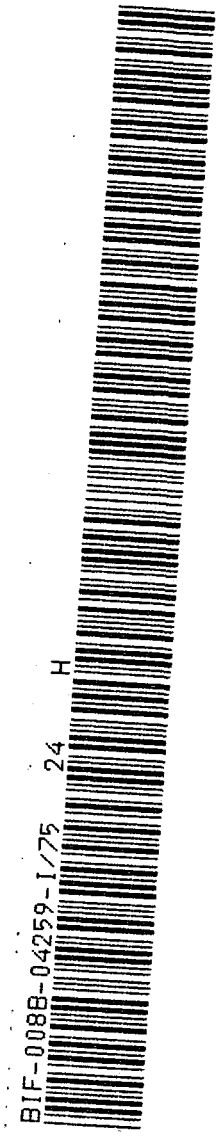


BRIDGEHEAD

WARNING NOTICE

Sensitive Intelligence Sources and Methods Involved

CLASSIFIED by BYEMAN 1
EXEMPT FROM GENERAL DECLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPTION CATEGORY 2
DECLASSIFY on: IMPOSSIBLE TO DETERMINE

Handle via BYEMAN
Control System Only

TABLE OF CONTENTS

INTRODUCTION

EKC - BRIDGEHEAD

PROGRAM RESPONSIBILITIES

- Develop and operate the primary NRP (TS) Film Processing and Reproduction Center.
- Equip, install and assist-operate NRP (TS) Field Film Processing and Reproduction Facilities.
- Provide technical and logistic photographic support to all NRP (TS) program elements.
- Conduct a R&D program, under a CCB, to:
  - Improve the practices, techniques, processes, and equipments concerned with exposure analysis and prediction; and the processing, reproduction, evaluation and analysis of photographic imagery.
- Establish and maintain NRP (TS) sensitometric reference standards.

PROGRAM OPERATION

- Under the administrative, contractual and security aegis of CIA-OSP.
- Under the budgetary and operational control of DNRO (S).
- Performs the following mission-related tasks:
  - Receives and downloads all space mission film recovery hardware.
  - Chemically processes all mission original B&W and Color photographic acquisition films.
  - Edits, composites, and titles augmented data on such films.
  - Performs image and exposure analysis, and
  - Performs image reproduction services, delivering finished photographic duplicate copies (including special enlargements) in accordance with the quantity, quality and time-line requirements of the COMIREX.

. Coordinates the development of

  - Specifications for and methodology of manufacturing test and flight film supply loads for all NRP (TS) programs; maintains orderly manufacturing and logistics flow to depots and satellite load requirements.

. Operates a Film Evaluation And Test Laboratory (FEAT).

SECTION I

FACILITIES

The Bridgehead Processing Facility is located in Rochester, New York at the Hawkeye Plant of the Eastman Kodak Co., Kodak Apparatus Division. (Figures 1 & 2).

The Facility houses the processing and reproduction operation as well as the R&D and engineering functions.

Bridgehead currently consists of:

1st Floor - Bldgs. 3-7-12-13 (Figure 3)
2nd Floor - Bldgs. 1-2-3-10-11-12 (Figure 4)
3rd Floor - Bldgs. 1-2-3-6-10-11 (Figure 5)
4th Floor - Bldgs. 1-2-3-6-10-11 (Figure 6)
5th Floor - Bldgs. 1-6-10-11 (Figure 7)

The facility is protected by a Security Perimeter with access only through a Guard Post on the 4th Floor of Bldg. 6. Movement within the facility is handled by 3 stairtowers and 3 elevators which are secured at the perimeter boundaries.

The floor plans (Figure 3-7) show the locations of the major items of equipment and work areas assigned to the processing and reproduction operations.

In addition, a small portion (approx. 9000 sq. ft.) of the Lincoln Plant Facility, located approximately 4 miles S.W. of Bridgehead, is used for Color Processing. It is expected this portion will be moved to Bridgehead during FY-76.

Figure 1 - Hawkeye Plant

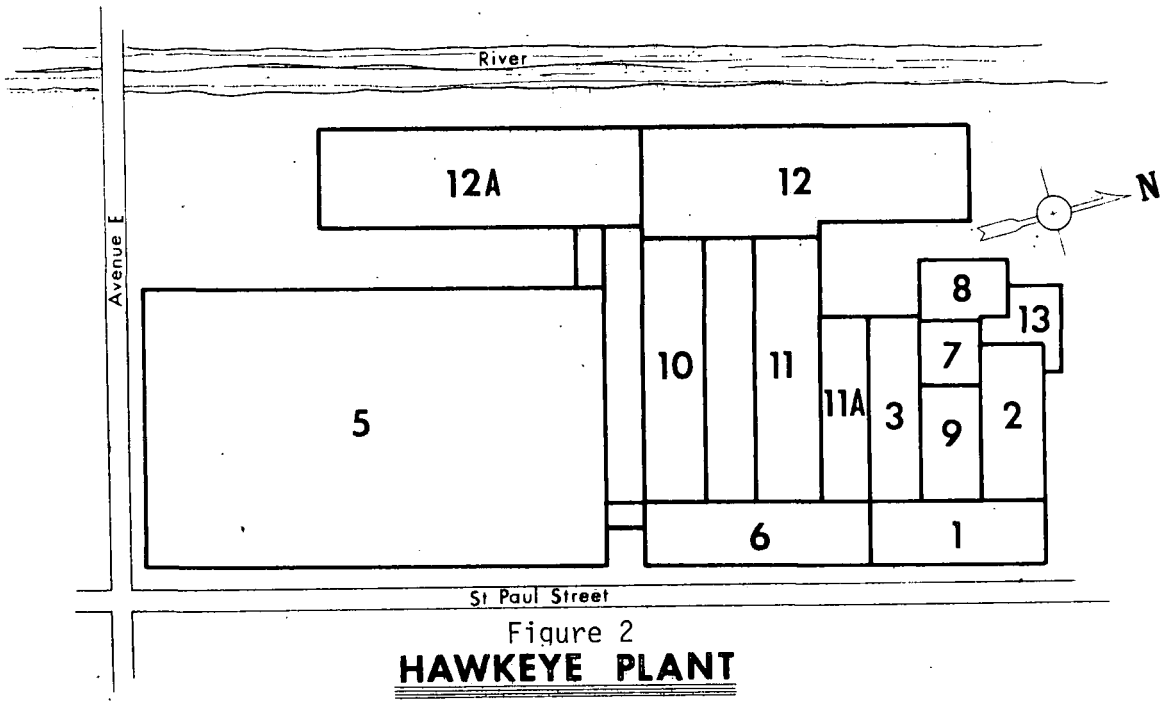
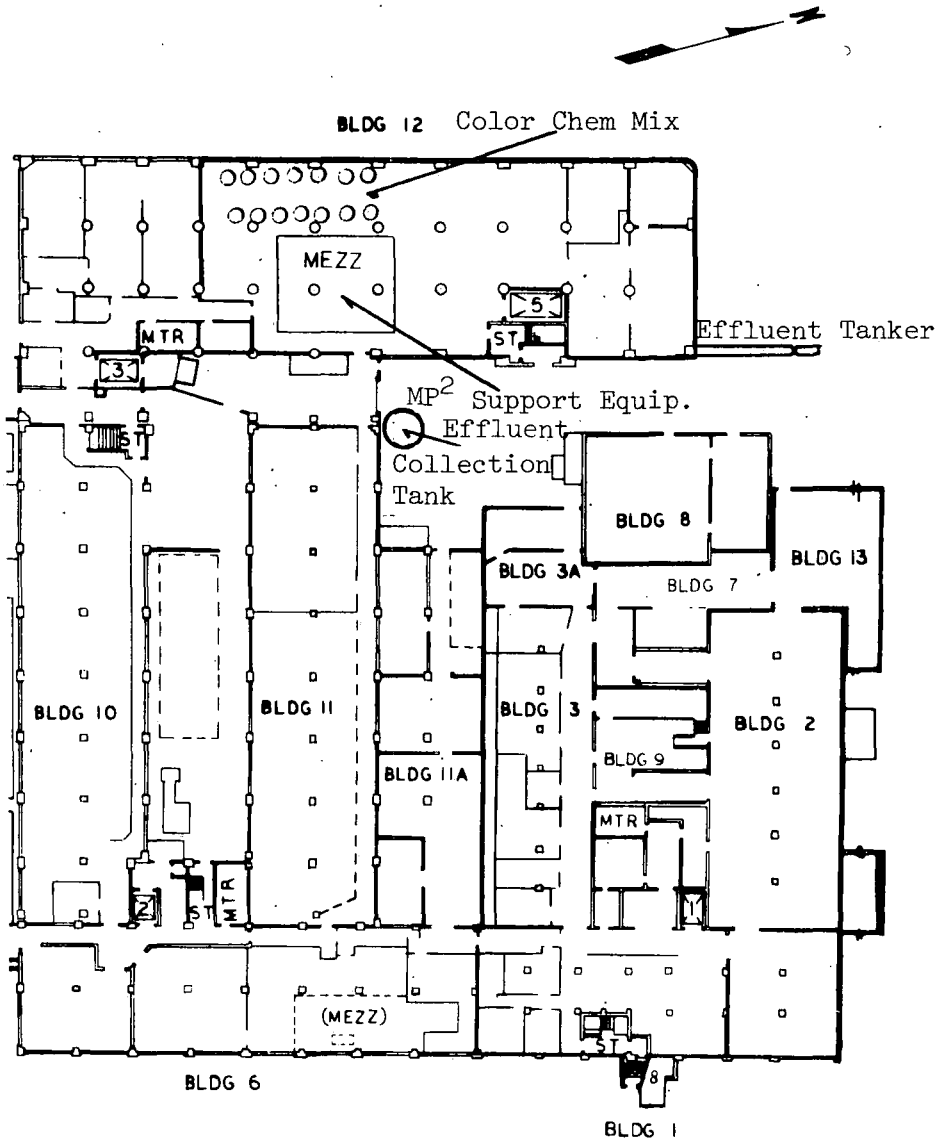


Figure 2

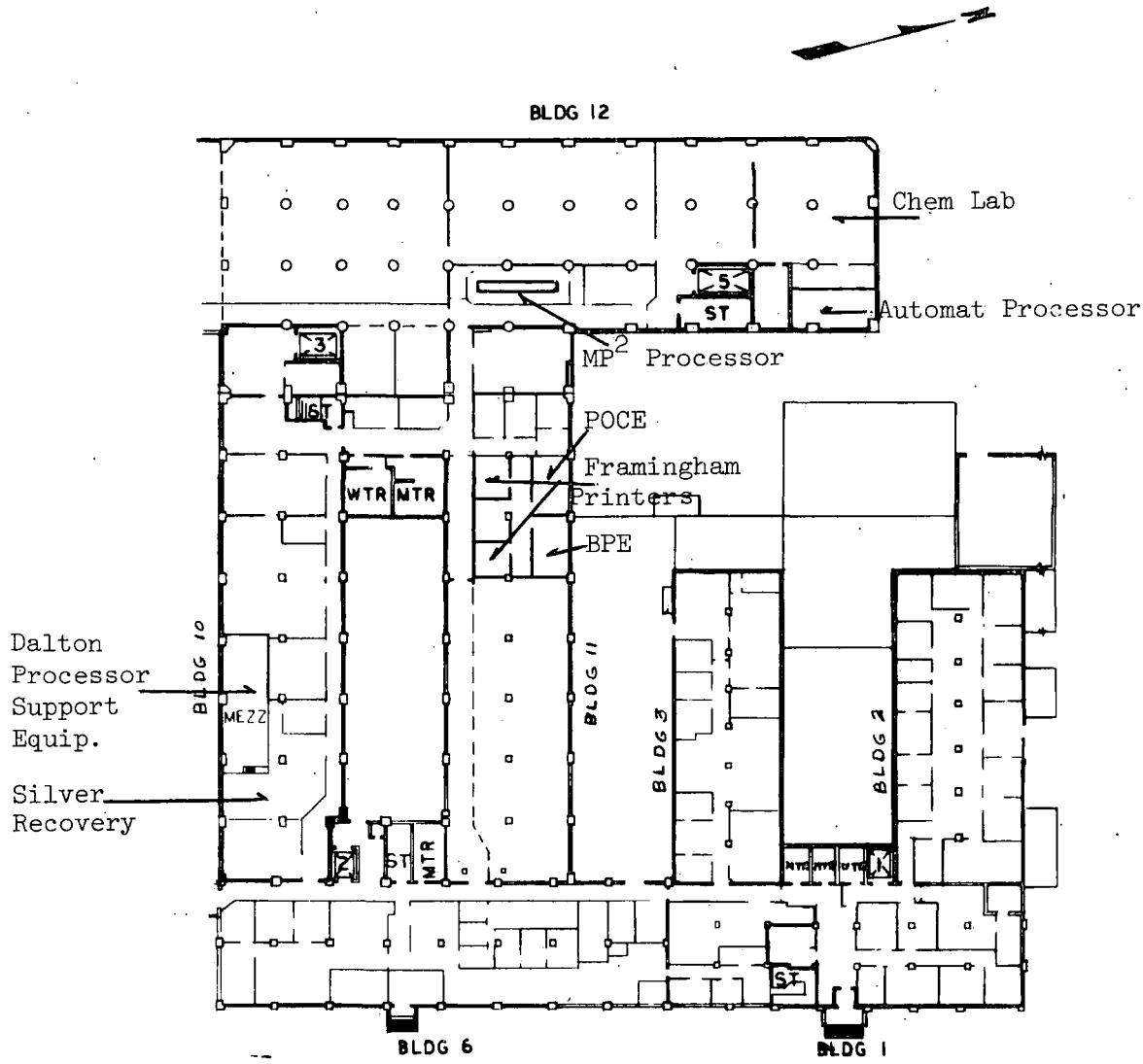
HAWKEYE PLANT

Eastman Kodak Company
Kodak Apparatus Division



1st FLOOR

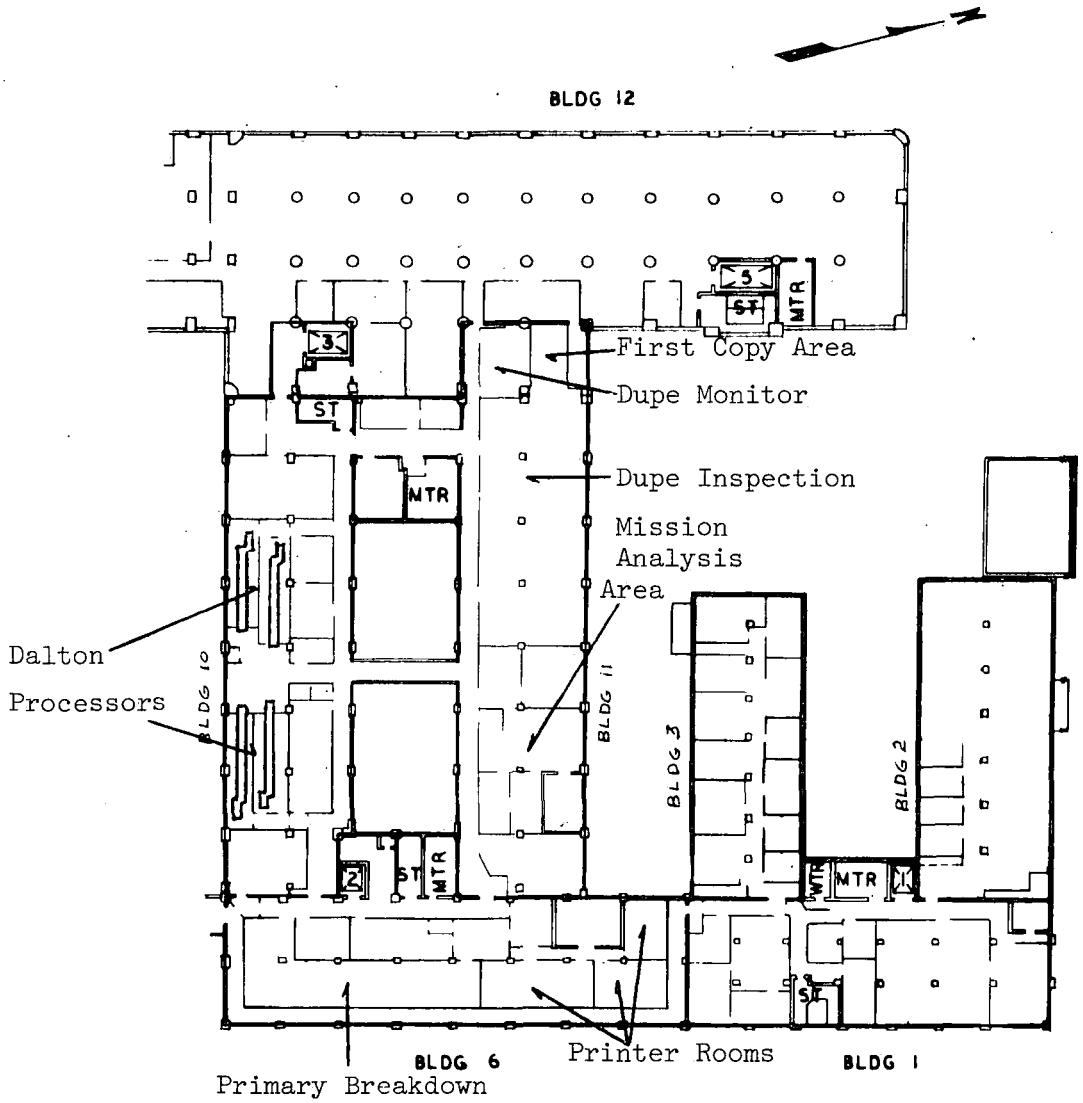
Figure 3



2nd FLOOR

Figure 4

Handle via BYEMAN
Control System Only



3rd FLOOR

Figure 5

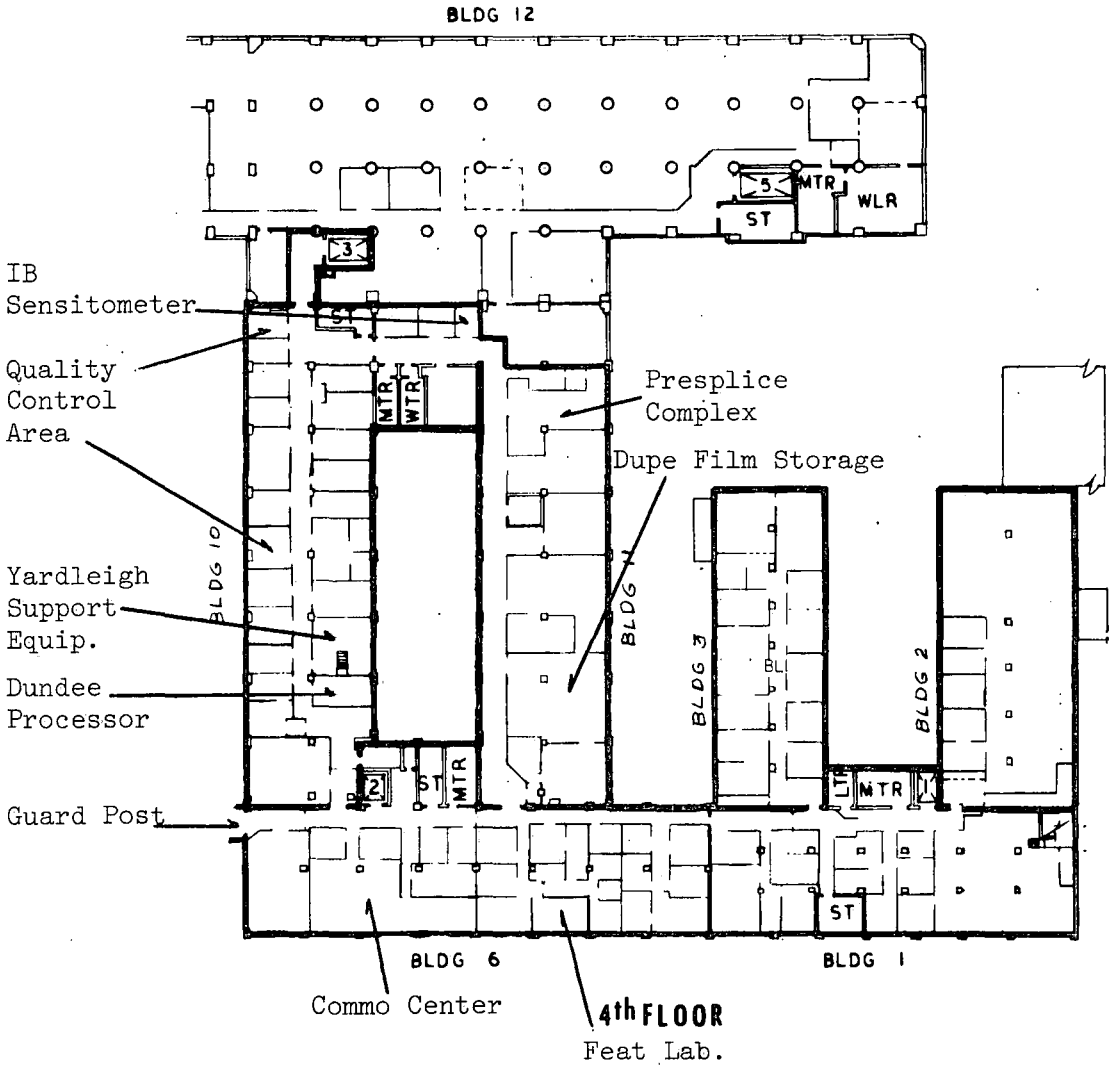


Figure 6

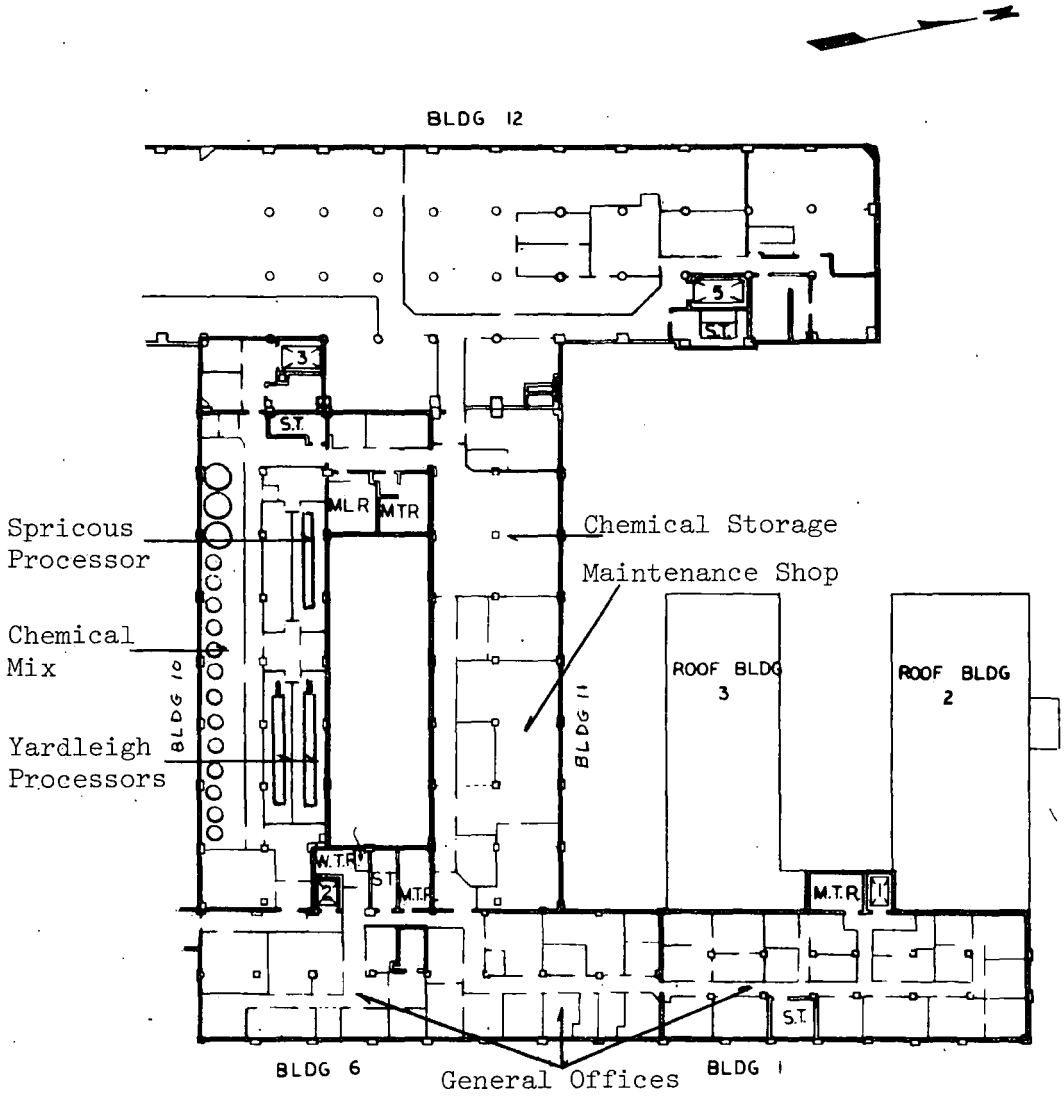


Figure 7

SECTION II

MISSION PREPARATION

Prior to the arrival of a Gambit or Hexagon mission recovery vehicle, readiness certification of hardware, systems and materiel is essential to expedient handling of the mission film. This readiness certification has three major components:

1. Procurement and Certification of Expendables
2. Duplicating Films
3. Processing Chemistry

PROCUREMENT AND CERTIFICATION OF EXPENDABLES

Expendables required for a typical mission include duplicating films, processing chemistries and shipping materiels which are ordered, received and stored in sufficient quantity for all the production operations required for a given recovery vehicle.

DUPLICATING FILMS

The film used for preparing mission duplicates is manufactured in splice-free rolls 9-1/2 inches wide by 1000 ft. long for Gambit missions and 6.6 inches wide by 1400 ft. long for Hexagon missions. Duplicating films are segregated by emulsion type, width and photographic (sensitometric) response. Each batch is sampled and pre-tested in the Production cycle in order to thoroughly analyze its sensitometric and photographic properties. Films are then stored under cold room conditions awaiting use.

PROCESSING CHEMISTRY

A typical Hexagon mission requires 34,000 lbs. of powder chemicals and a typical Gambit mission requires 17,000 lbs. of powder chemicals. The liquid and viscous processing solutions are mixed in the Chemical Mix Room (Figure 8) from which they are piped to the various processors in Bridgehead. Chemistry is mixed in sufficient quantity to fill all storage tanks before the mission arrives and as the solutions are expended during Production operations, additional mixes are made.

All processing solutions are certified for use before being committed to a processor. This certification includes laboratory chemical analysis (Figure 9) and photographic performance analysis performed on simulation sensitometric test processors, such as the Dundee (Figure 10).

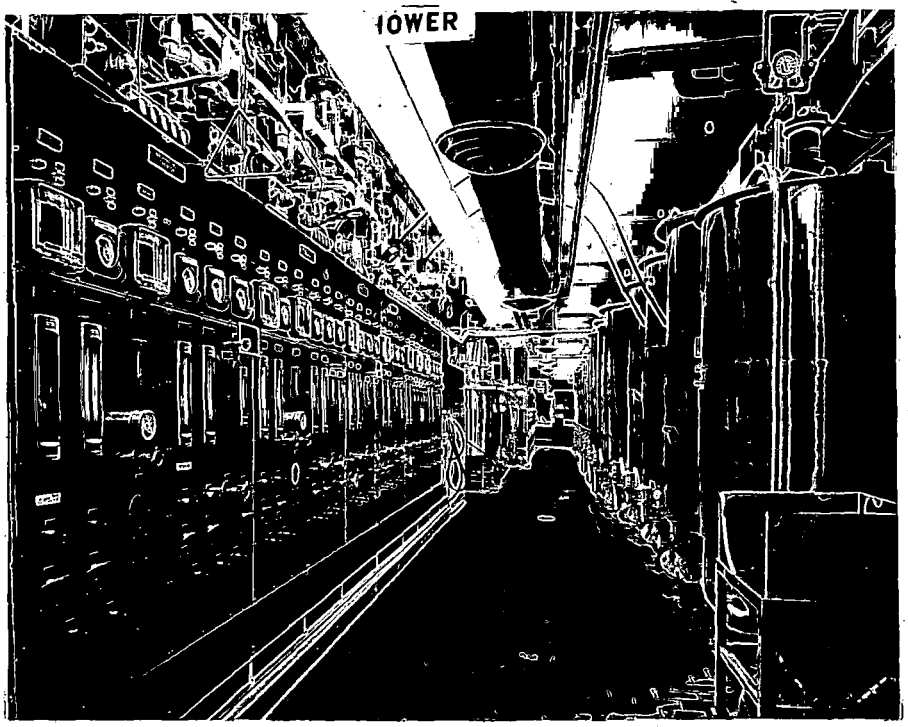


Figure 8 - Chemical Mix Room

Figure 9 - Chemical Laboratory

Figure 10 - Dundee Processor

PHOTOGRAPHIC QUALITY CONTROL MATERIALS

There are two main types of photographic quality control materials required for mission operations:

Sensitometric Control

Sensitometric step wedges or strips are the basic tool for controlling the photographic response of printers and processors. These strips are exposed on the 1B Sensitometer (Figure 11) a precision instrument with rigidly controlled exposure conditions to insure that all strips on a given film type are identical. Before a mission arrives, an adequate supply of sensitometric strips is prepared and stored in a freezer to guarantee the stability of the latent images. During the mission these strips are processed at specified intervals and compared to establish standards to maintain process control. Pre-processed strips are printed onto duplicate film, also at specified intervals, and then processed and compared to appropriate standards. All sensitometric strips are read on a Densitometer (Figure 12) and the data is plotted to obtain the characteristic or H&D curve that is compared to the standard.

Physical Quality Control

Uniformly exposed or "flashed" film is used to assure that the physical quality of the film from a processor is as high as possible. Prior to mission arrival, long lengths of raw film stock are given uniform exposure on the Rawstock Flasher (Figure 13). Exposure conditions for the flasher are selected so that the return density of the processed film will be the optimum to reveal even the most subtle processing defect. Flash material is processed immediately before and after the original camera films and at the specified intervals with sensitometric strips on the duplicate processors.

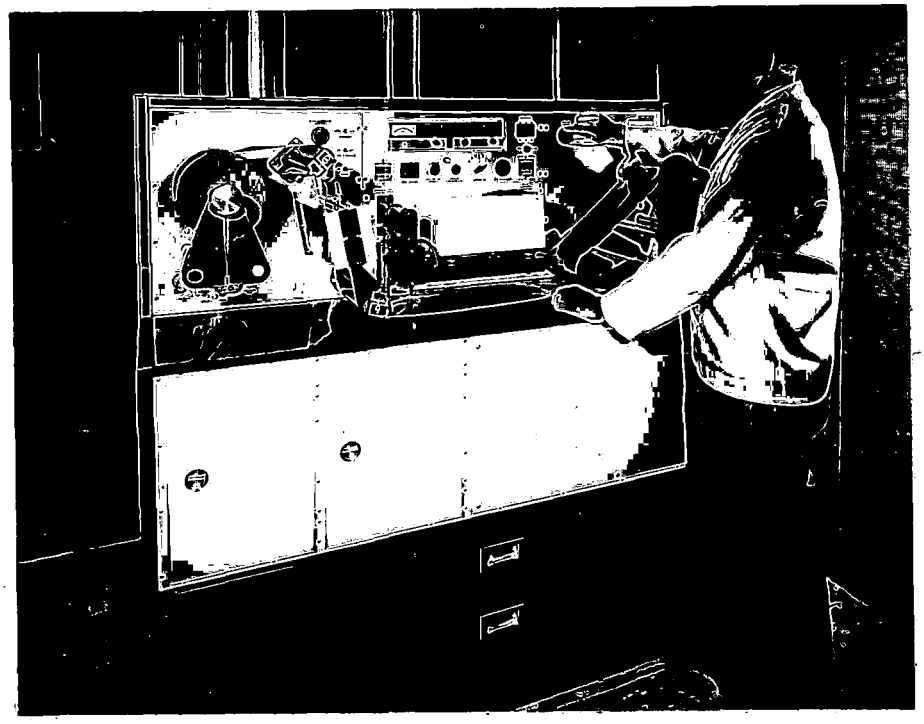


Figure 11 - 1B Sensitometer

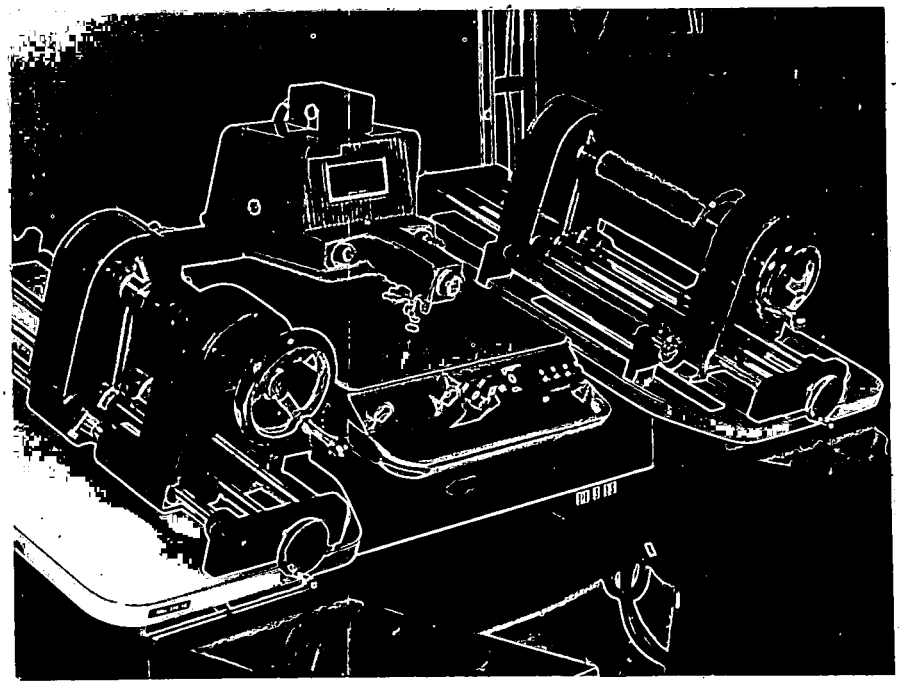


Figure 12 - Densitometer

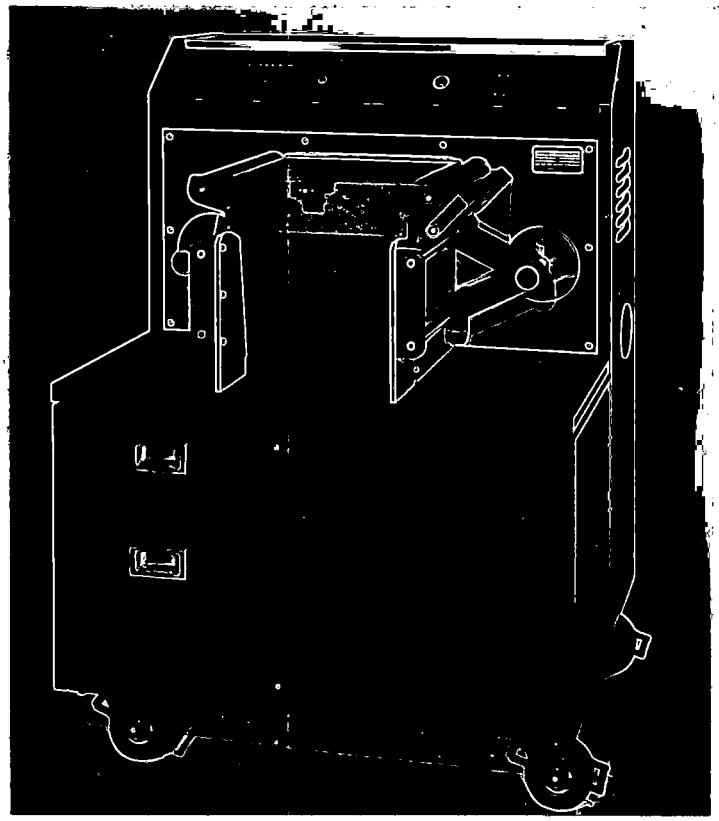


Figure 13 - Rawstock Flasher

MISSION DATA

As a typical mission is flying, data that is needed at certain stages of the Production operation are received via the data link. This data is then processed on the Univac 9300 Computer (Figure 14) to provide the inputs that are needed for various operations. Included in these inputs are frame number, length and classification information for the Optical Titling System, Geographic Area Breakdown information for the original negative breakdown and compositing operations, and customer distribution requirements for duplicate copies.

Some of this data is used to make the identification friskets for the original negative film after processing. These "idents" are generated on the Ident Printer (Figure 15) by exposing onto raw film all the identification required for each roll of film, i.e., mission number, camera, date, security classification, Geographic Area, etc. This film is then processed and cut into the proper lengths to be spliced on the individual rolls during the original negative breakdown operation.

PREVENTIVE MAINTENANCE AND CERTIFICATION OF HARDWARE

Prior to the arrival of each mission, preventive maintenance/certification work is performed on the various pieces of equipment used by Production. This maintenance activity helps to assure high quality output from the equipment, avoid hardware failures that may jeopardize the customer's film or delay shipments and increase the useful life of the equipment. The Bridgehead facility includes a well-equipped Maintenance Shop (Figure 16) staffed by technicians skilled in the maintenance of ground-handling equipment for aerial photography.

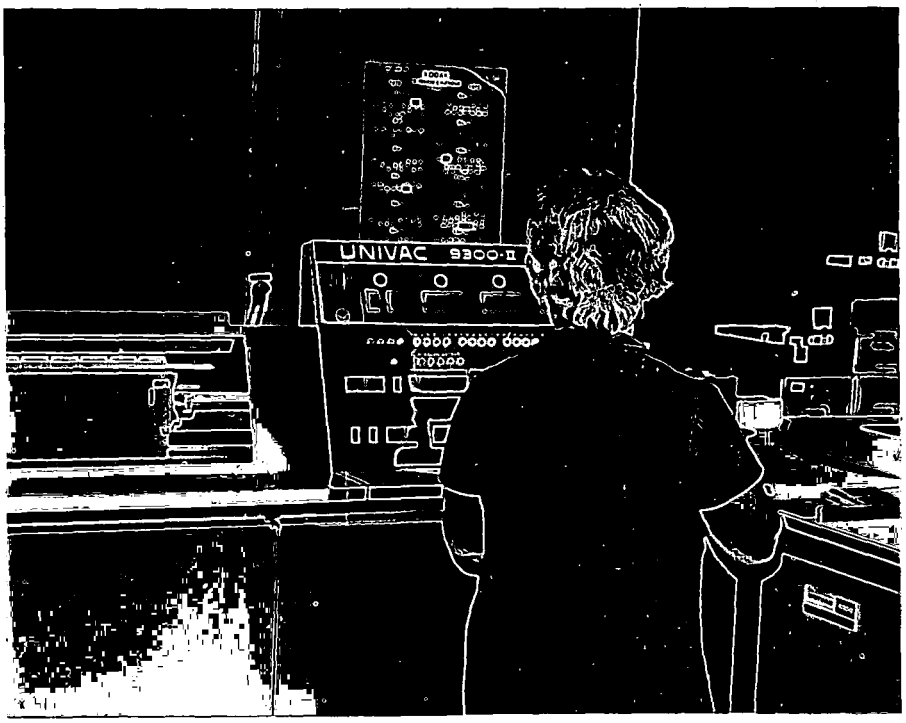


Figure 14 - Univac 9300 Computer

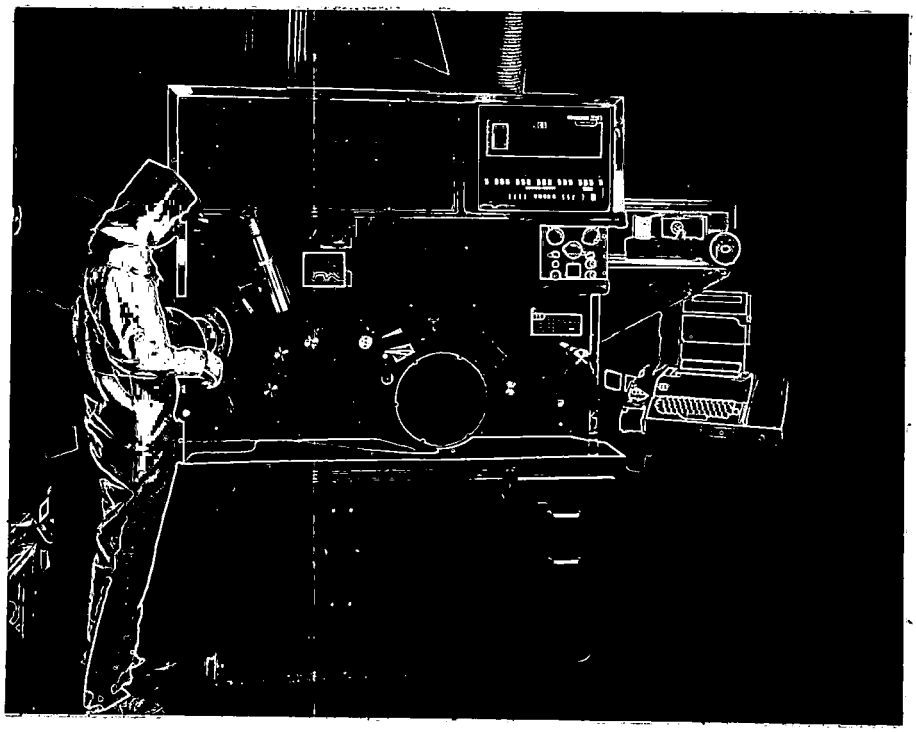


Figure 15 - Ident Printer

Figure 16 - Maintenance Shop

SECTION III

MISSION PRODUCTION

1. MISSION PROCESSING AND REPRODUCTION SEQUENCE

Figures 17 and 18 provide detailed work flow diagrams for Hexagon and Gambit processing and reproduction.

In the pages that follow, Section III describes in chronological order the major operations of these processing cycles.

"H" MISSION FLOW CHART

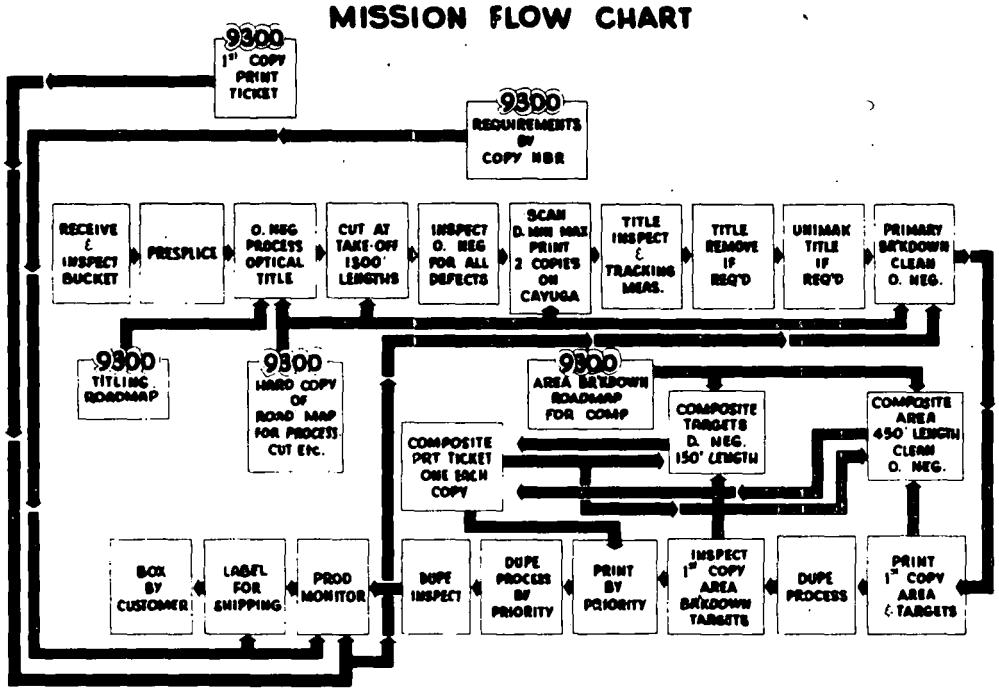


Figure 17

"G" MISSION FLOW CHART

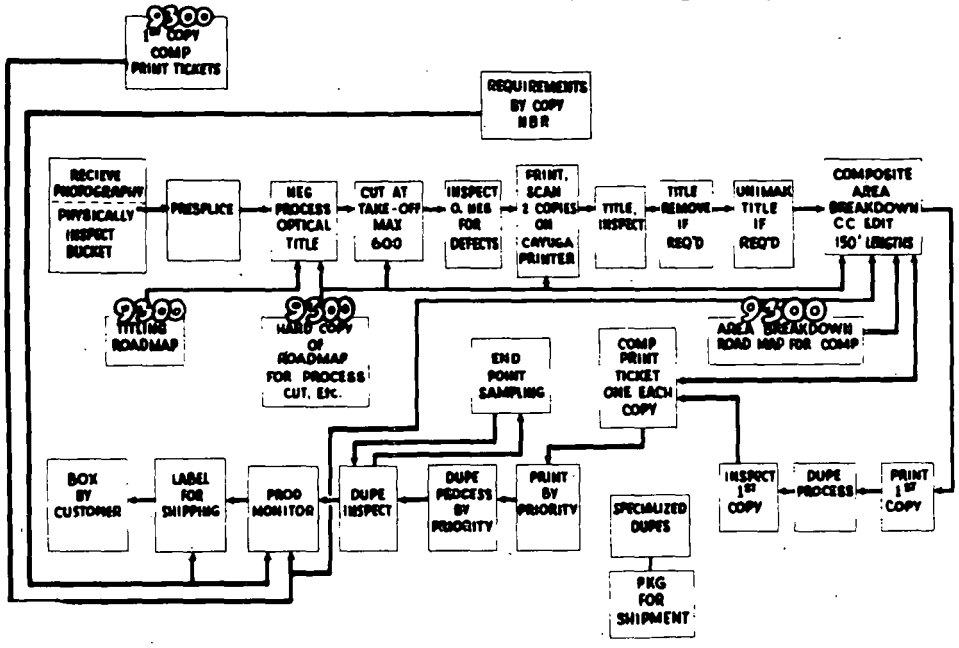


Figure 18

2. RECEIPT OF MISSION

The film payload, in the Satellite Recovery Vehicle (SRV), arrives at a local airport on a USAF Courier Aircraft (Figure 19) and is transported via truck to the Bridgehead Processing Facility.

Upon receipt, the SRV (Figures 20 and 21), is removed from its shipping container, weighed and placed in a special holding frame which aligns the SRV with the Presplice Complex.

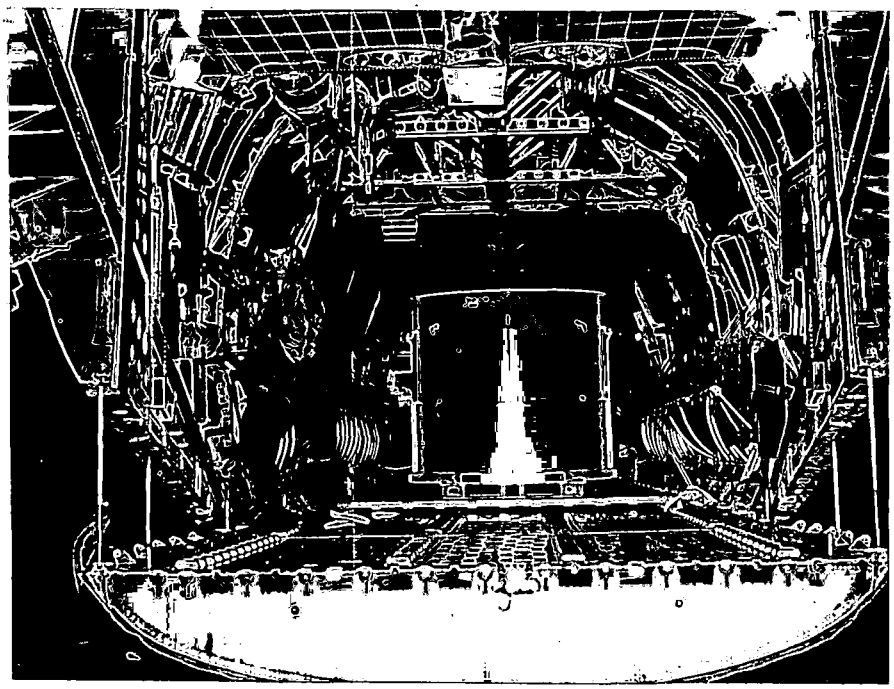


Figure 19

Shipping Container in Aircraft

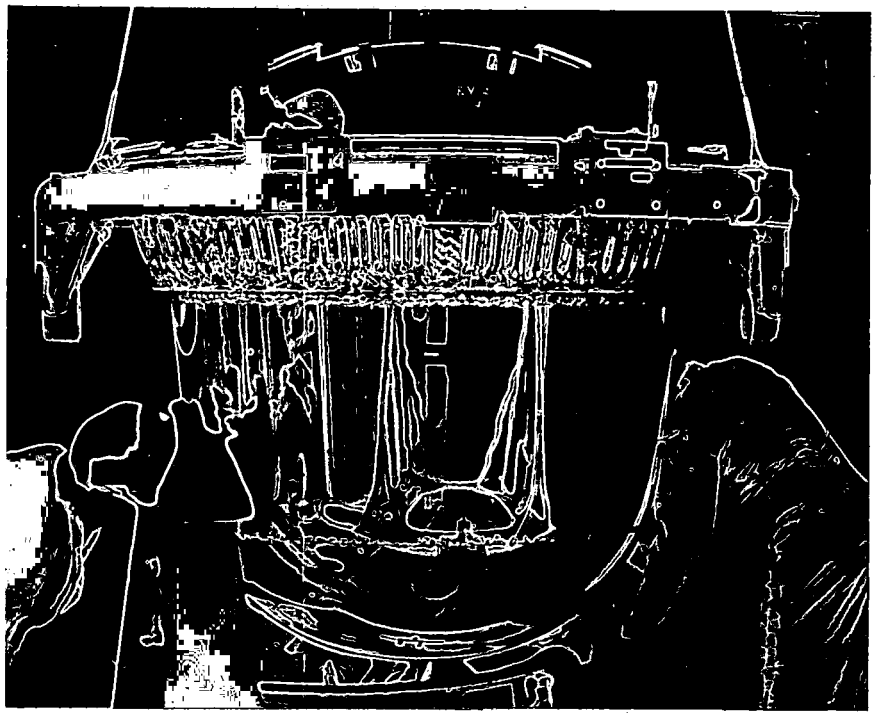


Figure 20 - Hexagon SRV

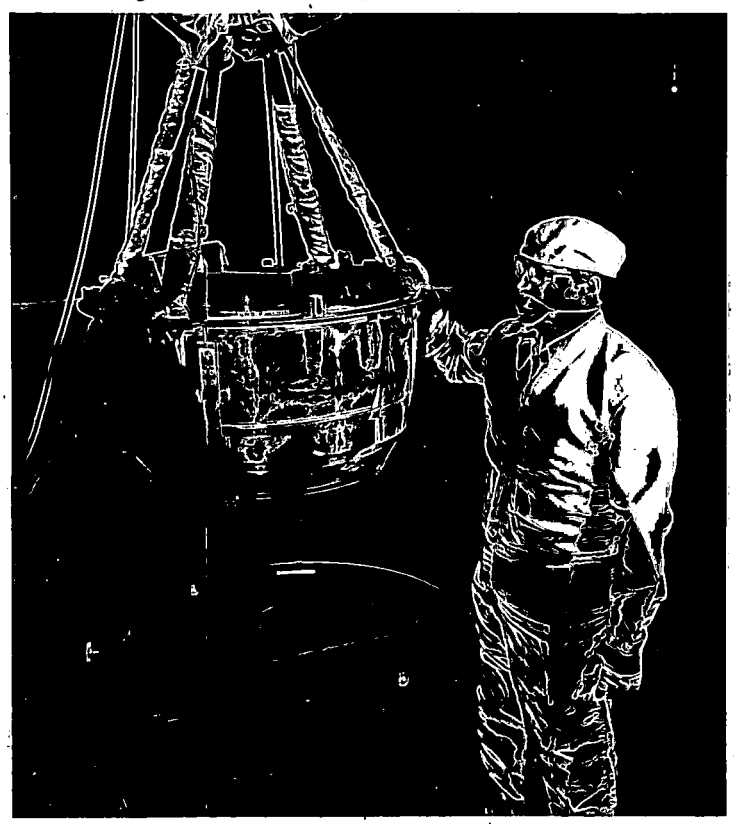


Figure 21 - Gambit SRV

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3. DOWNLOADING/PRESPLICE

The downloading/presplice operation consists of despooling the SRV payload to permit inspection for defects that might create problems during processing and to configure the film roll in "as flown" or "heads out" order for the processor. This operation takes place in the dark, but non-contacting infrared detectors and viewers are utilized to assist the operators. The film payload is transported across the Presplice Complex under controlled tension and onto a take-up spool dolly which will later be aligned to the feed end of a processor. (Figures 22 and 23). After an entire roll has been despooled and suitable photographic control materials have been prespliced to each end, a light-tight cover is placed over the take-up spool dolly and it is moved to a processor room.

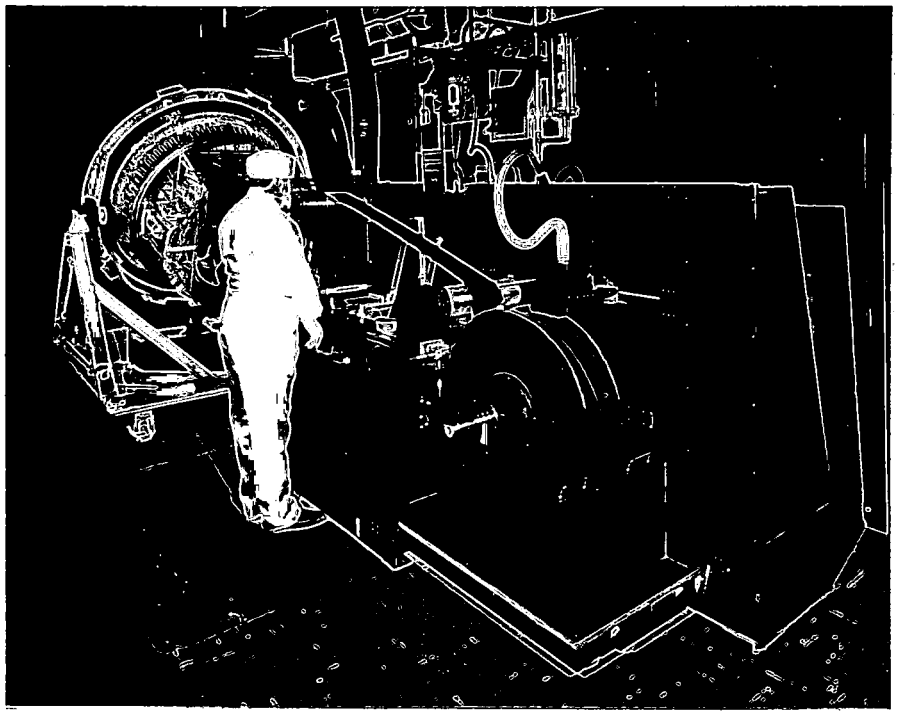


Figure 22 - Hexagon SRV Interfaced with Presplice Complex

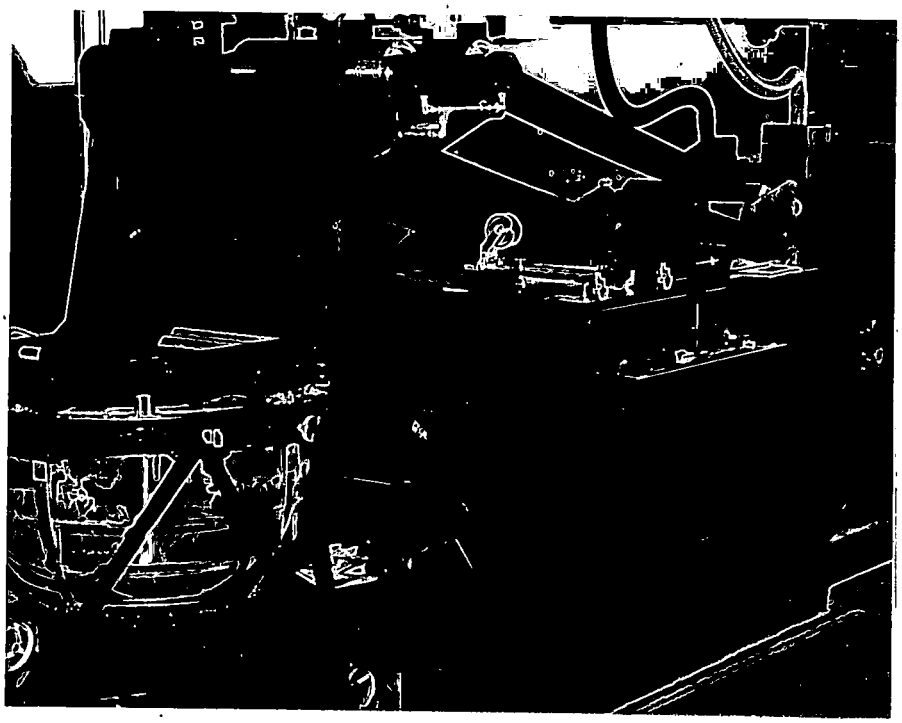


Figure 23 - Gambit SRV Interfaced with Presplice Complex

4. ORIGINAL NEGATIVE PROCESSING

There are two Yardleigh Processors (Figure 24) at Bridgehead for the continuous processing of original negatives of any length. They may be operated simulataneously when there are two film rolls, as from the Forward and Aft Cameras of a Hexagon Mission. The throughput rate is from 23-27 feet per minute, depending on the sensitometric properties of the particular film being processed.

The transport dolly that was loaded during Presplice is positioned at the feed end of a Yardleigh Processor, room lights are turned off and the cover is removed. The head of the roll is spliced to leader which is already threaded through the machine. Previous "start-ups" have established that the machine is in sensitometric control and not causing physical defects such as scratches. The sequence of processing steps is:

1. Static viscous layer development.
2. Fix
3. Dye Removal
4. Wash
5. Photoflo
6. Dry

The viscous developer is extruded onto the emulsion side of the film through a coating hopper and provides a dual gamma sensitometry.

During the processing operation, which may last for 24 hours, critical machine parameters such as temperatures, solution pressures and transport speed are monitored by a computerized system (Figure 25) to assure stable photographic control throughout the processing run.

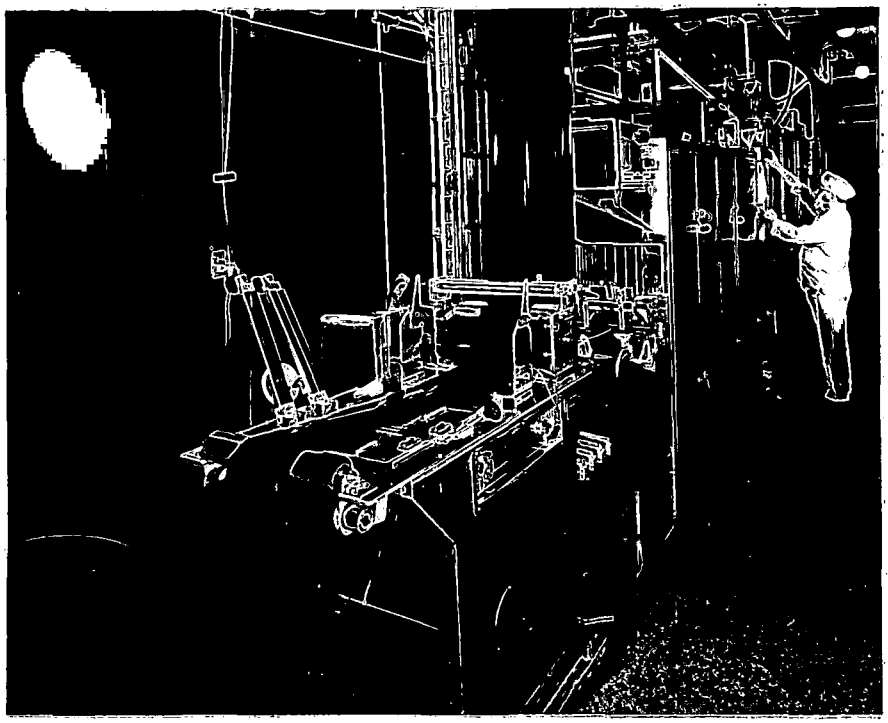


Figure 24 - Yardleigh Processor

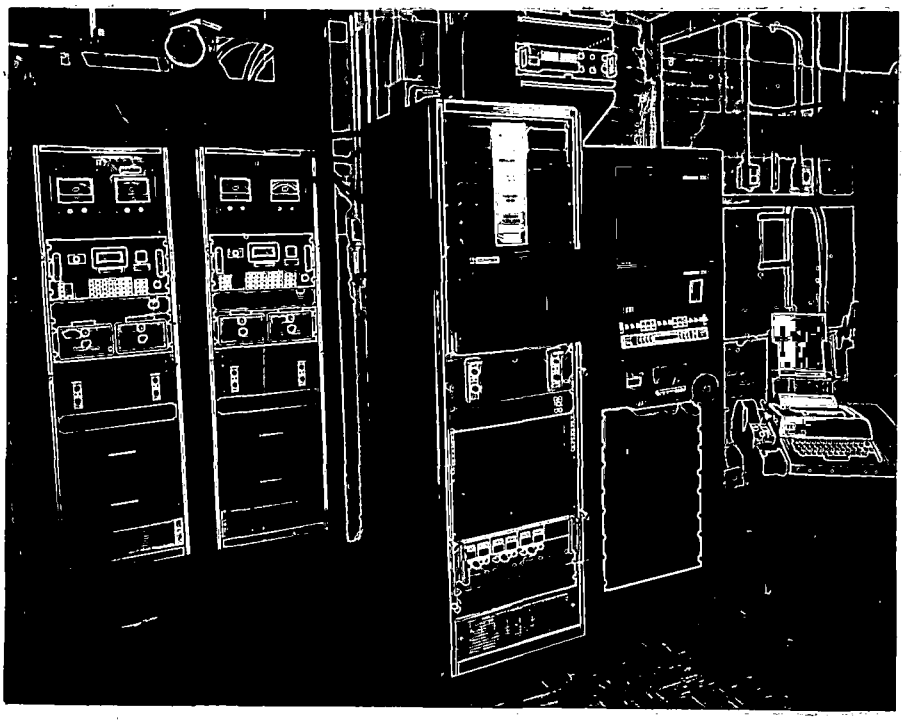


Figure 25 - Yardleigh Monitor Area

5. OPTICAL TITLING

Titles, consisting of mission and frame number, date of photography, security classification, and other information, are exposed on the film optically during the processing operation. The developer action proceeds to the point where camera-exposed framemarks can be detected to provide image location information. Immediately following framemark detection, the optical titling system exposes single- or double-row man-readable characters and machine-readable binary code along the edge of the film (Figure 26). The developer action continues to process these characters to a legible and reproducible density (Figure 27).

Titling is controlled by a computer (Figure 28) that has previously received a film format and title information "roadmap" that is prepared from information received via the data link (see page 18). Inputs are provided to continuously check film format and location against this data, to inhibit titling if a camera or format error exists, and to restart titling when synchronization is re-established. Software has been designed to accommodate a variety of possible camera anomalies.

The title exposing devices utilize fiber optics to achieve the small size required as a source and permit mounting of the actual exposing devices outside of the processor frame. The exposing heads are mounted on a carriage which tracks the film edge to insure proper title positioning in the available edge space. Programmable logic and footage and framemark detectors provide output commands to the titling exposure devices.

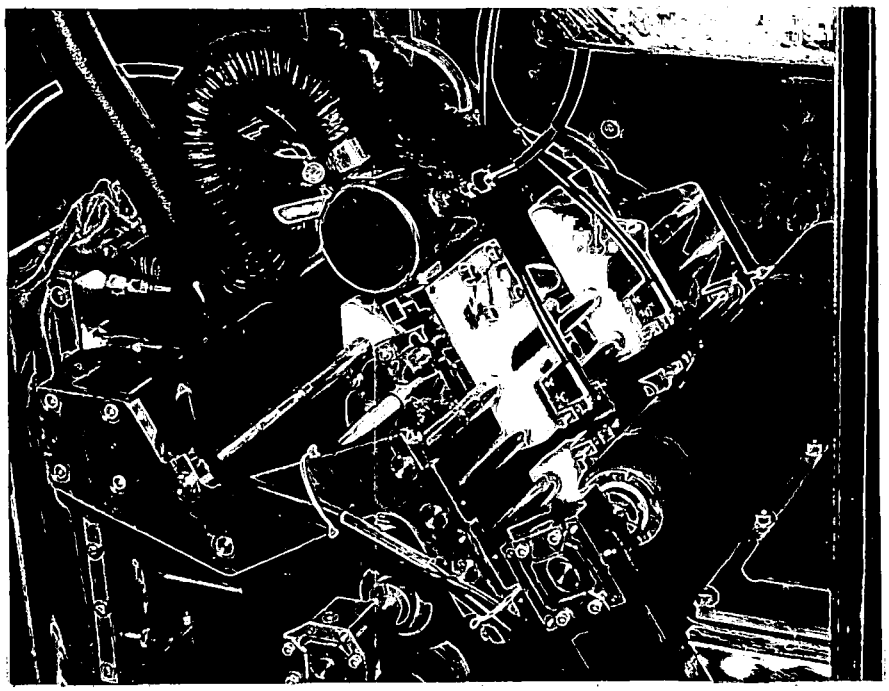
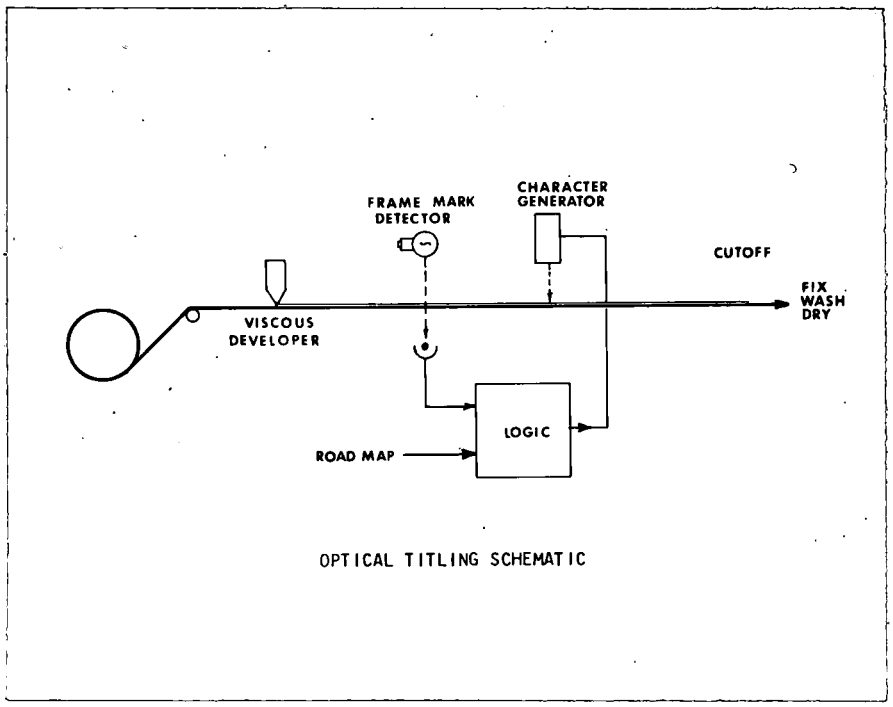


Figure 26 - Optical Titling Station



OPTICAL TITLING SCHEMATIC

Figure 27 - Optical Titling Schematic

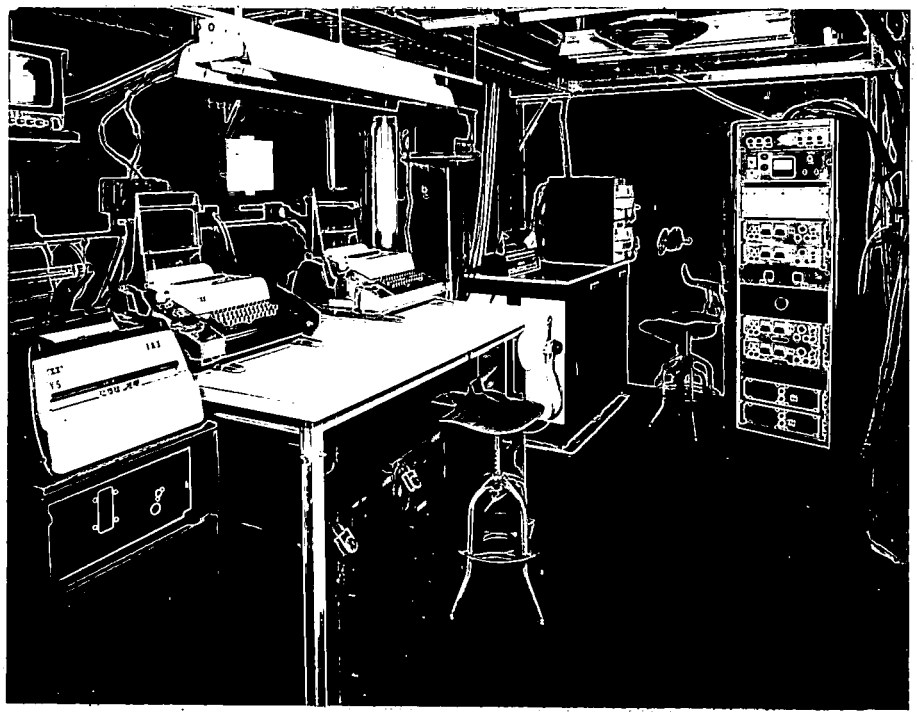


Figure 28 - Optical Titling Computer Station

6. PRELIMINARY EVALUATION

Each camera roll is fed into the processor as a continuous length of film, but at regular intervals a cut is made between two frames at the processor take-up and a "lab-cut" enters the reproduction cycle. The lab-cut is quickly given a Preliminary Evaluation (Figure 29) to check for possible processor-induced anomalies that would dictate immediate corrective action. During this evaluation temporary identification leader and trailer are spliced to each end of the roll to facilitate handling and to protect the original negative from damage. The accuracy of the optical titling is now checked and if corrections or additional manual titling are required, it is noted for subsequent action.

7. TITLE CORRECTION/ADDITION

Since an optical title is a photographic image, provision for the correction of erroneous titling requires unique procedures. The technique that is used, if necessary, involves subjecting the emulsion to an air-carried abrasive material. The erroneous portion of a title is positioned over an aperture and the nozzle-directed airbrasive removes that portion of emulsion and title exposed in the aperture (Figure 30). Then the correct title is applied via the conventional pigment transfer method using a Unimak Titler.

In the case where synchronization is lost in the optical titling system because of format errors or other malfunction, optical titling is inhibited and portions of the record come from the processor untitled. In this case, the proper title is determined and added using the Unimak Titler (Figure 31).

Figure 29 - Preliminary Evaluation

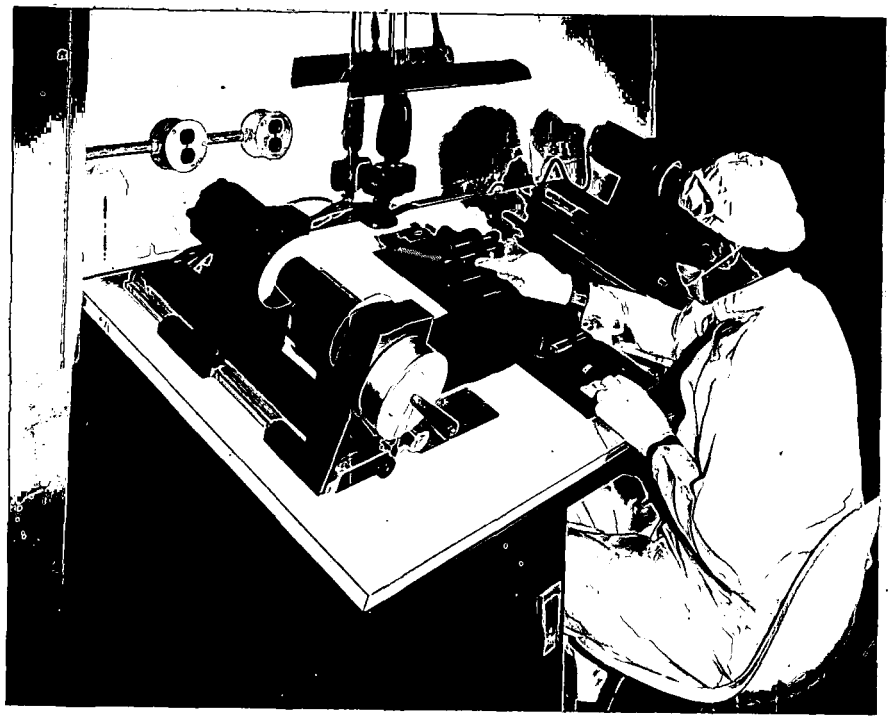


Figure 30 - Title Remover

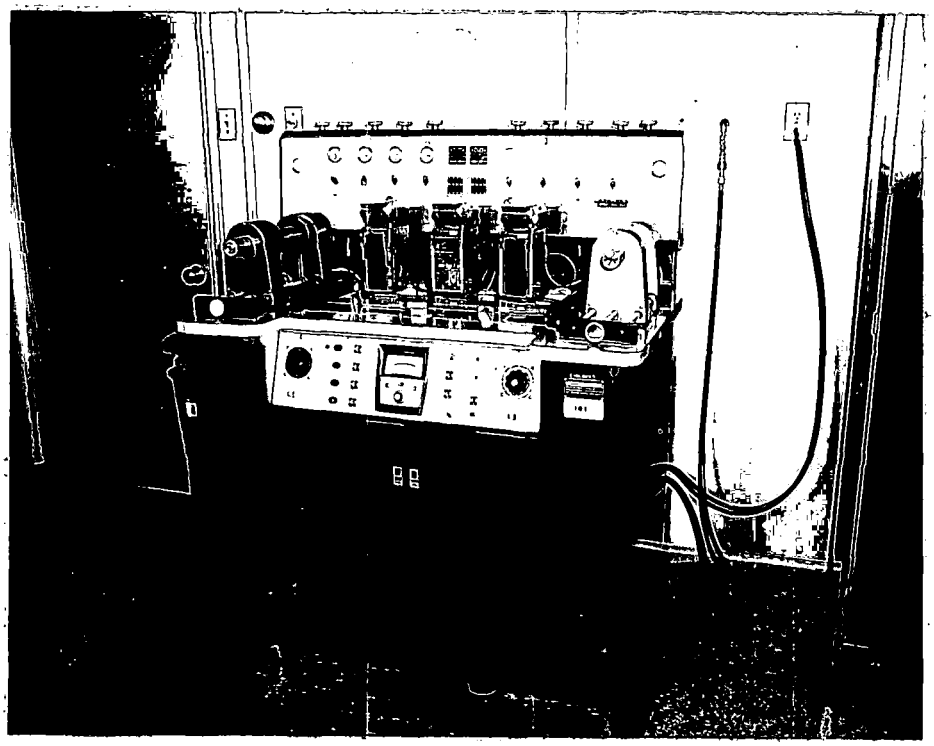


Figure 31 - Unimak. Titler

8. ORIGINAL NEGATIVE BREAKDOWN/COMPOSITING - HEXAGON

After the original negative has been evaluated and titling is complete and correct, the Hexagon negatives are cut (Figure 32) or "broken down" into sections according to the Geographic Area photographed. Currently, the world is divided into 24 separate "areas" (see page 57). These pieces of imagery range from a few feet in length to over a thousand. Identification leader and trailer are spliced to each section of imagery. Subsequently these sections are reassembled or "composited" by geographic area into rolls approximately 450 ft. long.

9. ORIGINAL NEGATIVE BREAKDOWN/COMPOSITING - GAMBIT

The approach to "breakdown" and "compositing" the Gambit original record is identical to that used for Hexagon. The major difference is the size of the sections of imagery. Because Gambit is a spotting system with a fairly short (5500 ft. per SRV) original record as compared to the Hexagon search system that returns 55,000 feet per SRV, the average piece of imagery leaving a geographic area is several inches long vice 100 ft. long. For this reason special equipment (Figure 33) is used to ultrasonically weld the sections of imagery to each other to form 150 ft. rolls that are physically near perfect and include a minimum of special inserted identification footage.

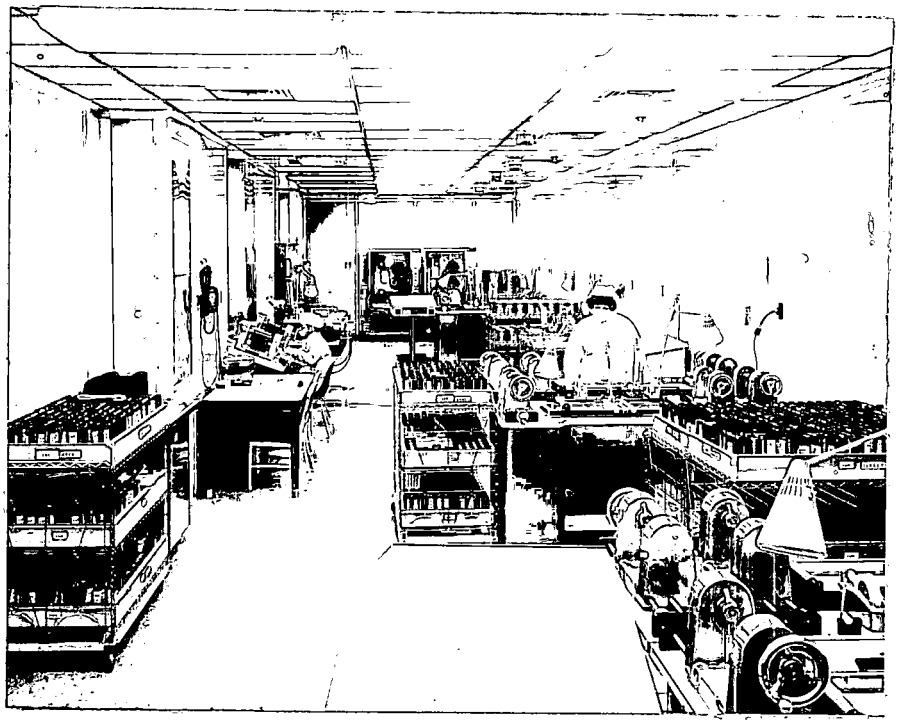


Figure 32 - Breakdown/Compositing Area

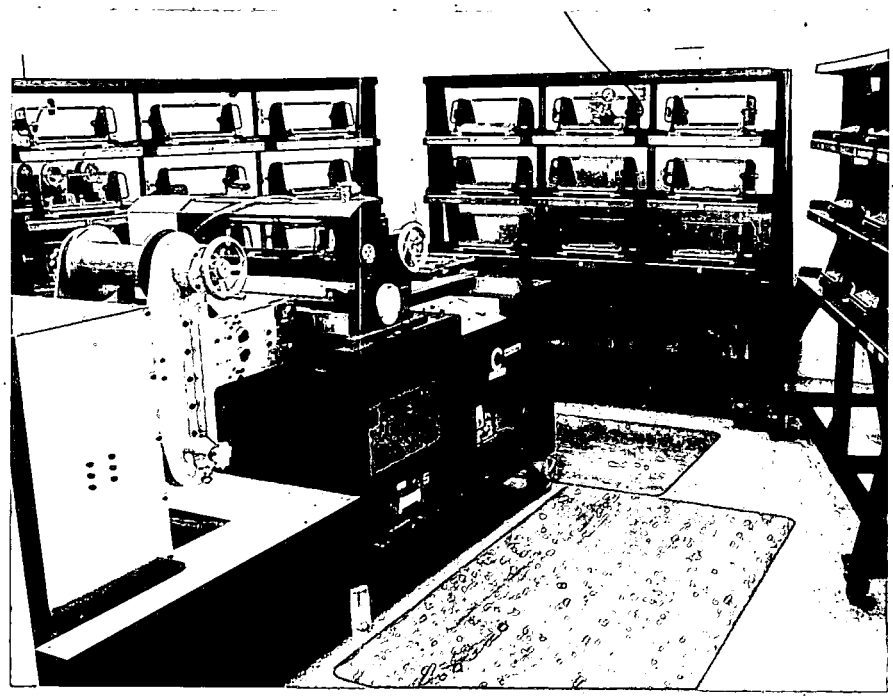


Figure 33 - Gambit Geographic Area Breakdown Workplace

10. PRINTING

After breakdown/compositing, each roll of original negative is run through the Webster Film Cleaner (Figure 34), to remove any foreign particles that may be on the film as a result of previous operations, and then taken to the Printing Area. Since density and contrast variations are experienced from part-to-part of the original negative, density and/or contrast optimization is accomplished during the printing operation. Both Cayuga and Redondo Printers are utilized to expose contact duplicate positives and negative from satellite mission films.

The Cayuga (Figure 35) is a computer-controlled scanning printer which scans the original negative immediately before printing and based on the densities encountered provides closed-loop feedback to control the exposing lamp intensity as required throughout each printing part. Corrected densities within the usable range are thus achieved on the duplicate copies. All Gambit Mission duplicates are prepared using four Cayuga Printers.

The Redondo Printers permit manual control of exposure and contrast on a part-by-part basis. Exposure and contrast settings are predicted by first scanning each part on a Cayuga Printer. Hexagon Mission duplicates are prepared using both Cayugas and Redondo Printers (Figure 36).

Figure 34 - Webster Film Cleaner

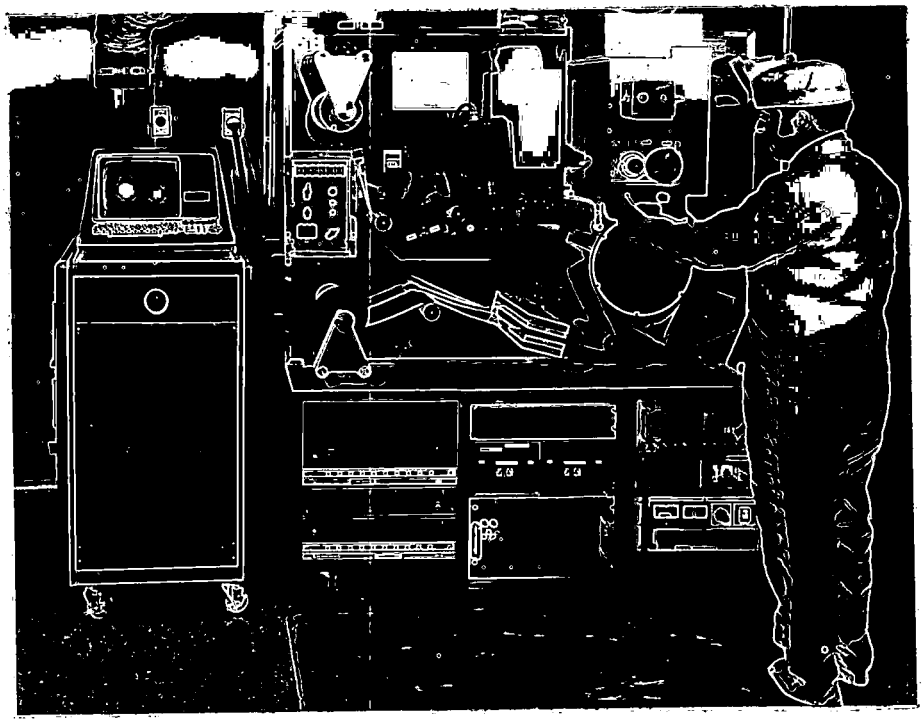


Figure 35 - Cayuga Printer

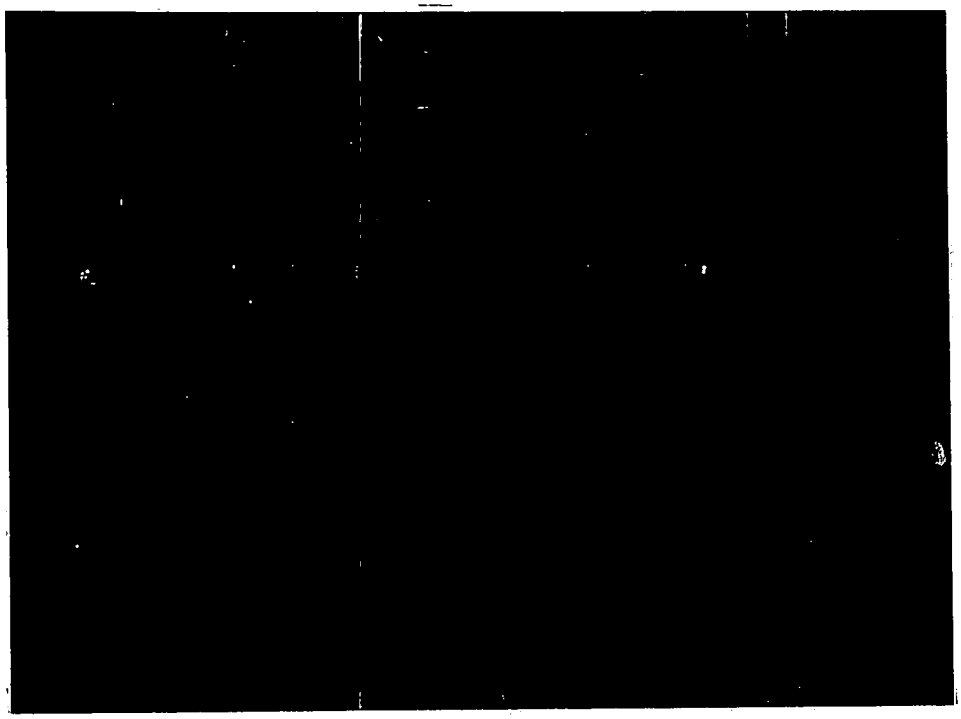


Figure 36 - Redondo Printing Room Under Safelight Conditions

11. DUPLICATE FILM PROCESSING

The exposed film rolls from the printing area are processed on four Viscous Dalton Processors (Figure 37). These processors each operate at 100 feet per minute and are set up to handle the various duplicating film types as required for each mission. The processing sequence is the same as on the Yardleigh Processors (see page 26) and all the critical parameters for each machine are monitored from a central console area (Figure 38).

Once mission originals have been processed, composited, edited and certified for production, Bridgehead maintains a capability of producing up to approximately 400,000 linear feet of black and white duplicate film products per 24 hour day. This production can (and frequently does) involve product mix of film sizes, quality, scale, etc. from a wide variety of sources.

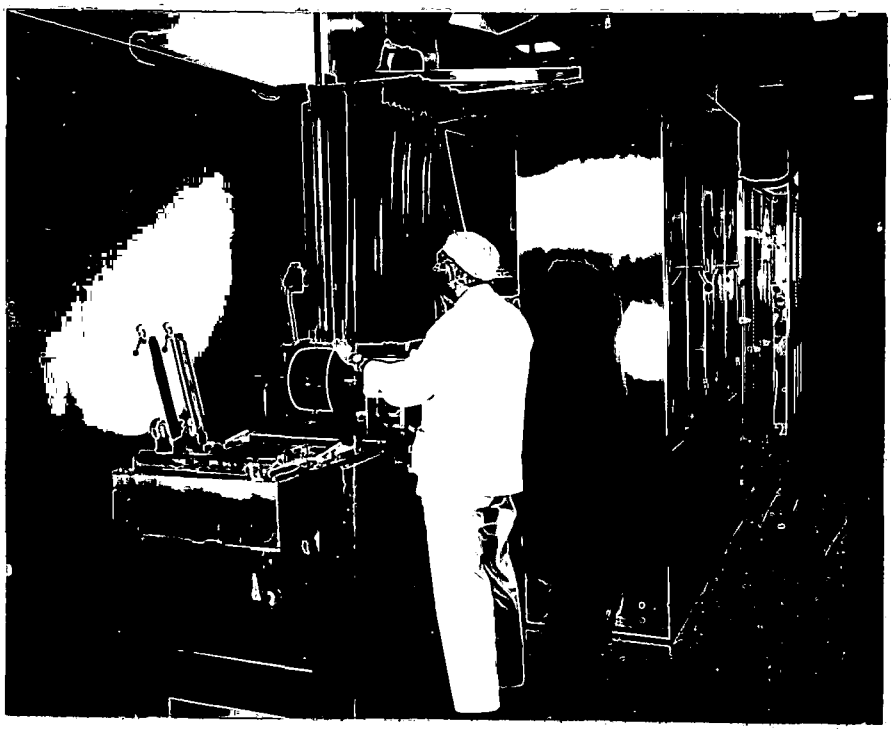


Figure 37 - Viscous Dalton Processor

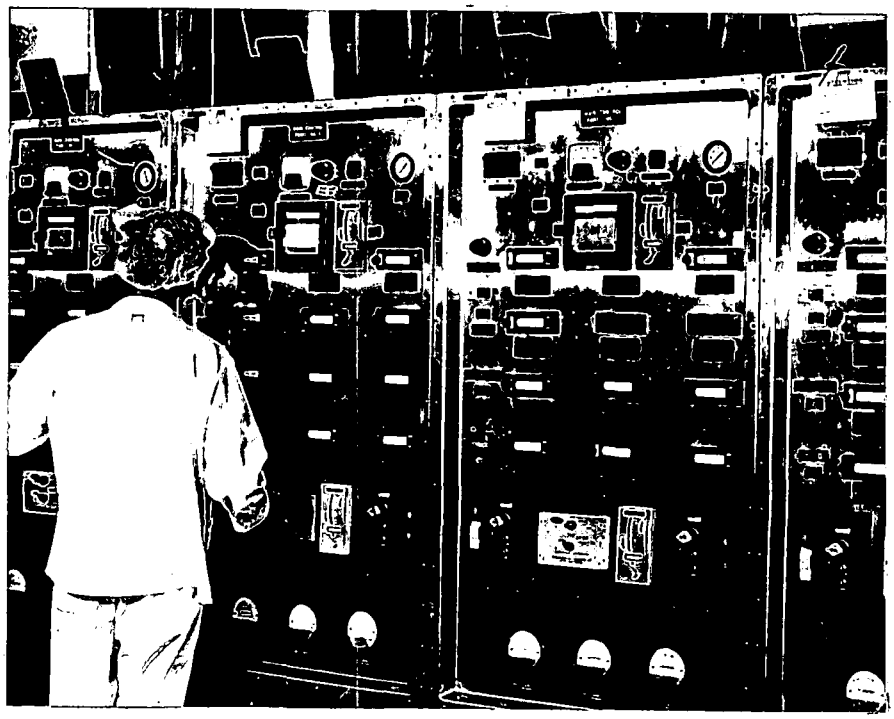


Figure 38 - Dalton Monitoring Consoles

12. DUPLICATE COPY INSPECTION

The processed rolls of duplicate copies from the Daltons are taken to the Inspection Area. If the roll contains the first copies printed from a particular segment of imagery, it is given a special First Copy Inspection (Figure 39) in addition to the normal physical quality check. This inspection includes verification that the printing parameters predicted for the part have provided optimum tone reproduction for the imagery. Once the printing parameters are established, all subsequent copies of the part are printed the same way, with photographic control strips to confirm that appropriate tone reproduction has been maintained. These copies receive a careful physical quality inspection and verification of photographic control (Figure 40).

Figure 39 - First Copy Inspection Area

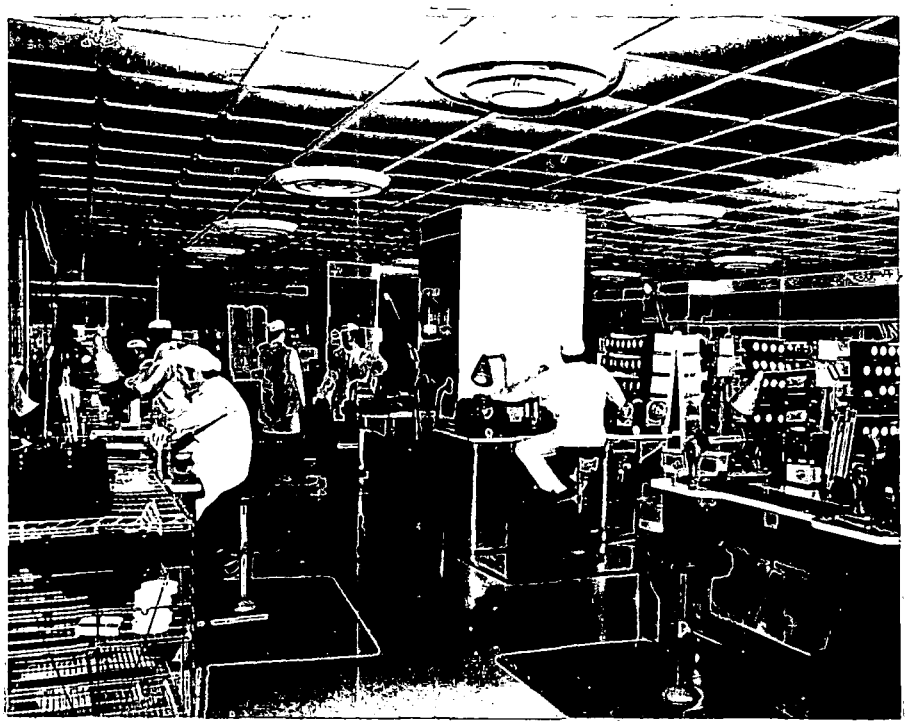


Figure 40 - Dupe Inspection Area

13. LABELING

As the duplicate copies pass inspection, they are taken to the Labeling Station (Figure 41) where labels for the film spool and can are generated and applied. These labels contain information to identify the film that is on each spool.

14. PRODUCTION STATUS MONITORING

A Production Monitoring System (Figure 42) provides supervisors with periodic status reports on the progress of the reproduction operation toward satisfying the requirements specified by the EXSUBCOM. From this status information, estimates of shipment availability are provided to courier and customer organizations.

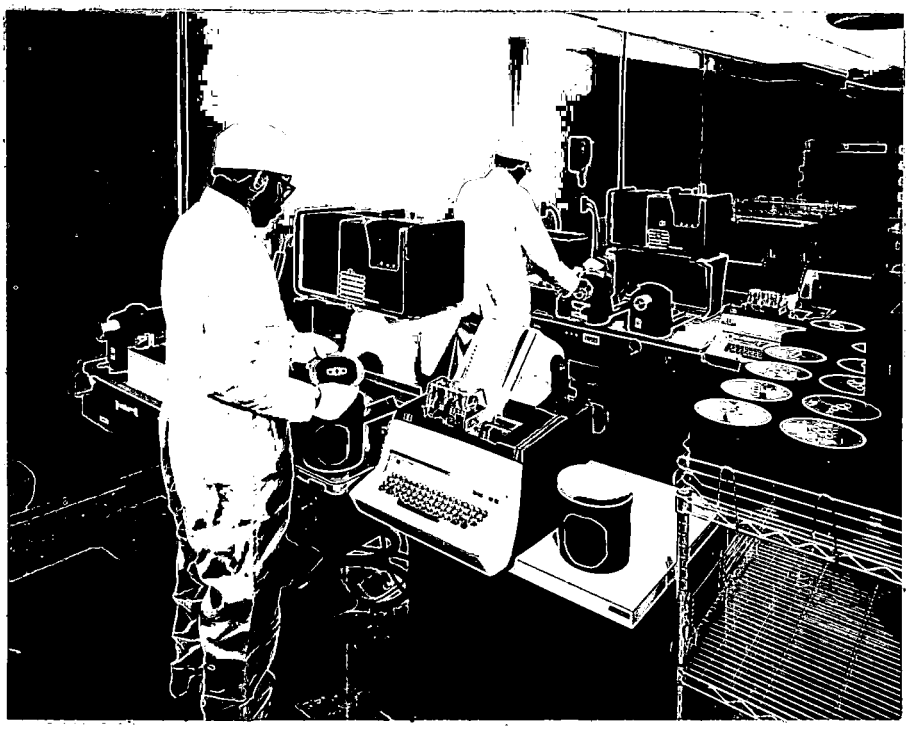


Figure 41 - Labeling Station

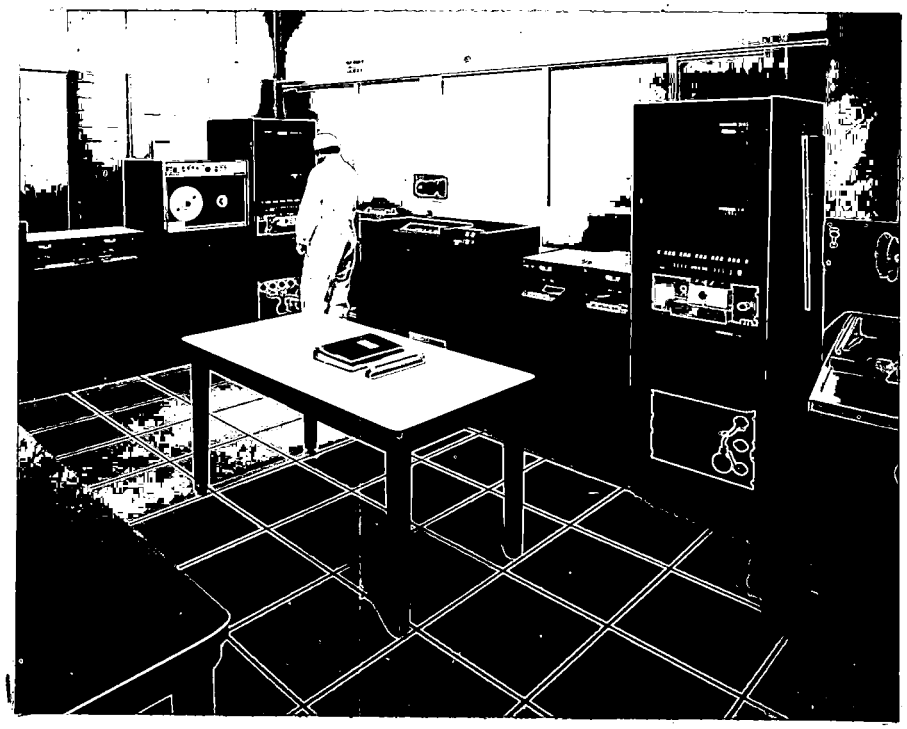


Figure 42 - Production Monitoring System

14. FINAL EVALUATION

When all reproduction requirements have been satisfied, the original negative receives a final quality inspection to document its condition as it is shipped from Bridgehead. This operation is analogous to the Preliminary Evaluation immediately after processing (see page 30).

15. CUSTOMER SHIPMENTS

Labeled cans containing duplicate copies are packaged for shipment according to priority and customer (Figures 43 and 44). For many customers the shipments are identified by group or component within their organization to facilitate distribution to the photo interpreters. The original negatives are shipped to NPIC for archival storage. Courier Aircraft transport all shipments from Rochester.

Figure 43 - Product Packaging

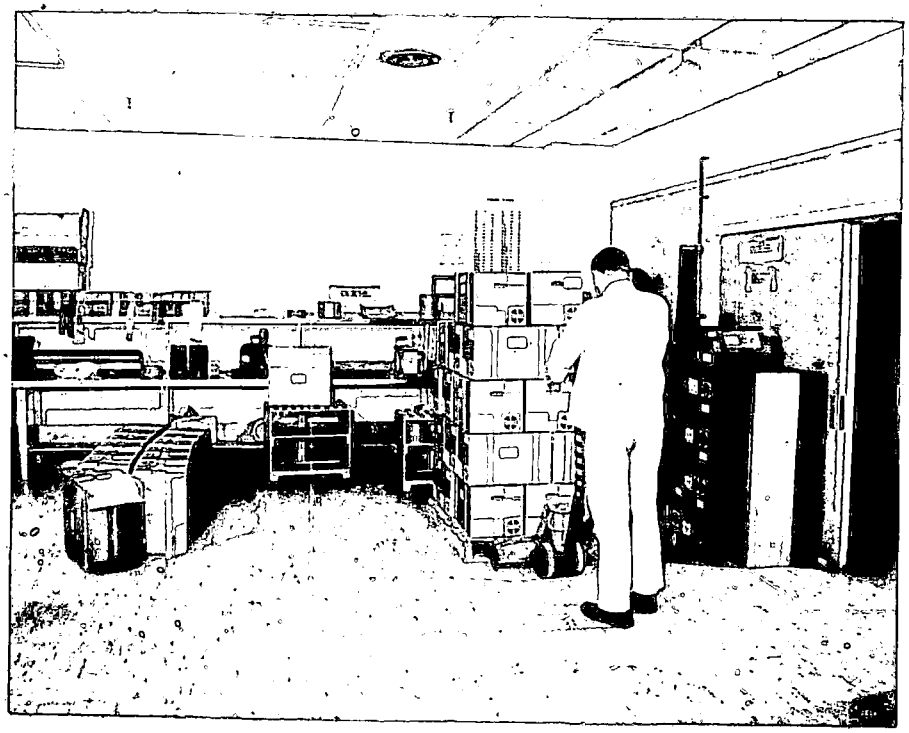


Figure 44 - Completed Shipment

SILVER RECOVERY

All of the processors are connected to a Silver Recovery System (Figure 45) to recover the undeveloped silver from fixer solutions. The fixer overflow from each processor is collected in a holding tank, from which it is pumped through the silver towers for electrolytic recovery as metallic silver. This highly efficient operation recovers the silver for credit to the cusomter and prevents pollution while conserving silver for re-use in the manufacture of sensitized materials.

The desilvered fixer is returned to the Chemical Mix Room for rejuvenation. Chemical additions are made so that the fixer can be re-used in the processors. They cycle from processor-to-silver recovery-to-rejuvenation-to-processor continues for the useful life of the fixer.

POLLUTION CONTROL

After de-silvering all used processing solutions are biologically decomposed in consideration of ecological and security standards. In practice, all appropriate processor effluents and Mix Room drains are tied into a 25,000 gallon chemical collection tank outside the building (Figure 46). Periodically, this effluent is transferred to a 5,000 gal. tank truck and is taken to the King's Landing Treatment Plant at Kodak Park for appropriate biological decomposition by the activated sludge process.

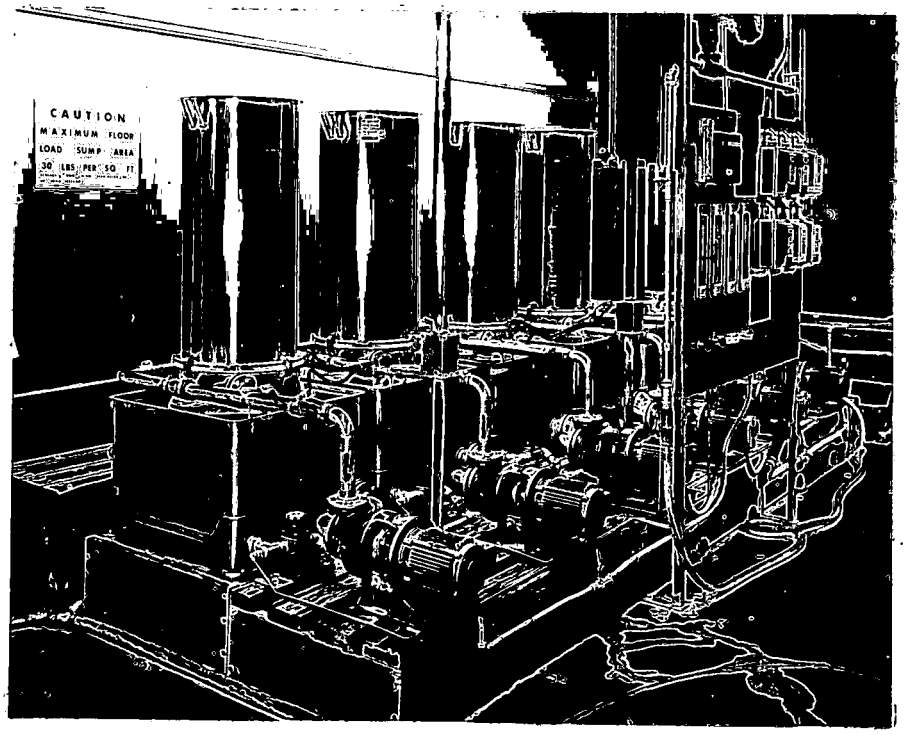


Figure 45 - Silver Recovery System

Figure 46 - Effluent Collection Tank

SECTION III-A

PROCESSING AND REPRODUCTION CAPABILITY FOR COLOR ACQUISITION MATERIALS

1. INTRODUCTION

Both conventional color and false-color infrared films are normally present in at least one SRV of each satellite mission. The basic sequence of Production operations is the same as described in Section III for black-and-white original negatives. Photographic control of color processing and reproduction is substantially more complex than black-and-white, and today's equipment throughput rates are miniscule compared to current black-and-white operations. This section will cover primarily those elements that differ from black-and-white production. Color Production operations are currently located at Lincoln Plant, which is approximately 4 miles from Bridgehead (Figure 47).

2. ORIGINAL CAMERA FILM PROCESSING

The prime processor for reversal color original films and reversal duplicates is the Grafton (Figure 48). This is an all-liquid deep tank processor that is normally operated at throughput rates of 7 feet per minute.

Figure 47 - Lincoln Plant

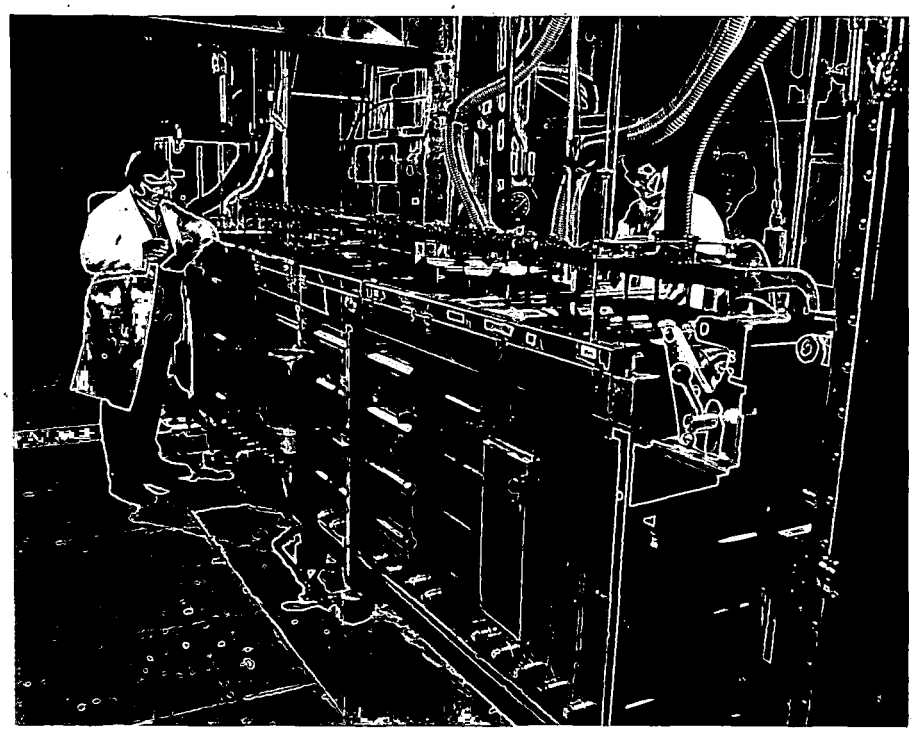


Figure 48 - Grafton Processor

3. COLOR PROCESSING CAPABILITY EXPANSION

The color processing and reproduction capability is currently undergoing revision as part of technical upgrade and consolidation into co-located Bridgehead facilities at Hawkeye (see page 6). A new Chemical Mix Room (Figure 49) has been established and the Multi-Purpose Modular Processor $(MP)^2$ is on-line at Bridgehead. The $(MP)^2$ (Figures 50 and 51) is used to process reversal infrared color acquisition films from missions and supports extensive test work. Throughput rates are comparable to the Grafton. A major new Color Production Processor $(CP)^2$ is currently being designed for installation at Bridgehead. The $(CP)^2$ will have throughput rates of up to 50 feet per minute, will incorporate optical titling, and will permit production volume delivery of color duplicates simultaneous with delivery of correlated black-and-white films.

Figure 49 - Color Chemical Mix Room

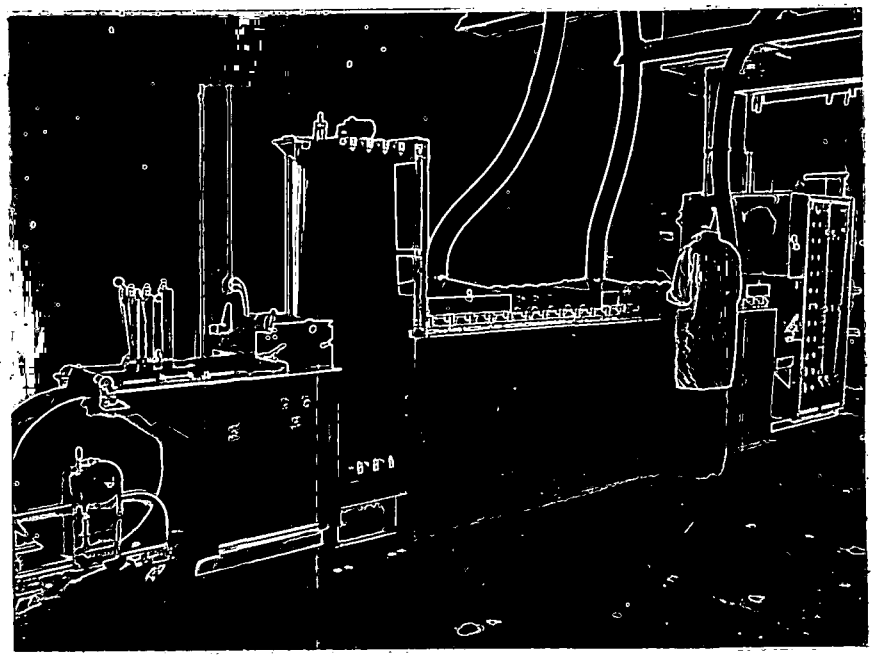


Figure 50 - Multi-Purpose Modular Processor $(MP)^2$

Figure 51 - $(MP)^2$ Mezzanine

4. MANUAL TITLING

The color processors do not currently have an optical titling capability. Therefore, color films are manually titled after processing using conventional pigment transfer techniques on the Unimak Film Titler (Figure 52).

5. VIDEO COLOR ANALYZER (VCA)

The Video Color Analyzer (Figure 53) is used as an aid to check the exposure and color balance when preparing color internegatives. A color internegative is displayed on a screen as it would appear under known reproduction conditions and the effect of various exposure/color balance adjustments is assessed without the need for extensive "proof" printing.

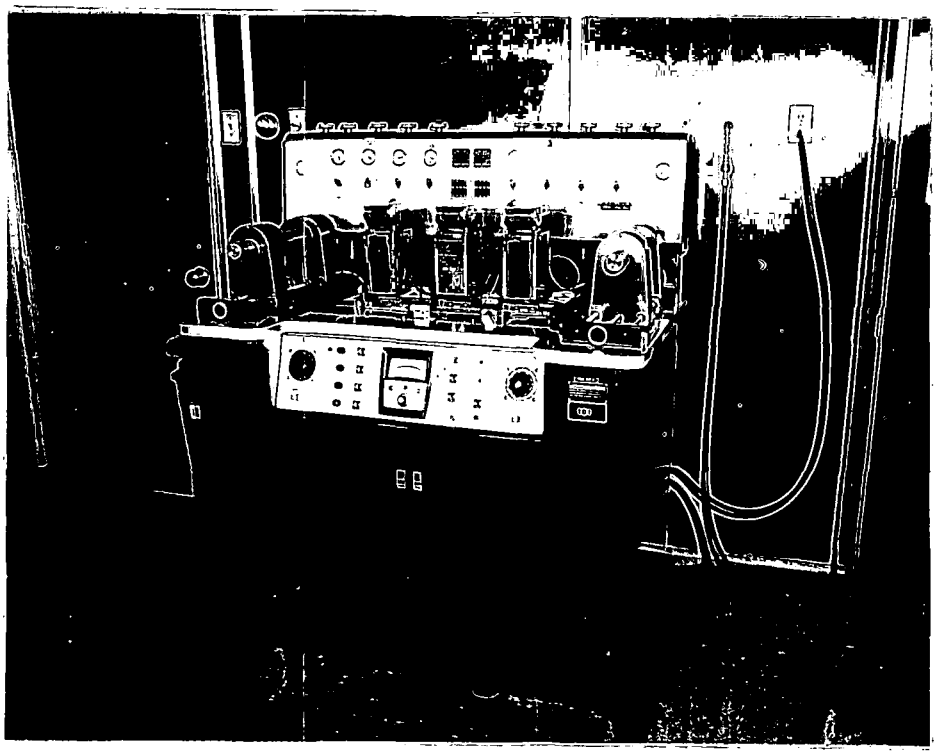


Figure 52 - Unimak Film Titler

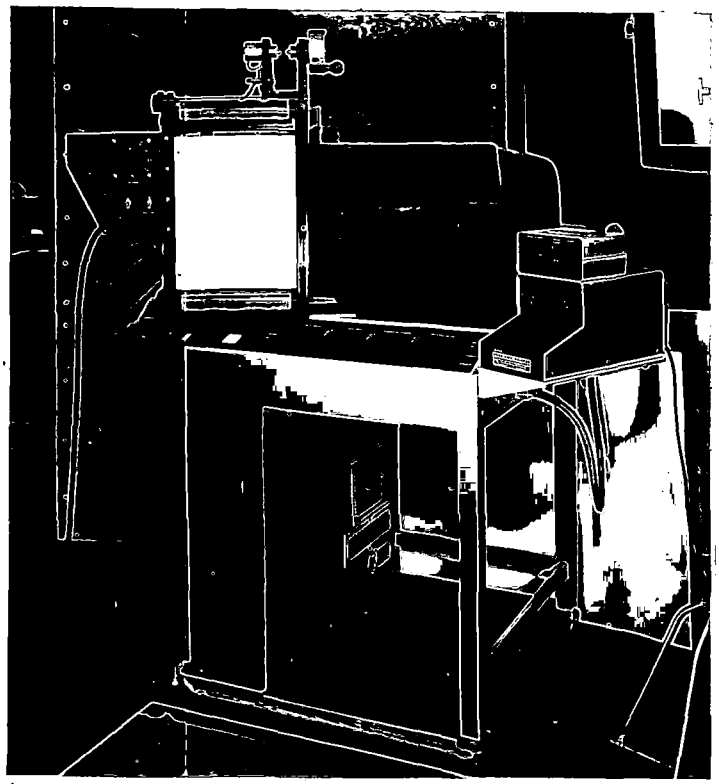


Figure 53 - Video Color Analyzer

6. COLOR PRINTING

Two types of contact printers are used for color printing. The Rainbow Printer (Figure 54) is an additive color printer with red, green and blue light sources. Intensity and color balance is set manually on a part-by-part basis. The five Rainbow Printers at Lincoln Plant are used primarily to prepare the duplicate copies from Hexagon Missions.

The Framingham Printer (Figure 55) is a subtractive color printer with a white light source and color correction filters. Exposure is computer-controlled on a frame-by-frame or intra-frame basis using commands determined by off-line densitometric measurements of the original color film. The two Framingham Printers are used primarily for duplicating Gambit Missions.

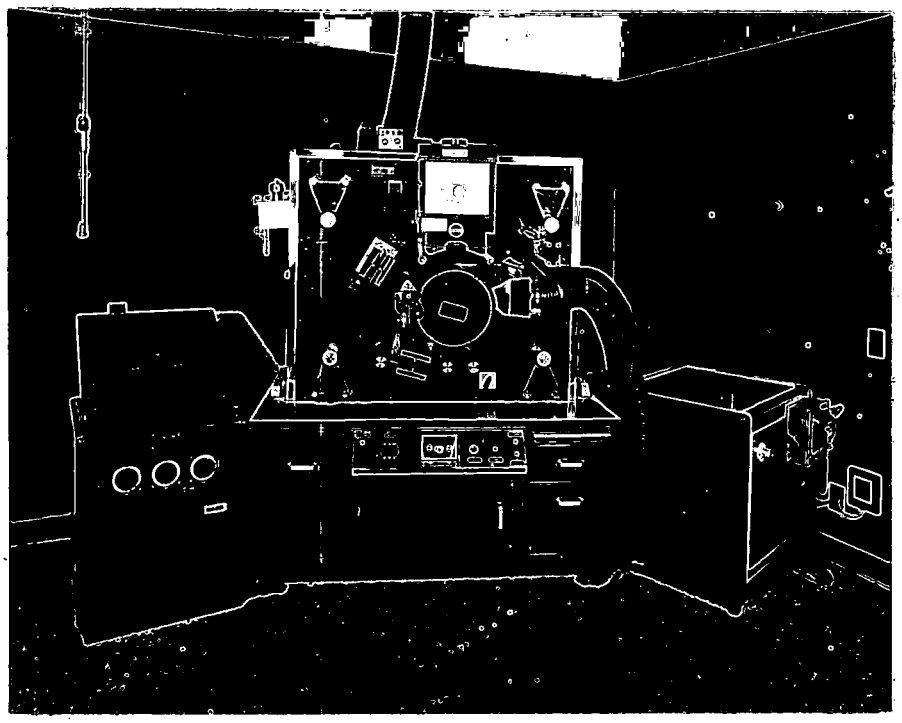


Figure 54 - Rainbow Printer

Figure 55 - Framingham Printer

7. COLOR ENLARGING CAPABILITY

Enlargements are frequently requested by customers to augment the high volume contact reproductions. This is more common with color materials than with black-and-white. The Pocatello Color Enlarger (POCE) (Figure 56) is used to prepare high quality color enlargements at 5x or 10x magnification on roll film or paper to facilitate processing.

The Beacon Precision Enlarger (BPE) (Figure 57) is used to prepare color or black-and-white enlargements on paper or film, at magnifications up to 153x and in sizes up to 30x40 inches. These are handled in sheet form and processed on the Automat Processor (Figure 58) or in a sink line of trays.

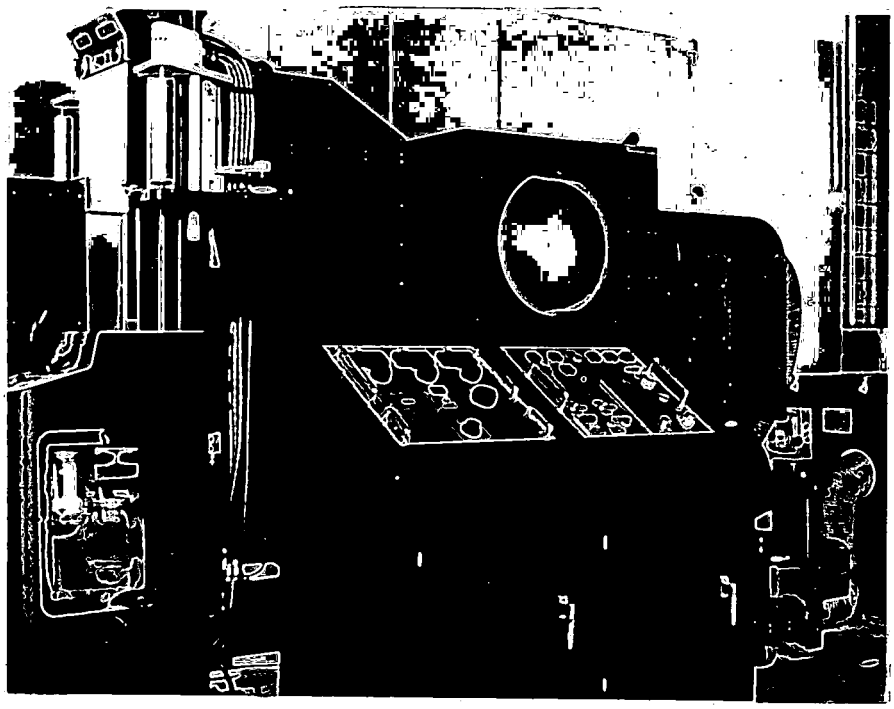


Figure 56 - Pocatello Color Enlarger (POCE)

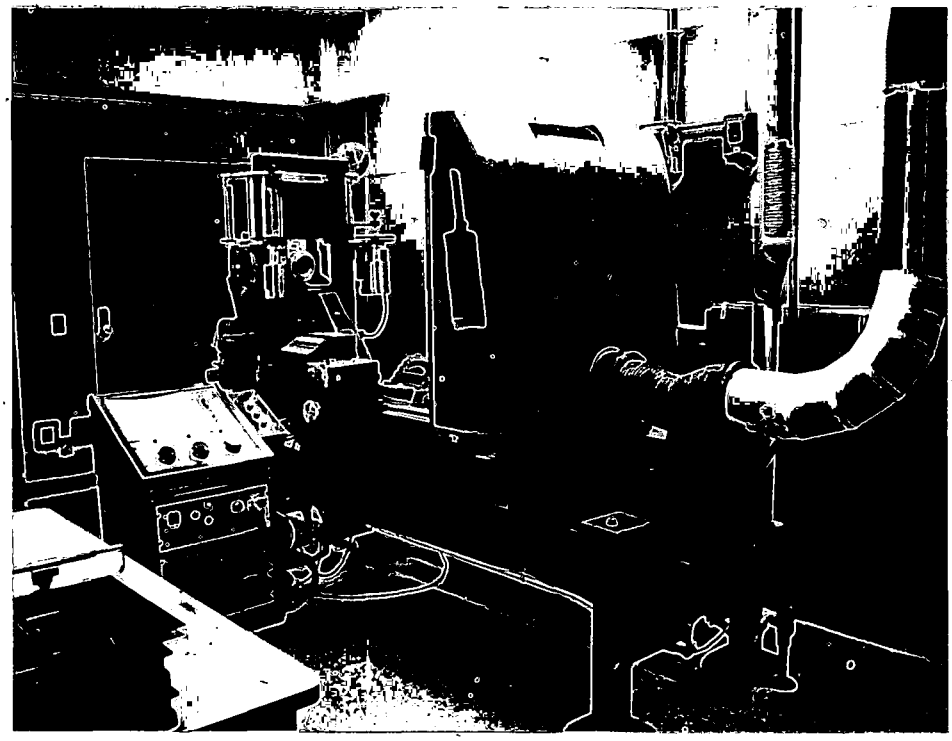


Figure 57 - Beacon Precision Enlarger (BPE)

Figure 58 - Automat Processor

SECTION IV

PRODUCTION CAPABILITIES

The processing and reproduction facility is currently equipped and staffed to support the following Satellite Recovery Vehicle payloads.

Mission	SRV/Yr.
Hexagon	8
Hexagon S/T	2
Gambit	4

SRV film loads usually include a mix of acquisition films. Typical linear footage breakdown for each satellite system SRV are as follows:

Acquisition Film	Hexagon	Hexagon S/T	Gambit
B&W	54,000	5,000	3,500
B&W (experimental)	-	200	1,400
Color (conventional)	2,000	-	300
Color (Infrared)	1,000	-	-

After processing, the Hexagon and Gambit acquisition films are re-ordered by Geographic Area of the world (Figure 59) to facilitate a match of customer interest with the quantity of duplicate copies produced. Reproduction of duplicate requirements is structured to provide copies prioritized by customer.

Table I shows a breakdown of typical reproduction requirements by program and priority, listing typical quantities of duplicate film and cans shipped.

Figure 59 - Geographic Area Breakdown.

TABLE I

TYPICAL REPRODUCTION REQUIREMENTS PER SRV

Mission	Priority	Number of Customers	Shipping Footage B&W	Color	Cans/Spools
Hexagon	1	1	375,000	10,000	1,400
	2	4	520,000	15,000	2,000
	3	18	500,000	10,000	2,300
	*4	4	30,000	-	100
Gambit	1	1	50,000	2,500	510
	2	3	65,000	6,000	750
	3	18	100,000	8,000	985
	4	4	35,000	5,000	430
Hexagon S/T	1	6	63,000	-	265

*B&W from Color Only

Table II shows personnel requirements per trick for both the Hexagon and Gambit systems. The Hexagon Stellar/Terrain is accomplished on a straight time basis without interference of higher priority work.

TABLE II

PERSONNEL REQUIREMENTS

(per 12 hr. trick)

Operations	Hexagon	Gambit
B&W Production	54	48
B&W Quality Control	12	9
Support (Logistics, Maint. etc.,)	35	35
Color Production	29	29

Figures 60 and 61 show production times required and the number of hours after receipt of the SRV which different priorities and type of material will be ready for pickup. The term "Hot Ops" is used for specific imagery required to satisfy a critical need that is expedited for earliest possible delivery.

PRODUCTION TIME LINE
FOR
TYPICAL HEXAGON SRV

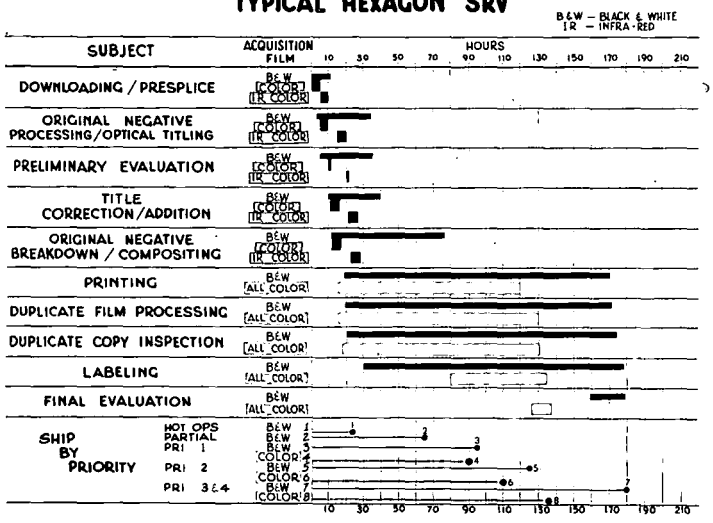


Figure 60

PRODUCTION TIME LINE
FOR
TYPICAL GAMBIT SRV

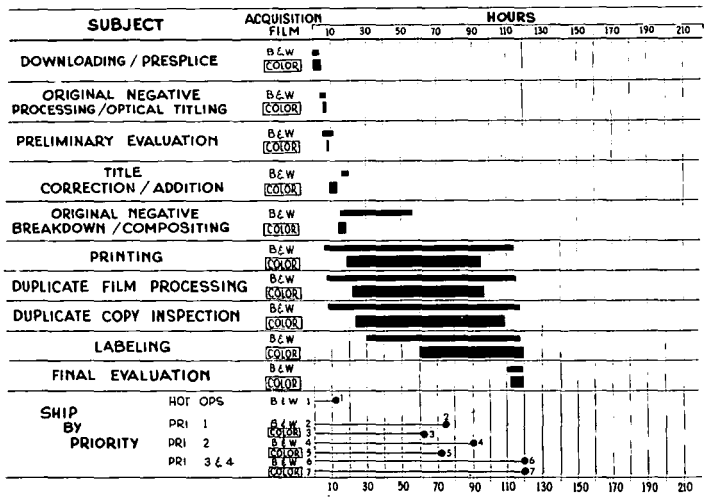


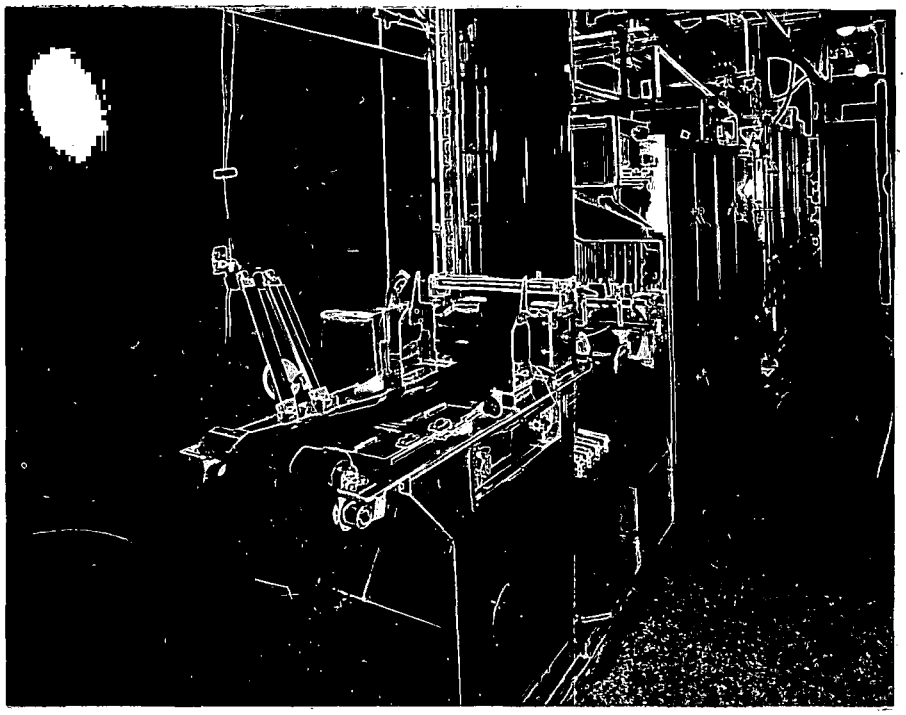
Figure 61

Handle via BYEMAN
Control System Only

SECTION V

MAJOR ITEMS OF EQUIPMENT

This section describes the major items of equipment used in the Bridgehead Processing Facility:



YARDLEIGH
Film Processor
Model II
No. 147-001

is a viscous black-and-white processor dedicated to the processing of orignal negative acquisition film. It will handle continuous rolls of any length from 70mm to 9.5 inches wide. Electronic and visual monitoring provide close control over critical development criteria. Its maximum speed is 35 feet per minute.

Figure 62

Viscous DALTON
Film Processor
No. 141-001

is used to process duplicating film at speeds up to 100 feet per minute. Viscous development makes possible sensitometric effects not readily obtainable by other processing methods.

Figure 63

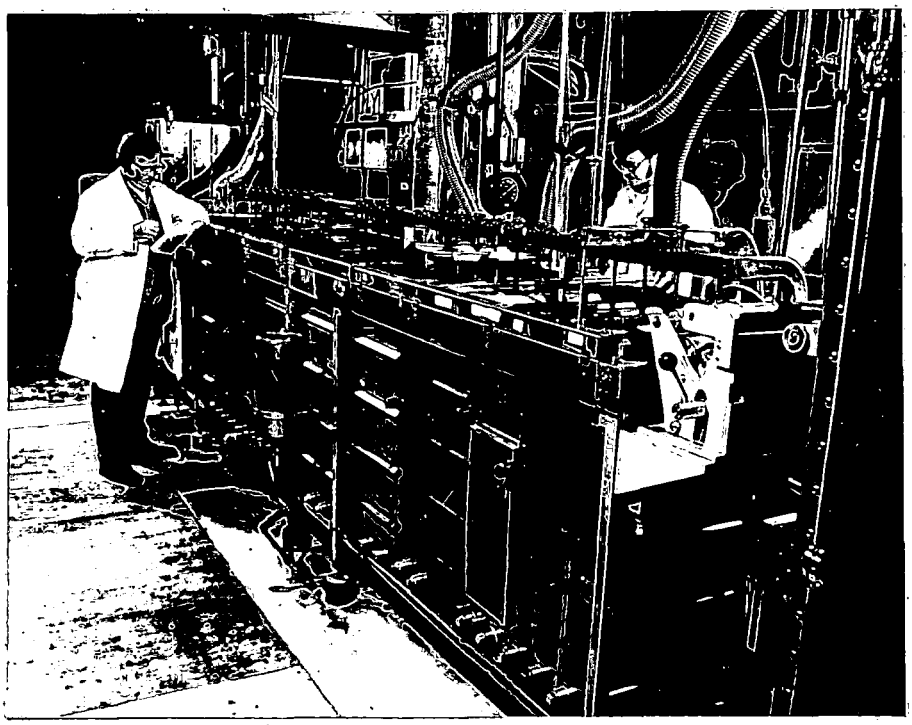


Figure 64

GRAFTON

Film Processor

is a color processor that will handle both acquisition and duplicating films in continuous lengths from 70mm to 9.5 inches wide. While primarily for reversal films, it can be modified to handle negative color films. It can flash the edge of reversal films to remove dye for subsequent titling. Its maximum output is 7-1/2 feet per minute.

Multi-Purpose Modular

Processor (MP^2)

No. 148-001

is an experimental color processor that can also be used for production of both acquisition and duplicating films in rolls of any length from 70mm to 9.5" wide. It is used mostly for reversal color films, but can be easily converted to process negative color. It can be modified for edge flashing. Its maximum speed for color is 7-1/2 feet per minute.

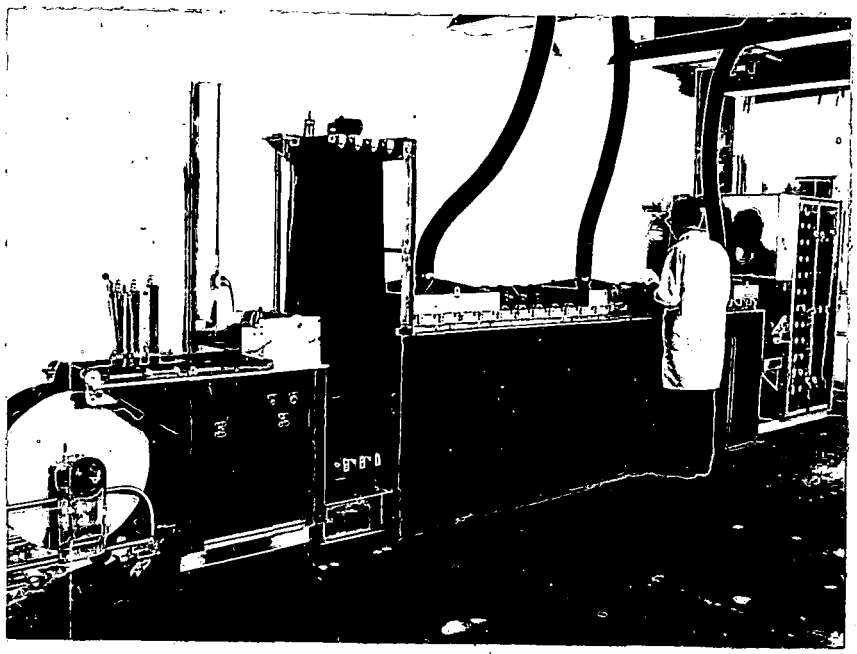


Figure 65

DUNDEE Processor
Model II

is a modular film processor used to test and evaluate various techniques for viscous, combination spray-viscous, and deep-tank processes for black-and-white films. Processing times and temperatures can be varied over a wide range with precise control over both.

Figure 66

Color AUTOMAT
Processor

is used in support of enlargers and other photographic activities to process black-and-white negatives and positives. It will handle reversal or negative color, internegatives and transparencies. It will accommodate a 30" x 40" single sheet or up to 46 8" x 10" sheets in one batch. It will process paper, as well as film, in both color and black-and-white.

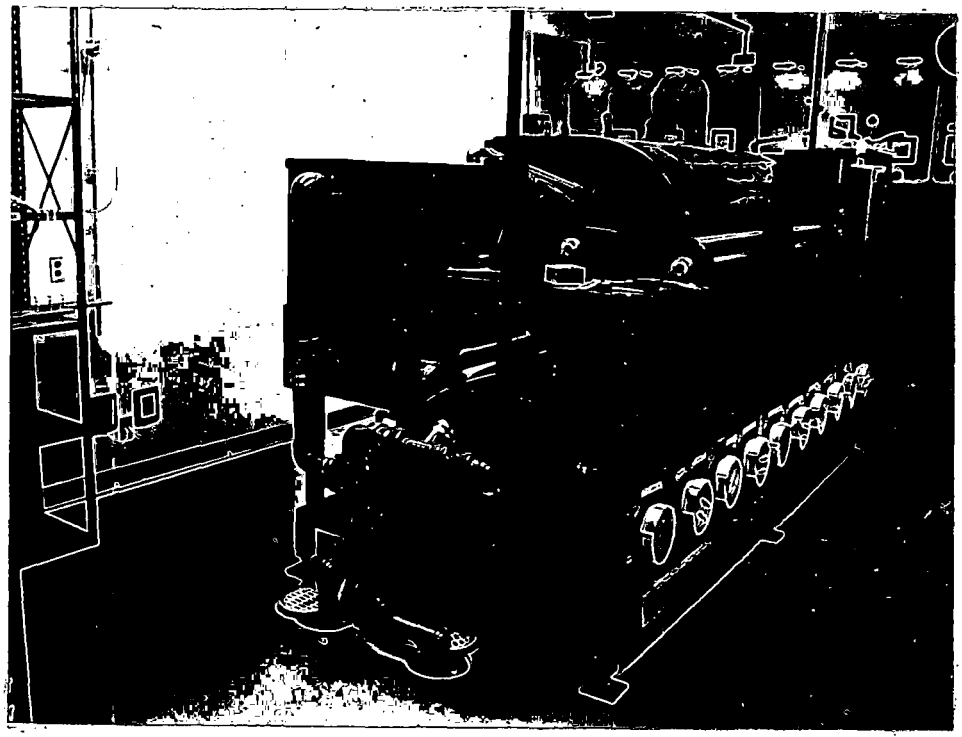
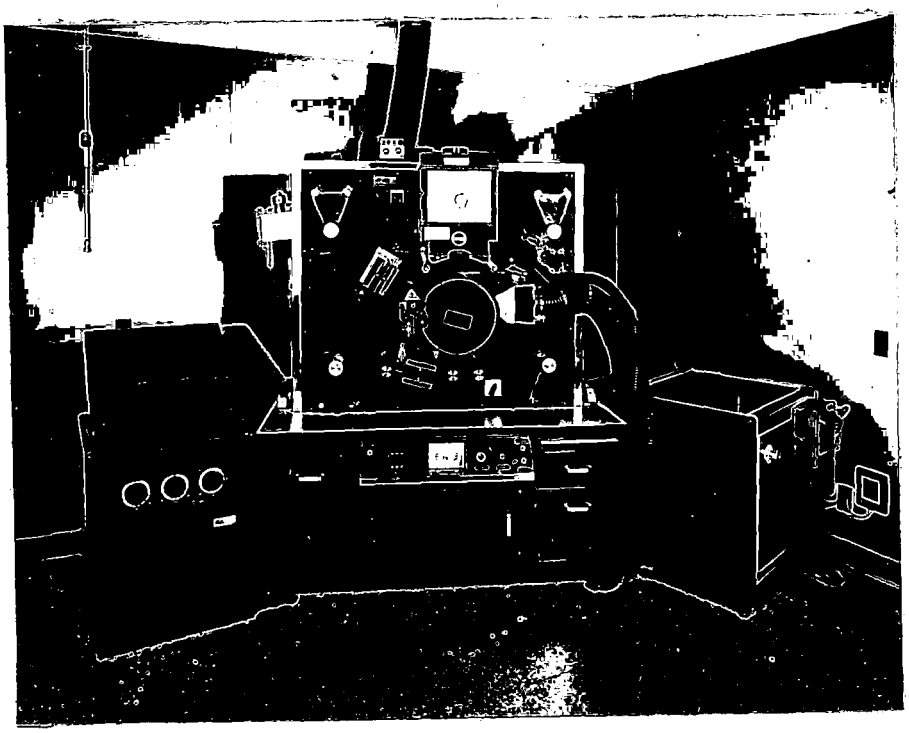


Figure 67



RAINBOW
Continuous Printer
No. 032-001

is a drumtype, contact color printer which reproduces photographic images on a secondary length of color duplicating film from a primary color print master at a top speed of 100 feet per minute. Designed primarily to handle reversal color films, the printer is used in conjunction with its control unit which regulates the light intensities of three separate lamps.

Figure 68

BEACON Precision
Enlarger
No. 023-001

makes enlargements from pre-selected areas of aerial roll film, with field diameters from 3.7" to .32" at magnifications from 3X to 40X in color and 3X to 153X in black and white. Enlargements can be printed on duplicating film or paper up to 40" square. Subject areas can be specified by coordinate location within any frame on film of standard widths from 70mm to 9.5" in rolls up to 7.6" diameter.

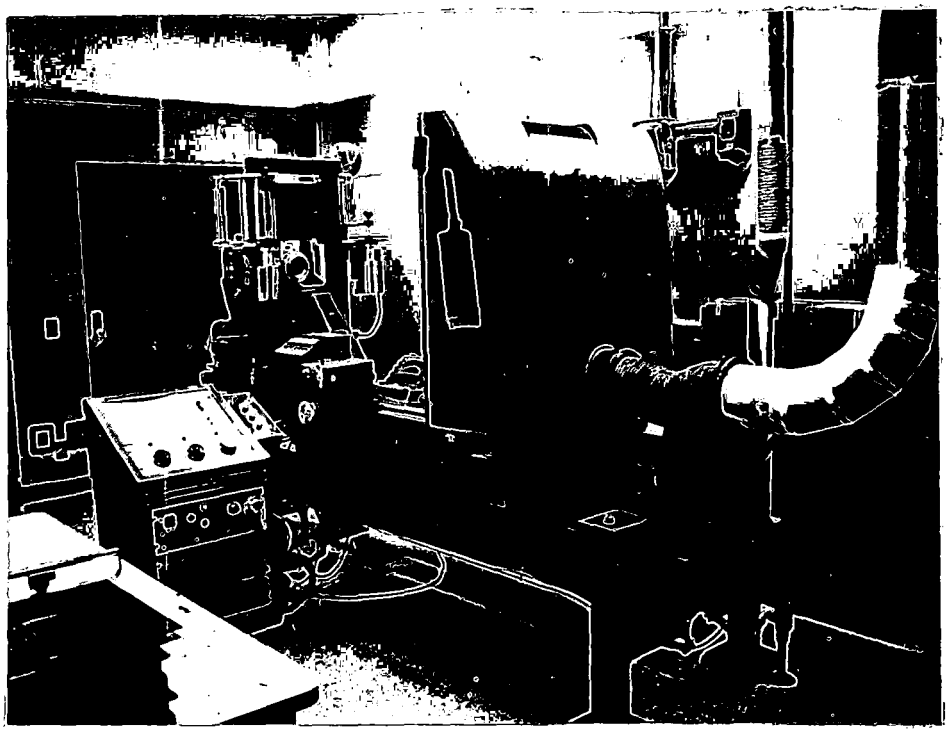
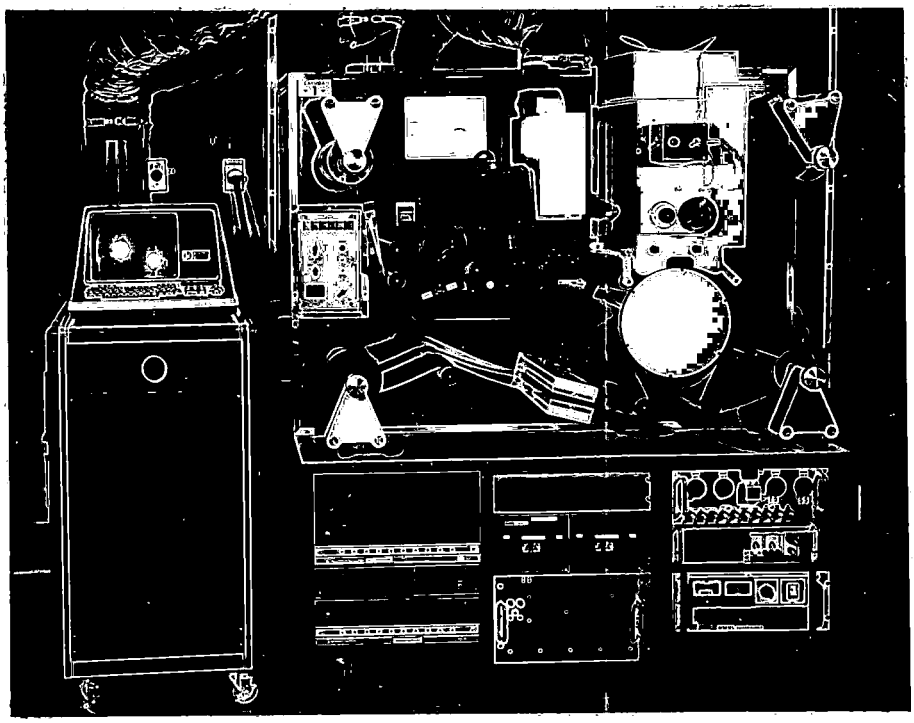


Figure 69



CAYUGA
Continuous Printer
No. 057-001

is a black & white contact printer with intraframe automatic exposure control that eliminates the need for printing-condition analysis of the printmaster prior to printing. It is capable of automatically scanning the printmaster and feeding obtained scan data through its own computer which modulates printing lamp intensity to produce a relatively even print density on the duplicate.

Figure 70

FRAMINGHAM Continuous
Color Printer
No. 050-001

is a continuous programmable frame-by-frame density controlled color printer capable of printing at 50 feet per minute, with an inter-frame density response transition of approximately one inch. The programmable frame-by-frame density control range is approximately 1.0 log exposure, with a manually controlled roll-by-roll color balance range for each primary color. Roll film in standard widths between 70mm and 9.5 inches can be printed on this machine.

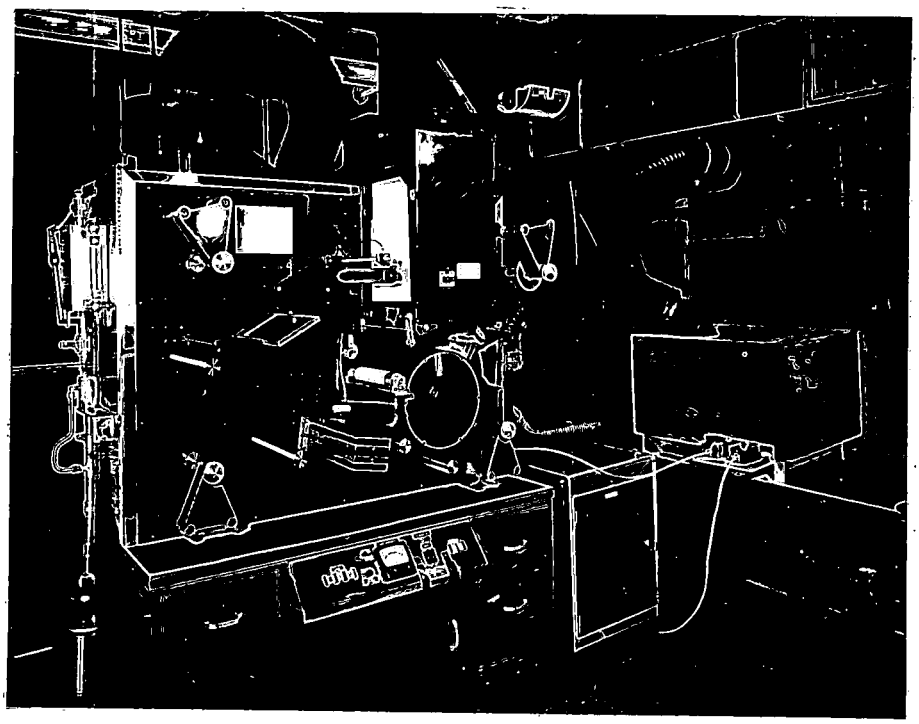


Figure 71

REDONDO NIAGARA

Printer

No. 008-800

is a second-generation continuous, drum-type contact printer that is used to duplicate precise copies of black-and-white negative or positive film. At speeds from 3 to 100 feet per minute and with a 400-watt lamp, it will print a wide range of print-master densities. By rewinding the print master, multiple copies can be printed.

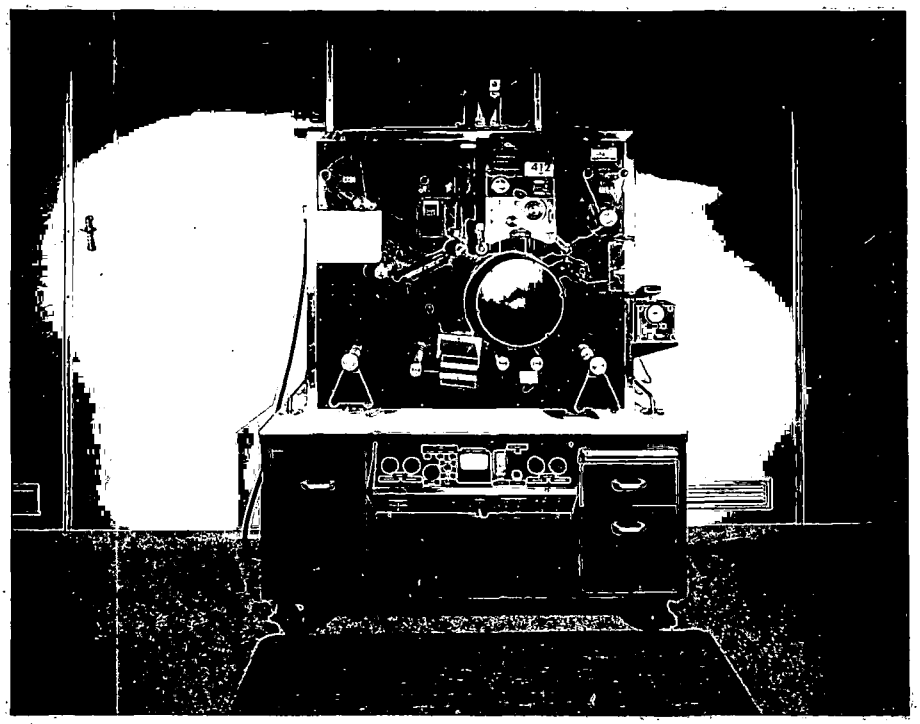
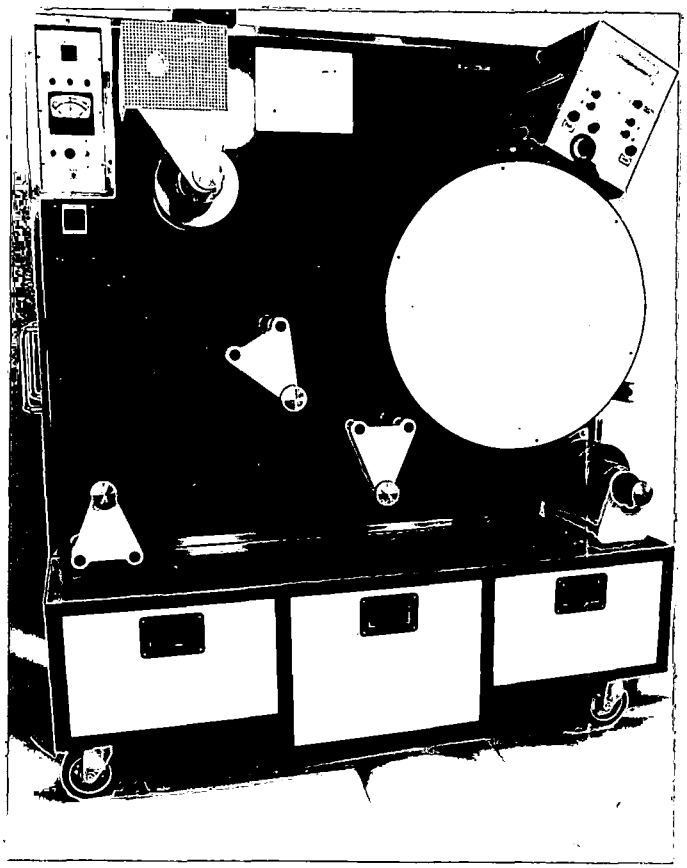


Figure 72



KINGSTON

Continuous Printer

No. 054-001

is used to contact print photographic film over an extra-large drum to obtain minimum distortion and optimum quality. Film travel from supply to take-up during printing is 100 feet per minute with both print master and duplicating stock maintained at constant tension through the entire printing rum.

Figure 73

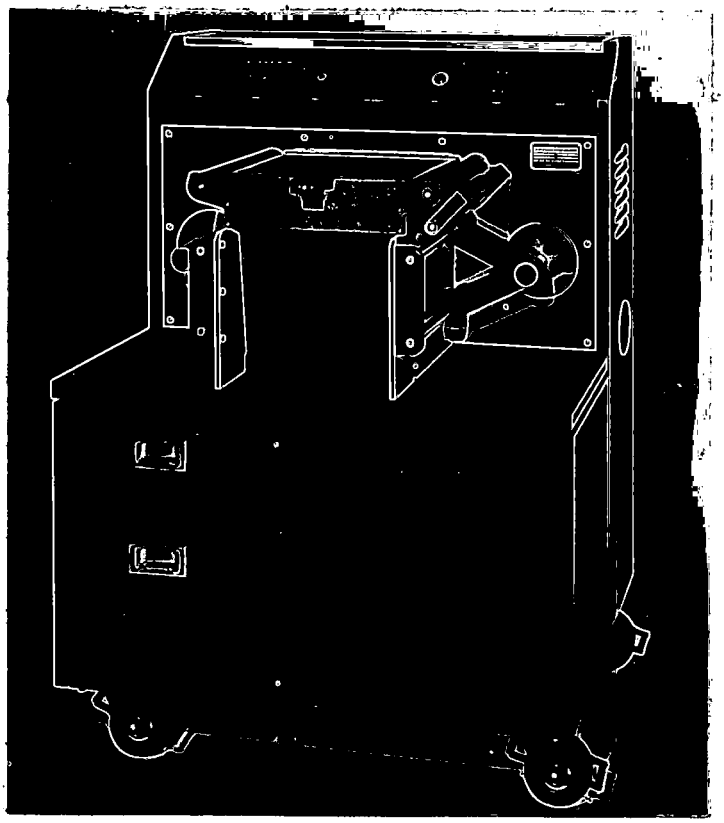


Figure 74

Continuous
Rawstock Flasher
No. 153-001

is used to flash a strand of film to obtain an even density across the web and from one end to the other. Flashed film is used for physical quality certification of film processors and for scratch testing in various items of film handling equipment.

Automatic Continuous
Identification Printer
No. 041-500

is used to print identifying mission data on head and trailer lengths of film for subsequent identification. Characters are photographically recorded from a matrix that is activated from computer processed input data.

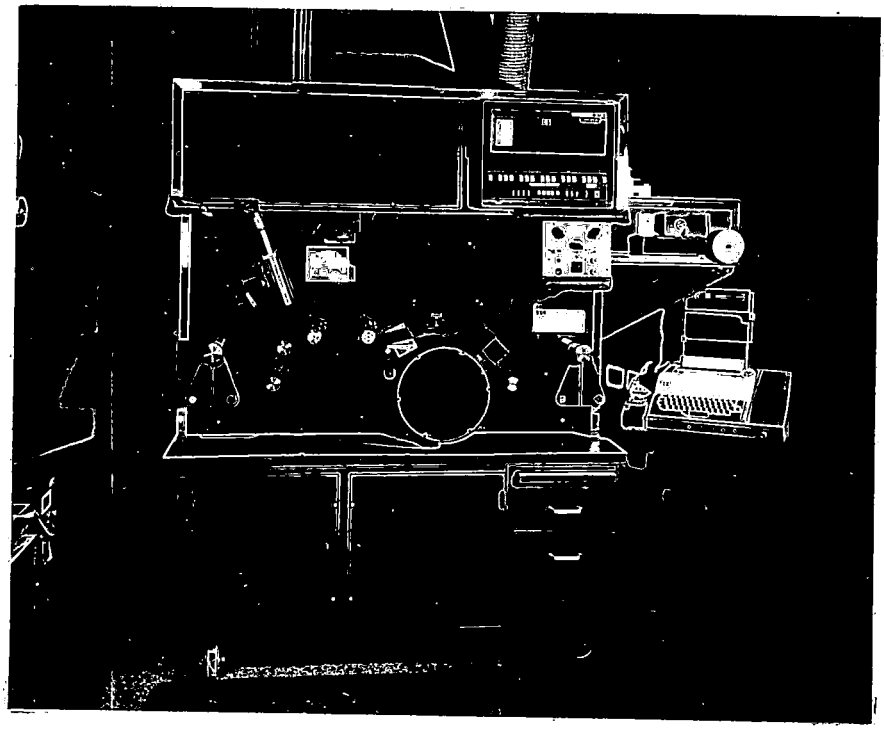


Figure 75

POCATELLO
Color Enlarger (POCE)
No. 048-001

is production-oriented for making multiple copies of 5X and 10X color enlargements. Input film can be any width from 70mm to 9.5 inches on MS 26565 spools up to 7-5/8 inches flange diameter. Color balance is regulated by a control matrix; titles can be contact printed on the enlargement.

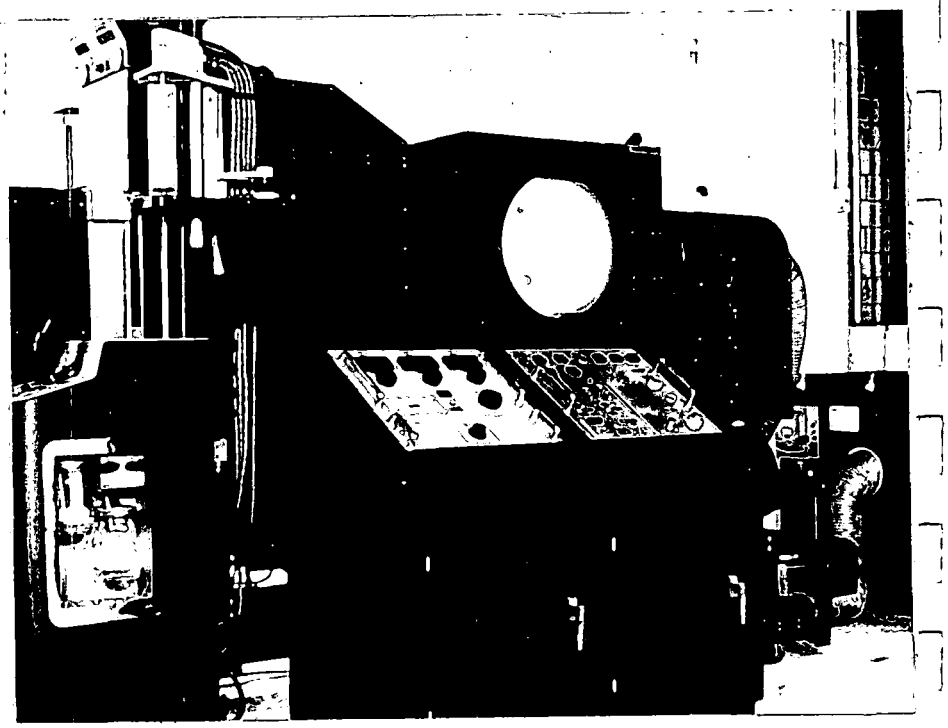


Figure 76

Modified
Video Color
Analyzer, Model III
No. 273-001

is used for continuous lengths of negative or positive aerial color films, from 70mm to 9.5" wide, to determine color printing criteria for color printers and enlargers.

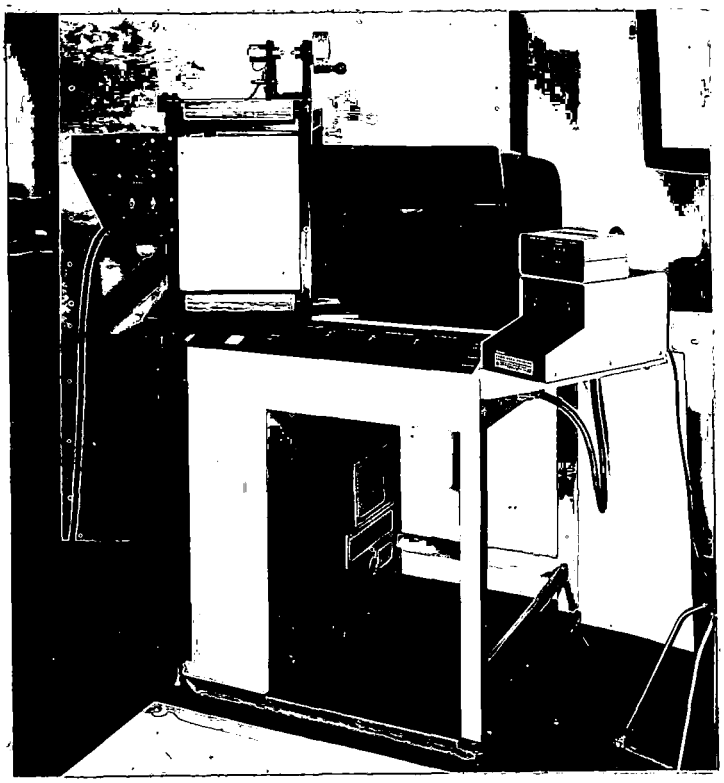
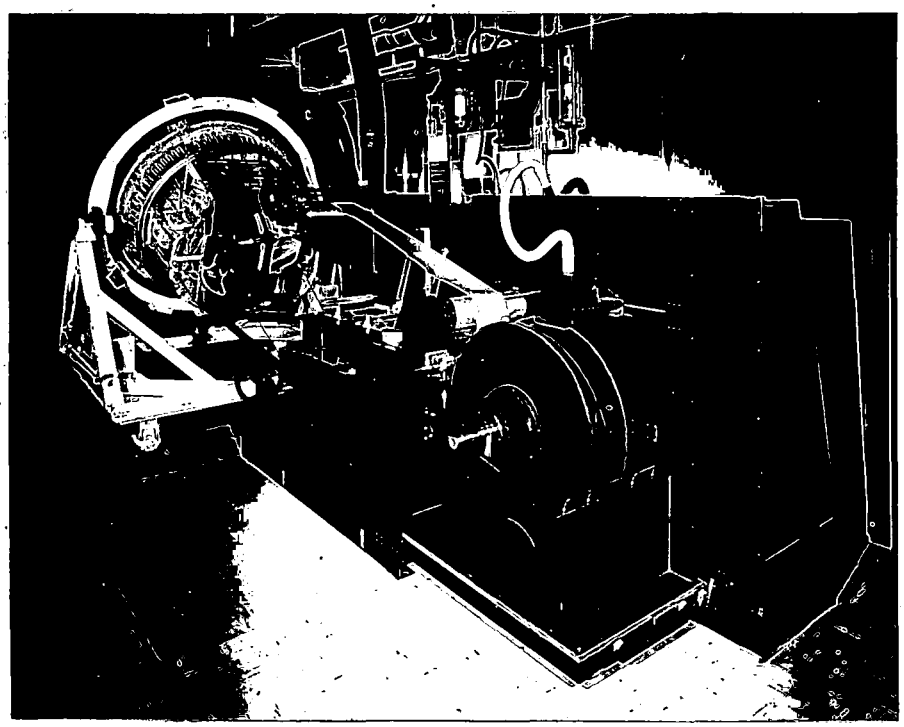


Figure 77



Presplice Complex

is used for downloading acquisition film from the vehicle payload and for rewinding the web onto spools in preparation for processing. During rewind, film is manually and electronically monitored for physical damage that might cause a problem during processing. Damaged sections can be removal and loose ends spliced to form a continuous web.

Figure 78

G-Area
Breakdown
Workplace

is used to edit, from continuous rolls of acquisition film, coverage over selected geographic areas and to compile the take for each area into a composite print master from which multiple duplicates can be contact printed.

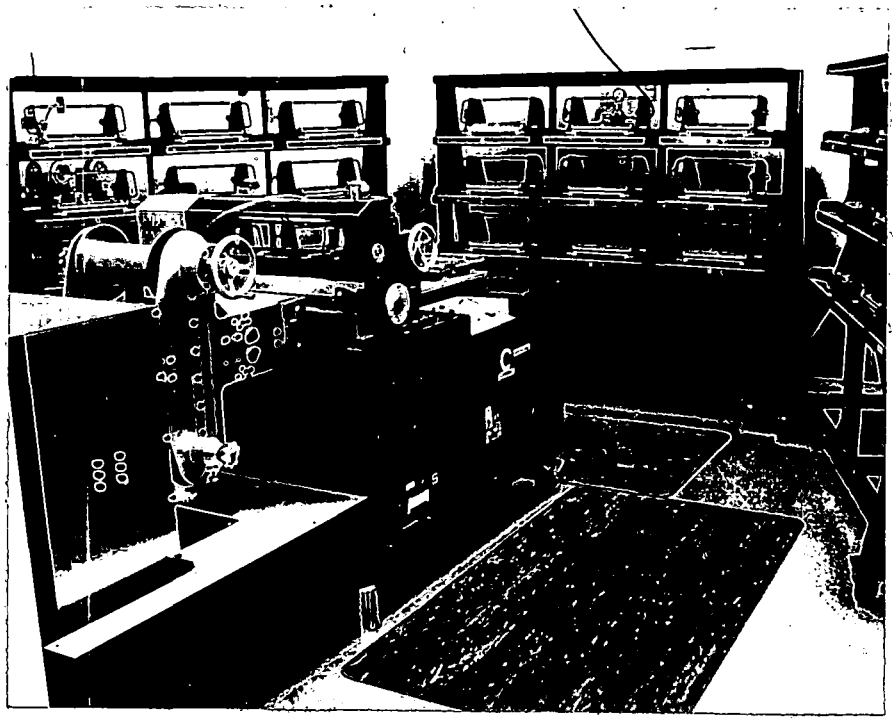


Figure 79

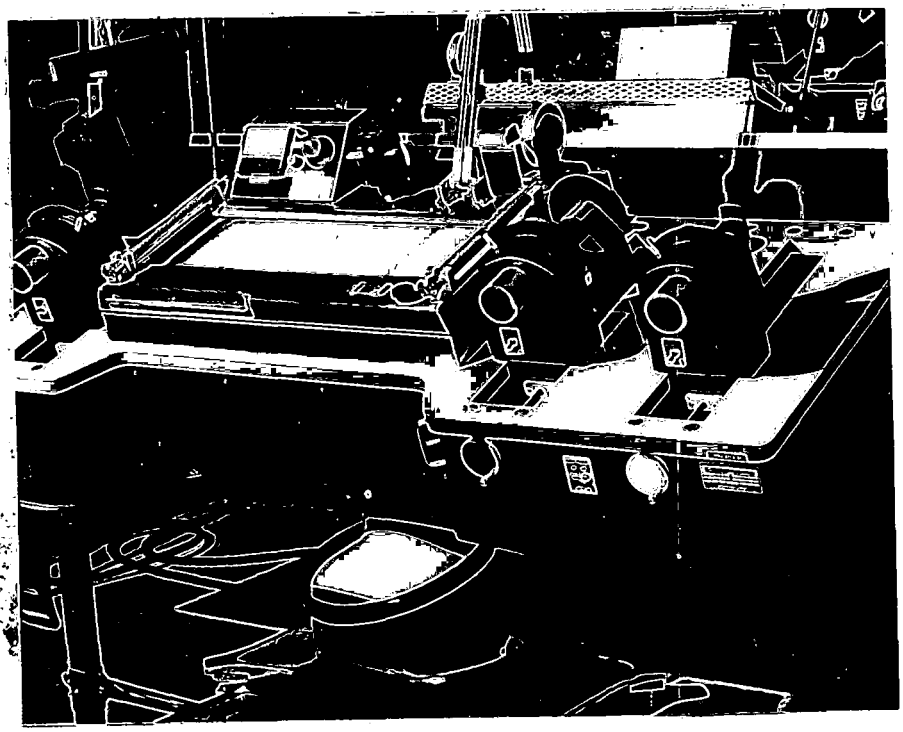


Figure 80

CAMDEN

Inspection Table

Various Models

are used for inspecting, evaluating, viewing, and editing large quantities of duplicate film. Different models have individual functions such as splicing, densitometry, and other features.

Editing Table,

30-Inch

No. 222-001

is used for viewing, inspecting, evaluating, and editing both original negative and contact printed duplicates in roll form. Manual rewinds provide close control over film transport to preclude physical damage to valuable acquisition film. Film widths from 70mm to 9.5 inches can be handled on MS 26565 aerial film spools up to 10-1/2" flange diameter.

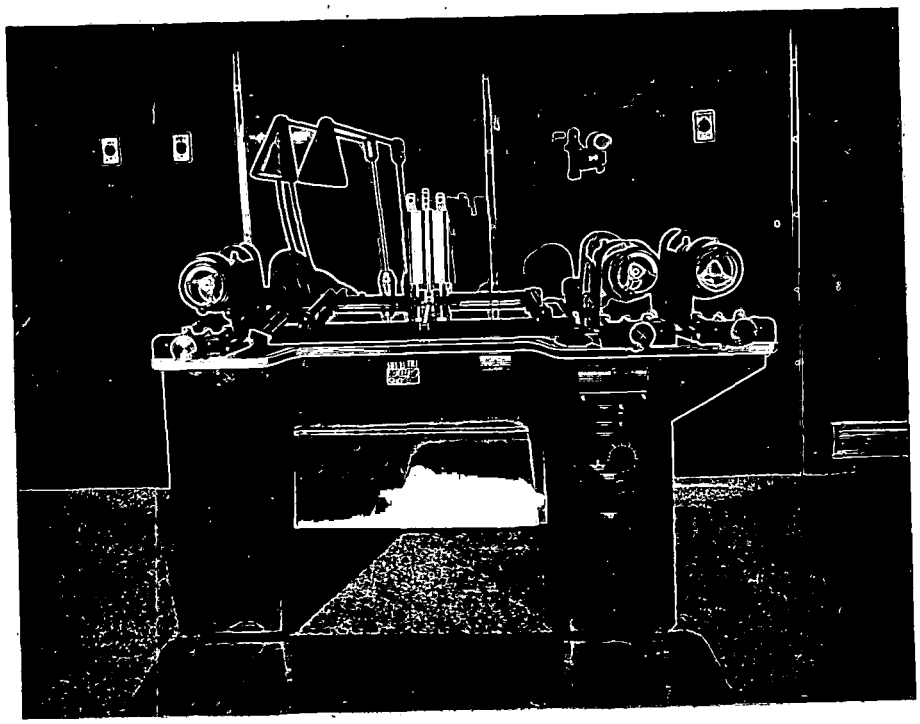
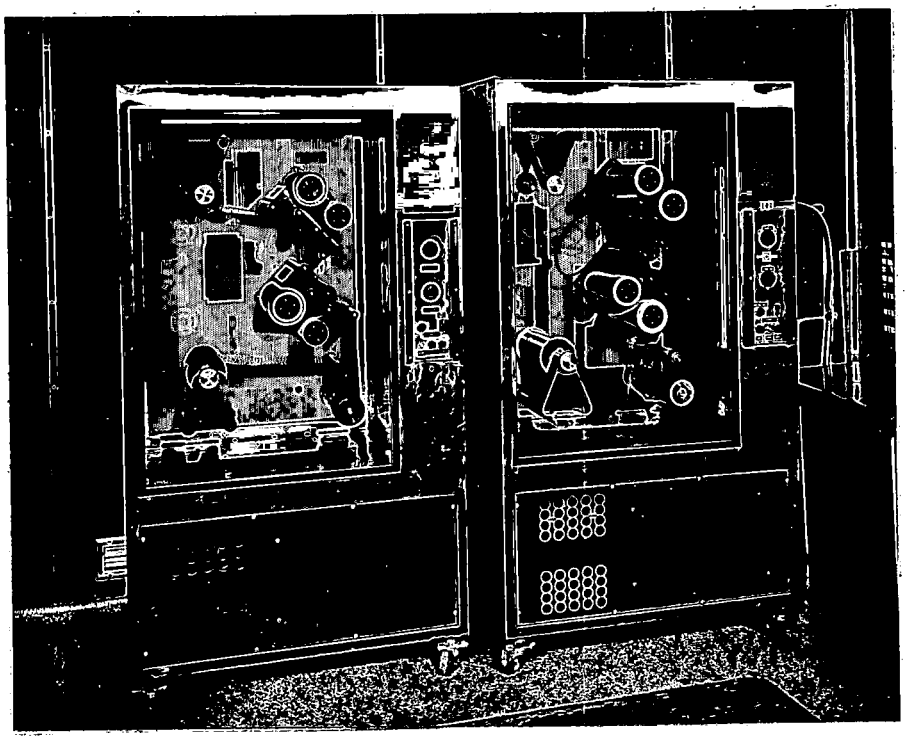


Figure 81



WEBSTER
Film Cleaner
No. 511-001

safely cleans non-adhesive dirt from the base and emulsion surfaces of all aerial roll films, and neutralizes static electric charges, thereby reducing further dust or lint attraction.

Figure 82

UNIMAK
Film Titler
No. 309-001

is used to apply identifying information to the border and/or interframe spaces of processed aerial films. It titles negative or duplicating film, including ultra-thin base, in standard widths from 70mm to 9.5 inches and accepts MS26565 spools up to 10-1/2 inches diameter. Titles generally consist of a fixed field of alphameric data plus an automatically sequenced frame number. Machine-readable binary-coded frame numbers can be titled.

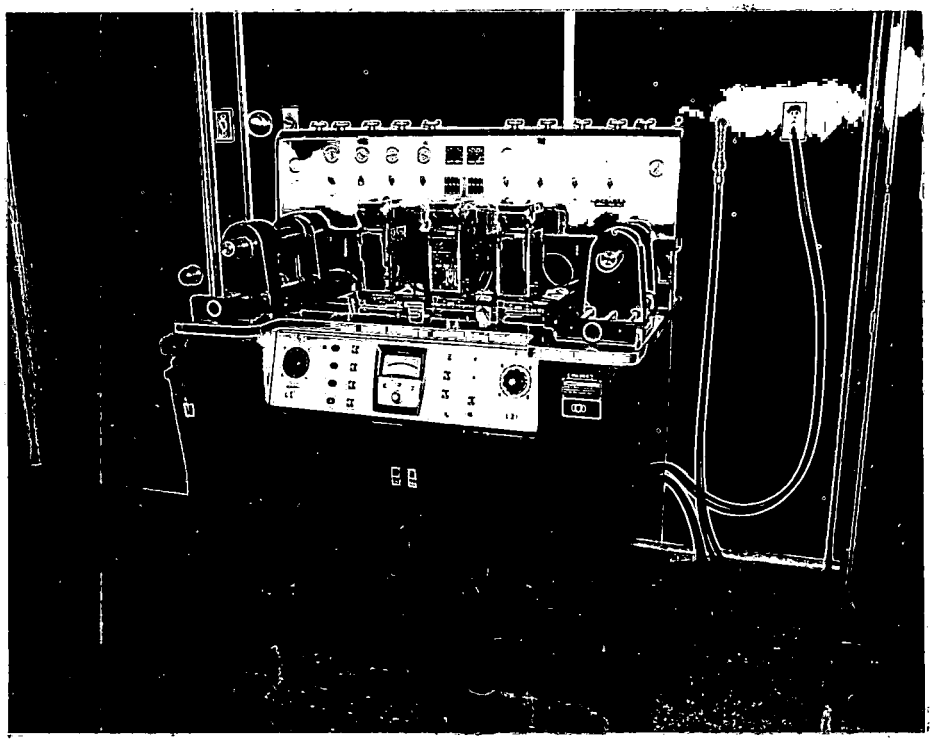
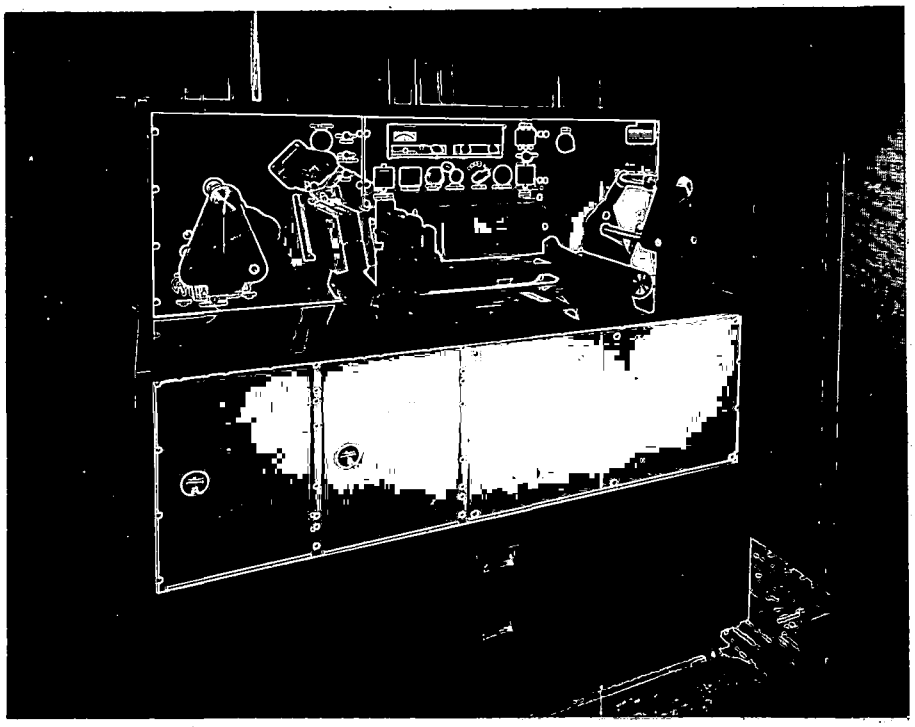


Figure 83



INTENSITY SCALE
SENSITOMETER
Type 1-B, Model V
No. 824-001

is used to make precise exposures through either a standard stepped density tablet or a continuous density wedge onto various types of light-sensitive film emulsions. The resulting sensitometric strips are used for primary sensitometric tests of black-and-white or color emulsion characteristics, or for sensitometric control of photographic processing equipment.

Figure 84

TITLE Remover
Assembly
No. 613-001

is used to remove unsatisfactory title data that has been photographically exposed, or mechanically applied, along the film edge. Once a title has been removed, the same area can be retitled by mechanical methods.

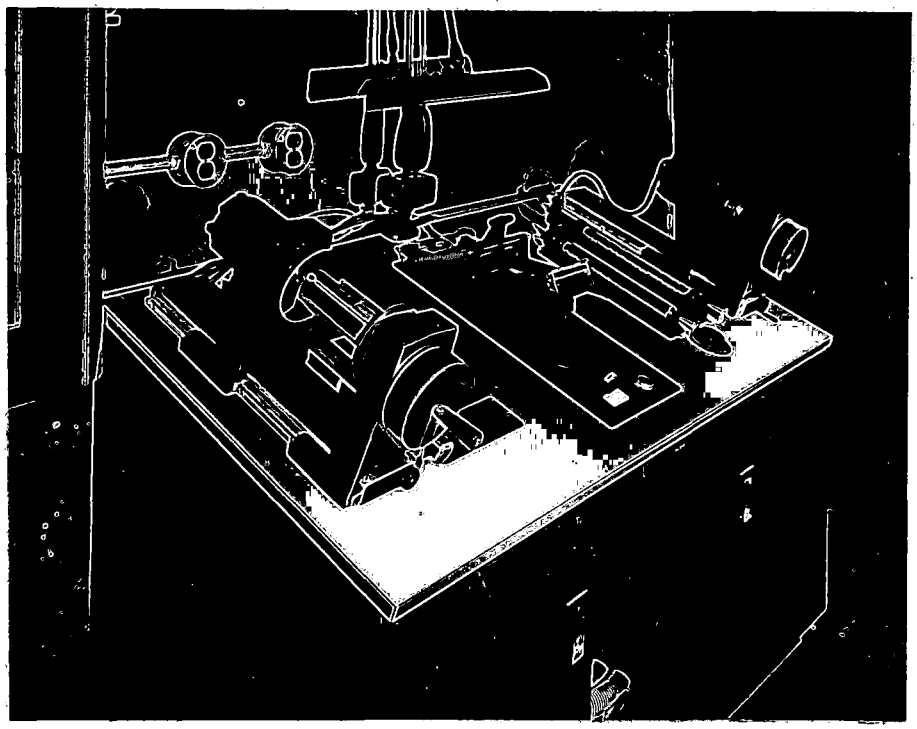


Figure 85