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6 Nov. 64*

October 16, 1964

Dear George:

Enclosed is a copy of the minutes taken during our meeting of 8 October.

Should you have any disagreement with these, would you please contact us within the next two weeks, since some of these items will appear in our monthly report.

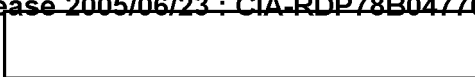
Very truly yours,



Associate Director,
Exploratory Development
Engineering

Enclosure

NGA Review Complete



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Q. B. M.

MINUTES OF MEETING

October 8-9, 1964

CONTACT DUPLICATING & RESEAU PRINTER

Afternoon Meetings

U. S. Government

[Redacted]

[Redacted]

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1. Presentation of artist's renderings of Printer No. 1

Colored Polaroid prints given to monitors at meeting. To be followed by 20"x24" colored prints and slides as soon as possible. Discussion of operational modes in conjunction with Industrial Design. Pointed out that pull-out drawer would light-seal dupe. film when fully extended (9'+). Illuminated viewing table will be optionally safe-lighted and bright-lighted. When extending drawer partially for frame location on Reseau, viewing table may be safe-lighted only. Reseau platen and clean platen may be easily interchanged with pull-out drawer extended. In automatic mode, Printer remains closed and from 1 to 10 prints of each negative frame are made without operator attention.

2. The DC motor, fluid clutch system was fully described with drawings by [Redacted] Description of tension regulation and film metering. System described provides uniform acceleration, no snapping or stress reversal of film. Tracking appears satisfactory in breadboard tests.

Tape-belt drive system was dropped even though promising since DC motor, fluid clutch system appears more advantageous. A list of proposed tests for film tension, contact pressure, and film transport characteristics were discussed. These tests will be implemented by [Redacted] on the M-H breadboard using portable scopes, recorders, and strain-gage equipment.

In preliminary tests of proposed drive system, tension was 6 in-lbs. maximum, and can be reduced by thinning oil in fluid clutch. Transport speed was 30 inches in 2 seconds. [Redacted] suggested relieved rollers to minimize film contact. [Redacted] proposes smoothest possible rollers, and possible use of air-bearing rollers.

3. Film metering of dupe. film to be accomplished by photoelectric counting of 1/4" increments using a narrow riding-roller with a perforated disc. Length of transport can be pre-set at control panel to advance sufficient dupe. film in accord with frame size.

Metering of negative film to be accomplished by photoelectric sensing of frame edge. Multiple photocells will discriminate between density difference at trailing edge of frame. Negative film will decelerate from transport speed (up to 100 ft/min) to positioning speed and coast to precise printing position. This applies to automatic mode only. A small percentage of missed frame edges due to low differential density will be tolerated.

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4. Air-bag operation was described. Inflates in 4 seconds, deflates in fraction of second. Intended pressure will be up to 4 psi with total pressure of roughly 1000 lbs. over full format. Air bag to be transparent polyethylene with continuous make-up air pressure. Photocells for A.E.C. to be within air-bag. Air bag does not retract -- deflates for clearance.

STAT 5. Reseau grid sample from [] was displayed and future step-wedge and exposure tests described. Preliminary tests were described and samples shown. Line spreading was discussed, and stipulation of 1.0 density for 12-15 micron line width was obtained from monitors.

Reseau platen thickness to be held to minimum necessary to prevent deflection under air-bag pressure. Metal binding frame will add strength. Excessive re-fraction may occur if glass is too thick.

6. RFI was discussed briefly and it was confirmed that design and fabrication to specifications would be sufficient without RFI test procedure.

STAT 7. Pre-View and Punch Station. Basic philosophy is to relegate precise fiducial location and alignment to off-line station. At the Printer, frame location should be quick, easy, and dark-room operable. No optical devices or tedious adjustment at Printer is desired. This rules out optical alignment at Printer and emphasizes quick manual location of punched holes over pins. Morton states that wear on punched holes is not a problem since frames will not be used more than 2-4 times. The problem of possible parallax and simultaneous focus of fiducial and single grid-line was mentioned since they lie in different planes. [] will concentrate on original punched-hole and raised-pin alignment techniques. Morton proposes possible punch format attachment directly to Pre-Viewer so that Viewer is moved to position on film rather than film moving to position under Viewer.

Use of limited number of punch formats for short, medium, and long frames was approved. Reduces number of punches and subsequent pins in Printer.

8. Controls, indicators, interlocks, and alarms were reviewed briefly. Negative film may be advanced and viewed in semi-auto. mode with pull-out drawer extended. Interlock will prevent advance when pins are extended.

9. Masking. Best location for mask appears to be under platen so as not to add thickness between films or under films. Masking in length is of primary importance to exclude light on dupe. film where not wanted. Masking does not necessarily have to be sharp. Must include coded information between frames.

It was pointed out that Reseau binding with pin-format would obscure all or most of near-border on film.

Any proposed punch formats will ultimately be reviewed by monitors to assure that coded information will not be punched out on near-border.

10. Presentation of latest approach to exposure control was made by [redacted] Multiple light source (120 G. E. 1385 bulbs) was proposed with 1:1 ratio of controlling photocells. Each lamp would be programmed in time according to amount of light transmitted to photocell through negative frame (and through platen, dupe. film, and air-bag)

Collimation of light sources will be controlled so as not to distort Reseau lines or overlap into areas which have already received sufficient exposure. However, some diffusion is desirable so as not to effect a pattern of lights on dupe. film. System delivers gross dodging in lateral as well as longitudinal direction of frame.

Monitors received system well, and approved of configuration and intent. Preliminary demonstration of system to be held on October 20th at [redacted] Circuitry may not be complete by then, but is being breadboarded at present.

Miscellaneous

A. Discussion was held with [redacted] on Design Analysis and future Design Plan. Monitor generally agrees to present content and presentation of Design Analysis. Agrees that Design Plan may follow same format as Design Analysis except that recommended method for each problem area will be described with layout drawings in support. Quantitative error analysis will be added to qualitative description now included.

After submission of Design Plan, [redacted] intends to spend day of review with [redacted] so that he may make best possible presentation of Plan to GIMRADA committee. Will be in conjunction with presentation of artist's renderings, technical objective display board, and drawings.

B. Confirmation of a change in specifications from S0-105 to S0-267 (Para. 3.11 of P.D.) was deferred.

C. Clarification of 5 micron tolerance in punching and final frame alignment was obtained from Morton to be ± 5 microns. [redacted] has some reservations and will investigate (Para. 3.4.3 of P.D.)

D. Reseau line print-out at 12-15 microns was clarified to be at 1.0 density rather than .2 to 3.2 as mentioned in (Para. 3.4.2)

E. Latest verbal commitments from meeting of September 22nd were reviewed with monitors.

F. A complete list of all verbal commitments and agreements pertaining to Purchase Description was given to monitors. It is [redacted] desire to have these agreements formally confirmed by Contracting Officers.

G. A list of requested samples and information was given to the technical monitors.

- RCZ:jbr
- Attachments
- List of verbal agreements
- List of requests from monitors
- List of proposed breadboard tests
- Agenda

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AGENDA

DESIGN REVIEW MEETING

October 8, 1964

CONTACT DUPLICATING & RESEAU PRINTER

1. Introduction Scope of meeting. Plans for submission of Design Analysis
 1. Industrial Design. General configuration and operation
 2. Drive Systems and Film transport
 3. Reseau Grid-Sources of supply. Samples of Reseau lines. Test results and tests planned.
 4. RFI design. List of approved components. Technical information and literature submitted to
 5. Film metering by photoelectric counting of increments. Frame sensing by photo-electric detection of frame edge. Test results.
 6. Contact pressure by inflatable air-bag. Resolution results.
 7. Pre-View & Punching Station. Punch formats. Optical means va. mechanical means for frame location.
 8. Controls and functions. Indicators, alarms, and interlocks.
 9. Masking. Coded information.
 10. Environmental design. Cambridge filters, etc.
 11. Resolution targets
 12. Discussion of Operational Modes. Automatic, semi-automatic, & Reseau mode.

II. Miscellaneous

1. Discussion of expected content and format for forthcoming Design Plan
2. Contractual confirmation of verbal agreements reached with technical monitors. Latest additions to list.
3. Reports, technical information, and samples requested from technical monitors.
4. Request for change in specifications (3.11) from S0-105 to S0-267.
5. Clarification of specification Para. 3.4.3 from 5 micron accuracy of Reseau location to ± 5 microns.
6. Since negative density affects Reseau line width, at what density is the line to print out at 12-15 microns (Para. 3.4.2)

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Requests from monitors.

1. [redacted] study report on High-Resolution Printing
2. Samples of "typical" aerial negatives to study fiducials, borders, skewness, frame edges, contrast levels, density ranges.
3. Frame size for each specified width of film. Needed for masking design.
4. List of approved RFI components from Signal Corps Procurement Agency, Philadelphia, Pennsylvania.

Proposed tests on breadboard equipment

- a. Measure film tension with various drive systems.
- b. Measure resolution over platen area with emulsion-to-emulsion and base-to-emulsion.
- c. Measure effect of diffuse source on Reseau grid transfer
- d. Measure uniformity of platen illumination with lamp array
- e. Measure range of exposure variation within negative frames
- f. Determine film scratching with tape-drive
- g. Measure typical exposure times with lamp array for compliance with printing speeds
- h. Check density gradient in negative frames in connection with edge-sensing of frames
- i. Determine effect of Wratten filters on resolution
- j. Measure thermal inertia of lamps, or how much after-glow would affect film exposure
- k. Determine lamp life characteristics at intended voltages and operating cycles

Latest verbal commitments from monitors.

1. Means for testing Automatic Exposure Control are up to [redacted] The Test Plan to be submitted later in the program. No objection was raised at this time to the use of a step-wedge rather than an aerial negative.
2. It has been resolved that no RFI test will be required. It will be sufficient if the machine is designed and fabricated to the referenced RFI specification.
3. It has been resolved that a 500' spool capacity for negative and duplicating film will be adequate. Provision for 1000' spools is not required.
4. The problem of hole-slot-hole punching on one edge was discussed. When films are to be printed with emulsion "down" instead of the normal "up" position, this will be determined beforehand and the appropriate edge will be punched so that it will coincide with the locator pin format at the printing station.
5. Masking of negative frames will include any code information between frames. Masks will be larger than frame size, but small enough to exclude adjacent frames.

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MINUTES OF MEETING

HIGH RESOLUTION STEP & REPEAT PRINTER

October 8, 1964

U. S. Government



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1. Presentation of Artist's Concept Materials

Technical monitor feels that material is satisfactory for the present, but would like to see 20" x 24" mattes with more color for a future presentation in about six weeks. Polaroid color snaps were given to the monitor for the present.

2. Technical monitor suggested that we consider future possibilities of combined features of printers 1 and 2 since the basic features are similar.

3. Control Panel

Preliminary configuration and modes of operation were discussed. Monitor requested resets for all pushbuttons one at a time, or a self cancelling feature.

"Emergency Stop" philosophy was questioned. It was pointed out that in the event of a malfunction, the machine could not be restarted until it was cleared.

4. RFI and Power Distribution

Monitor re-emphasized 208 volt, 4 wire, 3 \emptyset power, with no D. C. available. It was re-affirmed that equipment would comply with RFI spec but that tentatively no testing would be required.

5. Film Coding

Seventeen approaches to film coding were listed, and the monitor eliminated 14. Remaining options are marking inks, fluorescent penetrants, and ultrasonic deformation.

The coding size was tentatively determined to be approximately 3/32" x 1 with 13 code bits.

6. Film Gate

Monitor emphasized that #8430 will be the primary duplicating material. Newton rings or granular methods for correction cannot be tolerated.

7. Film Handling

Loop systems were discussed as a means for providing minimum film motion. Monitor suggested that [] successfully used vacuum capstans, but that [] had problems with dimpling in their wet processors. A multiple roller guiding system was mentioned as existing in an enlarging printer at the monitor's facility.

8. Exposure Control & Dodging

A presentation was made by [] on the parameter study. Monitor states that film processing would be controlled from roll to roll but that constant gamma could not be guaranteed.

Statistics on gamma, density ranges, D maximum, D minimum, etc., will be provided by the monitor later in the program. It was generally felt by the monitor that maximum contrast expansion of low contrast negatives is desired even though the results may not be pleasing from an aesthetic point of view.

Monitor suggests that he will bring experts from his facility to [] at a later date to specifically discuss sensitometry, photo interpretation, exposure control, and dodging.

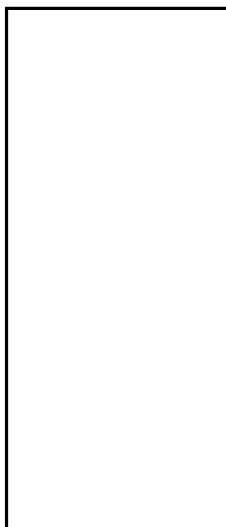
A presentation was made by [] on a possible approach to exposure control. It was generally agreed that the approach was a good one, but was neither accepted nor rejected by the monitor as meeting all of the technical requirements.

9. Agreements

There were no new agreements made at the meeting.

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8 October 1964

AGENDA

DESIGN REVIEW MEETING
HIGH RESOLUTION STEP AND REPEAT PRINTER

1. Delivery of Presentation Material to customer; discussion
2. Task Status Reports
 - A. Human Factors
 - Control Panel and Controls
 - B. Power Distribution and RFI
 - Power and Fusing Distribution Plan
 - C. Film Coding
 - Coding sensors and logic
 - D. Film Gate
 - Review of resolution and Newtons Fringes tests
 - E. Film Handling
 - Discussion of design parameters, sketches and Configurations
 - F. Exposure Control
 1. Parameter discussion by
 2. Discussion of proposed system by
3. Questions outstanding
 - A. Monitor procurement outstanding
 - B. New questions
 - C. General Discussion

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