - NPIC/SS
- 1 - NPIC/TSG
- 1 - NPIC/IEG

ii

- 1 - NPIC/PSG
- 1 - NPIC/TSG/ESD
- 1 - Approved For Release 2004/03/26 : CIA-RDP78B05171A000200010004-3
- 1 - IAS

NPIC/TSG/RED-28-71

19 FEB  
1971

MEMORANDUM FOR: Distribution List

SUBJECT : FY-72 R&D Planning Conference Objectives and Guidelines

1. The subject conference is for the purpose of developing a sound FY-72 R&D Program--one that is responsive to policy and requirements, and that is innovative and coherent. In the process of developing this information, personnel involved in the conference should expect to gain understanding of the operational/support interface and functions--and those within RED should expect to gain appreciation of the assigned and assumed roles of each of their fellow managers.

2. In preparation for the conference, each of the personnel representing components with potential R&D requirements should be able to present the general R&D requirements picture of his respective component and also be able to assess and discuss proposals for R&D support suggested by RED conference members.

3. RED personnel and others, where appropriate, attending the conference should be familiar with the NPIC 5-Year Plan, the FY-71 Catalog of R&D Projects, general technological forecasts, specific pending requirements, and innovative concepts arising from their respective branches. The C/RED will provide guidelines concerning the anticipated significance of EOI and possibly other major program areas.

  
Chief, Research & Engineering Division, TSG

25X1

Attachment:

FY-72 R&D Planning Conference Agenda

Distribution:

- 1 - ExDir/NPIC
- 1 - NPIC/PPBS
- 1 - NPIC/SS
- 1 - NPIC/TSG
- 1 - NPIC/IEG
- 1 - NPIC/PSG
- 1 - IAS
- 1 - NPIC/TSG/ESD
- 1 - NPIC/TSG/APSD

TSG/RED  
FY-72 R&D Planning Conference  
23-26 February 1971  
AGENDA

18 February 1971

23 February	-	Arrival Day
1800-1900		SUPPER
1900-		Get Acquainted
24 February	-	Requirements Presentations
0800-0900		Technological Forecast
0900-1000		PPBS - SS Inputs
1000-1100		IAS Input/Discussion
1100-1300		LUNCH
1300-1400		IEG Input/Discussion
1400-1500		PSG Input/Discussion
1500-1600		TSG/APSD Input/Discussion
1600-1630		TSG/ESD Input/Discussion
1630-1730		SUMMARY
1800-1900		SUPPER
1900-		Input Group Departure
1900-		Get Acquainted
25 February	-	REVIEW, EVALUATE, INNOVATE
0800-1000		Review Previous Plans and Requirements
1000-1200		Evaluate
1200-1300		LUNCH
1300-1700		Refine, Innovate Develop New Concepts and Approaches
1800-1900		SUPPER
1900-		Reassessment
26 February	-	Compile Preliminary FY-72 R&D Program Plan
0800-1200		Develop Project Lists and Cost Estimates
1200-1300		LUNCH
1300-1500		Prioritize
1500-1700		Rough out Program Plan

25X1

Approved For Release 2004/03/26 : CIA-RDP78B05171A000200010004-3

Approved For Release 2004/03/26 : CIA-RDP78B05171A000200010004-3

NPIC  
Technical Services Group  
Research & Engineering Division

10 May 1971

REPORT ON THE FY-72 R&D PLANNING CONFERENCE

PART I: Requirements Input Session

NPIC/TSG/RED  
FY-72 R&D Planning Conference  
24-26 February 1971

PART I: Requirements Input Session

On 24 February 1971, the FY-72 R&D Planning Conference was convened by TSG/RED and included various representatives from NPIC components which provide or influence R&D requirements. Following is a summary of the presentations and discussions held during the Requirements Input Session:

25X1 The session was opened with a brief welcome and presentation of the agenda by [redacted]

25X1 [redacted] then explained the purpose of the conference and particularly the first day's session, which was to surface and discuss the NPIC R&D requirements for FY-72. He said there is to be a report on this portion of the meeting and that, prior to publishing it, each attendee will be contacted and given an opportunity to go over the contents.

25X1 [redacted] then presented a Technical Forecast Briefing, a long-range forecast (15 years) designed for and originally given to the CIA committee studying concepts for a new NPIC building. This was essentially a means of providing initial stimulus to the planning conferees.

PPBS PRESENTATION

The first NPIC component to make a presentation was PPBS. During the briefing and subsequent discussion, the following points were made.

25X1 Money is tight-- [redacted] has been officially deducted from the FY-72 R&D budget and additional cuts are possible.

Contracted studies (e.g., systems and procedures-type efforts) will be harder to sell than in the past; some external support may be needed, but proposals for in-house studies will generally be received more favorably. R&D projects justification, in general, will become more tough. One good sales point--in view of the budget and T/O pressures-- is efficiency, but we have to be careful when we invoke the efficiency argument; it should be proven, preferably quantitatively.

NPIC/TSG/RED

PART I: Requirements Input Session

The following four of the eight R&D project categories were identified as those currently most susceptible to hard scrutiny by management:

1. Imagery Interpretation Process Research
2. Imagery Information Technology
5. Reproduction
6. Mensuration

It was mentioned that time constraints sometimes limit the definition of requirements; however, PPBS feels that it is important to properly and explicitly outline problems before proceeding toward solutions. The efficacy of a quasi-formal mechanism to gather this type of information was discussed. One suggestion was to establish an operational systems analysis group which would decide when a formal study was needed and charge someone with that specific responsibility. There was discussion on possible mechanisms for accomplishing this; it was generally agreed that close accountability for specific actions was necessary from analysis to implementation.

Another view, brought up by PPBS, was that the system should not be overly formalized, that the requisite official mechanisms already exist, and that the initial impetus should be generated internally within the operating group bearing the brunt of the problem, rather than from a separate group. Such analyses are an important means of educating our own people. It was questioned whether personnel can be spared for the time needed to obtain the necessary expertise to perform systems analysis. PPBS offered the view that what is required is a healthy mix of contractual and in-house work--given operational and skills constraints, as much of this type of work as possible should be performed in-house.

Considerable discussion was concerned with the definition of the various types of "system analysis" needed for evaluating requirements for R&D support. The R&D people proposed that the following three types were pertinent:

- a. Problem Definition. A study to establish the bounds and nature of the problem. Such a study is assumed to be the responsibility of the component having the problem. While assistance from other NPIC elements and/or outside contractors may be required, most of this work could be performed in-house provided appropriate dedicated manpower is available.
- b. Operational Analysis. A study to define the significance of the problem to related operations and the estimated cost and efficiency trade-offs of the more promising candidate solutions.

NPIC/TSG/RED

PART I: Requirements Input Session

Although such analyses can also be performed in-house, it generally requires inputs from analysts who are trained in behavioral science, engineering (both scientific and industrial), and operations research.

c. Operational Implementation Analysis. A study to define specific elements of the most promising alternative solutions including their operation, physical description, installation, and integration into related systems. The relative cost, complexity, time-to-installation, and pay-off characteristics for each system are specifically described and scientifically validated. Performance of these studies is generally limited to experienced operations or systems analysts who have an appropriate technology base.

There was considerable discussion on the related definitions but the R&D people wanted to make the point that misunderstandings frequently come about regarding in-house capabilities to perform system analysis because the above are often confused.

#### SUPPORT STAFF PRESENTATION

Unlike Headquarters, there has been a continual decline in the utilization of the centralized building planning function of the Support Staff; as a result of this function being performed on a local basis, some of the information concerning building alterations has not been provided to the central plans kept by the Support Staff. Similarly there has been a loss of standardization in the process of effecting building alterations. There is now an effort to provide up-to-date schematics of the building which are intended to correct this situation and also be an aid in long-range future planning.

#### TSG/APSD PRESENTATION

The APSD presentation consisted of a brief survey of the Division's functions and a short description of major projects underway. Two main areas of activity were described: Image Evaluation, including color evaluations, image manipulation techniques, subjective analysis, and EOI preparations; and Photogrammetry, including the relation to ADP and EOI preparations. In the area of Image Evaluation, several projects concerned with objective evaluations were mentioned, along with reference to current and proposed funding levels. The increased need for ADP was mentioned, as well as certain micro-D programs which are, or soon will be, on-line.

NPIC/TSG/RED

PART I: Requirements Input Session

In the area of subjective analysis, reference was made to the [redacted] Image Evaluation Project now underway, and to APSD work with RED on Subjective Color Image Evaluation Proposals. It was noted that APSD has funds to purchase an image comparison microstereoscope in FY-72. Most of the Division's FY-72 money for an Image Enhancement Facility has just been cut, but other work in image enhancement is progressing well.

25X1

APSD preparations for EOI are concentrated on electronic training courses. Four photoscientists and three photogrammetrists are currently taking correspondence courses in electronics.

In connection with the Division's work in photogrammetry, it was noted that APSD is the largest single user of the AID Open Shop Fortran capability: over 70 APSD programs are now on file.

Photogrammetric preparations for EOI are based on studies of possible problems in the mensuration of electronically recorded images. Work with [redacted] was cited.

25X1

The Division feels it has little current need for RED support. It is happy with the better relations that have developed between the two Divisions in the last couple of years. APSD hopes to continue this cooperation. APSD areas of particular current interest to the Division are: (1) applications of microdensitometry to mensuration and the analysis of imagery to determine acquisition system performance; (2) the ATB/HFS Image Evaluation Program under contract with [redacted]; and (3) comprehensive analytical techniques for DP evaluation, such as the DP Evaluation Handbook proposed to APSD by [redacted] Corporation.

25X1

25X1

The need for support with respect to EOI is not yet definable.

#### TSG/ESD PRESENTATION

The ESD presentation consisted of a fairly specific list of requirements for equipment development and study. For Light Source Measurements, there are needs for a Photometer/Radiometer to use for the High Intensity Tracking Light Source color measurement; a Spectroradiometer capable of UV measurement; and a State-of-the-Art Photometer (the Weston meter is developing stability and reliability problems).

Continued R&D is needed in the field of Viewing System Efficiency Measurement. In the area of Mensuration, the Division needs a Calibrated Two-Axis Grid for T&E. In film processing, there is need for a device to

NPIC/TSG/RED

PART I: Requirements Input Session

measure film tension in a dynamic mode. Test and evaluation of heat processing machines for dry materials will require instrumentation for measuring heat transfer, uniformity, etc., independent of the material to be processed. Color Targets will be required for the test and evaluation of color processing equipment. Requirements for work with [redacted] include a need for better definition of areas in which we are human-limited, and consideration of radiation hazards throughout the electromagnetic spectrum.

25X1

#### PSG PRESENTATION

In the PSG presentation, requirements, current projects, and problems were keyed to Group components.

The Research and Reference Division, together with RED, has an on-going materials handling study which deals, among other things, with film handling techniques and the upgrading of microfiche.

The Reprographics Division photo lab is interested in any dry processing developments that could be adapted to their needs--the high-speed roll-film, dry silver processor was mentioned as a possibility here. The problems associated with reproduction from DP's versus DN's [redacted] and the relative degradation of various generations of films were discussed at length without developing a consensus.

25X1

A Step and Repeat Printer design study is underway that will result in a set of specifications. This was judged to be of interest to the community as well.

The photo lab also needs a print straightener to accommodate prints of 30" widths. The commercial 10" model is too small and the 30" plus dryer previously developed for the lab by TSG/RED does not work.

Relative to color printing, the requirement for color reproductions is still unqualified, thereby making it most difficult to determine whether we have an adequate capability for the future. Developmental assistance may be required when requirements are defined.

Probably the most difficult area of reports production in RD/Publications Branch is the preparation of tabular information. Assistance in this area is needed and welcomed. However, it was stated that in-house studies concerning types of tables will first be required before addressing tabular equipment development. Initial studies have been accomplished in RD/PB.

NPIC/TSG/RED

PART I: Requirements Input Session

PSG/Automated Information Division would like RED's assistance in the area of remote station emanation and shielding problems. RED asked for a written problem definition of this requirement.

#### IAS PRESENTATION

In the IAS presentation it was noted that an NPIC capability to reproduce exploitation quality DP film chips, as with a step and repeat printer, is especially desirable. The continued pursuit of high quality dry-processed duplicating materials and equipment, particularly of the positive-to-positive type, was also encouraged. Pending the successful completion of R&D in these areas, IAS plans a back-up capability through the purchase of off-the-shelf dry-process printing and processing devices for use with diazo materials.

Other R&D items of potential benefit to IAS include a high intensity light source (for use with Advanced Stereo Rhomboids), the Image Comparison Microstereoscope, and the Wide Field High Power Anamorphic Stereoviewer. They have only marginal interest in rear projection viewing systems, but are concerned with the vibration problems in [redacted]

25X1

During further discussion of the Center's plans for DP and DN reproduction in the future, it was noted that IAS will receive only one copy of most [redacted] coverage (plus supplemental copies of selected areas and target complexes). IAS plans to continue rendering its roll DP's into chips or frame-segments for convenience in analysis and filing.

25X1

#### IEG PRESENTATION

The IEG presentation began with a description of the new Group organization. It was said that the new contact for the color program will probably be [redacted] was reassigned to the position of Branch Chief in the Scientific Division. He will work with [redacted] until he becomes sufficiently proficient to assume these responsibilities.

25X1

25X1

The IEG requirements for FY-72 R&D support are recorded by the following outline and three supplementary attachments.

#### I. FY-72 Equipment Requirements

1. 40" x 40" Electrostatic Boards
2. Quick-Copy Cameras with an 8" x 10" format and capable of 30X and 50X enlargements.
3. Direct Visual Stereo Registration Rhomboids.
4. A simplified equivalent of the Image Comparison Microstereoscope

NPIC/TSG/RED

PART I: Requirements Input Session

5. Map Holders for the 1540 light tables. Film Cutter/Splicers.

II. FY-72 Procedural Related Studies

1. An NPIC Task Team is examining the Center requirements for text processing. IEG will reserve its position until completion of this study.
2. Study of audio readout--perhaps along with image transmission, recording, and viewing to reduce paperwork and speed up 1st phase exploitation. (See Attachments I and II)
3. Study of material handling problems. IEG will wait to see outcome of PSG study.

III. FY-72 Human Factors Requirements

IEG proposed the establishment of two PI environmental test areas: one in a Geographic Division and one in a substantive Division. These test work areas would be used to develop an optimized environment. Various concepts regarding lighting, acoustics, and equipment/space relationships would be tested. (See Attachment III)

IV. FY-72 Photogrammetry Requirements

1. The adaptability of the HPSC Calibration Device for use with other PHD comparators should be studied.
2. Study the principle of the automatic pointing capability of the HPSC calibration device for use in instrument pointing on continuous tone imagery.
3. Investigate what can be done to modify our present comparators to permit use of different colored filters with the present light source.

NPIC/TSG/RED  
PART I: Requirements Input Session

ATTACHMENT I  
May 1971

IEG PROPOSAL: AUDIO READOUT

It is believed that considerable time might be saved if 1st phase reporting were accomplished without resort to writing. Recording tape and audio storage devices should be tested. Audio reporting might provide the following advantages:

- a. Permit the PI to record his read-out as he is looking at the imagery. A throat mike could be used.
- b. Permit rapid (on demand) playback to check his report while he is viewing the image.
- c. Permit audio corrections where required.
- d. Permit the PIs to work with subdued room lighting.

At the present time, PIs must have room light on because they must write their report. Bright room lights degrade the PIs viewing capability. They cause the iris of his eye to close down at the very time his image interpretation task requires more light. (It is somewhat comparable to driving a car at night with the interior lights on; the driver's vision is impaired.)

- e. Permit rapid transmission of the recorded and checked report to an audio storage device, where a supervisor can play back and approve the report before he transmits it to a second audio storage device. This would be the "input station" where the audio recording would be typed into text for automatic data base input.
- f. Permit rapid transmission of audio intelligence information and correlated imagery directly to a crisis management authority or other high level control point.

Advantages:

1. Speed up 1st phase reporting. This would allow fewer PIs to handle more imagery. It would also speed up the report handling process.
2. Increase PI efficiency by permitting him to:
  - a. Report while he is looking at his image.
  - b. Maintain ideal room lighting while he is performing his imagery analysis.
3. Be more compatible with follow-on exploitation systems.

IEG PROPOSAL: AUDIO READOUT (Cont'd)

ATTACHMENT I

Possible Problems to be Explored in the Test Phase:

1. Can a system be developed which permits the PI to record his findings in the desired sequence for ultimate transformation into textual material for data base input?
2. How rapidly can a PI transition from writing his report to talk-  
ing his report. Will errors be a problem and, if so, can anything be done to solve this problem?
3. Can a supervisor learn to rapidly sign-off on an audio report instead of the usual written report.
4. What intercommunication system will be required between the PI station and a supervisor's clearing house or control station.
5. Will a system for image transmission be required? (See sugges-  
tion for an Image Transmission and Viewing System)

NPIC/TSG/RED  
PART I: Requirements Input Session

ATTACHMENT II  
May 1971

IEG PROPOSAL: IMAGE TRANSMISSION & VIEWING SYSTEM (ITVS)

If the 1st phase reporting operation is to be substantially speeded up, many of the time consuming steps presently taken must be eliminated. One possible approach requiring test and evaluation is an audio readout capability (see attached proposal). To be more effective, particularly in a crisis management situation, audio readout must be combined with a good intercommunication system and an image transmission and viewing system. It is proposed that closed circuit TV be investigated for such utilization. It is visualized that such a system would permit the transmission of PI selected images, at selected magnifications and composition, directly from the PI station to a control station and to a higher authority.

Advantages:

- a. It would permit the PI to transmit critical imagery which is correlated with the audio readout.
- b. Permit rapid coordination regarding the selection of intelligence information for priority handling for cables, black book items, or audio-visual transmissions to a higher echelon control center or national crisis management center.

Possible Problems to be Explored in the Test Phase:

1. Can a device be developed which will:
  - a. Permit the transmission of a high fidelity image from a duplicate positive to a remote station for viewing?
  - b. Permit the PI to transmit an image which he manipulates with regard to composition and enlargement factors.
  - c. Can the transmitted image be stored at a number of remote receiving stations and correlated with the proper audio report when the remote control station is ready to review the report?
  - d. Can the stored image be viewed at the remote control station and discussed via an intercom link between the remote station and the PI station?

NPIC/TSG/RED  
PART I: Requirements Input Session

ATTACHMENT III  
May 1971

IEG PROPOSAL: OPTIMUM PI WORK STATION

Problem Definition

There is a lack of unanimity regarding what constitutes an ideal PI work environment. It is possible that a different environment is best for 1st phase and 3rd phase type activity. It is possible that a PI team handling manned system reconnaissance imagery requires a different work environment. We must explore this question and arrive at sound work decisions, based on first hand experience. The answer to these questions should be available when plans for a new building are drafted.

Proposal

It is proposed that at least two work areas in IEG be designated as PI environmental test areas.

One work area should be in a Geographic Division and another should be in one of the substantive Divisions, where most of the 3rd phase work is done.

The working conditions in these test areas can be varied at intervals to test certain concepts. Work conditions can be optimized to provide the most desirable lighting, acoustics, and equipment/space allocation.

NPIC  
Technical Services Group  
Research & Engineering Division

10 May 1971

REPORT ON THE FY-72 R&D PLANNING CONFERENCE

PART II: Preliminary FY-72 R&D Project List

NPIC/TSG/RED  
FY-72 R&D Planning Conference Report

7 May 1971

Part II: Preliminary FY-72 R&D Project List

As a result of the FY-72 R&D Planning Conference and on the basis of the Requirements Input Session, TSG/RED has compiled a preliminary list of proposed R&D projects for FY-1972. This list is preliminary and is intended to form the basis for a continuing dialog between TSG/RED and the related operational and managerial components within the Center. The objective of this dialog is to refine the FY-72 R&D Program into the most responsive, timely, and well-coordinated R&D Program prepared at NPIC to date.

The Preliminary FY-72 R&D Project List is organized within the standard NPIC R&D Categories as follows:

Item Number. Project Title

- a. Type of Development, (follow-on or new) Nominating Element
- b. Elements Served; Directly, "D" or Indirectly, "I"  
(COM stands for Community)
- c. Brief project requirement and description statement.

FY-72 Preliminary Listings  
NPIC/TSG/RED

22 June 1971

Recon. Sys. Branch

Advan. Tech. Branch

Systems Res. Branch

Systems Dev. Br

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

I. Imagery Interpretation Research

1. RPV Screen Evaluation

- a. Engineering Development (F.O.) ATB/HFS
- b. TSG/RED/D, IEG/I, COM/I
- c. This effort is required to provide the capability for timely and systematic operational assessment of new rear projection screen materials now under development.

2. Illumination/Magnification Effects on Mensuration

- a. Engineering Development (New) ATB/HFS
- b. IEG/PHD/D, TSG/RED/D, COM/I
- c. This study is one in a series of efforts to improve the absolute accuracy of mensuration. The proposed effort will seek to determine optimum magnification levels to be employed in conjunction with various combinations of wave lengths and intensity of illumination for black and white and color imagery.

3. Calibrated Test Imagery

- a. Engineering Development (New) ATB/HFS
- b. TSG/RED/D, TSG/APSD/D, IEG/I, COM/I
- c. This effort is required to produce standardized test imagery to be used in the evaluation of: (1) PI performance under various tasks, and (2) the influence of new techniques, procedures, material or equipment on this performance.

4. Manipulated Imagery Intelligence Value Study

- a. Engineering Development (New) ATB/HFS
- b. TSG/RED/D, TSG/APSD/I, IEG/I, COM/I
- c. As various image manipulation techniques are developed to a point that they may be applied to operational imagery, it is necessary to assess their effects on intelligence extraction.

5. Photographic Emulsion Intelligence Value Study

- a. Engineering Development (New) ATB/HFS
- b. TSG/RED/D, TSG/APSD/D, IEG/I, COM/I
- c. The continuing development of new photographic emulsions for the acquisition and duplication of imagery necessitates their assessment in terms of efficiency and intelligence yield for NPIC imagery exploitation processes.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

I. Imagery Interpretation Research

6. Imagery Interpretation Research SOA Review

- a. Engineering Development (F.O.) ATB/HFS
- b. TSG/D, IEG/I, COM/I
- c. This effort is required to maintain up-to-date knowledge of the behavioral sciences as they relate to improving imagery exploitation techniques, procedures, and equipment design criteria.

7. Advanced PI Equipment Design Study

- a. Advanced Development (F.O.) ATB/HFS
- b. TSG/RED/D, IEG/D, COM/I
- c. Many of the current exploitation equipments were developed on the basis of existing concepts not necessarily specific for the exploitation of imagery. Improvements of these concepts are approaching their practical limits. This effort is required to establish new, operator/task-oriented design concepts for exploitation equipment which are based directly on NPIC activities.

8. In-House Psychophysics Research Support

- a. Advanced Development (F.O.) ATB/HFS
- b. TSG/RED/D, IEG/I, COM/I
- c. Requirements at NPIC and at NPIC contractors for psychophysical testing and evaluation of new techniques, procedures, materials and equipment exceed the manpower available in-house. Contractual support and consultation is required to assist in performing these evaluations. Examples are: manipulated imagery, color imagery, unconventional imagery, and Imagery Interpretation Research Program Review.

9. Experimental Design Support

- a. Engineering Development (New) ATB/HFS
- b. TSG/RED/D, NPIC/I, COM/I
- c. This task is needed in order to provide professional support in the design and analysis of experiments being performed at NPIC to evaluate the performance of new techniques, procedures, materials, and equipment. This support will assure that experiment design, data collection, and analysis will provide valid and reliable results.

10. Operational Personnel Test Program

- a. Engineering Development (New) ATB/HFS
- b. IEG/D, TSG/I, COM/I

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

I. Imagery Interpretation Research

c. The growing complexity of imagery characteristics and read-out requirements and the limitations on the operational personnel complement require more specific means for evaluating prospective employees. Refinement of current test batteries to assist in the employee selection process is the objective of this project.

11. Stereo Height Measurement Training

a. Engineering Development (New) ATB/HFS  
b. IEG/PHD/D, COM/I  
c. Past research within PHD has pointed to the need to train photogrammetrists in stereo height measurement techniques. The proposed effort would provide such training, possibly in the form of self-administered training packages.

12. Target Recognition Training Program

a. Engineering Development (F.O.) ATB/HFS  
b. IEG/D; TSG/RED/I, COM/I  
c. Previous analysis indicated the need to improve target recognition and identification capabilities of geographic photo-interpreters. This is a continuing effort to establish self-instruction training packages for the most pertinent target categories.

13. Color Stereo Test Development

a. Advanced/Engineering Development (New) ATB/HFS  
b. IEG/D, TSG/RED/D, COM/I  
c. This test is to furnish the Center with a production version of a color stereo test currently under development. The test will be employed in personnel selection and stereo equipment evaluation. At present, there is no test material suitable for such evaluation.

14. Image Quality/PI Performance Correlation Analysis

a. Exploratory Development (F.O.) ATB/HFS  
b. TSG/APSD/D, TSG/RED/D, IEG/I, COM/I  
c. The current study to identify key physical parameters of images and correlate to photo interpretation performance is limited to the use of original negative material. The proposed study is intended to expand this effort by employing dupe positive film. The effort will be phased to dovetail with work currently underway to provide requisite basic microdensitometric data on dupe positive material. The overall program helps satisfy the basic requirement

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

I. Imagery Interpretation Research

to develop both objective and subjective assessments of image quality, data from which can be applied to improving current acquisition system capabilities.

15. Subjective Color Image Quality Assessment

- a. Engineering Development (New) ATB/HFS
- b. TSG/RED/D, TSG/APSD/D, IEG/I, SS/TB
- c. Responsibility to provide color imagery readout and assessment of color imagery for future mission programming requires that NPIC be adequately prepared to perform both of these functions. Continuing efforts are required to refine assessment criteria and develop training methods for color imagery exploitation.

16. PI Environmental Test Area

- a. Engineering Development (New) ATB/HFS
  - b. IEG/D, IAS/D
  - c. Requirement stated by IEG reps at FY-72 R&D Planning Conference.
- There is a requirement to determine the characteristics of the ideal PI work environment for both 1st and 3rd phase type activity. It is proposed that two work areas in IEG be designated as PI environmental test areas, one in a Geographic Division and one in one of the substantive Divisions. The working conditions in these areas will be varied at intervals to test certain concepts to determine the best illumination and acoustical conditions and equipment/space allocations for IEG PI operations.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

II. Imagery Information Technology

1. Automated Page Composition Device

- a. Engineering Development (F.O.) SRB
- b. PSG/D, COM/I
- c. This is a requirement to alleviate the current manual method of composing page by "cutting and pasting" printed material. This device would result in an operational system for composing report pages before they are printed.

2. TID Improvement Program

- a. Engineering Development (F.O.) SRB
- b. PSG/D, TSG/APSD/D, COM/D
- c. Engineering modifications to the existing TID (Mechanical, optical, electronics, and software) are required to make it more reliable and more consistently accurate. It may also be appropriate, at this time, to add the capability of the TID to handle different film formats and to incorporate the power spectrum (image quality) capability.

3. Non-Computerized Information Handling Study

- a. Advanced Development (F.O.) SRB
- b. PSG/D
- c. Requirement is to improve equipment and procedures in handling large volumes of collateral information not feasible for computer storage. This will be Phase II of the project consisting of generating specific designs for equipments to be developed if any are required.

4. Related Intelligence Data Automation

- a. Exploratory Development (New) SDB
- b. IEG/I, IAS/I, AID/I, DDI/I, COM/I
- c. The requirement for this project is the need to extract as much information as possible from imagery. This project was proposed by an independent consultant ( ) formerly with ( ). The proposal is to develop a process for automated interaction between the computer data base and the interpreter/analyst to supplement his intellectual skills by rapidly performing the correlation and modelling of observed activities, cueing collateral information, and predicting the implications of these observations. This project has been discussed with expressed interest from NPIC personnel.

25X1

25X1

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

II. Imagery Information Technology

5. First Phase Verbal Reporting Study

- a. Exploratory Development (New) SDB
- b. IEG/D
- c. Requirement expressed by IEG reps at FY-72 R&D Conference. To develop a system for the PI to orally record his thoughts as he interprets imagery. Provide a means for transferring this to hold storage and signal Branch or Division Chief when the information is ready.

6. Photo & Audio Recording/Reporting System

- a. Exploratory Development (New) SDB
- b. IEG/I
- c. Requirement expressed by IEG at FY-72 R&D Conference. Develop a method (closed circuit TV or photo) for a PI to record a picture of a site of the imagery on his light table and also record his oral description for future briefings or situation reports.

7. Film Check-Out and Locator System

- a. Engineering Development (New) SDB
- b. PSG/D, IEG/I, COM/I
- c. This is required to control the limited copies of  imagery and make them available to maximum number of people. Develop a system of checking out cans of film so that their locations are known at all times. Use badges, IBM cards, or credit type cards to check cans in and out.

25X1

8. Frame/Target Locator Device

- a. Engineering Development (New) SDB
- b. IEG/I, IAS/I, COM/I
- c. This is required to relieve the PI of the tedious task of looking through entire rolls for one frame. Develop a device which can be attached to light tables and viewers and which can count frames in 450' rolls of film--when it is at the appropriate frame, the device will move the optics to the X and Y position of the target.

9. Multiple-Channel Interactive Audio System

- a. Engineering Development (New) SDB
- b. IEG/I, IAS/I

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

II. Imagery Information Technology

c. This system is required to insure that all and only pertinent facts about a target are covered by the interpreter. Develop a system that would question the PI on what he sees at a selected site, record his answer, and provide a means of composing a verbal report. It will also give the PI an opportunity to recall previous editions of tape records to use for comparison in evaluating the site.

10. Fold Machine For PI Reports

a. Engineering Development (New) SDB  
b. PSG/RD/D  
c. Requirement expressed by PSG at FY-72 R&D Conference.  
Investigate the types of folding machines that are available off-the-shelf. Modify a multiple fold machine to aid in the NPIC report production cycle.

11. Pre-Drafting Machine--Line Drawing

a. Engineering Development (New) SDB  
b. PSG/RD/D  
c. This is required to improve the output in graphics work.  
Investigate the types of pre-drafting machines in use in the mapping and drafting industry. Modify off-the-shelf equipment to assist in some of the tedious tasks in graphic work such as zip-a-tone, stick-up, etc.

12. Anti-Vibration Device

a. Exploratory Development (New) SDB  
b. RED/D, IEG/I, IAS/I, COM/I  
c. High resolution imagery requiring high magnification viewing has posed a vibration problem. Investigate, design, and develop a vibration tuner for light tables. This could be used to set up a certain vibration in the table to cancel the externally induced vibration.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

III. Image Analysis & Manipulation

1. False Color Toning

- a. Exploratory Development (New) ATB/EDL
- b. PSG/RD/D, TSG/APSD/D, IEG/I
- c. To manipulate the color relationship between an object and its surrounding to enhance their contrast and thereby to improve detectability and/or mensuration of that object.

2. Operational Image Quality Standards

- a. Advanced Development (F.O.) ATB/ITL
- b. TSG/APSD/D, IEG/I
- c. This project will provide the PI performance evaluation data on operational imagery necessary for subsequent correlation with the objective image quality measures under development in other projects. Ultimately, this will enable APSD to specify the quality of any imagery in terms directly related to its information content and/or interpretability.

3. Color Image Quality Standards

- a. Advanced Development (F.O.) ATB/ITL
- b. TSG/APSD/D, TSG/RED/D
- c. Color image quality standards are needed for the APSD image evaluation function. This project will tie together the subjective and objective color image quality measures, developed previously, in a system which can be applied by RED in equipment specifications and APSD in the routine color image quality assessments made for each mission.

4. Non-Conventional Imagery Quality Standards

- a. Exploratory Development (New) ATB/EDL
- b. TSG/APSD/D, TSG/RED/D, IEG/I, COM/I
- c. This project will identify new quality measures required to specify the unique characteristics of non-conventional imaging materials. For example, free radical, RS, dry silver, and diazo imagery are known to have characteristics significantly different from conventional silver films. Methods will be developed so that users of these projects will be able to specify their performance characteristics for reproduction purposes and make objective comparisons with materials currently in use.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

III. Image Analysis & Manipulation

5. OPS Image Quality Measurement System

- a. Advanced Development (F.O.) ATB/ITL
- b. TSG/APSD/D, TSG/RED/D, COM/I
- c. To satisfy the requirement for improved, more efficient image evaluation procedures for APSD, this project will continue the Optical Power Spectrum (OPS) development. This Phase (III) will determine the extent to which this technique can be used to augment current image quality measures. It will consider the specific equipment design, and applications of the technique to conventional, EOI and color imagery. The OPS is expected to provide the main source of objective image quality data for use in design specifications, in routine system evaluation.

6. Optical Image Manipulation (OIM) System

- a. Advanced Development (F.O.) ATB/ITL
- b. IEG/D, TSG/APSD/I
- c. This project is aimed at the requirement to improve degraded operational imagery through OIM techniques so the PI can extract more information from the manipulated image than the degraded image. Targets will be selected by IEG. A bench OIM viewer for use by the PI will be developed. This will allow the PI to manipulate imagery in an interactive mode, i.e., as he is viewing it. Some preliminary experimental work with color OIM will be performed. Ultimately the system developed will be employed by APSD.

7. Digital Image Manipulation (DIM) System

- a. Advanced Development (F.O.) ATB/ITL
- b. IEG/D, OSA/D, IAS/D, OSI/D, TSG/RED/I, TSG/APSD/I
- c. Like OIM, the requirement for DIM is based on the need for a means to glean as much information as possible from degraded or system limited imagery of important targets where coverage is limited for whatever reason. DIM is a system for increasing the visually perceptible information in degraded imagery. It is more sensitive and flexible than the OIM approach to the problem, but is not as rapid by several orders of magnitude. This system, once developed, will be applicable to APSD functions.

8. Chemical Image Manipulation

- a. Exploratory Development (F.O.) ATB/EDL
- b. TSG/RED/D, IEG/D, TSG/APSD/D

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

III. Image Analysis & Manipulation

c. The project will extend in-house laboratory results to operational imagery selected by IEG. The specific instances where chemical image enhancement will improve the degraded image will be identified. Methods necessary for APSD to implement this technique will be developed.

9. Hybrid-Automated Image Manipulation System

- a. Exploratory Development (New) ATB/ITL
- b. TSG/RED/D, IEG/I, TSG/APSD/I
- c. This project will study the variety of image manipulation techniques available and make proposals for an efficient, practical hybrid system which takes advantage of the best attributes of each technique. The project will consider cost, equipment, and time as related to the pay-off expected, and will provide the basic system data for the image manipulation system to be used by APSD.

10. Electronic Image Manipulation (EIM)

- a. Exploratory Development (New) ATB/ITL
- b. TSG/RED/D, TSG/APSD/I
- c. This project will be the first NPIC study to investigate electronic image manipulation techniques for improving degraded conventional and EOI imagery. It will evaluate the advantages of operating on digital signals and photographic images produced from sampled data. It will define the system necessary to provide APSD with the capability of improving degraded EOI type imagery.

11. Image Evaluation/Manipulation-Scientific Support

- a. Exploratory Development (F.O.) ATB/ITL
- b. TSG/RED/D, TSG/APSD/I
- c. The support provided by this project includes expert consultation, proposal evaluation, small feasibility studies in optics, and calibration of special electro-optical testing equipment. The support is available to all elements of the Center and provides sources of technical expertise on a quick reaction basis when unexpected problems arise.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

III. Image Analysis & Manipulation

12. Archival Color Image Study

- a. Exploratory Development (New) ATB/EDL
- b. PPBS/I, TSG/RED/I, IEG/I, PSG/I, COM/I
- c. A national requirement exists that calls for maintenance of archival records of reconnaissance imagery; presumably this requirement applies to color photography as well as black and white. We now know that the dyes in SO-242 are of a non-stable nature and are subject to deterioration. The requirement is to determine a means of archivally maintaining the color information as recorded on SO-242 and SO-255 films.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

1. New Activity Detector

- a. Exploratory Development (New) SRB
- b. TSG/RED/D, IEG/I, COM/I
- c. There is a requirement for an automatic device which could detect potential new activity to alleviate the manual searching of vast, remote land areas by the PI. This is a study project to determine if the current technology in Diffraction Pattern Sampling can be extended to the detection of new activity in remote areas as would be evidenced by changes in the terrain or in land use.

2. SLAR/ATR Feasibility Study

- a. Exploratory Development (New) SRB
- b. TSG/RED/D, IEG/I, COM/I
- c. A study to determine if current technology of Automatic Target Recognition could be applied as an aid to the interpretation of radar imagery.

3. Automated Target Rescan Device

- a. Exploratory Development (New) SDB
- b. TSG/RED/D, IEG/I, COM/I
- c. Investigate the possibility of developing a system which can memorize the information at a target site and then recognize this and compare and identify it on other imagery.

4. Image Comparison Microstereoscope

- a. Engineering Development (F.O.) SRB
- b. IEG/D, TSG/APSD/D, IAS/D, COM/I
- c. A follow-on to develop operational instruments--the specifications and/or modifications to be determined by evaluation of the prototype to be delivered in the summer of 1971.

5. Electro Static Map Board

- a. Engineering Development (New) SDB
- b. IEG/D, IAS/D, COM/I
- c. Requirement is to facilitate map and data sheet mounting on the light table before the PI Requirement was reconfirmed at R&D Planning Conference. Develop an electro static board to hold maps

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

and overlays in a vertical position and which will fit in with the 1540 light table configuration. This will provide the PI with an efficient way to hold collateral material.

6. Electro Static 40" x 40" Briefing Board

- a. Engineering Development (New) SDB
- b. IEG/D, IAS/D, COM/I
- c. Requirement is to facilitate mounting and display of large briefing materials. Develop an electro static board to hold large sheets of briefing materials. It should also be able to hold several overlay sheets simultaneously. This will provide a convenient method for displaying material.

7. Electro Static Holddown for 1540 Light Table

- a. Exploratory Development (New) SDB
- b. TSG/RED/D, IEG/I, COM/I
- c. Requirement is to hold film flat on light table for magnified viewing. This development will provide a means of holding the film flat and in focus even when the table is tilted position.

8. Automatic Stereo Scanner

- a. Advanced Development (F.O.) SRB
- b. TSG/RED/D, IEG/I, COM/I
- c. Requirement is to automate roll film stereo registration and also the scanning process. The initial work would be the development of critical components, i.e., automatic focussing and film flatness control.

9. UV Projection Viewer Study

- a. Exploratory Development (F.O.) SDB
- b. TSG/RED/D, IEG/I, COM/I
- c. Requirement is to improve contrast and resolution of imagery viewing devices. Since the inception of the present UV Rear Projection Viewer project several years ago, the state of the art in the fields of UV optics, light sources, and screens has been advanced. A UV projection system shows promise as a means of achieving rapid scanning and low and high magnifications of high resolution films. The UV Study will survey the present state-of-the-art and form the basis for future development of a viewing device.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

10. PI Microstereoscope System

- a. Engineering Development (New) SDB
- b. IEG/D, IAS/D, COM/I
- c. Requirement is to design a PI Microstereoscope System including the illumination aspect as a total integrated system in order to improve efficiency and performance. Design a new PI Microscope-Light Source viewing station as a total package. Use basic design of [ ] Wide Field Viewer and design light source as part of optical system. Fix position of optics and light source and more film and table. Reduce size of table, 1000 line-pairs per millimeter.

11. Scan & Search PI Station

- a. Engineering Development (F.O.) SDB
- b. IEG/D, COM/I
- c. Make engineering changes to the S&S as requirements are discovered during operational suitability tests. One item which is almost sure to require a change is a method to move the film over certain increments (x and y pattern) to insure that all portions are scanned.

12. Large Field-of-View, Low-Power Microstereoscope

- a. Advanced Development (New) SRB
- b. IEG/D, IAS/D, COM/I
- c. Requirement is for a high-performance, wide field-of-view optical film scanning aid. Utilizing the optical technology developed for the Wide-Field, High-Power Anamorphic Stereoviewer at [ ]-develop an instrument with less magnification which would permit a very large field-of-view of approximately 6". This field-of-view would permit a PI to scan the full width of the [ ] photography (but with only about 3X magnification).

13. Automatic Coordinate Display (AUTOCORD)

- a. Engineering Development (F.O.) SRB
- b. IEG/D
- c. Requirement is to reduce time and increase reliability of target coordinates obtained from imagery. A follow-on project to an FY-71 feasibility study to develop a system which would permit the PI to automatically and very rapidly determine geographic coordinates on [ ] at (or near) his work station. The follow-on would be the actual implementation of the appropriate hardware and software.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

14. Photo/Radar Comparison Viewer

- a. Advanced Development (New) SRB
- b. TSG/RED/D, IEG/I
- c. Requirement is to assist radar imagery interpretation by a viewer capable of presenting coincident radar and photo imagery. To develop a prototype projection viewer on which a radar image could be compared with a collateral photographic image of the same target. This direct comparison should aid in the identification of radar "blobs" and thereby increase the interpretability of radar imagery.

15. SLAR Correlation and Display System

- a. Advanced Development (New) SRB
- b. IEG/I, TSG/RED/D
- c. Requirement is to provide the SLAR interpreter with a correlation and display device which he is able to adjust to the best setting for a specific interpretation task. To develop a radar correlator which would be used directly by the PI to manipulate the radar image to achieve maximum enhancement of target detail.

16. Collateral Imagery Display System

- a. Engineering Development (New) SRB
- b. IEG/I, PSG/R&R/I
- c. Requirement is to provide a more efficient means for storing and viewing collateral imagery. To develop an inexpensive display system on which PI's could view collateral photography (chips), maps, ground photos, keys, etc., for rapid comparison and interpretation of the target being reported. Could replace the target pocket.

17. Auto-Focus System

- a. Advanced Development (New) SRB
- b. TSG/RED/D, TSG/APSD/I, IEG/I
- c. Requirement is to maintain focus in film viewing equipment while scanning imagery. Design and develop a device to automatically adjust focus as film flatness changes when film is viewed in the dynamic mode. This will be used on the ASS and the S&S PI Station.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

18. Coincident UV Clue Display

- a. Advanced Development (New) SDB
- b. TSG/RED/D, IEG/I
- c. Requirement is for a means to display correlated information; such as geographic coordinates and positions on an RPV simultaneously with the imagery, but in a readily distinguishable mode. Develop a technique wherein collateral data, clues, overlays, etc. could be flashed and superimposed on imagery displayed on a screen. This will be on a UV sensitive screen and possibly use a laser as a light source.

19. Front Projection Viewer (FPV) Study

- a. Exploratory Development (New) SDB
- b. TSG/RED/D, IEG/I
- c. Requirement is to determine whether Front Projection Viewing can be adapted to the PI Search & Scan function with improved performance over the RPV system. Feasibility study to determine if this approach can be used on operational material. With new screens and scanning systems this may be applicable for small groups.

20. PI Colorimetric Measuring Device

- a. Advanced Development (New) SDB
- b. TSG/RED/D, IEG/I
- c. Requirement is to develop a means whereby the PI can determine the specific color of an image. Fabricate a colorimeter device based on the parameters established in the FY-71 Color Study. This development will provide the PI with a means of rapidly and accurately describing the color of images being interpreted.

21. 4X Objectives for Mod 28 Rhomboids

- a. Engineering Development (New) SDB
- b. IEG/D
- c. Design and develop 4X objectives, mono and stereo, for the Mod 28 Arm/Zoom 240 System. The new 1540 light source and the improved reproduction film have created need for higher power objectives for the Mod 28 rhomboid arms.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

22. Mod 28 Rhomboid Positioning System

- a. Engineering Development (New) SDB
- b. IEG/D
- c. Develop a method for the PI to easily view through the rhomboid objective (without use of microstereoscope) to position it over area of imagery desired. Develop a retrofit package which can be adapted to the existing Model 28 arms.

23. PI Aids Console

- a. Engineering Development (New) SDB
- b. IEG/D
- c. Design a console that is compatible with the 1540 light table. This will have a writing surface, storage for chips, storage of supplies and small equipment. This might help eliminate the number of desks and give the PI added work space.

24. Color Correction of Viewing Equipment

- a. Engineering Development (New) SDB
- b. TSG/RED/D, IEG/I
- c. Have  or a qualified optical company evaluate the Zoom 240 with various rhomboids and the High Power Viewer with operational color imagery to determine what color correction may be required in existing systems.

25. 1540 Light Table--PI Use Analysis

- a. Engineering Development (New) SDB
- b. TSG/RED/D, IEG/I, COM/I
- c. Perform an investigation similar to the one  did on the 940 tables. Determine the actual user requirements of the new 1540 light tables so as to achieve the most effective utilization of PI personnel and input materials. With new motorized optics mount and precise motorized film drive, investigate PI procedures and habits during use of the tables. Results of this study will form the basis for the development of future, more advanced viewing systems.

26. UV Projection Light Table

- a. Exploratory Development (New) SDB
- b. TSG/RED/D, IEG/I

25X1

25X1

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

c. Based on the results of the UV Study program, develop a light source, optics, and phosphor screen into a system allowing both rapid scanning and detailed analysis of large volumes of film. This would be a sloping screen for a PI to scan film and auxiliary optics to permit him to do detailed analysis right on the screen. Recent tests have produced about 200 line pairs/mm at the screen.

27. 1520 Roll Film Light Table

- a. Engineering Development (New) SDB
- b. IEG/D
- c. The original reason for a 40-inch long table is probably no longer valid and experiments indicate that the PI spends most of his time in the middle 8 inches on each side of the center of the table. This project will develop a table with limited (or no) Y motion of the optics, rugged optics mount, high intensity source, etc. This format saves floor space, decreases heat load, is lighter, and easier to operate.

28. Semi-Automatic Comparator Pointing Aid

- a. Engineering Development (New) SDB
- b. IEG/PD/D, TSG/RED/I
- c. Requirement stated at FY-72 R&D Conference. A requirement exists for improved image pointing accuracy in measuring small images. This development will be based on the centering technique successfully employed on the Calibration Device for the HPSC in FY-71.

29. Aerial Image Projection Light Table

- a. Engineering Development (New) SDB
- b. TSG/RED/D, IEG/I
- c. A PI station featuring both a scanning capability at relatively low magnification and a detailed viewing capability at very high magnification. This system would feature rapid scanning, convenient detailed analysis, capability of exploiting very high resolution imagery, and total magnification up to 180X.

30. Illumination Characteristics for B&W and Color Imagery

- a. Engineering Development (New) ATB/EDL
- b. TSG/RED/D, IEG/I
- c. In order to establish standards for specifying the spectral power distributions of light tables we need to know under what

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

IV. Image Interpretation Instruments & Techniques

illumination conditions the maximum amount of information is extracted from photography and how to relate this (if possible) to the spectral distribution of the viewing source. Such information is required for both setting standards and tolerances on light tables delivered to NPIC.

31. Rectifying Stereogram Printer

- a. Advanced Development (New) SRB
- b. TSG/RED/D, IEG/I, NPIC/I
- c. The initial phase of development of a printer (which would automatically make stereogram prints from roll film) would be a design feasibility study centered around the feasibility of designing the optics. The rationale for a stereogram printer is that PI's could view a target in stereo without the use of expensive, complex stereoscopes.

32. Personalized Zoom 240 Optics

- a. Engineering Development (New) SDB
- b. IEG/D, IAS/D, TSG/RED/D
- c. A requirement exists for the Zoom 240 microstereoscopes to be individually adjusted to match the optical aberrations of the photo interpreter using the instrument. Since each PI has his own 240, the instrument can be adjusted to his individual needs. This program would include a procedure for  to adjust the scopes on a regular basis.

25X1

33. Light Table Target Location Display

- a. Engineering Development (New) SDB
- b. IEG/D, IAS/D
- c. A requirement exists for improving the efficiency of the imagery search process. This project would be a part of an overall scheme to allow the interpreter to query the computerized data base about the location of specific known targets or classes of targets and enable the computer to respond by highlighting the target area on the film.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

V. Reproduction

1. B&W Dry Silver Reversal Material

- a. Advanced Development (F.O.) SDB
- b. TSG/RED/D, IEG/I, PSG/RD/I, COM/I
- c. The requirement is for the PI to be able to make his own high quality photo duplicates in a simple and direct manner. Continue funding the development of this material. This should be completed in either FY-72 or 73. There is an immediate requirement for this material in the operational areas.

2. Dry-Process Color Reproduction Material

- a. Advanced Development (F.O.) SDB
- b. TSG/RED/D, PSG/RD/I, IEG/I
- c. The requirement is based on anticipated quantities of color imagery and the need to simplify the present reproduction systems. Continue FY-71 funded study to develop Dry Color process based on dry silver techniques. This will require several years funding.

3. Compact, High-Speed, 9 $\frac{1}{2}$ " Dry-Silver Processor

- a. Engineering Development (F.O.) SDB
- b. PSG/RD/D, IEG/I, COM/I
- c. The requirement is to provide an appropriate dry-silver roll film processor to enable Reprographic Division to efficiently utilize dry-silver photo reproduction materials. This processor will process negative and positive dry silver and dry color materials under optimized temperatures and speeds.

4. PI Dry Silver Contact Printer

- a. Engineering Development (New) SDB
- b. IAS/D, IEG/D, COM/I
- c. This requirement expressed informally by IAS for high-performance semi-dark pos to pos contact printer. A related hypothetical requirement exists in IEG. Design a print out station optimized for: (1) Printing daylight positive to positive material by the PI in IEG and (2) printing in a semi-lab condition with dark condition such as IAS might use.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

V. Reproduction

5. Advanced PI (30X, 50X) Enlarger Printer

- a. Engineering Development (New) SDB
- b. IEG/D, IAS/D, COM/I
- c. This requirement stated at R&D Conference. Requirement is for PI capability to produce 8 x 10 pre-briefing points. Investigate the feasibility of fabricating a device which will enable the PI to make 30X and 50X enlargements. Determine if it can be done by either a Polaroid or 3M Printer approach.

6. Dry Silver 40" Paper Processor

- a. Engineering Development (F.O.) SDB
- b. PSG/RD/D, IEG/I, IAS/I, COM/I
- c. This requirement is to provide a means for processing dry-silver paper prints (contact or enlargements). The need for this project is based on the assumption that the pre-prototype model now under T&E will require significant improvement. Fabricate a prototype 40" processor and incorporate features high lighted in T&E of engineering model. This can be used in the lab to process material from the BPE.

7. Dry Silver Processing Implementation Plan

- a. Engineering Development (New) SDB
- b. PSG/RD/D, COM/I
- c. Requirement is to provide outfitting techniques and procedures for using dry-silver materials. Provide a consulting service for PSG and RED to plan for future use of Dry Silver Materials and equipment. Determine areas best for dry silver and areas to retain conventional processing.

8. Step & Repeat Contact Printer

- a. Engineering Development (F.O.) SDB
- b. PSG/RD/D, IEG/I, COM/I
- c. Requirement is for a high-performance, B&W and color, roll film contact printer, capable of printing multiple copies of selected frames on the negative. Fabricate a S&R Printer based on the design produced under a separate contract. This will provide PSG with a means of producing positives or negatives of conventional or dry silver material.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

V. Reproduction

9. 30 Inch Print Straightener

- a. Engineering Development (New) SDB
- b. PSG/RD/D, COM/I
- c. Requirement stated at R&D Conference. Requirement is for a device to eliminate the curl in large format briefing prints.

10. Sensitometric Viscous Processor

- a. Engineering Development (New) SDB
- b. TSG/ATB/EDL/D
- c. Requirement is for in-house sensitometric testing capability to be more independent with respect to photo materials evaluation.

11. Dylux Dry Color Reproduction Material

- a. Exploratory Development (New) ATB/EDL
- b. TSG/RED/D, PSG/RD/I, COM/I
- c. Requirement is to simplify and reduce cost of reproducing color imagery. This project will investigate the feasibility of developing [redacted] material to appropriate performance levels for NPIC color duplication requirements.

12. Unconventional Film Evaluation

- a. Advanced Development (New) ATB/EDL
- b. TSG/RED/D, TSG/APSD/D, COM/I
- c. Requirement is to determine methods for objectively evaluating unconventional film systems. Evaluation of improved unconventional films for possible use in aerial film duplication systems. Tests will include the usual tests of speed, resolution, uniformity, shelf-life, image stability, reprint capability, etc., as well as development of new tests designed to better estimate the potential of unconventional films.

13. Unconventional Reproduction Systems

- a. Exploratory Development (New) ATB/EDL
- b. TSG/RED/D, PSG/RD/I, COM/I
- c. An exploratory study to locate and check feasibility of new and unique conventional photographic systems which are in their early stages of research. The purpose would be to identify these

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

V. Reproduction

systems, do a few feasibility tests to determine whether research support should be used to exploit the system for improvements in aerial film duplicating systems.

14. Photo Science Support

- a. Advanced Development (F.O.) ATB/EDL
- b. TSG/RED/D, NPIC/I
- c. This is a continuation of the project in which [ ]

provides an extension to ATB capabilities for evaluating new ideas, analyzing materials, and training branch personnel in highly technical areas. To date such topics as: chemistry of unconventional photo-materials, false-color toning as a technique of color image manipulation, training in electron microscopy techniques, continuous tone-lithography, techniques of chemical image manipulation, oil analysis, and others have been investigated in support of the indicated organizations. Project objective: to gain low-budget technical guidance on which to predicate discrete R&D projects in areas of new technology.

25X1

15. [ ] Contrast Enhancement Printer

- a. Exploratory Development (New) ATB/EDL
- b. TSG/RED/D, TSG/APSD/I, PSG/RD/I, IEG/I
- c. This project is aimed at gaining maximum information from

underexposed ON imagery. Its principle involves contrast enhancement through multiple-pass printing; it poses no threat of damage to the ON. Under the Photoscience Support Program, [ ] has evaluated one model of this printer and will shortly evaluate a second. This project envisions prototype development of that Model which shows the greater potential for image enhancement.

25X1

16. Photo Products Pollution Control

- a. Exploratory Development (New) ATB/EDL
- b. NPIC/D
- c. Required because of polluting properties of photo products

and present need for constraints on pollutants. A one man year study program should be initiated to determine the best technique to use to reduce or eliminate photo-chemicals and other chemicals from polluting the water effluent coming from [ ] The recommended program should:

25X1

- 1. Cut down on amount of chemical contamination by treatment and recycling processing chemicals.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

V. Reproduction

2. Provided recommended equipment and procedures for treating and removing all toxic chemistry from the waste water leaving



17. Wet Processing Technology

- a. Advanced Development (New) ATB/EDL
- b. TSG/RED/ATB/D, PSG/RD/I
- c. Applied development research should be continued in the area of black and white and color processing techniques to update processing standards.

18. Sensitometric Processor Modification

- a. Engineering Development (New) ATB/EDL
- b. TSG/RED/ATB/D, PSG/RD/I
- c. In order to fully support the investigation programs of the ATB in both B&W and color processing techniques, to update processing standards, handling of operational imagery up to 25' x 6.5" to support CIM, OIM and DIM research, it is necessary to build a new processing tank to couple to present sensitometric processor to handle larger film size.

19. Small Format Precision Enlarger/Rectifier

- a. Advanced Development (New) RSB
- b. TSG/RED/D, PSG/RD/I, IEG/I
- c. Predicted high-resolution, small format acquisition systems will require this device. A long lead time is required for development. The enlarger/rectifier will be capable of producing large format briefing prints and/or rectifier plan views of this high-resolution imagery.

20. Dry Silver Film Resolution Limits

- a. Advanced Engineering (New) SDB
- b. TSG/RED/D, PSG/RD/D
- c. A requirement exists to determine the theoretical resolution limits of dry silver film and its potential for reproducing future high resolution acquisition materials. During the R&D cycle of this material, resolution, which started at 1800 lines/mm, was

25X1

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

V. Reproduction

sacrificed in order to attain speed, stability, etc. This project will investigate the basic molecular interactions with the goal of determining theoretical limits and improving the resolution of dry-silver emulsions.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

VI. Mensuration

- 25X1
1.  Film Data Block Reader
    - a. Engineering Development (F.O.) SDB
    - b. IEG/PD/D
    - c. This is requested by NPIC to fulfill its mission of providing ephemeris data in case of telemetry failure. Fabricate a data block reader to handle the information from the latest operational acquisition system.
  
  2. Comparator Automatic Pointing System
    - a. Exploratory Development (F.O.) SDB
    - b. IEG/PD/D, COM/I
    - c. Coordinated with IEG/PD. Required to improve efficiency of the mensuration process. Continue the development of an automatic printing capability for mensuration instruments. This task was initiated in FY-70 and will require several years research. Successful development would provide a fast and accurate means of pointing at objects to be measured.
  
  3. Mensuration Equipment Design Improvement Study
    - a. Exploratory Development (F.O.) SDB
    - b. IEG/PD/I, TSG/RED/D
    - c. Coordinated with IEG/PD. Required for general improvement in the efficiency, accuracy and economy of the mensuration process. This program is a vehicle to fund several tasks each year in improving the subsystems of measuring equipment. It is also used to fund areas in which in-house studies require contractor support.
  
  4. Comparator Variable Density Reticle
    - a. Exploratory Development (F.O.) SDB
    - b. IEG/PD/D
    - c. Required to assist comparator (mensuration) operators in pointing the comparator reticle to the edges of images having low contrast and/or low tonal gradients.
  
  5. EOI Mensuration Study
    - a. Exploratory Development (New) SDB
    - b. TSG/RED/D, PPBS/I, IEG/PD/I

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

VI. Mensuration

c. A requirement exists within NPIC for information on methods of performing mensuration on video images. This will help determine the accuracy, limitations, and type of mensuration equipment which will be required for EOI.

6. HPSC Pointing Investigation

- a. Exploratory Development (New) SDB
- b. TSG/RED/D, IEG/PD/I
- c. Requirement is to improve pointing (for mensuration) on the HPSC. Investigate the feasibility of applying various pointing techniques to the HPSC. Determine if the techniques developed for the Calibration Device can be applied to mensuration. Also determine if correlation technique can be applied to pointing.

7. Micro D Applications to Mensuration

- a. Exploratory Development (New) SDB
- b. TSG/RED/D, IEG/PD/I, TSG/APSD/I
- c. A requirement exists for a more accurate and objective means of measuring small images. Perform tests to determine if Microdensitometer can be utilized in mensuration process. Determine the feasibility of combining the Micro-D and comparator techniques. Use initial work at RADC as a basis for further work.

8. UV/RPV Applications to Mensuration

- a. Exploratory Development (New) SDB
- b. TSG/RED/D, IEG/PD/I
- c. Hypothetical Requirement. Investigate the possibility of using a UV Rear Projection System in the mensuration process. Determine if the high resolution at the UV System screen provides a means of rapidly making measurements.

9. Manipulated Imagery Mensuration Analysis

- a. Exploratory Development (New) RSB
- b. TSG/RED/D, IEG/PD/I
- c. Required to determine the benefits or handicaps for mensuration of manipulated imagery and the practical extent of imagery manipulation for mensuration purposes.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

VI. Mensuration

10. Special Collection Systems Studies Support

- a. Advanced Development (F.O.) SRB
- b. NPIC/D, Collection Community/I
- c. Continuing requirement for presenting coordinated technical constraints related to NPIC operations as they influence collection system design and performance parameters.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

VII. T&E

1. Vibration Elimination Implementation

- a. Engineering Development (F.O.) SDB
- b. TSG/RED/D, NPIC/I
- c. Requirement is to minimize degrading effects of vibration in imagery exploitation equipment. Based on the information obtained in the Phase I tests, modify a representative piece of equipment to demonstrate the improvement.

2. Universal Comparator Calibration Device

- a. Engineering Development (New) SDB
- b. IEG/PD/D, TSG/ESD/D
- c. Requirement is to improve accuracy and efficiency of calibration of NPIC comparators at minimum cost. Fabricate a Universal Calibration Device based on techniques developed on an earlier contract. Device will be able to be used on  Comparators and other mensuration instruments with binocular viewing heads.

25X1

3. Two-Axis Calibration Grid

- a. Advanced Development (New) SDB
- b. TSG/ESD/D, COM/I
- c. Requirement is to improve accuracy and facility of calibration of NPIC comparators at minimum cost and in short time frame. Investigate the possibility of producing a two-axis calibration grid on low expansion material and thin enough to fit under objective lenses of modern day comparators. Grids must be calibrated by National Bureau of Standards.

4. Advanced Photometer

- a. Advanced Development (New) SDB
- b. TSG/ESD/D, COM/I
- c. Requirement is for a photometer of sufficient portability, accuracy, range and spectral sensitivity to perform typical and anticipated evaluations of illumination for various NPIC viewing devices and conditions. A need exists for a reliable instrument capable of measuring illumination levels up to 50,000 foot lamberts. This device must be rugged enough to endure shipping and use in field conditions.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

VII. T&E

5. Specialized Acceptance Test Equipment

- a. Engineering Development (New) SDB
- b. TSG/ESD/D
- c. Requirement is for special acceptance test devices to facilitate acceptance test evaluation procedures; such as, film tension, heat transfer, etc.

6. T&E Data Sheets

- a. Engineering Development (New) SDB
- b. TSG/ESD/D, TSG/RED/D
- c. Requirement is to improve, standardize and coordinate the statement and coverage of performance specifications in R&D contracts. When Development Objectives and Technical Specifications are prepared, specifications are often written without real knowledge of the capability of ESD to determine and measure these parameters. This project would help determine and produce the boiler plate sheets to be incorporated in the contract. These data sheets would describe the equipment to be used during a particular measurement and the accuracies desired.

7. Viewing System Efficiency Measurement

- a. Exploratory Development (New) SDB
- b. TSG/ESD/D, TSG/RED/D
- c. Requirement is more specific and comprehensive test regimens for defining and evaluating the performance of imagery exploitation optical systems; such as, viewers, and enlargers. Investigate the various parameters which influence the efficiency of a viewing system (Ex: MTF-OTF, color, aberrations, flair, etc.). Determine if a device or set of tests can be fabricated to determine the efficiency of optical systems.

8. Optical Equipment MTF Analyzer

- a. Engineering Development (F.O.) SDB
- b. TSG/ESD/D, TSG/RED/D
- c. The requirement exists for a superior means of measuring optical quality on the millions of dollars worth of optical equipment purchased and developed by NPIC. Phase II of the MTF Analyzer program will provide a finished MTF Analyzer, based on a technique proven in Phase I, which will measure the MTF of complete optical systems in an operational environment.

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

VIII. EOI

1. Primary & Collateral EOI Imagery Displays
  - a. Engineering Development (New) SRB
  - b. NPIC/D
  - c. There is a requirement to modify (or fabricate) an inexpensive light table or projection viewer for viewing new EOI imagery and comparing it with collateral target imagery. Specifications will depend upon the FY-71 format study.
2. EOI Reporting System Study
  - a. Advanced Development (New) SRB
  - b. NPIC/D
  - c. There is a requirement to examine the various alternatives available for real-time reporting of the Initial EOI Scan results and to perform a trade-off study of each to determine the most efficient method (also valid for Plan B).
3. EOI Map Display System
  - a. Advanced Development (New) SRB
  - b. NPIC/D
  - c. This requirement is to perform a preliminary design study of a system to display a 1:200,000 series map to the PI performing Initial EOI Scan (and possible Immediate Intelligence). The display would indicate, automatically, the ground coverage of the image currently being exploited.
4. EOI Primary and Collateral Imagery Video Display
  - a. Advanced Development (F.O.) SRB
  - b. NPIC/D
  - c. The follow-on requirement would be a preliminary design of a video display system for viewing both the primary (new) EOI imagery and for displaying collateral (old) EOI images of the same target for comparison purposes. It is dependent upon the results of the current video feasibility study.
5. EOI Collateral Materials Display
  - a. Advanced Development (New) SRB
  - b. NPIC/D
  - c. This requirement is for a preliminary design study of a system to display non-computerized collateral materials to the EOI PI in a very rapid fashion. It would display PI keys, ground photos,

NPIC/TSG/RED  
FY-72 Preliminary R&D Project List

VIII. EOI

and other materials currently contained in the target pocket. The system might be used for target study prior to acquisition or it might be used while he is interpreting his new image (or both).

6. EOI Segmented Imagery Impact Study

- a. Exploratory Development (New) SRB
- b. NPIC/D
- c. A study is required to determine the effects and potential problems of exploiting EOI imagery which portrays a target in four segmented (non-contiguous) pieces. It would examine such areas as stereo viewing, mensuration, target obscuration, target location, etc. on such segmented imagery.

7. EOI PI Station Simulation

- a. Exploratory Development (New) SRB
- b. NPIC/D
- c. This requirement is for a pre-design physical simulation and analysis of a Plan A PI station for the EOI Initial Scan function. It would include actual equipment and/or mock-ups to study the function of the primary image viewing, collateral image viewing, map handling & viewing, mensuration, data base access, and reporting: It should result in an optimum layout and a more precise definition of equipment which will be required.

FY-72 Preliminary Project Listings  
 NPIC/TSG/RED

22 June 1971

<u>Recon. Sys. Br.</u>	<u>Advan. Tech. Br.</u>	<u>Sys. Res. Br.</u>	<u>Sys. Dev. Br.</u>
V - 19	I - 1 (HFS)	II - 1	II - 4
VI--9	I - 2 (HFS)	II - 2	II - 5
	I - 3 (HFS)	II - 3	II - 6
	I - 4 (HFS)	IV - 1	II - 7
	I - 5 (HFS)	IV - 2	II - 8
	I - 6 (HFS)	IV - 4	II - 9
	I - 7 (HFS)	IV - 8	II - 10
	I - 8 (HFS)	IV - 12	II - 11
	I - 9 (HFS)	IV - 13	II - 12
	I - 10 (HFS)	IV - 14	IV - 3
	I - 11 (HFS)	IV - 15	IV - 5
	I - 12 (HFS)	IV - 16	IV - 6
	I - 13 (HFS)	IV - 17	IV - 7
	I - 14 (HFS)	IV - 31	IV - 9
	I - 15 (HFS)	VI - 10	IV - 10
	I - 16 (HFS)	VIII - 1	IV - 11
	III - 1 (EDL)	VIII - 2	IV - 18
	III - 2 (ITL)	VIII - 3	IV - 19
	III - 3 (ITL)	VIII - 4	IV - 20
	III - 4 (EDL)	VIII - 5	IV - 21
	III - 5 (ITL)	VIII - 6	IV - 22
	III - 6 (ITL)	VIII - 7	IV - 23
	III - 7 (ITL)		IV - 24
	III - 8 (EDL)		IV - 25
	III - 9 (ITL)		IV - 26
	III - 10 (ITL)		IV - 27
	III - 11 (ITL)		IV - 28
	III - 12 (EDL)		IV - 29
	IV - 30 (EDL)		IV - 32
	V - 11 (EDL)		IV - 33
	V - 12 (EDL)		V - 1
	V - 13 (EDL)		V - 2
	V - 14 (EDL)		V - 3
	V - 15 (EDL)		V - 4
	V - 16 (EDL)		V - 5
	V - 17 (EDL)		V - 6
	V - 18 (EDL)		V - 7
			V - 8
			V - 9
			V - 10
			V - 20
			VI - 1
			VI - 2
			VI - 3
			VI - 4
			VI - 5
			VI - 6
			VI - 7

NPIC/TSG/RED

21 June 1971

FY-72 Preliminary R&D Project List Tabulation

Interest expressed by Components: D = Direct, I = Indirect. IEG Priorities A - G

Category	IEG	PSG/RD	PSG/R&RD	PSG/AID	TSG/APSD	TSG/ESD	IAS
I - 1	B						
I - 2	D						I
I - 3	C				D	D	I
I - 4	B				D		I
I - 5	B				D		I
I - 6	C						I
I - 7	B						I
I - 8	C				D		
I - 9	C				D	D	
I - 10	B						I
I - 11	G						I
I - 12	B						I
I - 13						D	I
I - 14	C				D		
I - 15	E				D		
I - 16	B					I	I
II - 1	C	D					
II - 2	E				D		
II - 3	C						
II - 4	E						I
II - 5	B						
II - 6	C						
II - 7	D						
II - 8	F						

<u>Category</u>	IEG	PSG/RD	PSG/R&RD	PSG/AID	TSG/APSD	TSG/ESD	IAS
II - 9	B						
II - 10							
II - 11							
II - 12	E				I		I
III - 1	C	D			D		
III - 2	E				D		
III - 3	F				D	D	
III - 4	E	D			D	D	
III - 5	B				D		
III - 6	C				D		I
III - 7	C				D		I
III - 8	C				D		I
III - 9	C				D		I
III - 10	B				D		I
III - 11	C				I	D	
III - 12	F	D					
IV - 1	C						
IV - 2	C						
IV - 3	F						
IV - 4	B				I		D
IV - 5	B						
IV - 6	C						
IV - 7	D						I
IV - 8	C						
IV - 9	B						

NPIC/TSG/RED

FY-72 Preliminary (Cont'd)

<u>Category</u>	IEG	PSG/RD	PSG/R&RD	PSG/AID	TSG/APSD	TSG/ESD	IAS
IV - 10	B						
IV - 11	C						
IV - 12	B						
IV - 13							
IV - 14					I		
IV - 15	E						
IV - 16	C						I
IV - 17	E				I		
IV - 18							
IV - 19	B						
IV - 20					I	I	
IV - 21	B						
IV - 22	B						I
IV - 23	B				I		
IV - 24	C						
IV - 25	D						
IV - 26	B						
IV - 27	F						D
IV - 28	C						I
IV - 29	B						
IV - 30	C				I	I	
IV - 31	F						
IV - 32	WE						
IV - 33	E						
IV - 34							
IV - 35							

Category	IEG	PSG/RD	PSG/R&RD	PSG/AID	TSG/APSD	TSG/ESD	IAS
V - 1	B				I		D
V - 2	C	D			I		I
V - 3	B	D			I		I
V - 4	B				I		D
V - 5	F						D
V - 6	B						I
V - 7					I		
V - 8		?					D
V - 9		?					
V - 10						D	
V - 11							
V - 12					D	D	
V - 13							
V - 14					D		
V - 15	C	D			D		
V - 16	B						
V - 17		?					
V - 18						D	
V - 19	C						
V - 20					I	I	
V - 21							
VI - 1	E						
VI - 2	C				I	I	I
VI - 3	B						
VI - 4	C						I

NPIC/TSG/RED

FY-72 Preliminary (Cont'd)

Category	IEG	PSG/RD	PSG/R&RD	PSG/AID	TSG/APSD	TSG/ESD	IAS
VI - 5	B				D		D
VI - 6	C					I	
VI - 7	C				D		I
VI - 8	D						
VI - 9	F				D		
VI - 10	F				D		
VII - 1	B					D	I
VII - 2	C					D	I
VII - 3	E					D	I
VII - 4						D	
VII - 5						D	
VII - 6						D	
VII - 7						D	
VII - 8					I	D	
VIII - 1	E						D
VIII - 2	B						
VIII - 3	C						
VIII - 4	E						
VIII - 5	C						I
VIII - 6	F				I		
VIII - 7	G						