D R A F T:cgw/[redacted] 25X1
7 April 1971

I. Imagery Interpretation Research

1. RPV Screen Evaluation

a. Engineering Development (F.O.) ATB/HFS

b. RED/D, IEG/I, COM/I

c. This effort is required to provide the capability for timely, 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, 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. RED/D, APSD/D, IEG/I, COM/I

c. This effort is required to produce test imagery to be used in evaluation: (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. RED/D, APSD/I, IEG/I, COM/I

I. Imagery Interpretation Research

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 the intelligence extraction process.

5. Photographic Emulsion Intelligence Value Study

a. Engineering Development (New) ATB/HFS

b. RED/D, 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.

6. Imagery Interpretation Research SOA Review

a. Engineering Development (F.O.) ATB/HFS

b. RED/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.

I. Imagery Interpretation Research

7. Advanced PI Equipment Design Study

a. Advanced Development (F.O.) ATB/HFS

b. 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 exploitation of imagery. Improvements of these concept are approaching their practical limits. This effort is required to establish new design concepts for exploitation equipment which are based directly on NPIC operations.

8. In-House Psychophysics Research Support

a. Advanced Development (F.O.) ATB/HFS

b. RED/D, IEG/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, advanced stereo rhomboids, and Imagery Interpretation Research Program Review.

9. Experimental Design Support

a. Engineering Development (New) ATB/HFS

b. RED/D, NPIC/I, COM/I

c. This task is needed in order to provide, professional support in the design of experiments being performed at NPIC to evaluate the

I. Imagery Interpretation Research

performance of new techniques, procedures, materials and equipment. This support will assure that experiment design, data collection and analysis will provide reliable results.

10. Operational Personnel Test Program

a. Engineering Development (New) ATB/HFS

b. IEG/D, TSG/I, COM/I

c. The growing complexity of imagery characteristics and readout 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, 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.

I. Imagery Interpretation Research

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.

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.

15. Color Imagery Intelligence Value Study

a. Engineering Development (F.O.) ATB/HFS

b. TSG/RED/D, PPBS/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.

D R A F T: cgw [redacted] 25X1
23 April 1971

II. Imagery Information Technology

1. Automated Page Composition Device

a. Engineering Development (F.O.) SRB

b. PSG/D, COM/I

c. This device would result in an operational system for composing report pages before they are printed. It would greatly alleviate the current manual method of composing page by "cutting and pasting" printed material.

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

II. Imagery Information Technology

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. This project was proposed by an independent consultant (Mr. [redacted] formerly with [redacted] 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 representatives of [redacted]

25X1 25X1 25X1 25X1

5. First Phase Verbal Reporting Study

a. Exploratory Development (New) SDB

b. IEG/D, IAS (?)

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

IEG/I

II. Imagery Information Technology

c. Hypothetical Requirement. 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. Hypothetical Requirement. Develop a system of checking out cans of film so that its location is known at all times. Use badges, IBM cards, or credit type cards to check cans in and out.

8. Frame/Target Locator Device

a. Engineering Development (New) SDB

b. IEG/I, IAS/I, COM/I

c. Hypothetical Requirement. 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 it 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

c. Hypothetical Requirement. Develop a system that would question a PI on what he sees at a selected site, record his answer, provide a means of composing a verbal report. It will also give a PI an opportunity to recall back editions of tape to use for com-

II. Imagery Information Technology

10. Fold Machine for PI Reports

a. Engineering Development (New) SDB

b. PSG/RD/D

c. Hypothetical Requirement. Investigate the types of folding machines that are available off-the-shelf. Modify a multiple fold machine to aid in NPIC report production cycle.

11. Pre-Drafting Machine--Line Drawing

a. Engineering Development (New) SDB

b. PSG/RD/D

c. Hypothetical Requirement. Investigate the types of pre-drafting machines in use in the mapping and drafting industry. Modify off-the-shelf equipment to take over some of the tedious tasks in graphic work such as a zip-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 complement or cancel the building vibration.

D R A F T: cgw [redacted] 25X1
26 April 1971

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. This will enable APSD to specify image quality of any imagery in terms directly related to its information content.

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 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.

III. Image Analysis & Manipulation

4. Non-Conventional Imagery Quality Measures

a. Exploratory Development (New) ATB/ITL

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.

5. OPS Image Quality Measurement System

a. Advanced Development (F.O.) ATB/ITL

b. TSG/APSD/D, TSG/RED/D, COM/I

c. Requirement for improved, more efficient image evaluation procedures for APSD function. This project will continue the Optical Power Spectrum (OPS) development and specify quantitatively 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 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

III. Image Analysis & Manipulation

c. This project is concerned with the improvement of degraded operational imagery through OIM techniques. 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.

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. The requirements for DIM is based on the need for a means to glean as much information as possible from imagery of certain targets and/or in critical situations. DIM is a system for increasing the visually perceptible information in degraded imagery.

8. Chemical Image Manipulation

a. Exploratory Development (F.O.) ATB/EDL

b. TSG/RED/D, IEG/D, TSG/APSD/D

c. The project will extend the 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, and methods necessary to implement this technique will be developed.

9. Hybrid-Automated Image Manipulation System

a. Exploratory Development (New) ATB/ITL

III. Image Analysis & Manipulation

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, 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 imagery. It will evaluate the advantages of operating on digital signals and EOI photographic images. It will define the system necessary to provide APSD with the capability to improve degraded EOI 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 a source of technical expertise on a quick reaction basis when unexpected problems arise.

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.

D R A F T: cgw [redacted] 25X1
3 May 1971

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 Rescan Device

a. Exploratory Development

b. TSG/RED/D, IEG/I, COM/I

c. Investigate the possibility of developing a system which can memorize the information at a site and then recognize this and compare it on other imagery.

IV. Image Interpretation Instruments & Techniques

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 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.

IV. Image Interpretation Instruments & Techniques

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. A full re-design of the ASS-but utilizing the optical design developed for the High Precision Stereo Comparator. The design would also be accompanied by a firm fixed-price proposal for a follow-on fabrication of a prototype.

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 system.

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 B&L 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

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 [redacted]-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 see the full width of the [redacted] (but with only about 3X magnification).

25X1

25X1

IV. Image Interpretation Instruments & Techniques

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 25X1 [redacted] (or near) his work station. The follow-on would be the actual implementation of the appropriate hardware and software required for operational use.

14. Photo/Radar Comparison Viewer

a. Advanced Development (New) SRB

b. TSG/RED/D, IEG/I

c. Requirement is to assist radar imagery information 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

IV. Image Interpretation Instruments & Techniques

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. Would replace the target pocket.

17. Auto-Focus System

a. Advanced Development (New) SDB

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.

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

IV. Image Interpretation Instruments & Techniques

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 a 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.

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

25X1 c. Have [redacted] 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

IV. Image Interpretation Instruments & Techniques

c. Perform an investigation similar to the one [redacted] 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. 25X1

26. UV Projection Light Table

a. Exploratory Development (New) SDB

b. TSG/RED/D, IEG/I

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 slopping 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.

IV. Image Interpretation Instruments & Techniques

28. Scanning Light Source RPV

a. Engineering Development (New) SDB

b. TSG/RED/D, IEG/I

c. If the FY-71 Scanning Light Source Investigation proves successful, the results can be used to fabricate an engineering model of a rear projection system. This engineering model can be used to demonstrate this technique with conventional and UV light sources.

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 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.

IV. Image Interpretation Instruments & Techniques

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.

D R A F T: cgw [redacted] 25X1
28 April 1971

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.

3. Compact, High-Speed, 9½" 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 Reprographics Division to efficiently utilize dry-silver photo reproduction materials.

V. Reproduction

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.

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

V. Reproduction

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.

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. Color Light Source for Niagara Printer

a. Engineering Development (New) SDB

b. PSG/RD/D, COM/I

c. Requirement is for color printing capability on the standard Niagara Printer. Modify an existing PSG Niagara Printer with a new light source. This will provide a capability of printing conventional color material and the new dry silver material.

11. 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.

V. Reproduction

12. 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.

13. 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.

14. 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 unconventional photographic systems which are in their early stages of research. The purpose would be to identify these 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.

V. Reproduction

15. 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 [redacted] 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

16. Cloupeaux 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. It's principle involves contrast enhancement through multiple-pass printing; it poses no threat of damage to the ON. Under the Photoscience Support Program, [redacted] 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

17. Photo Products Pollution Control

a. Exploratory Development (New) ATB/EDL

V. Reproduction

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 techniques to use to reduce or eliminate photo-chemicals and other chemicals from polluting the water effluent coming from [redacted] The recommended program should: 25X1

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

2. Provided recommended equipment and procedures for treating and removing all toxic chemistry from the waste water leaving [redacted] 25X1

18. 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.

19. 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 100' x 6.5" to support CIM, OIM and DIM research, it is necessary to build a

V. Reproduction

new processing tank to couple to present sensitometric processor to handle larger film size.

20. 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.

D R A F T: cgw [redacted] 25X1
26 April 1971

VI. Mensuration

1. 9-System Film Data Block Reader

a. Engineering Development (F.O.) SDB

b. IEG/PD/D

c. Fabricate a data block reader to handle the information from the latest operational acquisition system. This will enable NPIC to fulfill its mission of providing ephemerial data in case of telemetry failure.

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

VI. Mensuration

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

c. A requirement exists within NPIC for information on methods of doing 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 printing 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.

VI. Mensuration

7. Micro D Applications to Mensuration

a. Exploratory Development (New) SDB

b. TSG/RED/D, IEG/PD/I

c. Hypothetical Requirement. 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.

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

VI. Mensuration

constraints related to NPIC operations as they influence collection system design and performance parameters.

D R A F T: cgw/[redacted] 25X1
26 April 1971

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 [redacted] and other 25X1
mensuration instruments with binocular viewing heads.

3. Two-Axis Calibration Grid

a. Advanced Development (New) SDB

b. IEG/PD/D, COM/I, TSG/ESD/D

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.

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.

VII. T&E

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.

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