

SECRET



THE NPIC EQUIPMENT SUMMARY 1967

NPIC/R-91/67
JUNE 1967

Declass Review by NIMA/DOD

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WARNING

This document contains information affecting the national defense of the United States, within the meaning of Title 18, sections 793 and 794, of the U.S. Code, as amended. Its transmission or revelation of its contents to or receipt by an unauthorized person is prohibited by law.

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THE NPIC EQUIPMENT SUMMARY 1967

JUNE 1967

Prepared by the
Technical Development Staff

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

Overall classification of this report is SECRET.
Individual UNCLASSIFIED items carry the
following caveat:

(This item is Unclassified)

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THE NPIC EQUIPMENT SUMMARY 1967

The National Photographic Interpretation Center (NPIC) is responsible for conducting an active program of development of equipment and techniques to improve and advance the exploitation of imagery in support of the national intelligence effort. The development of new systems, instruments, materials, and devices for imagery exploitation includes a wide range of optical-mechanical and electronic instrumentation as well as the application of automated systems for the extraction of data from photographic and other image-forming sensors. In addition, the Center provides technical advice and support to government components responsible for the development of new systems for intelligence collection, and coordinates its research and development activity with interested elements of the intelligence community for their own use or further adaption.

The Technical Development Staff is responsible for the development of techniques and equipment which will ensure timely, efficient, and accurate imagery exploitation.

This publication presents a summary or catalog of equipment developed and/or in use at NPIC. This presentation will allow the reader to visualize the base upon which research and development in NPIC is conducted. However, it should be noted that this is a listing of equipment only, and does not include R&D activities such as long range studies, exploratory developments, etc. Generally, each item is covered by a short narrative, a photograph or conceptual drawing, and a tabulation of physical characteristics. Where possible, the approximate cost of a production unit is given; these figures should be used with care, however, as prices will vary, and quantity buying may reduce cost. Items of equipment which have been dropped from the program are described and the reasons for termination given. Obsolete items are also included since they may still have some value in field operations.

For convenience, the equipment listed is grouped into 3 sections as follows:

1. Reproduction and Processing
2. Viewing and Interpretation
3. Measurement and Evaluation

It should be noted here that computer devices grouped under an Information Handling Section have not been listed. NPIC operates both a computer center and an information storage and retrieval system using Minicard and is currently investigating techniques and equipment to replace Minicard. The computer center is currently equipped with an IBM 1401, UNIVAC 490, 494, and two UNIVAC 1004's. It is evolving toward a remote access, multi-programming, multi-processing system that

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will consist of two UNIVAC 494's and associated equipment. NPIC plans to release the IBM 1401 during Fiscal Year 1968, and it is envisioned that the UNIVAC 490 and 1004's will be phased out in 1969.

Your comments or criticisms are solicited in order to continually improve this annual product.

The overall classification of this publication is SECRET. Individual items have been classified according to their respective security levels.

WARNING: NO CONTACT IS TO BE MADE WITH ANY MANUFACTURERS REGARDING CLASSIFIED ITEMS WITHOUT PRIOR APPROVAL BY NPIC.

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25X1A

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SECTION I. REPRODUCTION AND PROCESSING

- A. PROCESSING**
- B. DRYING**
- C. PRINTING**
- D. ENLARGING**
- E. COPYING**
- F. SUPPORTING**

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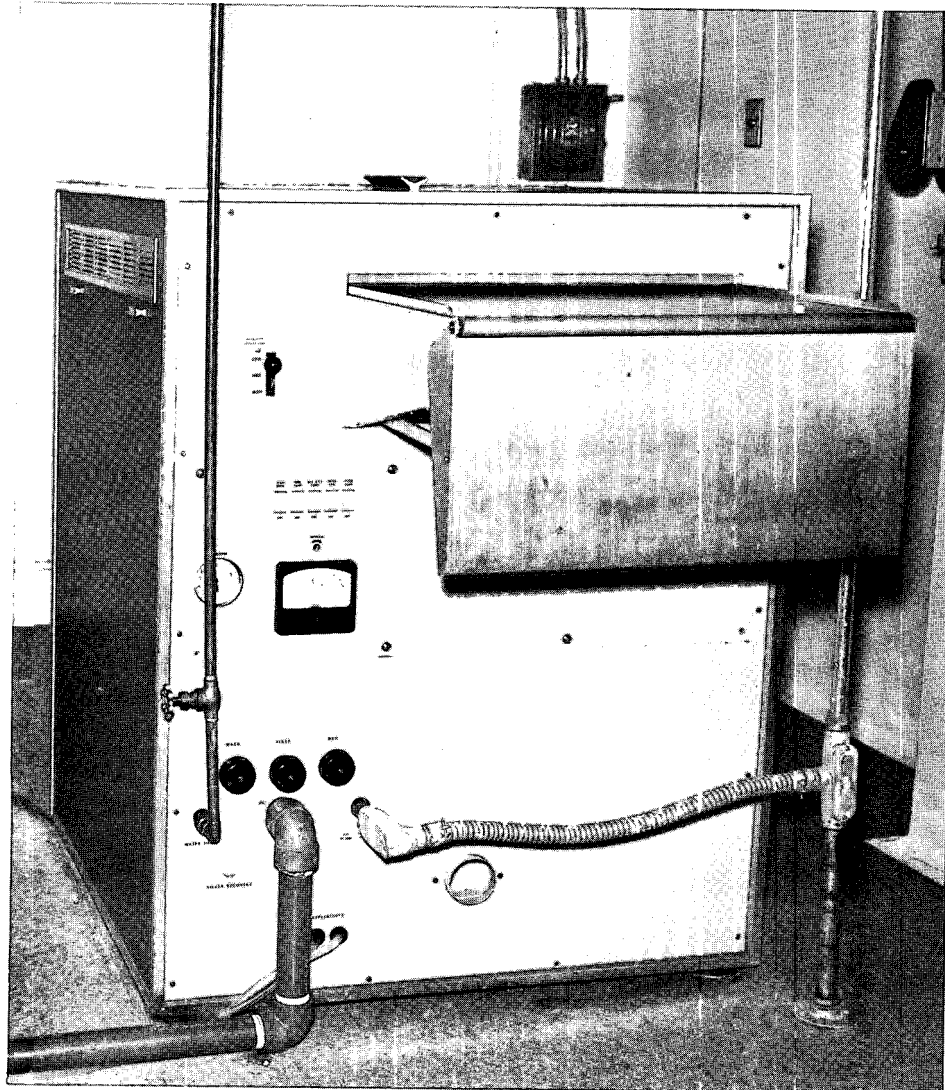
A. PROCESSING

1. EASTMAN KODAK KODALITH PROCESSOR

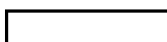
(This item is Unclassified)

This machine processes Kodalith sheet film in sizes ranging from 5 by 7 inches to 24 inches wide by any length. It is a self-contained unit with built-in temperature control, solution re-

plenishment, and recirculation of solutions. Film is transported through the several solutions and the dryer by a series of rollers. The processing speed ranges up to 4.4 feet per minute.



25X1A



Size: H 50 in.

Weight: 1,000 lbs.

W 40 in. L 50 in.

Power Requirements: 220 V, 60 CPS, 30 A, 3 phase, 4 wire

Special Requirements: Dark room, water input and drainage

Status: Commercially available

Development Source: Commercial

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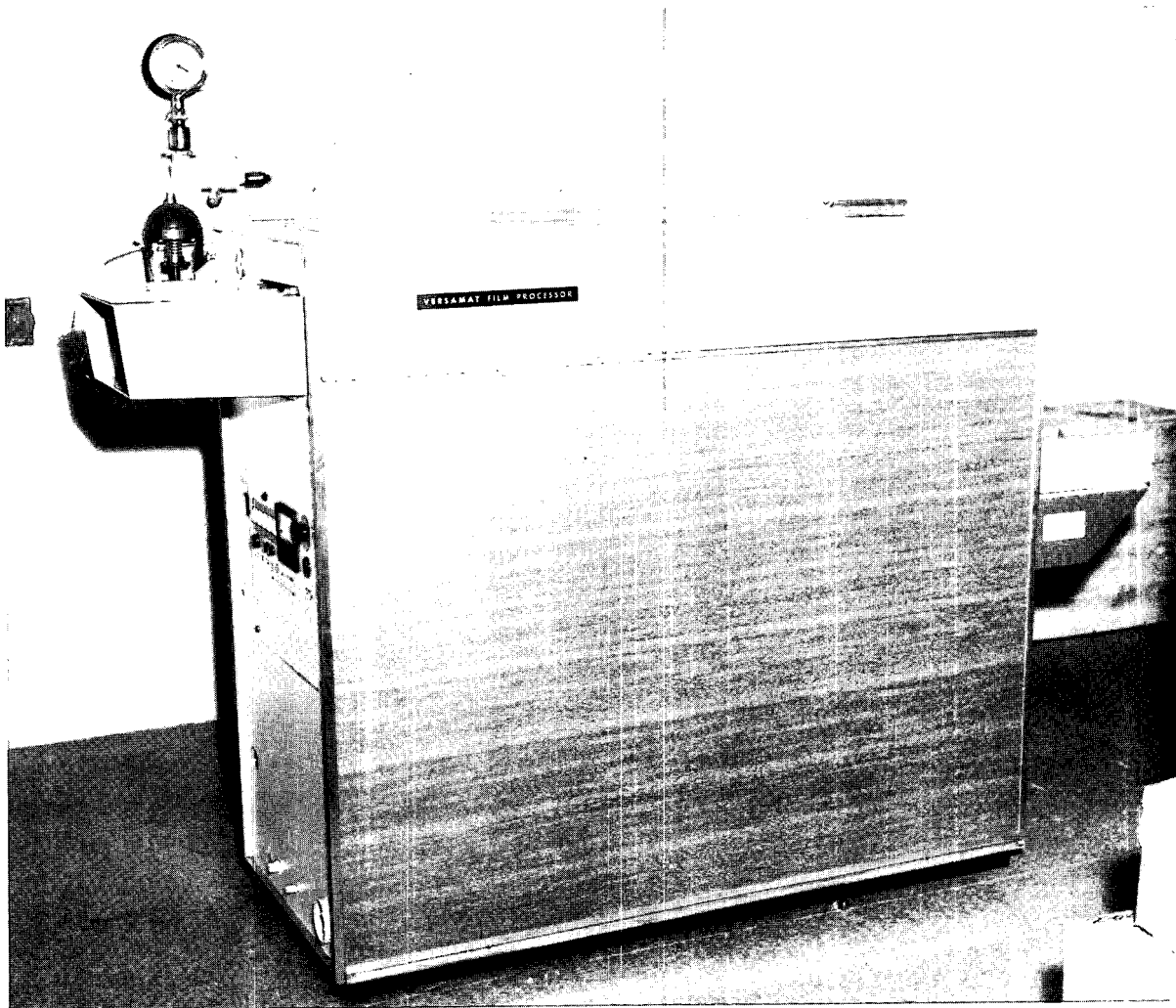
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2. EASTMAN KODAK VERSAMAT FILM PROCESSOR

(This item is Unclassified)

This processor accommodates sheet film ranging in size from 4 by 5 inches to 11 by 14 inches. With the use of feed and take-up roller attachments, it will accept roll film up to 9.5 inches wide. The equipment makes use of a series of rollers to guide and transport the film

through the several processing baths and the self-contained dryer. Processing speed ranges up to 20 feet per minute. Temperature control, solution replenishment, and recirculation of solutions are built into the machine.



25X1A

Size: H 51 in.

Weight: 1,200 lbs.

W 24 in. L 57 in.

Power Requirements: 208 V, 60 CPS, 55A, 3 phase, 4 wire

Special Requirements: Dark room, water input and drainage

Status: Commercially available

Development Source: U.S. Government

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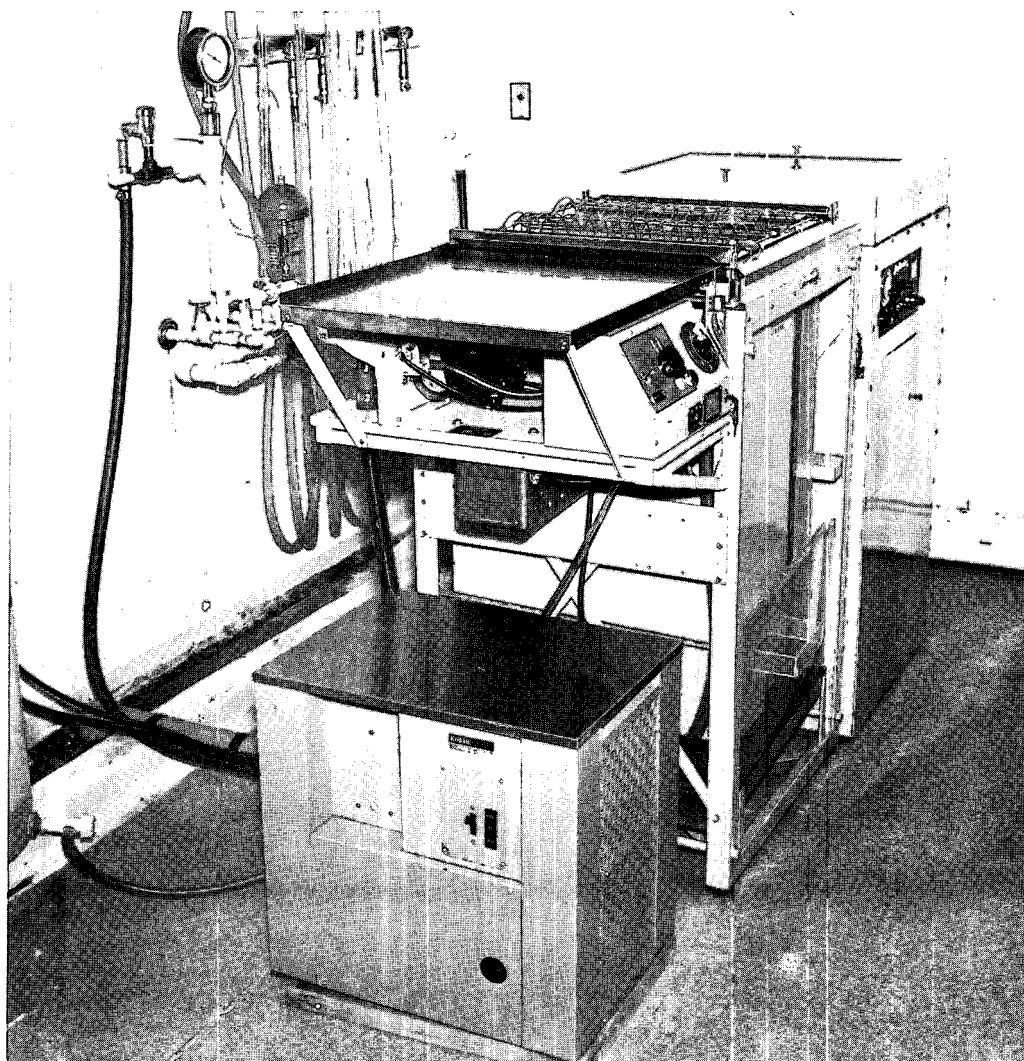
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3. LOGETRONIC LITHOGRAPHIC FILM PROCESSOR

(This item is Unclassified)

This processor has power-driven rollers and web belts that carry the lithographic films through the various solutions and the dryer. It will accept cut sheets in any size up to 20 inches wide and

all graphic film thicknesses, including the .004 inch. The film transport speed can be varied between 2.8 and 4.5 feet per minute, and the processing time between 2.5 and 1.5 minutes.



25X1A



Weight: 1,610 lbs.

Size: H 54.50 in. W 79.75 in. I 44.75 in.

Power Requirements: 115/230 V, 60 A

Special Requirements: Dark room, tempered water, drainage, chemical replenishment

Status: Commercially available

Development Source: Commercial

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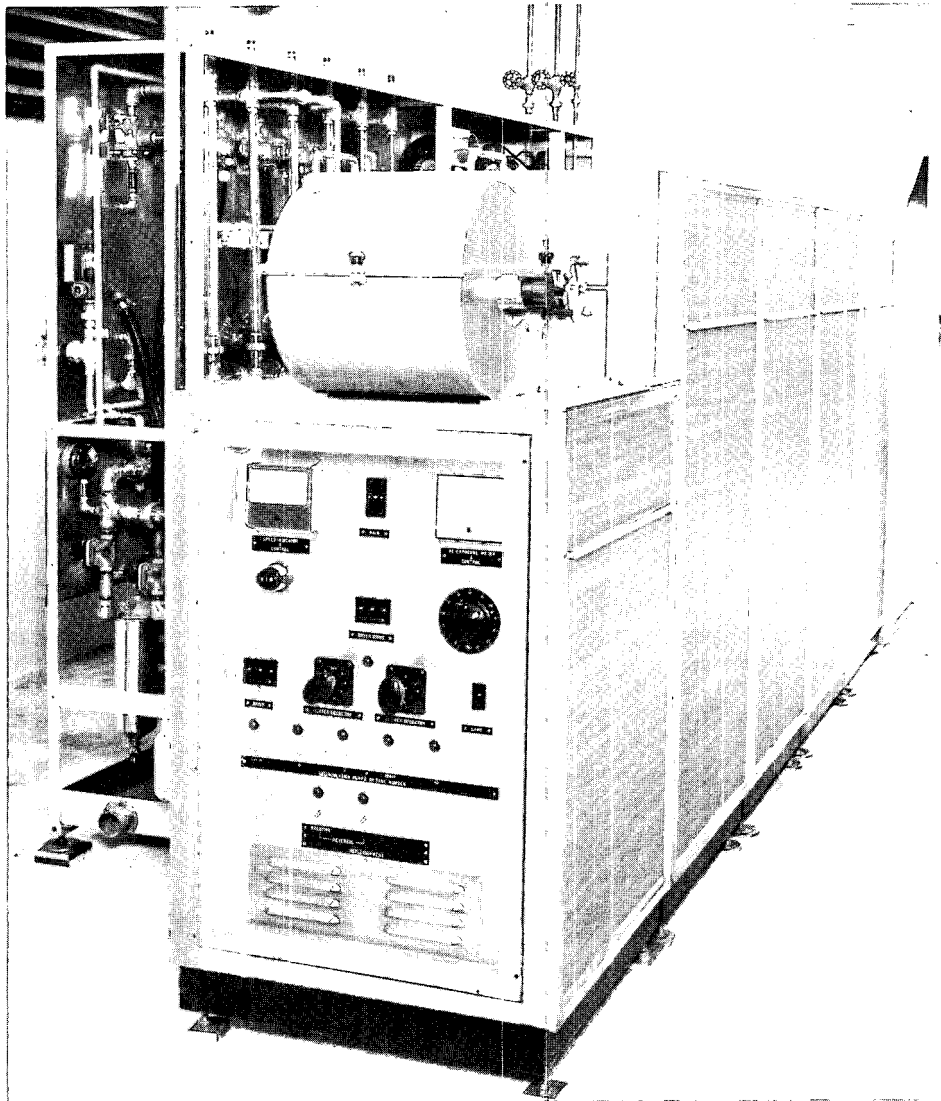
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25X1A

4. [] ROLLER-TRANSPORT REVERSAL PROCESSOR (RT-12)

This processor will handle up to 10 inch widths of either roll film or cut sheets. The self-threading machine has its own dryer and allows

ready conversion from negative to reversal by change of chemicals and adjustments. Output rates are from 0 to 30 feet per minute.



25X1A

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Weight: 7,000 lbs.

Size: H 66 in.

W 60 in.

L 189 in.

Power Requirements: 220 V, 6 CPS, 60 A, 3 phase, 4 wire

Special Requirements: Compressed air at 25 PSI, dark room, chemical replenishment, water input and drainage

Status: Prototype

Development Source: NPIC

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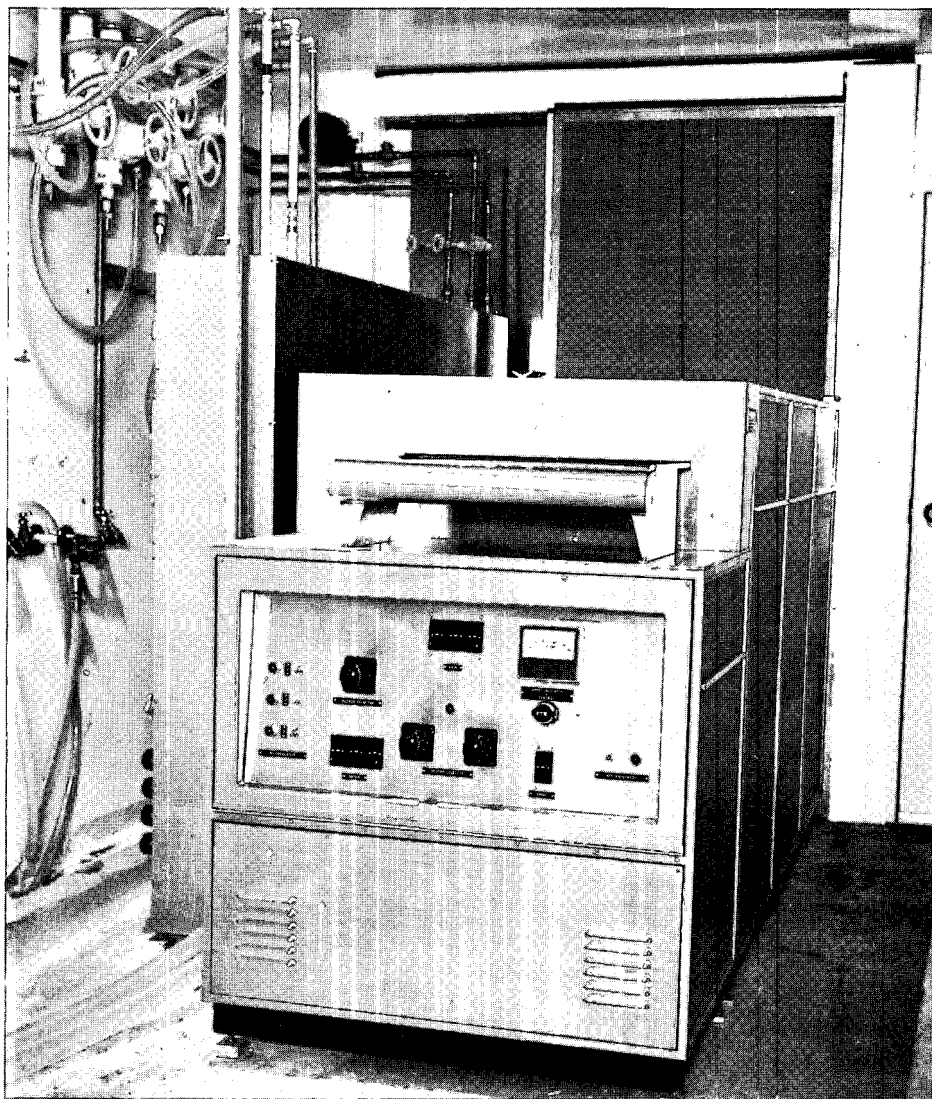
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25X1A

5. **ROLLER-TRANSPORT PROCESSOR (RT-24)**

This processor, which will handle up to a 24-inch sheet of cut film or waterproof paper, is self-threading and includes its own dryer.

The processing time from dry to dry for negative materials is 14 minutes; for print materials, 7 minutes.



25X1A

Weight: 7,000 lbs.

Size: H 7 ft. 8 in. W 5 ft. L 16 ft.

Power Requirements: 220V, 60 CPS, 100A, 3 phase, 4 wire

Special Requirements: Compressed Air at 25 PSI, dark room, chemical replenishment, water input and drainage

Status: Prototype

Development Source: NPIC

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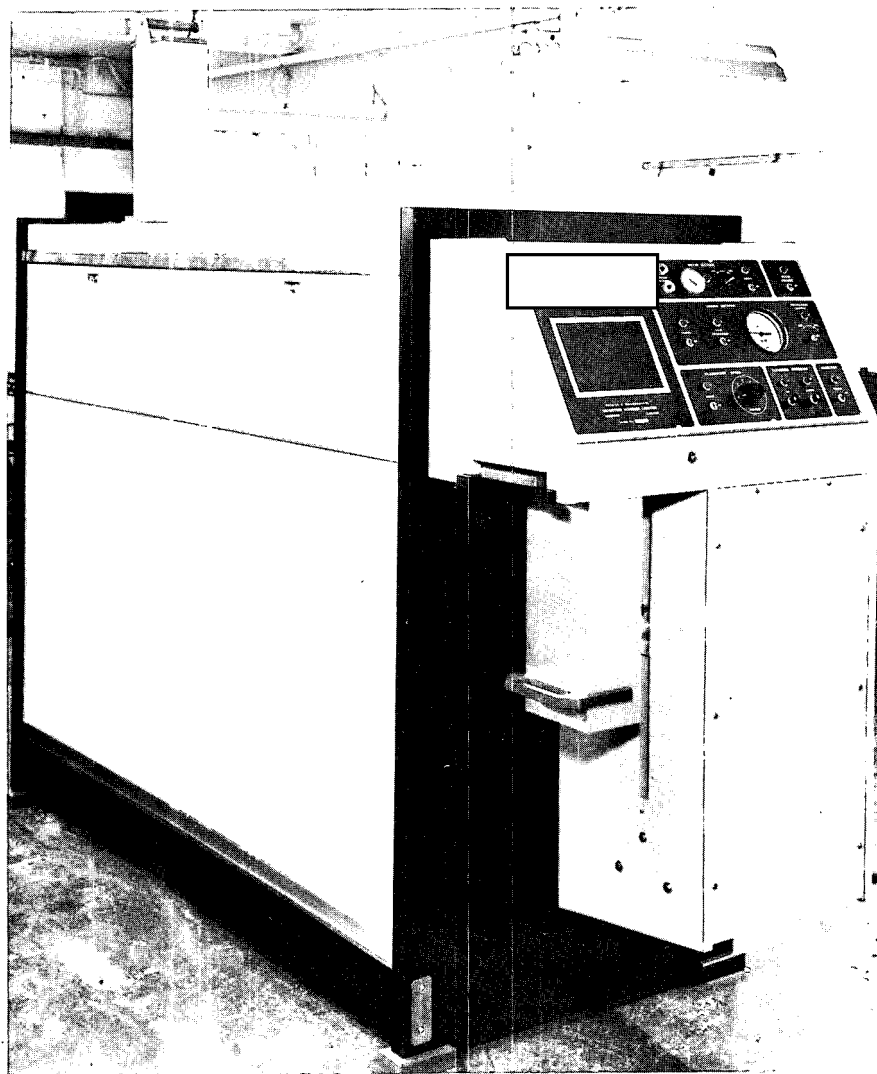
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6. [] FILM-CHIP PROCESSOR

This film-chip processor is designed to process the 4- by 5-inch cut-sheet film chips produced by a chip printer which is also currently under development. The film chips are processed without

any physical contact with the film emulsion or base at a rate of 10 chips per minute. In operation, the printer loads the chips into a magazine which is then loaded on the processor manually.



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25X1A

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Weight: 1,500 lbs.

Size: H 63 in. W 36 in. L 88 in.

Power Requirements: 220 V, 60 CPS, 40 A

Special Requirements: Ambient light, chemical replenishment, water input and drainage

Status: Prototype delivered to [] in December 1966 for evaluation

Development Source: NPIC

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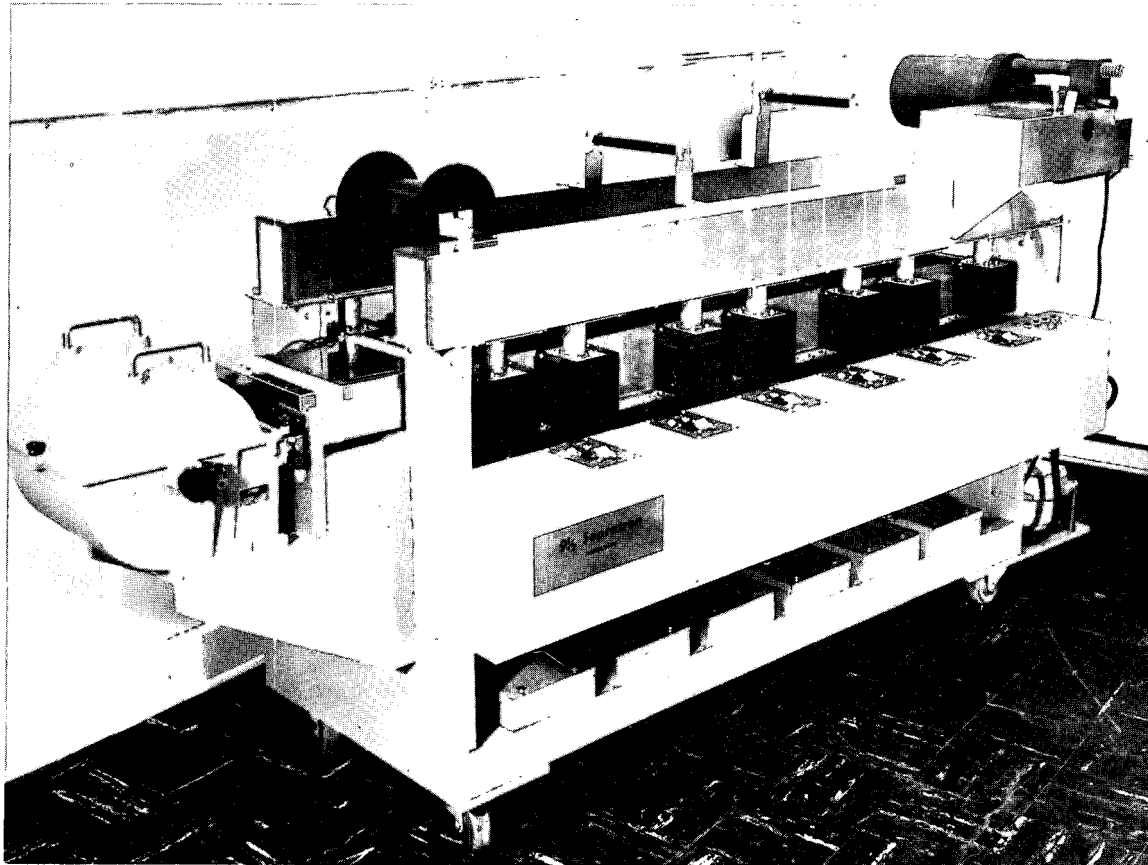
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[REDACTED] **SEPRATRON AIR-BEARING FILM PROCESSOR**

This proposed film processor will be a continuous processor that will fully process, wash, and dry 70mm-to 9.5-inch-wide aerial roll film with no physical contact with the film base or emulsion. The film will follow a perfectly parallel path through the developer, fixer, stabilizer, washer, and dryer modules by air and liquid transport. The film passes through the walls of successive tanks on air bearings. Solution transfer or leakage from one tank to another will be prevented by differential air pressure between the

tanks which is greater than the head pressure in the solution tanks.

The feasibility of this concept for processing 70mm-wide film has been fully demonstrated. Processing at a rate of 4 feet per minute has been accomplished in a processor 3 feet long and 15 inches high. In the proposed processor, the length will not exceed 8 feet and the processing rate will be 0 to 15 feet per minute.



25X1A

[REDACTED]
Weight: 1,000 lbs.
Size: H 60 in. W 36 in. L 98 in.
Power Requirements: Not Available

Special Requirements: Dark room, chemical replenishment,
water input and drainage
Status: Prototype due for delivery by July 1967
Development Source: NPIC

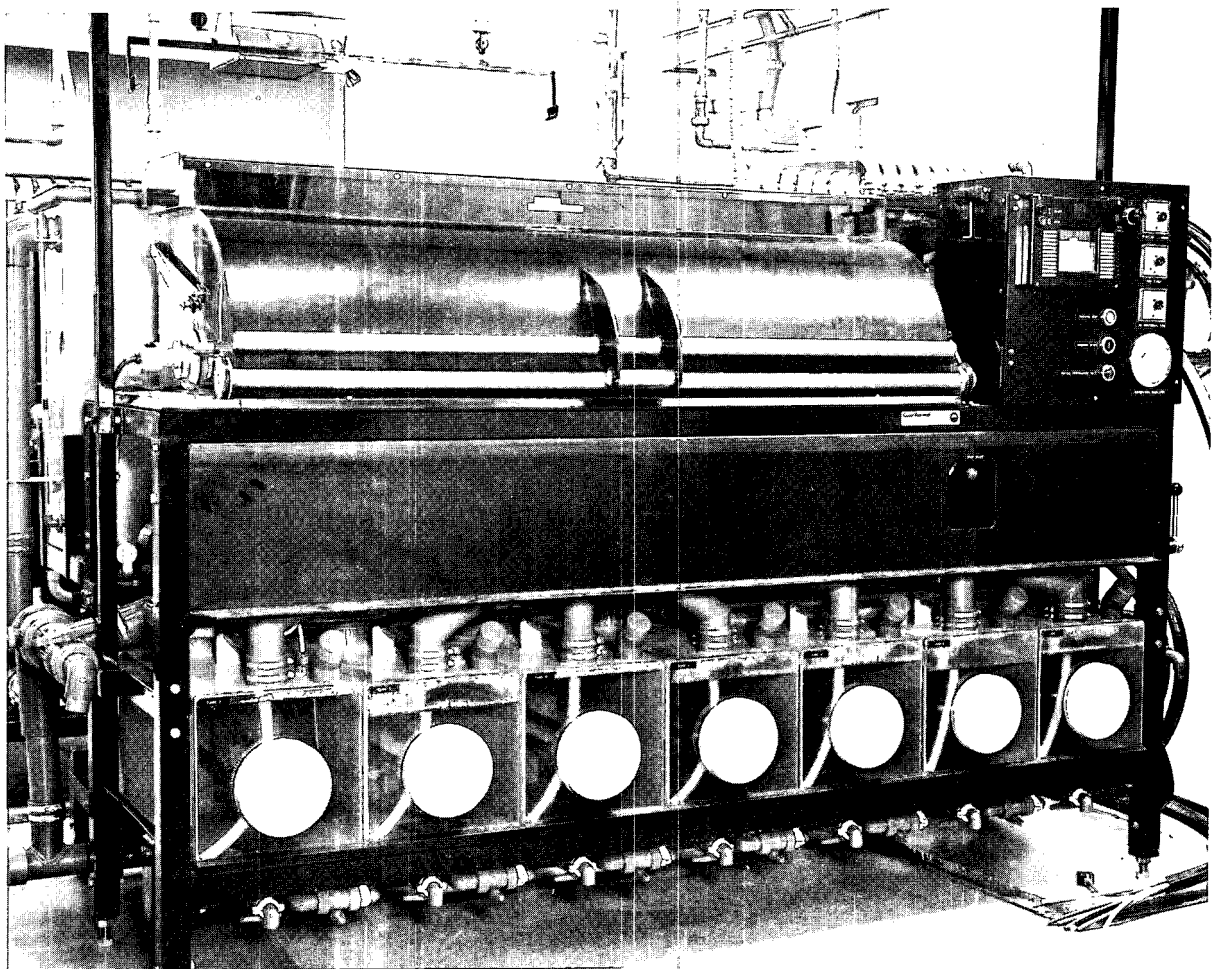
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8. AUTOPAN COLOR AUTOMAT PROCESSOR

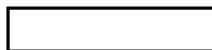
(This item is Unclassified)

This is a fully automatic processing machine for the production of color prints, print-films and transparencies. Material of all sizes and mural sections or prints in sizes up to 52 x 140 inches can be readily intermixed. It can be pro-

grammed for any color processing requirement, including color negative film, color print-film, color duplicates, color paper, positive transparencies, film or paper sheets of all sizes, roll film, and motion picture film.



25X1A



Weight: 1,460 lbs., with filled tanks 2,870 lbs.

Size: H 7 ft. 5 in. W 4 ft. L 8 ft. 11 in.

Power Requirements: 220 V, 50 CPS, 20 A, 4 kW

Special Requirements: Water input and drainage, automatic chemical replenishment, temperature control

Status: Commercially available (Dunlop Photo Lab.)

Development Source: Commercial

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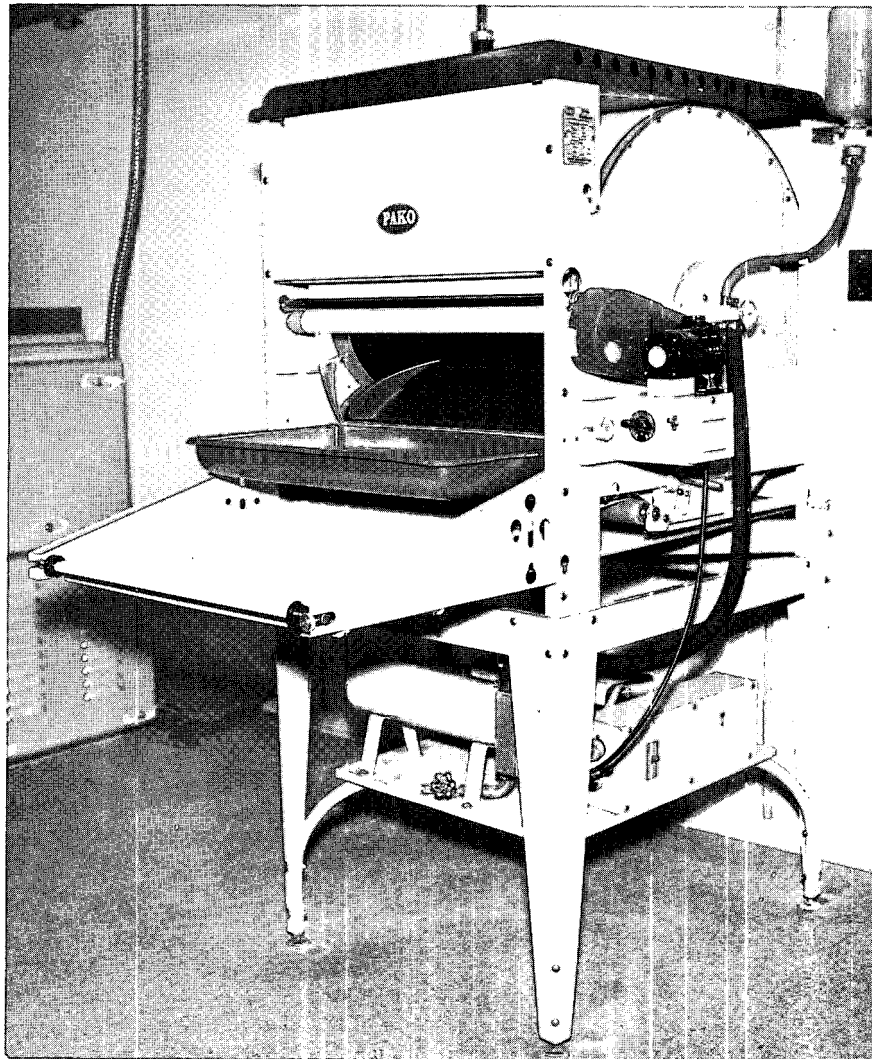
B. DRYING

1. PAKO PAPER DRYER (DRUM)

(This item is Unclassified)

This machine is an electrically heated paper-print dryer for glossy prints up to 24 inches wide. The prints are carried around a stainless steel drum by a web belt which also serves as an apron for accepting the wet prints and dis-

charging the dry ones. Temperature uniformity in the drum is maintained by internal circulating water. The speed of the rotating drum can be controlled to meet the time requirements of the material being dried.



25X1A



Weight: 200 lbs.

Size: H 6 ft. W 3 ft. L 3 ft.

Power Requirements: 115/230 V, 30 A

Special Requirements: None

Status: Commercially available

Development Source: Commercial

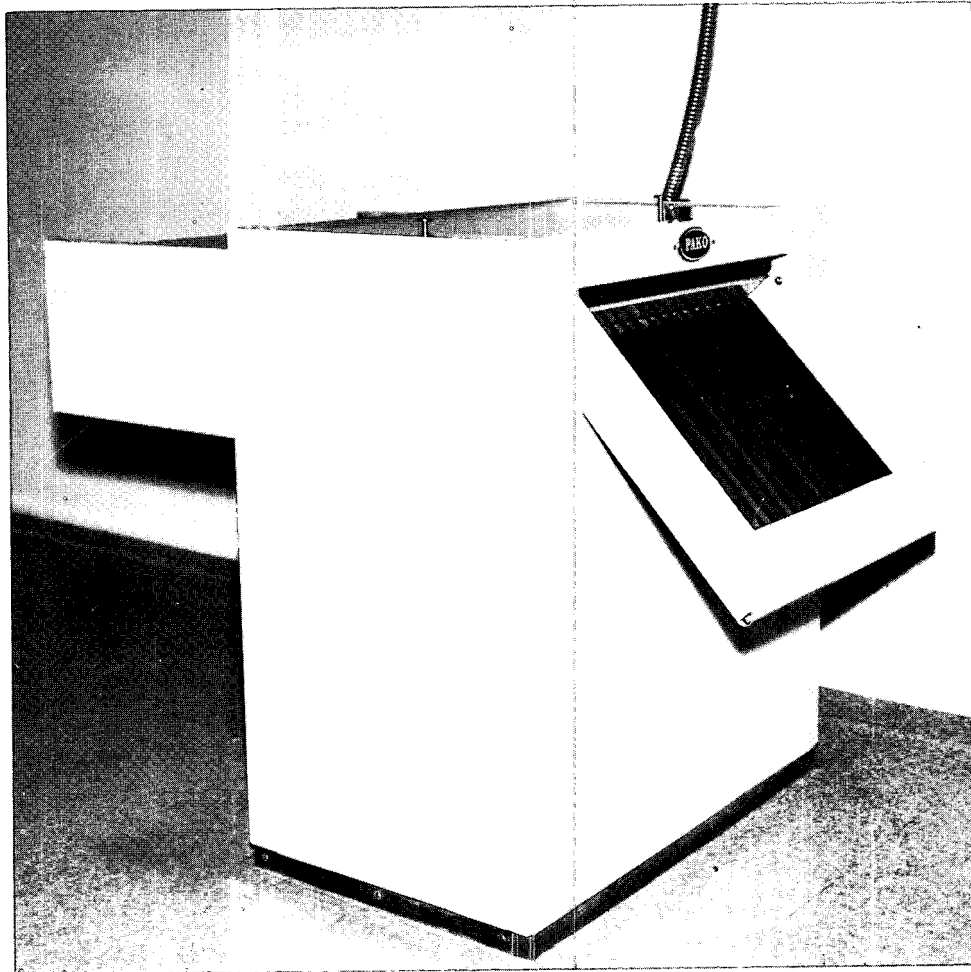
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2. PAKO ROLLER-TRANSPORTED CUT-FILM DRYER

(This item is Unclassified)

This dryer will accommodate either black-and white (continuous tone) or lithographic (half-tone) cut film in widths ranging from 5 to 24 inches and in lengths up to 36 inches. It is a heated-air (90 to 150 degrees F), impingement-type dryer in which the negatives are carried through by a series of driven rollers. Drying

time is as short as 1 minute but can also be increased for the heavier-type emulsions. The film transport speed ranges from 6 to 30 inches per minute. The minimum thickness of material which can be handled without a leader is .005 inches for acetate and .004 inches for polyester.



25X1A

Size: H 43 in. W 37 in. L 44 in.
Weight: 470 lbs.
Power Requirements: 120/208 V, 16 A

Special Requirements: None
Status: Commercially available
Development Source: Commercial

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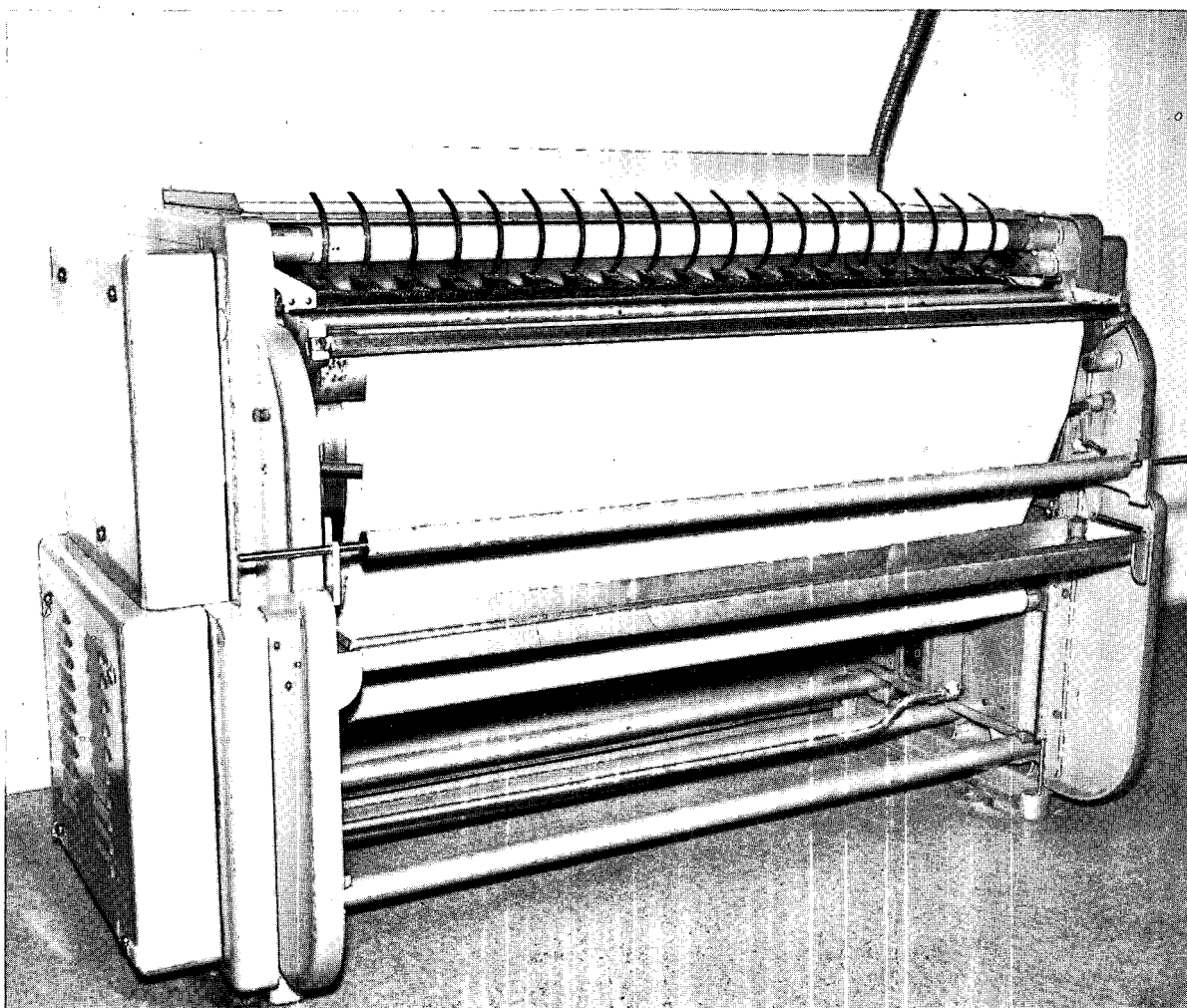
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3. CHARLES BRUNING REVOLUTE LARGE-PRINT DRYER

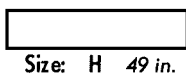
(This item is Unclassified)

The large-print dryer is an electrically heated machine for mat drying of single-or double-weight prints up to 54 inches in width. The

prints are carried around the thermostatically controlled drum on a canvas belt at a drying rate of approximately 7 linear feet per minute.



25X1A



Weight: 900 lbs.
Size: H 49 in. W 8 in. L 35 in.

Power Requirements: 210 V, 60 A

Special Requirements: None
Status: Commercially available
Development Source: Commercial

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25X1A

4. **ABD/4 FILM DRYER**

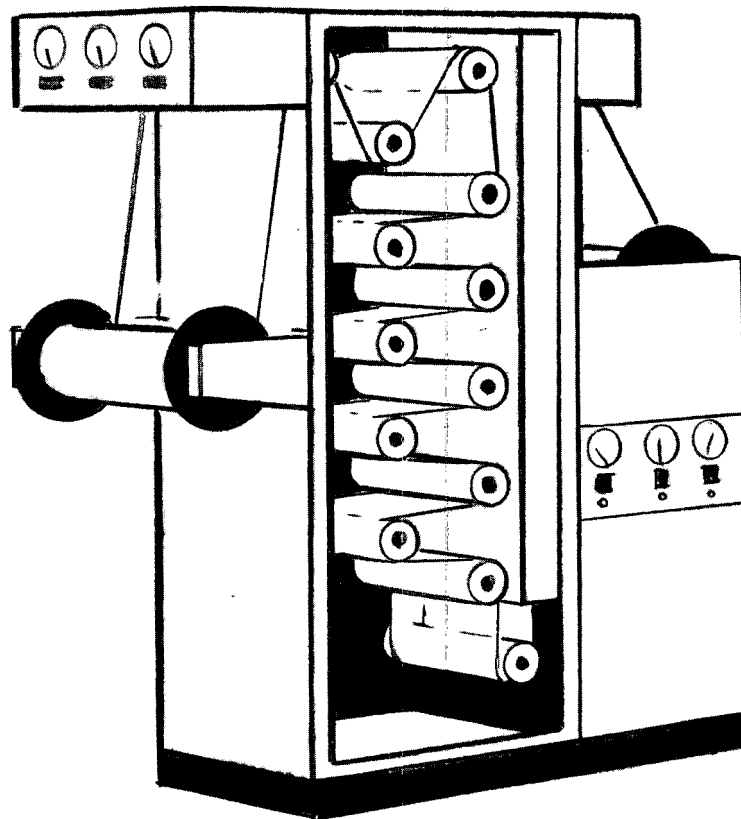
(This item is Unclassified)

25X1

This roll-film dryer was under development by for use with the HTA/2 or HTA/3 Film Processors, or other equipment. Designated type ABD/4 (Air-Bearing Drive), it employed the air-bearing principle to transport the film through the drying cabinet on a cushion of air warmed slightly above ambient temperatures. The dryer consumed approximately 25 amperes at 230 volts and achieved proper drying conditioning of the roll film to ambient relative humidity at approximately 30 feet per minute.

It occupied only one-fifth of the space of the former equipment.

Principal advantages were to be: 1) elimination of direct contact with film surfaces, 2) simplification by eliminating many moving parts, 3) reduction of required maintenance, and 4) improvement of transport methods. The transport method impinged large volumes of air against the film surfaces, resulting in an accelerated drying rate in a smaller compartment.



25X1A

Weight: 1500 lbs.

Size: H 72 in. W 16 in. L 36 in.

Power Requirements: 208 V, 30 A

Special Requirements: None

Status: Experimental model unsuccessful, project terminated, parts used in salvage.

Development Source: NPIC

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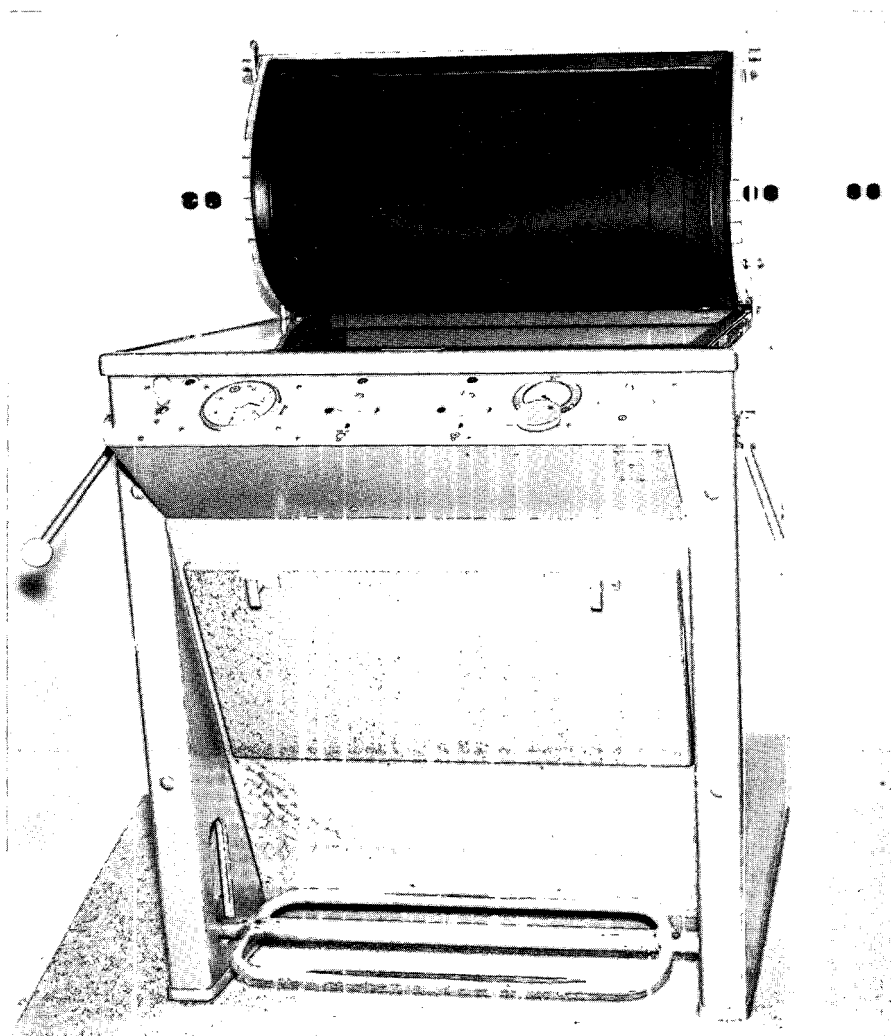
C. PRINTING

1. KLIMSCH CONTACT PRINTER (20 BY 24 INCH)

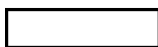
(This item is Unclassified)

This is a vacuum-type printer in which the negative and print stock are held in close contact by vacuum. A rubber blanket is brought into position over the negative-paper sandwich and the air is evacuated between the blanket and the printer cover-glass. The printer contains

2 light sources, one with tungsten-opal lamps, the other with a "point" light. Exposure is accomplished by means of an electrical shutter actuated by a timer. Filters are provided in a rotating filter disc. No provision is made to handle roll negatives.



25X1A



Size: H 38 in.

Weight: 200 lbs.

W 32 in.

L 34 in.

Power Requirements: 110 V, 15 A

Special Requirements: Dark room

Status: Commercially available

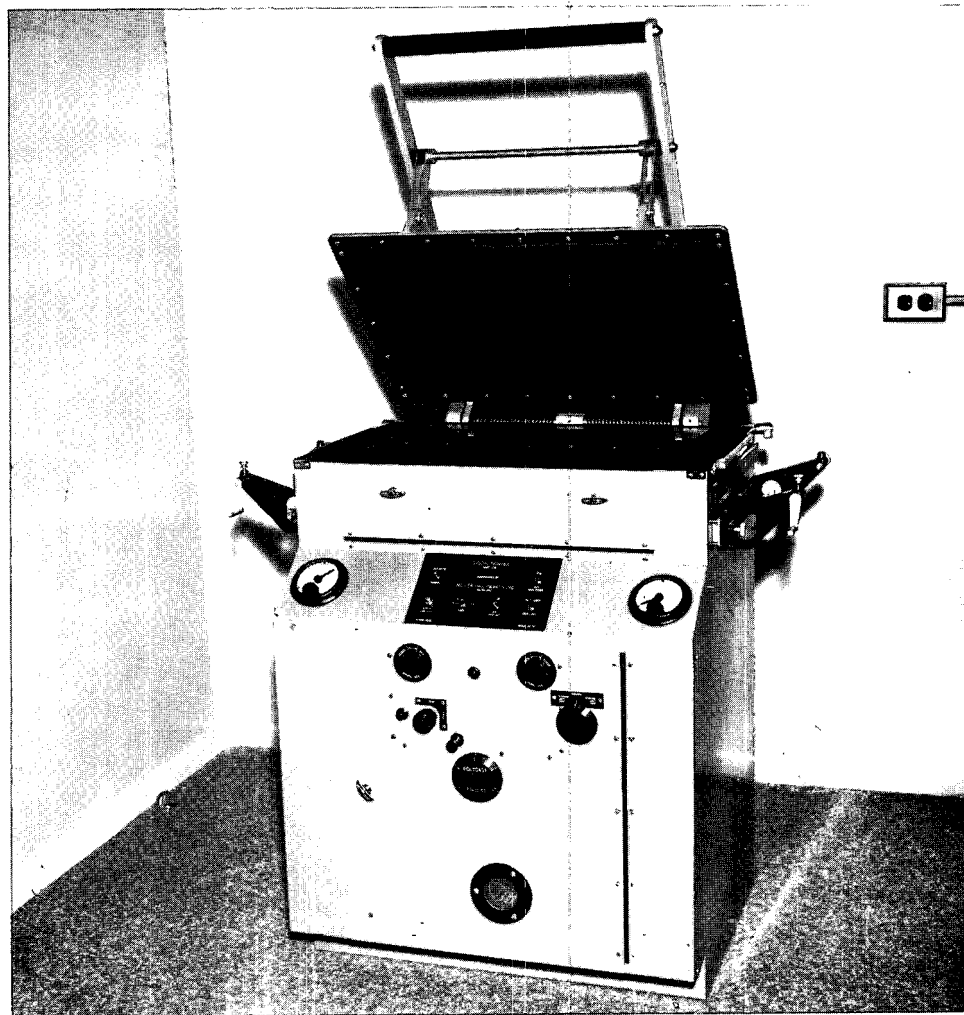
Development Source: Commercial

2. MILLER-HOLZWARTH CONTACT PRINTER (HIGH RESOLUTION)

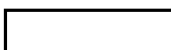
(This item is Unclassified)

This high-resolution contact printer is a step-and-repeat instrument handling either sheet film, up to 11 by 19 inches, or roll film in any width up to 9.5 inches and any length up to a maximum of 500 feet. Critical contact is obtained by means of an air bag. The light may be either specular or diffused, depending on whether or

not a diffusing glass is used. Area dodging is accomplished by manual manipulation of the controls. Variable contrast papers may be used by inserting contrast filters. The printer has a resolution capability of 228 lines/mm, and the wavelength of the unfiltered light is suitable for color printing.



25X1A



Size: H 44 in.

Weight: 185 lbs.

W 30 in.

L 28 in.

Power Requirements: 110 V, 15 A

Special Requirements: Dark room

Status: Commercially available

Development Source: Commercial

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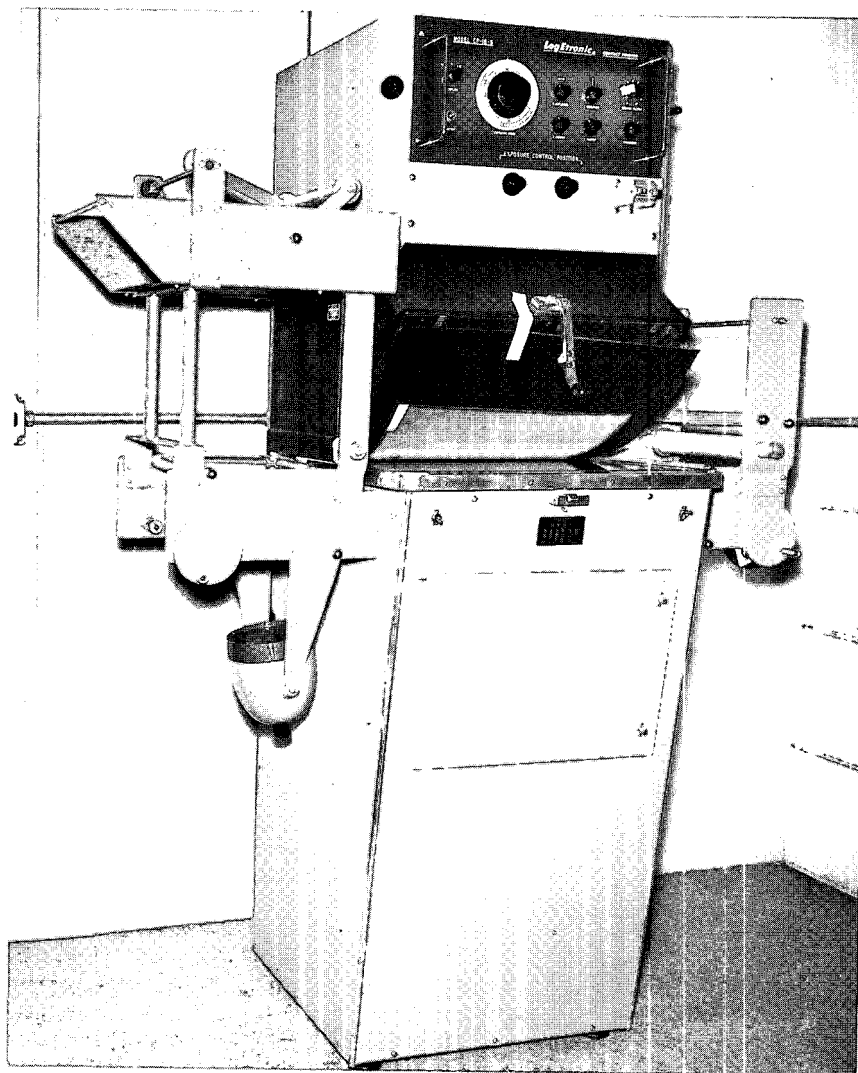
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3. LOGETRONIC CONTACT PRINTER (AUTOMATIC DODGING)

(This item is Unclassified)

This is a 12- by 20-inch format step and repeat printer in which the printing light is a flying-spot scanner similar to that in normal television. After passing through the negative, the scanning light is sensed by a phototube and,

by means of a feedback circuit, its intensity is altered to match the local density of the negatives. Transport of both negative and printing paper is manual, and the printer will accept either cut or roll negatives.



25X1A

Weight: 450 lbs.

Size: H 60 in. W 40 in. L 25 in.

Power Requirements: 115 V, 5 A

Special Requirements: Dark room

Status: Commercially available

Development Source: Commercial

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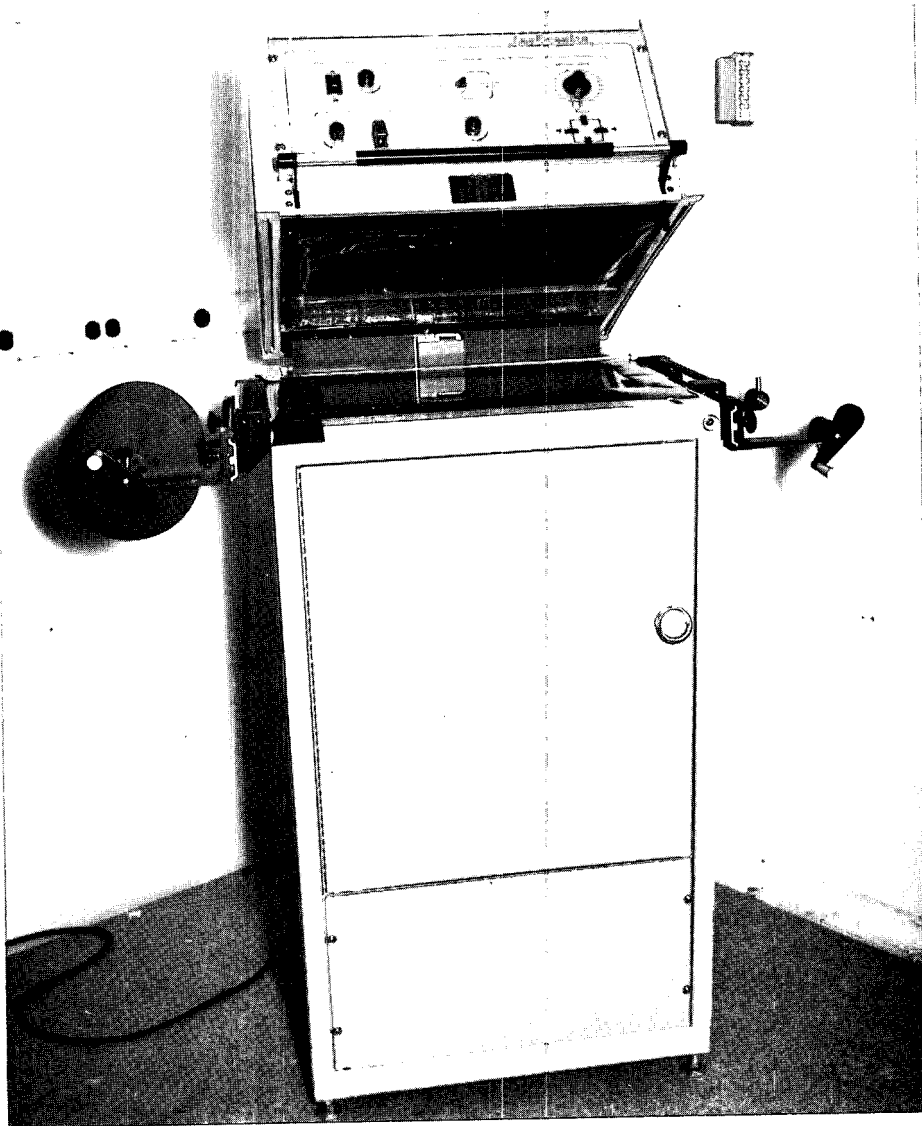
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4. LOGETRONICS CONTACT PRINTER (MARK II)

(This item is Unclassified)

This is an electronic contact printer with fully automatic incremental exposure control for black and white photography. It provides precise exposure control for all types of negatives.

The printer can handle positive or negative cut sheets up to 15 by 18 inches and rolls 9 3/8 inches by 500 feet, single or double-weight paper, and glass plates.



25X1A



Size: H 53 in.

Weight: 200 lbs.

W 27 in.

L 25 in.

Power Requirements: 117 V, 60 CPS, 50 W

Special Requirements: None

Status: Commercially available

Development Source: Commercial

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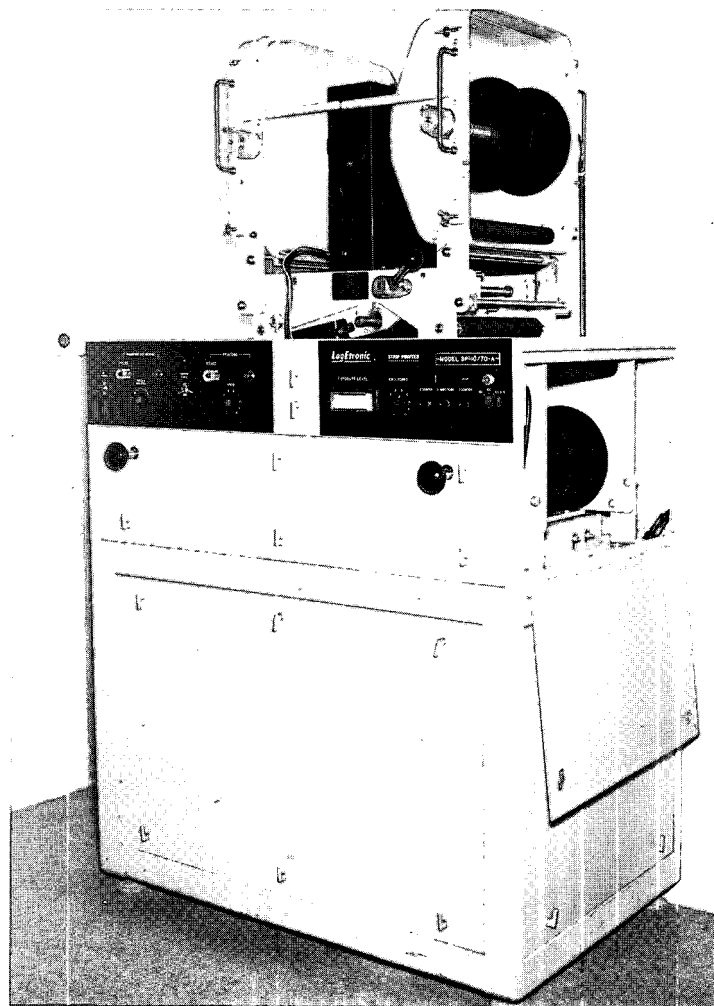
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5. LOGETRONIC CONTINUOUS-STRIP CONTACT PRINTER (AUTOMATIC DODGING)

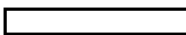
(This item is Unclassified)

This printer accepts roll film up to 9.375 inches wide and up to 400 feet long, both the negative and the print stock being transported by motor drive at speeds which can be varied from 6 to 60 feet per minute. The printing light is a flying-spot scanner, which scans in a straight line across the width of the film. After passing

through the negative, the scanning light is sensed by a phototube and, by means of a feedback circuit, its intensity is altered in ratio to the density of the negative, thus providing local dodging of the image. The machine is capable of resolutions up to 140 lines/mm at high contrast.



25X1A



Size: H 68 in.

Weight: 450 lbs.

W 40 in.

L 28 in.

Power Requirements: 115 V, 20 Amps

Special Requirements: Ambient light, magazine loaded

Status: Commercially available

Development Source: Commercial

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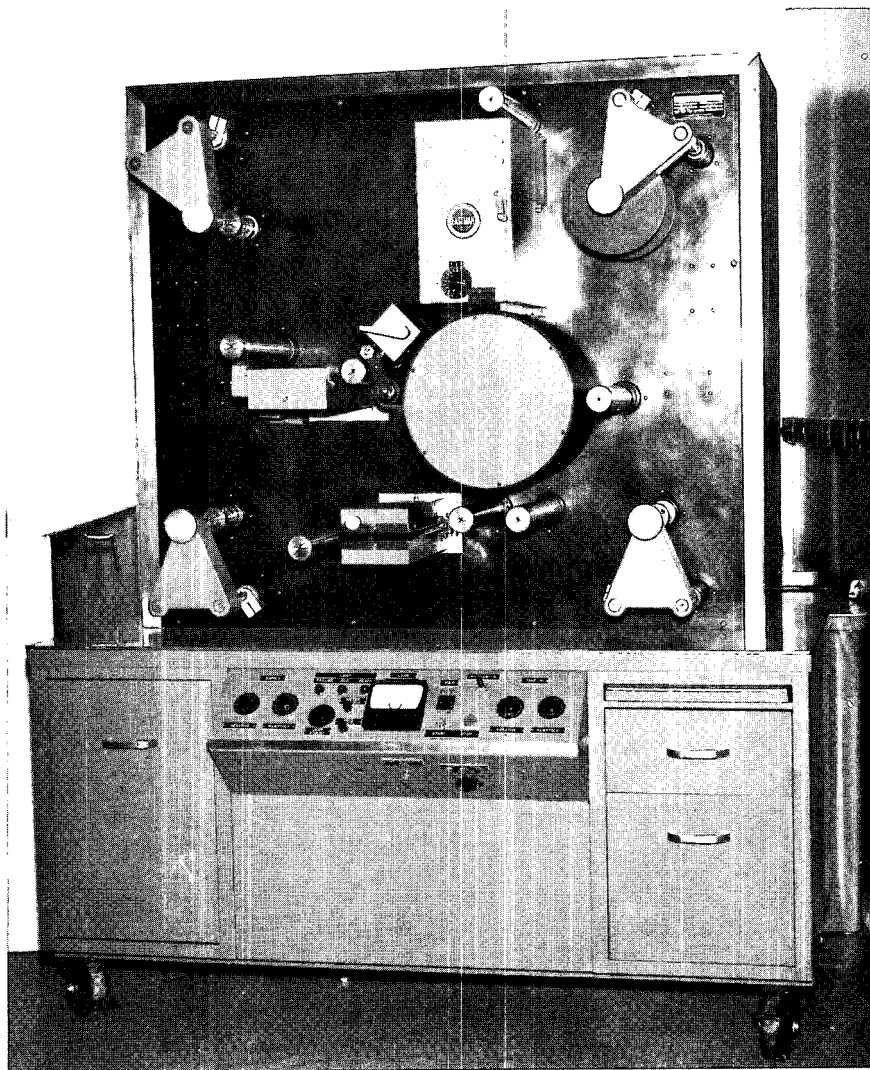
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6. EASTMAN KODAK CONTINUOUS-STRIP PRINTER (NIAGARA)

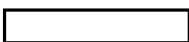
(This item is Unclassified)

This printer is used for the continuous-contact printing or duplicating of films ranging from 70mm to 9.5 inches in width, at a speed of 82.5 feet per minute. Exposure from the ultraviolet mercury light is attenuated by means of a neutral-

density wedge introduced into the light path at 22 positions ranging in density values from 0 to 1.10. The maximum resolution capability of the printer is 397 lines/mm at 1,000:1 contrast.



25X1A



Size: H 73 in.

Weight: 1,100 lbs.

W 60 in. L 34 in.

Power Requirements: 115 V, 60 CPS, 1 phase, 12 A

Special Requirements: Toxic air exhaust, dark room

Status: Commercially available

Development Source: U.S. Government agency

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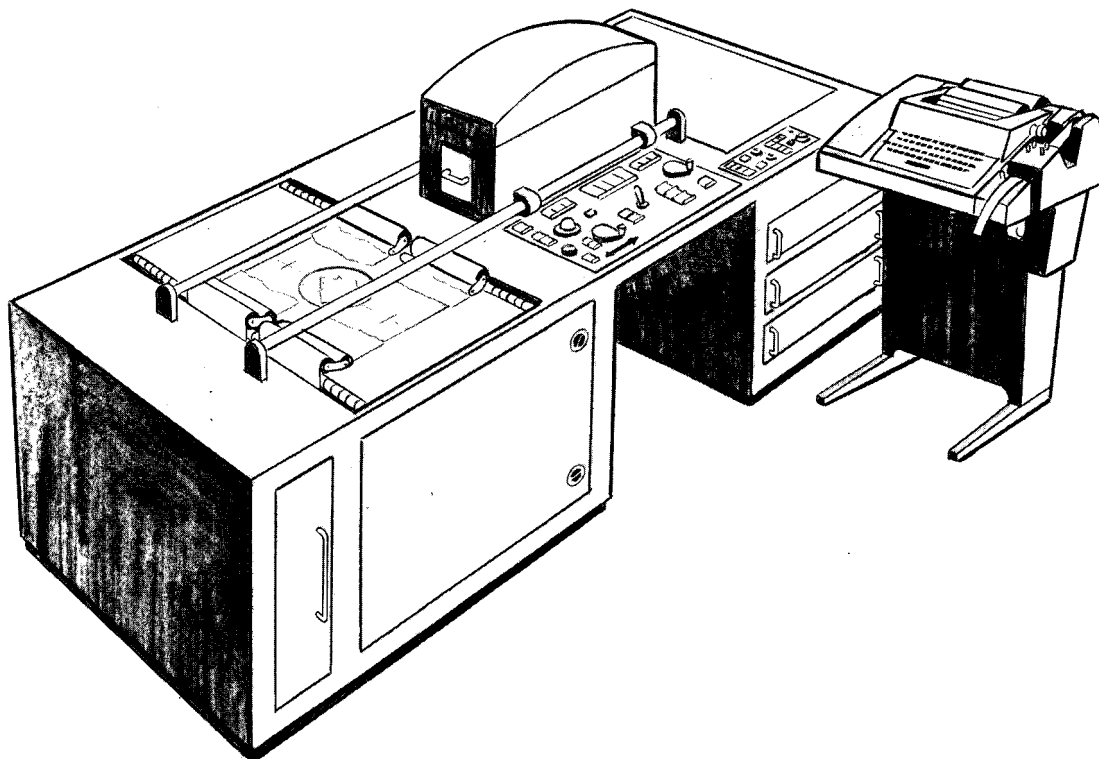
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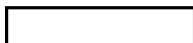
7. **CONTACT CHIP PRINTER**

This contact chip printer is now under development and will be capable of producing high-resolution photographic images on 4- by 5-inch cut film. Two image sizes will be provided (55 by 117mm plus 80 by 117mm), offering the analyst an image size commensurate with scale and ground coverage insofar as can be accommodated. A human/machine-readable accession or

reference number consisting of usable information as well as fiducial marks and security classification will be simultaneously printed on the output film chip. Input materials will be 70mm- to 5-inch-wide original negatives in single or dual roll, or single rolls up to 9.5 inches wide. The printer will be paper-tape driven with manual override for all functions.



25X1A



Weight: 3,500 lbs.
Size: H 50 in. W 48 in. L 72 in.
Power Requirements: 208 V & 115 V, 60 CPS, 3 phase, 4 wire, 10.8 AMP

Special Requirements: Toxic vent, magazine loaded; ambient light
Status: Prototype delivery expected in August 1967
Development Source: NPIC

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25X1A

8. **DRY PRINTER-PROCESSOR**

This is a dry-process, step and repeat, contact printer-processor for printing, processing, and delivering completely finished film positives as well as roll paper prints. The printer accomplishes both exposure and heat development within the same unit.

This printer-processor is a companion item to the dry-photo material currently being developed, in which the film and/or paper prints remain completely dry and require no wet processing. In the dry-process, this printer-processor will per-

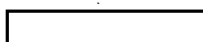
form in one machine all the functions which in the conventional wet silver system require separate operations for printing, developing, fixing, washing, and drying.

The prototype model was completed in December 1966. The unit is being retained at as Government Furnished Equipment (GFE) to be used in the testing and evaluation of the companion dry silver film and paper development.

25X1A



25X1A



Size: H 66 in.

Power Requirements:

Weight: 1,620 lbs.

W 32 in. L 82 in.

Two 115/120 V, 30 A

Special Requirements: Exhaust of 60 CFM

Status: One-of-a-kind prototype completed

Development Source: NPIC

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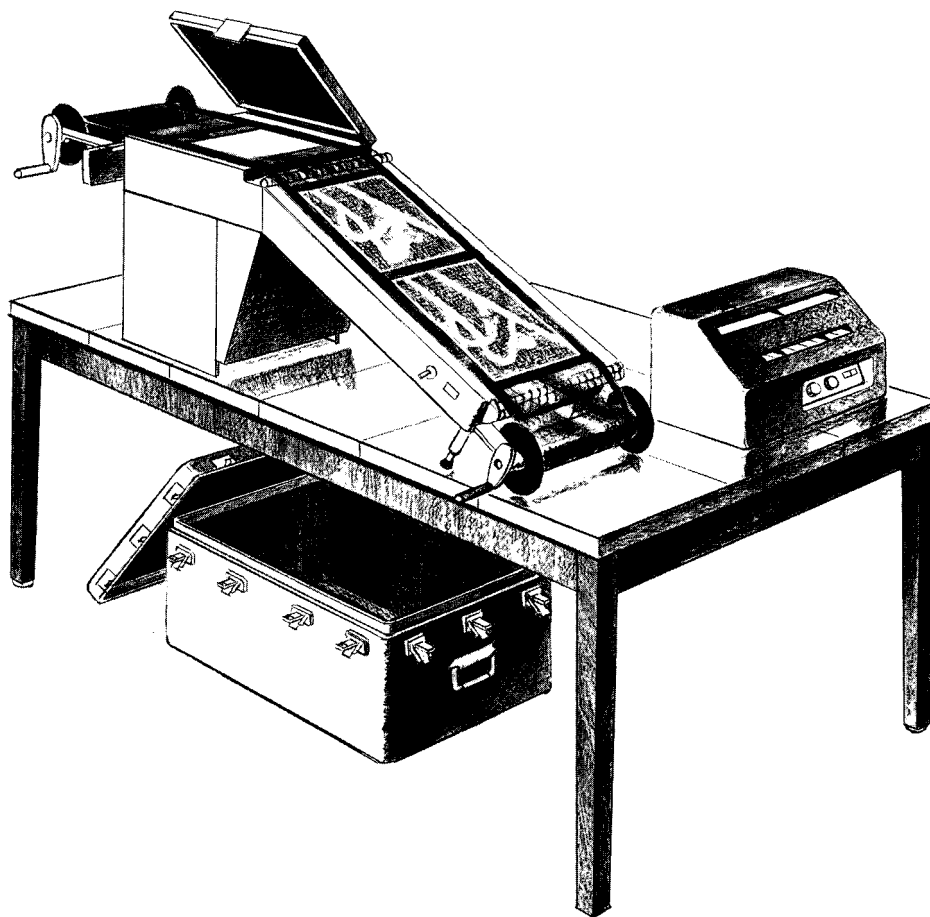
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9. **DRY PRINTER (FIELD)**

This proposed development, a prototype rapid access printer-processor suitable for laboratory or field use by the photo interpreter, will exhibit significant advantages over conventional processing with regard to time, manpower, and equipment required.

The photo interpreter will be able to view roll film on the light table and produce either film or paper contact prints in sizes up to 9 1/2

by 9 1/2 inches. The system will have a resolution capability or up to 150 lines/mm and will produce prints under ambient lighting conditions. The kit is designed so that all the separate items and a limited amount of reproduction material can be packed into one fly-away box. A separate box or boxes packed with reproduction material only could be provided for long range logistic support.



25X1A

Weight: *Approximately 90 lbs.*
Size: H 15 in. W 15 in. L 10 1/2 in.
Power requirements: 115/120 V, 15A

Special Requirements: None
Status: *Prototype delivery date August 1967*
Development Source: NPIC

SECRET

~~SECRET~~

X1A

10. [] LIGHT TABLE PRINTER

(This item is Unclassified)

X1A

Following a basic concept developed at the Naval Reconnaissance and Technical Support Center, a Richards 940 MCE light table was modified by C.B.S. Laboratories to add a [] copying capability.

The light table can be used in the conventional mode; however, when the area to be copied is found, it is placed over the 9- by 9-inch exposure platen at the end of the table and a

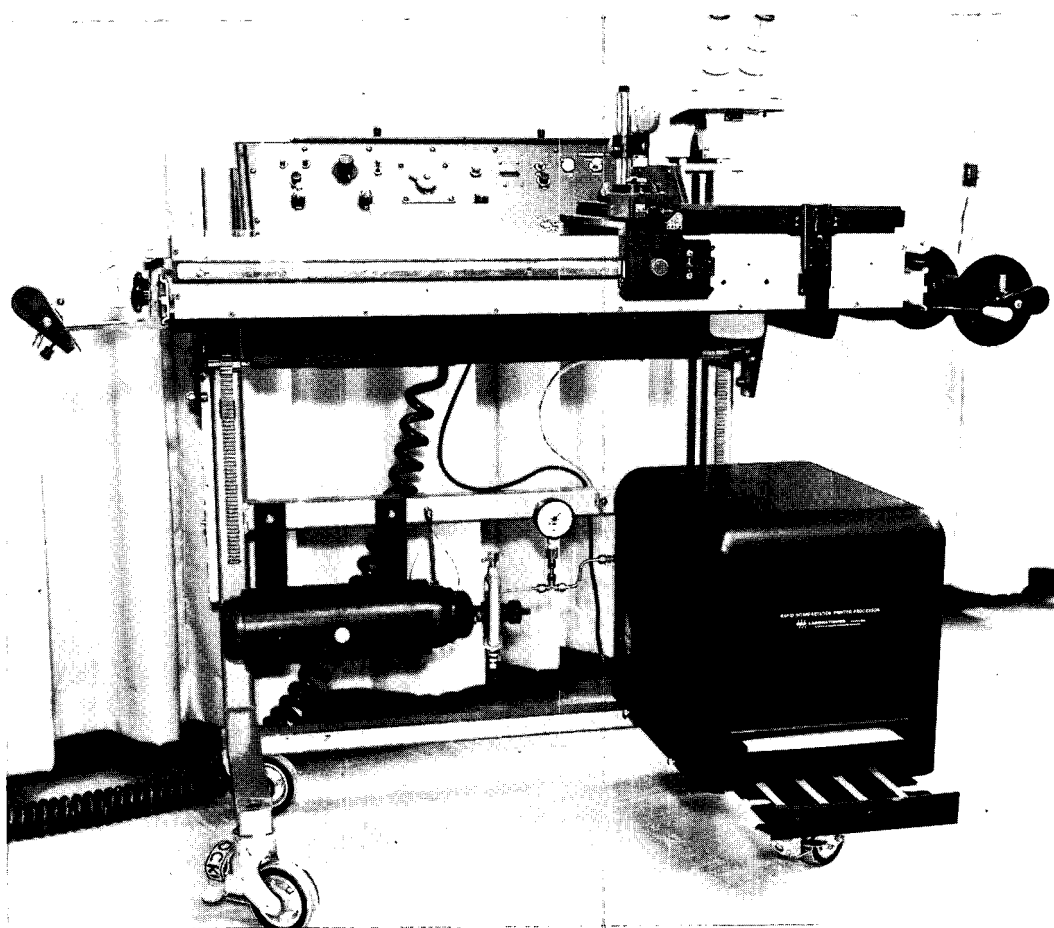
[] copy made. The exposure time can be varied from 10 to 60 seconds, depending upon the density of the original film. After exposure, the [] copy is fed into the integral processor, which produces a dry developed copy in 50 seconds. The process is positive to positive.

Utilization of special Technifax [] film gives a density range of 0.05 to 1.85, with a resolution of 200 lines/mm.

25X1A

25X1A

25X1A



X1A

[]

Weight: 450 lbs.
Size: H 36 in. W 48 in. L 21 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Six production units delivered in December 1966
Development Source: Started by U.S. Navy, completed by NPIC

~~SECRET~~

~~SECRET~~

NPIC/R-91/67

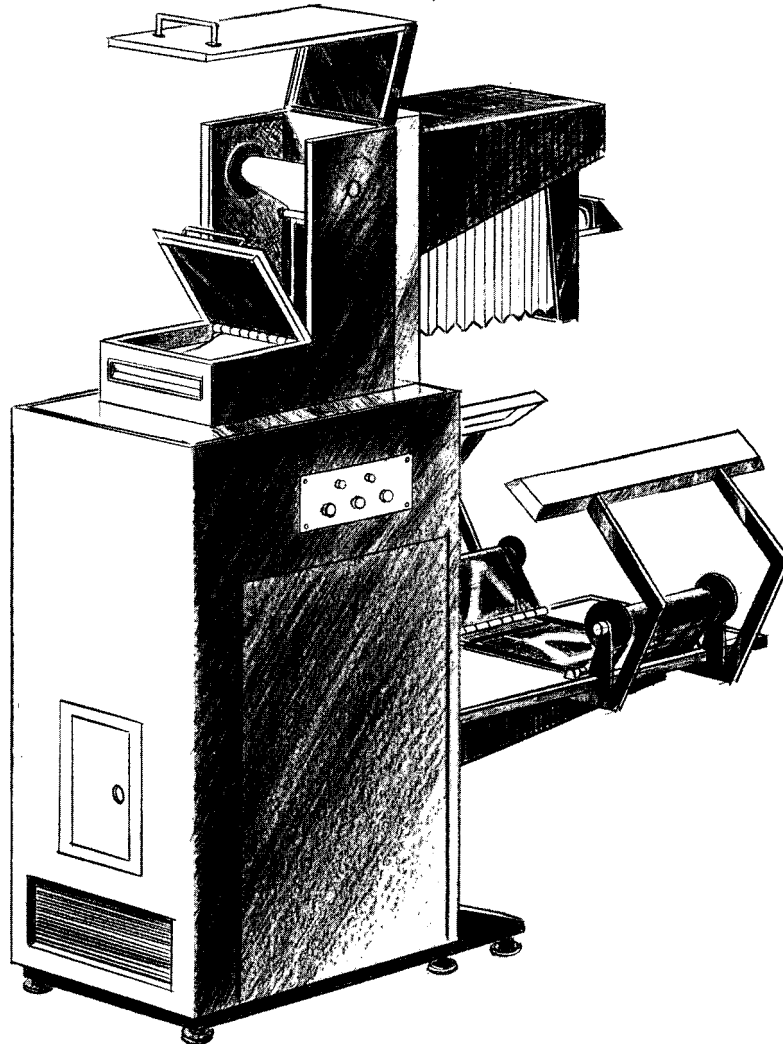
25X1A

11. VIEWGRAPH MAKER

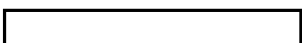
(This item is Unclassified)

The automatic viewgraph maker will produce a standard size viewgraph from transparent and reflective copy originals ranging in size from 70mm to 40 by 40 inches. A viewgraph produced from this equipment can be mounted and ready for

projection in less than five minutes. The viewgraph maker is designed for room light operation, and it utilizes the Anken Diffusion Transfer Transparent Material.



25X1A



Weight: 1,100 lbs.
Size: H 66 in. W 48 in. L 72 in.
Power Requirements: 110 V, 20 A

Special Requirements: None
Status: Prototypes to be developed in FY 67-68
Development Source: Modification by NPIC of Commercial Item

~~SECRET~~

SECRET

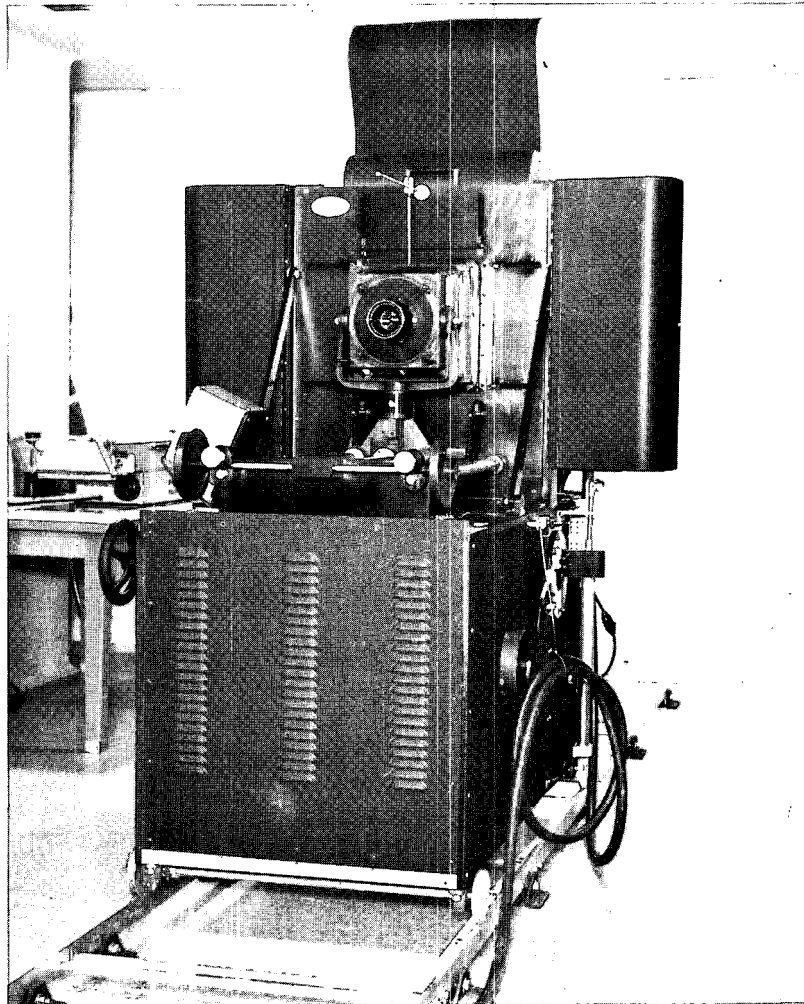
D. ENLARGING

1. SALTZMAN HORIZONTAL ENLARGER (8 BY 10 INCH)

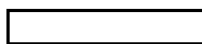
(This item is Unclassified)

With appropriate lenses, this instrument is suitable for enlargements from 7x - 140x, but requires long exposure times at large magnifications. The 9.5-inch aerial roll-film folder, which accommodates up to 300 feet of film, can be raised, lowered, and tilted to position the desired area to be printed from the 9-inch film.

This printer can accept 12- by 12-inch color compensating filters for making color prints. The enlarger utilizes four 12-inch pulsating xenon lamps and exposure is accomplished by the lens capping method without use of a shutter. The entire unit (less easel) is mounted on a 24-foot track, with the maximum movement being 20 feet.



25X1A



Size: H 5.75 in.

Weight: 1,000 lbs.

W 2.9 in. L 6.75 in.

Power Requirements: 220 V, 60 CPS, single phase, 50 A

Special Requirements: Dark room

Status: Commercially available

Development Source: Commercial

SECRET

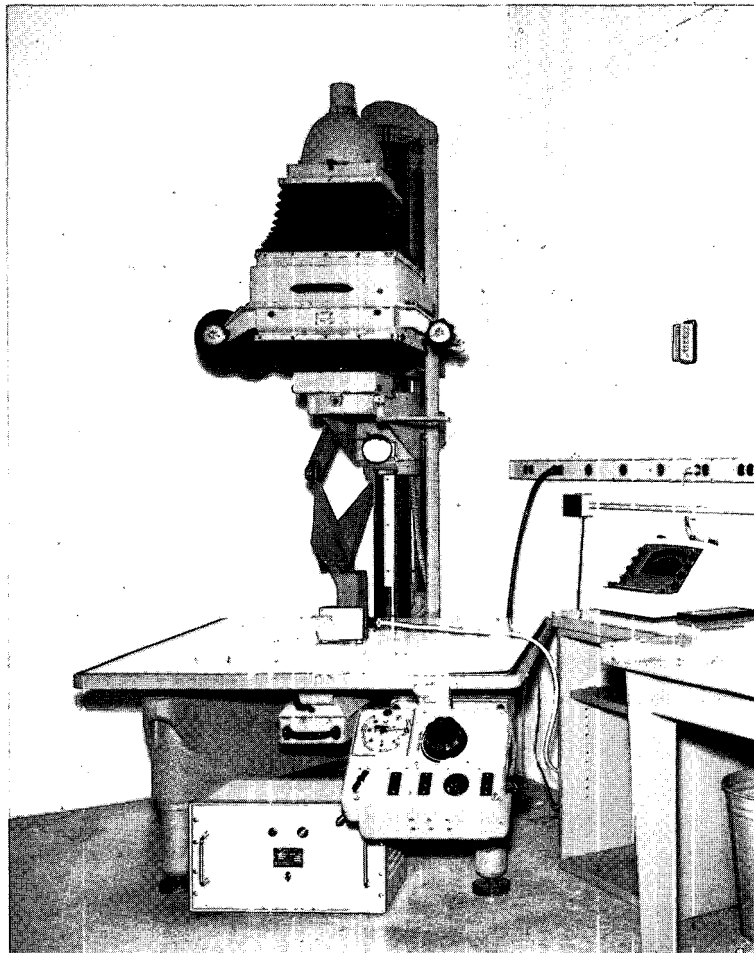
SECRET

2. WILD VG-1 AUTOFOCUSING ENLARGER (0.75X TO 7X)

(This item is Unclassified)

The Wild VG-1 Enlarger will accommodate glass plates or cut film up to 9.5 by 9.5 inches, and roll film up to 9.5 inches in width and 500 feet in length. The light source is a diffused mercury-vapor lamp and the enlarging lens is corrected to the narrow band-width or wavelength of this light (350 to 700 microns). The Reprogon lens has a focal length of 150mm, a

speed of $f/5.6$, and a maximum angular field of 74 degrees. Its capability ranges from 200 lines/mm on-axis to about 60 lines/mm at 37 degrees off-axis. Exposure time is controlled by a built-in meter and is accomplished by means of a between-the-lens shutter. The maximum paper, or easel, size is 40 by 41 inches.



25X1A



Weight: 1,160 lbs.
Size: H 85 in. W 41 in.
Power Requirements: 220 V, 60 CPS, 570 W

Special Requirements: Dark room
Status: Commercially available
Development Source: Commercial

SECRET

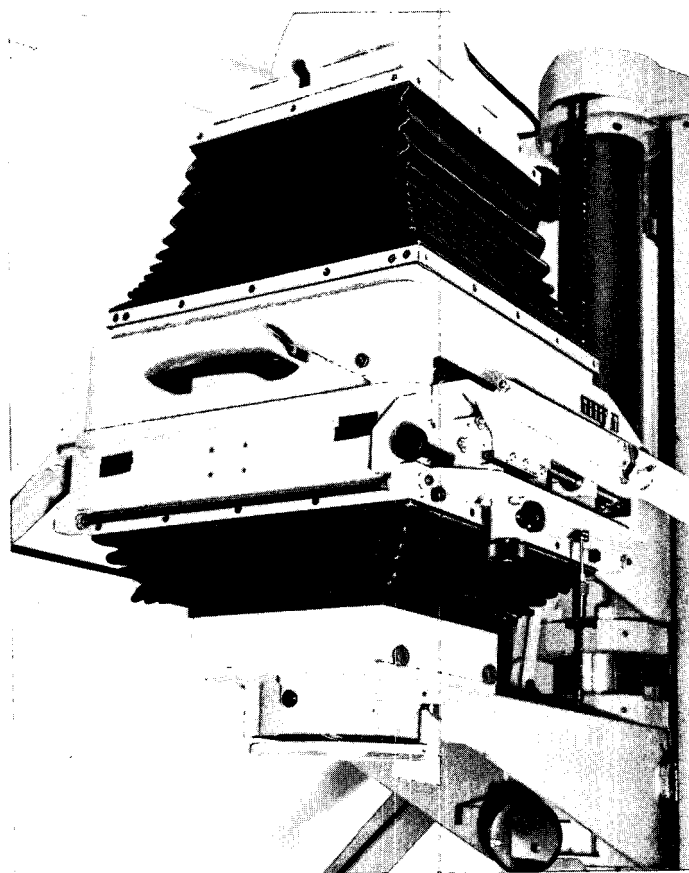
SECRET

3. MODIFICATION OF THE [] VG-1 ENLARGER FILM TRANSPORT

(This item is Unclassified)

This enlarger was designed to accommodate film formats up to 9.5 by 9.5 inches and has a maximum magnification power of 7x; however, at the highest magnification only the middle 6 inches of the film can be enlarged because the film cannot be transported perpendicular to the film transport axis. Therefore, the 42-inch-square enlarging table restricts the operator to the middle 6-inch-square area of the negative at 7x. Any imagery outside of this 6-inch area is projected off the printing table.

Since it is more advantageous to use the center of the lens field, it would be beneficial to move the original in the "Y" direction (perpendicular to the film transport axis). This modification will allow any portion of the 9.5- by 9.5-inch format to be projected on the printing table at any magnification up to the maximum of 7x. One instrument has been modified to allow movement of the complete film transport system in the "Y" direction.



[]

Weight: Modification adds approximately 15 lbs. to enlarger
Size: Original enlarger not increased
Power Requirement: None

Special Requirements: None
Status: Modification completed and additional procurement not anticipated
Development Source: NPIC

SECRET

~~SECRET~~

25X1

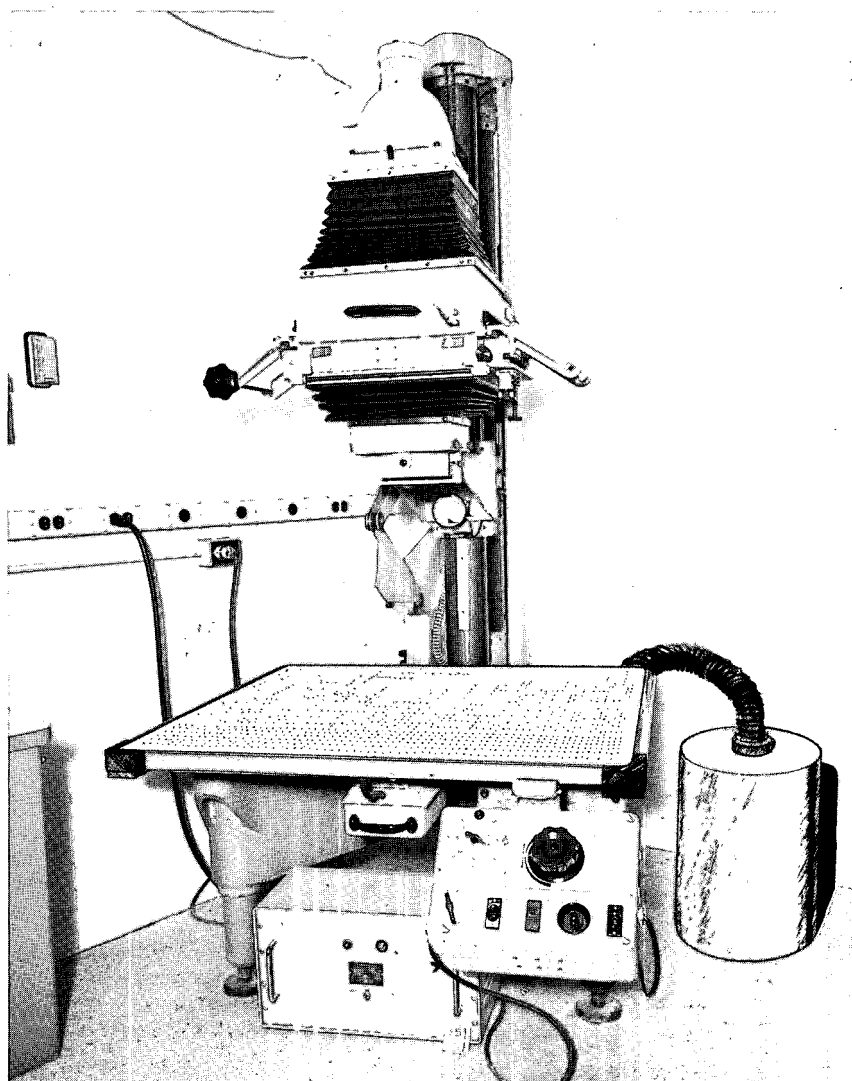
25X1

4. VACUUM EASEL FOR THE VG-1 ENLARGER

(This item is Unclassified)

A vacuum easel is being developed for the VG-1 Enlarger. Because of the internal construction of the easel, only those vacuum ports actually covered by the printing paper

will be activated. Thus, there will be no vacuum loss around the outside of the paper. It will not be necessary for the operator to use masks or weights.



25X1A

Weight: 150 lbs.
Size: H 2 in. W 42 in. L 42 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Prototype scheduled for delivery in August 1967
Development Source: NPIC

~~SECRET~~

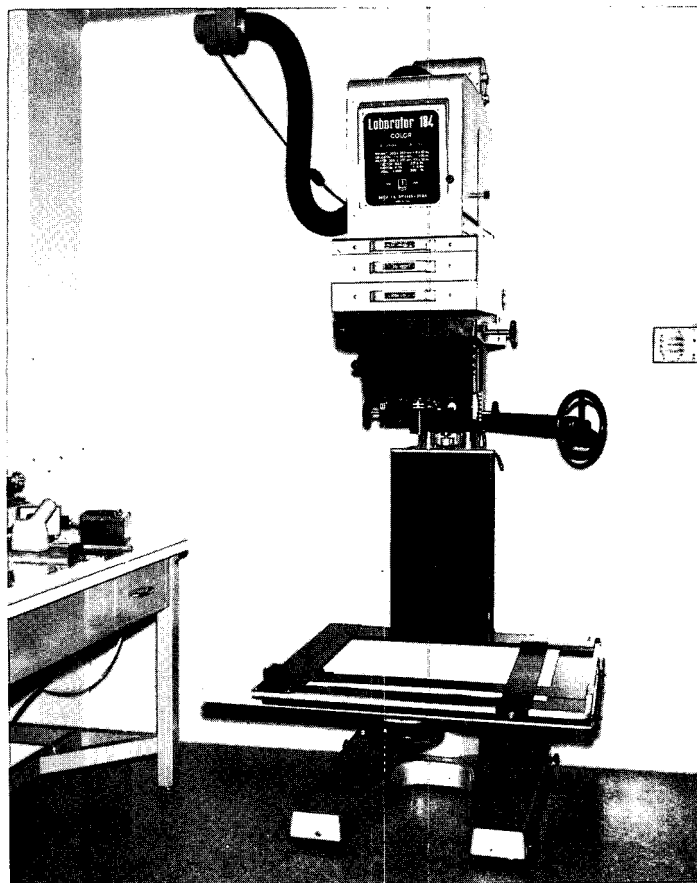
SECRET

5. DURST ENLARGING PRINTER (35MM TO 8 BY 10 INCHES)

(This item is Unclassified)

This enlarging printer can be used either vertically, with a 28- by 39.5-inch adjustable easel, or horizontally, projecting onto the wall of a room. The enlarger head can be tilted up to 90 degrees and the lens stage can be swung to either right or left to match the tilt of the negative. The easel, or baseboard, can be ball-and-socket mounted to provide movement in any direction to correct for distortions. Lenses from 50mm to 300mm are available, depend-

ing on the size of the negative used and the degree of magnification desired, and 2 different lamp houses are also available, one with a frosted tungsten lamp and the other with a cold cathode grid. Condensers and filters are designed with drawer mounts and are readily interchangeable. A roll-film carrier, available as an accessory, handles film up to 9.5 inches wide and up to 500 feet long.



25X1A

Size: H 74 in.

Weight: 352 lbs.
W 39.5 in. L 35 in.

Power Requirements: 115 V, 60 CPS, single phase, 12 A

Special Requirements: Dark room

Status: Commercially available

Development Source: Commercial

SECRET

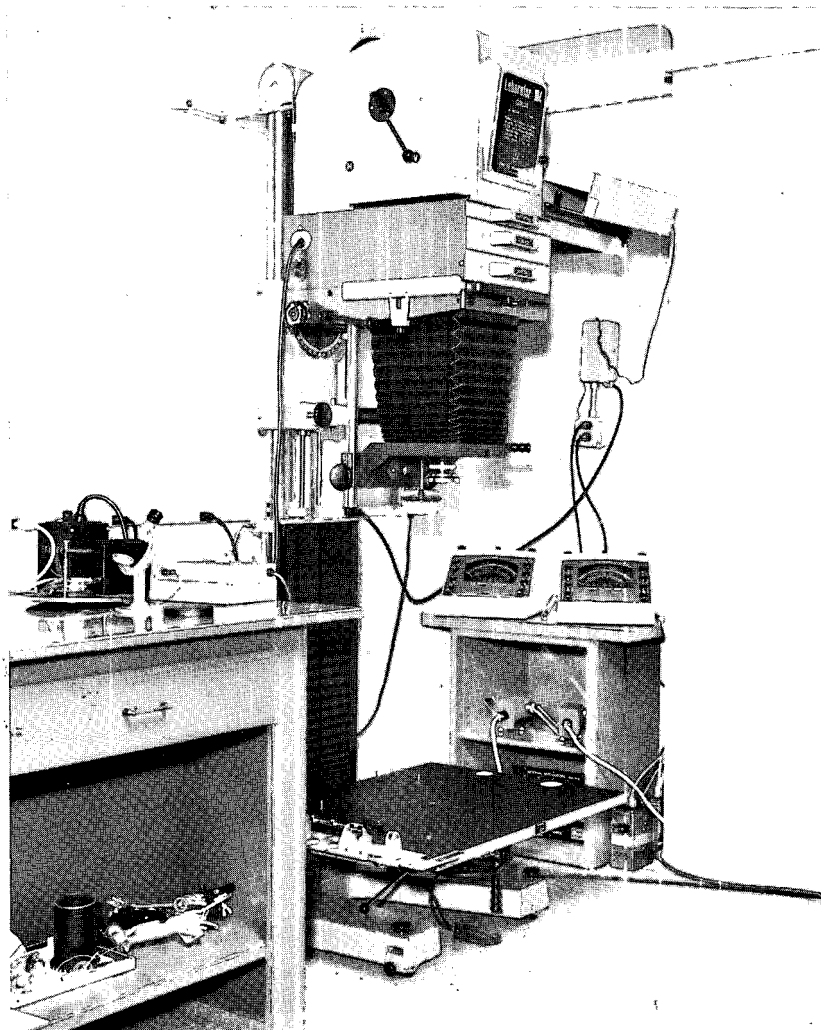
SECRET

6. DURST ENLARGING PRINTER-COLOR MODIFICATION (35MM TO 8 BY 10 INCHES)

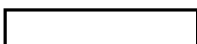
(This item is Unclassified)

This enlarging printer with color head is used for specialized work in making color separations from transparencies. Teamed with a densitometer, it standardizes the mechanics of color separation, minimizing or eliminating the

variables that affect consistency. Also used in making paper prints and dupe transparencies, it provides a maximum range of enlargement and reduction.



25X1A



Size: H 110 in.

Power Requirements:

Weight: 420 lbs.

W 36 in. L 42 in.

115 V, 60 CPS, single phase, 12 A

Special Requirements: Ambient light

Status: Commercially available

Development Source: Commercial

SECRET

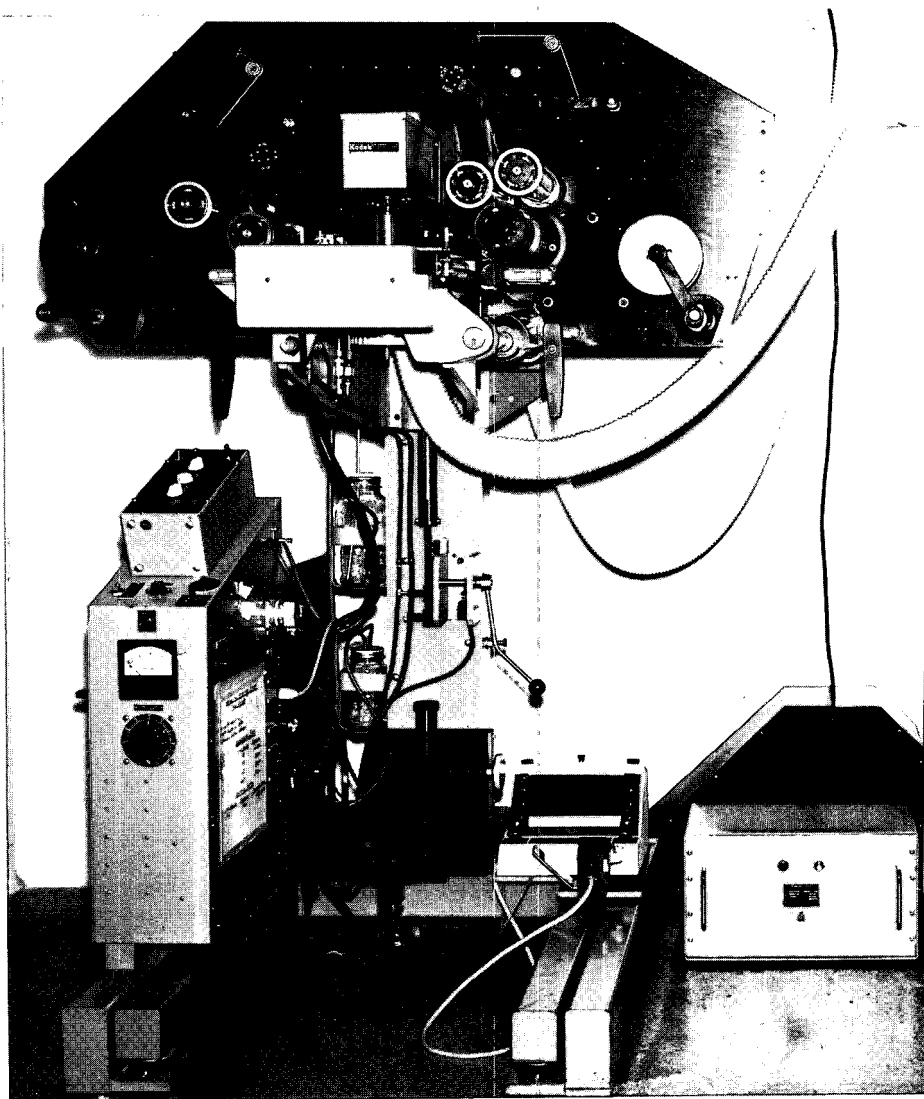
SECRET

25X1A

7. [] PRECISION ENLARGER (10X-20X-40X)

This high-resolution enlarger accommodates negatives of 70mm, 5, 6.6, 8, and 9.5 inches transported by motor drive. Magnifications of 10x, 20x, and 40x are obtainable by means of

separate lenses. The on-axis resolutions obtained by this enlarger are: for the 10x, 350 lines/mm; for the 20x, 550 lines/mm; and for the 40x, 575 lines/mm.



X1A

[]

Weight: 1,500 lbs.

Special Requirements: Toxic air exhaust, dark room

Size: H 77 in.

W 56 in. L 41 in.

Status: Commercially available

Power Requirements: 115 V, 60 CPS, 1 phase, 715 A

Development Source: NPIC

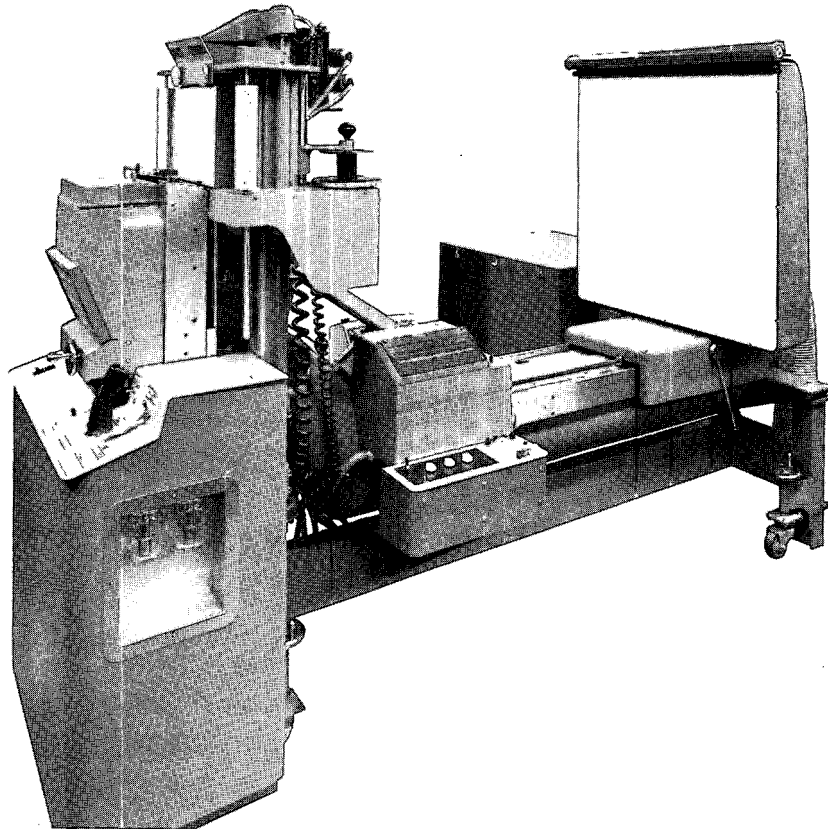
SECRET

25X1A

8. BRIEFING PRINT ENLARGER (3X TO 60X)

This horizontal-type enlarger will accommodate black and white or color film in widths from 70mm to 9.5 inches and lengths to 500 feet. The magnification range from 3x to 60x is accomplished by a family of six separate lenses with matching condensers. A film area of 0.58 inch diameter may be enlarged to as much as 40 by 40 inches. The top resolution attainable with the negative is 550 lines/mm based on a

100:1 contrast target. Other features include a vertical fluid gate, X and Y movement of the film plane, and a coordinate measuring system with a least count of 1mm. A lens system has been developed as a component part for this instrument which will extend the enlargement capability to 160x. A prototype 160x lens is scheduled to be delivered in October 1967.



25X1A

Size: H 35 in.

Weight: 2,450 lbs.

L 42 in. W 128 in.

Power Requirements: 208/120 V, 60 CPS, 20A, 2 phase, 4 wire

Special Requirements: Toxic air exhaust, dark room

Status: Prototype delivery in July 1967

Development Source: NPIC

SECRET

25X1A

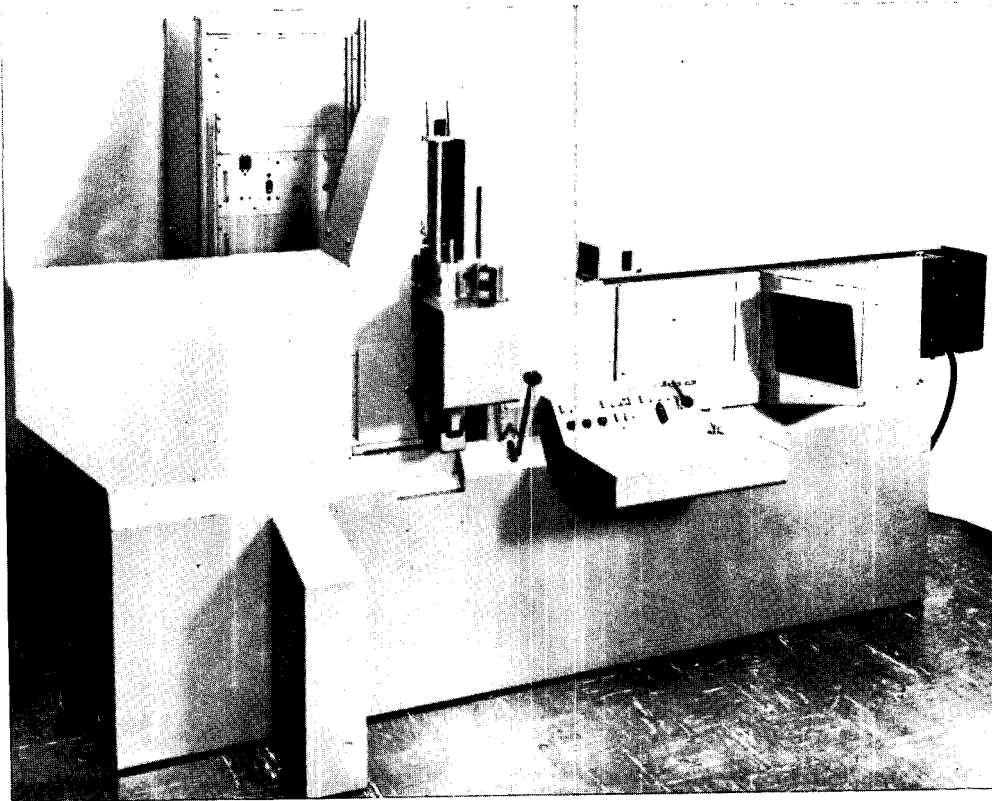
9. [] COHERENT-LIGHT ENLARGER

This enlarger was built to test the feasibility of using coherent or partially coherent light as a mode of illumination for an enlarger. The enlarger was built by [] and evaluated by Technical Operations. The results of the experiment were negative, i.e., it was found that there was no significant advantage to using coherent illumination in the enlarging of conventional photography. However, the enlarger itself proved to be a versatile and useful test bed for spatial filtering experiments and other ex-

periments requiring light of varying degrees of coherence. The enlarger produces a 4x enlargement and, in its incoherent mode of operation, has a resolution limit approximating 1000/mm on axis, at the image plane.

NPIC has loaned the enlarger to Technical Operations as government furnished equipment for use in the Image Analysis Program. Since the enlarger would not prove cost effective in the present operational environment, it is planned to be used only as a test bed.

25X1A



25X1A

[] Weight: 2,000 lbs.
Size: H 6 ft. W 4 ft. L 11 ft.
Power Requirements: 115 V, 20 A

Special Requirements: Outside exhaust vent
Status: Test device only
Development Source: NPIC

SECRET

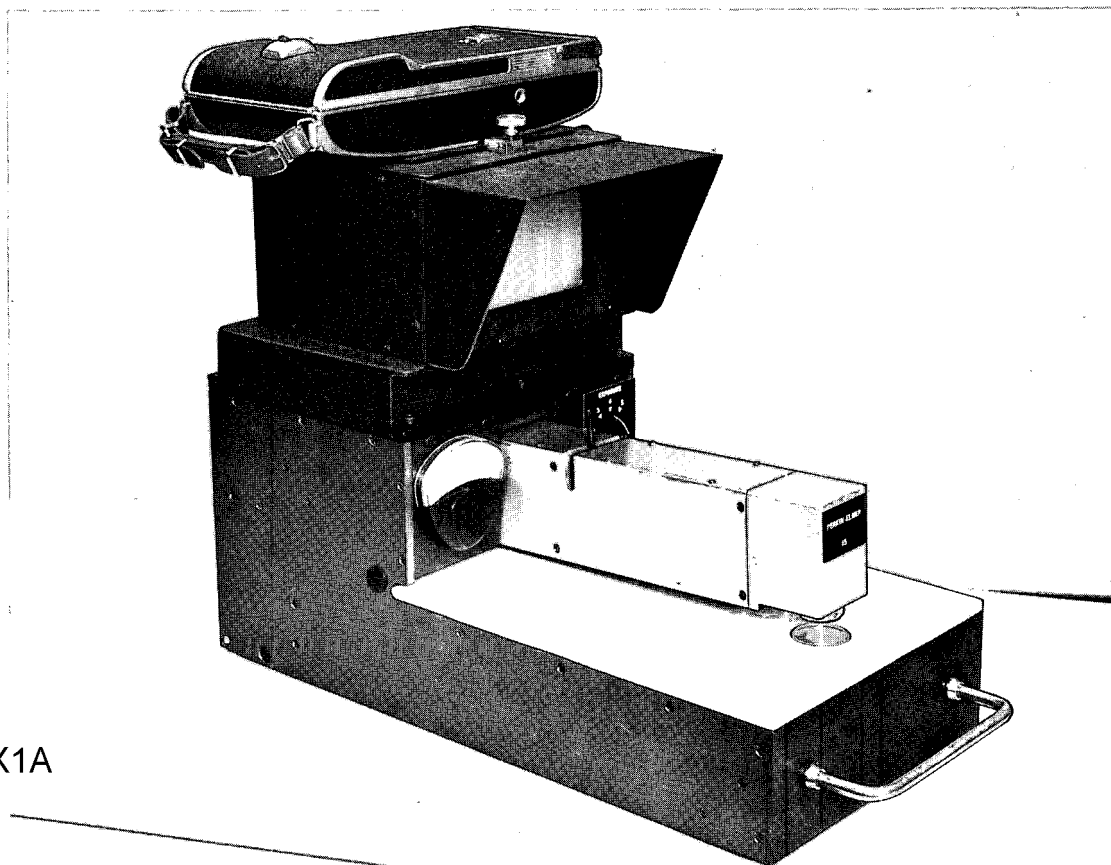
SECRET

10. PERKIN-ELMER PHOTOMICROGRAPHIC ENLARGER

(This item is Unclassified)

This enlarger is designed to meet the need of photo interpreters and photogrammetrists who must frequently make photomicrographs yet cannot afford more than a minimum of time, effort, and preparation. The enlarger provides magnified permanent photographic records of small areas of film and is intended for tabletop use in ambient light. It incorporates all the necessary elements for high-quality photomicrography, in-

cluding condenser unit, microscope objective, ocular viewing screen, and Polaroid film back. Exposure and fine-focus adjustments are provided for occasional trimup or use with a filter. A choice of 3 magnifications (15x, 33x, or 64x) is offered by substituting objective heads. An adapter for Polaroid roll film or 4 x 5 inch cut film is available.



25X1A

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Weight: 20 lbs.

Size: H 15 in. W 5 in. L 19 in.

Power Requirements: 110 V, 60 CPS

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet
NPIC stated requirements**SECRET**

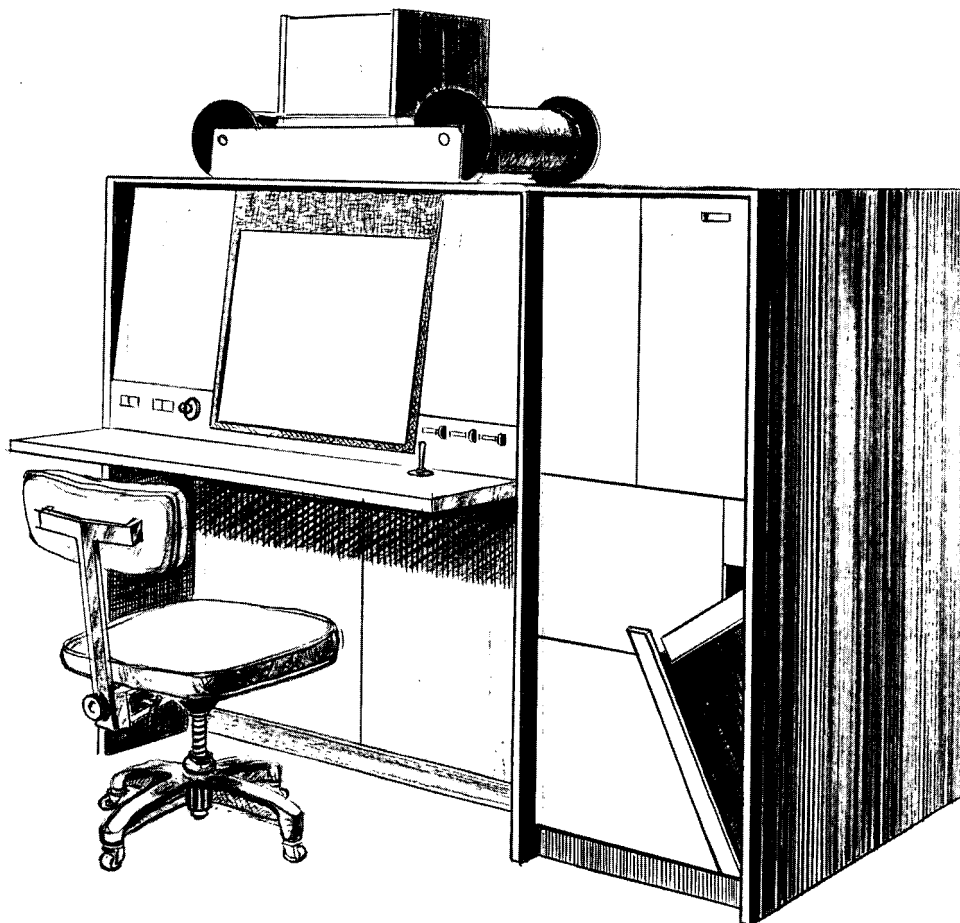
SECRET

25X1A

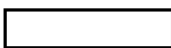
11. **P. I. PRINT ENLARGER**

This enlarger will allow multimagnification viewing and positive-to-positive (or negative-to-negative) hard copy printout from photography 70mm to 9½ inches wide. The input images will be enlarged approximately 2, 4, 7, 10 and 20x and the output size will be either 10 by

10 or 20 by 20 inches. Full X and Y translation of the input will allow any portion to be reproduced. The printer will utilize the Anken Diffusion Transfer Material which will yield a finished hard copy print in less than 1 minute.



25X1A



Size: H 76 in.

Weight: 9,000 lbs.

W 48 in. L 49 in.

Power Requirements: 115 V, 15 A

Special Requirements: None

Status: Prototype to be delivered November 1967

Development Source: NPIC

SECRET

SECRET

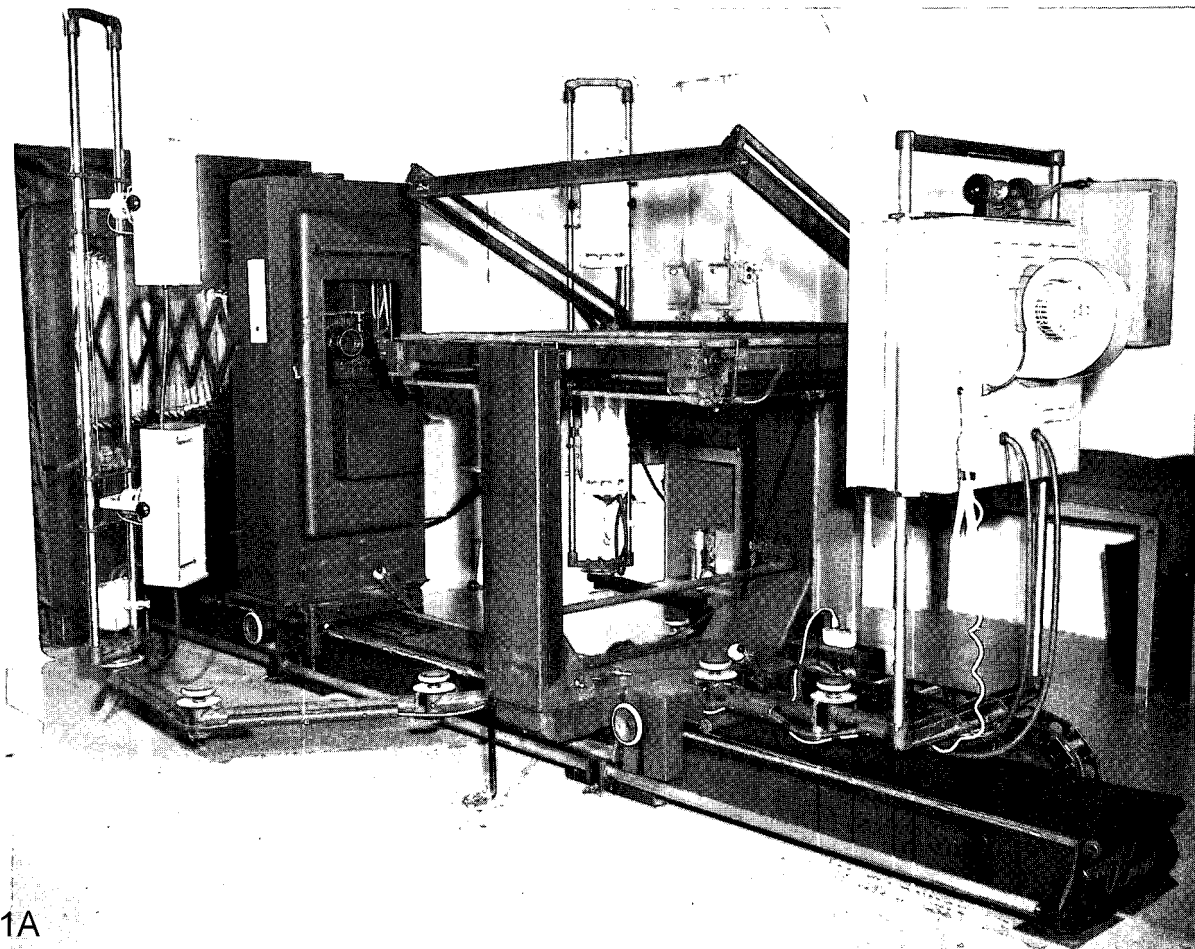
E. COPYING

1. KLIMSCH HORIZONTAL COPY-CAMERA (32 INCH)

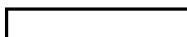
(This item is Unclassified)

This is a darkroom-type camera for half-tone, line, and continuous-tone negatives or transparencies, color separations, and masking. The lens stage and easel are mounted and travel on a heavy channel at floor level; the four 1,000-watt xenon enclosed-arc lamps are mounted on, and travel with, the easel base. Vacuum is pro-

vided for holding the film in the camera back, and exposure is controlled by means of an electrical behind-the-lens shutter. The equipment is designed for through-the-wall-type installation, with the camera back and controls in a darkroom, and is capable of reproductions ranging from 7x for enlarging to 10x for reducing.



25X1A



Weight: 2,000 lbs.
Size: H 7 ft. W 4.75 ft. L 19.5 ft.

Power Requirements: 240 V, 30 A

Special Requirements: Dark room
Status: Commercially available
Development Source: Commercial

SECRET

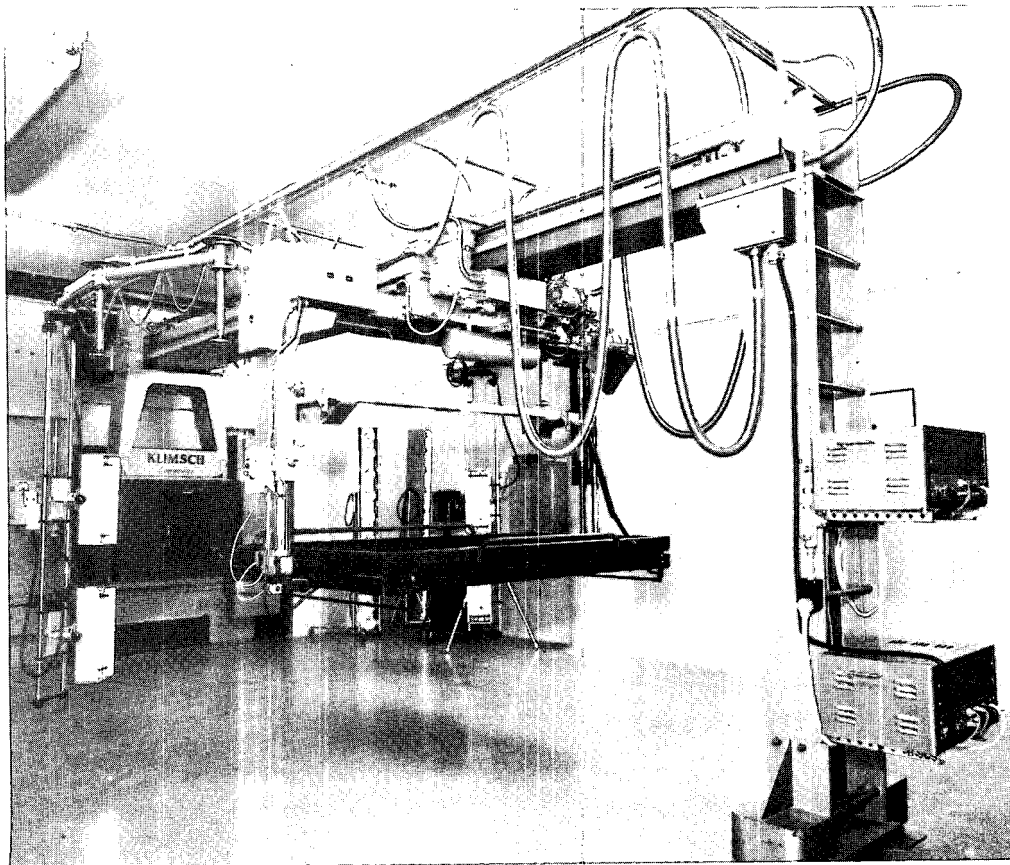
SECRET

2. KLIMSCH AUTOFOCUSING COPY-CAMERA (40 BY 40 INCH)


(This item is Unclassified)

This is a large, horizontal, precision, overhead, darkroom-type camera for halftone, line, or continuous-tone reproduction from either reflection or transparent copies (color reproductions may also be made). The overhead rails that carry the movable copyboard and lens stage are supported by columns at the ends. The camera is designed for through-the-wall installation in which the film holder and controls are in the darkroom. Complete freedom of movement is provided for the copyboard and lens

mount to allow for rectification and correction of distortion. A double-reversing mirror system is also provided for inverting the negative image when necessary; vacuum is available for holding both the film and the copy material. Four 1,000-watt xenon enclosed-arc lamps are included for illumination of the copy material. The range of reproduction is 1x to 5x for enlargements and 1x to 12x for reductions. Exposure is controlled by an electrically operated behind-the-lens shutter.



X1A


 H 10.5 ft

Weight: Several tons
 W 10 ft. L 26.5 ft.

Power Requirements: 240 V, 30 A

Special Requirements: Dark room
 Status: Commercially available
 Development Source: Commercial

SECRET

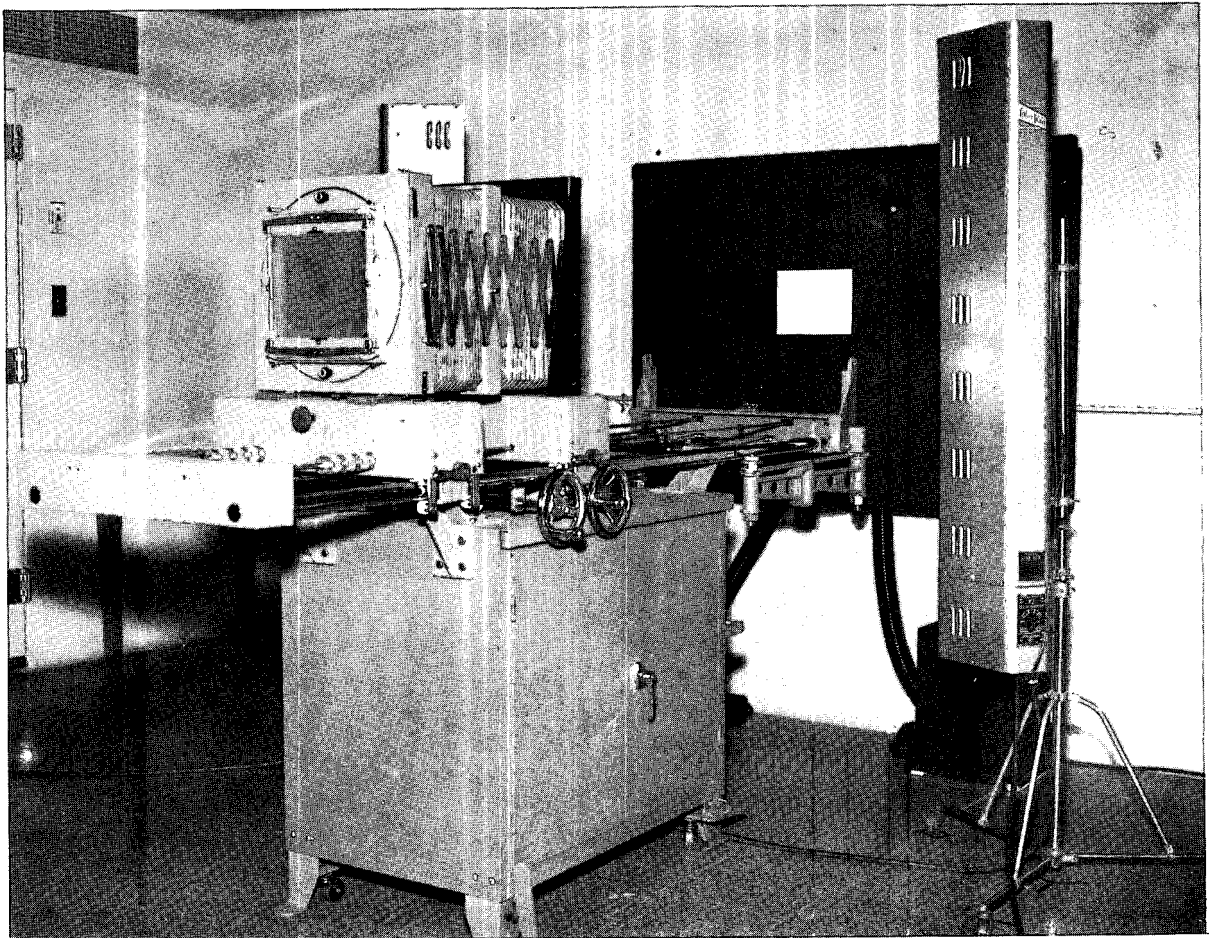
SECRET

3. BURKE AND JAMES PRINCETON COPY-CAMERA (11 BY 14 INCH)

(This item is Unclassified)

This copy-camera may be used in either the vertical or horizontal mode, and 4- by 5-inch film is accommodated by means of a reducing back, the maximum enlargement/reduction obtainable being 4 times the linear dimension of the front of the camera bed and the camera moves on the bed by means of 2 carriages, one supporting the lens, the other the camera back. The lens is a Series XII Anastigmat copying

type having a focal length of 14 inches and a maximum aperture of f/6.3 with a 15- to 60-inch focus range between the lens and the copy object. The shutter is a between-the-lens type with speeds ranging between 1.5 and .02 seconds, flash synchronization being provided for both Class M and Class X bulbs at all speeds. The lamps required to illuminate the copy material are not included.



Size: H 62 in. W 29 in. L 87 in.
 Weight: 147 lbs
 Power Requirements: None

Special Requirements: Cut film holder
 Status: Commercially available
 Development Source: U.S. Government

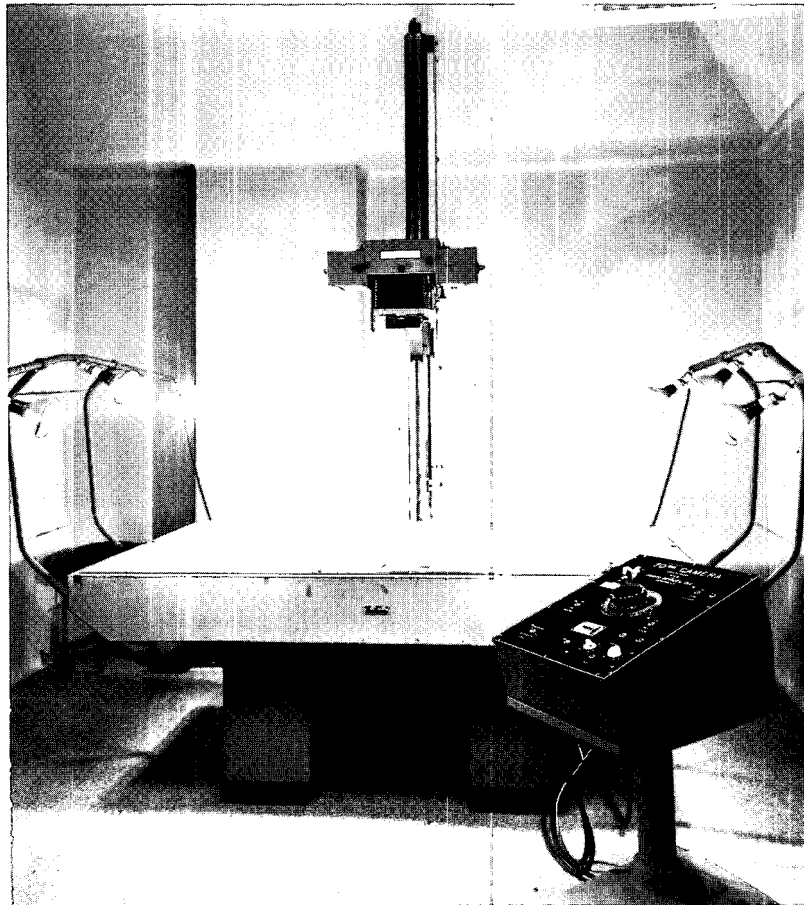
SECRET

4. PHOTO DEVICES COPY-CAMERA

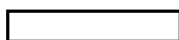
(This item is Unclassified)

This machine uses non-perforated 70mm film in 100-foot darkroom-loading spool-type magazines. A cutoff knife is built into the magazine to permit instant removal of a single exposure from any part of the 100-foot roll. The 60- by 40-inch easel is equipped with vacuum and has a built-in diffused backlight light source for exposing any transparent subject matter. The reflection illumination consists of 6 reflector-

type floodlamps, the intensity of which can be controlled from a console. Exposure with speeds ranging from 0.1 to 11 seconds is accomplished by an electrically operated shutter that is controlled by an electronic timer. The reduction ratio ranges from 8x to 30x and automatic focus is provided throughout the entire range. The reduction ratio is set by means of a motor drive on a geared center post.



25X1A



Size: H 69 in W 72 in. L 60 in.
Power Requirements: 115 V, 20 A

Weight: 500 lbs.

Special Requirements: None
Status: Commercially available
Development Source: Commercial

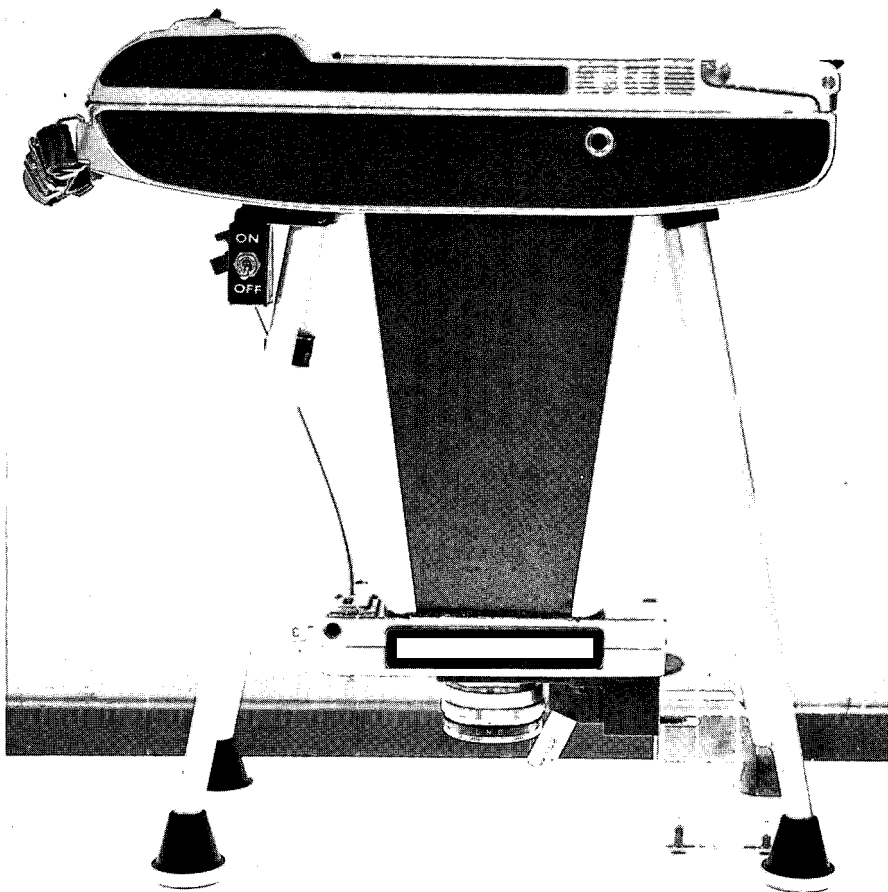
SECRET

5. **FIXED-FOCUS COPY-CAMERA**

(This item is Unclassified)

This camera has a fixed-focus 3x enlargement capability on Polaroid roll film. This enables the operator to produce an instantaneous enlargement of the area of interest on an image. The camera, designed for use by inexperienced operators, is completely automatic; the only adjustment required is for various types of Polar-

oid film. This camera is simply placed over imagery that is on a light table, and the film is exposed by opening the shutter. An automatic exposure control measures the light level and the length of exposure. The camera can be used in a normally lighted room.



25X1

25X1A

Weight: *Approximately 7 lbs.*
Size: H 12 in. W 11 in. L 7 in.
Power Requirements: *Battery operated*

Special Requirements: *None*
Status: *Commercially available*
Development Source: *Commercially developed to meet NPIC stated requirements*

SECRET

SECRET

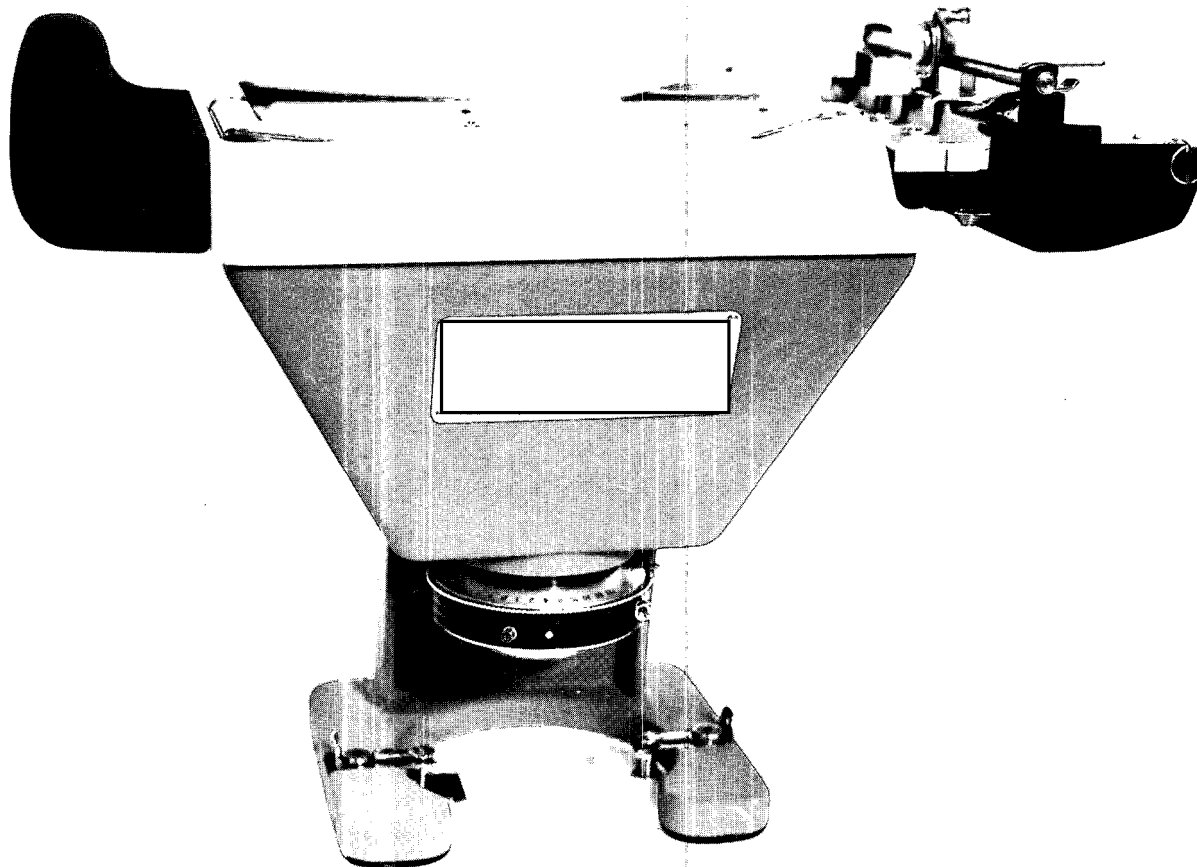
25X1

6. **FIXED-FOCUS COPY-CAMERA**

(This item is Unclassified)

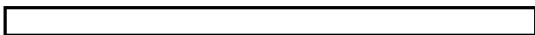
This camera is available without the exposure control. A new model is expected to be introduced with an automatic exposure control.

This camera uses the Polaroid 4- by 5-inch sheet film, and is available in 3 models with fixed magnifications of 1x, 3.16x, and 7x.



25X1

X1A



Size: H 12 in. W 6 in. L 12 in.

Weight: Approximately 7 lbs.

Power Requirements: None

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet NPIC stated requirements

SECRET

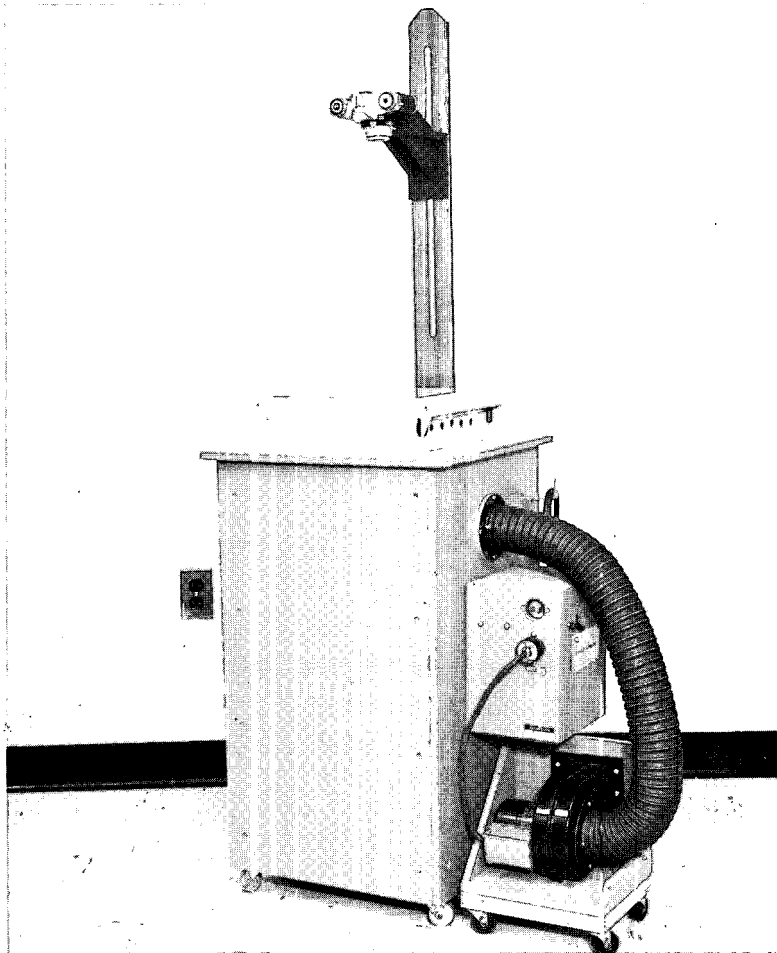
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7. 35MM COLOR SLIDE COPYING UNIT

(This item is Unclassified)

Commercially available slide duplicating printers did not meet NPIC's requirement for making 35mm slides from existing vu-graphs, both black-and-white and color; therefore, the Center built its own copying unit. The unit consists of: 1) A wooden cabinet on casters which houses the light source (4 colortran bulbs); 2) An aluminum column attached to the cabinet

with a bracket to hold the camera; 3) A light table with a masking arrangement to control stray light; 4) A voltage regulator to control light intensity and maintain proper color balance; 5) An exhaust system to prevent overheating which is independently mounted on its own dolly to eliminate vibration; and 6) A 35mm camera.



25X1A



Size: H 60 in.

Power Requirements: 110 V

Weight: 50 lbs

W 30 in. L 18 in.

Special Requirements: None

Status: In use (drawings on file)

Development Source: NPIC

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SECRET

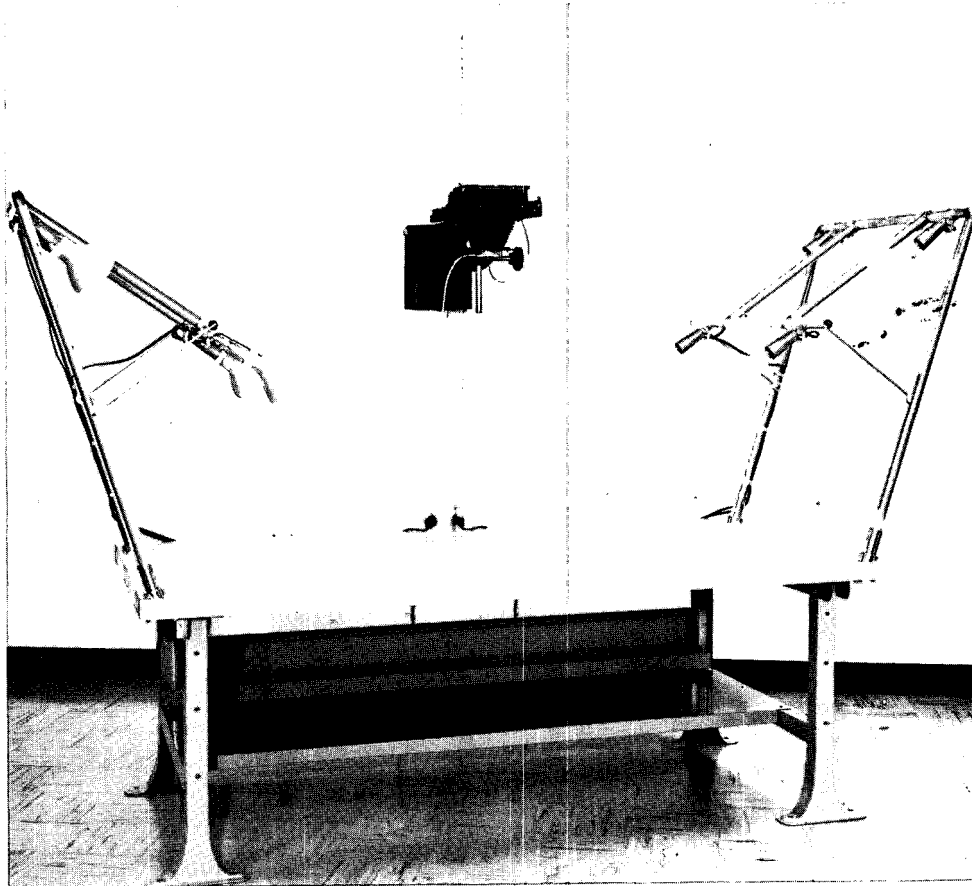
8. BRIEFING BOARD COPIER FOR MODIFIED POLAROID CAMERA

(This item is Unclassified)

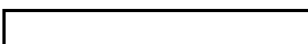
A Polaroid MP-3 copy camera was modified at NPIC to increase its maximum copy size capability from 20 by 24 inches to 30 by 40 inches to enable it to copy briefing boards of that size. This was accomplished by replacing the original base and lighting assembly with a 3 by 6 feet hardwood top workbench fitted with a double array of flood lamps. The only change in the camera itself is the addition of a tubular spacer

between the camera body and its carriage to move the optical centerline out to the center of the larger copy area.

The lower set of four lamps duplicates the performance of the original lamps. They swing down out of the way of the upper high intensity lamps when the latter are used for the larger copy size.



X1A



Weight: 250 lbs.

Special Requirements: None

Size: H 82 in. W 36 in. L 91 in.

Status: In use (drawings on file)

Power Requirements: None

Development Source: NPIC

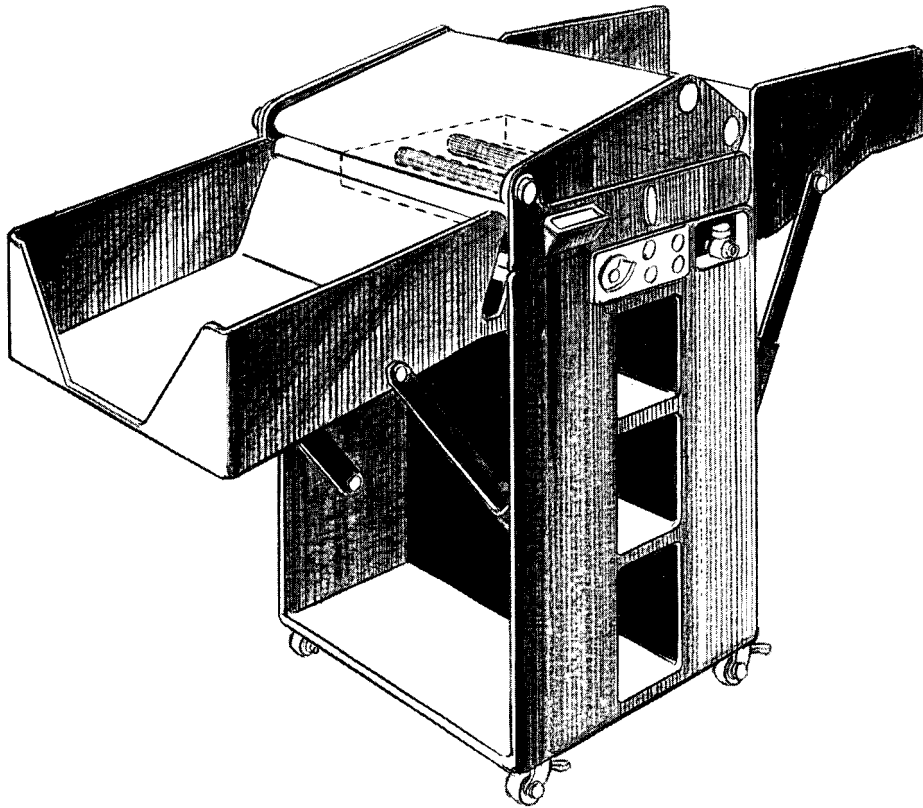
SECRET

F. SUPPORTING

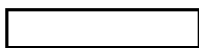
1. SUPER-WIDE PRINT STRAIGHTENER

This machine removes the curl from photographic prints up to 30 inches wide. The prints may be either ferrotype or matte finish, single

or double weight. The print curl is removed by a combination of moisture application and staggered rollers.



25X1A



Size: H 36 in.

Power Requirements:

Weight: 150 lbs.

W 34 in. L 45 in.

100 V, 20 A

Special Requirements: None

Status: Prototype to be delivered June 1967

Development Source: NPIC

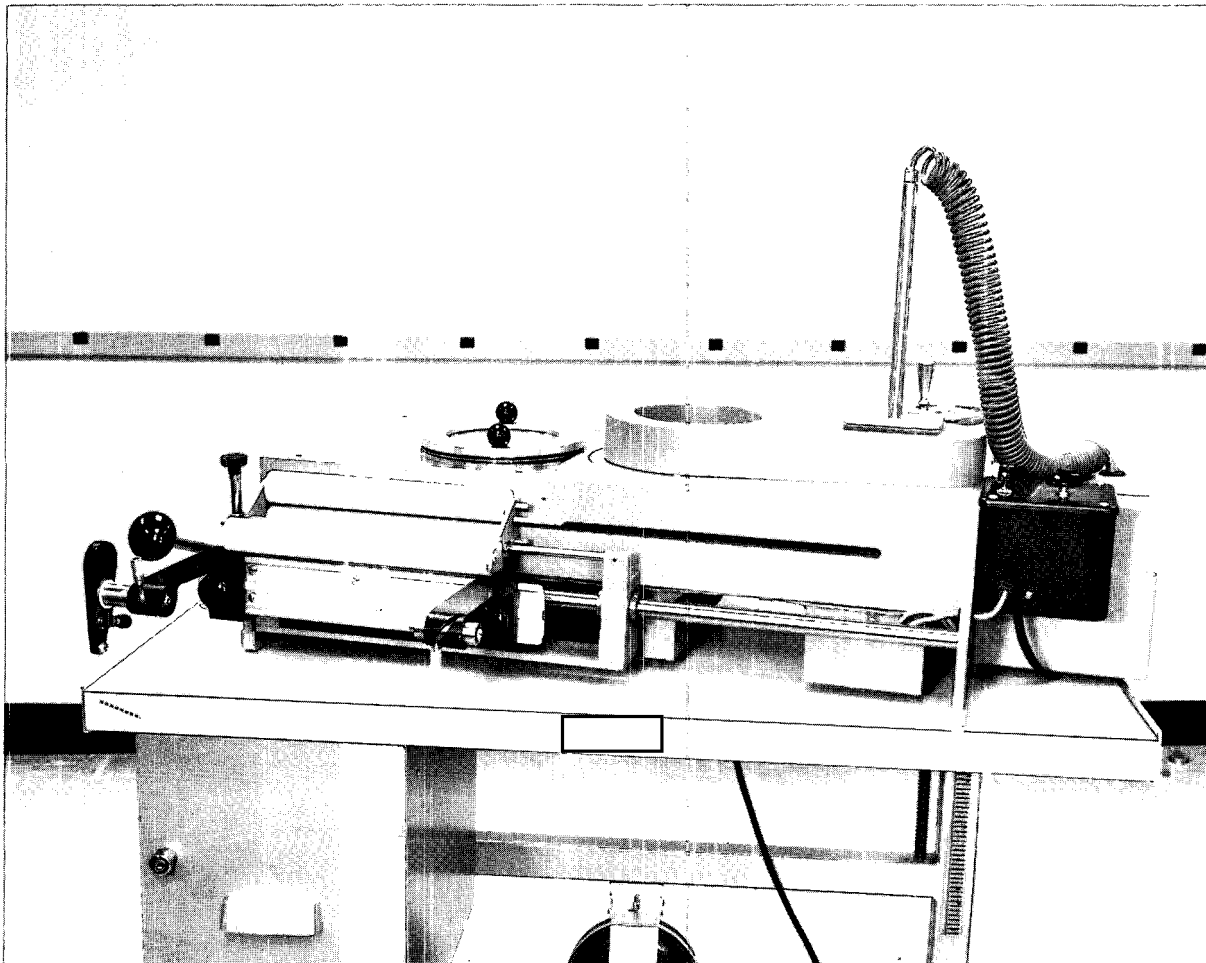
SECRET

25X1A

2. **CHIP CUTTER**

This chip cutter cuts rectangular chips from film frames on roll film. Although it presently produces 70mm by 100mm chips, it could easily be redesigned to cut other sizes. The instrument

operates in a horizontal position and consists of a die-cutter assembly, 2 light tables with film rewinds, and a vacuum chip-removal device.



25X1

25X1A

 Weight: 40 lbs.
Size: H 12 in. W 20 in. L 40 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Evaluation completed. No procurement anticipated
Development Source: NPIC

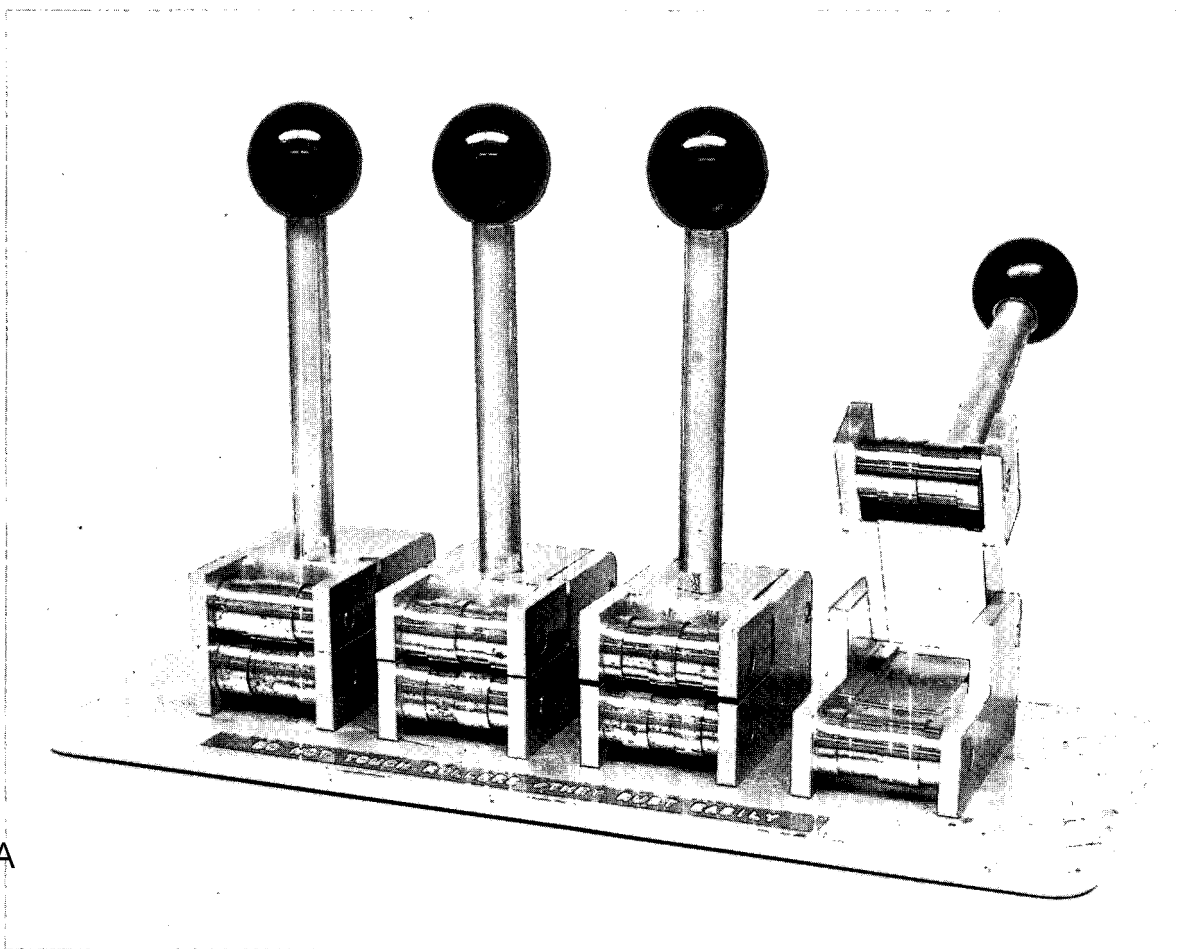
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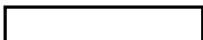
3. HEADLINER SLITTER

(This item is Unclassified)

A slitter for trimming 35mm headliner paper or film has been designed and fabricated to trim simultaneously from 1 to 3 lines of a specific type size.



25X1A



Weight: 12 lbs.

Size: H 6 in. W 4.5 in. L 12 in.

Power Requirements: None

Special Requirements: None

Status: Two units fabricated and used at NPIC. (Drawings on file)

Development Source: NPIC

SECRET

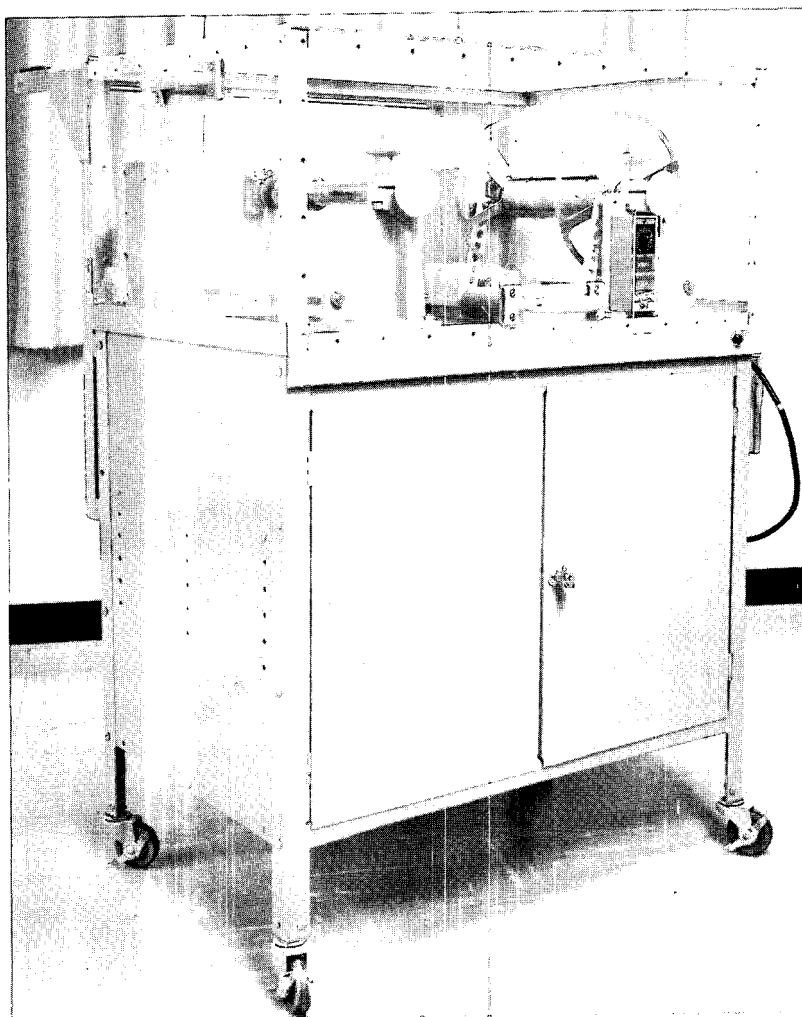
SECRET

4. **MOTORIZED FILM REWIND UNIT**

(This item is Unclassified)

This unit features a specially designed, collapsible spool which permits rapid and efficient removal of film up to 500 feet in length from spools with a maximum width of 9.5 inches. Other features of the unit include automatic control of pre-set transfer speed so that the film can be maintained at a constant tension; vari-

able transfer speeds up to 1,000 RPM; automatic cutoff when transfer of film is completed, or if film breaks during transfer; capability of handling two 5-inch spools or three 70mm spools concurrently. A clear plastic safety cover, which operates a micro-switch in the electrical system, is also provided.



25X1A

Size: H 55 in.

Power Requirements:

Weight: Less than 200 lbs.

W 31 in. L 41 in.

115 V, 25-60 CPS

Special Requirements: None

Status: Procurement limited to one only

Development Source: NPIC

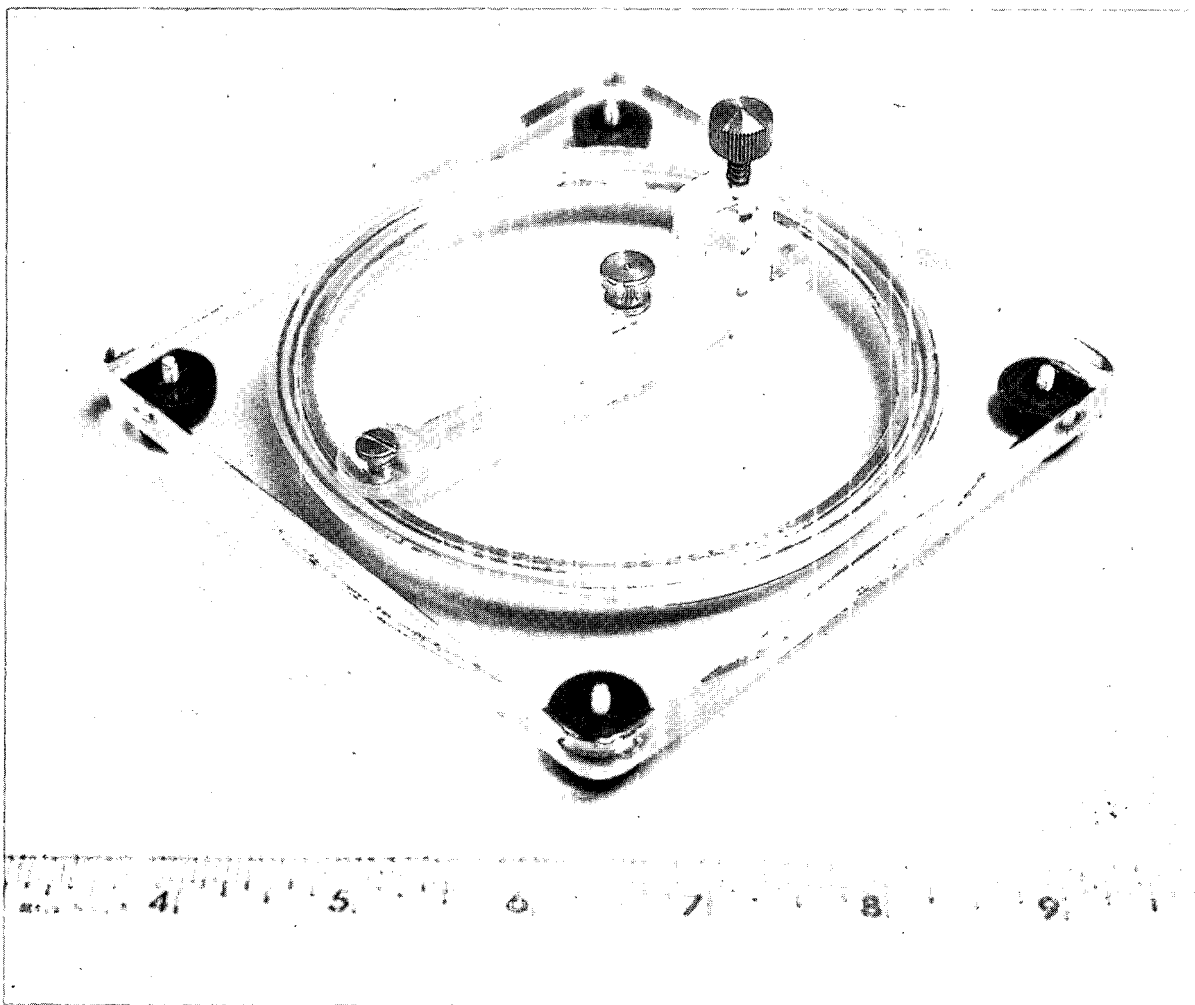
SECRET

5. CIRCLE SCRIBER

(This item is Unclassified)

A need existed in the graphic arts field for a manually operable mechanical device for generating arcs and circles on scribe-coated plastic sheet material. Such a device was conceived, designed and produced at NPIC and is being used successfully for scribing circles of up to 3 inches in diameter.

The housing is of clear plastic and has four rubber feet. A standard scribing point is mounted in an adjustable holder which is attached to a frictionless ball-bearing equipped rotatable disk. The scribe point doubles as a center indicator when set for "0" radius.



Size: H 2 in. W 5 in.
 Power Requirements: None

Weight: 1 lb
 L 5 in.

Special Requirements: None
 Status: Used at NPIC (Drawing on file)
 Development Source: NPIC

25X1A

SECTION II. VIEWING AND INTERPRETATION

- A. MAGNIFIERS**
- B. MICROSCOPES**
- C. LIGHT TABLES**
- D. PROJECTORS**
- E. MEASURING TOOLS**
- F. VIEWERS**
- G. DATA BLOCK READERS**
- H. STEREO VIEWERS**

SECRET

A. MAGNIFIERS

1. BAUSCH AND LOMB 7X TUBE-MAGNIFIER

(This item is Unclassified)

The most widely used item of photo-interpretive equipment is the 7x tube magnifier. This instrument provides acceptable field of view, field flatness and versatility, but less than the desired magnification. It accepts a variety

of standard reticles and provides ample focus adjustment for variations in the user's eye.

The stainless steel ring shown in place of the reticle is procured separately.



Size: H 2 in.

Power Requirements: None

Special Requirements: None

Status: Commercially available

Development Source: Modification by NPIC of commercial item

SECRET

25X1A

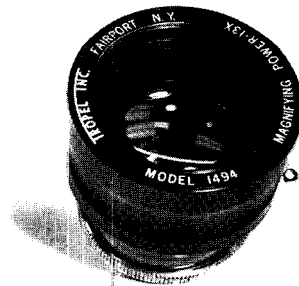
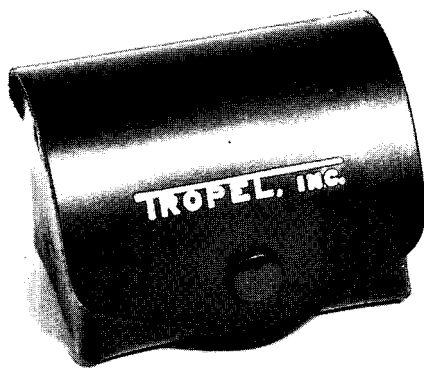
SECRET

2. TROPEL 13X TUBE-MAGNIFIER

(This item is Unclassified)

This tube-magnifier, developed for micro-card reading, has been redesigned for use on high-resolution, small scale, film positive imagery.

It incorporates a field flattener lens which ensures a large field of view with little distortion. Two reticles are available for use with this magnifier.



25X1A



Size: H 1.5 in.

Power Requirements: None

Special Requirements: None
Status: Commercially available
Development Source: NPIC

SECRET

25X1A

3. **8X TO 18X ZOOM TUBE-MAGNIFIER**

(This item is Unclassified)

This instrument was designed to provide the photo interpreter with a light-weight compact tube-magnifier which incorporates continuous zoom magnification from 8x through 18x. Evaluation of the first prototype showed that the small field of view (less than 14 mm at 8x, reducing to 3.8mm at 18x) and image distortions were unac-

ceptable. Further design studies and evaluation of a second prototype indicated that no significant improvements could be made without substantially increasing the overall size of the instrument. It was decided not to proceed with production models.



25X1A

Weight: 6 oz.

Size: H 3 1/4 in.

Power Requirements: None

Special Requirements: None

Status: Prototype Delivered. No more scheduled for production.

Development Source: NPIC

SECRET

25X1A

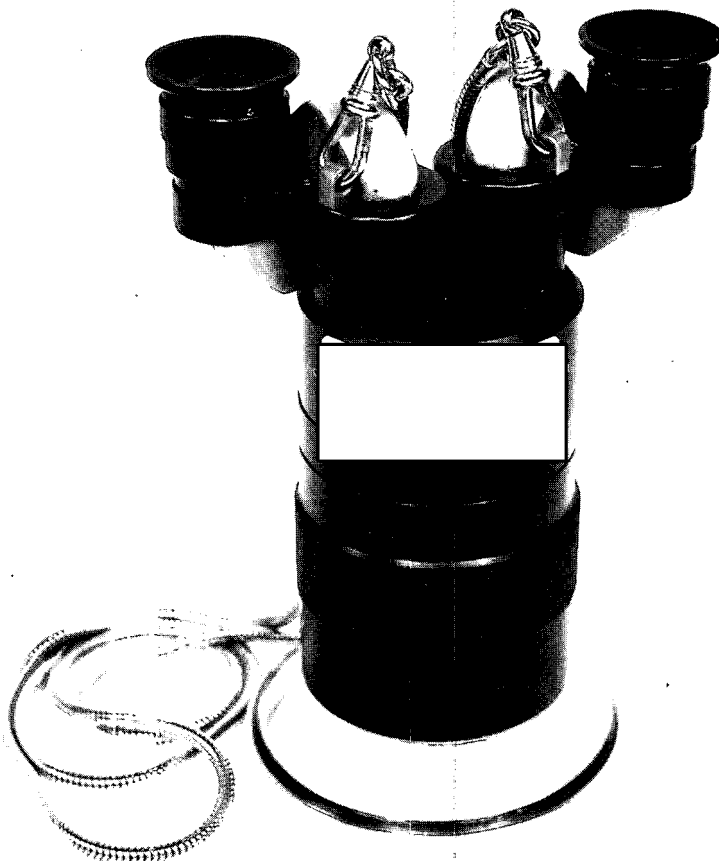
4. **BINOCULAR TUBE-MAGNIFIER**

(This item is Unclassified)

This instrument is designed to provide the advantages of binocular viewing in a small, hand-held instrument. It can be used in much the same manner, and for many of the same purposes, as the present photo interpreter's tube-magnifier. Experience with microscopes, comparators, and other direct-viewing equipment has shown that binocular viewing is more comfortable and more effective than monocular viewing.

Although both mechanically and optically

simple, the binocular tube-magnifier offers excellent image quality. The salient features include a conversion capability whereby a single instrument can be quickly modified to produce either 10x or 20x magnification; a field of view of 15.5mm at 10x, and 8mm at 20x; an interpupillary distance adjustment between 56mm and 76mm; and individual focusing adjustments for both eyes.



25X1A

25X1A

Size: H 6 in. W 3 in. L 3 in.
 Power Requirements: None

Special Requirements: None
 Status: Experimental model only. No production planned.
 Development Source: NPIC

SECRET

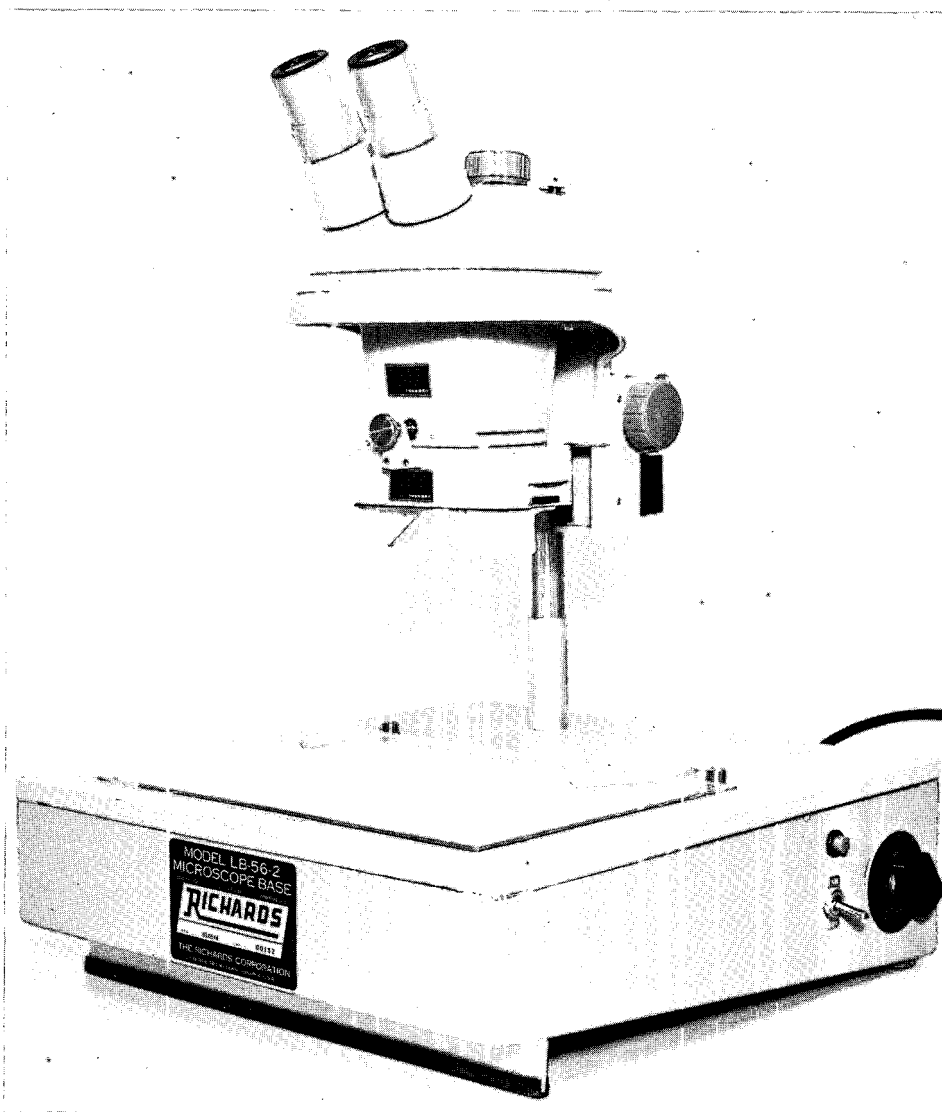
B. MICROSCOPES

1. RICHARDS MICROSCOPE BASE (MODEL LB-56-2)

(This item is Unclassified)

The LB-56-2 is a portable microscope light base which has a 6- by 10-inch glass top stage divided into two 6- by 5-inch sections. Each section is separately controlled from 1,500 ft-lamberts

maximum down to one-tenth of maximum brightness. The bases are provided with the Bausch and Lomb rotatable arm.



25X1A

Size: H 4 in.

Weight: 22 lbs.

W 13 in. L 14 in.

Power Requirements: 110 V, 60 CPS

Special Requirements: None

Status: Commercially available

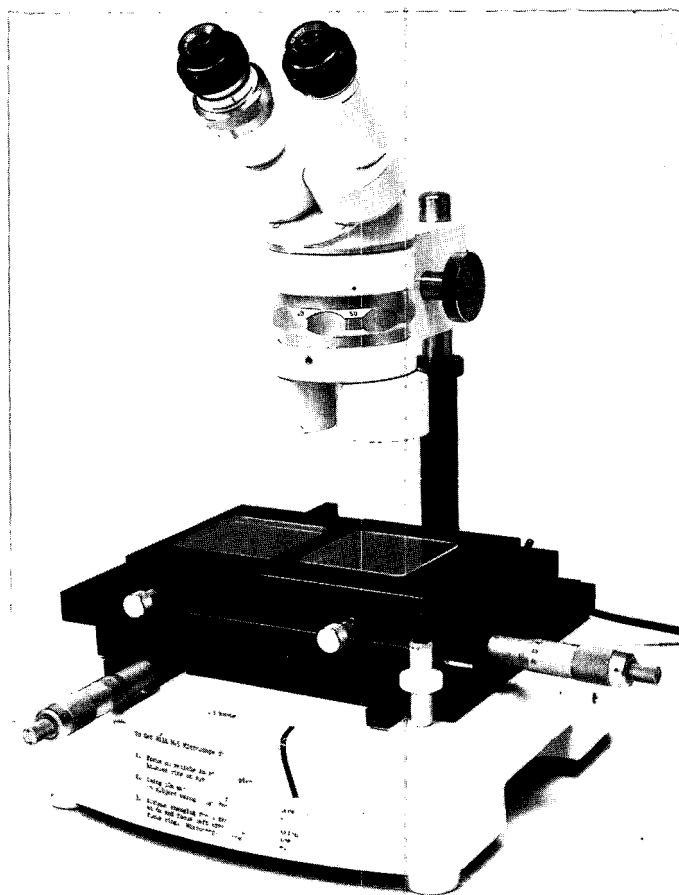
Development Source: Commercial

2. WILD M-5 MICROSTEREOSCOPE

(This item is Unclassified)

The Wild M-5 Microstereoscope permits stereoscopic examination of either transparencies or prints at magnifications of 6x, 12x, 25x, or 50x. The working distance between objectives and stage-plate remains constant after initial focusing regardless of the magnification power used. There is no need for changing of eyepieces or objectives, because the intermediate optical system provided for each magnification operates

in conjunction with the common objective component. By substituting the single calibrated eyepiece and using the vernier-screw-controlled stage-plates, accurate measurement to within .01mm of both X and Y coordinates can be made. The same calibrated eyepiece also permits angular measurement through a full 360 degrees. Rheostat-controlled variable-intensity illumination is provided for each film stage.



25X1A

Weight: 35 lbs.
 Size: H 18 in. W 12 in. L 12 in.
 Power Requirements: 110 V, 60 CPS

Special Requirements: None
 Status: Commercially available
 Development Source: Modification by NPIC of commercial item

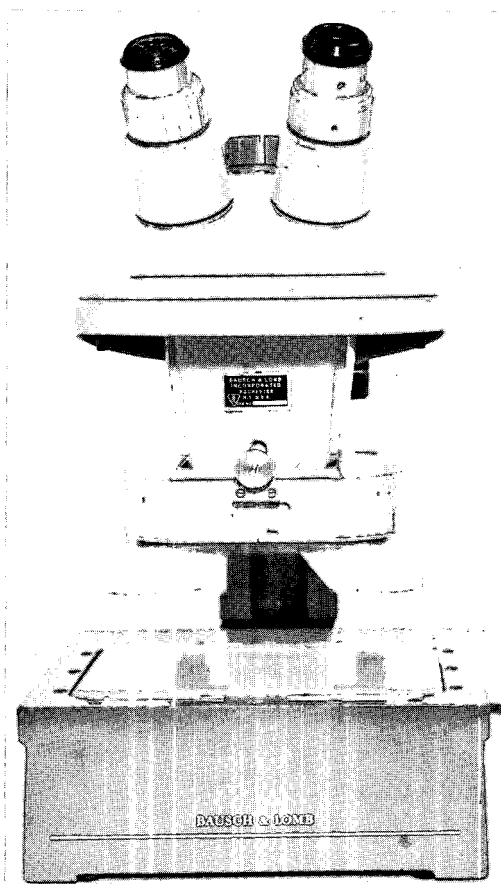
SECRET

3. BAUSCH AND LOMB STEREOMICROSCOPIC (MODEL II)

(This item is Unclassified)

The Model II, a revised version of the original Zoom 70 stereomicroscope, incorporates numerous improvements and new features. Its versatility has been extended by providing additional zoom controls that can either vary the magnification in both halves of the optical system simultaneously or can be disengaged for individual magnification control when photographs of different scales are viewed. In addition,

by detaching the rhomboid arm assembly and replacing it with an adapter plate and a supplemental 2x objective lens, the instrument becomes a zoom microscope. It can then be used for binocular viewing of photographic images with continuously variable magnification from 3.5x to 120x. It may also be fitted with dovetail accessory slides as shown.



25X1A

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Weight: 12 lbs.

Size: H 14 in. W 9.5 in. L 7.5 in.

Power Requirements: 120 V, 60 CPS

Special Requirements: None

Status: Commercially available

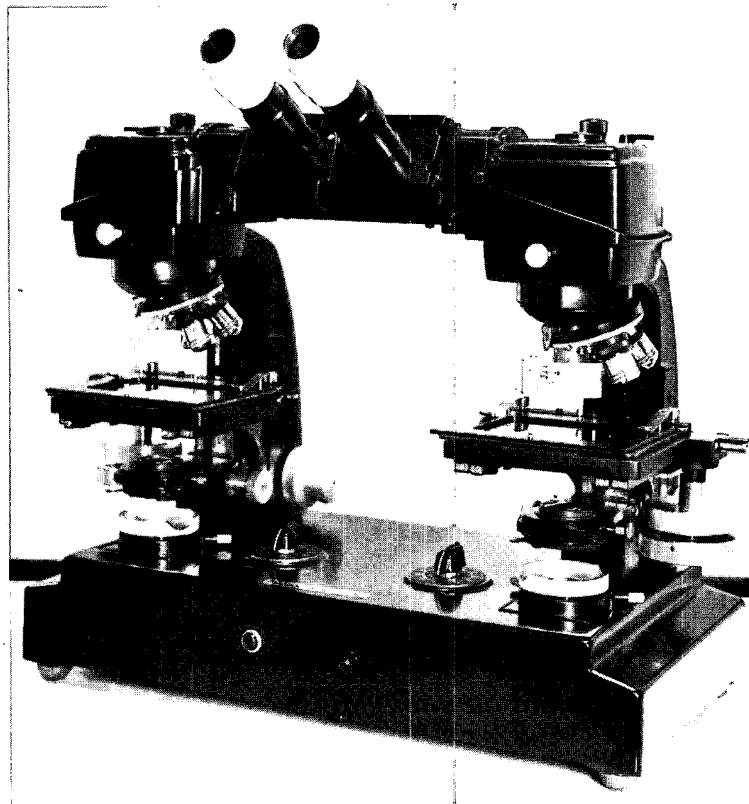
Development Source: Modification by NPIC of commercial item

SECRET

SECRET**4. BAUSCH AND LOMB TWIN DYNAZOOM MICROSTEREOSCOPE***(This item is Unclassified)*

This instrument, also known as the High-Power Stereoviewer, has been developed by Bausch and Lomb to provide the capability of viewing, in stereo, conjugate pairs of high-resolution images under high magnification. It incorporates 2 Bausch and Lomb Dynazoom laboratory microscopes and offers continuously variable magnification from 8x to 200x by using combinations of 6x and 10x eyepieces and 1.3x to 10x objectives. The eyepieces and objectives, with the exception of the

B&L 1.3x widefield objective, are manufactured by Wild, Heerbrugg, from whom filar and goniometer eyepieces are also available. Film is acceptable in randomly pre-cut chips, each chip being held flat between a glass stage-plate and a metal pressure-plate. Image rotation by optical means is provided in each optical path, precluding the necessity for precise placement of the film chips on the glass stage.



25X1A

 on quantity

Wild Eyepieces & Objectives: \$724 set

B & L Widefield Objectives: \$330 pair

Weight: Less than 50 lbs.

Size: H 18 in. W 9 in. L 21 in.

Power Requirements: 115 V, 60 CPS

Special Requirements: None

Status: Commercially available

Development Source: NPIC

SECRET

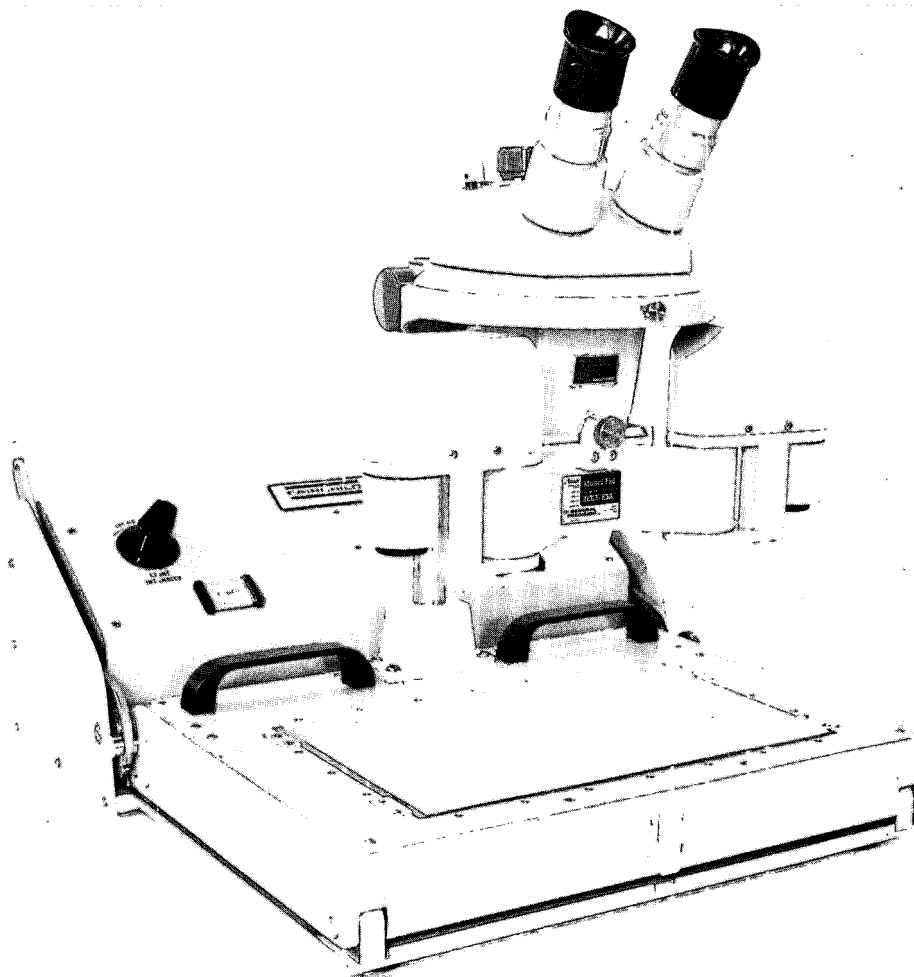
SECRET

25X1A

25X1A 5. [] **ADVANCED RHOMBOID (PROTOTYPE)**
(This item is Unclassified)

This rhomboid accessory fits directly on any [] Zoom 70 microstereoscope that has been modified for "dovetail" accessory attachment. This accessory will increase the performance and, therefore, the useful life of the Zoom 70. A Zoom 70 is equipped with this ac-

cessory can resolve in excess of 300 LP/mm (high contrast) using 10x eyepieces. It has a 2x premagnification and an optical axis separation of 1.6 to 9.5 inches. A 360-degree image rotation device is incorporated in each optical path. The working distance is approximately 2 inches.



25X1A

[]

Weight: 1.5 lbs.
Size: H 5 in. W 4 in. L 11 in.
Power Requirements: None

Special Requirements: Zoom 70 must have dovetail modification
Status: Production units being fabricated
Development Source: ~~None~~ NPIC

SECRET

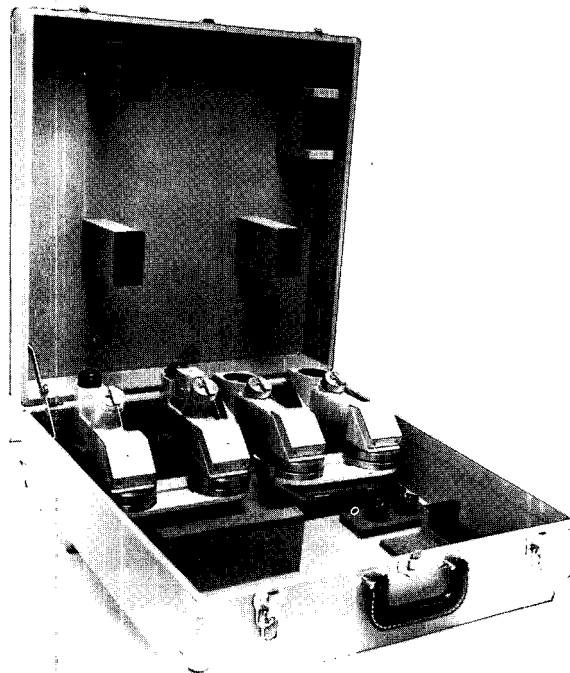
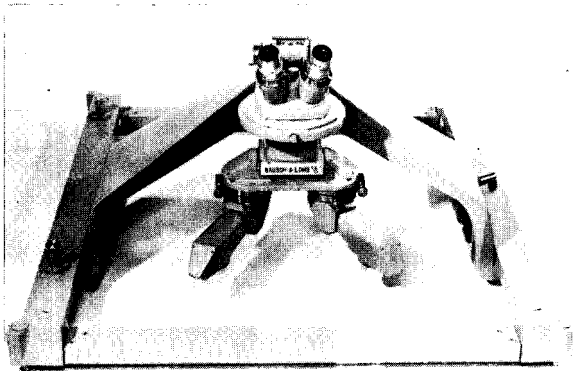
6. BAUSCH AND LOMB INTERCHANGEABLE RHOMBOID STEREOSCOPE

(This item is Unclassified)

This high-power, high-resolution microstereoscope provides magnifications from 3x through 12 x and resolutions up to 600 lines per mm. Magnification is of the zoom type and is continuously variable in 3 stages by utilizing 3 separate rhomboid relay systems. Independent

zoom magnification and optical image rotation are incorporated into both right and left optical paths. This stereoscope is unusual in that the extremely long rhomboid arms provide a spread of up to 485mm and therefore permit stereoscopic viewing of roll film in all conventional widths.

25X1A



depending on quantity (includes pod, three relays, scanning stand with focusing adapter, carrying case)

Weight: Under 100 lbs.

Size: H 16.5 in. W 30.5 in. L 30.5 in.

Power Requirements: None

Special Requirements: None

Status: Commercially available

Development Source: Started by U.S. Navy, completed by NPIC

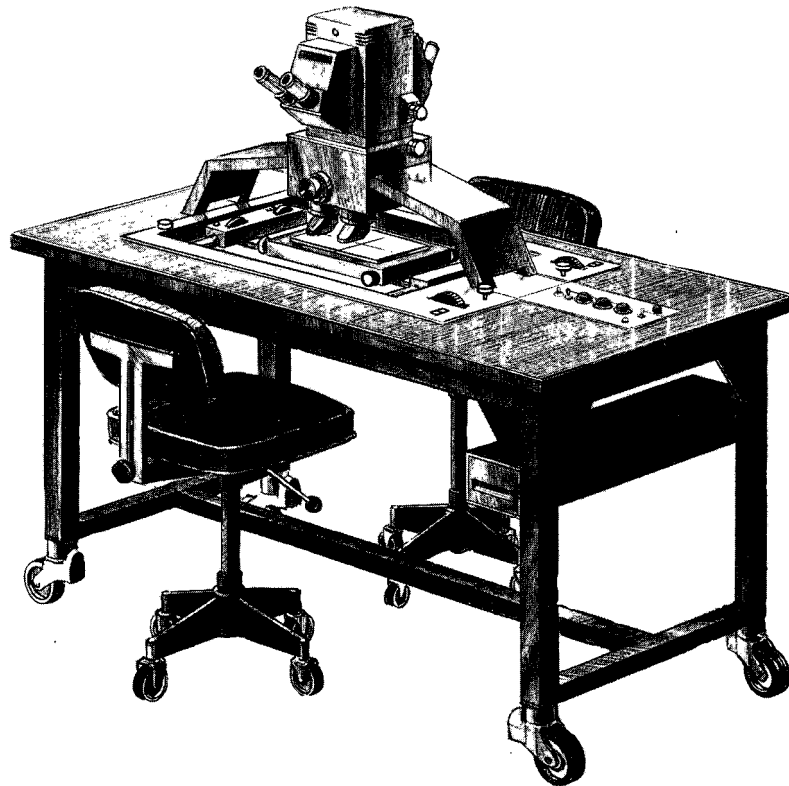
SECRET

25X1A

7. **DUAL-VIEWING MICROSTEREOSCOPE (MODEL II)**

The dual-viewing microstereoscope is a sophisticated, high-resolution device permitting 2 analysts to stereoscopically view the same stereo pair at a common magnification and orientation, and to accurately designate specific image features for discussion. The device is to be used for training, in briefing, and for actual interpretation where more than one analyst is involved. The instrument will provide 11x through 75x zoom magnification and 355 lines per mm resolution

through a 7:1 zoom element. The prototype model has been evaluated and a proposal for a preproduction version has been received. Primary changes from the prototype include, a larger stage (10 inches), split for fine stereo adjustment, and manually adjustable in two scanning modes--rapid and fine. The illumination will be increased and a "flagging" mark for the pointing device will be added.



25X1A

Weight: 250 lbs. (including table)
 Size: H 48 in. W 30 in. L 45 in. (including table)

Power Requirements: 115 V, 60 CPS, 2.5 A
 Special Requirements: None
 Status: Pre-production version undergoing evaluation
 Development Source: NPIC

SECRET

25X1A

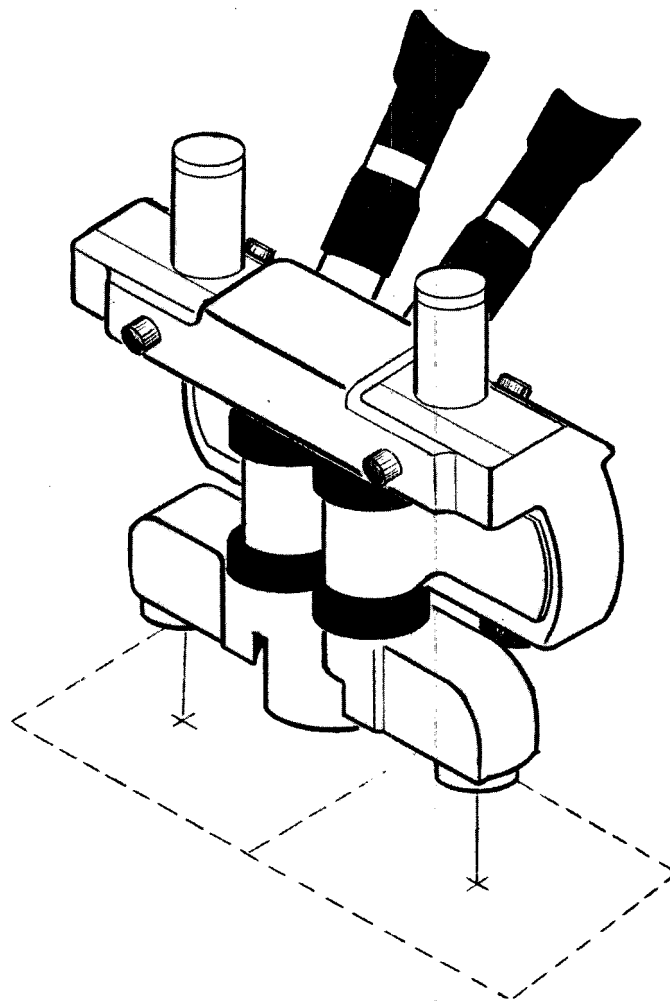
8. ADVANCED [REDACTED] MICROSTEREOSCOPE

(This item is Unclassified)

25X1A

An advanced microstereoscope was under development by [REDACTED]. This microstereoscope was designed to resolve in excess of 5 lp/mm/power at 160x or a maximum of 800 lines/mm. The total magnification range was 10x to 160x. A 10x eyepiece was to be used in

conjunction with objective magnifications of 1x, 2x, and 4x, along with a zoom ratio of 4:1. A 360-degree optical-image rotation was to be incorporated in each optical channel. The working distance was to be about 50mm and the field size at 90x was to be 2mm.



Cost:
Weight:
Size: H W L
Power Requirements:

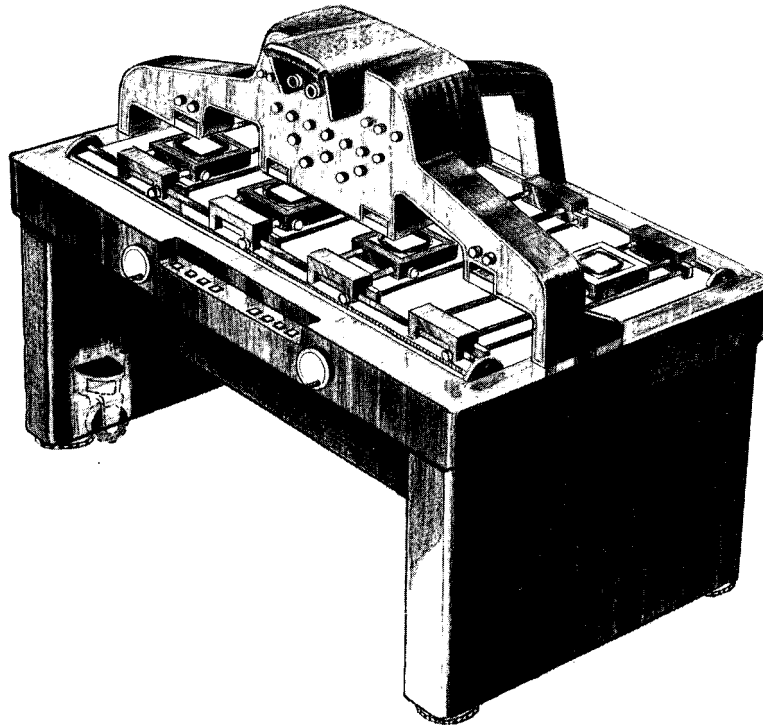
Special Requirements:
Status: Phase I development unsatisfactory; project terminated
Development Source: Was being developed by NPIC

9. IMAGE COMPARISON MICROSTEREOSCOPE

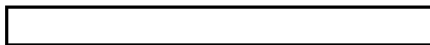
In a two-phase program (study/fabricate), an operational prototype Image Comparison Microstereoscope will be developed to permit the photo interpreter to compare photographic data, in film chip form, from as many as four different missions or sensors. The principle use of the instrument will be to view stereoscopically a stereo pair from one mission and then rapidly switch to a stereo pair of the same area from a different mission, detecting differences by memory recall. In addition, the instrument will allow the operator to optically superimpose any two of the four images (with and without colored filters), to view

any two images side by side in a split field, and to use certain change detection techniques, such as "flicker" and "traveling" split field.

The unit will have 4 independently rotatable and illuminated stages, each of which will accept cut film in various sizes, with a hold-down area of approximately 5 by 5 inches. Movement in X and Y directions will be either independent for each stage or common to two, three, or four. Each optical path will have 10x to 120x zoom magnification, anamorphic correction, image rotation, and resolution to 600 lines/mm.



25X1A




Weight: 700 lbs.

Size: H 55 in. W 32 in. L 65 in. (approx)

Power Requirements: 115 V, 60 CPS, 5.5 A

Special Requirements: None

Status: Contract for prototype recommended for negotiation with 

Development Source: Under development by NPIC

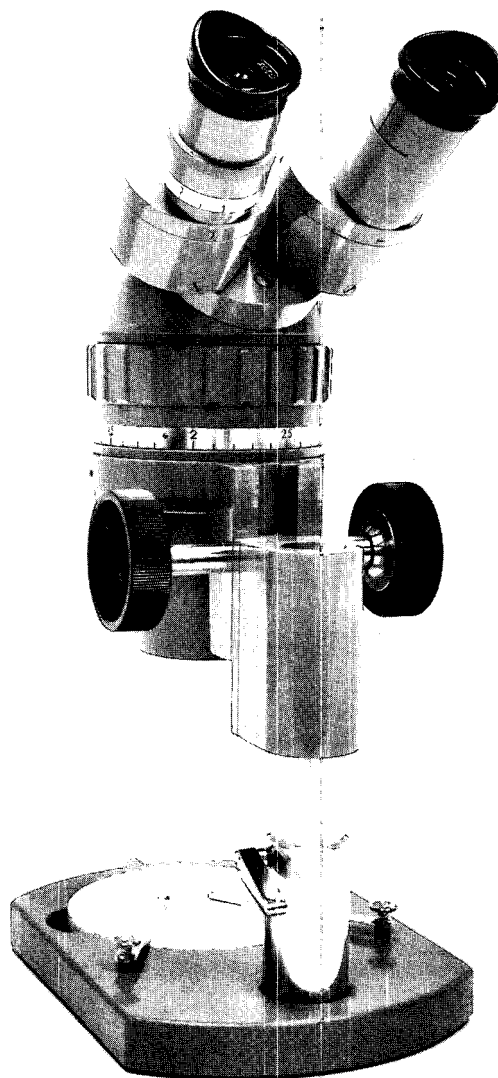
25X1A

SECRET

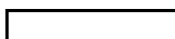
10. ELGEET STEREOMICROSCOPE

The Elgeet Stereomicroscope provides a 4:1 zoom range (.75x to 3x) with good continuity of focus throughout. The use of 10x and 20x eyepieces (with or without a 1.5x auxiliary objective

lens) provides a total range of 7x through 90x magnification. Although it cannot be used for viewing stereo pairs, a stereo version is currently under development by Elgeet.



25X1A



Size: H 16 in.

Power Requirements: None

Weight: 12 lbs.

W 7 in. L 5 in.

Special Requirements: None

Status: Commercially available

Development Source: Commercial

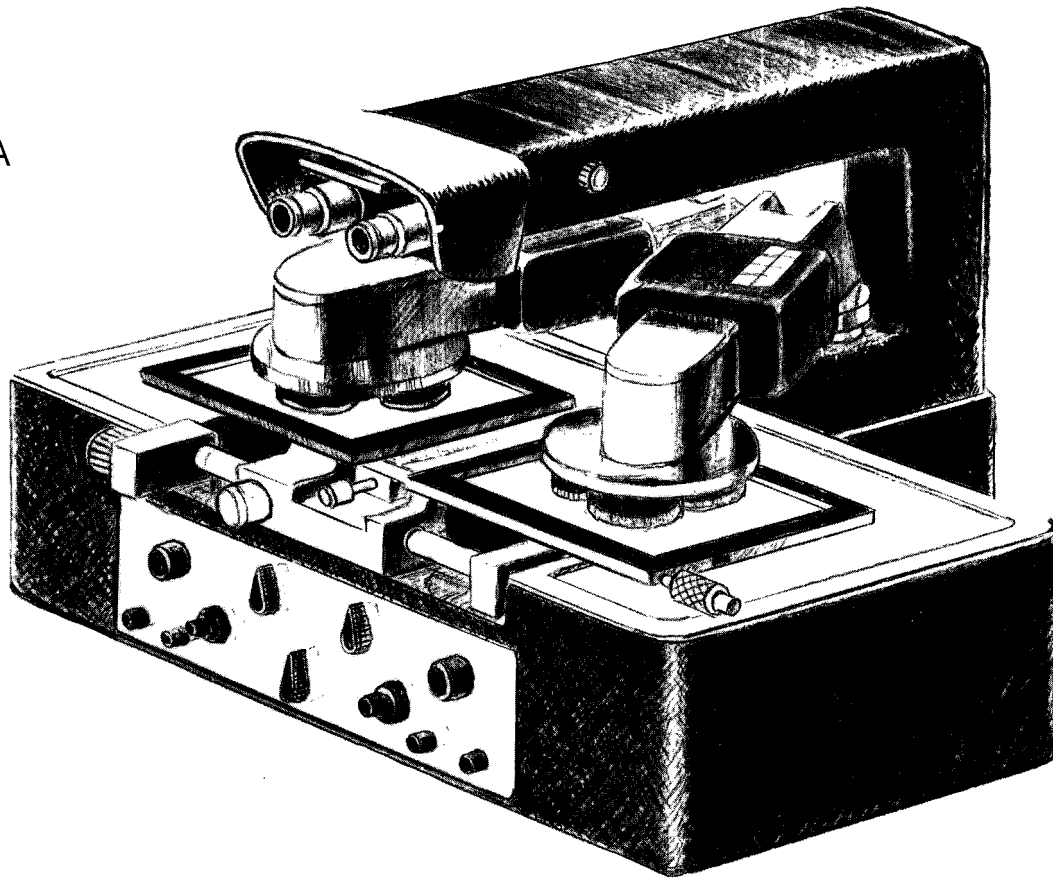
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11. WIDE-FIELD HIGH-POWER ANAMORPHIC STEREO MICROSCOPE

This instrument will incorporate many optical devices that are proven aids in the photo interpretation process. Specifically, the area of the field of view will be three times greater than existing microstereoscopes, but the image quality will not be degraded in comparison to high performance instruments such as the

High-Power Stereoviewer. The magnification range will be 10x to 180x and an anamorphic magnification capability will be included. The instrument will incorporate two 5- by 5-inch cut film stages that can be moved independently or in common.

25X1A



25X1A

Weight: 20 lbs.

Size: H 20 in. W 28 in. L 25 in.

Special Requirements: None

Status: Proposals being evaluated

Development Source: Under development by NPIC

SECRET

25X1A

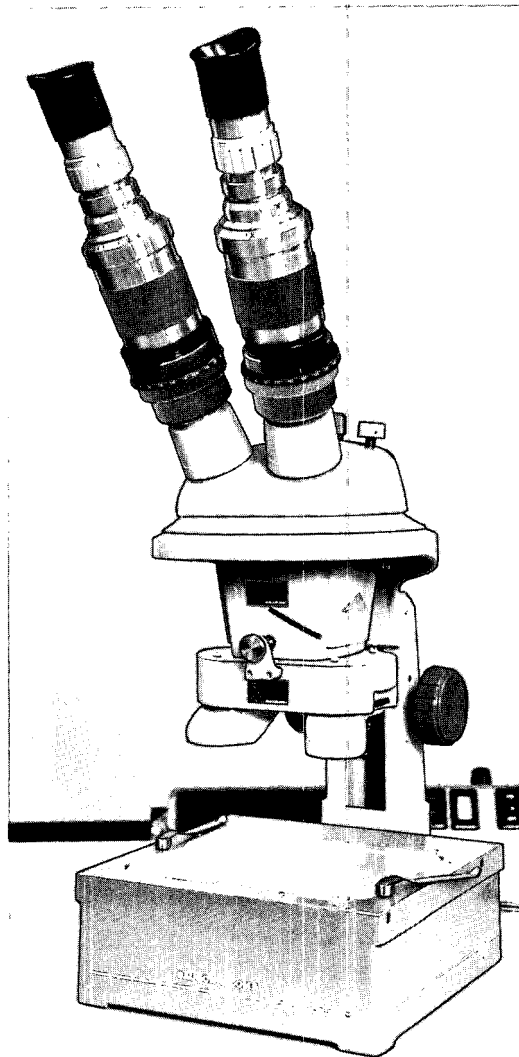
12. **VARIABLE RATIO ANAMORPHIC EYEPIECE (PROTOTYPE)**

25X1A

25X1A

These eyepieces can be used with a Zoom 70 Microstereoscope to enable the operator to enlarge the image along one axis with the other axis being held to the fixed micro-

scopic magnification. These eyepieces will enable the operator to "stretch" the image up to 2.8x on one axis, thereby providing the interpreter with a capability to visually rectify images.



25X1A

Weight: 6 lbs.

Size: H 6 in. W 2 in. L 2 in.

Power Requirements: None

Special Requirements: None

Status: Evaluation completed. No further procurement anticipated

Development Source: NPIC

SECRET

SECRET

25X1A

25X1A

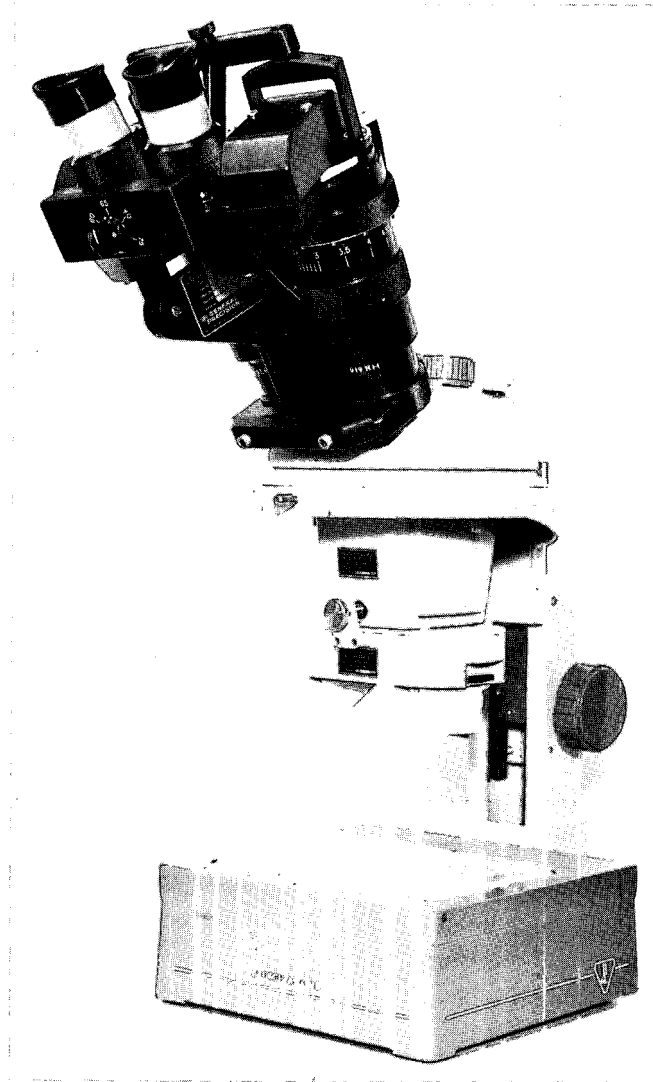
13. **VARIABLE RATIO ANAMORPHIC EYEPIECE**

25X1A

These eyepieces were produced by for use with the Zoom 70 Microstereoscope. They enable the interpreter to enlarge or "stretch"

one image along a selected axis while holding the other image to a fixed magnification, thereby providing a capability to visually rectify distortion between the images of a stereo pair.

25X1A



25X1A

Size: H 8 in.

Power Requirements: None

Weight: 4 lbs.

W 5.5 in. L 6.5 in

Special Requirements: None

Status: Limited procurement completed

Development Source: NPIC

SECRET

SECRET

25X1A

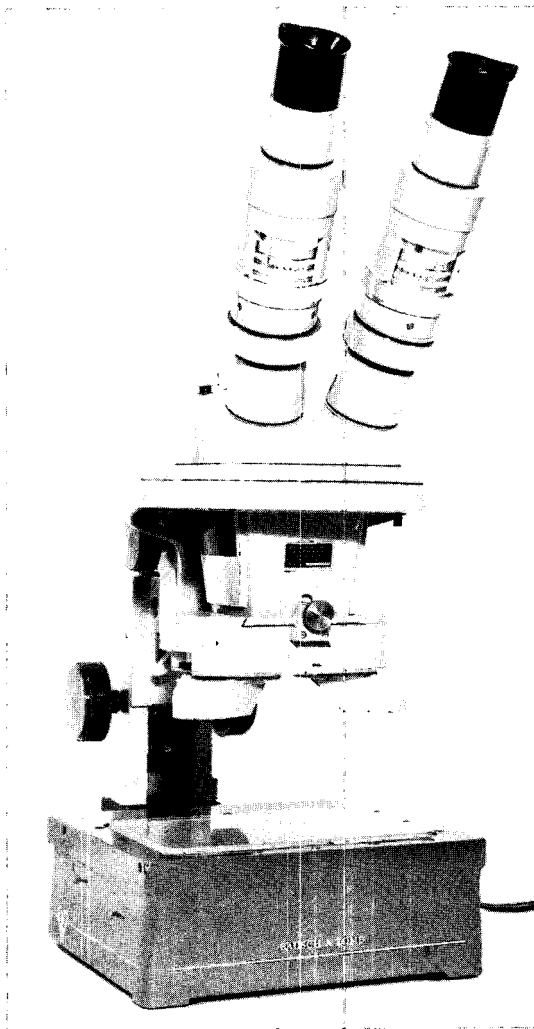
14. **ADVANCED ANAMORPHIC EYEPIECE (PROTOTYPE)**

(This item is Unclassified)

An advanced anamorphic eyepiece is being developed for mounting on the Zoom 70 Stereoscope. The goal of this project is to decrease the size of current eyepieces to a minimum and produce a human-engineered design. The anamorphic

ratio will be continuously variable from 1:1 to 1:2.2 and the anamorphic axis will be rotatable through 360 degrees. This version will not optically invert the image as in the previous

25X1
25X1



25X1A

Size: H 4 in. W 2 in.
Power Requirements: None

Weight: 3 lbs.
L 2 in.

Special Requirements: None
Status: Under evaluation
Development Source: NPIC

SECRET

SECRET

25X1A

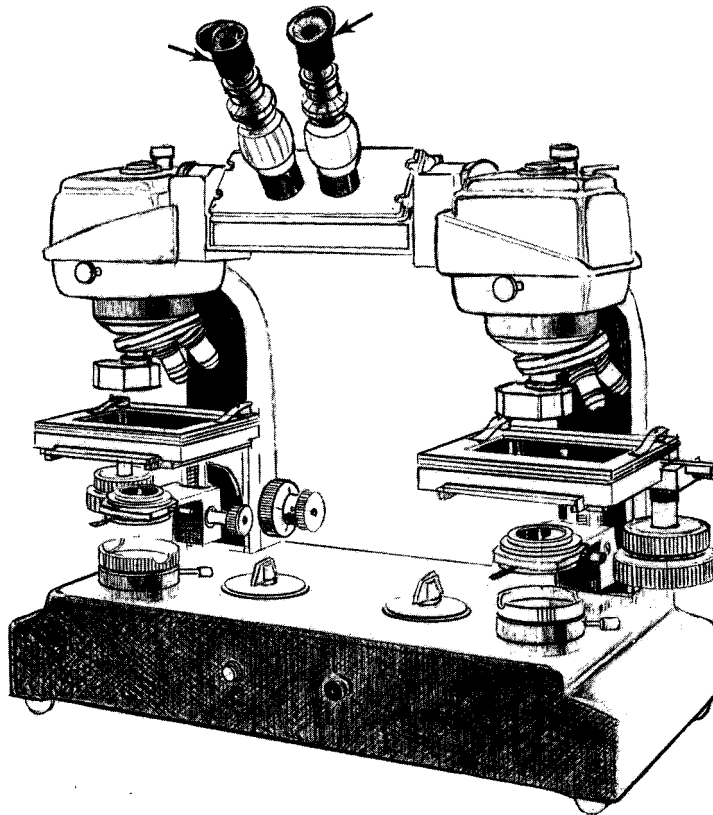
25X1A

15. **TWIN DYNAZOOM ANAMORPHIC EYEPIECE**

(This item is Unclassified)

Recently developed anamorphic eyepieces for the Zoom 70 have proven to be advantageous to the photo interpretation process. Because the High-Power Stereoviewer (Twin Dynazoom) is finding extensive employment at NPIC, it was decided to fabricate an anamorphic magnification capability for that instrument. This capability will be similar to the

Zoom 70 except the eyepoint will not be extended more than one inch from its present position. The anamorphic magnification ratios will be continuously variable from 1:1 to 1:2.2 and the anamorphic axis will rotate through 360 degrees. The instrument will be configured for rapid removal.



25X1A

Weight: 2 lbs.

Size: H 4 in. W 2 in. L 2 in.

Power Requirements: None

Special Requirement: None

Status: Prototype being fabricated

Development Source: Under development by NPIC

SECRET

SECRET

NPIC/R-91/67

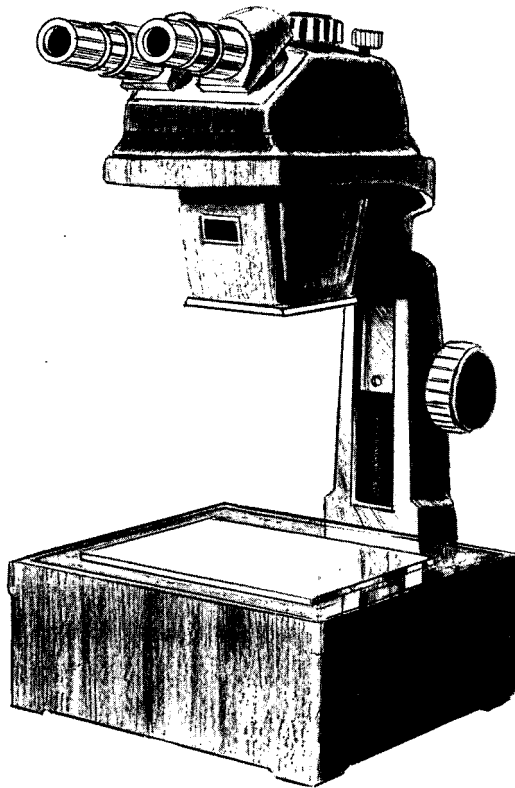
25X1A

16. TILTED EYEPIECES FOR ZOOM 70 (PROTOTYPE)

(This item is Unclassified)

This new eyepiece assembly, for mounting on the Zoom 70 Stereoscope, will change the optical path so that the viewing angle will be about 15 degrees above the horizontal. With this optional item mounted on the Zoom 70, the photo interpreter can remain comfortably seated and use the microscope in a higher position than at present. Thus, the operator will not be restricted in the type of light table or stereo rhomboids he wishes to use from his seated position.

The proposed tilted eyepieces will contain a special prism to change the direction of the optical path without reversing the image. The eyepiece assemblies can be fitted on the Zoom 70 by equipment maintenance technicians. The prototype pair of tilted eyepieces will be delivered in the Fall of 1967 and production orders will be collected for joint procurement after the prototypes have been evaluated and approved.



25X1A

Weight: About 1 lb.
Size: H 1½ in. W 1½ in. L 2 in.
Power Requirements: None

Special Requirements: None
Status: Prototype pair of tilted eyepieces under development; will be delivered in the Fall of 1967
Development Source: Under development by NPIC

SECRET

25X1A

25X1A

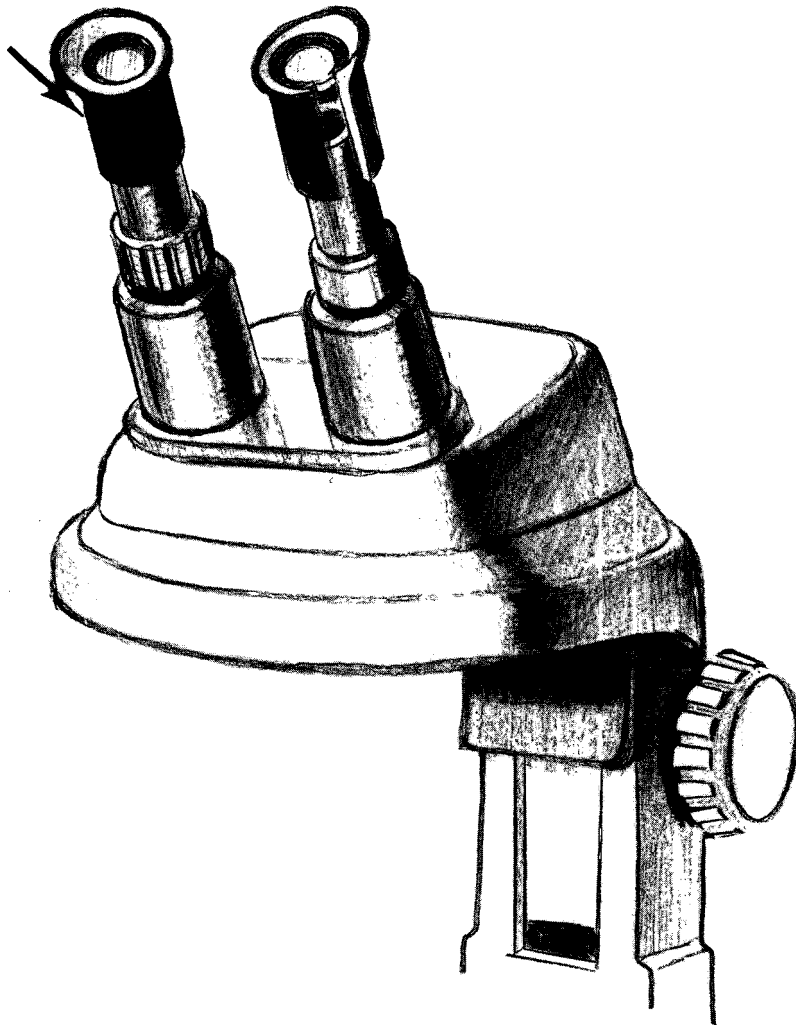
17. [] ACUITY ADAPTERS FOR B&L EYEPIECES (PROTOTYPE)

(This item is Unclassified)

25X1A

The [] will design and fabricate, for test and evaluation, five sets of acuity adapters to be used with the [] Zoom 70 Stereoscope. The adapters will fit onto the standard 10x eyepiece and will permit photo

interpreters, who normally wear eyeglasses, to view photographic imagery without them. The anticipated results will be an improvement in the P.I.'s vision and a reduction in overall eye fatigue.



25X1A

[] Weight: 10 oz. per set
Size: H 2 in. W 1 1/2 in.
Power Requirements: None

Special Requirements:
Status: Contract for prototype being negotiated
Development Source: Under development by NPIC

SECRET

NPIC/R-91/67

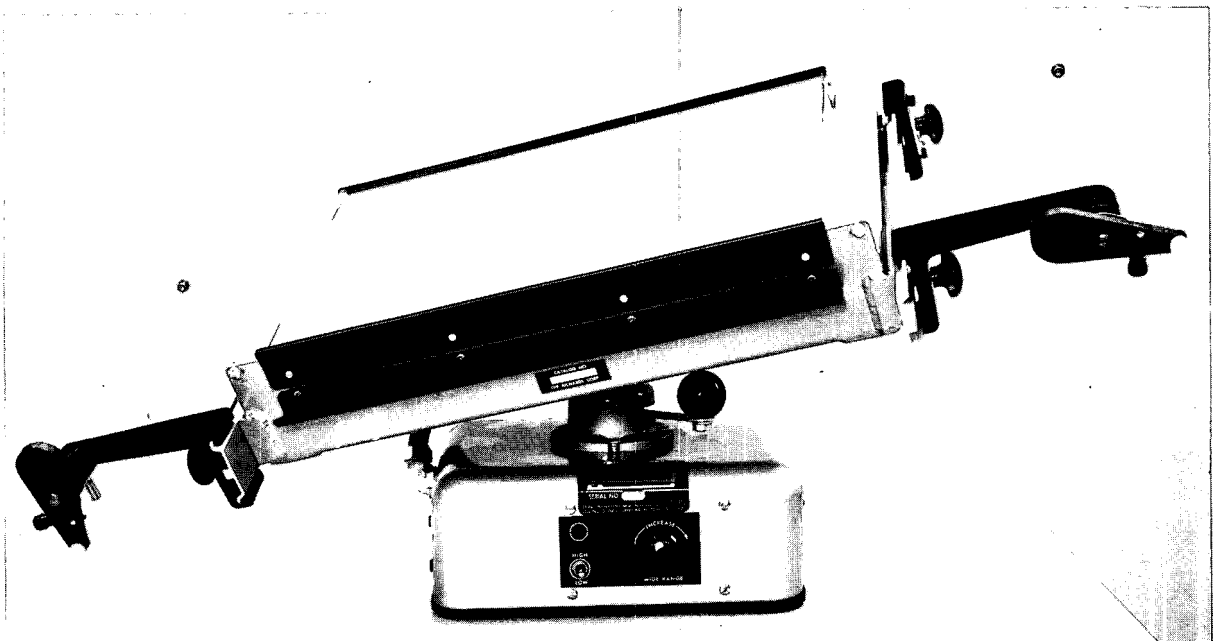
C. LIGHT TABLES

1. RICHARDS LIGHT TABLE (MODEL GFL 918)

(This item is Unclassified)

This light table has an 11- by 18-inch viewing surface mounted on a universal ball-and-socket base with adjustable tension, allowing over 45 degrees of tilt in any direction. All Richards light tables are available with a cold-light grid having an infinitely variable intensity control from 900 foot-lamberts intensity, complete diffusion being accomplished through a specially coated grid and a translucent plastic top. A plate-glass top for a rigid working

surface is also available. The table can handle film from 70mm to 9.5 inches in width and up to 500 feet in length with welded polyester transport belts and single-reel brackets; with segmented nylon rollers and dual reel brackets, it has the additional capacity of handling two 70mm, or one 70mm and one 5-inch, film rolls up to 500 feet in length. All reel brackets have adjustable nylon drags, positive-latching spindle retractors, and full ball-bearing spindles.



25X1A

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Weight: 55 lbs.

Size: H 11 in. W 12 in. L 32 in.

Power Requirements: 110 V, 60 CPS

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet
NPIC stated requirements

SECRET

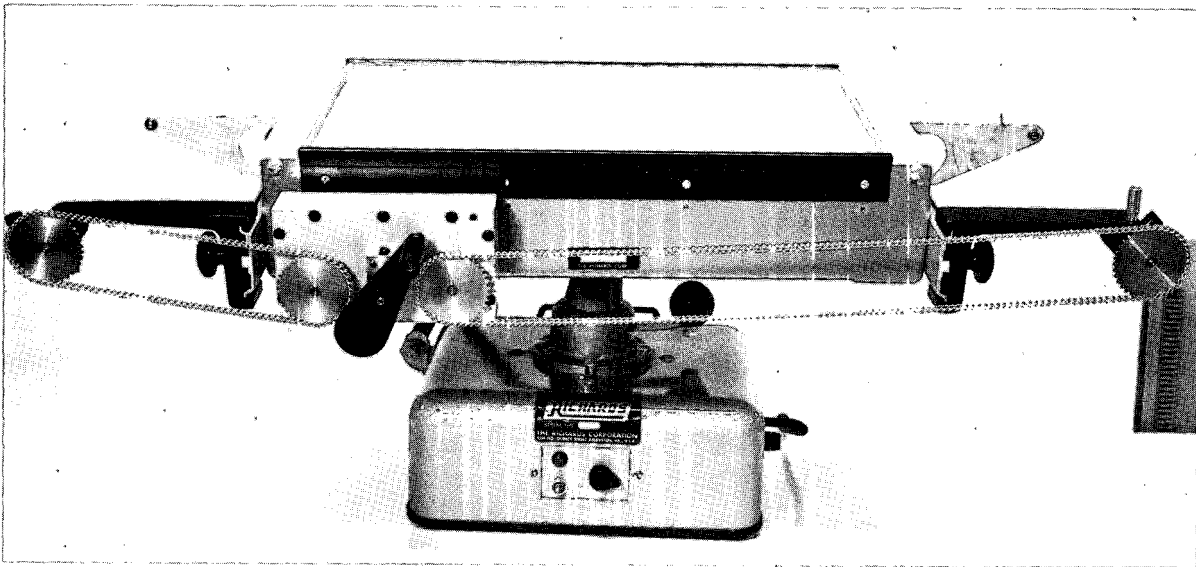
25X1

2. SINGLE-CRANK DRIVE FOR GFL 918 LIGHT TABLE

(This item is Unclassified)

A single-crank drive for the [] GFL 918 Light Table has been designed and fabricated at NPIC. Intended for use when the table is in a tilted position, the device is mounted near the lower end of the table and allows the operator to wind film onto either spool by turning the crank in the appropriate direction. A simply

engaged gear gives an approximate 3:1 winding ratio if required. The crank-drive system employed on the model illustrated does not allow alternate rotation of the take-up spool and film may be viewed emulsion down only. A modification has been completed that permits film to be viewed emulsion up.



[]
Size: H 3 in. W 1.5 in. L 24 in.
Power Requirements: None

Special Requirements: None
Status: One-of-a-kind item, (drawings on file)
Development Source: NPIC

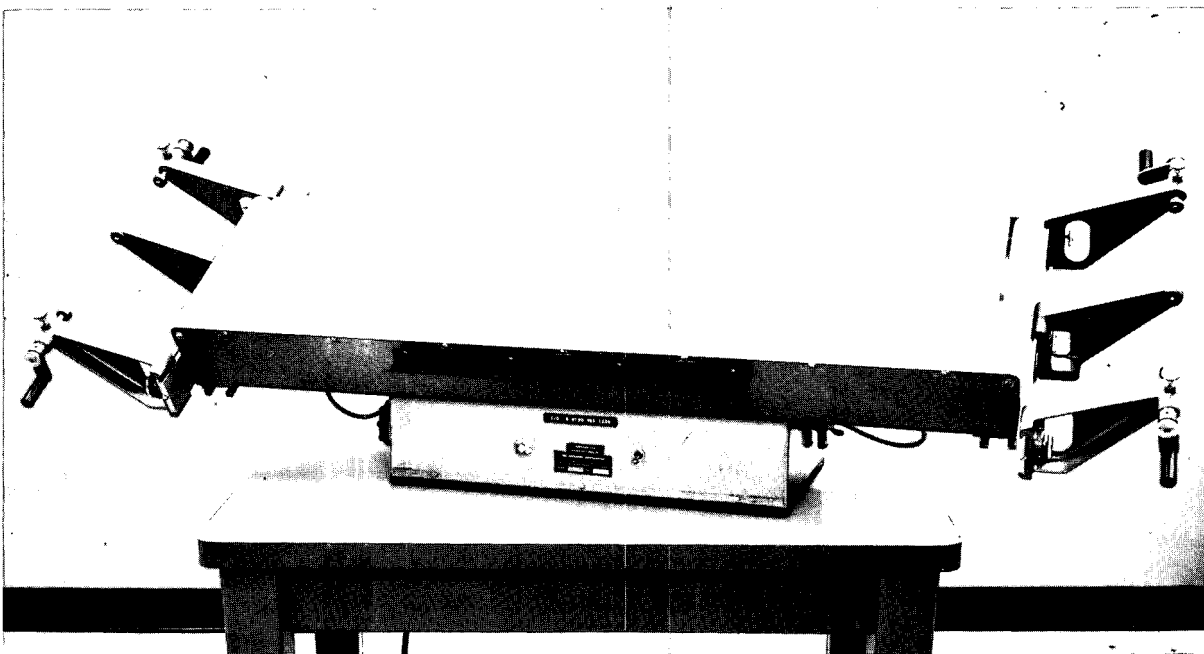
25X1A

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SECRET**3. RICHARDS LIGHT TABLE (MODEL GFL 940)***(This item is Unclassified)*

This table provides an 11- by 40-inch viewing surface, tiltable up to 45 degrees forward, with a Richards cold-light grid, controls, and reel brackets. An engraved grid system can be provided on the plastic table top, to order. Optionally available on this and other models is an ultrasonically spliced polyester transport belt on ball-bearing

rollers. This table is available either with standard light source (cold-light argon-mercury grid having at least 900 foot-lambert intensity at 70 degrees F), or with encapsulated light source (cold-light argon-mercury grid embedded in clear elastomer matrix having at least 900 foot-lambert intensity at 70 degrees F).



25X1A

 Weight: 70 lbs.

Size: H 11 in. W 12 in. L 54 in.

Power Requirements: 115 V (230 V available), 50/60 CPS

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet NPIC stated requirements

SECRET

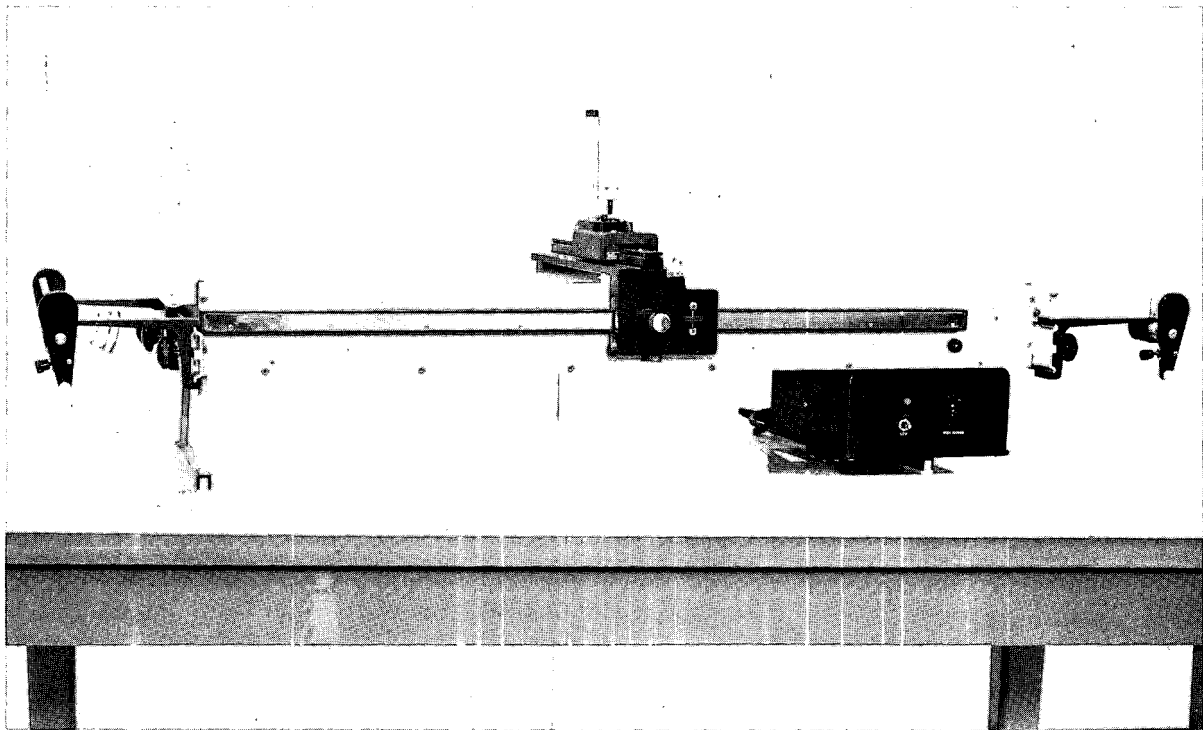
SECRET

4. RICHARDS LIGHT TABLE (MODEL GFL 940MC)

(This item is Unclassified)

This table provides an 11- by 40-inch viewing area with a cold-light grid having infinitely variable control with a 5:1 ratio (20:1 ratio optional) from 900 foot-lamberts. Richards-type T-2-5 reel brackets with multiple nylon rollers provide for the viewing of dual 70mm or 5-inch film widths on standard 7.625 inch reels (500 feet), or single films from 70 mm to 9.5 inches in width. Brackets have adjustable nylon brakes permitting any desired film tension over the viewing area and

positive cam latches for the retractable spindles. The microscope carriage covers a 10- by 28-inch area with full recirculating ball-bearing suspension, adjustable drag brakes, and limit stops. In addition, a quick and simplified optical measurement of X and Y coordinates can be provided. Other optional equipment available includes an encapsulated light source, reel brackets to accommodate 1,000-foot spools, and a vacuum hold-down top.



Weight: 80 lbs.

Size: H 14 in. W 17 in. L 54 in.

Power Requirements: 115 V (230 V available), 50/60 CPS

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet NPIC stated requirements

25X1A

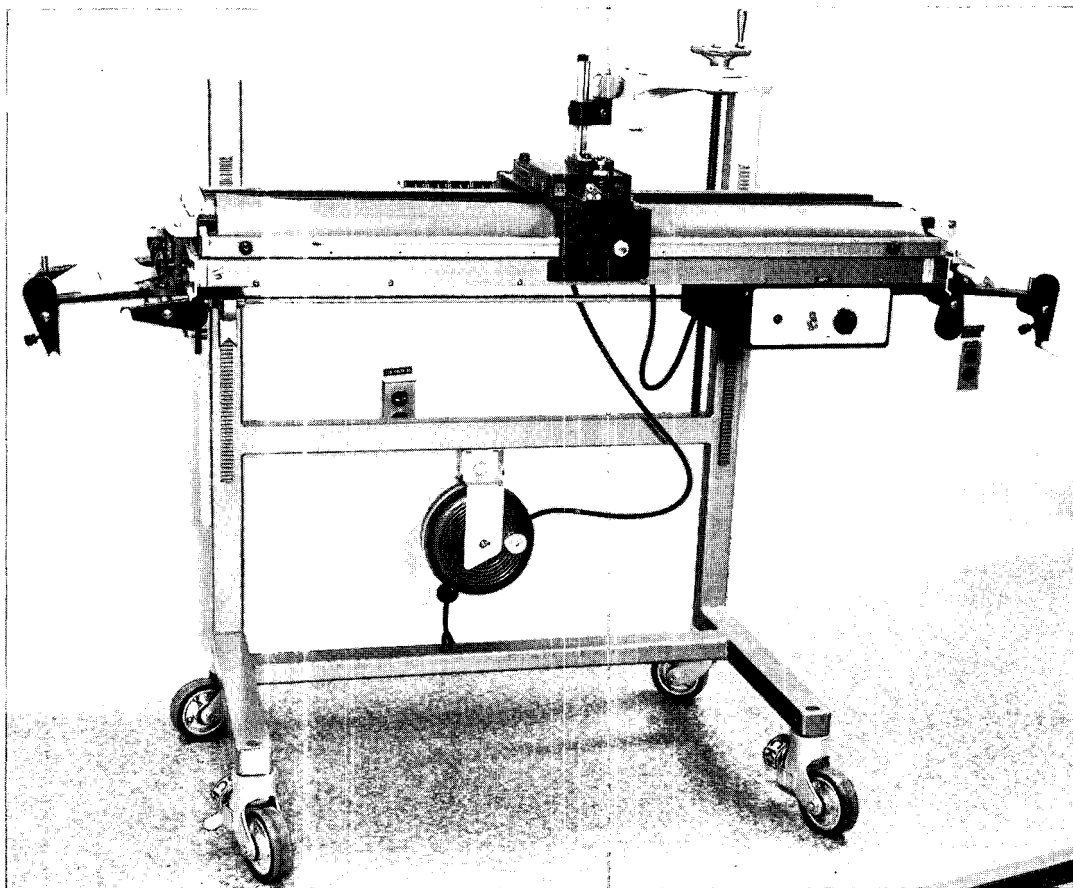
SECRET

5. RICHARDS LIGHT TABLE (MODEL GFL 940MCE)

(This item is Unclassified)

This unit, a combination of the Model GFL 940MC Light Table and the Model TE-2140 Elevating Table, allows the photo interpreter to adopt a comfortable standing or sitting position while viewing the full range of film sizes this table can handle. All the features of the Model GFL 940MC Light Table have been retained, including variable-intensity cold-light source, recirculating ball-bearing microscope carriage, and

a choice of T-series reel brackets. These units are available with a choice of accessories, such as powerplug strip, retractable 20-foot power cord fused for 7 amperes, drawer, or backboard. In addition, the unit can be equipped readily with the Vernac Optical Measuring System for rapid film measurement, edge masks, and a vacuum film hold-down feature.



25X1A

Weight: 270 lbs.
 Size: H 48 in. W 24 in. L 54 in.
 Power Requirements: 115 V, 2.5 A

Special Requirements: None
 Status: Commercially available
 Development Source: Commercially developed to meet NPIC stated requirements

SECRET

NPIC/R-91/67

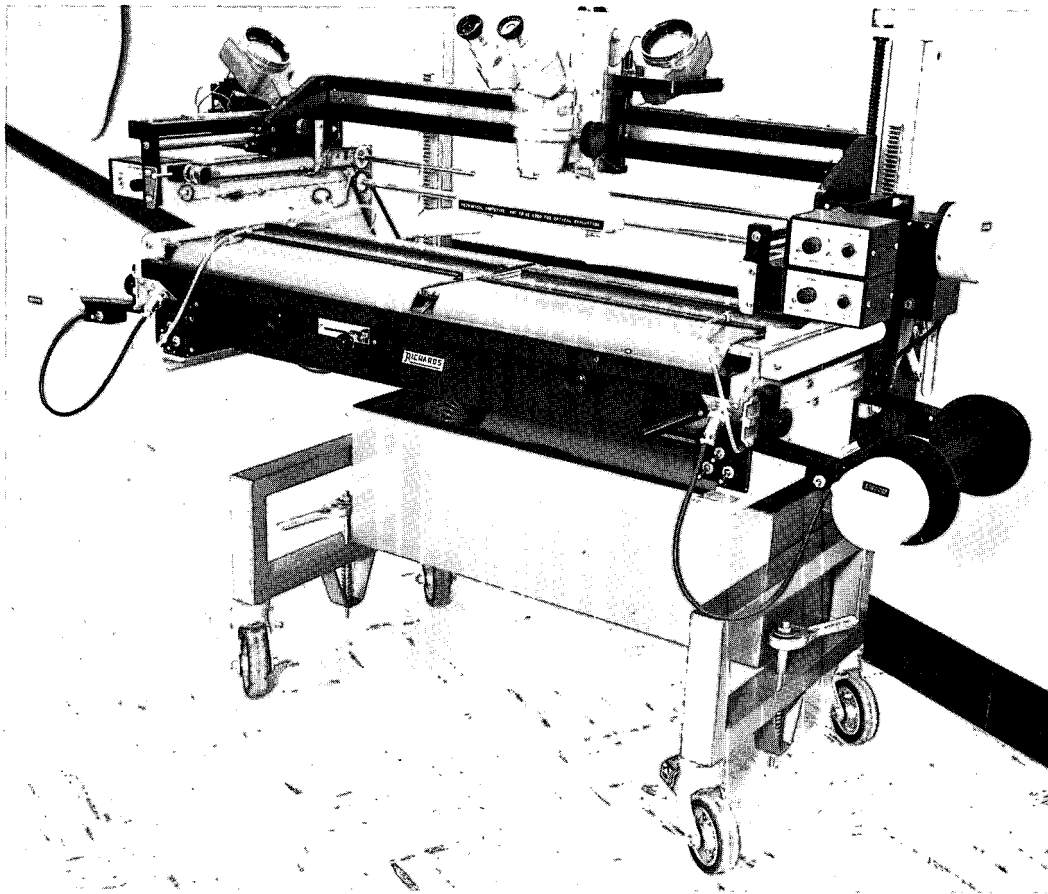
6. RICHARDS SPLIT VERTICAL LIGHT TABLE (MODEL GFL-940-MCE)

(This item is Unclassified)

This light table is essentially two 11-x 18-inch light tables placed end to end, straddled by a microscope carriage, and mounted on an elevating table. It is capable of handling a single roll of film up to 9½ inches wide or two rolls of film, each up to 5 inches wide. The special feature of this table is the adjustable take-up mechanism which allows for viewing of widely separated images simultaneously and in stereo.

Options which are available and which are shown on the photograph include, motorized film drives, Vernac measuring system, vacuum hold-down, and tilting top.

NPIC is currently developing a modified version of this light table. The modifications are minor but make the table more adaptable to NPIC needs.



25X1A

Weight: 300 lbs.

Size: H 48 in. W 24 in. L 54 in.

Power Requirements: 115 V, 2.5 A

Special Requirements: None

Status: Basic model commercially available

Development Source: Modification by NPIC of commercial item

SECRET

SECRET

25X1A

25X1A

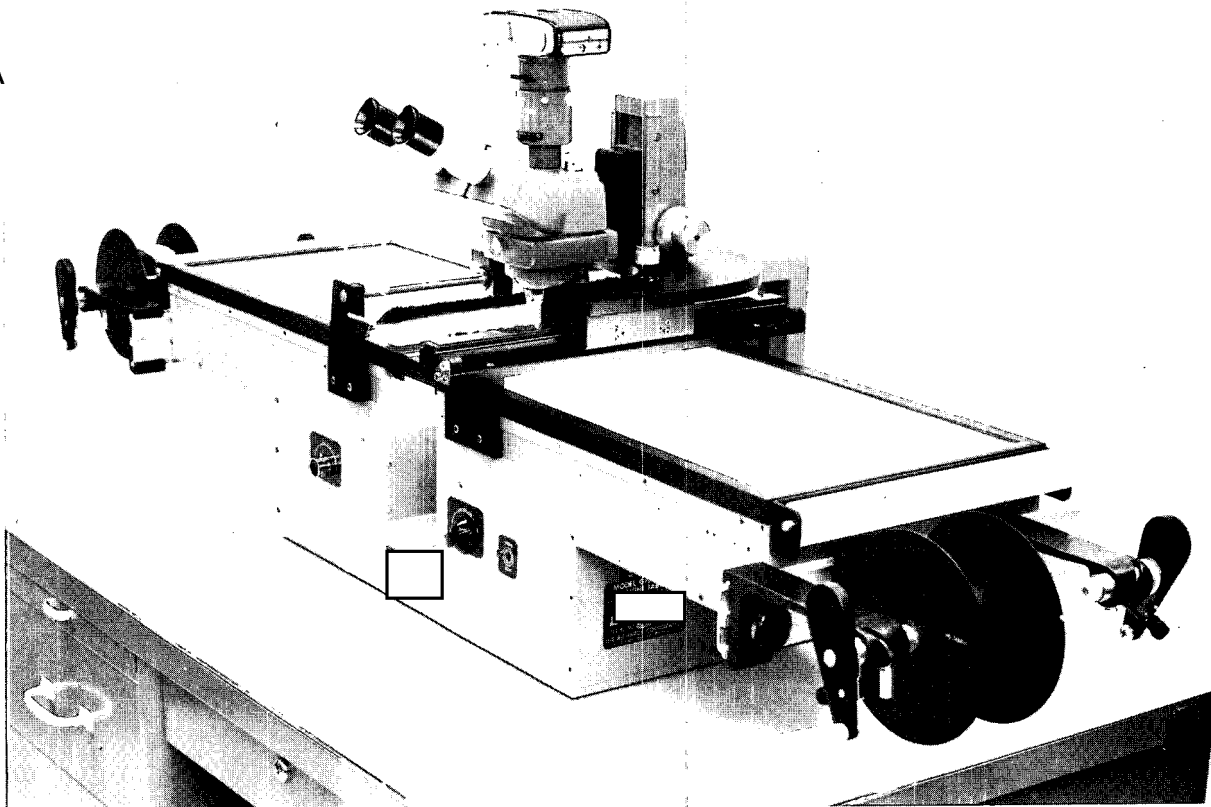
7. [] LIGHT TABLE MOUNTED WITH DYNAZOOM MICROSCOPE

(This item is Unclassified)

This light table, developed primarily for use in film evaluation, consists of an old-style [] GFL 940 Light Table especially adapted to mount a stock [] Dynazoom microscope

with associated photo-micro graphic equipment. The split light table has an integral-tracking, high-intensity light source.

25X1A



25X1A

[]
Size: H 11 in. W 14 in. L 54 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: One-of-a-kind item
Development Source: NPIC

SECRET

25X1A

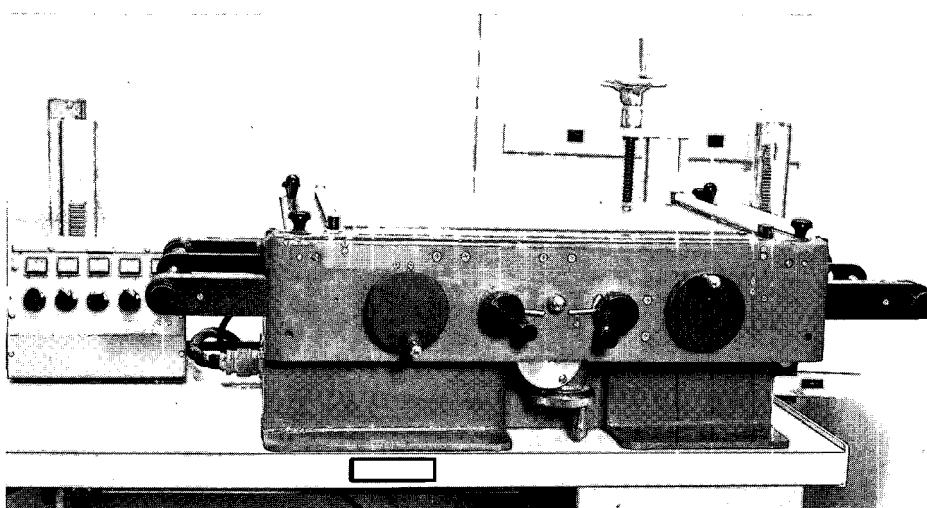
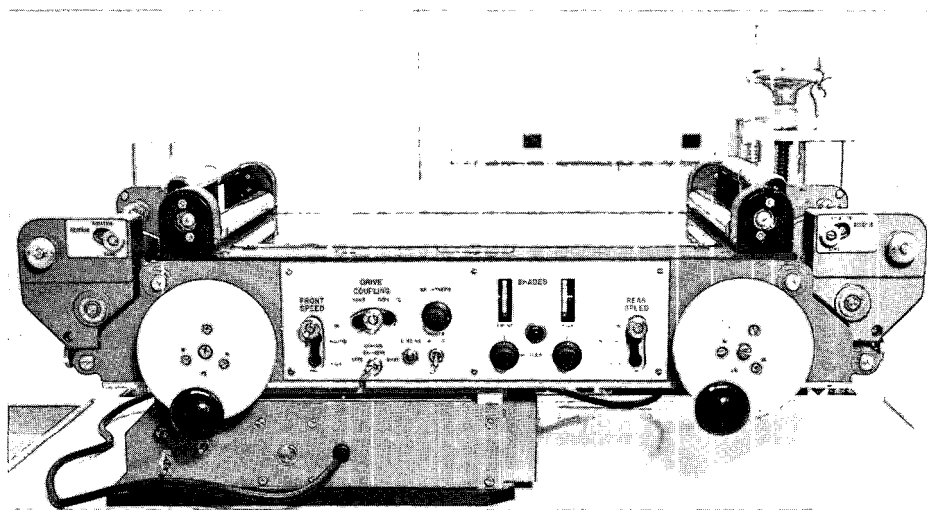
8. ADVANCED-CONCEPT LIGHT TABLES: 11- BY 18- INCH FORMAT

(TILT - TOP UNIT)

In a parallel effort, two of these advanced-concept light tables are currently under development,

Overall, this effort will result in sophisticated but reliable prototype light tables designed with due regard for human engineering and providing

better illumination, better film drives, and more comfortable viewing conditions for the operator. It is anticipated that the best features of both prototypes will be combined into a single version and an advanced prototype fabricated.



25X1

25X1A

Weight: 180 lbs.
 Size: H 9 in. W 17 in. L 32 in.
 Power Requirements: 110 V, 60 CPS

Special Requirements: None
 Status: Under evaluation
 Development Source: NPIC

SECRET

9. ADVANCED-CONCEPT LIGHT TABLES: 11- BY 40- INCH FORMAT

25X1A

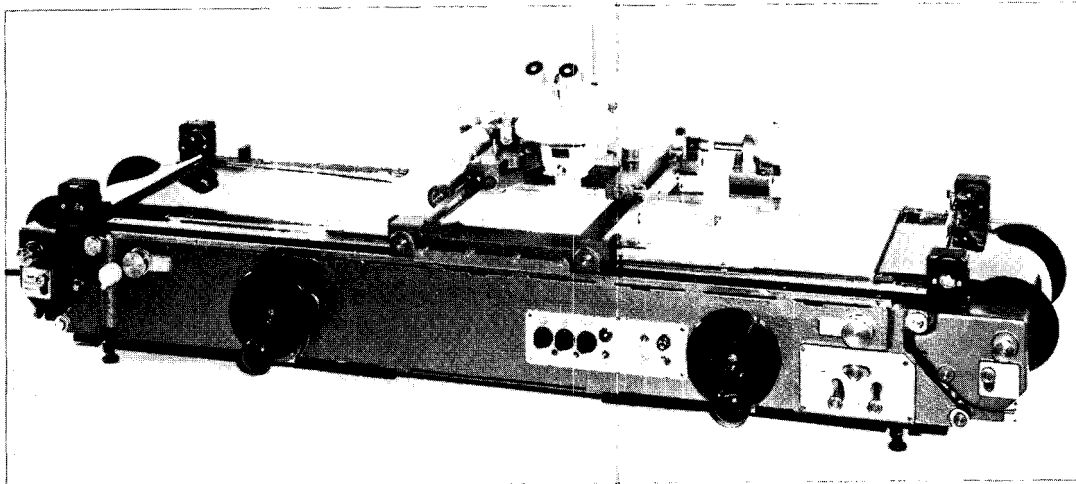
(NON-TILTING UNIT WITH TRANSLATING MICROSCOPE CARRIAGE)

In a parallel effort, two of these advanced-concept light tables are currently under development, one by [] and the other by []

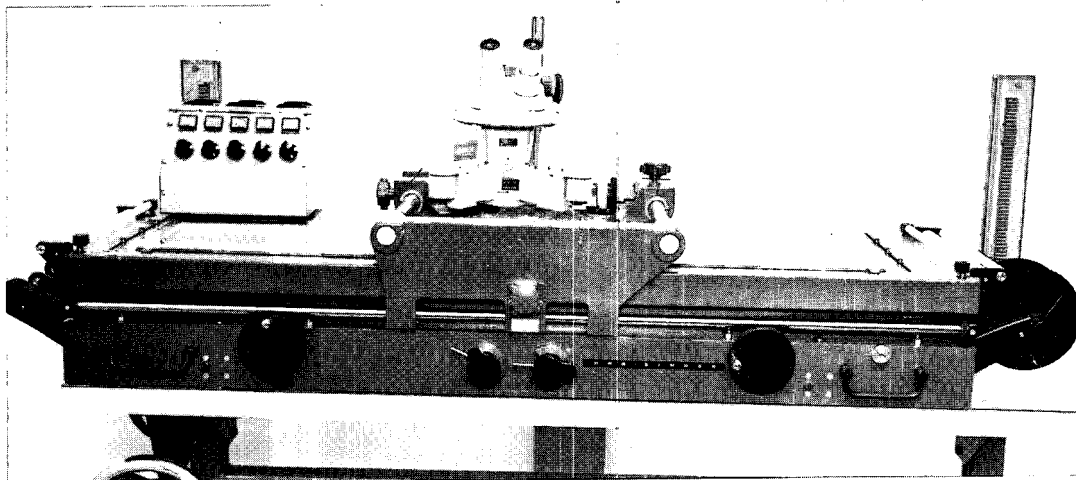
Overall, this effort will result in sophisticated but reliable prototype light tables designed with due regard for human engineering and providing

better illumination, better film drives, and more comfortable viewing conditions for the operator. The instrument has a one micron least count measuring capability. It is anticipated that the best features of both prototypes will be combined into a single version and an advanced prototype fabricated.

25X1A



25X1A



[]

Weight: 300 lbs.
Size: H 9 in. W 19 in. L 55 in.

Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Under evaluation
Development Source: NPIC

SECRET

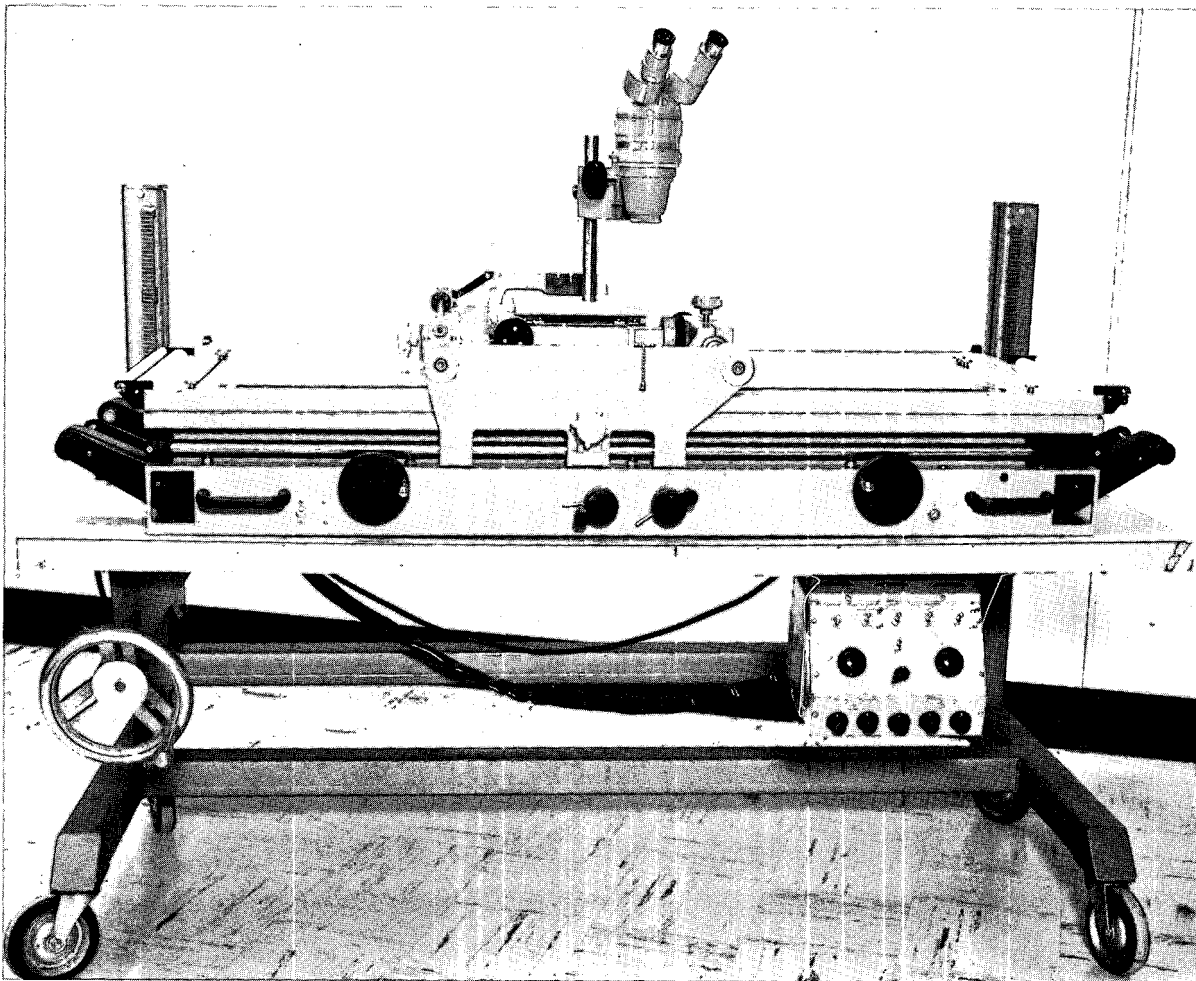
25X1A
25X1A

10. ADVANCED-CONCEPT LIGHT TABLES: 11- BY 40- INCH FORMAT
(NON-TILTING UNIT WITH TRANSLATING MICROSCOPE CARRIAGE AND AN INTEGRAL HIGH-INTENSITY TRACKING LIGHT SOURCE)

In a parallel effort, two of these advanced-concept light tables are currently under development. The light table pictured below was fabricated by [redacted]. The parallel development (not pictured) is by [redacted].

Overall, this effort will result in sophisticated by reliable prototype light tables designed with

due regard for human engineering and providing better illumination, better film drives, and more comfortable viewing conditions for the operator. Measuring least count will be 1 micron. It is anticipated that the best features of both prototypes will be combined into a single version and an advanced prototype fabricated.



[redacted]

Size: H 9 in.

Power Requirements:

Weight: 300 lbs.

W 19 in. L 55 in.

110 V, 60 CPS

Special Requirements: None

Status: Under evaluation

Development Source: NPIC

25X1A

SECRET

25X1A

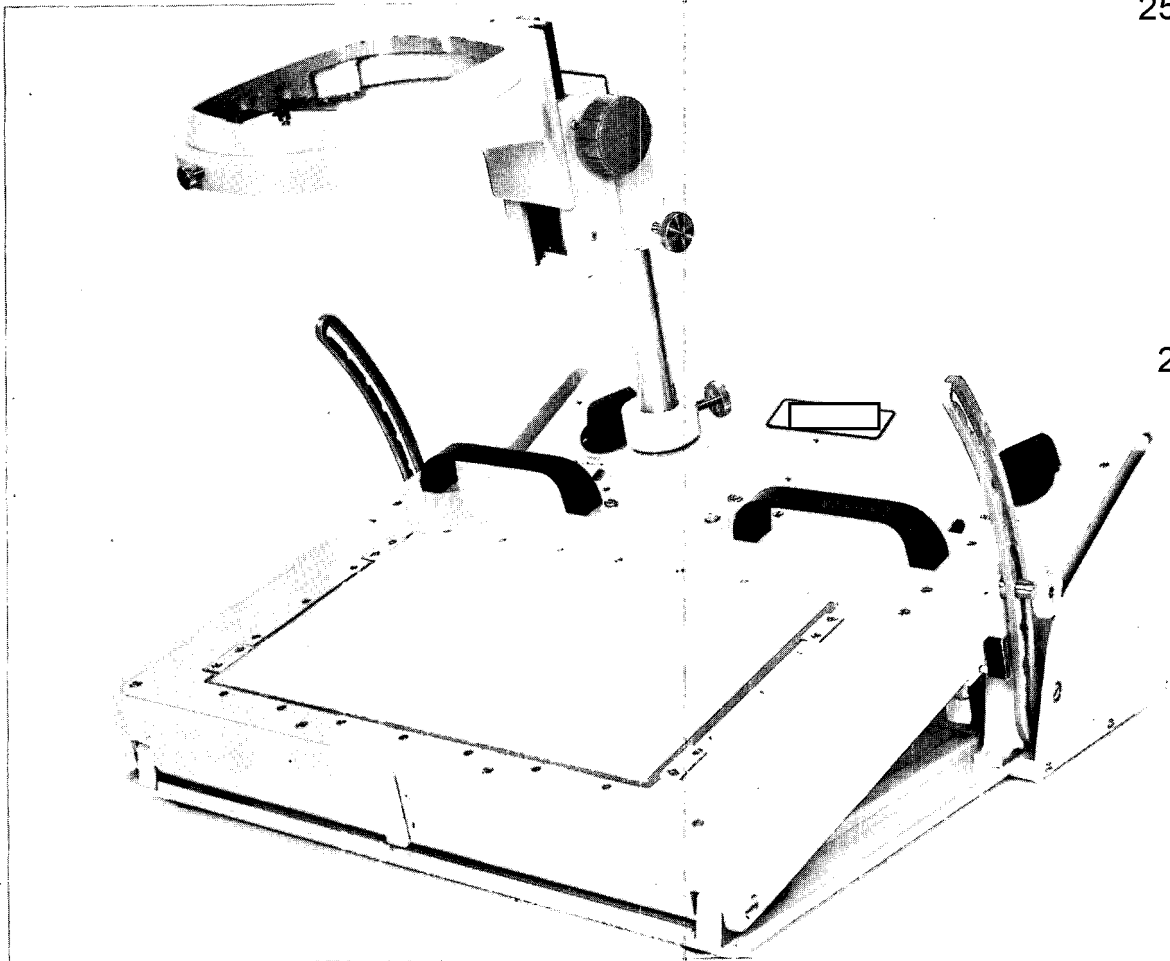
11. **TWIN-LIGHT-SOURCE STEREOSCOPIC LIGHT TABLE--TILTING MODEL**

25X1A

This table has a large illuminated stereoscopic viewing surface that can be tilted to positions convenient for the user, and is divided into 2 separately controlled viewing areas. Each light source is continuously variable from 100 to 2,000 foot-lamberts, and its operation is independent of the other. The size of each light source is 5 by 6 inches and the overall size of the table

is 16 by 17 inches. The light table accommodates the Zoom 70 Stereomicroscope or the M-5 Microstereoscope. When viewing in the monoscopic mode, the light baffle between the 2 light sources can be removed and an even distribution of light is produced over the entire 6- by 10-inch viewing area.

25X1A



25X1A

Size: H 6 in.
 Power Requirement: 110 V, 60 CPS

Weight: 40 lbs.
 W 18 in. L 14 in.

Special Requirements: None
 Status: Evaluation completed. No procurement anticipated.
 Development Source: NPIC

SECRET

SECRET

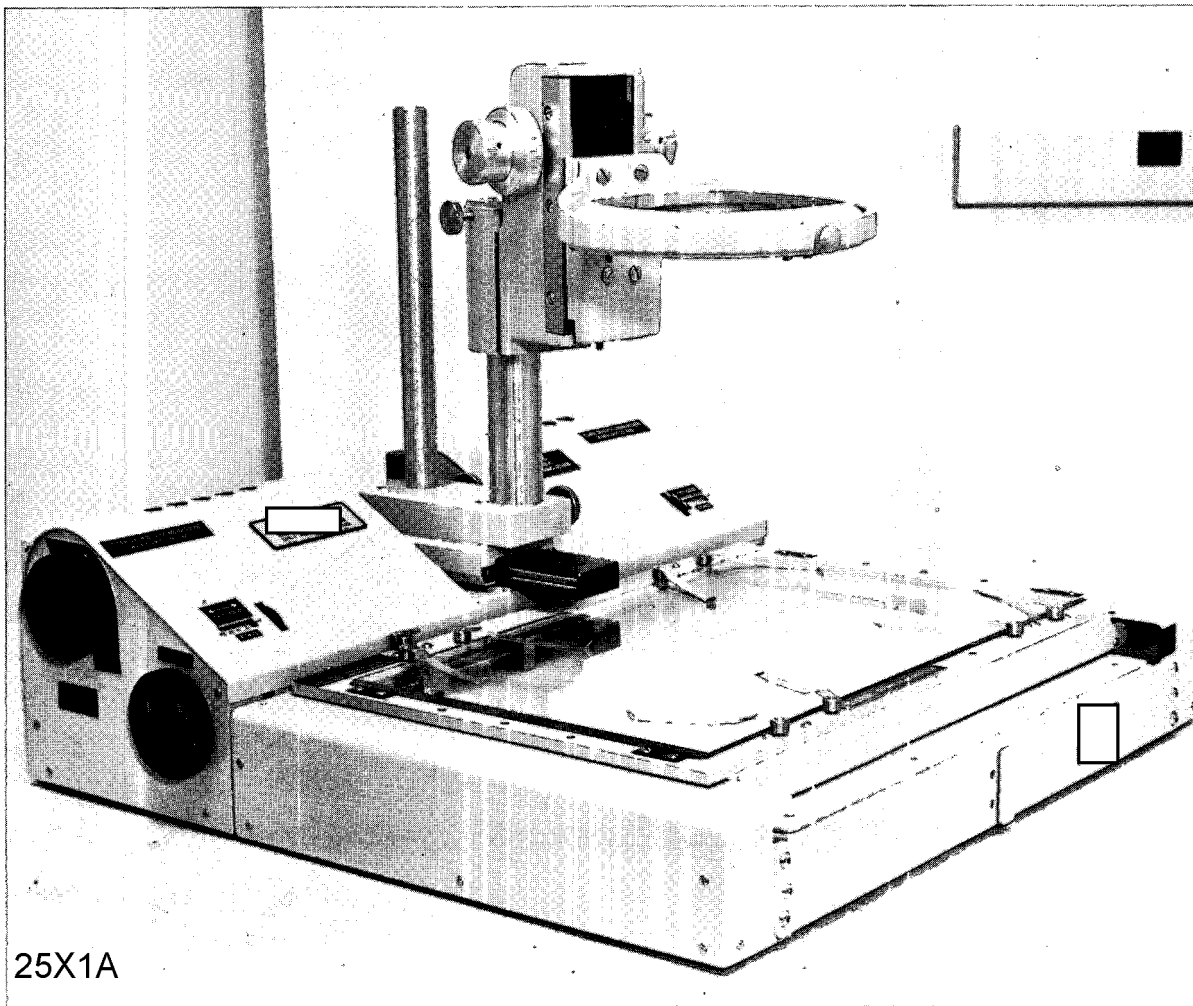
25X1A

12. **TWIN-LIGHT-SOURCE STEREOSCOPIC LIGHT TABLE WITH MENSURATION SCANNING STAGE**

(This item is Unclassified)

This light table is a projected advanced development of the tilting model. It will incorporate a scanning stage which may be moved in both axes by precision lead screws having an accuracy of .001 inch/inch. A digital readout,

as a 4-digit number, will be provided for each axis. The tilting arrangement of the earlier model will be eliminated, thereby reducing the weight and size of the basic unit.



25X1

25X

25X1A

Weight: 40 lbs.
Size: H 6 in. W 22 in. L 19 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Prototype model is now under evaluation at NPIC
Development Source: NPIC

SECRET

SECRET

13. DIGITIZED MEASURING LIGHT TABLE

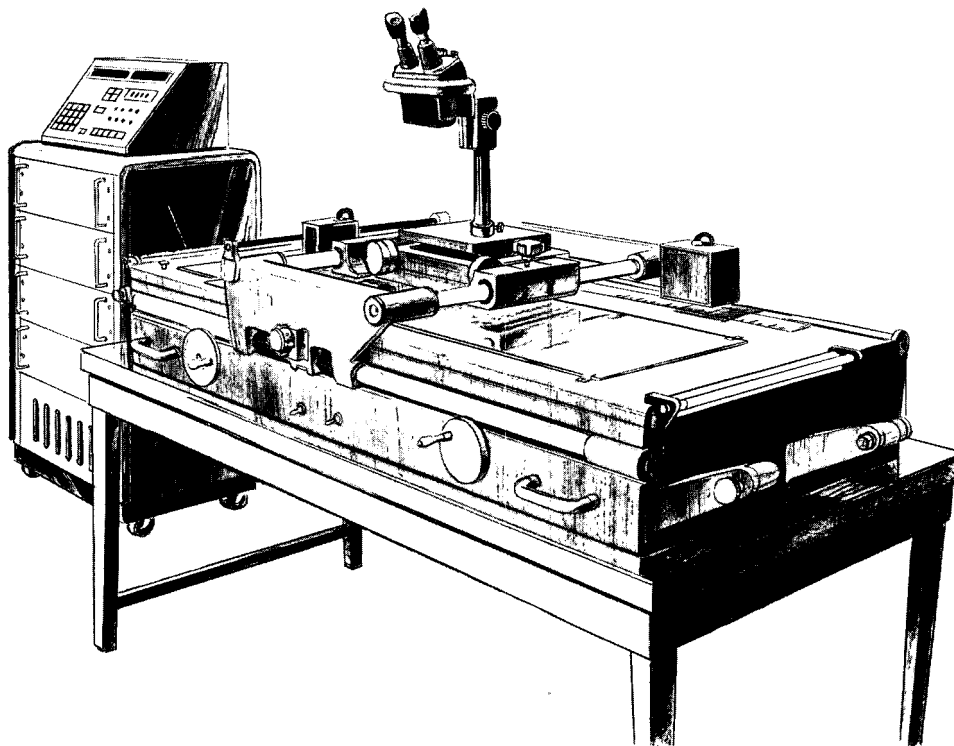
25X1A

This light table will convert a photo interpreter light table into an X-Y coordinate, on-line, input station. The light table with its associated digitizers and teletype will serve the P.I. as an accurate (anticipated 5 micron accuracy) measuring device which will utilize available computer programs to yield true ground information. In the advent of a computerized central information handling system, the Digitized Measuring Light Table will serve as an integral part of the P. I. station.

The present concept of the unit incorporates

an advanced 11- by 40-inch light table with the [redacted] 'DIG' measuring system.

The "DIG" consists of a stationary, ruled glass bar and a traveling optical reading head which is connected to the readout electronics. By mounting the reading heads and rules on "standard" light tables, costs can be kept to a minimum. Another possibility for cost savings being considered is a quick disconnect mount for the reading heads. This would allow one set of reading heads and readout electronics to be shared by three or four light tables.



25X1A

[redacted]
Weight: 150 lbs. (Excluding console)
Size: H 9 in. W 16 in. L 60 in.
Power Requirements: 115 V, 7 A

Special Requirements: None
Status: Prototype under development
Development Source: NPIC

SECRET

SECRET

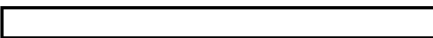
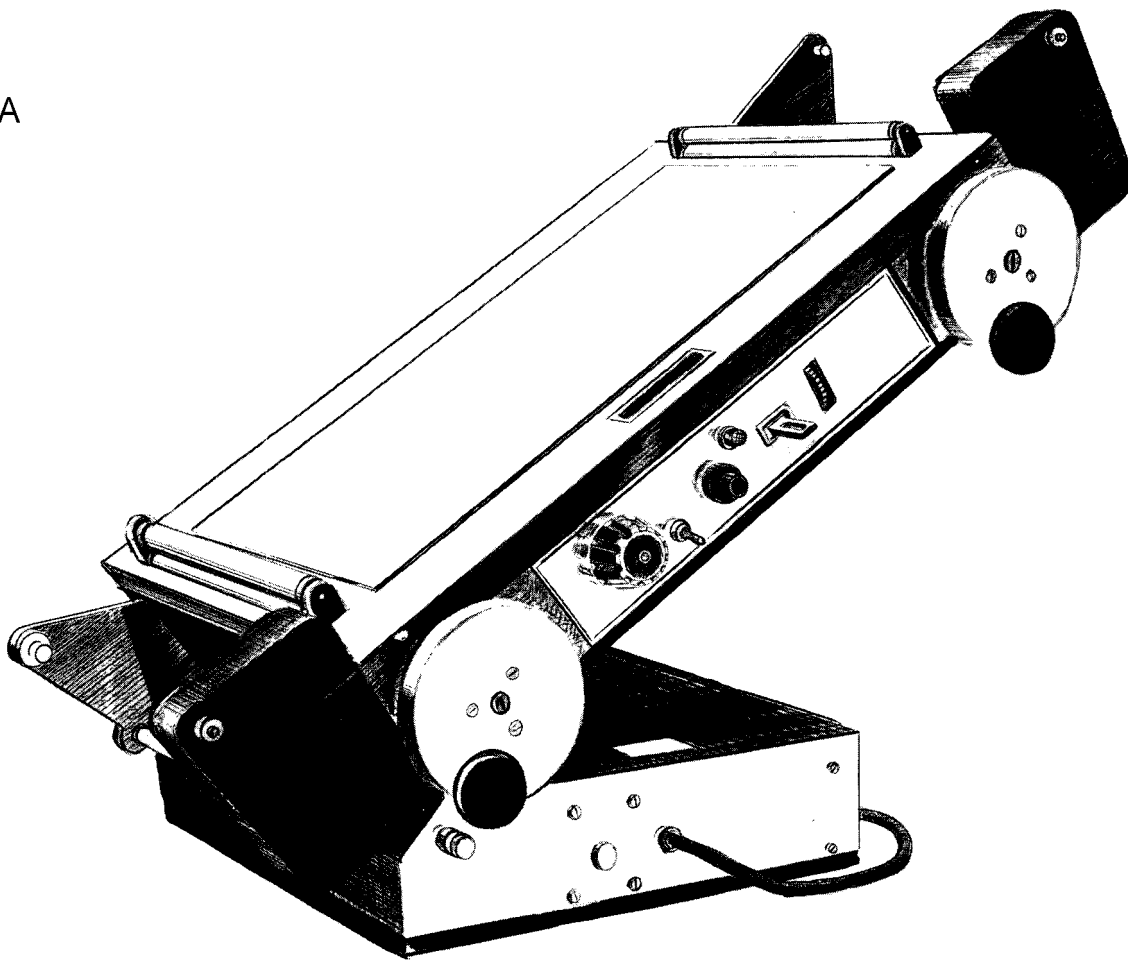
25X1A

14. **ADVANCED LIGHT TABLE PROTOTYPE (11- BY 18-INCH)**

The pre-production 11- by 18-inch advanced light table prototype will be a simplified, light-weight version of the Model 603 Tilting Light Table. The new prototype will feature an improved illumination system, motor-

ized and manual drives, magnetic drag, tilting top and single handwheel control of film movement. This prototype will be evaluated and if accepted will serve as the model for a new generation of light tables.

25X1A



Weight: 60 lbs. (goal)
Size: H 9 in. W 16 in. L 32 in.
Power Requirements: 115 V, 5 A

Special Requirements: None
Status: Prototype due in July 1968. Production model may be available in the spring of 1969.
Development Source: NPIC

25X1A

SECRET

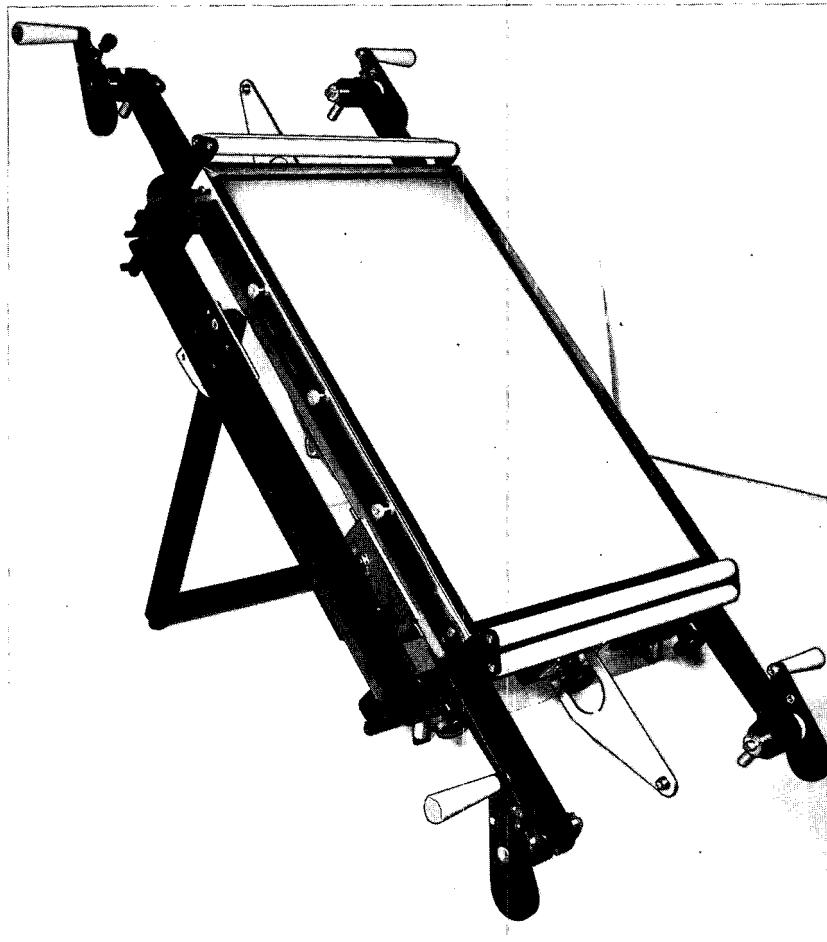
SECRET

15. RICHARDS LIGHT TABLE FOR PI FLY-AWAY KIT

(This item is Unclassified)

This light table, designed for field use, is a rugged, light-weight unit which is completely functional and yet easily packed for shipment. The table is so constructed that the reel brackets and film rollers can be removed, allowing the table to be reduced to a 19.5- by 14.5-inch size. This small, compact size will allow the table to be packed in existing waterproof ship-

ping containers. The brightness of the viewing surface is continuously variable from 100 to 1,200 foot-lamberts without flicker. The table is so constructed that it may be used in 2 modes of operation: 30 and 45 degrees. A microscope bridge accommodating the Bausch and Lomb Zoom 70 is available.



25X1A

Size: H 6 in. W 15 in.
 Power Requirements: 110 V, 60 CPS

Weight: 30 lbs.
 L 20 in.

Special Requirements: None
 Status: Commercially available
 Development Source: NPIC

SECRET

SECRET

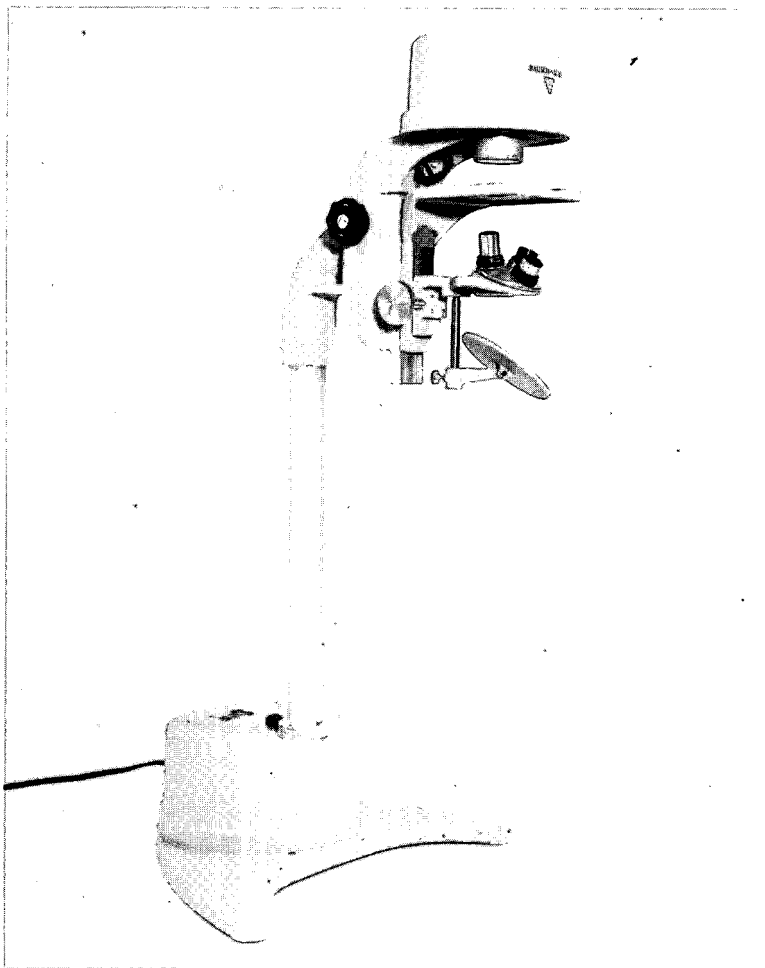
D. PROJECTORS

1. BAUSCH AND LOMB TRI-SIMPLEX PROJECTOR, STANDARD

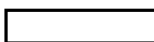
(This item is Unclassified)

Objectives on the Tri-Simplex Projector are of microscopic quality and are coated to reduce internal flare, which so frequently causes image deterioration. The internal condensing system is the Bausch and Lomb 2-lens design, engineered for maximum efficiency and provided with functional heat-absorbing glass. An external swing-in/out supplementary condenser provides ample

light intensity for the high-power 43x objective. In addition, there is a 12x objective as standard equipment, and 2.7x and 5x achromatic objectives as optional equipment at extra cost. The 4-inch-square stage is recessed to compensate for cover-glass thickness. A 3.5-inch-diameter mirror with a clamp and supporting post serves to project images onto a vertical surface.



25X1A



Size: H 27 in.

Power Requirements:

Weight: Less than 50 lbs.

W 12 in. L 10 in.

115 V, 60 CPS

Special Requirements: None

Status: Commercially available

Development Source: Commercial

SECRET

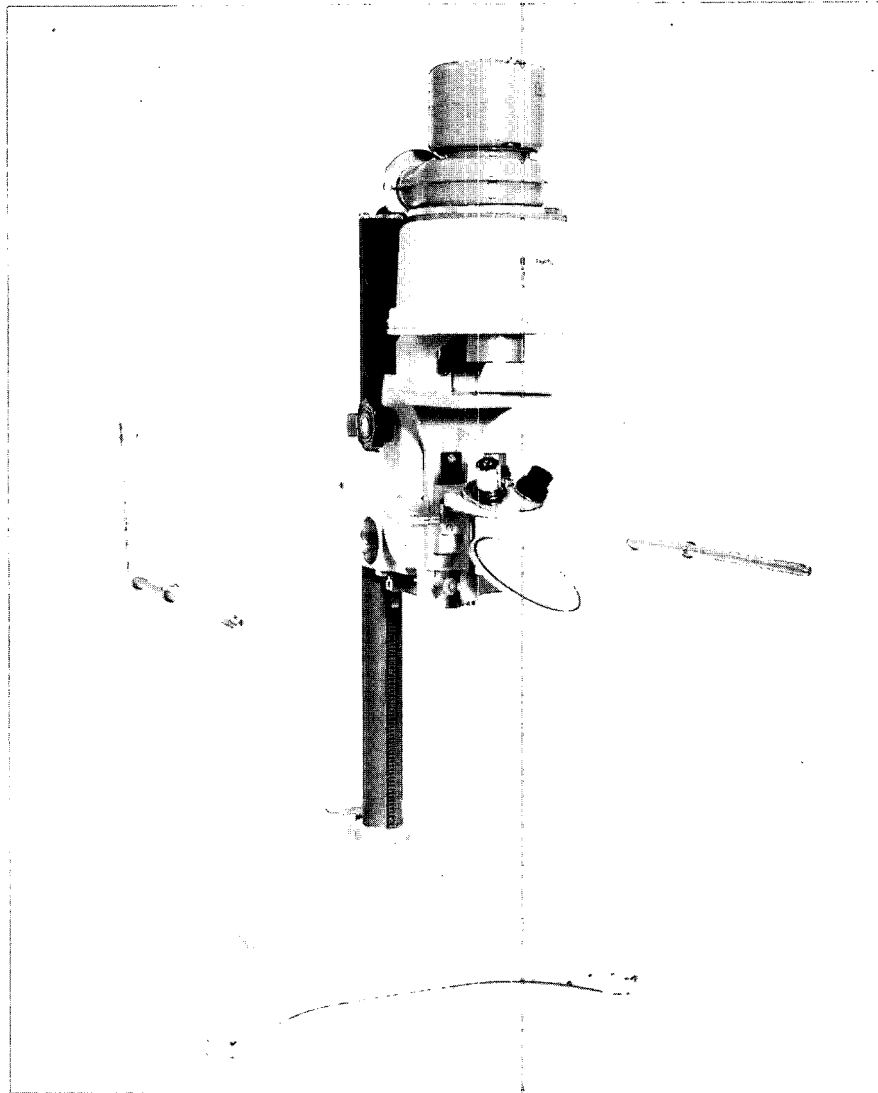
SECRET

2. BAUSCH AND LOMB TRI-SIMPLEX PROJECTOR, MODIFIED

(This item is Unclassified)

Modifications, developed by the U.S. Navy, have been incorporated in the Standard Bausch and Lomb Projector. These include a blower

for the lamp housing, rack and pinion support bar; and a spool holder.



25X1A

Weight: Less than 50 lbs.
Size: H 32 in. W 18 in. L 18 in.
Power Requirements: 115 V, 60 CPS

Special Requirements: None
Status: Commercially available
Development Source: U.S. Navy

SECRET

SECRET

25X1A

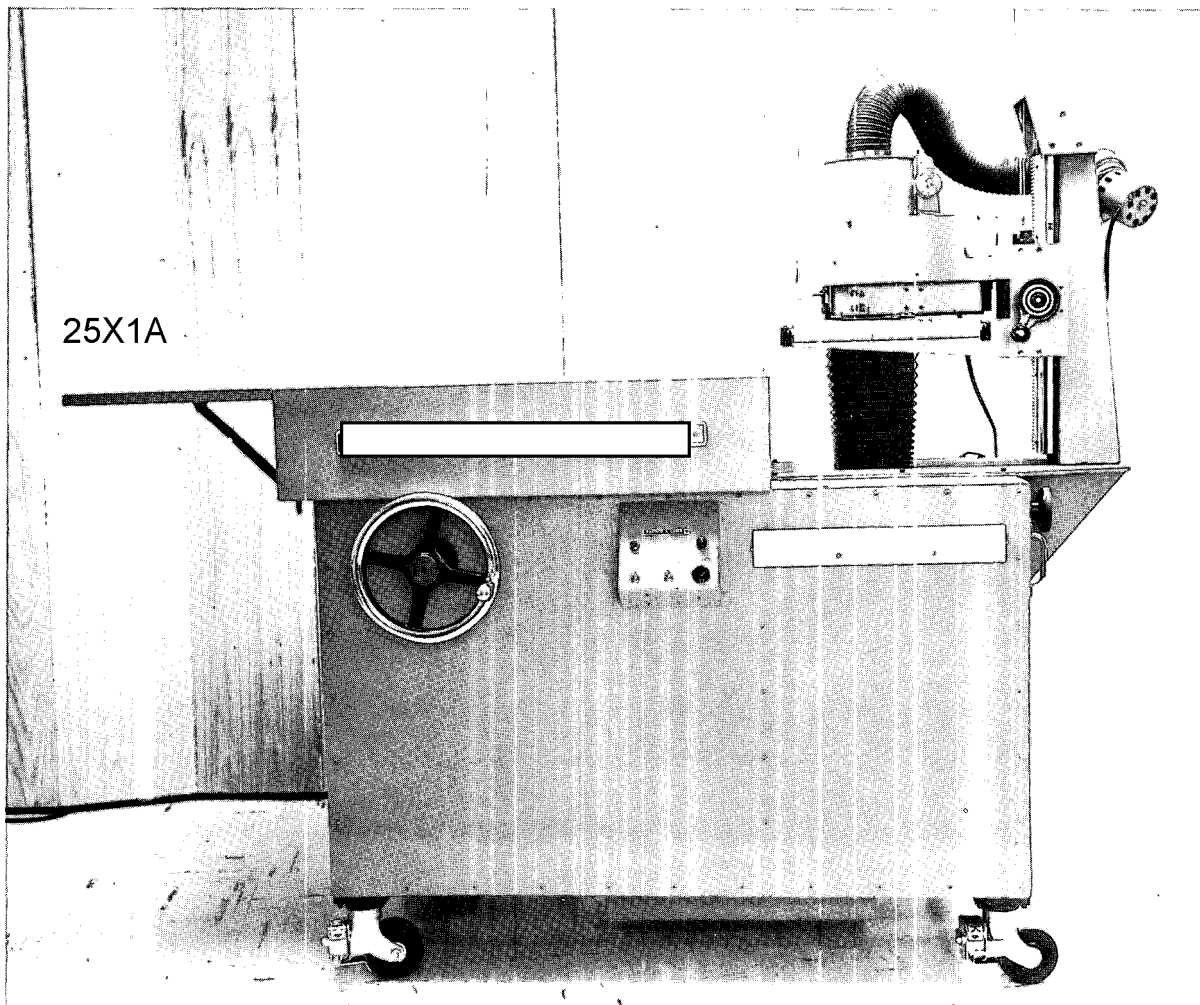
3. [] **VARIABLE-MAGNIFICATION TRACING PROJECTOR**

(This item is Unclassified)

25X1A

This prototype tracing projector, developed by [] provides a ready means of projecting contact-size film positives at magnifications ranging from 2x to 16x for the purpose of preparing line drawings. The image is rear-

projected into tracing material placed over a 24- by 24-inch horizontal, glass work-surface. Film chips or roll film from 70mm to 9.5 inches in width can be used on the instrument.



25X1A

[]
 Weight: 350 lbs.
 Size: H 60 in. W 36 in. L 66 in.
 Power Requirements: 115 V, 60 CPS

Special Requirements: *Semi-darkened room*
 Status: *Prototype delivered. None scheduled for production.*
 Development Source: *NPIC*

SECRET

SECRET

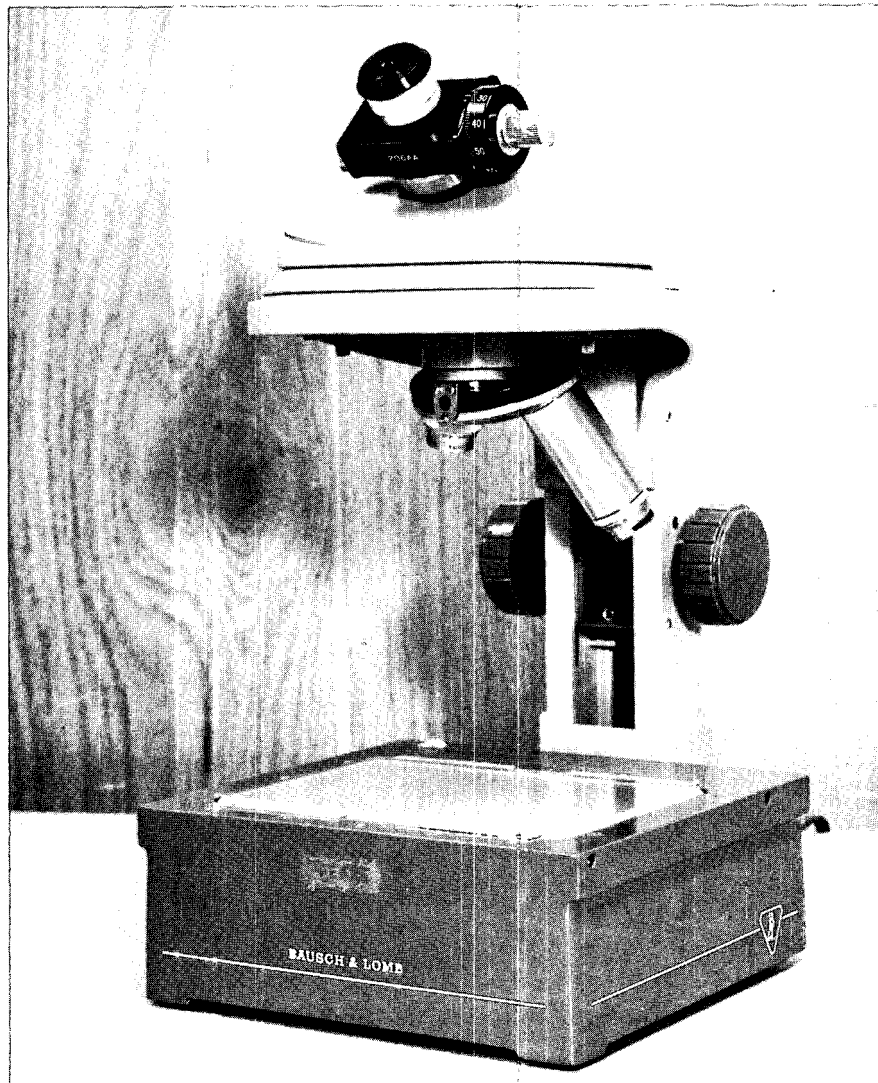
E. MEASURING TOOLS

1. BAUSCH AND LOMB DUAL-POWER MEASURING MACROSCOPE

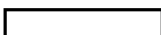
(This item is Unclassified)

This macroscope is easier to use and provides twice the resolution and 10 times the accuracy of the zoom macroscope, which was previously the best simple measuring tool for small images.

The filar eyepiece measuring device with 20.5x and 41x magnification can be mounted in any ring stand that would normally accept a Bausch and Lomb power pod.



25X1A



Size: H 10 in.

Power Requirements: 110 V, 60 CPS

Weight: 10 lbs.

W 6 in. L 6 in.

Special Requirements: None

Status: Commercially available

Development Source: NPIC

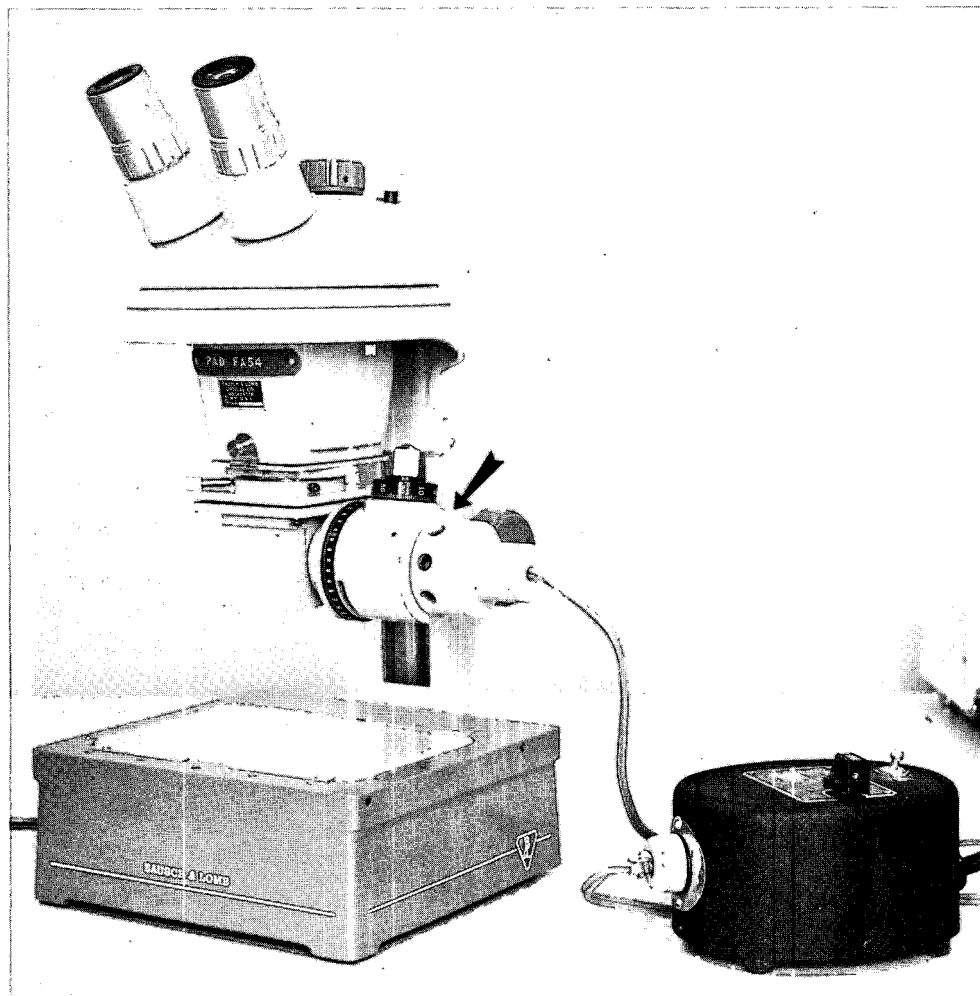
SECRET

2. BAUSCH AND LOMB PROJECTED-SCALE MICROMETER (MODEL I)

(This item is Unclassified)

This projection-type measuring device clips to the base of the Model II Zoom 70 Stereo-microscope. It permits binocular viewing of a

.00001-foot scale superimposed on the photographic image through the Zoom 70's full range of magnification.



25X1A

Size: H 3 in.

Weight: 5 lbs.

W 4 in. L 6 in.

Power Requirements: 110 V

Special Requirements: None

Status: Commercially available

Development Source: NPIC

SECRET

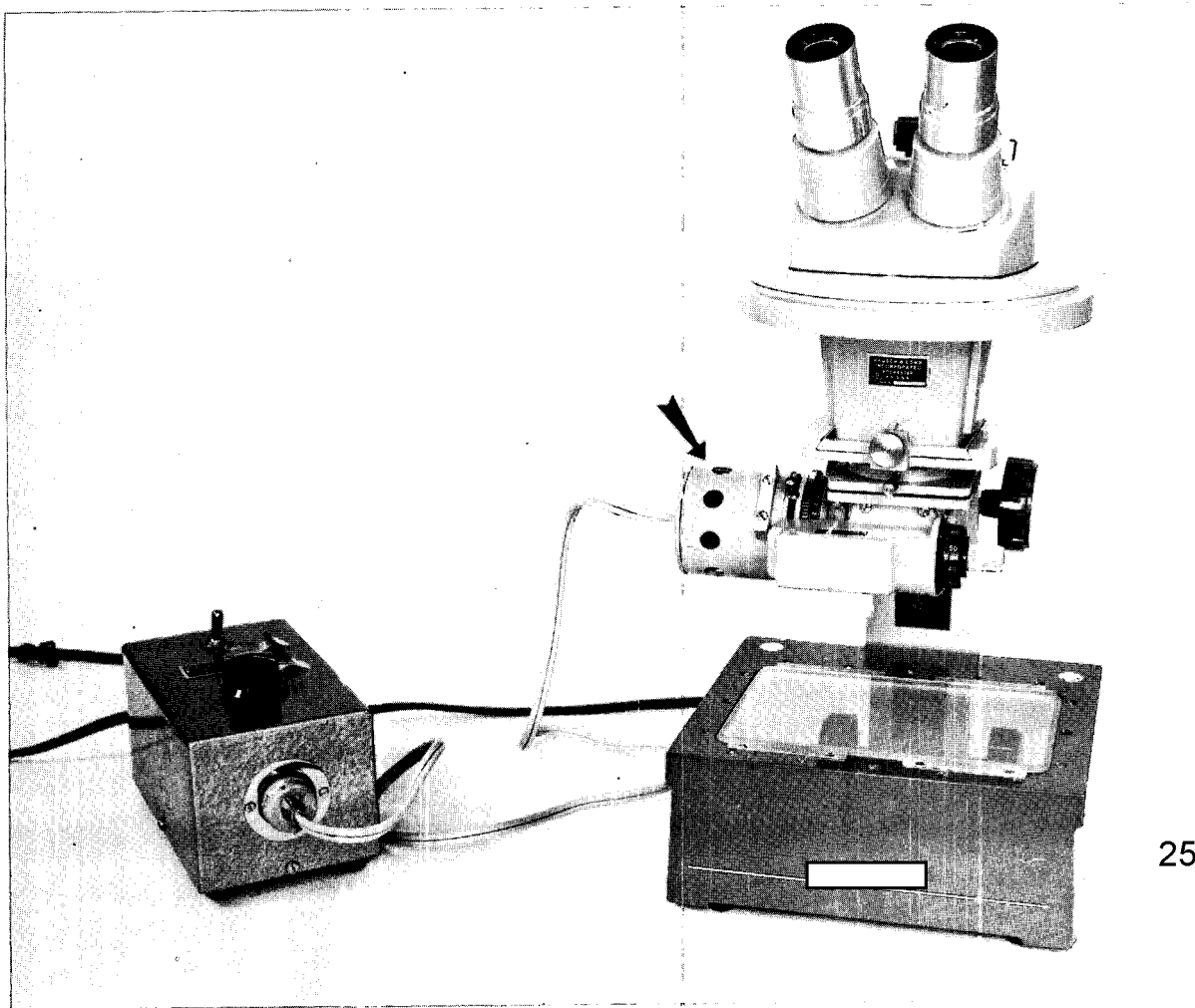
25X1A

3. **PROJECTED-SCALE MICROMETER (MODEL II)**

(This item is Unclassified)

This instrument incorporates many improvements over the Model I production version. These include: a luminous-line reticle instead of a scale projected into the plane of the photograph, the reticle being moved across the field of view by a micrometer screw; a combination

digital counter/micrometer drum that will automatically record the measurement. In addition, the unit is more compact and the micrometer drum remains in a fixed position when the line azimuth is rotated.



Weight: 8 lbs.
Size: H 3 in. W 3 in. L 8 in.
Power Requirements: 115 V, 60 CPS, step-down transformer supplied with unit provides 6-12 volts to projection lamp.

Special Requirements: None
Status: Prototype delivered; no more scheduled for production.
Development Source: NPIC

25X1A

SECRET

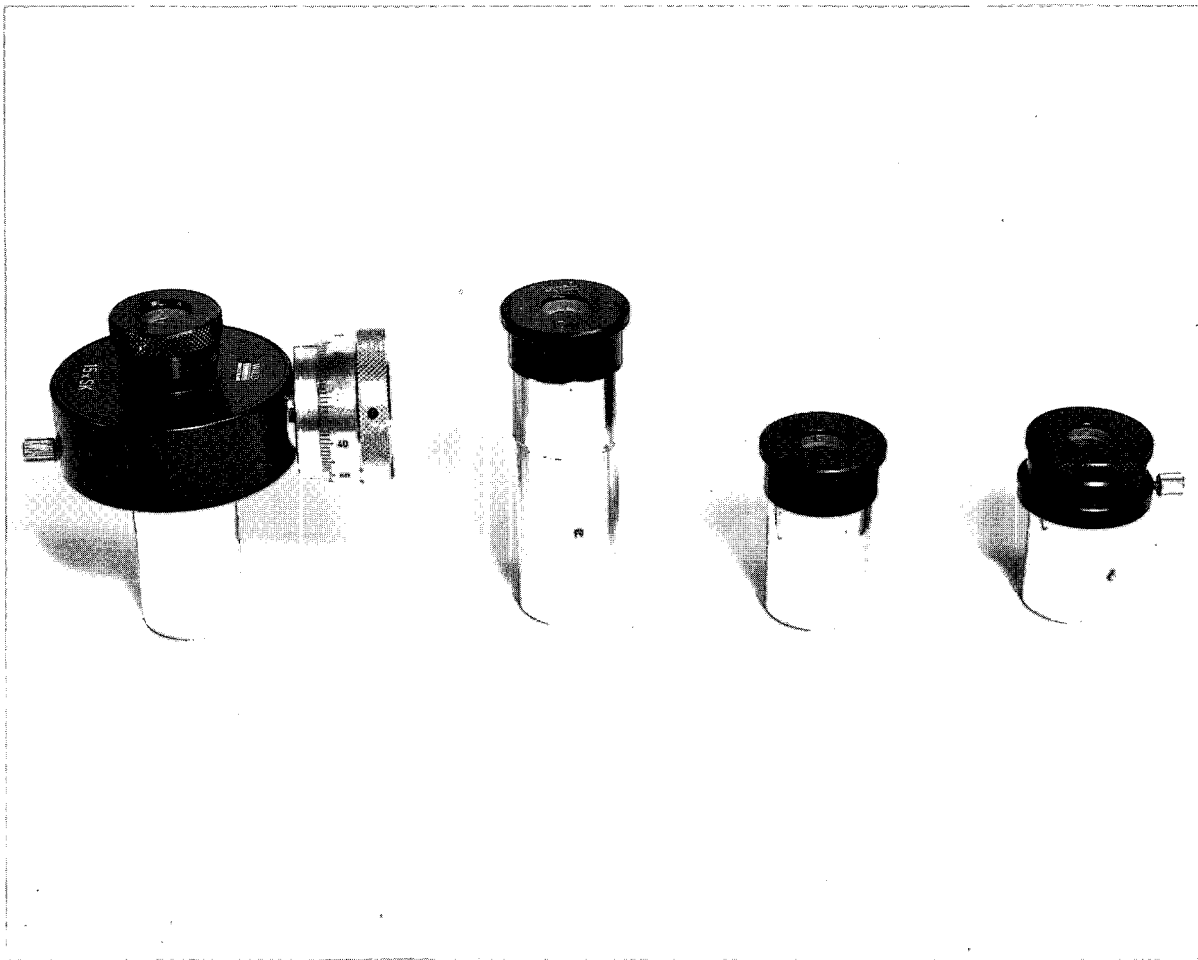
SECRET

4. WILD HEERBRUGG MEASURING EYEPIECES FOR B&L HIGH-POWER STEREO VIEWER

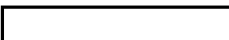
(This item is Unclassified)

In order to give a precision, comparative mensuration capability to the Bausch and Lomb High-power Stereo Viewer, a set of measuring eyepieces may be obtained from Wild Heerbrugg Inc. The set, from left to right in the illustration, includes: one 15x filar screw micrometer eye-

piece for measuring dimensions, one 15x compensating eyepiece for use with the filar, one 15x compensating eyepiece for use with the goniometer, and one 15x goniometer eyepiece for measuring bearings and angular displacements.



25X1A



Weight: 2 lbs. per set

Size: H 3 in. W 1½ in.

Power Requirements: None

Special Requirements: *Modified eyepiece holders if not already on instrument*

Status: *Commercially available*

Development Source: *NPIC*

SECRET

25X1A

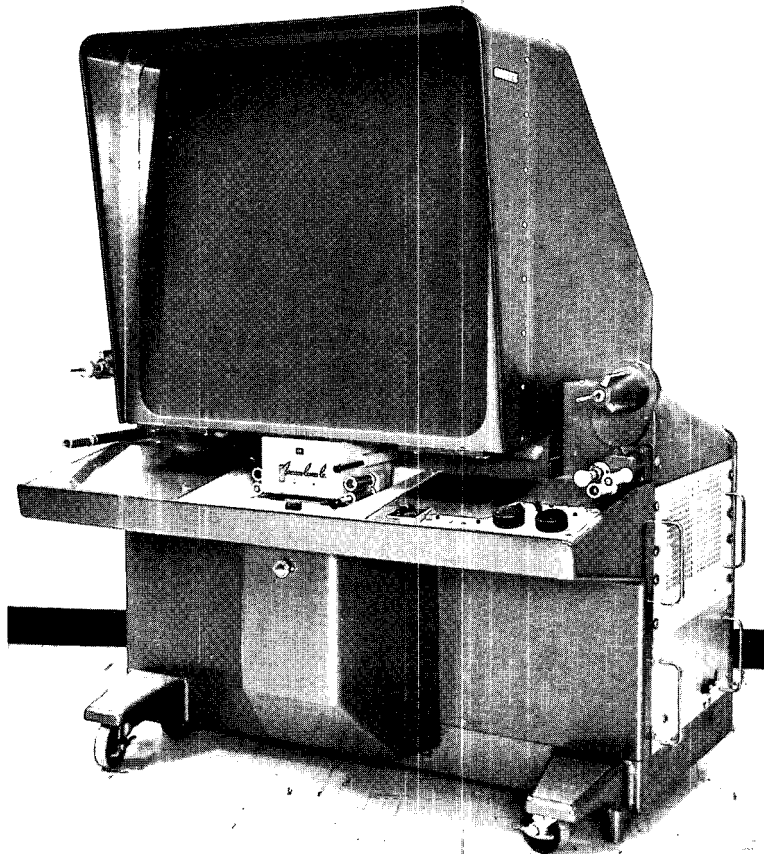
F. VIEWERS

1. FILM VIEWER (MODEL 550-M)

(This item is Unclassified)

This unit provides rapid scanning and viewing of images on 35mm and 70mm perforated or non-perforated film on reels of up to 1,000-foot capacity. Film transport speed ranges from 0.1 to 3 inches per second in forward or reverse. When the stop switch is actuated, the film is immediately stopped and a solenoid-operated glass platen automatically closes for optimum focus. Upon release, the platen opens and the

film continues to advance at the preselected speed. A 2-lens indexing turret is provided, allowing the operator to electrically select either 10x or 20x magnification. The lenses are parfocal and the operator has an additional manual fine-focus control. Each lens has its own optical rotating prism which can be turned 360 degrees. The light source is a 500-watt Sylvania Tru-focus projection lamp.



25X1A

Weight: 600 lbs.

Size: H 62 in. W 38 in. L 50 in.

Power Requirements: 110 V, 60 CPS, 8 A

Special Requirements: None

Status: Production item. Replaced for Center use by Model 705-V in 1962. Surplus items turned over to the U.S. Navy.

Development Source: Commercially developed to meet NPIC stated requirements.

SECRET

NPIC/R-91/67

25X1A

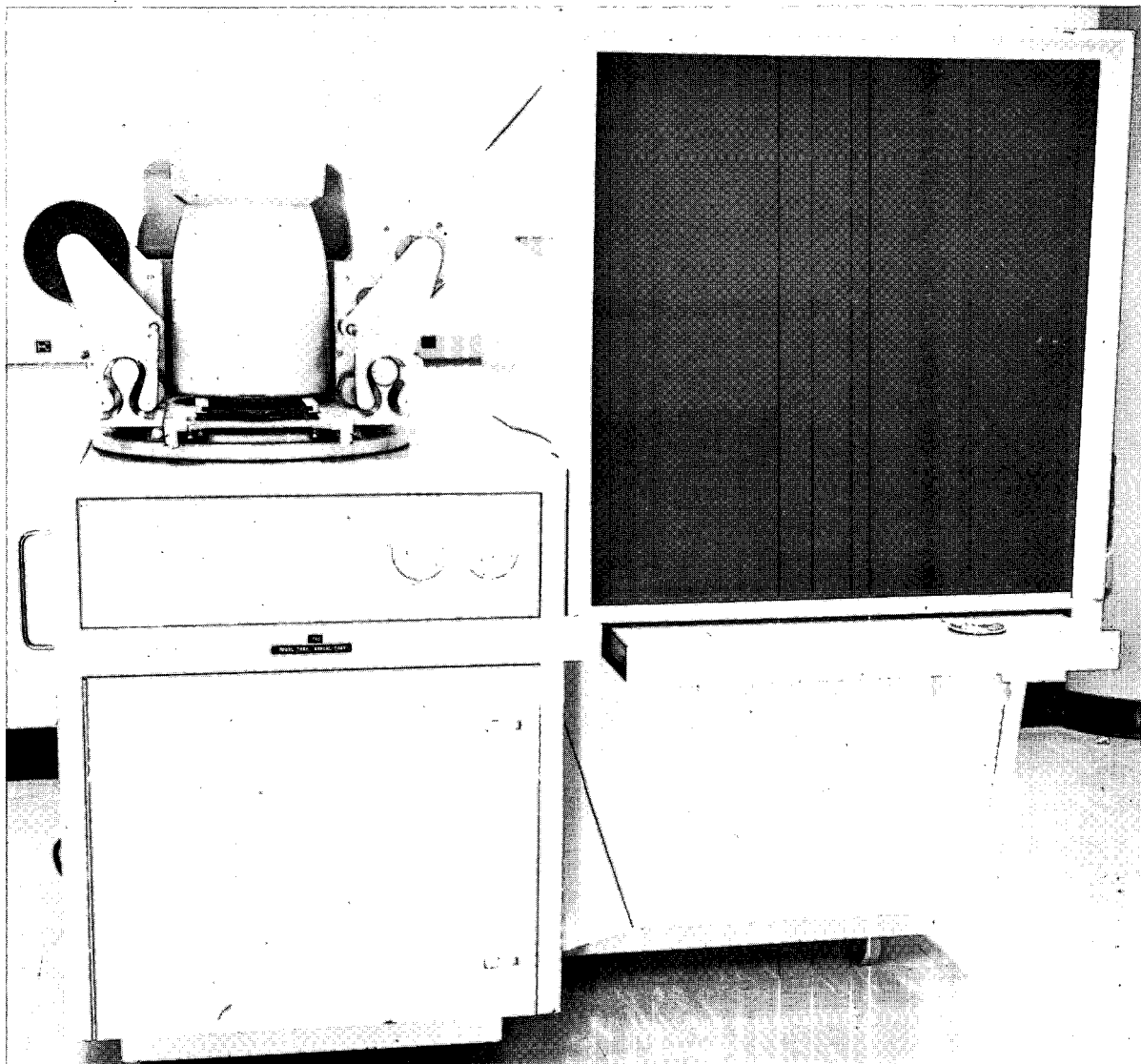
25X1A

2. **FILM VIEWER (MODEL 705-V)**

(This item is Unclassified)

This viewer retains many of the qualities of the Model 550-M Viewer. It has many additional advantages, however, including

the ability to accommodate 35mm to 9.5-inch-wide film and permit viewing and reading of images at 5x, 12x, and 30x magnifications.



Size: H 62 in. W 36 in. L 61 in.
 Power Requirements: 115 V, 60 CPS, 15 A

Special Requirements: None
 Status: Production item. Replaced by Model 706-M in 1963.
 Development Source: NPIC.

25X1A

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NPIC/R-91/67

25X1A

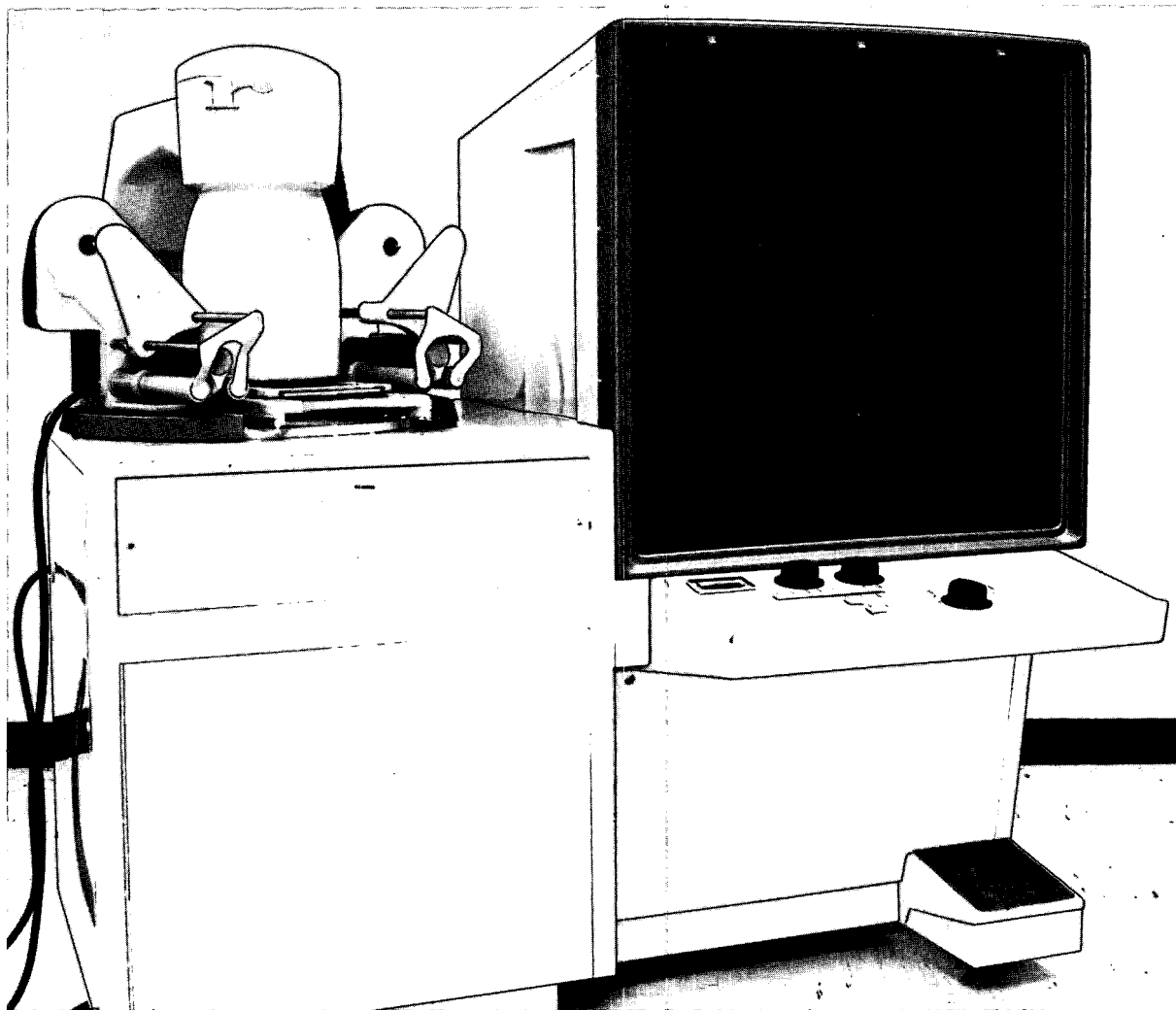
3. [] FILM VIEWER (MODEL 706-M)

(This item is Unclassified)

This viewer is an updated production version of the 705-V [] Viewer with all the capabilities of the VF-550 and 705-V viewers,

and increased reliability. It will handle 35mm through 9.5 inch wide film and permit viewing of images at 5x, 12x, and 30x magnification.

25X1A



[]
Size: H 52½ in. W 51 in. L 63 in.
Power Requirements: 115 V, 15 A

Special Requirements: None
Status: Production item
Development Source: NPIC

25X1A

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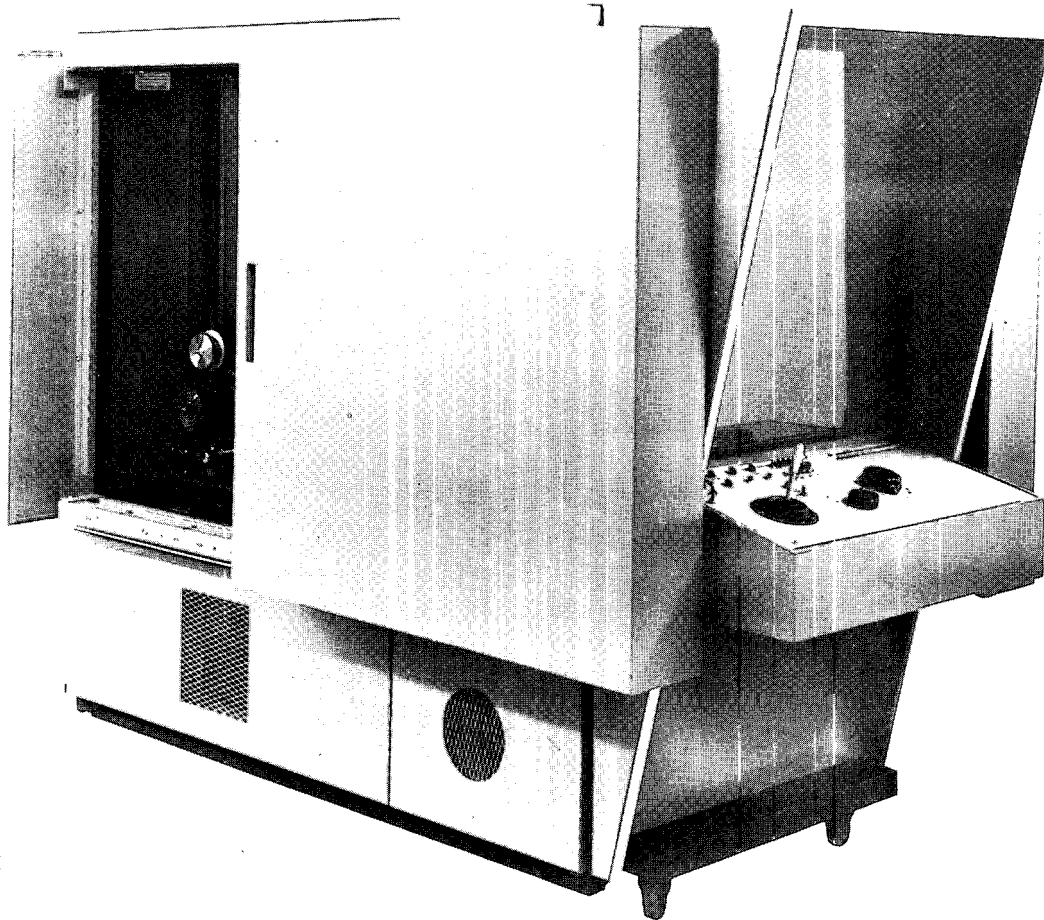
SECRET

4. NRI VARISCAN FILM VIEWER

(This item is Unclassified)

In an effort to find a replacement model for the rear-projection viewers now at NPIC, an NRI Variscan Film Viewer was procured for evaluation in an operational environment. The Variscan has been compared with an Itek version of a rear-projection viewer as well as with viewers now in use. The NRI Variscan is built by the NRI Division of Houston Fearless Corporation.

It has a single-image reflecting-mirror and an interchangeable projection lens system, as well as interchangeable condensor elements. The viewer can accommodate any width of film up to 9.5 inches, projecting the imagery onto a 30- by 30-inch screen at 3x, 6x, 12x, or 30x magnifications. An optional 48x lens is available.



25X1A

Weight: 1,800 lbs.

Size: H 68 in. W 51 in. L 90 in.

Power Requirements: 115 V, 20 A

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet NPIC stated requirements

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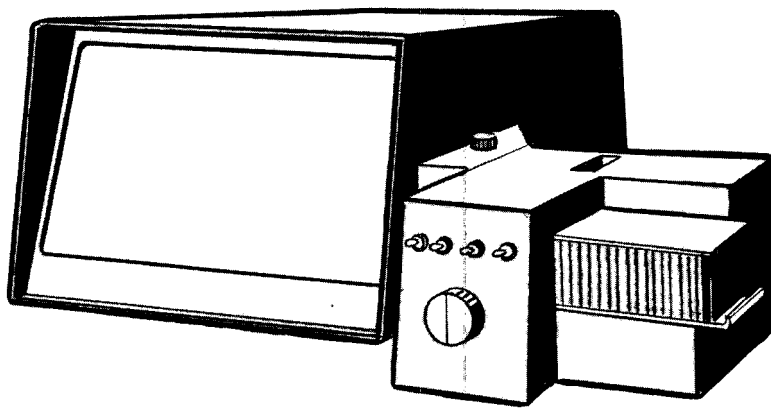
SECRET

5. REAR-PROJECTION CHIP VIEWER

(This item is Unclassified)

Design parameters are still being formulated on a prototype chip scanner-and-selection unit for the Center's 4- by 5-inch photo interpretation chip. This development is based on the premise that a considerable number of chips from previous missions will have to be correlated with current material, and that a rear-projection viewer utilizing slide-projection techniques would be of great assistance to the photo interpreter in this initial

selection and evaluation process. The proposed viewer would have either single or multiple magnification of sufficient resolution for screening purposes and would accept a cassette of previous-coverage chips to enable fast and easy review by the analyst. Such an instrument would also be valuable for group viewing, small briefings, and collateral referencing.



Status: *Deferred*

Development Source: *Proposed for development by NPIC.*

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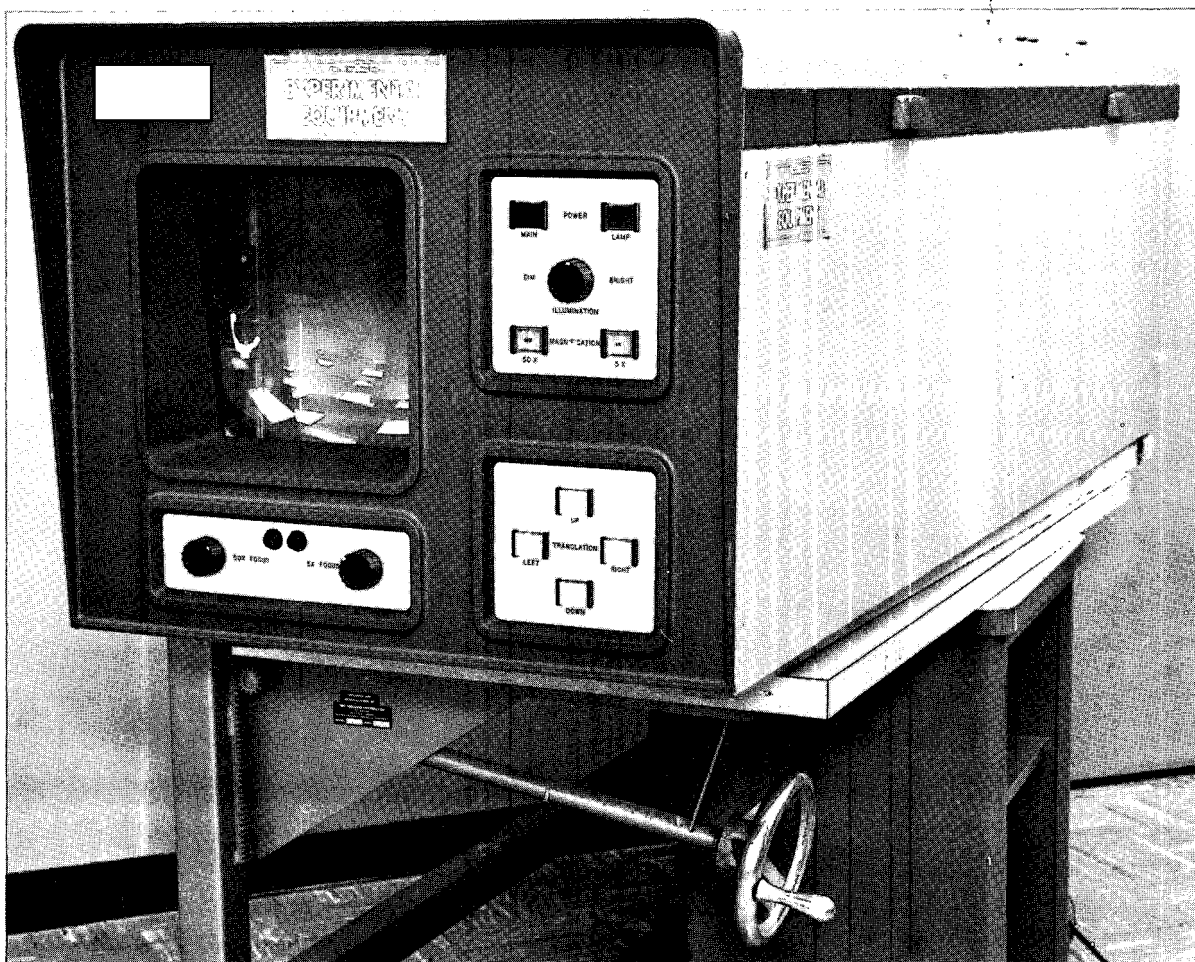
NPIC/R-91/67

25X1A

6. VIRTUAL (DIRECT) IMAGE VIEWER

The virtual-image (direct) viewer is capable of presenting the eye directly with ultra-high-resolution aerial images which can be viewed simultaneously with both eyes at magnifications of 5x (60 lines per mm) or 50x (200 lines per mm) in a 3.5-inch pupil field. Because this viewer

is not limited in resolution by a diffusing screen, and because it can deliver the image directly to the human eye, its performance is comparable in quality to advanced microscopic viewing. This experimental item is capable of operating with chips up to 4- x 5-inches.



25X1

K1A

Weight: 200 lbs.
Size: H 30 in. W 30 in. L 80 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Experimental model. Diffraction gratings undergoing further development.
Development Source: NPIC

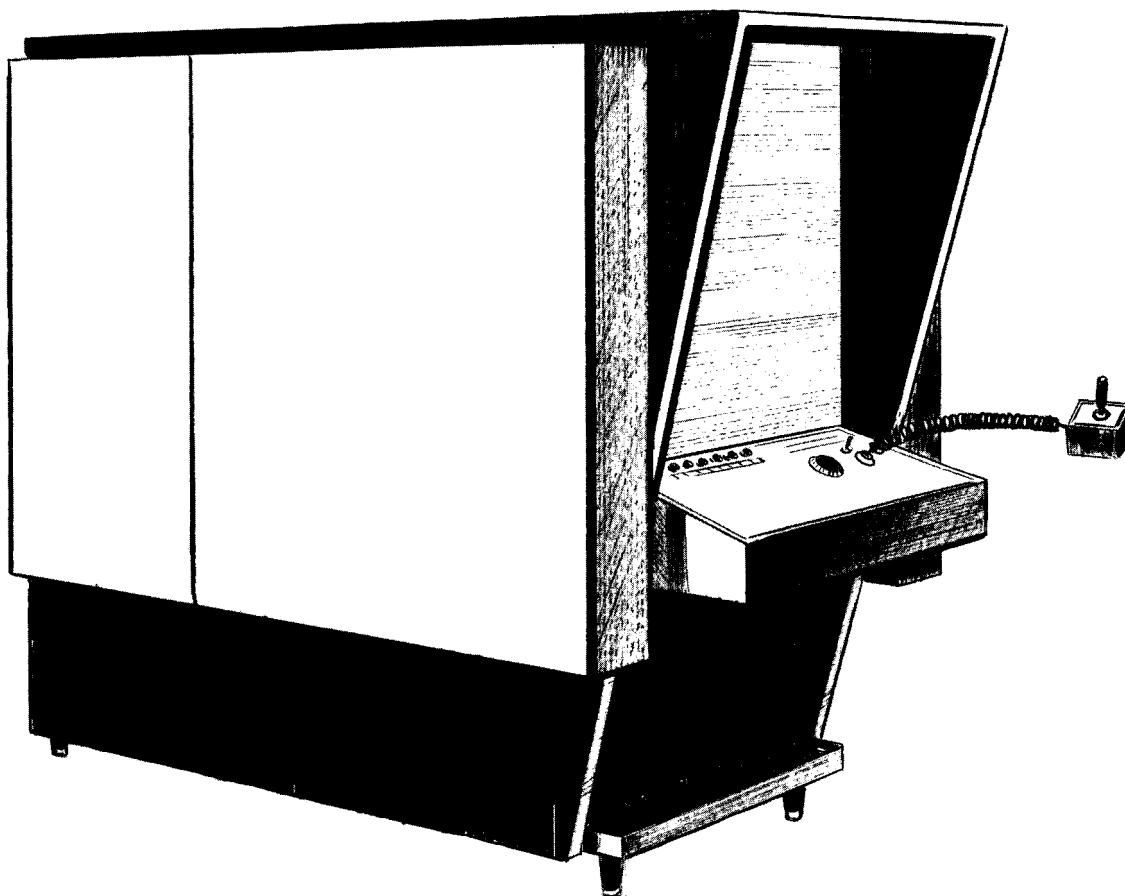
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7. ADVANCED REAR-PROJECTION VIEWER

The purpose of this development is to obtain a higher performance rear-projection viewer. The viewer will have a 3x to 70x continuously variable magnification range with no more than 3 objective lens changes. The resolution requirement is 10

lines per mm per power, with a brightness of at least 20 foot-lamberts on the screen. The viewer is to provide automatic focusing and a superior loading system.



25X1A

[Redacted]

Weight: 2,000 lbs.
Size: H 74 in. W 36 in. L 84 in.
Power Requirements: 220 V, 60 CPS

Special Requirement: None
Status: Contract for prototype being negotiated

25X1

[Redacted]
Development Source: Under development by NPIC

25X1

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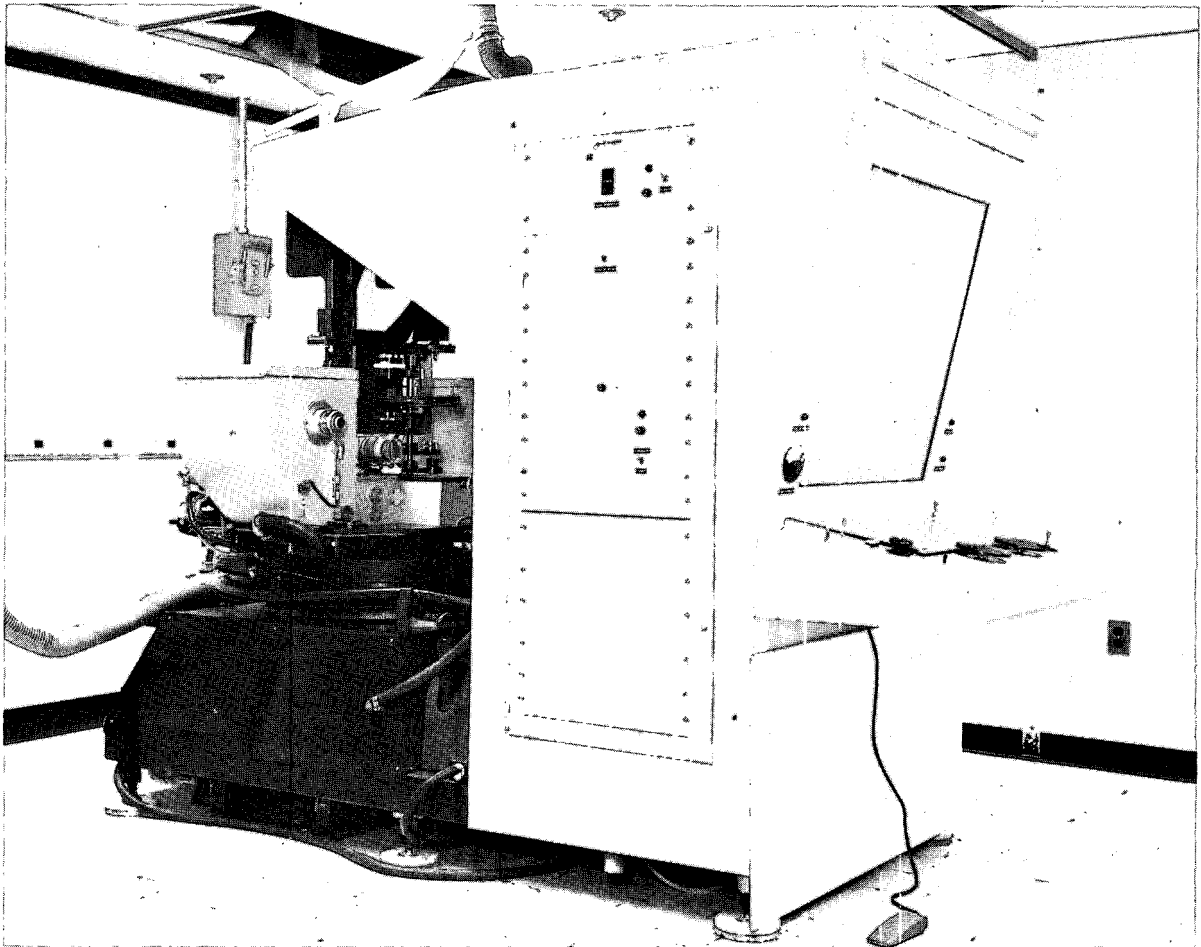
25X1A

25X1A

8. VARIABLE-WIDTH FILM READER (PROTOTYPE)

The Variable-Width Film Reader contains several advancements in rear-projection viewing. It will handle film widths up to 9.5 inches and utilizes a liquid film-gate cooling system. This latter feature is necessary to give adequate cooling when using the 5,000-watt xenon short-arc light source in the illumination system. Four optical magnification ranges are available at the operator's option: 6x, 12x, 24x,

and 48x. Indications are that intensities in excess of 300 foot-lamberts will be achieved at 48x with proportionately higher levels at lower magnifications. This instrument has been delivered to NPIC and is presently being evaluated. In addition, an engineering redesign of this reader has been completed and is under consideration for FY 1968 procurement.



Size: H 72 in. W 47 in. L 120 in.
Power Requirements: 208 V, 3 phase, 50 A

Special Requirements: Water and toxic vent
Status: Prototype under evaluation
Development Source: NPIC

25X1A

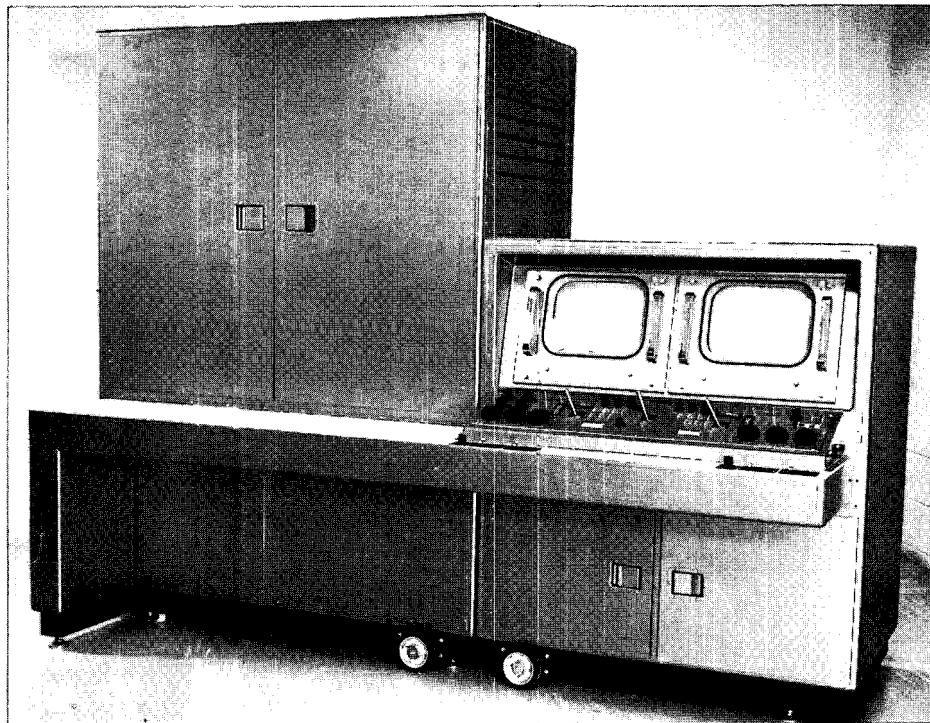
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25X1A

9. **P.I. CHANGE DETECTOR**

The P.I. Change Detector permits the operator to display on two CRT monitor screens, manually or automatically register, and compare two photographic images of the same area. The instrument has controls for side-by-side comparison, flicker detection on a single screen, and various video difference change detection techniques involving the subtraction and enhancement of the two film images. In addition, cross-hairs and readout indicators enable position recording of the areas of interest. System specifications include the following:

1. Film Accommodations--two rolls, 70mm wide, 250 ft. long.
2. Film Transport Speed--Slow Mode--0.2 inches/sec., Fast Mode--0.24 inches/sec.
3. Image Rotation-- ± 180 degrees.
4. Scale Adjustment--2:1.
5. Tip Adjustment-- ± 5 degrees.
6. Tilt Adjustment-- ± 5 , -3 degrees.
7. Film-to-Monitor Magnification--5x.
8. Zoom Magnification Control Range--40x.
9. Resolution: minimum magnification approximately 6 lines/mm; maximum magnification approximately 30 lines/mm.
10. Flicker Rate-- $1/2$ to 6 CPS.



25X1A

Weight: 2,500 lbs.
 Size: H 80 in. W 45 in. L 105 in.
 Power Requirements: 110V, 60 CPS, 25A, single phase

Special Requirements: None
 Status: One-of-a-kind unit undergoing operational evaluation
 Development Source: NPIC

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25X1A

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10. **AUTOMATED STEREO SCANNER**

The Automatic Stereo Scanning Program is aimed at producing at the end of 5 years a production capability permitting the photo interpreter to stereoscopically scan all roll film as fast or faster than he does now.

25X1

The first task of this program is a for an operational prototype automated stereo scanner based upon the electronic correlation optical viewing principles of the EROS.

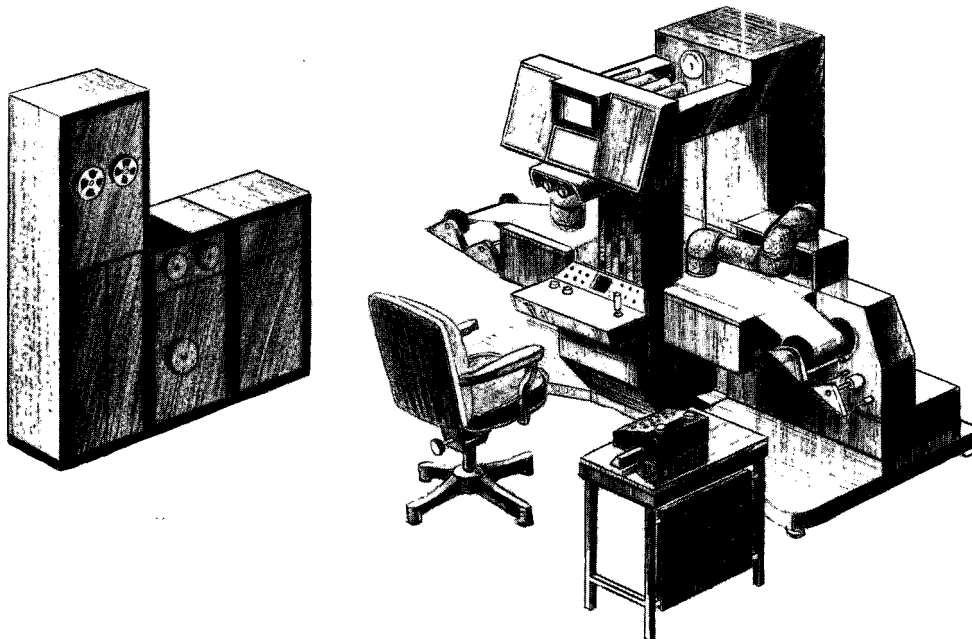
25X1

The automated stereo scanner will consist of two principal subsystems: The stereo scanner console and the computer subsystem. The stereo scanner console will continuously present to the

operator the two images of each stereo pair with the various zero and first order distortion differences removed. Optical characteristics include: zoom magnification from 3.5x to 35x (with no objective change), field of view from 2.5 inches to 0.25 inches, system resolution of 200 lines/mm on-axis, and 4:1 anamorphic ratio correction in any orientation.

The computer subsystem, a DDP-516, will assist in operator set-up and control of the stereo scanner console by means of precomputed programs on a central computer facility. Additional programming, such as target location and mensuration, will be considered in the future.

25X1A



25X1A

Weight: *Undetermined*
Size: *Stereo Scanning Console
 H 66 in. W 51 in. L 72 in.
 Computer Subsystem
 H 62 in. W 30 in. L 76 in.

Power Requirements: *Undetermined*
Special Requirements: *Central air supply*
Status: *Mock-up and detailed design plan have been accepted; fabrication of operational prototype is being negotiated.*
Development Source: NPIC

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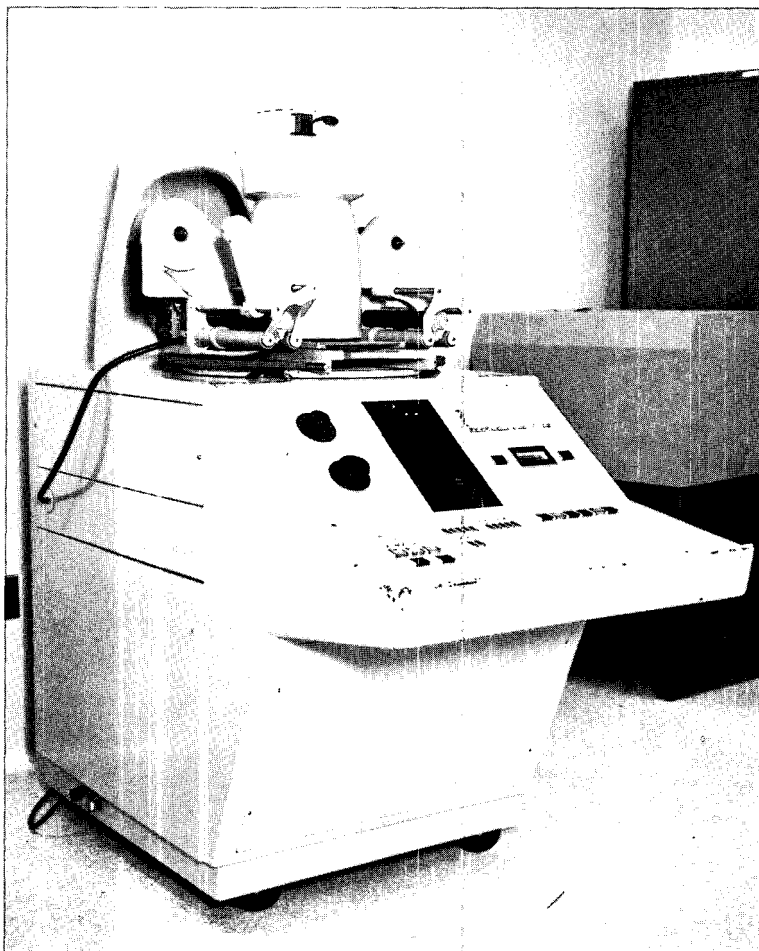
G. DATA BLOCK READERS

25X1A

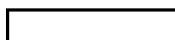
1. AUTOMATIC DATA-BLOCK READER

The Automatic Data-Block Reader is an NPIC development (by modifying a viewer) for reading and recording, in a form suitable for computer input, the binary time-work imaged on each frame of photography.

The unit consists of a variable-speed motor-driven transport, a 3x magnification system, a transistor-amplified read-head, a variable light source, and associated electronics to provide output from IBM card punch.



25X1A



Size h 72 in.

Power Requirements: 115 V, 15 A

Weight: 750 lbs.

W 48 in. L 48 in.

Special requirements: None

Status: NPIC use (one-of-a-kind)

Development Source: NPIC

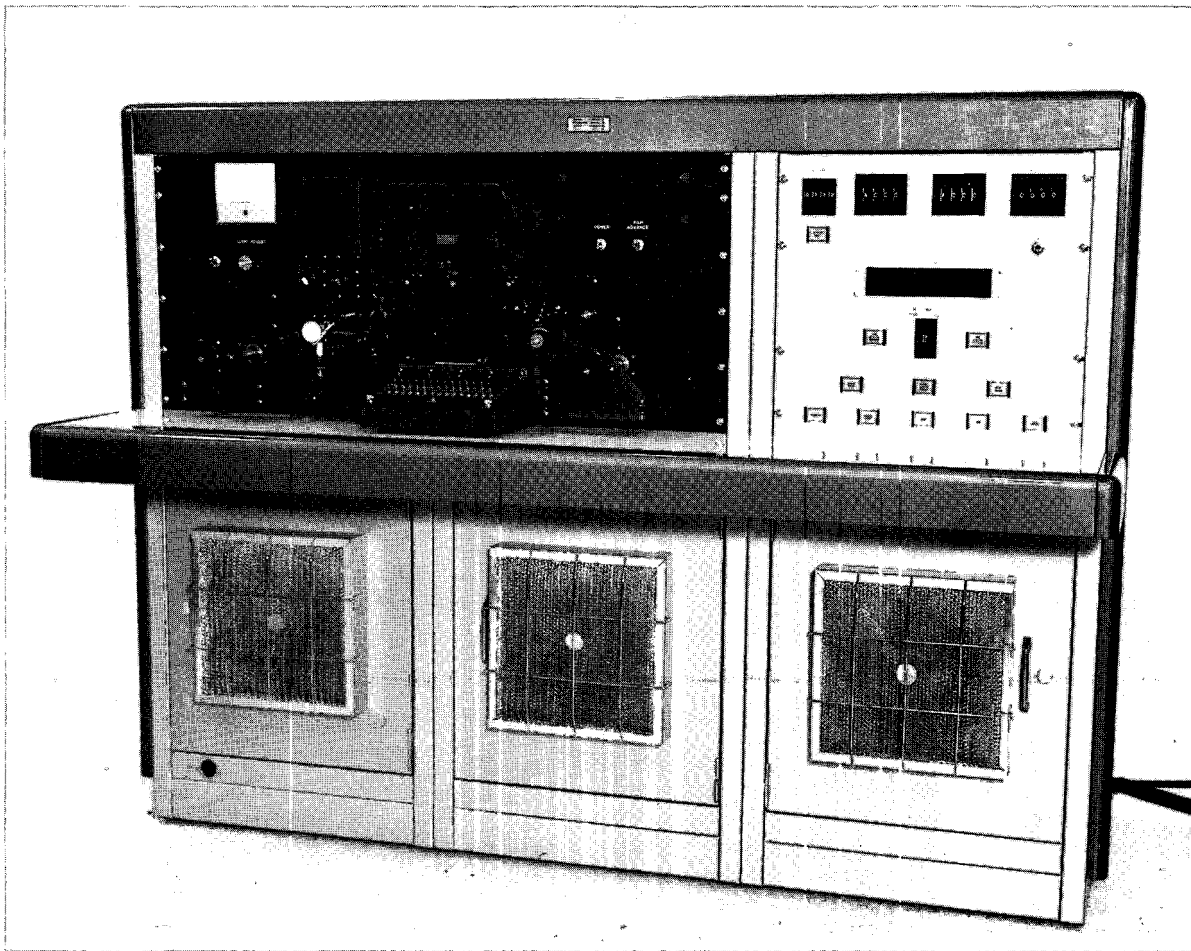
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25X1A

2. 70 MM DATA-BLOCK READER

This reader can read digitally coded data on positive transparencies and prints up to 250 feet in length at speeds of 75 feet per minute or faster. It automatically reads the information on

the film and transfers it to punch cards through an IBM 519 punch. The instrument provides greater reliability, higher accuracy, and faster output than was possible previously.



25X1A

Weight: 1,600 lbs.
Size: H 70 in. W 37 in. L 70 in.
Power Requirements: 115V, 60 CPS, single phase, 15A

Special Requirements: None
Status: Prototype (one-of-a-kind) delivered in May 1966
Development Source: NPIC

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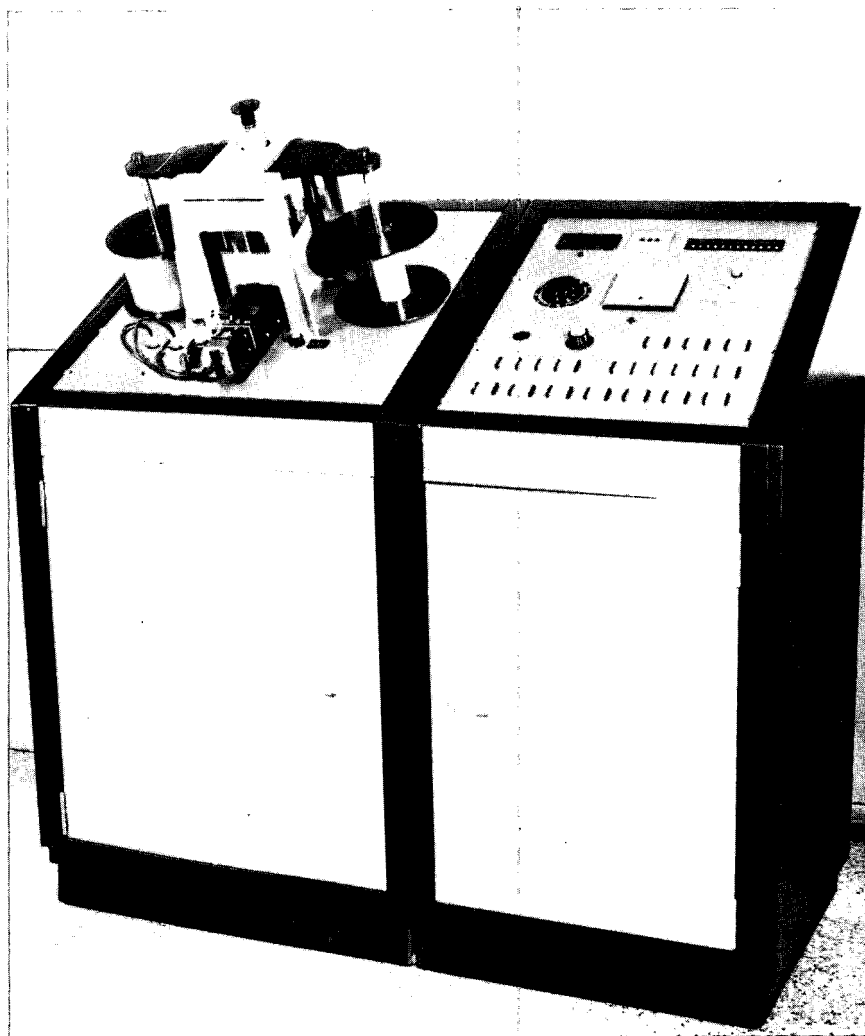
NPIC/R-91/67

25X1A

3. MULTI-FORMAT DATA-BLOCK READER

A Multi-Format Data-Block Reader for various airborne systems which do not follow the DOD Standard 782-A system is under contract. This reader will permit "on-the-fly" reading

of a variety of specific formats of solid-state digital recordings. Interchangeable heads will also permit reading of the DOD Standard Data-Block if it is solid-state recorded.



25X1A

25X1A

Weight: 1500 lbs.
Size: H 72 in. W 36 in. L 72 in.
Power Requirements: 115V, 30A

Special Requirements: None
Status: Prototype by
Development Source: Under development by NPIC

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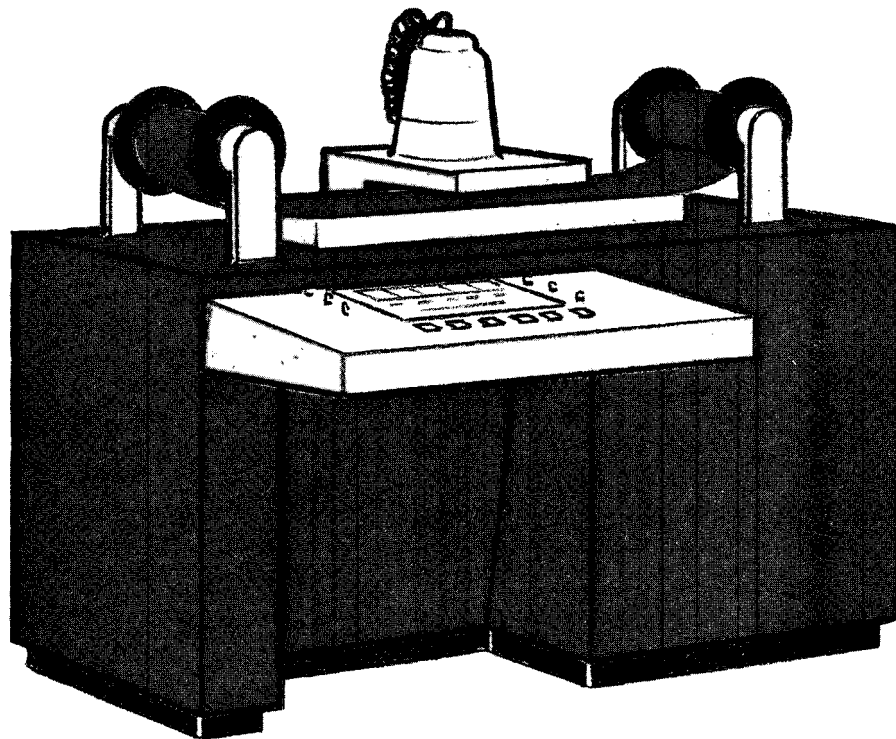
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4. TIME/VELOCITY BINARY READER

(This item is Unclassified)

This development program was proposed to meet the requirements for the design and fabrication of an instrument capable of automatically measuring and reading out coordinate data to determine the velocity of continuous-strip film in a camera system. The Time/Velocity Binary Reader would consist of a high-performance

sensing system capable of discriminating distances, accurate and repeatable to plus or minus 3 microns between timing marks imaged along the edge of 9.5-inch roll film. A binary time-word, also imaged along the film edge, would be read and recorded by the time reader.



Cost: Weight
Size: H W L
Power Requirements:

Special Requirements:
Status: *Requirements were not validated. Project terminated.*
Development Source: *Proposed for development by NPIC*

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SECRET

25X1A

H. STEREO VIEWERS

25X1A

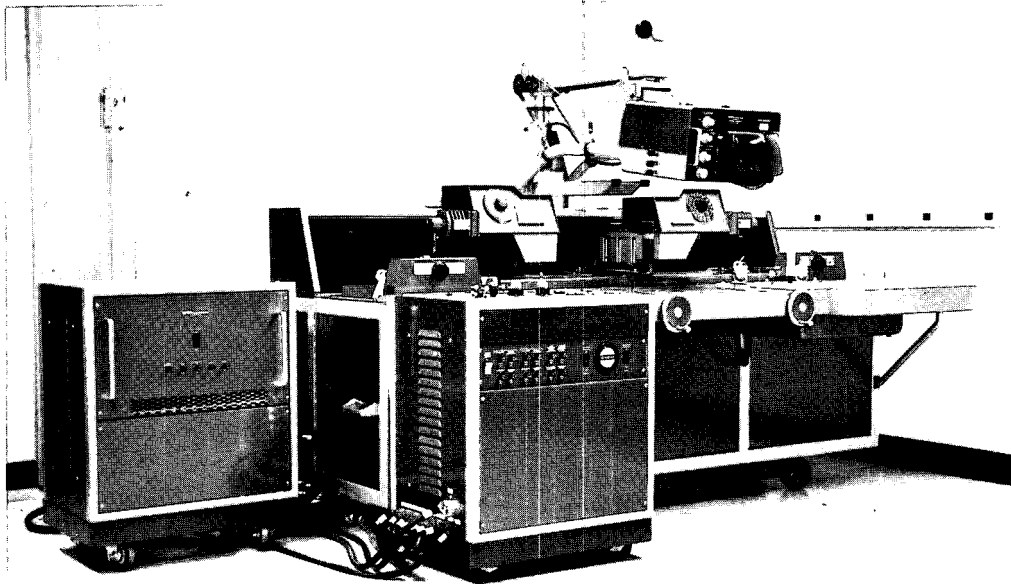
1. **VERSATILE HIGH-PERFORMANCE STEREO VIEWER**

The basic characteristics of the versatile high-performance stereo viewer were established by the Model 387 stereo viewer developed under contract to the Bureau of Naval Weapons. The current development by was sponsored by NPIC to expand the versatility and increase the performance of the instrument.

This new viewer has a cast frame permitting conversion to a 5-micron stereo comparator. The zoom magnification range is from 1.5x to 128x in 4 steps. The field of view is approximately 36 degrees, an increase of 3 times over the earlier model, with 600 lines/mm resolution.

The versatility of the optical system is indicated by independent magnification, 360-degree

image rotation, independent image reversion, crossover of the stereo channels, and binocular monoscopic viewing. Scanning is controlled through a single joystick, but the direction and proportion of the scan is correlated with both the magnification and the rotation setting of the corresponding optical train. Although film is presently handled manually, modifications are underway to add a power-assisted film-transport system. One or 2 rolls between 70mm and 9.5 inches in width and in lengths up to 500 feet can be accommodated. The loop-forming mechanism has been expanded to handle 19 feet of film between sequential stereo pairs. The film is held flat by vacuum while being viewed.



X1A

Weight: 4000 lbs.
 Size: H 72 in. W 88 in. L 72 in.
 Power Requirements: 115 V, 60 CPS (special plug required)

Special Requirements:
 Status: Under Evaluation
 Development Source: NPIC

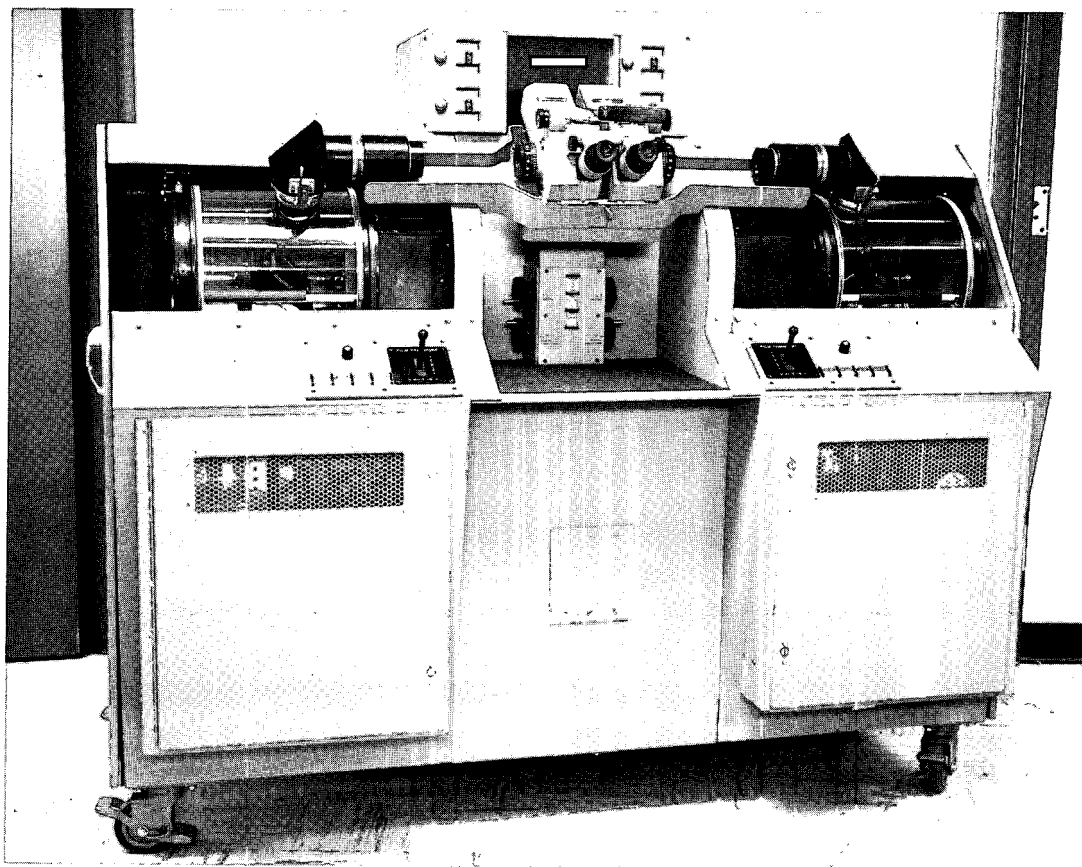
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25X1A

2. **PANORAMIC STEREO VIEWER**

The Panoramic Stereo Viewer is a direct viewing instrument for stereoscopic examination of conjugate imagery on two separate film rolls, 70mm to 9 1/2 inches in width and 500 feet in length. It is capable of viewing vertical, convergent, and oblique frame photography and vertical and convergent panoramic photography. The viewing magnification is continuously variable from 2 1/2x to 38x with a scale matching ratio of 3:1 between the left and right optical systems

and 360 degrees optical rotation in each system. A unique design feature is the two cylindrical glass stages which support and rotate in contact with the film so that it may be viewed in critical focus while being translated. Both manual and motor film drives, coupled or uncoupled, are provided. General background and high intensity illumination are available and 1mm counters can be operated to provide X-Y indexing of images for recovery at a later date.



25X1

25X1A

Weight: 1,000 lbs.
Size: H 60 in. W 36 in. L 72 in.
Power Requirements: 115 V, 10 A

Special Requirements: None
Status: Undergoing operational evaluation
Development Source: NPIC

SECRET

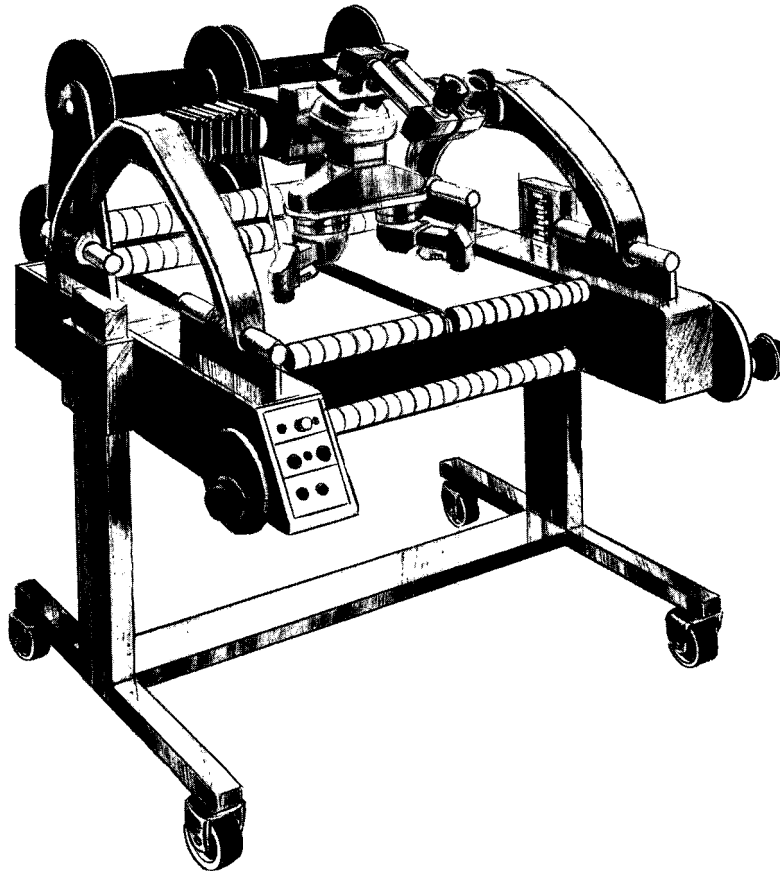
25X1A

3. **WIDE-FIELD HIGH-POWER STEREO VIEWER**

A complete light table and base is being developed for the Versatile (or interchangeable rhomboid) Stereoscope. The unit will provide 2 parallel 11- by 20-inch illuminated areas for viewing dual or single rolls of film of any size between and including 70mm and 9.5 inches. General illumination will vary

continuously between 250 and 1,700 foot-lamberts and a high-intensity tracking-light source will be provided for each optical path of the stereoscope. Fully powered film transports will be provided. An automatically activated, glass pressure platen will be incorporated.

25X1A



25X1A

Weight: 200 lbs.
Size: H 57 in. W 36 in. L 41 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Prototype due August 1967
Development Source: Started by U.S. Navy, development completed by NPIC

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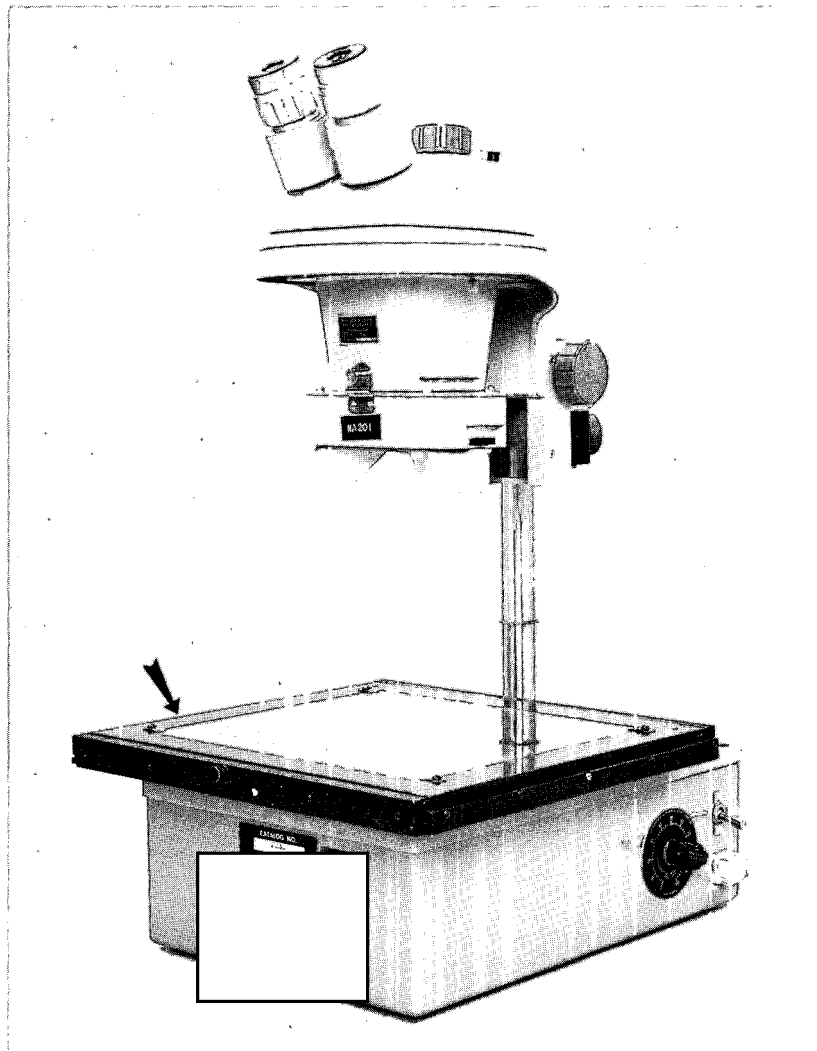
25X1

4. X-Y TRANSLATING STAGE FOR STEREO VIEWING

(This item is Unclassified)

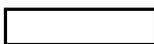
An X-Y translating stage, designed and fabricated at NPIC, consists of a movable stage that is easily mounted on a light base to permit film scanning in the X-Y directions. The stage was designed primarily for the [redacted]

Zoom 70 Stereoscopes that have the pod support arm set back from the rear edge of the light base; however, it can be used with other stereoscopes having similar light bases.



25X1

25X1A



Size: H 1 in.

Power Requirements: None

Weight: 6 lbs.

W 11 in. L 11 in.

Special Requirements: None

Status: Several in use. (Drawings on file)

Development Source: NPIC

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25X1A

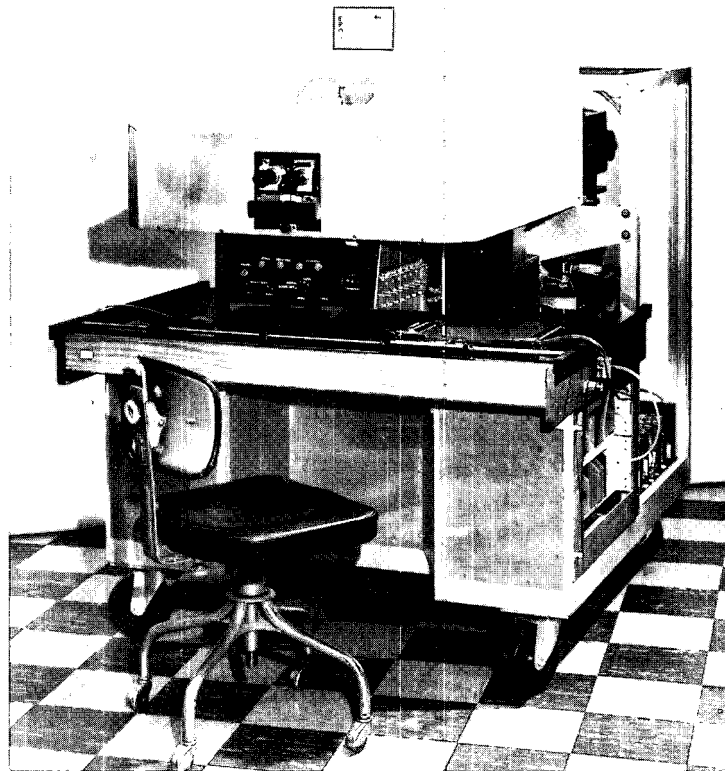
5. ELECTRONIC REGISTRATION OPTICAL STEREOSCOPE (EROS) FEASIBILITY MODEL

This device, known as EROS will automatically maintain stereo registration during the film scanning process, thus eliminating a previously time-consuming manual task. The electronic logic necessary for correlating signals, performing error analysis, and sending corrective error signals was demonstrated under a previous development for video presentations, the Automatic Registration Electronic Stereoscope (ARES). EROS differs from ARES in that the error signals are used to drive servo-operated optical components, rather than the deflection yoke of a

cathode ray tube as in the video presentation. The use of optical components vastly increases the resolution capability of EROS over the video system of ARES.

EROS accepts 9 1/2- by 9 1/2-inch glass diapositives or cut film, has 6x to 24x continuous magnification, field of view is 32mm at 6x and 8mm at 24x, resolution is 144 lines/mm at 24x, and distortion correction available includes 4:1 scale difference, 360 degrees rotation, 4:1 anamorphic ratio at any orientation.

25X1



25X1A

Weight: 500 lbs.
 Size: H 65 in. W 55 in. L 70 in.
 Power Requirements: 110 V
 Special Requirements: Internal air compressor

Status: Feasibility model acceptable, being used as a "test bed" for the follow-on Automatic Stereo Scanning Program. No operational equipment planned.
 Development Source: NPIC

SECTION III. MEASUREMENT AND EVALUATION

A. MEASURING

B. EVALUATING

C. PLOTTING

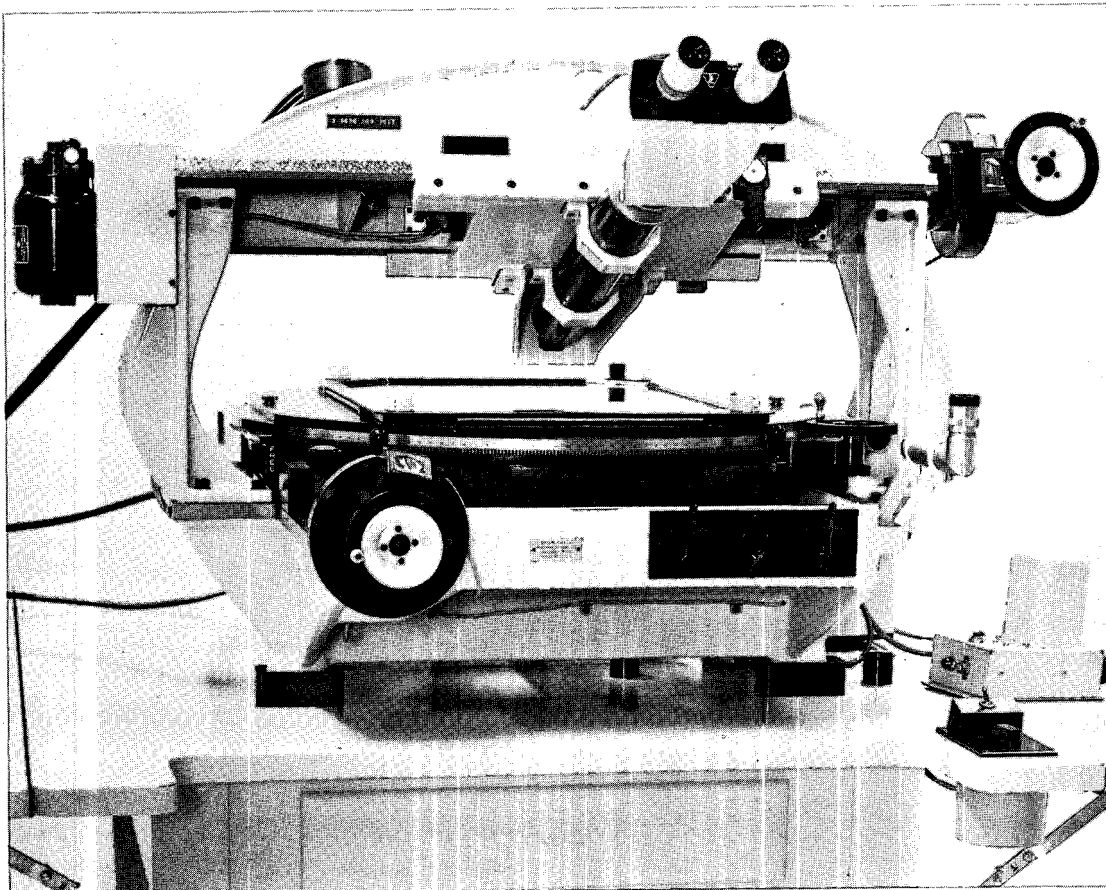
III

SECRET**A. MEASURING****1 MANN COMPARATOR (TYPE 621)***(This item is Unclassified)*

This is a large, 2-coordinate comparator with 500mm travel in the Y axis, 360mm in the X axis, and accommodation for roll film up to 9.5 inches in width and 250 feet in length. Coordinates can be read direct to 1 micron by means of illuminated dial systems located at the ends of the screws. Both screws are motor-driven for ease of travel between widely separated points. The rotating stage has full 360-degree range,

and its position may be read optically to 20 seconds.

Modifications to the basic instrument include a binocular optical system and a new light source which provide a zoom system capable of resolving 400 lines/mm at the film plane, with a magnification range of 20x through 80x. Data readout is by means of a Benson-Lehner two axis telecordex unit and IBM card punch.



Weight: 400 lbs.
 Size: H 30 in. W 42 in. L 42 in.
 Power Requirements: 115 V, 5A

25X1A

Special Requirements: *Controlled environment*
 Status: *Commerically available*
 Development Source: *Modification by NPIC of commercial item*

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2. MANN COMPARATOR (TYPE 829C)

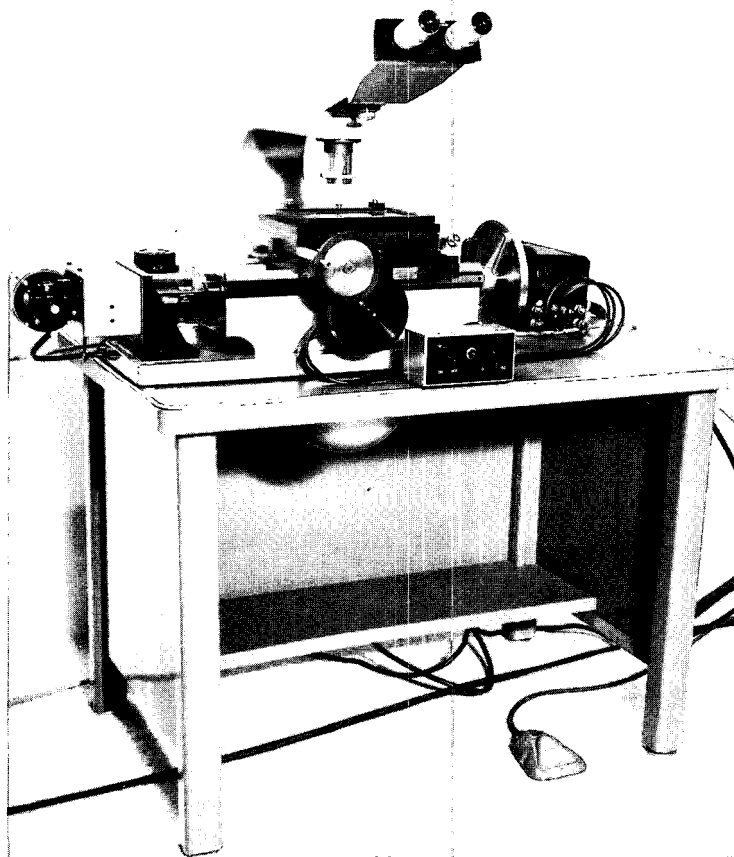
(This item is Unclassified)

This comparator is designed for horizon- data reduction work. Readings are direct to 5 microns in the 2 coordinate axes. Measurements can be made over an area 100mm by 150mm on plates or films up to 4.5 by 7 inches; plates 6 by 10 inches can be accommodated easily.

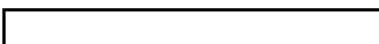
Recent modifications have been made to one model 829C by replacing the conventional lead

screw with a one micron least count readout system, by replacing the projection viewing system with a direct optical viewing system, and by installing a larger platen.

Data readout for both instruments is accomplished by Benson-Lehner telecordex and IBM cardpunch.



25X1A



Weight: 200 lbs.
 Size: H 24 in. W 36 in. L 24 in.
 Power Requirements: 115 V, 5 A

Special Requirements: *Controlled environment*
 Status: *Commerically available*
 Development Source: *Commercial*

SECRET

25X1A

SECRET

25X1

3. [] COMPARATOR (TYPE 880A)

(This item is Unclassified)

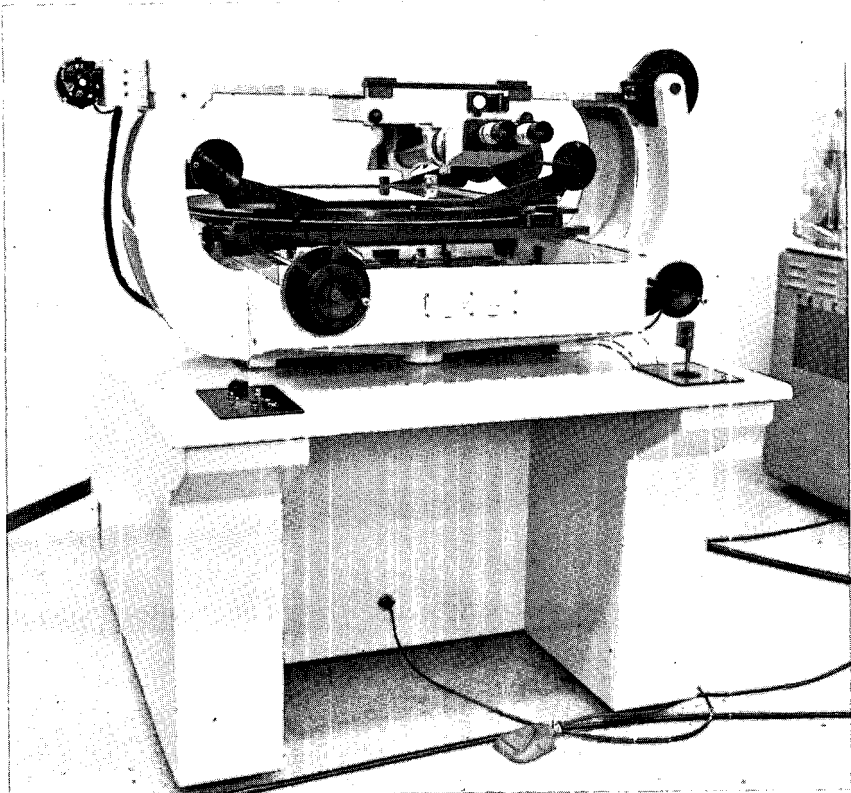
This comparator accepts film formats of 70mm, 5, 6.6, 8, and 9.5 inches. Measurement is accomplished on both axes by precision ground and lapped lead screws. Readout is available on a coded disc directly readable by the operator, or from an electronic position encoder which provides input to an electronic module manufactured by []

The electronic module allows the operator to transmit data directly on-line to the 490 computer or off-line to a 526 card punch.

Viewing is accomplished by a binocular

optical system which provides a continuously variable magnification of 17.5x to 35x with 5x eyepieces, or 35x to 70x when 10x wide-field eyepieces are used. Field of view is 2.6mm to 5.2mm with a crosshair constantly visible in the optical path. Modifications consist of the binocular optical system, provision for handling various film sizes, a selsyn-drive system for the secondary axis, a selsyn-drive high-intensity light source, and provisions for accepting a projection viewing screen. The electronic module costs []

25X1A



25X1A

[]

Weight: 500 lbs.
Size: H 42 in. W 48 in. L 48 in.
Power Requirement: 115 V, 5 A

Special Requirements: Controlled environment.
Status: Operational
Development Source: Modification by NPIC of commercial item

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NPIC/R-91/67

4. NISTRI STEREO COMPARATOR RIC/1

(This item is Unclassified)

25X1

This comparator handles formats up to 9.5 by 18 inches in either cut film or glass plates. The magnification range is from 4.5x to 18x, and the measurement system is the Ferranti Moire fringe with a 2-micron least-count. The instrument is designed primarily for control extension work but has a limited application in the intelligence field when utilizing medium-scale,

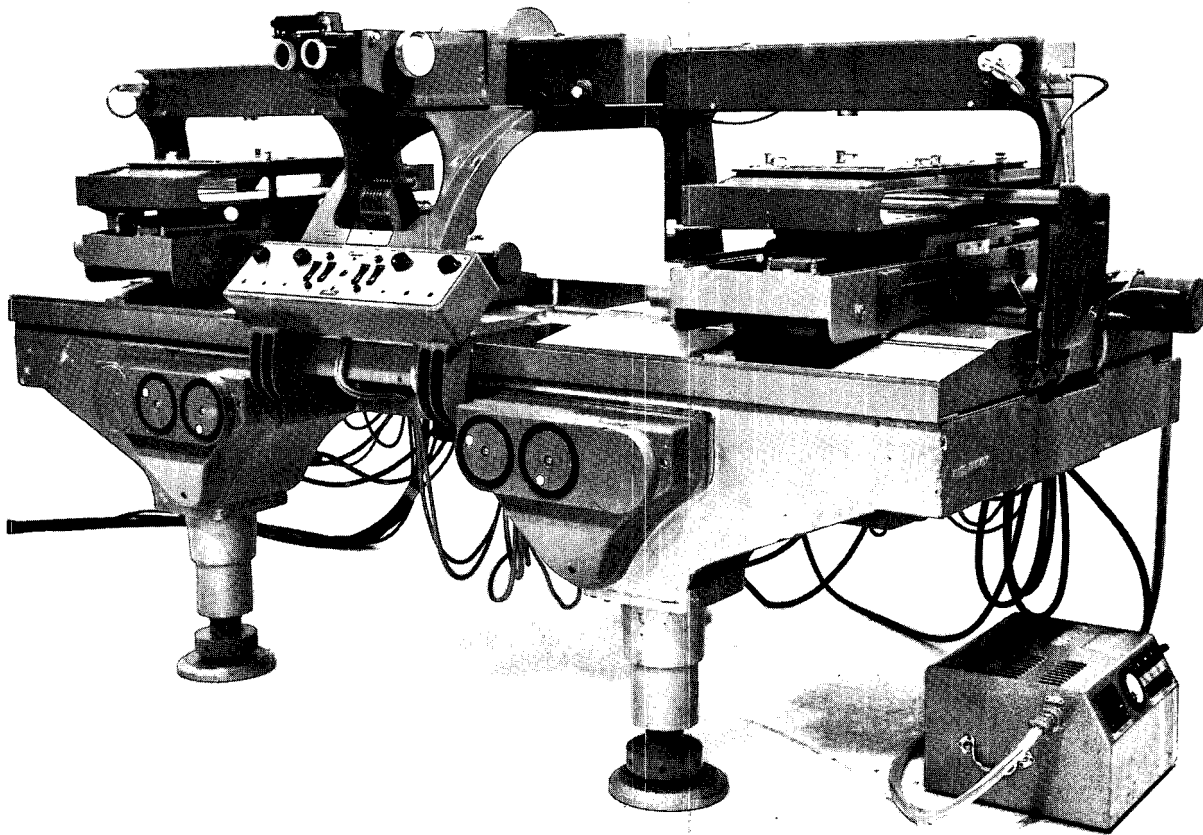
high-resolution photography.

Current modifications include a punched card output and an increase to 40x magnification. Also, the original Ferranti electronic components are being replaced with [redacted]

[redacted] equipment at an additional cost of [redacted]

25X1

25X1



25X1A

[redacted]
Weight: 2 tons
Size: H 60 in. W 96 in. L 48 in.
Power Requirement: 115 V, 15 A

Special Requirements: *Controlled environment.*
Status: *Commercially available*
Development Source: *Commercially developed to meet NPIC stated requirements*

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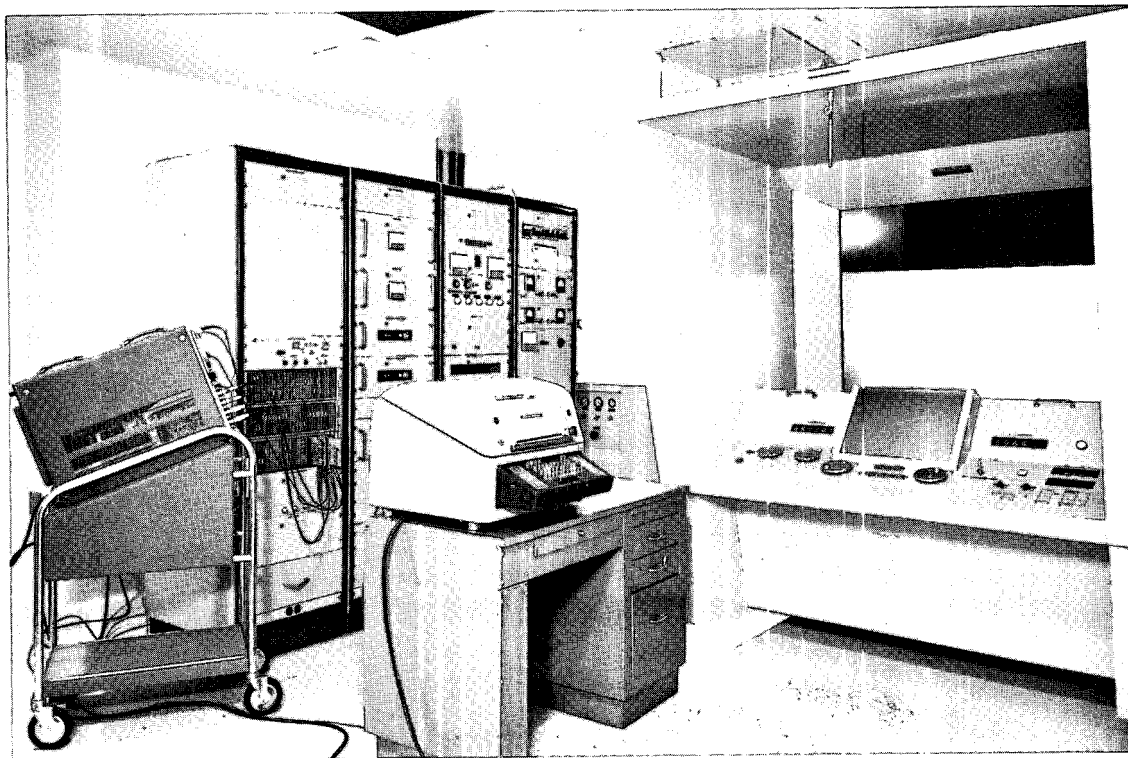
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25X1A

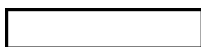
5. **DUAL-SCREEN MEASURING PROJECTOR**

This projector is a high-precision film comparator now operational at NPIC. It has the capacity to measure format areas up to 9.5 by 29 inches. The Ferranti Moire fringe system has been modified to give the measuring sensors a least-count of 1 micron, and air bearings have replaced the conventional method of stage transport. The unique vacuum-clamping and film-transport device accommodates films in rolls from 35mm to 9.5 inches wide. This instrument is connected directly on-line with the Univac 490 computer for data reduction.

Two screens are used simultaneously: the larger, 40 by 40 inches, is for scanning; the smaller, 12 by 17 inches, is for mensuration. The larger screen has a fixed 8x magnification; the smaller offers 8x, 16x, or 32x magnifications, with the area of high magnification indicated on the low-magnification image. A crosshair is projected on the small screen as a fixed reference point. A 2,500-watt, water-cooled, xenon-mercury-vapor arc lamp provides illumination for the crosshair projection and for the image on both screens.



25X1A



Weight: 12,000 lbs
 Size: H 80 in. W 78 in. L 16 1/2 ft.
 Electronic Pack H 78 in. W 27 in. L 108 in.
 Aux. Console H 37 in. W 49 in. L 61 in.

Power Requirements: 208 V, 50A
 Special Requirements: Compressed air & water
 Status: Operational
 Development Source: NPIC

SECRET

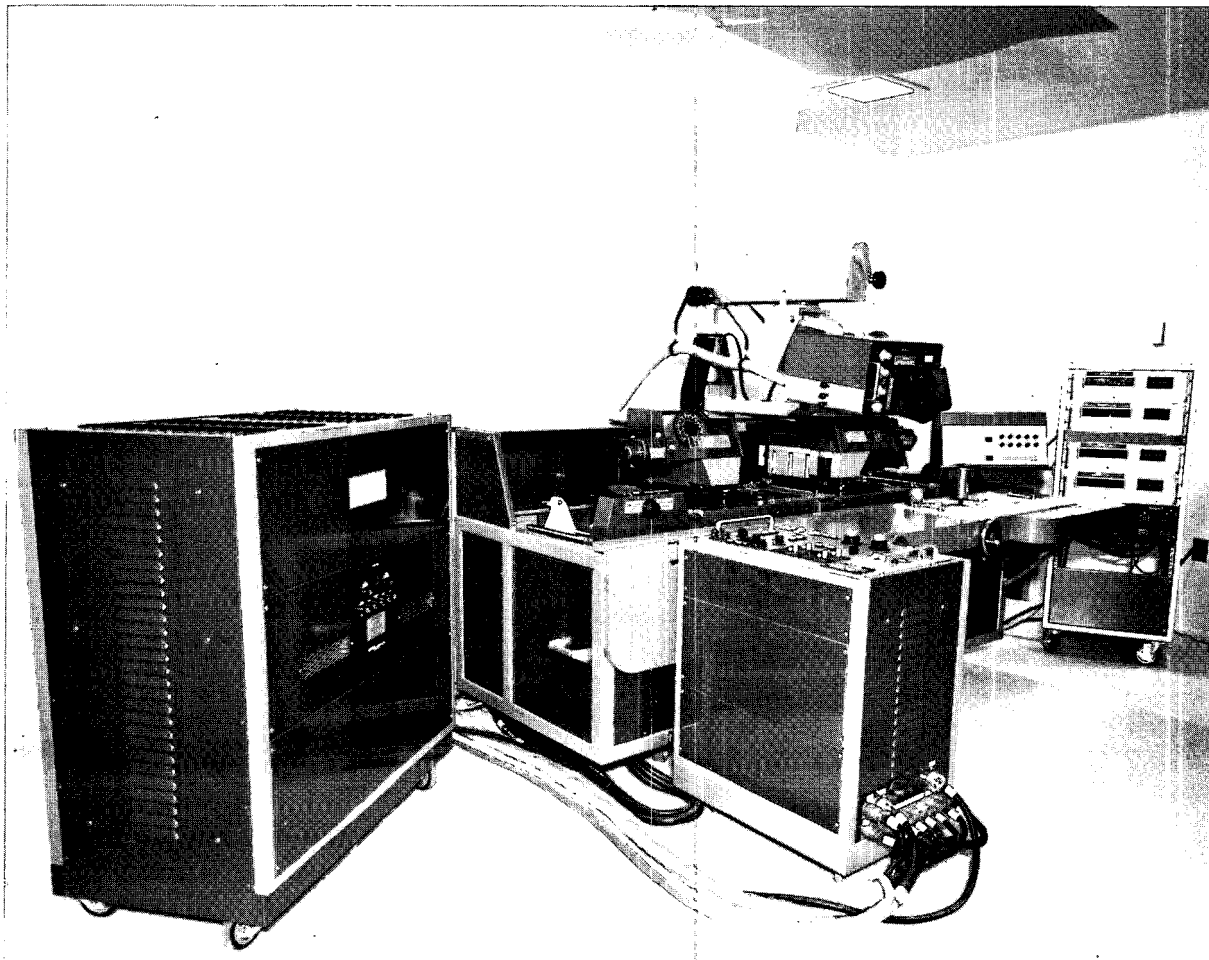
SECRET

25X1A

6. **VERSATILE STEREOSCOPIC POINT TRANSFER DEVICE**

This device is a versatile high-performance stereo-viewer fitted with a precision mensuration and point marking system. This system can handle 1 or 2 rolls of film in widths varying from 70mm to 9.5 inches. There are two full format viewing areas of 10 by 20 inches. The viewing system has an independent zoom range

of 1.5x to 128x for each optical train. The laser point marking system can make a reticle dot mark of 20 microns on the film emulsion. This point mark can also be flagged and numbered. The measuring precision is 2.5 microns plus .005 percent of distance travelled. There is an off-line/on-line capability to the central computer.



Weight: 5,000 lbs.
 Size: H 6 ft. W 9 ft. L 12 ft.
 Power Requirements: 120V, 60 CPS, 30 A

Special Requirement: None
 Status: Under evaluation
 Development Source: NPIC

25X1A

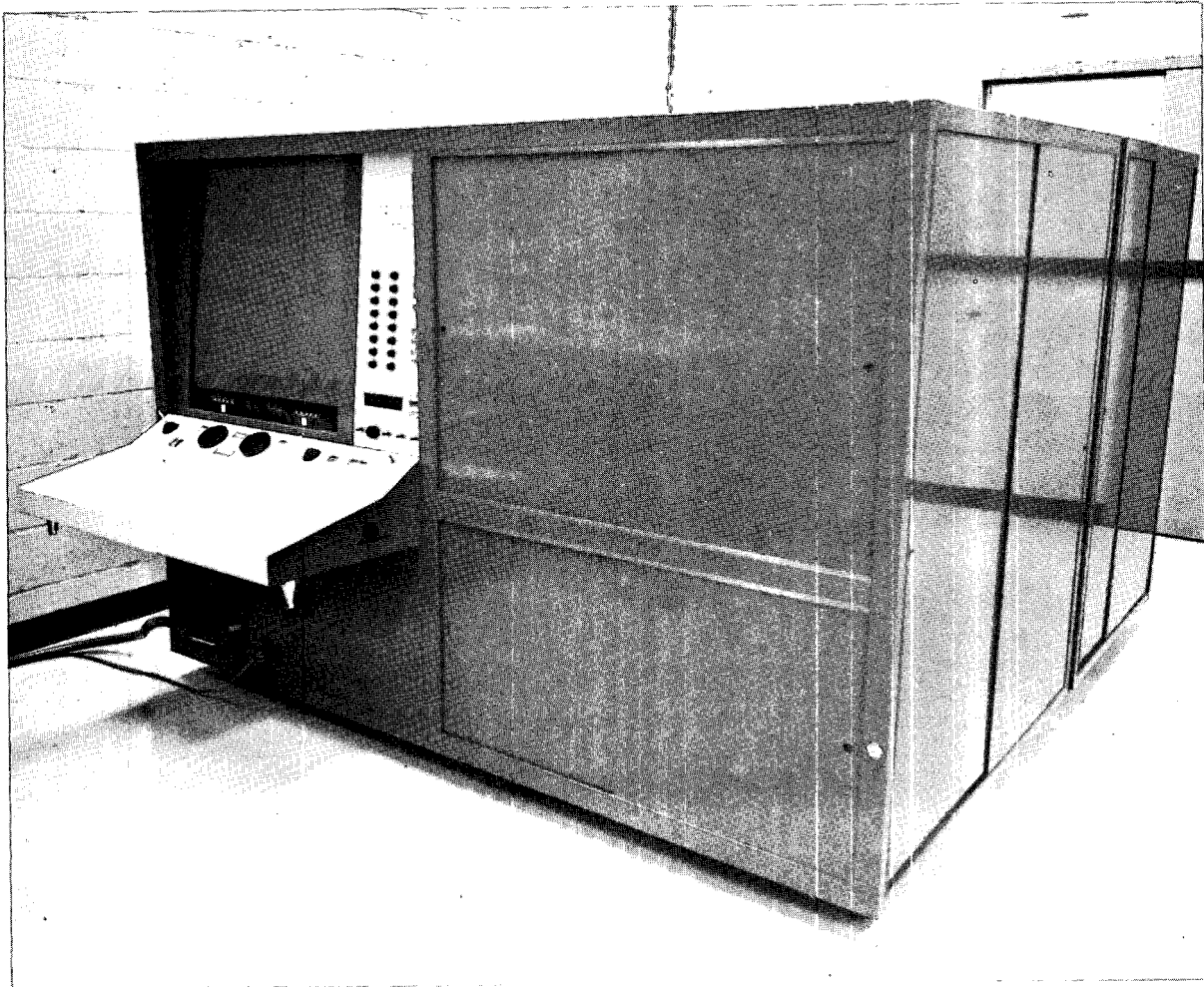
SECRET

SECRET

7. **STELLAR COMPARATOR**

The stellar comparator is a precision, rear-projection measuring instrument capable of plus-or-minus 1 micron accuracy over a format 10 inches square. It can handle film up to 9.5 inches wide and has a magnification range from 20x to 40x. Centering on the stellar image can be accomplished either manually by the use of

handwheels or automatically by the use of a joystick coupled with an autocentering device. Although called a stellar comparator, it is actually a dual-purpose instrument since both stellar coordinates and distances on terrestrial photography can be determined. The output is either direct reading or punchcard.



Size: H 7 ft.

Power Requirements:

Weight: 5,000 lbs.

W 9 ft. L 9 ft.

115 V, 35 A

Special Requirements: None

Status: Operational (Washington, D.C. Area)

Development Source: NPIC

SECRET

SECRET

NPIC/R-91/67

25X1A

8. [] STEREO CHIP COMPARATOR

(This item is Unclassified)

This comparator is designed to accept film chips up to 5 by 5 inches. This instrument simultaneously measures the X and Y coordinates of any point on the film plane with respect to a chosen reference. The system is capable of resolving to 0.14 micron least-count. Linear

measurements are obtained through the output of an X- and Y-axis interferometer, utilizing the wavelength of an Hg 198 lamp (5461A°). The comparator is designed to operate on-line with the Univac 490 systems.



[]
Size: H 55 in. W 42 in. L 51 in.
Power Requirements: 115 V, 30 A

Special Requirements: None
Status: Operational
Development Source: NPIC

25X1A

SECRET

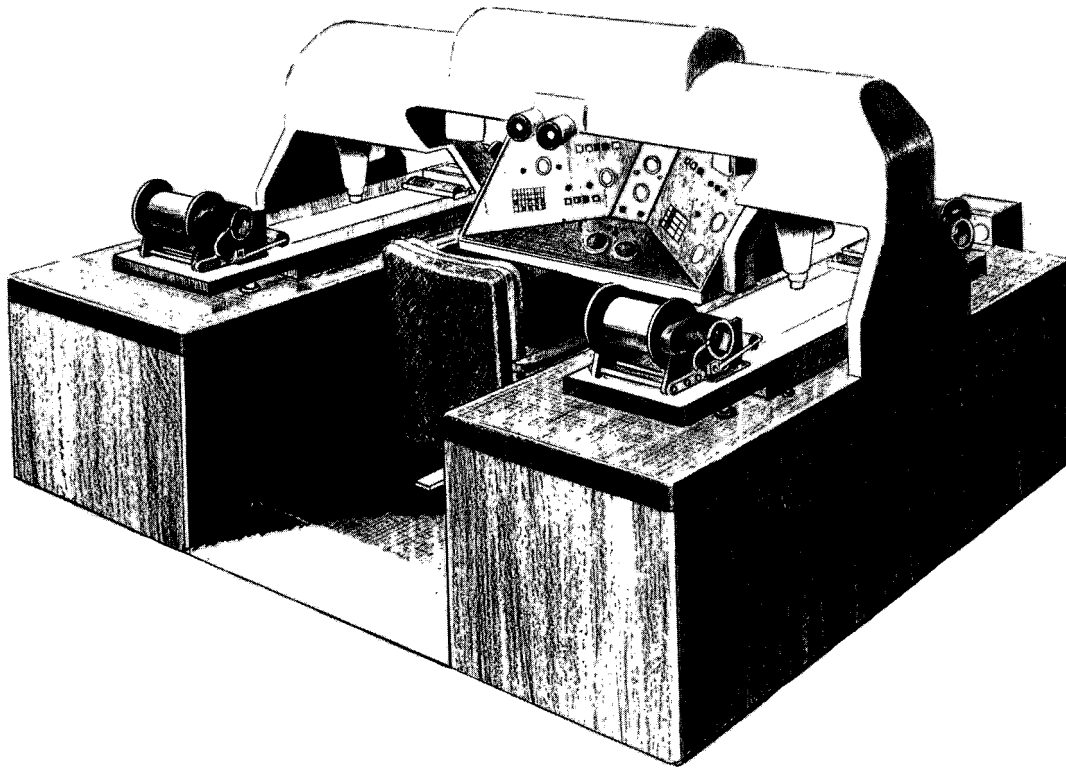
25X1A

25X1A

9. HIGH-PRECISION STEREO COMPARATOR

has been awarded a contract to design and develop a high precision stereo comparator. The design goals are:

1. Continuously variable viewing magnification ranging from 10x to 200x with maximum resolution of 1000 lines/mm.
2. Four axis laser interferometer mensuration system with a minimum of 1:100,000 accuracy over the entire 10 by 20 inch format.
3. Automatic stereo correlation and tracking of frame, panoramic, and strip stereoscopic photography.
4. Air bearing X and Y carriages on both film stages.
5. Anamorphic correction continuously variable from 1:1 to 1:2 and rotatable through 360°.
6. Mensuration readout system with .1 micron least-count on-line/off-line to the central computer and card punch.



Size: H 8 ft.

Power Requirements: To be determined

Weight: 15,000 lbs. (Estimated)

W 19 ft. L 17 ft.

Special Requirements: None

Status: Design drawings and final report due January 1968

Development Source: Under development by NPIC

25X1A

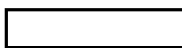
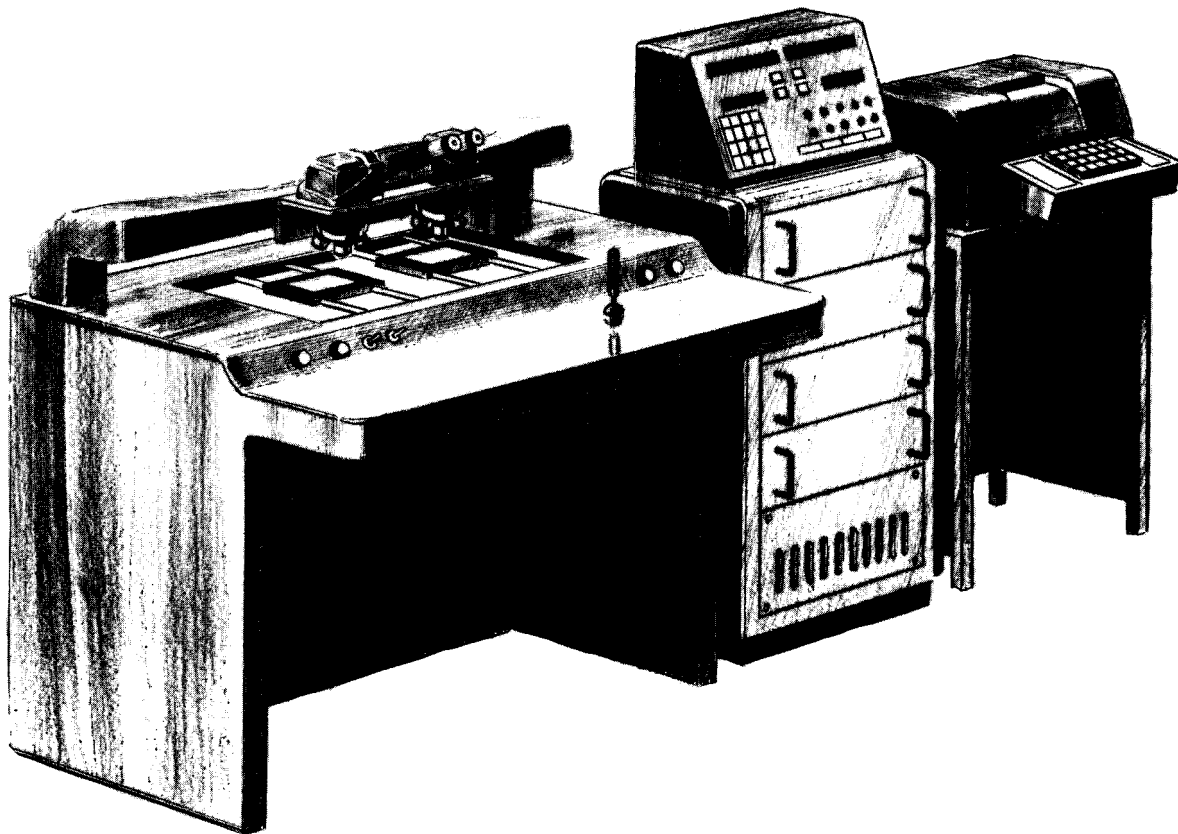
SECRET

25X1A

10. TWIN-STAGE ON-LINE P. I. COMPARATOR

Early in FY-1968, it is planned to award a contract to design and fabricate a twin stage comparator for use on-line to a computer. This is intended for use by the P.I. during the normal photo interpretation process. It is proposed that the High Power Stereoviewer Head be used as the optical system, incorporating two independent 5- by 5-inch film stages with one

stage two-axis digitizers. The design goal is measuring error of 2 microns or less for measurements up to 1 inch and minimum accuracy of 1:5,000 over the entire 5- by 5-inch format. The comparator will be used on-line to a central computer or at a decentralized location with its own integral computer.



Size: H 60 in.
(maximum size)

Weight: 400 lbs.
W 34 in. L 48 in.

Special Requirements: None
Status: Contract to be awarded
Development Source: Under Development by NPIC

25X1A

SECRET

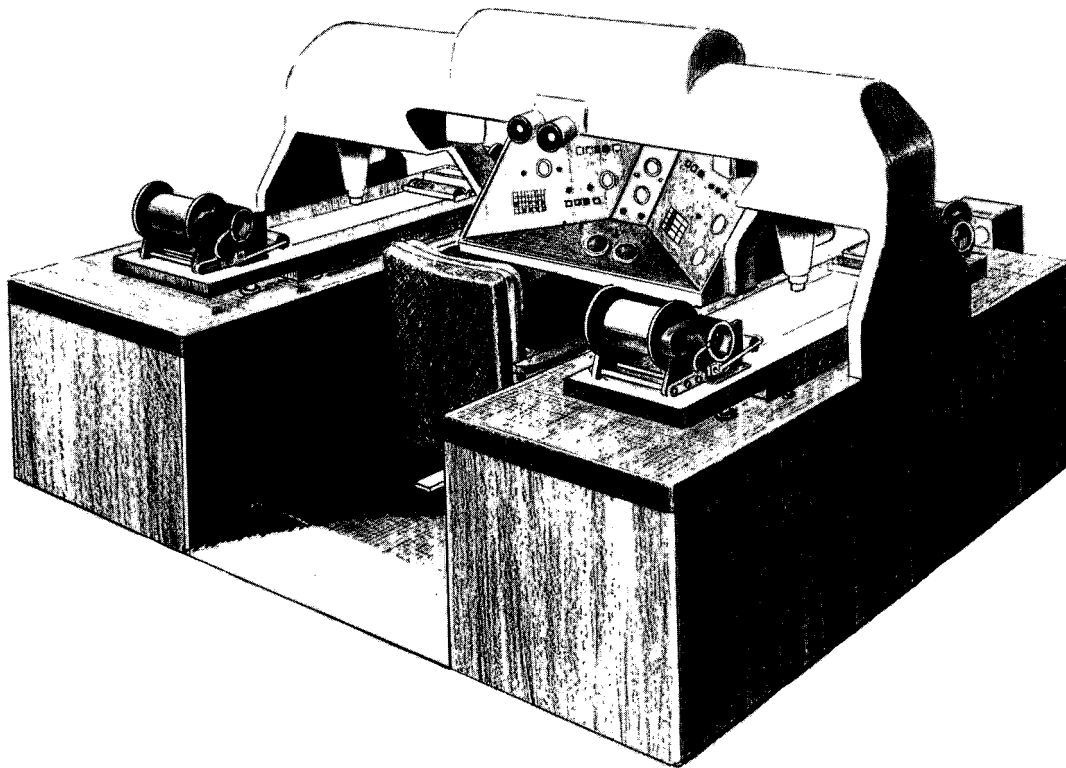
25X1A

25X1A

9. **HIGH-PRECISION STEREO COMPARATOR**

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1. Continuously variable viewing magnification ranging from 10x to 200x with maximum resolution of 1000 lines/mm.
2. Four axis laser interferometer mensuration system with a minimum of 1:100,000 accuracy over the entire 10 by 20 inch format.
3. Automatic stereo correlation and tracking of frame, panoramic, and strip stereoscopic photography.
4. Air bearing X and Y carriages on both film stages.
5. Anamorphic correction continuously variable from 1:1 to 1:2 and rotatable through 360°.
6. Mensuration readout system with .1 micron least-count on-line/off-line to the central computer and card punch.



Weight: 15,000 lbs. (Estimated)
 Size: H 8 ft. W 19 ft. L 17 ft.
 Power Requirements: To be determined

Special Requirements: None
 Status: Design drawings and final report due January 1968
 Development Source: Under development by NPIC

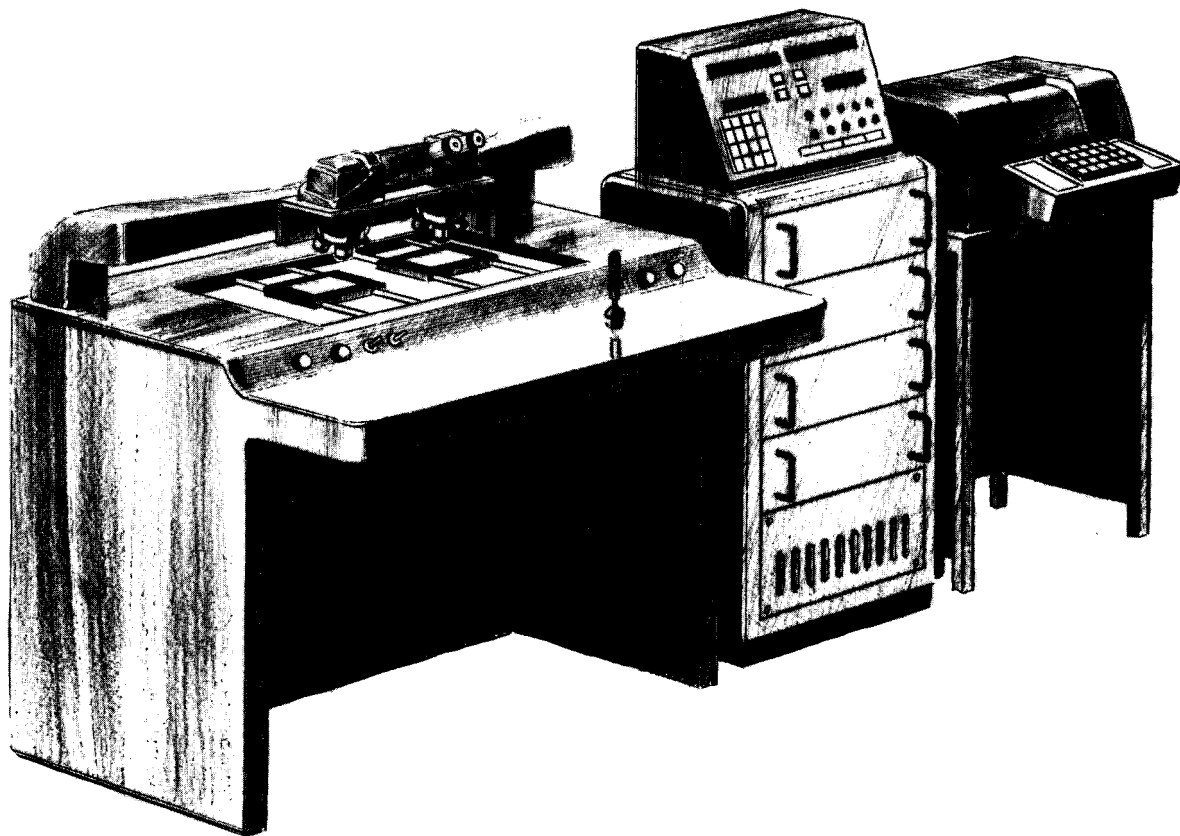
SECRET

25X1A

10. TWIN-STAGE ON-LINE P. I. COMPARATOR

Early in FY-1968, it is planned to award a contract to design and fabricate a twin stage comparator for use on-line to a computer. This is intended for use by the P.I. during the normal photo interpretation process. It is proposed that the High Power Stereoviewer Head be used as the optical system, incorporating two independent 5- by 5-inch film stages with one

stage two-axis digitizers. The design goal is measuring error of 2 microns or less for measurements up to 1 inch and minimum accuracy of 1:5,000 over the entire 5- by 5-inch format. The comparator will be used on-line to a central computer or at a decentralized location with its own integral computer.



Size: H 60 in.
(maximum size)

Weight: 400 lbs.
W 34 in. L 48 in.

Special Requirements: None
Status: Contract to be awarded
Development Source: Under Development by NPIC

25X1A

SECRET

SECRET

B. EVALUATING

1. EASTMAN KODAK INSPECTION AND VIEWING TABLE

(This item is Unclassified)

The Eastman Kodak Inspection and Viewing Table has a 32- by 10-inch viewing surface and is designed for use in inspecting large quantities

of film up to 9.5 inches in width. The table has a film tension adjustment and a variable speed, reversible, motorized spool-drive.



Weight: 400 lbs.

Size: H 4 ft. W 5 ft. L 2.5 ft.

Power Requirements: 115 V, 10 A

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet
NPIC stated requirements

SECRET

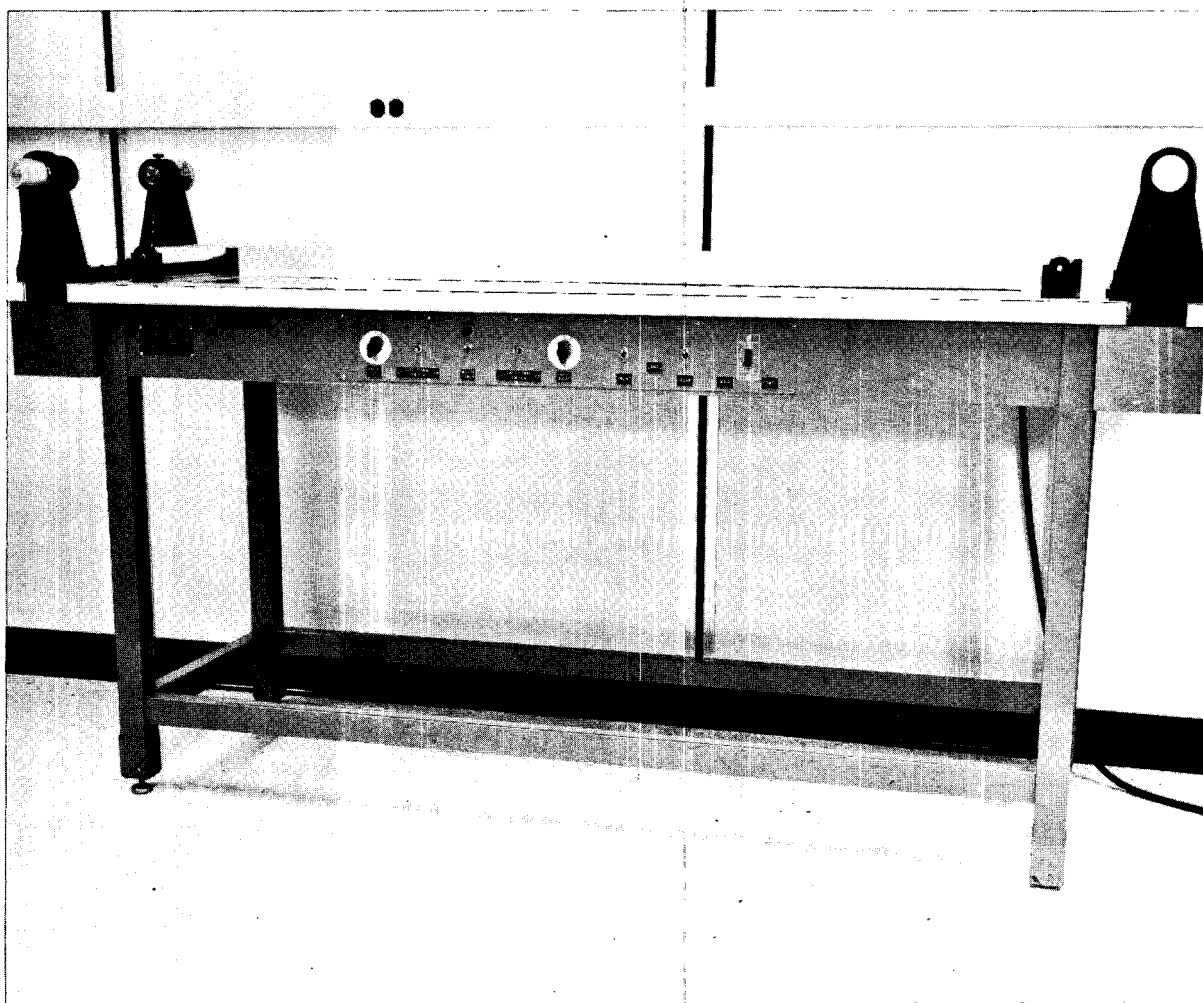
SECRET

2. EASTMAN KODAK 55-INCH VIEWING TABLE

(This item is Unclassified)

This is a motorized light table designed for the inspection and viewing of large volumes of film. The 55- by 10-inch surface of the light table allows viewing of more than 1 frame of

photography at a time. Film speed is variable, and photography ranging in width from 70mm to 9.5 inches can be accommodated.



Weight: 300 lbs.

Size: H 4 ft. W 7 ft. L 3 ft.

Power Requirements: 115 V, 7 A

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet NPIC stated requirements

25X1A

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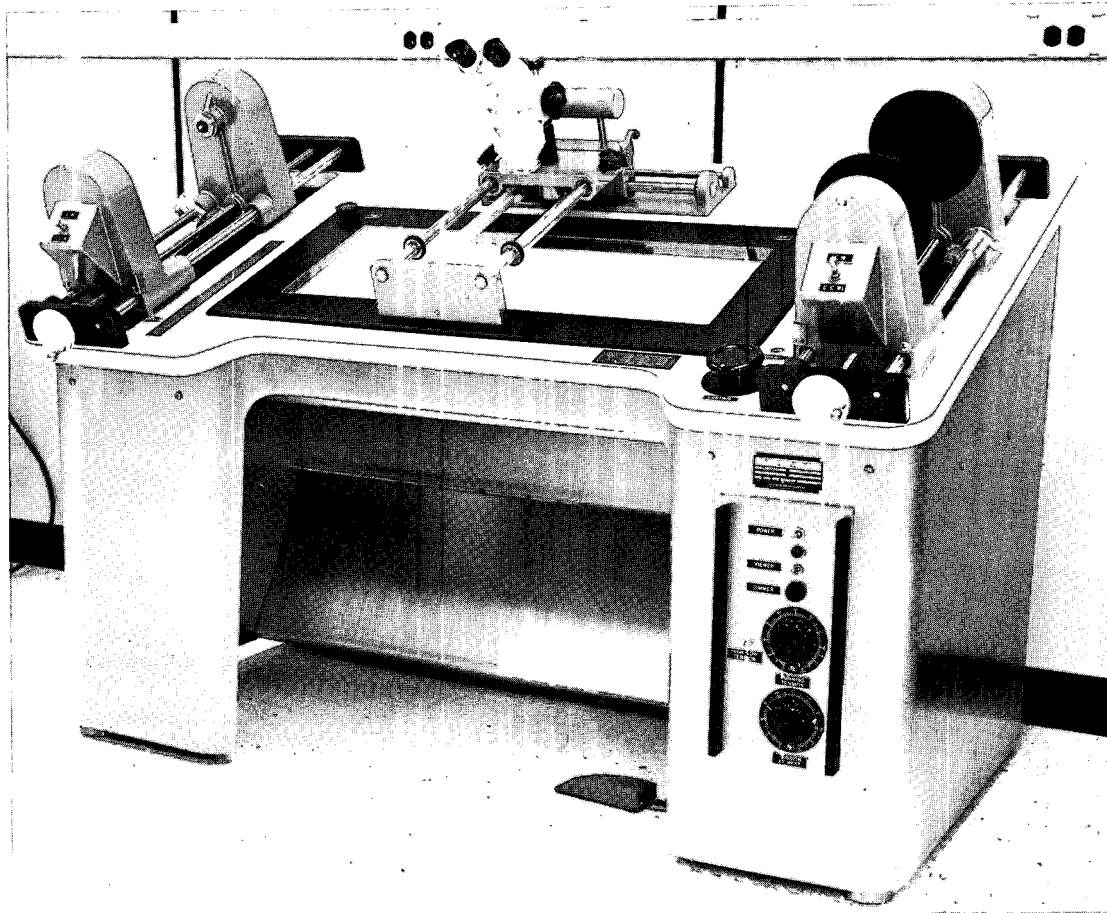
3. EASTMAN KODAK MICROSCOPE VIEWING TABLE, MOTOR WIND

(This item is Unclassified)

This viewing table incorporates a high quality binocular microscope to provide viewing at magnifications of 6X, 12X, 25X, and 50X. Processed roll films in standard widths from 70mm to 9 1/2 inches on spools up to 10 1/2 inches in diameter can be accommodated by this table.

Efficient film handling is obtained by incorporating motor-driven rewind units and asso-

ciated electrical controls to lessen the physical effort required by operating personnel and to provide a bi-directional variable speed control that is equipped with brakes to permit controlled stops. In addition, tension is regulated so that film in the course of stopping, starting, or otherwise changing speed, does not become slack and drag.



Weight: 600 lbs.

Size: H 40 in. W 30 in. L 60 in.

Power Requirements: 115 V, 60 CPS, 8 A

Special Requirements: Ultra-clean area illuminated by subdued white light.

Status: Commercially available

Development Source: U.S. Government

SECRET

25X1A

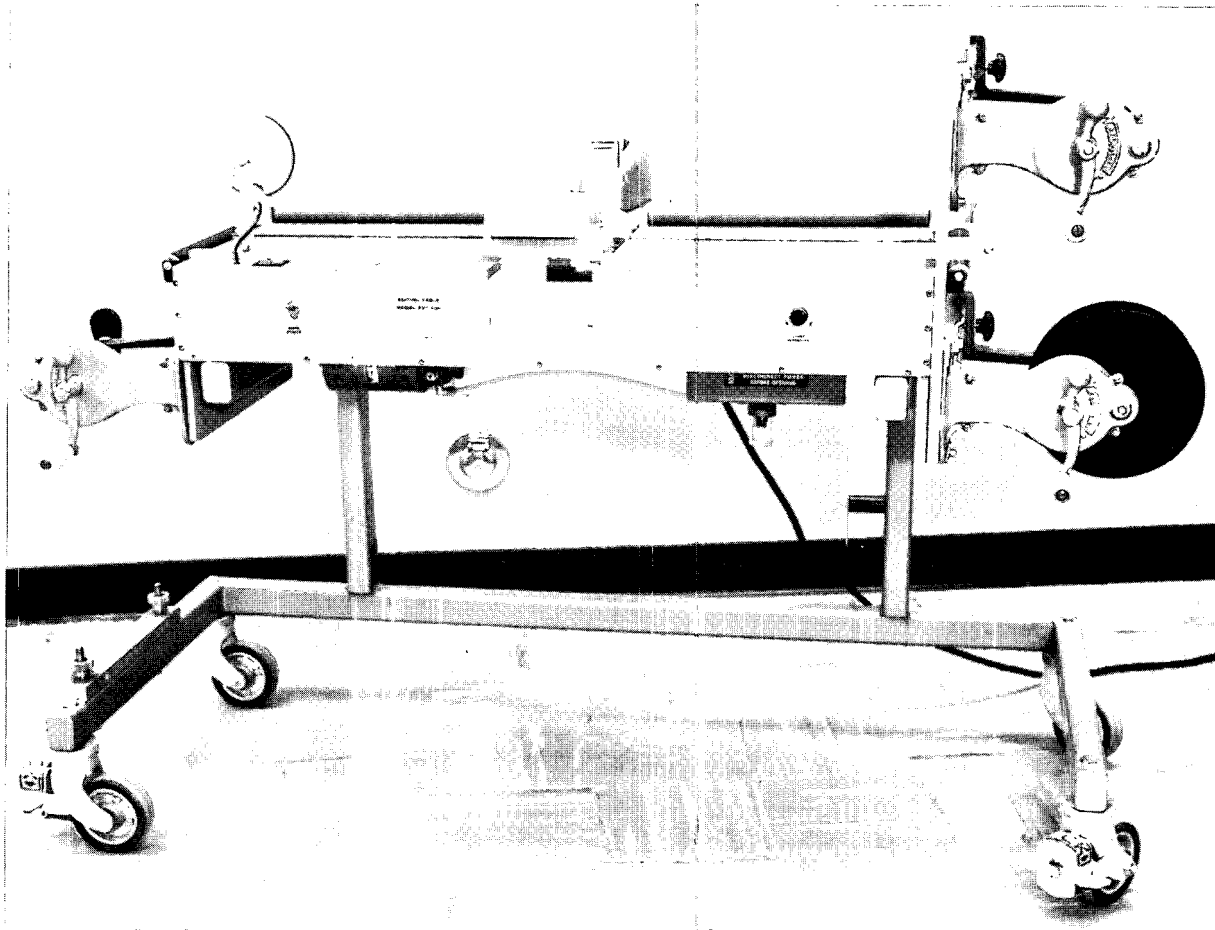
4. [] **FILM EDITING TABLE**

(This item is Unclassified)

25X1A

[] Film Editing Table, especially designed with an attachment for handling large-diameter film spools and a device for cutting the film, provides a capability for cutting any 70mm to 9.5-inch film base in roll form and of joining the film with a temporary splice. Used in the editing and breakdown of film as received from the processing laboratory, this table facili-

tates the preparation of manageable size film spools and the removal before reproduction of those portions of a mission which are unwanted. The original model was delivered in June 1965 and was later modified to include a translucent vacuum platen on each side of the film cutter, shutter-controlled light source, additional take-up spool brackets, and a film-footage counter.



[]
Weight: 150 lbs.

Size: H 41 in. W 29 in. L 56 in.

Power Requirements: 115 V, 60 CPS

Special Requirements: None

Status: Procurement limited to one only.

Development Source: Commercially developed to meet NPIC stated requirements.

25X1A

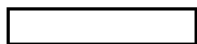
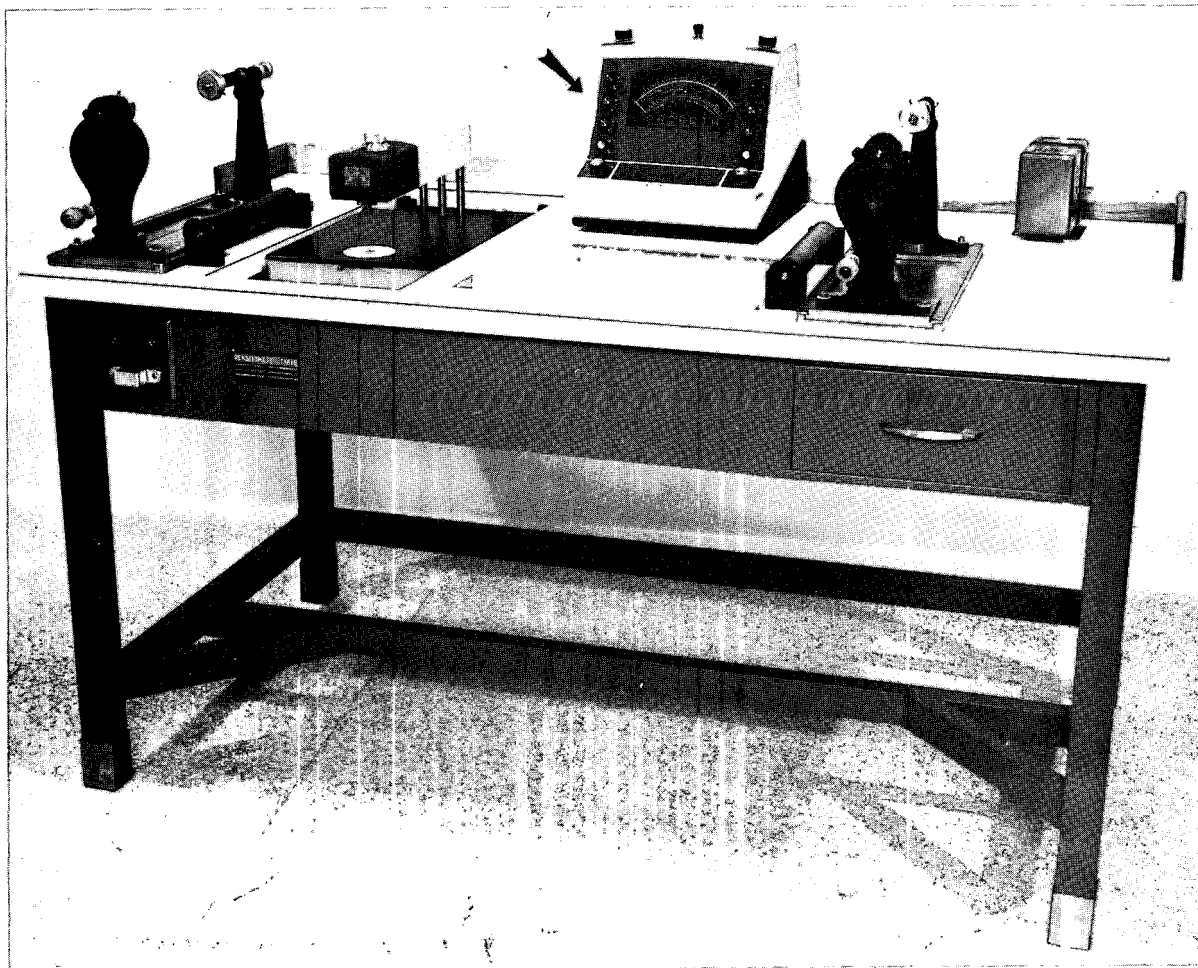
SECRET

6. MACBETH QUANTA LOG DENSITOMETER

(This item is Unclassified)

This is a standard shelf item used to measure American Diffuse Densities on film. It may be equipped with a variety of aperture shapes and sizes, down to a minimum diameter of 0.5mm. The reading head will accommodate film up to 9.5 inches in width, and the use of various accompanying filters allows measurement of color film. With additional auxiliary units

(not shown) the densitometer may be used on an enlarger easel to read the average transmitted light in a projection printer or as an exposure control instrument to read reflection densities in copying. In the illustration, the Macbeth unit is mounted on an Eastman Kodak densitometer table.



Size: H 12 in.

Power Requirements: 110 V

Weight: 35 lbs.

W 24 in. L 18 in.

Special Requirements: None

Status: Commercially available

Development Source: Commercial

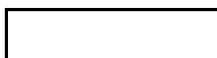
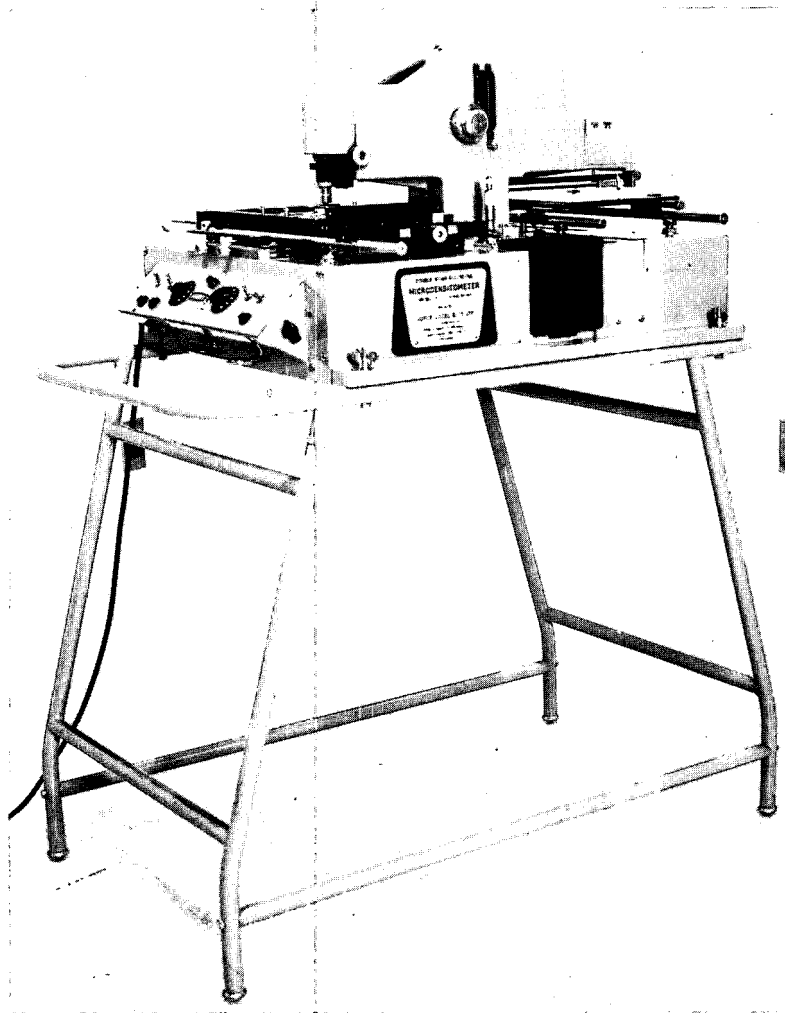
SECRET

5. JOYCE, LOEBL MICRODENSITOMETER

(This item is Unclassified)

This low-cost, double-beam instrument, capable of measuring specular-type densities, is used primarily for edge traces and special microdensitometer studies. Various slit and circular effective apertures are available, ranging down to 1 micron in diameter. The instrument is capable

of measuring densities up to approximately 4, and the output is a continuous trace of deflection (density) versus distance. The distance scale of the trace can be expanded from a ratio of 1:1 to 1:1,000.



Size: H 5 ft.

Power Requirements:

Weight: 200 lbs.

W 2 ft. L 3 ft.

115 V, 3 A

Special Requirements: *Controlled environment*

Status: *Commercially available*

Development Source: *Commercial*

25X1A

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7. MANN TRICHROMATIC MICRODENSITOMETER (TYPE 1032T)

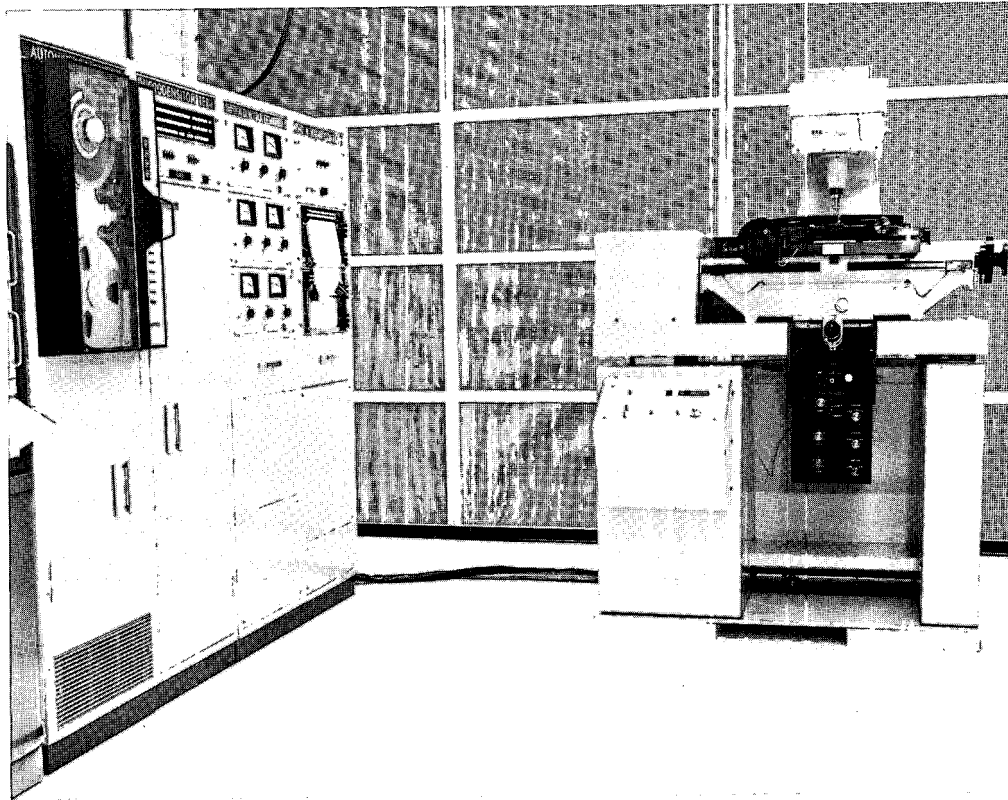
(This item is Unclassified)

This is a precision instrument which scans a photographic transparency and at preset intervals, simultaneously measures position and optical transmittance in three spectral regions. This machine will automatically scan across an image on one line, step over and scan along a parallel line; meanwhile, it is recording on magnetic tape and strip charts the density or transmittance of the imagery at successive intervals. The machine is accurate in linear measurement to 1 micron or 0.0015 of the travel, whichever is greater. The

reproducibility of density measurements is ± 0.01 density units or 1 percent of density, whichever is greater.

NPIC, with the assistance of [redacted] is currently assembling a computer program package which will utilize the output of the microdensitometer as an input for film and image analysis. Color image analysis is also to be looked into by [redacted] under this contract.

25X1
25X1
25X1



25X1A

[redacted]

Weight: 3 tons
Size: H 6 ft. W 5 ft. L 4 ft.
(input instrument)
Power Requirements: 117 V, 4 KVA

Special Requirements: Clean room, temperature and humidity control
Status: Commercially available
Development Source: Commercial

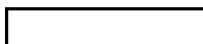
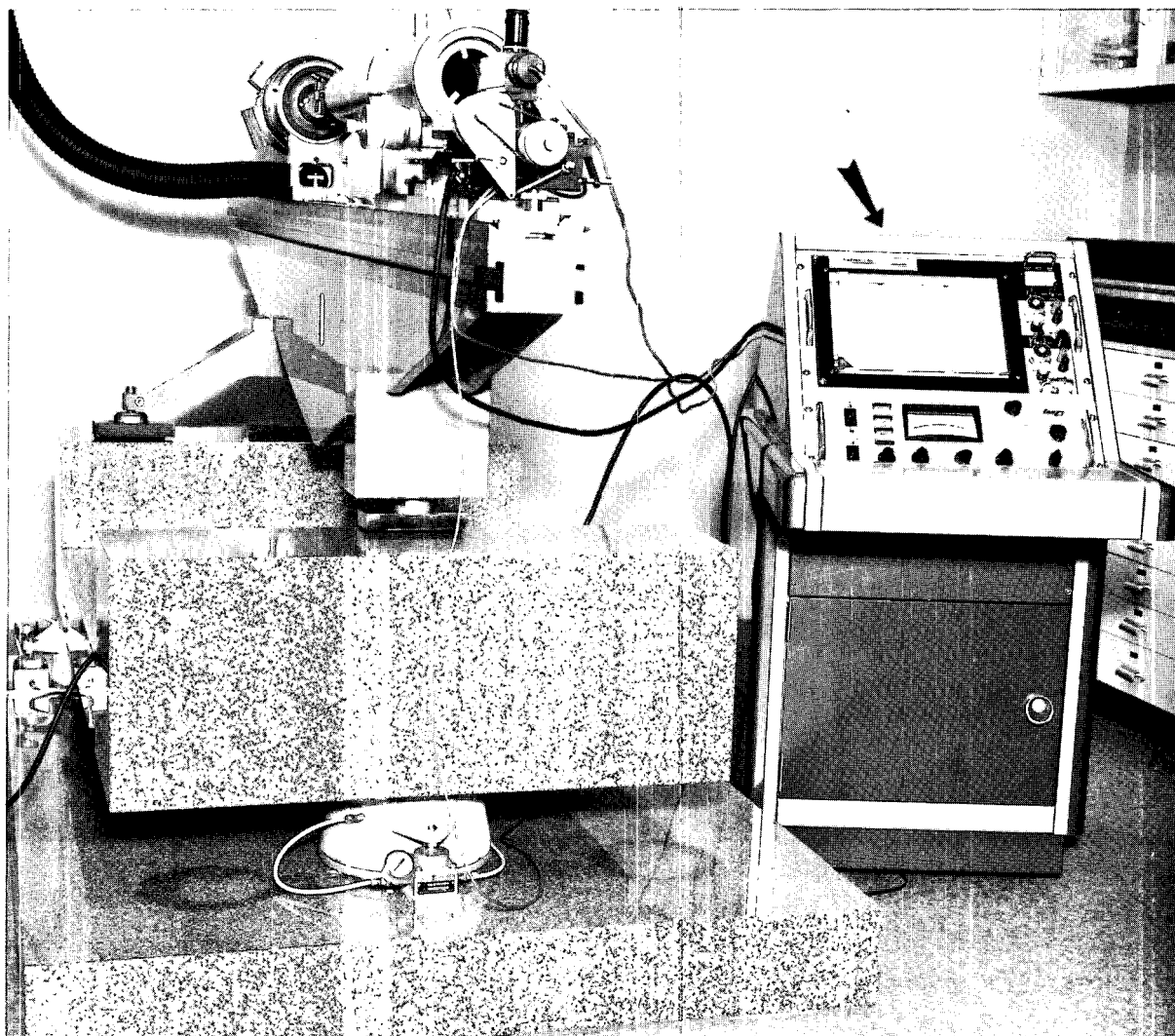
SECRET

8. LOGETRONIC FOCATRON (MODEL P-122-R)

(This item is Unclassified)

The Focatron measures the contrast of a real image on an optical bench. By recording the peak value of contrast as the Focatron sensor is moved through focus, and by repeating the measurement with images of grating targets

of varying spatial frequencies, it is possible to make an objective measurement of the contrast transfer function of a lens. Other measurements with the Focatron allow the determination of all of the more important lens aberrations.



Size: H 40 in. W 25 in. L 36 in.
 Power Requirements: 250 V, 115 V, 60 CPS

Weight: 237 lbs.

Special Requirements: Stable optical bench, collimator

Status: Commercially available

Development Source: Commercial

25X1A

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NPIC/R-91/67

25X1A

25X1A

25X1A

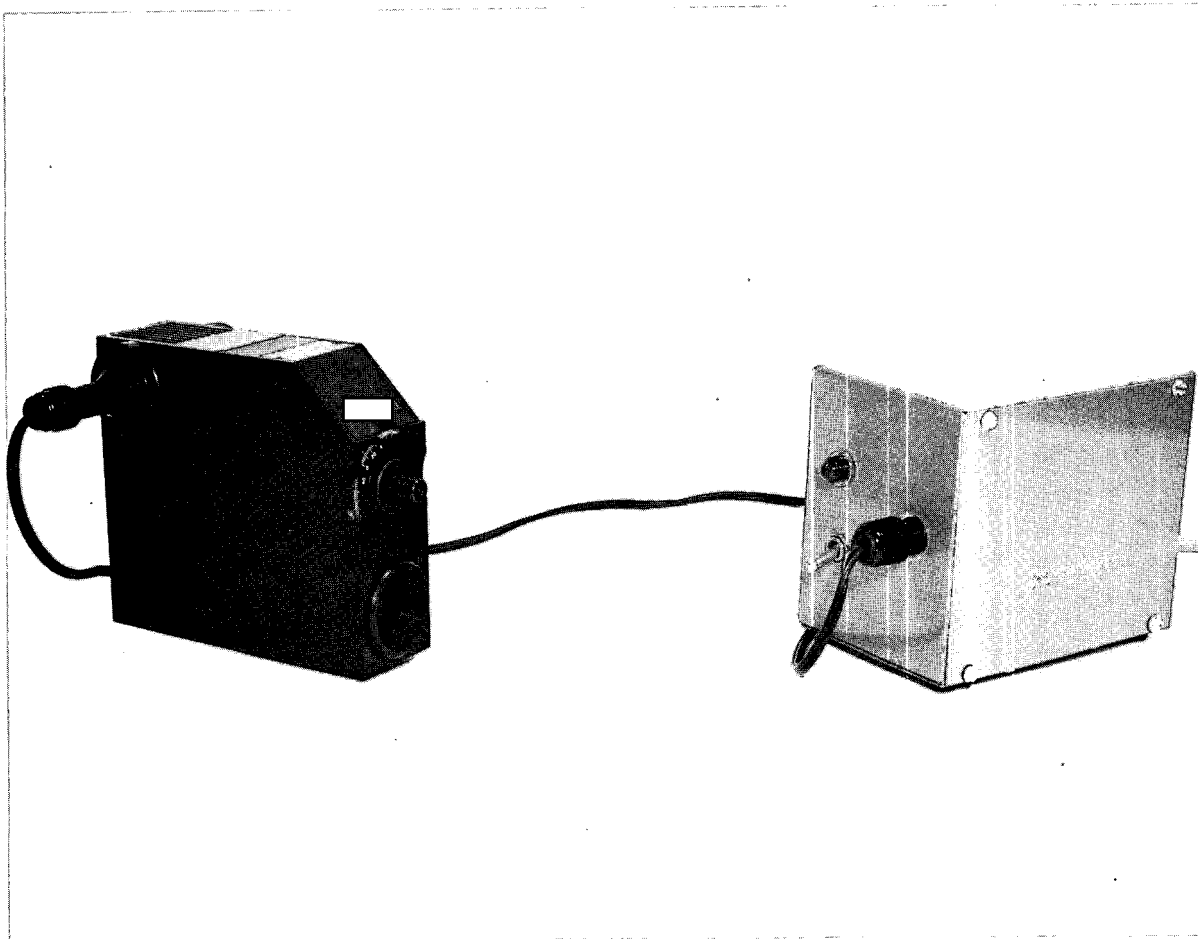
9. [redacted] **LABORATORY SINE-WAVE TEST EQUIPMENT**

(This item is Unclassified)

[redacted]
[redacted] has produced a device for laboratory bench determinations of modulation transfer function of optical systems and components. The present techniques of modulation transfer function measurement require rather large pieces of equipment or installations, extensive data-processing analysis, and a large capital outlay. The present equipment, in its production version, will cost

approximately [redacted] and its computations can be reduced to reading nomographs. It can be adapted to any optical bench with a minimum of modification (all in the mounting method). It is capable of assessing transfer curves out to 1000 cycles/mm, and preliminary tests indicated a high reliability and an excellent reproducibility.

25X1A



[redacted]

Size: H 6 in.

Power Requirements:

Weight: 5 lbs.

W 3 in.

L 6 in.

110 V, 60 CPS

Special Requirements: None

Status: Prototype delivered in March, 1967

Development Source: NPIC

25X1A

SECRET

SECRET

25X1A

10. [REDACTED] **SINE-WAVE TEST EQUIPMENT (PORTABLE)**

(This item is Unclassified)

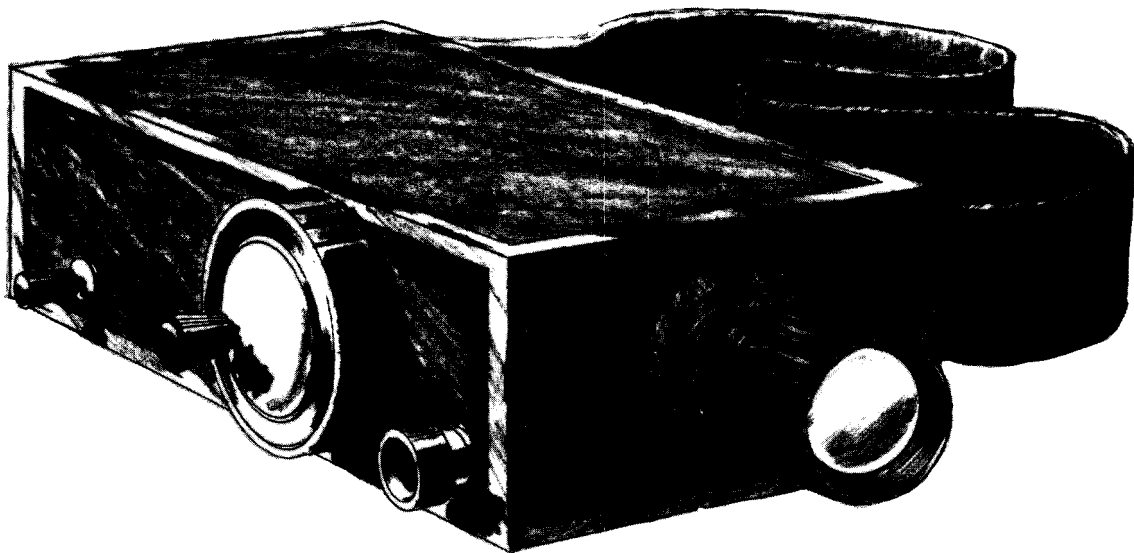
25X1A

A portable version of the Sine-Wave Test-
ing Equipment is under development by [REDACTED]

[REDACTED] The primary objective
is to provide the technical monitor (or evaluat-
ing engineer or scientist) with a portable, high-
precision instrument for ascertaining modulation
transfer characteristics of optical systems under
development in the field. It will be used to test
viewing systems in situ, including that system's
light source, condensing system, and firm pla-
ten. It will be particularly useful when these

cannot be evaluated on precision test benches
because of size, weight, or general configuration.
It will be of further use in acceptance testing
of optical equipment at the contractor's facility
and for spot-checking production runs during
assembly or during preliminary trials of proto-
type equipment. Its use can further extend to
the laboratory in substantive investigations where
space and weight do not permit routine bench
testing. The frequency limit will be 1000 cycles/
mm, as in the laboratory model.

25X1A



25X1A

[REDACTED]

Weight: 5 lbs.
Size: H 6 in. W 3 in. L 3 in.
Power Requirements: 110 V, 60 CPS

Special Requirements: None
Status: Prototype delivery date is November, 1967
Development Source: NPIC

SECRET

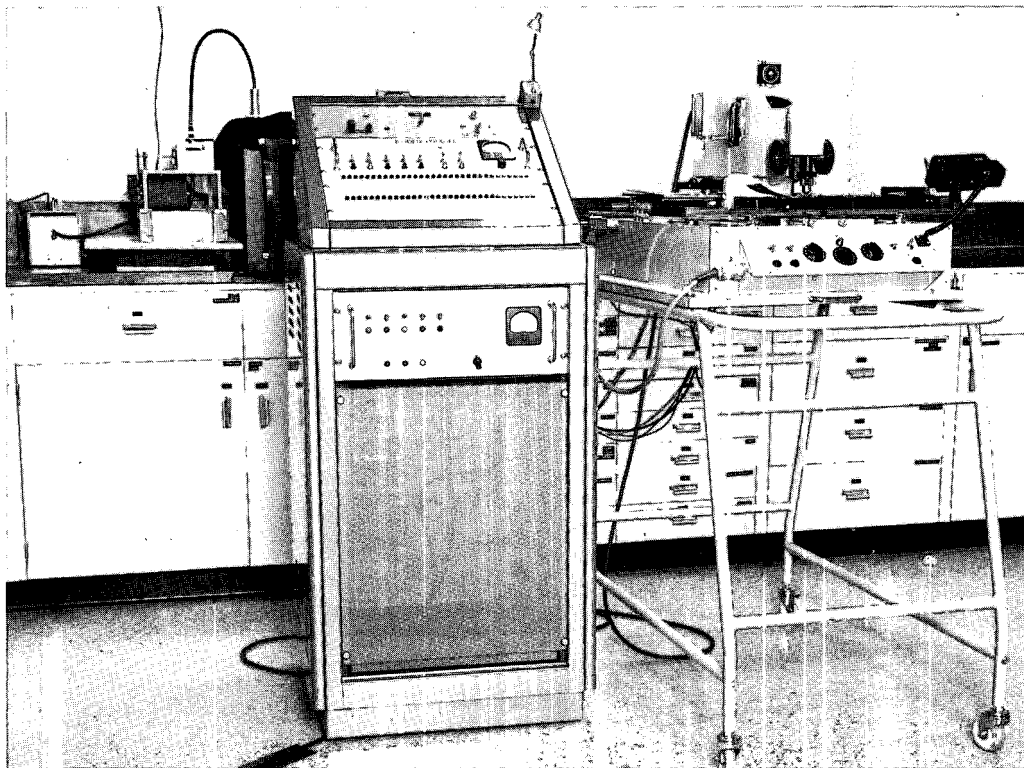
11. NATIONAL INSTRUMENT LABORATORY ISODENSITRACER

(This item is Unclassified)

The Isodensitracer automatically prints out contour maps of the density distribution in photographs. The contour lines appear as boundaries between regions which are color-coded according to the density. Three different patterns in four different colors plus blank yield a total of 13 different codes, any one of which may be arbitrarily assigned to any one of 64 increments into which a pre-selected density range is divided. These contours may be made to be as little as 0.008 density units apart. Thus, the Isodensi-

tracer print-out can show the existence of an edge with contrast more than an order of magnitude below the detection threshold of the human eye.

The Isodensitracer pictured here is the first of the new four-color models. NPIC also uses single-color Isodensitracers which print out in a three-element code and an Isodensitracer fitted with magnetic-tape read-out through which the density-contour map may be generated by computer.



Size: Recorder unit -	
H 18 in.	W 36 in. L 24 in.
Control unit -	
H 30 in.	W 22 in. L 18 in.

Weight: 285 lbs.

Power Requirements: 115 V, 250 W, 50-60 CPS
 Special Requirements: None
 Status: Commercially Available
 Development Source: Commercially developed by Technical Operations INC.

25X1A

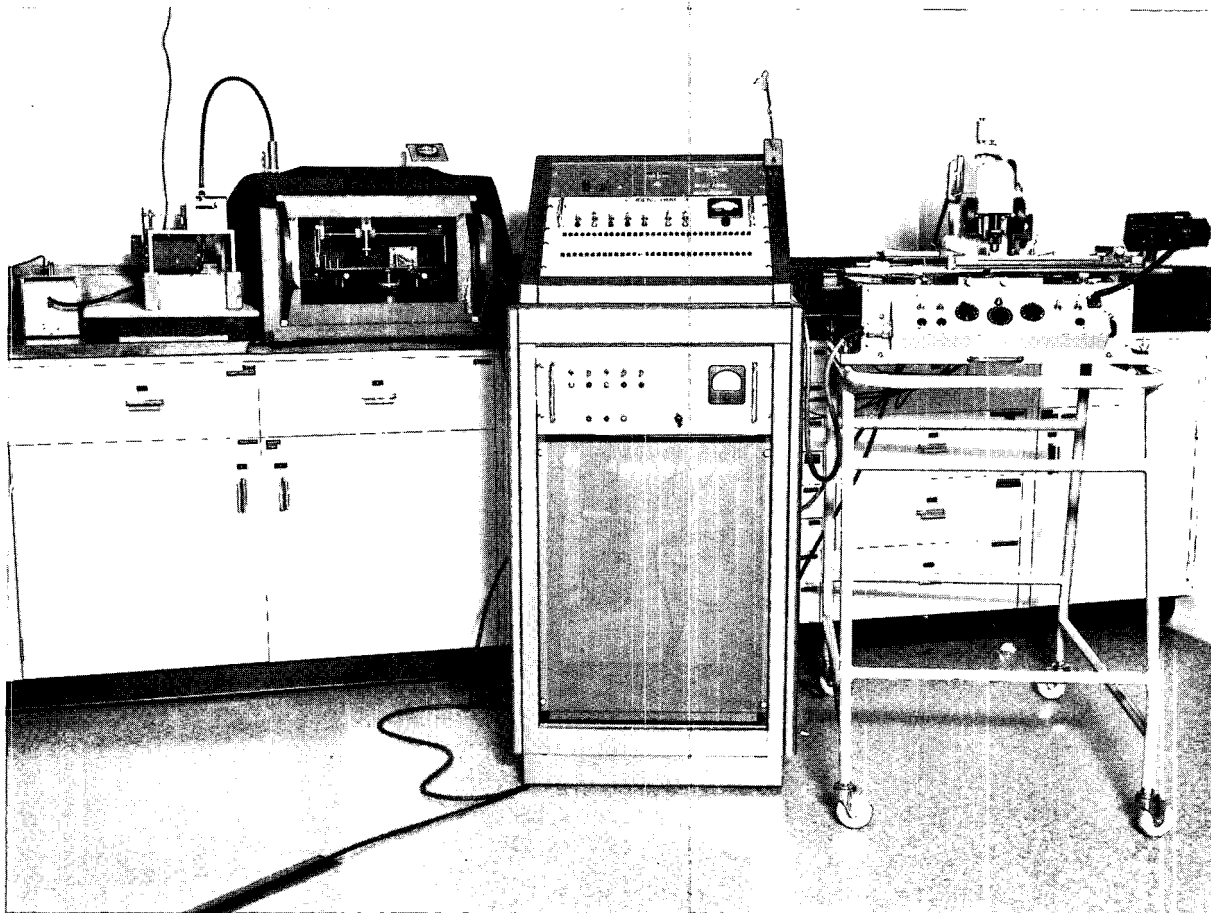
SECRET

12. ISODENSITY IMAGE OPTICAL TRANSFORMER (IDIOT)

(This item is Unclassified)

The IDIOT is a specialized output device for the Isodensitracer. The Isodensitracer scans a photograph and measures the photographic density at each point. The density signals from the Isodensitracer are used to control the IDIOT to print out another photograph, one in which the pattern of color or of density is functionally related to the pattern of density in the scanned

photograph. For example, the input picture may be an infra-red image in which warm objects are represented by areas of low density and cool objects by areas of high density. In the IDIOT print-out, warm objects may be shown as red and cool objects as blue, a picture which is much more striking as well as more readily interpretable.



Weight: 400 lbs.

Size: H 24 in. W 36 in. L 30 in.
(in addition to Isodensitracer)

Special Requirements: None

Power Requirements: 115V, 250W, 50-60 CPS

Status: Item under evaluation (one-of-a-kind)

Development Source: NPIC

SECRET

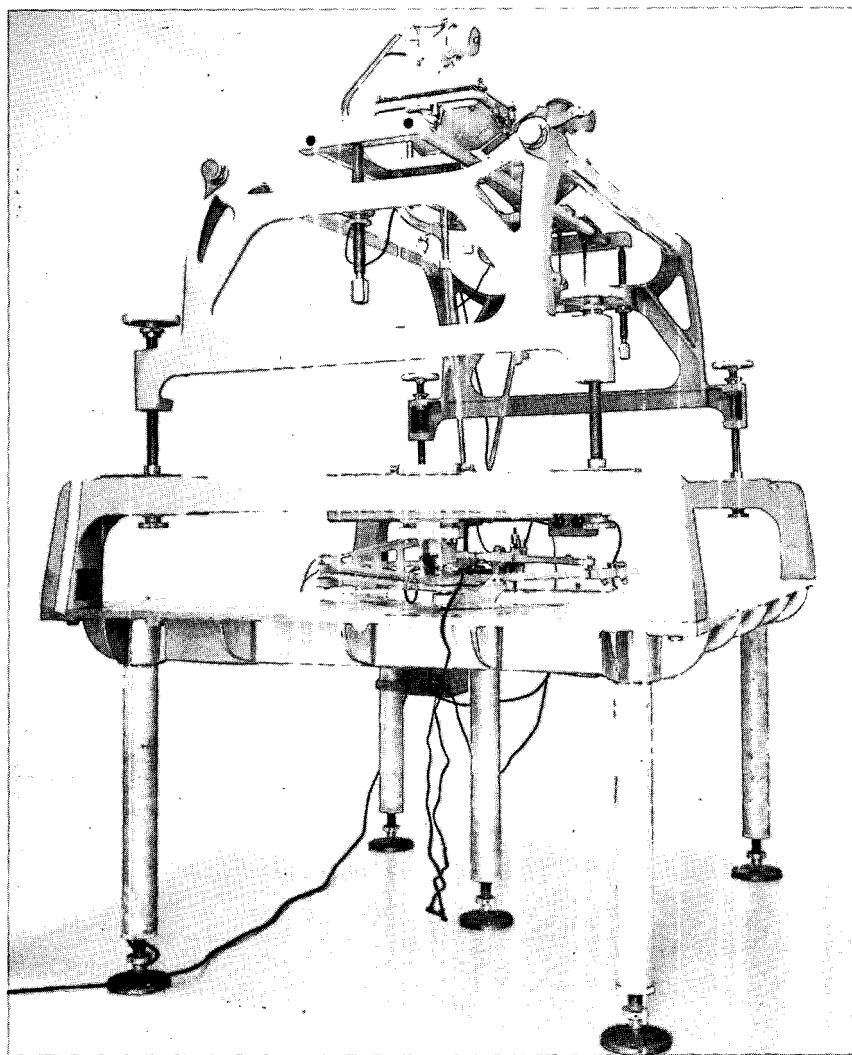
C. PLOTTING

1. KELSH PLOTTER

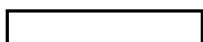
(This item is Unclassified)

The Kelsh Plotter is a projection instrument which produces a stereoscopic image by projecting a pair of overlapping photographs. Its primary use is in the preparation of maps for which it can delineate both planimetric features

and contours. Although primarily designed to utilize 6- or 8.25-inch focal-length aerial photography, it can be adapted for limited use with other photography.



25X1A



Size: 8 ft.

Power Requirements: 110 V

Weight: 1,600 lbs.

W 10 ft. L 12 ft.

Special Requirements: Dark room with variable light level

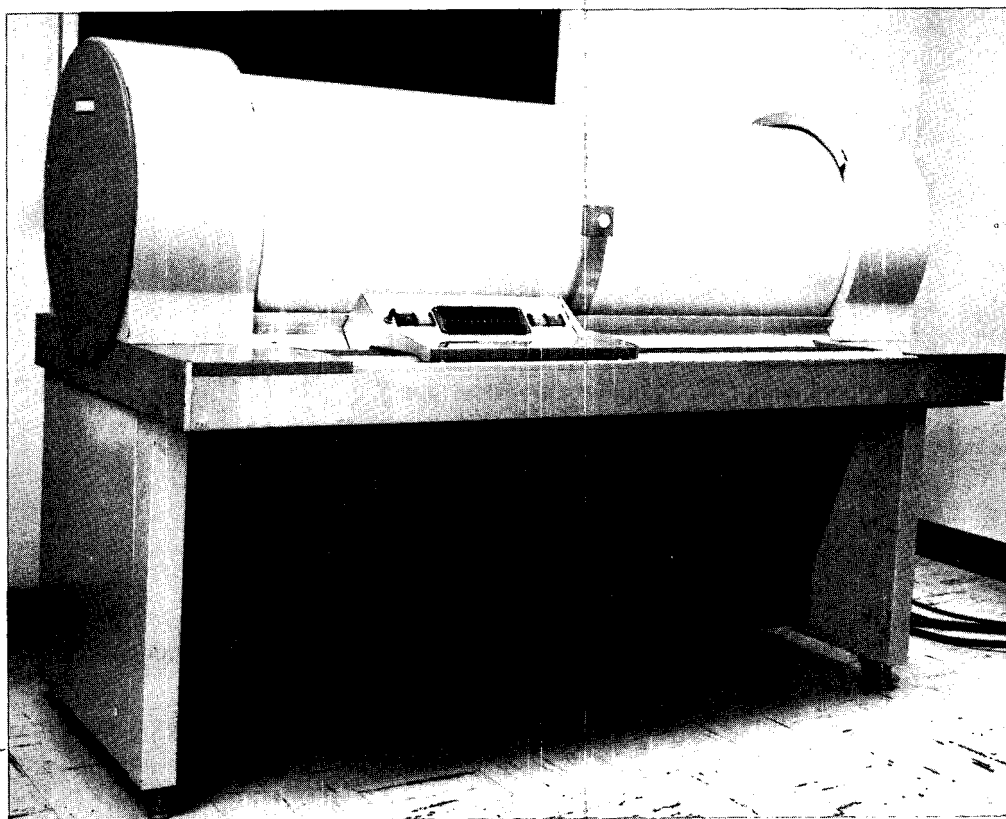
Status: Commercially available

Development Source: Commercial

SECRET**2. BENSON-LEHNER LARGE-AREA RECORD READER (MODEL D-2)***(This item is Unclassified)*

The Large-Area Record Reader (LARR), manufactured by the Benson-Lehner Corporation, is a semiautomatic, precision, coordinate reader designed for reading and automatically recording X-Y measurements from records up to 48 by 48 inches. It may also be used manually as a point plotter for the precise positioning of points. The coordinates are automatically displayed in a Position-Indicating General Measuring Instrument (PIGMI II). The read-plot head mounts a microscope or crosshair and can be moved

anywhere along the length of the drum. X-axis measurements are made by moving the read-plot head; Y-axis measurements by rotating the drum with the mounted record. Both motions are controlled by 2 independently operated rollers immediately in front of the operator. The precision-steel bands attached to both the drum and the reading head drive precision measuring drums geared to optisyn shaft encoders. Counters in the PIGMI II convert the emitted pulses into digital coordinates at 1,000 counts per inch.



--

Weight: 1,500 lbs.

Size: H 47 in. W 32 in. L 66 in.

Power Requirements: 115 V, 15 A

Special Requirements: None

Status: Commercially available

Development Source: Commercially developed to meet NPIC stated requirements

25X1A

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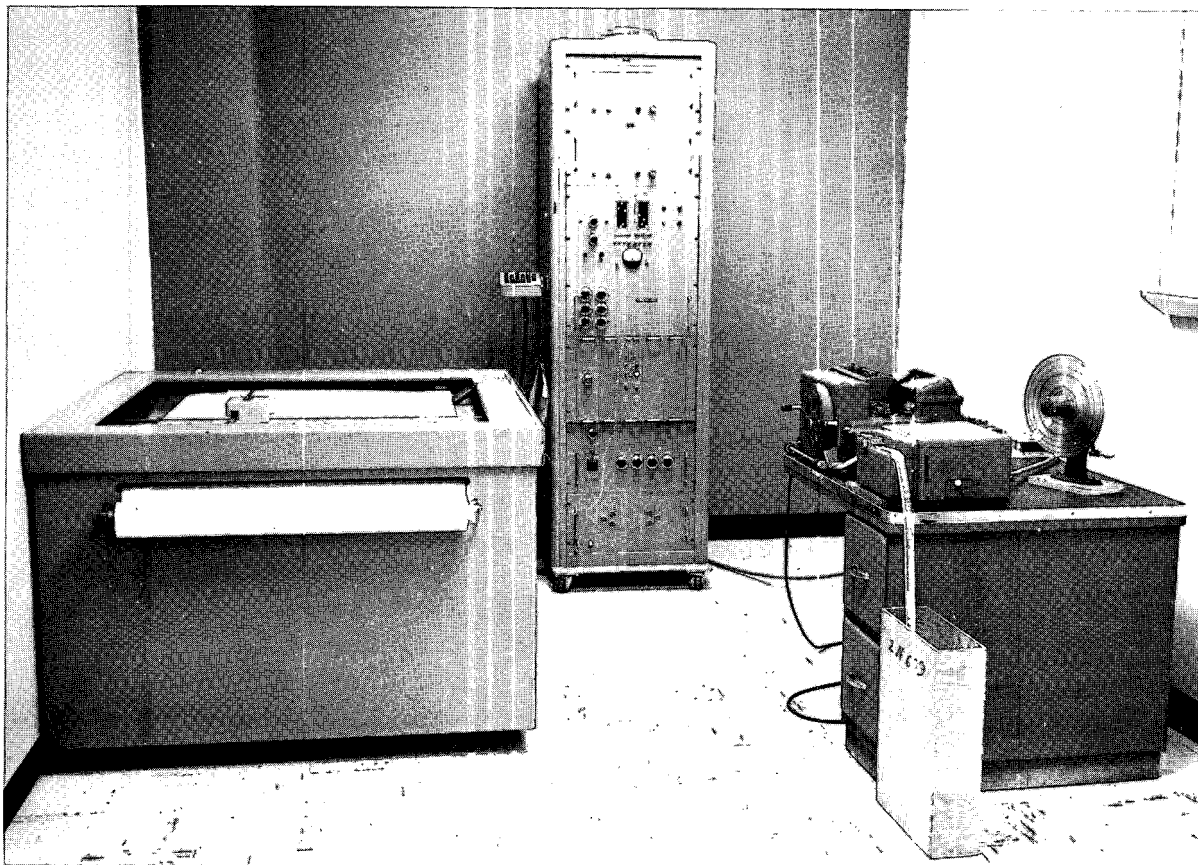
SECRET

3. BENSON-LEHNER PLOTTER (MODEL H)

(This item is Unclassified)

This plotter accepts coordinate input data in digital form and plots a point or symbol at the corresponding location on a 28- by 30-inch plotting table. The input data may be inserted manually from a keyboard, or it can be read automatically from punched paper tape. Other modes of operation include an incremental programming of the X-axis, so that only Y values need be entered, and an analog-voltage input

for direct plotting from certain Benson-Lehner record readers. In operation, the plotting head follows the intersection of two chrome-plated bars which move perpendicularly to each other. Scaling of the plot is variable, and permits optimization of the plot size and exact matching to graph paper held in position by a vacuum-clamp system to prevent accidental displacement during plotting.



Size: Plotting Table:
 H 34 in. W 49 in. L 49 in.
 Electric Rack:
 H 78 in. W 24 in. L 24 in.

Weight: 1,100 lbs.

Power Requirements: 115 V, 15 A
 Special Requirements: None
 Status: Commercially available
 Development Source: Commercial

SECRET

4. CALCOMP PLOTTER AND RECEIVER (MODEL 563)

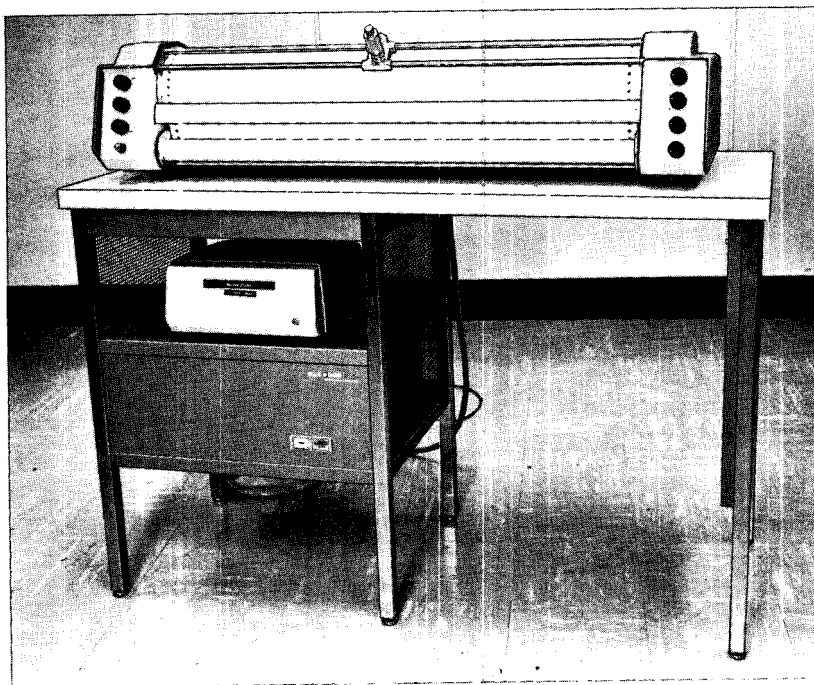
(This item is Unclassified)

This remote-station plotter is capable of plotting data up to 29.5 inches wide and 120 feet long. The plotter accepts data directly from a computer and can be used at any remote computer outlet. Manufactured by California Computer Products (Calcomp), the plotter is used in conjunction with film readers and chip comparators in support of real-time photo measurement.

The plotter is a high-speed 2-axis plotter designed for plotting one variable against another. The actual plot is produced by the movement of a pen over the surface of a chart paper; the X-axis by rotary motion of the chart drum, and the Y-axis by lateral movement of the pen

carriage. Z-axis motion is provided by a pen solenoid which permits the pen to be lifted or lowered to the plotting surface in response to electrical input signals. A bidirectional rotary-step motor on both the X- and Y-axis drives causes the drum or pen carriage to move 0.01 inch in either a positive or negative direction, at a rate of 200 steps per second.

Because of the rotating-drum method of plotting, this unit offers several advantages over most flatbed plotters. The major advantage is the capability of making much larger-scale plots of elongated objects, such as targets with aspect ratios in excess of 2:1.



Weight: 200 lbs.
Size: H 39 in.
(includes receiver)

W 18 in. L 45 in.

Power Requirements: 115 V, 5 A
Special Requirements: None
Status: Commercially available
Development Source: Commercial

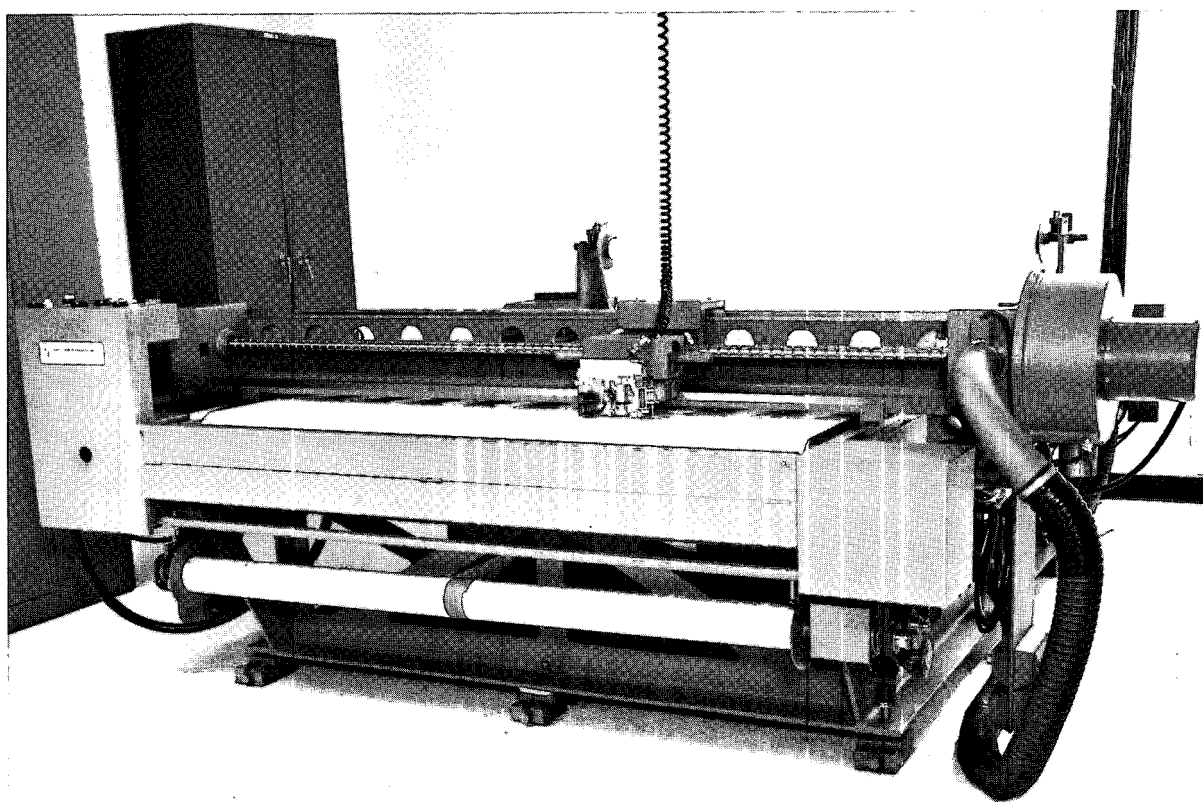
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25X1A

5 **PRECISION COORDINATOGRAPH**

This instrument will handle general-purpose plotting requirements, particularly coverage plots, and contains a 60- by 60-inch plotting surface which is large enough to produce overlays for the largest maps generally available. It will be used on-line with the Univac 490 and all func-

tions will be under computer control, including vacuum hold-down and paper advance, so that a minimum amount of operator attention will be required. The system logic is digital and no analog techniques are used.



Weight: Coordinator graph - 7,500 lbs., Director - 900 lbs.
Size: Coordinator graph
 H 48 in. W 96 in. L 96 in.
 Director:
 H 80 in. W 76 in. L 30 in.

Power Requirements: 460/240 V, 3 phase, Y-connected, 60 ± 3 CPS, 20A per line, 15 KVA, Director - 208/120 V, 3 phase, Y-connected, 60 ± 3 CPS, 20 A per line
Special Requirements: Vacuum, air conditioning and special installation
Status: New marking system being evaluated
Development Source: NPIC

25X1A

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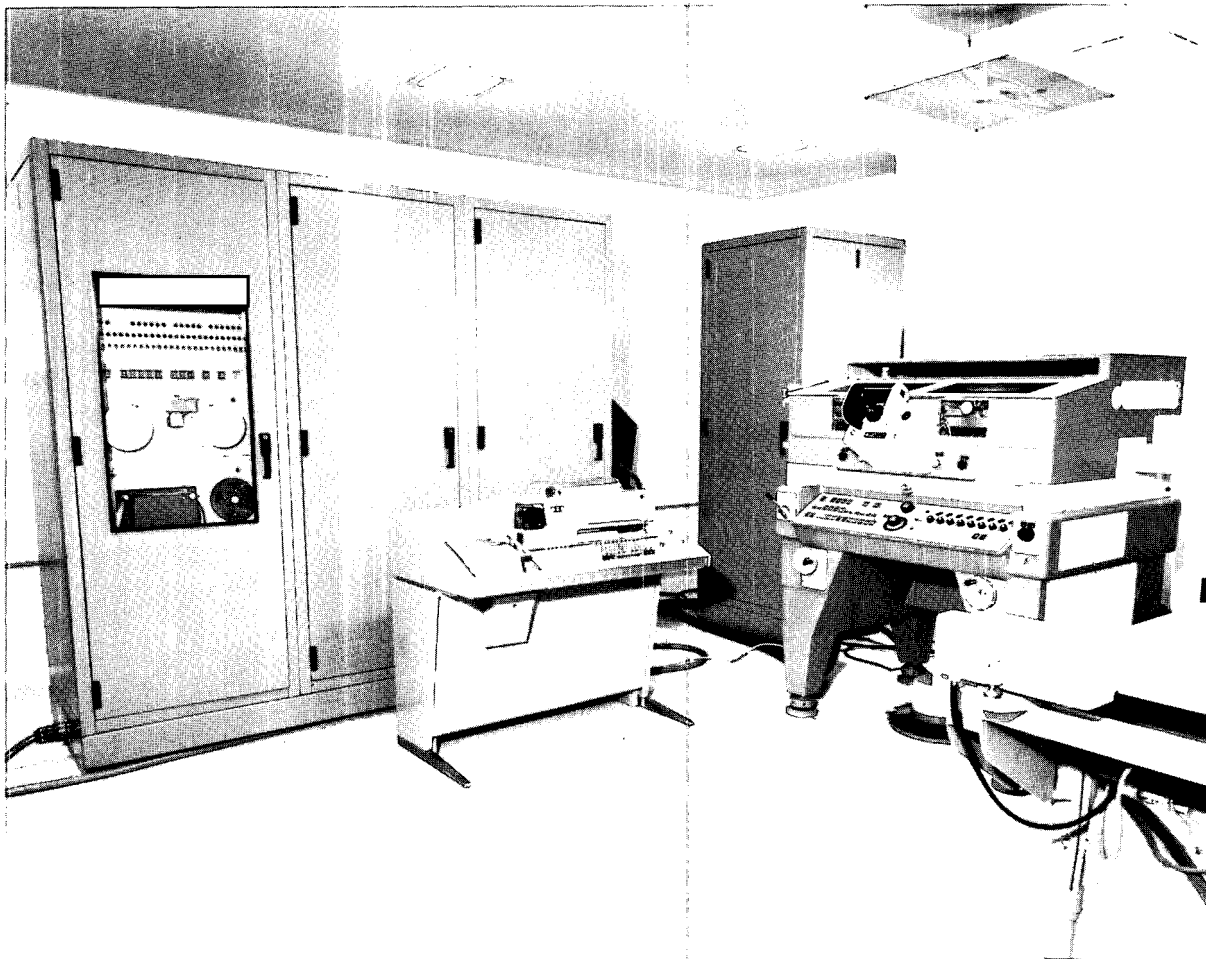
25X1A

6. **AP/3 ANALYTICAL STEREO PLOTTER**

(This item is Unclassified)

The AP/3 Analytical Stereo Plotter is a higher-capability version of the AP/2 Stereo Plotter. The major improvements incorporated in the AP/3 are continuous-zoom viewing from 10x to 100x; higher resolution; 1.25-micron ac-

curacy over a 2-inch-square area; capability of handling terrestrial stereo pairs as well as aerial frame and panoramic photography; ground-distance readout capability; and an improved plotter.



X1

Weight: 2,900 lbs.
Size: H 8 ft. W 19 ft. L 17 ft.
Power Requirements: 120 V, 30 A, 60 CPS
Special Requirements: +60° to 75° F, Humidity 45% to 55%

Status: Delivered in November 1966, undergoing evaluation; detachable anamorphic eyepieces to be delivered in July 1967
Development Source: Modification by NPIC of commercial item

25X1A

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7. BENSON-LEHNER PLOTTER (MODEL L.T.E.)

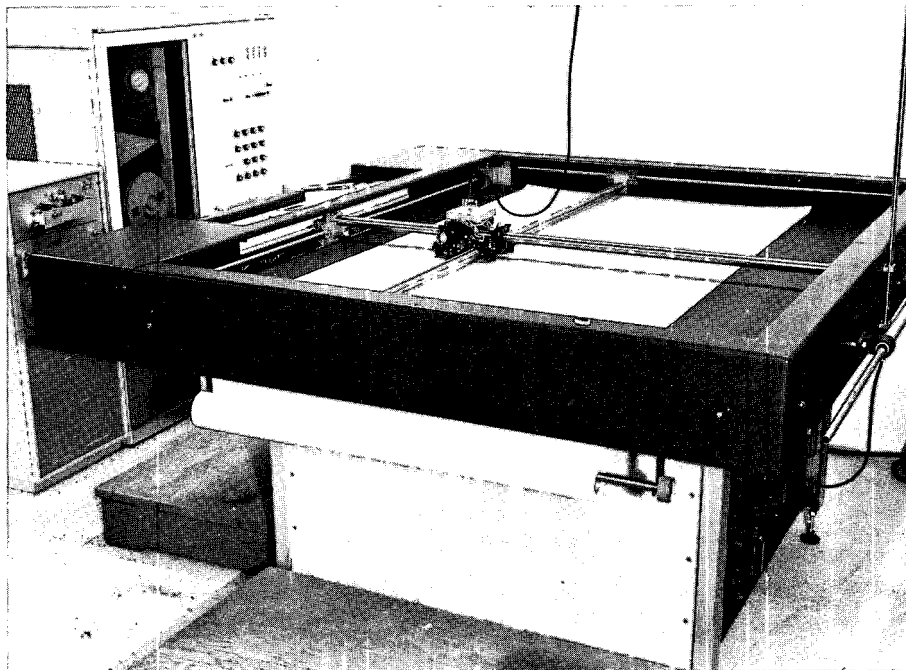
(This item is Unclassified)

The Large Table Electroplotter is a fully automated plotter that plots from computer produced magnetic or paper tape. Plotting area size is 42 by 58 inches. It is equipped with a scaling and point selection capability, a selection of 48 alpha-numeric symbols, and the option of 4 interchangeable colors. If desired, it can be used in a line drawing mode as well as point plotting. Origin can be selected any place on the plotting area or offset from it.

Plotting or straight line drawing accuracy is either ± 0.05 percent of full scale or ± 0.015

inch. Plotting rates are: points and symbols to 300 points per minute, straight line drawing to 275 lines per minute, and contour drawing to 4,500 points per minute.

Under either program control or operator control, the plotter plots points, symbols or alpha-numeric characters, and draws straight or curved lines as desired in four colors. This affords almost complete latitude in plotter operation, including adjusting scale between 1:1 to 1:10,000 times the unit of measure being used.



25X1A

Weight: Plotter - 1,400 lbs., Tape Drives - 600 & 300 lbs.

Size: Plotter

H 46 in. W 84 in. L 82 in.

Magnetic Tape Drive:

H 66 in. W 48 in. L 24 in.

Paper Tape Drive:

H 48 in. W 20 in. L 24 in.

Power Requirements: 115 V, 60 CPS, 30 A

Special Requirements: +40° to 90° F

Status: Commercially available

Development Source: Commercial

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