

STAT

Approved For Release 2005/06/23 : CIA-RDP78B04770A002700040016-3

STAT

5 October 1965

Rome Air Development Center
Griffiss Air Force Base
Rome, New York

Attention:

Subject: DSE Proposal Number 130-1-65
Image Enhancing Flying Spot Microscope

Gentlemen:

In order to explore some of the "Development Alternatives," page 10-1 of Data Systems Engineering's Proposal Number 130-1-65, a parametric study of bandwidth, resolution, frame rate, etc., was made.

The three enclosed graphs summarize our calculations, indicating a best compromise design, based on a flicker-free frame rate of 20 frames per second as the independent variable.

Figure 1 shows the feasible operating region of a flying spot scanner, using a very short persistence P16 Pan Aura tube -- of which we have a sample. The upper limit seems to be a 1000 line system with a bandwidth of 20 mc/second -- imposed by phosphor decay time (.12 microseconds). A two-inch tube permits a one-inch raster at 1000 lines/inch with electronic raster shrink (zoom) down to 0.1 inch or 10,000 lines/inch. This is possible only with a grainless, high resolution screen such as Pan Aura's. Any further raster shrinkage (electronic zoom) would far exceed any advertised phosphor resolution and would also reduce area coverage below useful limits.

Figure 2 shows resolution at the film plane versus coverage at the film plane with a combine electronic (10:1) and optical (3:1) zoom over the total continuous range of 30:1. Coverage extends from a 1.2 inch square down to a 0.04 inch square at the film. A fine focus adjustment will be provided for the optical zoom, but none is required for electronic zoom -- its major advantage. With minimum coverage, resolution reaches a maximum of 1000 lines/mm at the film -- limited by the optics.

Declass Review by NGA.

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Page 2

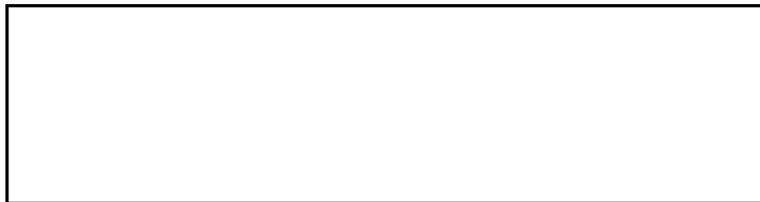
Figure 3 shows overall magnification of the system versus coverage at the film for three sizes of display tubes. Although the resolution requirements of the display tube are not as stringent as for the scanner tube, the improved contrast of a Pan Aura display tube might warrant its use. Notwithstanding the size or type of display tube used, the screen would be filled with the 1000 line picture regardless of the area covered at the film.

We believe that the combined electronic and optical zoom arrangement represents a considerable operational convenience over the originally proposed design. The 1000 line system at 20 mc/second appears to be the best compromise between proven feasibility and challenge to the designer -- with useful image enhancement still being the primary target of the development.

Enclosed is an extra copy of our proposal.

Sincerely,

STAT



Manager, Research and Development
Data Systems Engineering

Enclosures (7)

- Figure 1 (two copies)
- Figure 2 (two copies)
- Figure 3 (two copies)
- DSE Proposal No. 130-1-65 (one copy)

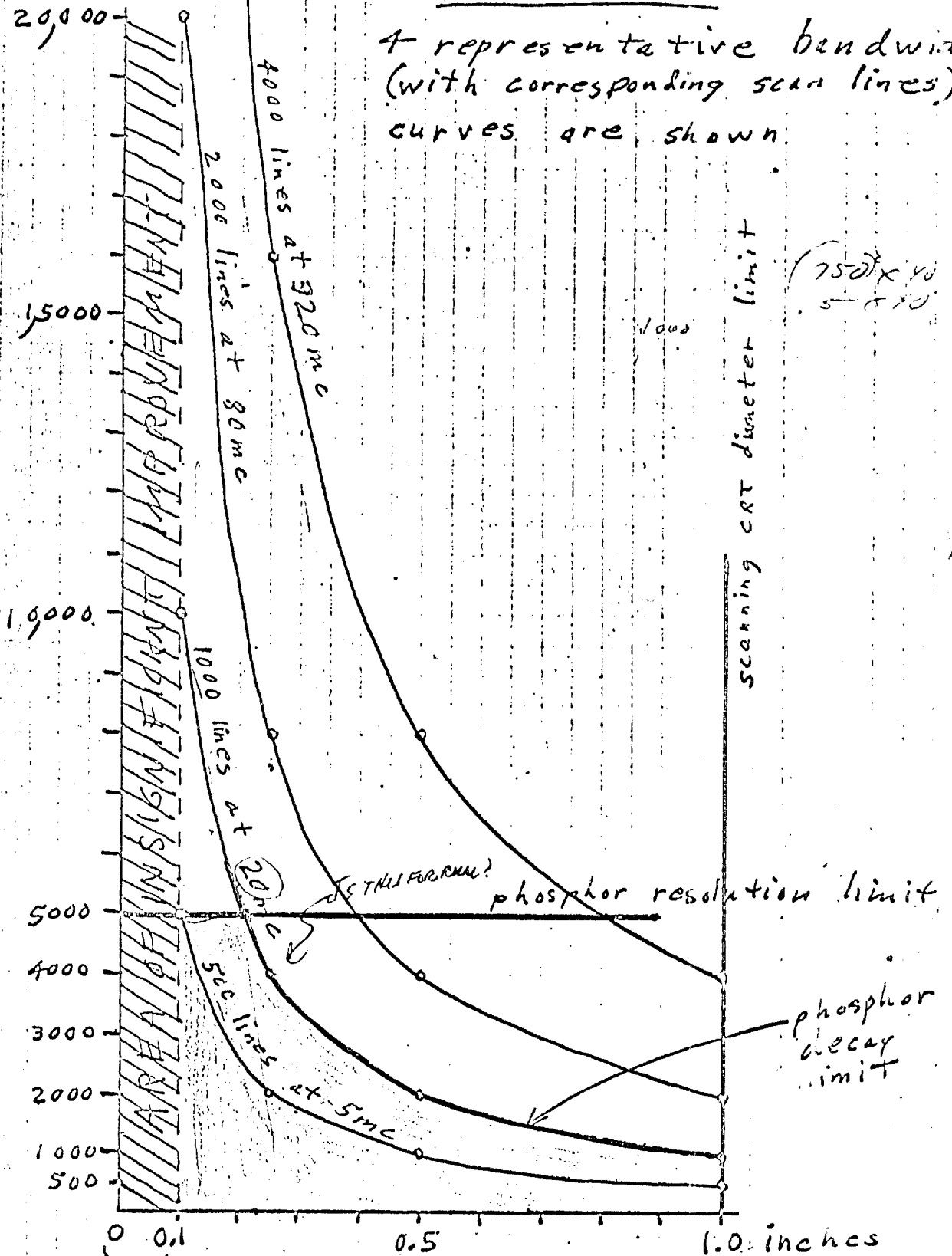
DRC/cet

Flying spot microscope

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Performance vs Bandwidth for 20 frames/second

4 representative bandwidths
(with corresponding scan lines)
curves are shown.



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COVERAGES TOO SMALL

← electronic zoom range →

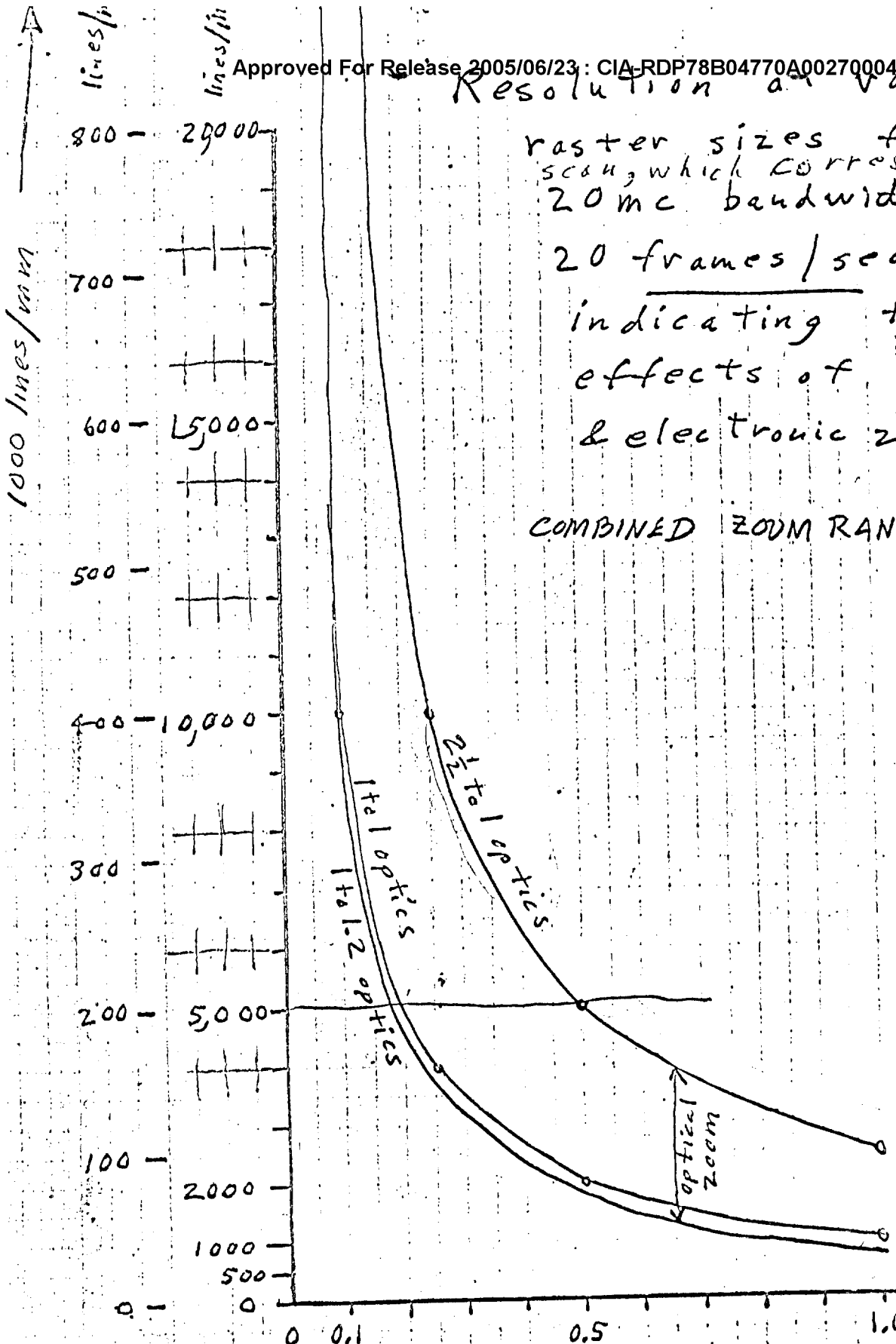
scanning tube

Resolution at various

raster sizes for 1000 lines
 scan, which corresponds to
 20mc bandwidth at
 20 frames/second

indicating the
 effects of optical (3:1)
 & electronic zoom (10:1)

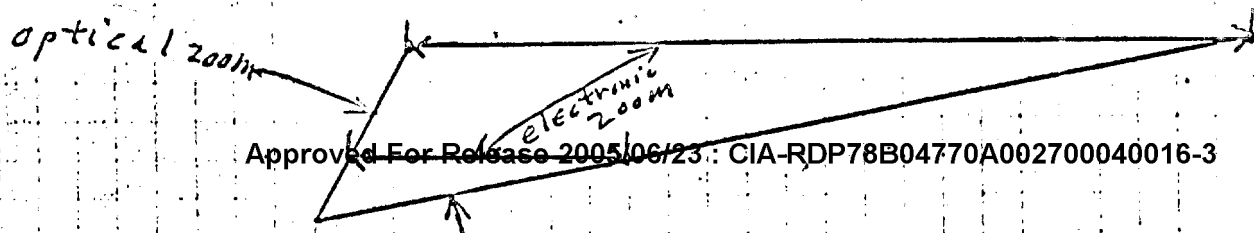
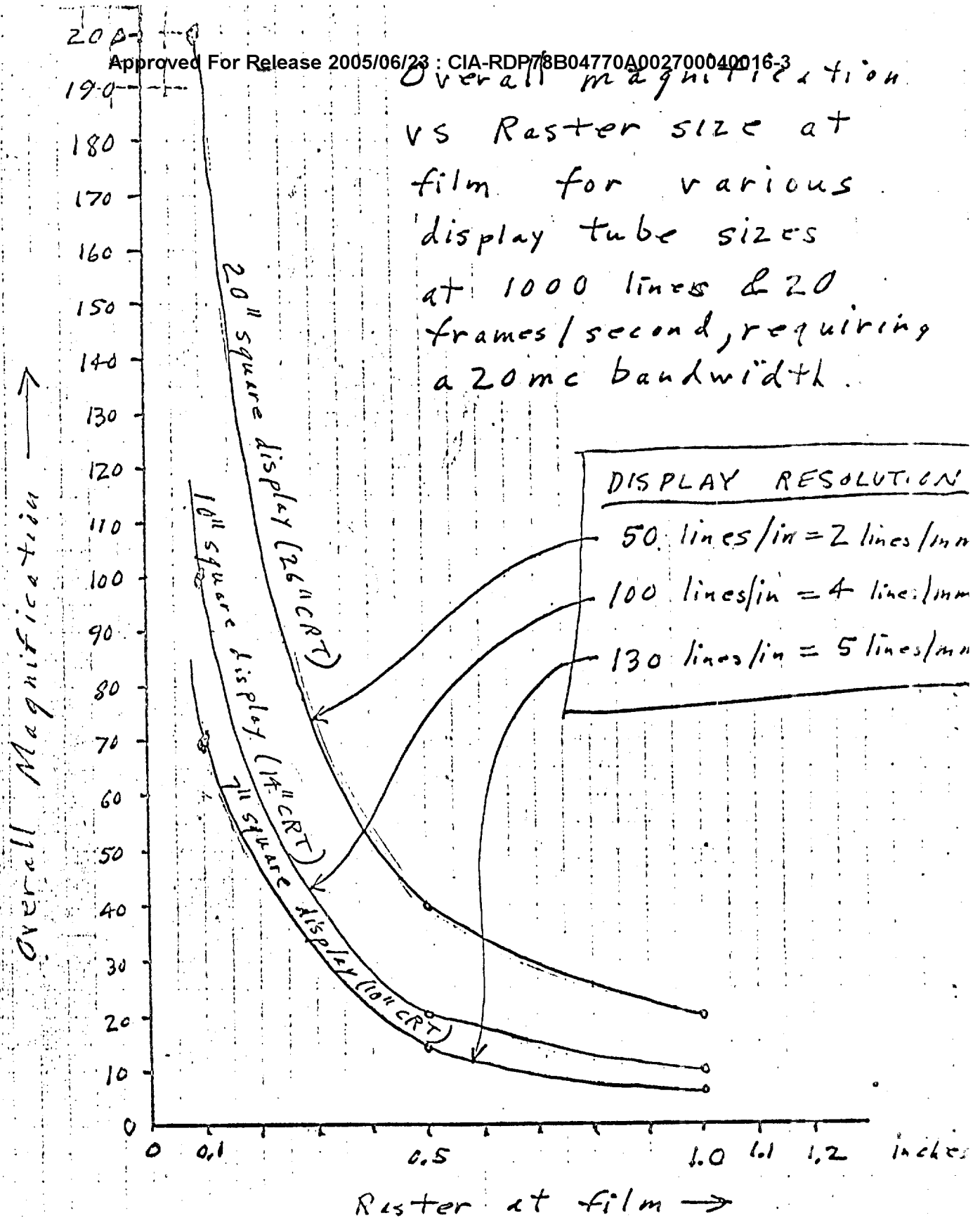
COMBINED ZOOM RANGE = 30:1



to 1.2 mag. →
to 1 mag. →

1.0 inches raster at scanning tube face
1.2 inches raster coverage at film (edge of square)

Overall magnification
vs Raster size at
film for various
display tube sizes
at 1000 lines & 20
frames/second, requiring
a 20mc bandwidth.



RESEARCH AND DEVELOPMENT MANAGEMENT REPORT				F-66-1-6274	
				REPORT CONTROL SYMBOL AF-R16	
1. TITLE Reconnaissance Interpretation (PR I-6-4711)				2. PROJECT NO. 6244	
				3. OSD PROGRAM ELEMENT NO. 62405454	
4. PROJECT OFFICE RADC (EMIRC)		5. MANAGEMENT ORGANIZATION RTD		6. RESPONSIBLE COMMAND AFSC	
7. TYPE OF REPORT				8. DATE PREPARED	
STATUS	SPECIAL	ACTION	<input checked="" type="checkbox"/> OTHER	Request for D&F	
9. NARRATIVE				30 September 1965	
<p>This management report is submitted to obtain AF approval for procurement of the portion of program element 62405454, Project 6244 (Purchase Request I-6-4711) described below.</p> <p>1. This effort will cover Exploratory Development for Viewing Devices for Photointerpretation and is specifically directed toward a very high resolution flying spot microscope viewing device for detailed analysis of aerial reconnaissance imagery. This device will permit detailed microscope scanning and electronic display as well as direct viewing by the operator. Provision shall be made for positioning a selected area of the image area in the microscope viewing aperture, and for variable zoom magnification of the final display. Resolution capabilities shall be optically rather than electronically limited. Development in this area will significantly add to the state-of-the-art of high resolution electronic scanning and display of aerial reconnaissance imagery.</p> <p>a. This part of the program will provide a significantly improved capability for detailed analysis of high resolution aerial reconnaissance imagery, and is integrally related to the reconnaissance interpretation investigation being conducted under Projects 6244 and 665A.</p> <p>b. The end result of this effort will be an experimental viewing device for in-house investigation of photo-interpretation equipment concepts and interpretation techniques. This procurement will produce quantitative data relating high resolution electronic scanning techniques, with photo-interpretation analyses for varied scale aerial reconnaissance imagery, in conjunction with data derived from comparable experiments with other interpretation equipment.</p> <p>c. The overall result of this work will provide engineering data for the design of reconnaissance oriented high resolution electronic scan and presentation devices including remote multi-station display and long-range transmission techniques. In addition, advanced photo-interpretation concepts for exploitation of small scale aerial reconnaissance imagery, using video scan procedures, will be developed and reported.</p> <p>d. The current level of technology which supports the feasibility of this program is as follows. An electronically generated image generally results in considerable degradation of the source record and</p>					

low effective resolution at the display screen, when compared to optical or direct visual modes of display. Video scan techniques of limited resolution capability have been developed for a variety of reconnaissance ground data handling projects.

The principal design problems of effective scanning lines for various raster sizes, the frequency response of system components with the attendant ability to handle large data rates, and basic electronic noise interference have each been investigated in a variety of photo interpretation equipments employing electronic scanning procedures (Contracts AF 30(602)-3060, 3245, 3451, 3514). Recent developments with transparent phosphors appear to yield significantly higher scanning resolutions than previously possible with the shortest persistent silvered phosphors. State-of-the-art thin film techniques now make possible the fabrication of screen materials whose unique transparent properties permit an effective screen trace as fine as the electron beam. The use of such cathode ray tube screen materials, in conjunction with advanced video signal and transmission techniques, makes it feasible to discuss electronic scanning procedures which would result in an optically limited system. It is the intent of this procurement to investigate the application of the feasibility for the reconnaissance image interpretation transmission and display problem, making maximum use of the inherent signal processing flexibility and the potential of high resolution electronic techniques for rapid (real-time) scanning, variable range data transmission, signal manipulation and multi-format/multi-station display.

e. This work has been coordinated with the Inter-Service Coordinating and Integrating Group (ISCIG) for Tactical Air Reconnaissance and Aerial Battlefield Surveillance. It is also closely related to Project 698DB (Reconnaissance Exploitation). In addition, the planned procurement parallels a similar project within the reconnaissance equipment program of the Naval Reconnaissance and Technical Support Center; close coordination and exchange of information is to be maintained between respective Naval and Air Force Representatives to ensure complement development in the mutual photo transmission and photo interpretation research areas. STAT

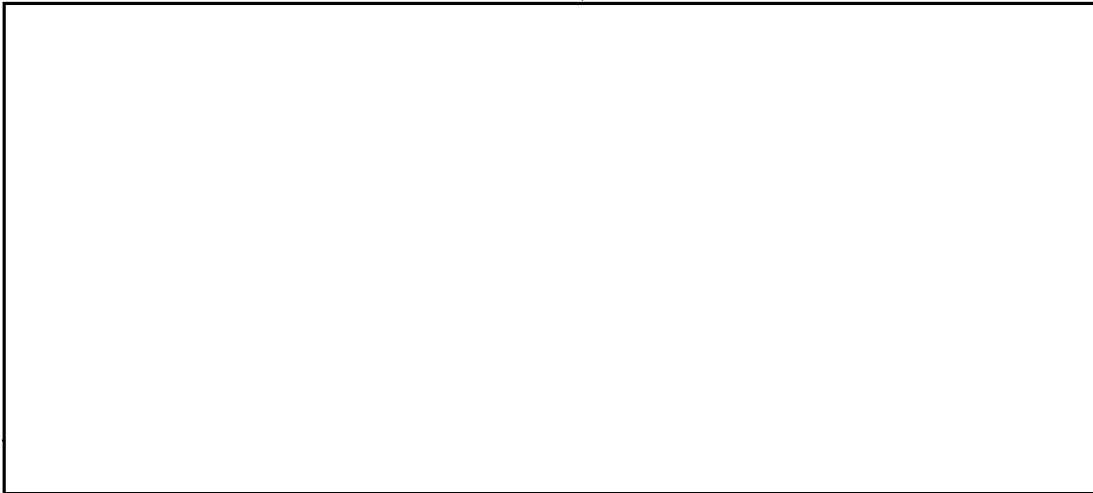
3. The purchase request number is I-6-4711; the citation of funds is 57X3600 2854702 P676244 62405454 S503901; the Project Number is 6244; the Task Number is 624412; the Program Element Code is 62405454; the date of the latest DD Form 1498 is 1 March 1965.

4. It is desired that a contract for this effort be awarded by 1 January 1966. Initially it was estimated that the proposed procurement

P-66-1-6244

would be less than Competitive solicitation was effected on this basis and proposals received exceeded the initial estimate. Hence, the desired contract award date appears to be realistic based upon receipt of proposals. STAT

5. At present the following sources are being considered for this procurement:



PROVED:

Chief, Interp & Analysis Section
Recon Intel Data Handling Branch

APPROVED:



Chief, Intel & Info Processing Div

APPROVED:

Trade off between bandwidth, flicker rate,
and resolution.

Bob suggests interlace system - should double
these figures.

Also other "TV" techniques

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Date - 18 February 1966

Place - OCCG - Pictorial & Audio Visual Branch
Army Signal Corps.

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Unmanned demonstration of Video Disk Recorder (M.V.R. Corp) Model VDR 210 CF. Two of these devices were delivered to ASC. Recordings were made from live T.V. programs. For ~~so~~ second replay or single stop frame play back. The ~~same~~ replay appeared to be of the same quality as the ~~live~~ broadcast. Single frame motion appeared to be degraded due to lack of integration which occurs during a sequence of frames (similar to stop motion movie projection imagery).

Since the read head does not come into contact with the metallic disc, there is no degradation of the play back over an ^{extended} period of time. Tests of up to 1000 hours have been made - no degradation observed.

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TO	INITIALS	DATE	REMARKS
DIR			
DEP/DIR			
EXEC/DIR			
TECH ADV			
ASST FOR ADMIN			
CH/SS			
CH/MSS			
ASST FOR OPS			
ASST FOR PA			
ASST FOR P&D	✓		
CH/CSD			
CH/IPD			
CH/PD			
CH/PSD			
CH/TID			
CH/CIA/PID			
CH/DIA/XX-4			
CH/DIA/AP-IP			
CH/SPAD			
LO/CGS/CIA			
LO/NSA			

DIS R.
FEB 1966



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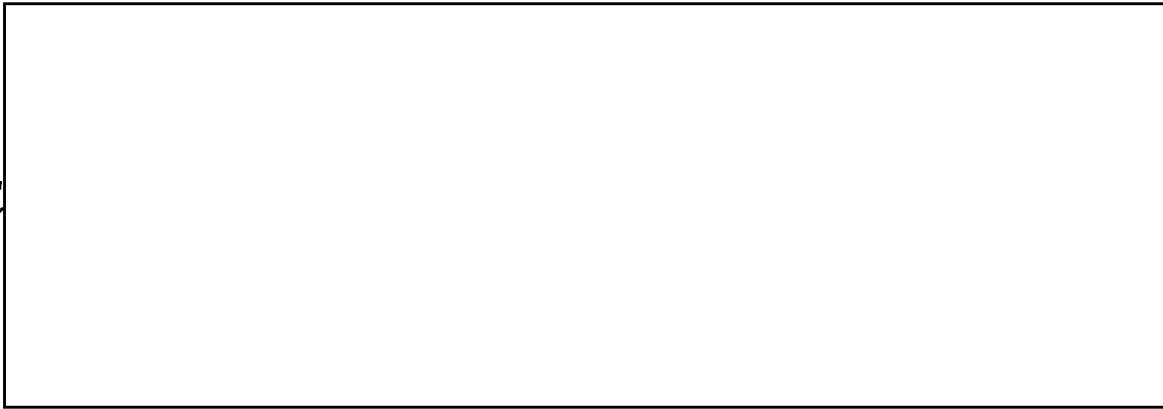
discuss with FP

14 February 66

Time: 11 February 1966 - 1300

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Place:



Attendees:

Discussion:

Discussion centered about the capabilities of [redacted] TV Tape Recorders, TR-22-D and stop motion capabilities.

It was verified that the TR-22-D would accept 525/60cps and 525, 625, 405/50cps or 525, 625, 819/50cps TV standard.

[redacted] recommended kineoscope equipment for quality photo hard copy reproduction. He indicated at least a 50% loss of resolution could be expected with Tape loops or disc storage equipment for stop motion techniques.

Delivery times for purchase equipment 3-4 mos

Recommended visit to USA facilities for foreign broadcast info. - 2nd floor Franklin P.O.

USA [redacted]

Work 2-2200

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MIL-O-13830 - OPTICAL SURFACE REQUIREMENTS

MIL-STD-701

MIL-STD-200

FED-STD-220

MIL-I-26600

ELECTRONIC SPECS

NOTES From [redacted] STAT

VIDIO TAPE RECORDING & REPRODUCTION STAT

NSA - NPIC Liaison - [redacted]

NSA [redacted] STAT
NSA [redacted] STAT

NSA - [redacted]
NSA - [redacted]

[redacted] VR-660 (Helical Scan)
Still frame mode [redacted] STAT

[redacted] - Vidio Disc Recorder STAT
MVR - 600 D
MVR - 1000 D
MVR - 1600 D

TV-Information Display Div. STAT
OC 9190 (Army)

Chief - [redacted]

[redacted] STAT produced

Several hard copy prints using MVR disc recorder which suspends action or stops motion - Some jitter.

5A1062
5B1066

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[Redacted]

Preparing proposal for high resolution / grey
scale Steps - Dev. costs [Redacted]

STAT
STAT

STAT

[Redacted] - Govt. Programs Marketing [Redacted]

STAT

[Redacted]

Have CRT with electrostatic read out, ~~for~~
cathode tube only no continuous tone
capability.

STAT

★

[Redacted]

2 page letter proposal for production of
2 1/4 x 3 1/4 hand copy from 2" std 525
line broadcast tape. [Redacted] - 120 day delivery

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Langley Office of T.V. Knowledge [Redacted]

[Redacted]

Recorder for non U.S. standard
broadcast.

T.V. Magnetic Tape Transducer

0930 [redacted] (cleared) STAT

STAT from [redacted] delivered brochure from Company. Will set up cleared contacts (some unclear) for discussion of technical details of magnetic tape readers.

STAT [redacted] will locate a cleared person or persons (check security) in main Calif. office to demonstrate equipment or talk state of the art