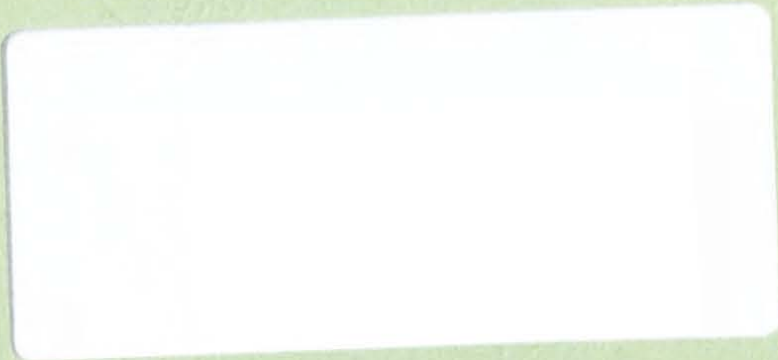


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BRIDGEHEAD

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	Describes the physical location and size of the Primary NRP Processing Center and identifies work areas within the complex.	
SECTION II	- MISSION PREPARATION	Page 13
	Discusses tasks that are accomplished to establish readiness prior to mission arrival.	
SECTION III	- MISSION PRODUCTION	Page 20
	Describes in chronological order the typical workflow of a satellite mission payload through processing and reproduction.	
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SECTION V	- MAJOR ITEMS OF EQUIPMENT	Page 58
	Provides a brief description of major items of ground handling equipment used in the processing center.	

INTRODUCTION

EKC - BRIDGEHEAD

PROGRAM RESPONSIBILITIES

- . Develop and operate the primary NRP Film Processing and Reproduction Center for Photo-optical Systems.
- . Equip, install and assist-operate other NRP Film Processing and Reproduction Facilities.
- . Provide technical and logistic photographic support to all NRP 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.
  - Address the data processing and mass data storage needs of the NRP.
- . Establish and maintain NRP sensitometric reference standards.

PROGRAM OPERATION

- . Under the administrative, contractual and security aegis of CIA.
- . Under the budgetary and operational control of DNRO.
- . Performs the following photographic 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 timeline requirements of the COMIREX.

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GAMBIT  
HEXAGON

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- . Coordinates the development of:
  - Specifications for and methodology of manufacturing test and flight film supply loads for all NRP programs; maintains orderly manufacturing and logistics flow to depots and satellite load requirements.
- . Operates a Film Evaluation And Test Laboratory (FEAT).
- . Operates an Advanced Image Processing and Recording Laboratory (AIPRL) to support the simulation of digital data systems and to perform processing of sensitive data.

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GAMBIT  
HEXAGON

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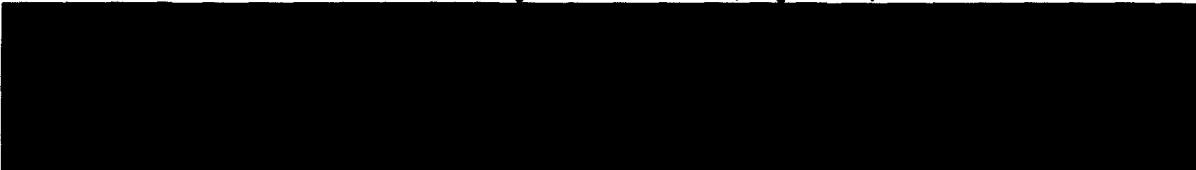
SECTION I  
FACILITIES

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. 1-2-3-7-9-12-13 (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 floor plans (Figure 3-7) show the locations of the major items of equipment and work areas assigned to the processing and reproduction operations.

*D-385 floor plan = 12,000 sq ft 2-1-82*



FIGURE 1 - Hawkeye Plant

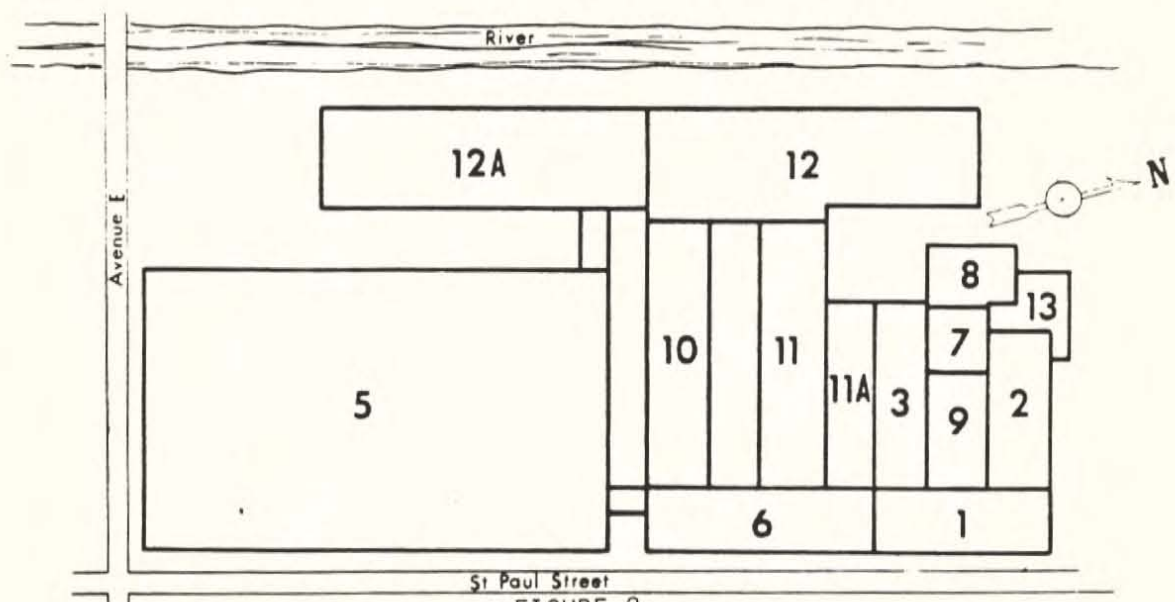
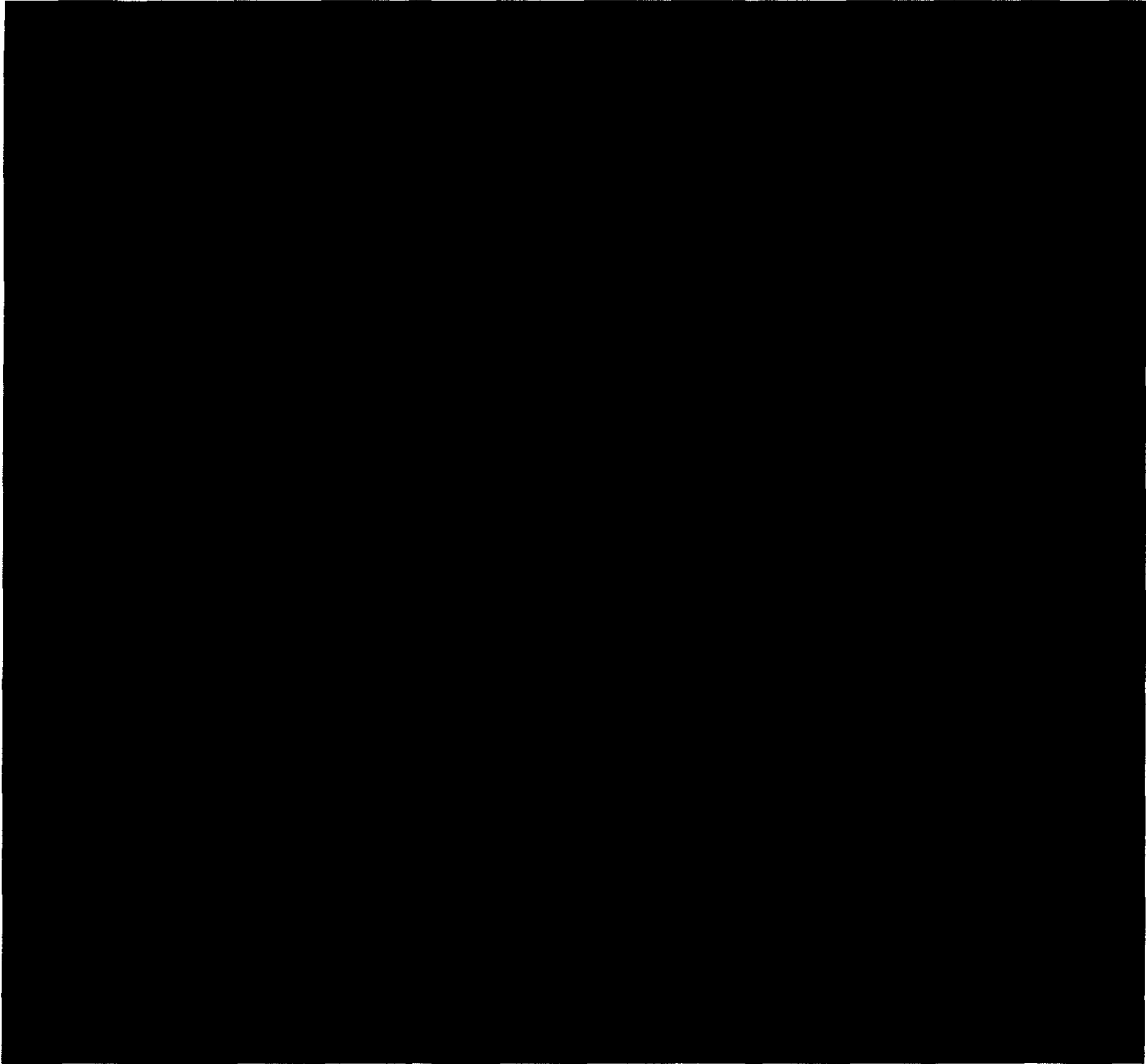


FIGURE 2

**HAWKEYE PLANT**

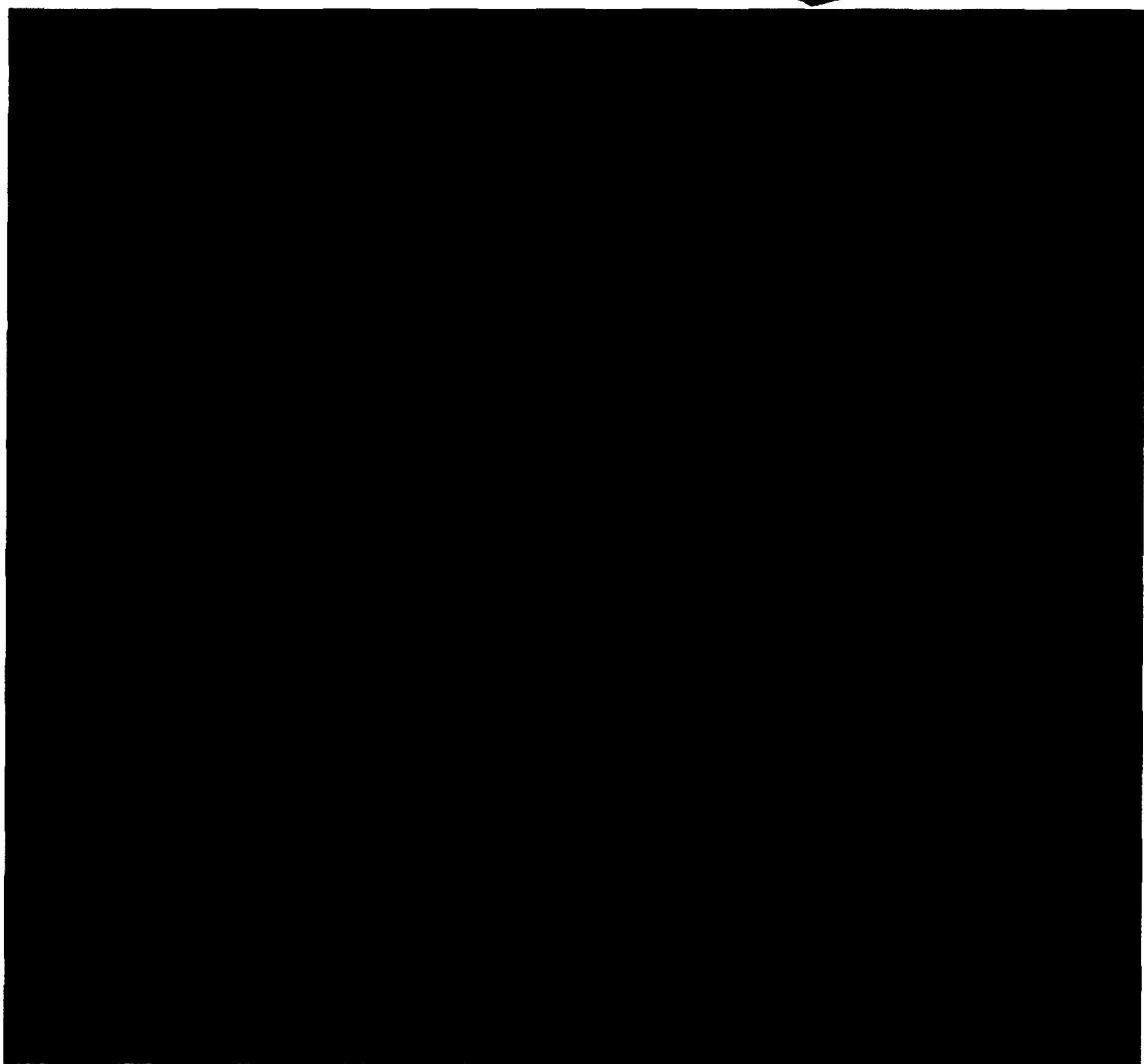
Eastman Kodak Company  
Kodak Apparatus Division



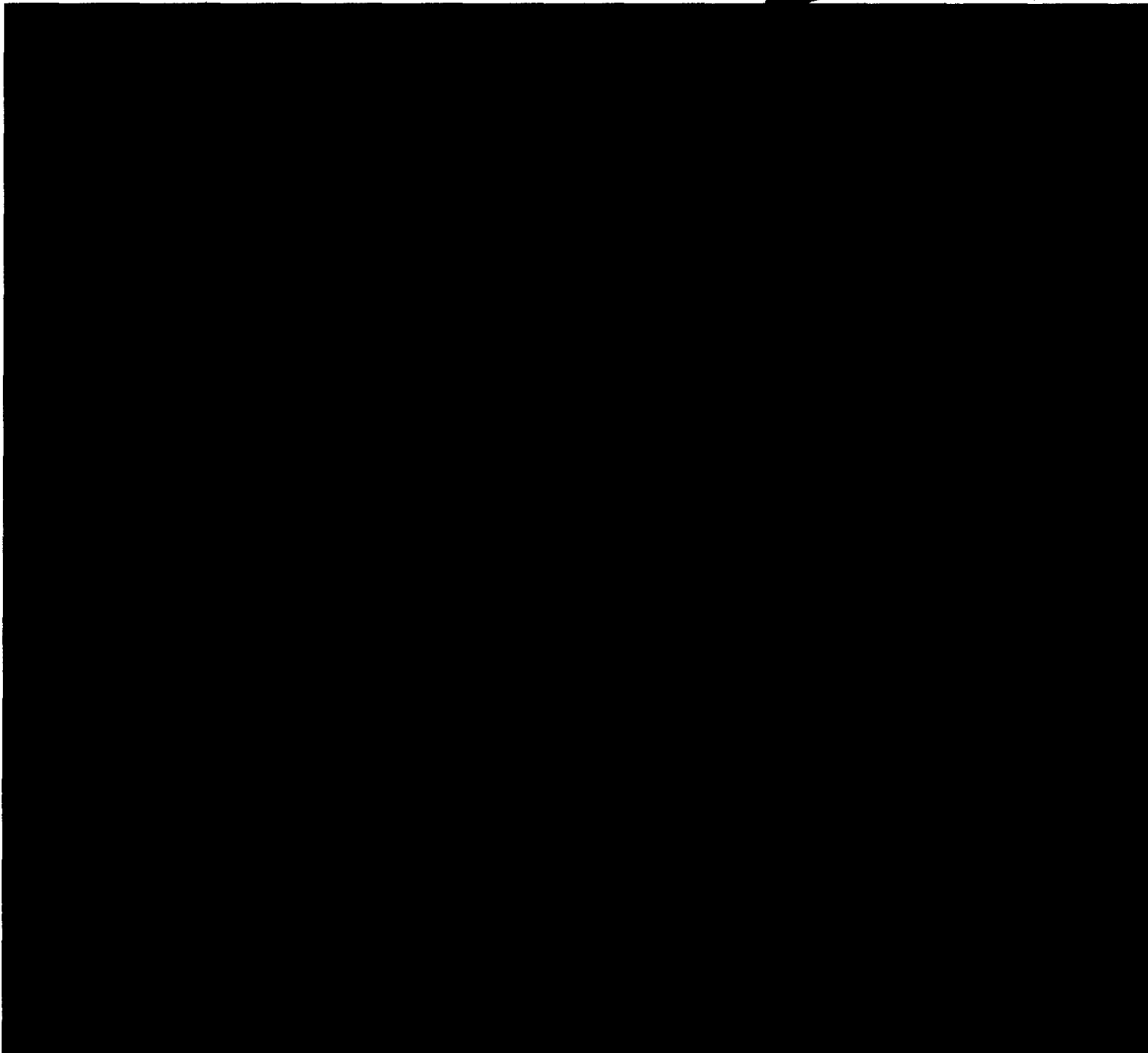


1st FLOOR

FIGURE 3

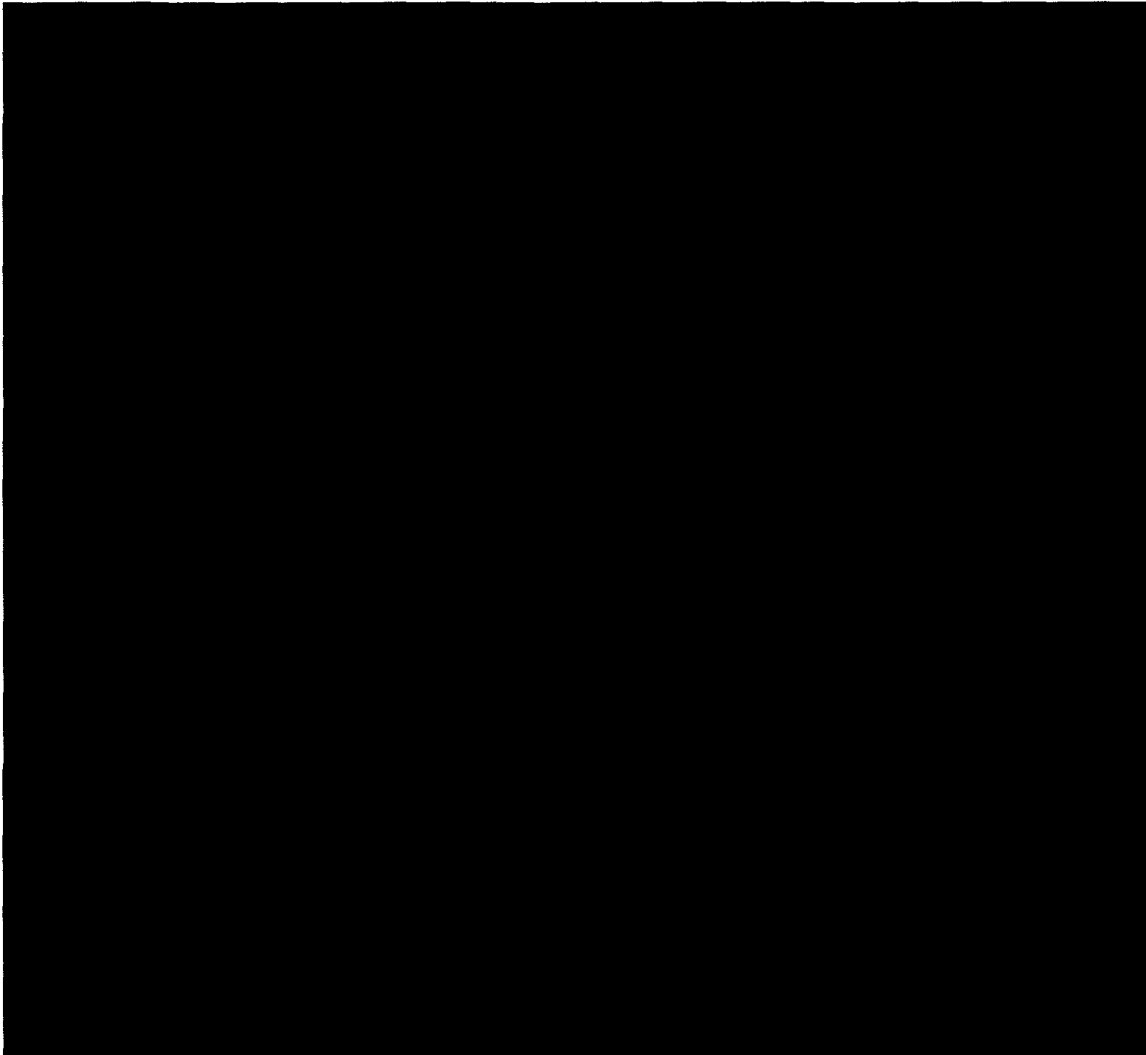


2nd FLOOR  
FIGURE 4



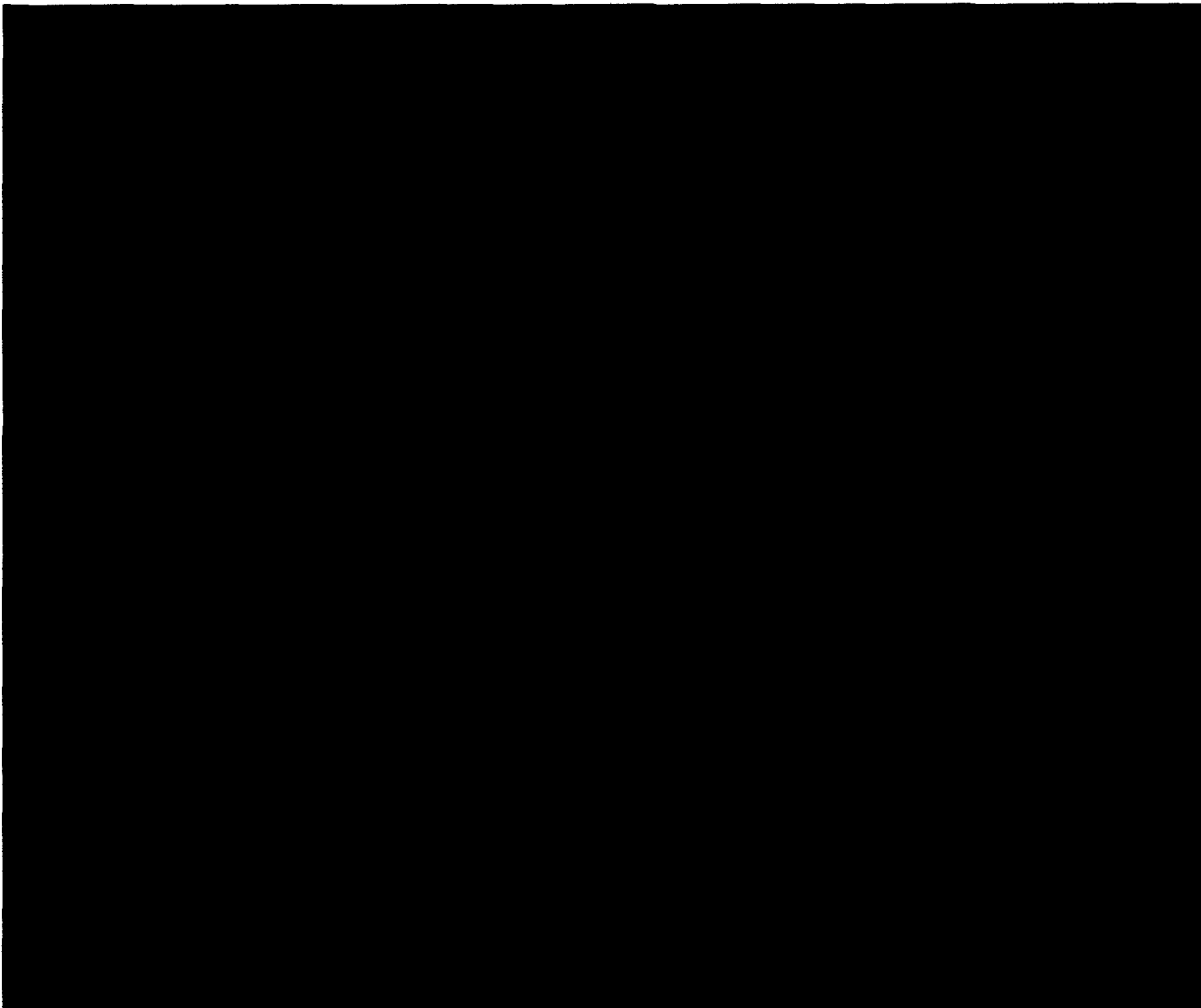
3rd FLOOR

FIGURE 5



4th FLOOR

FIGURE 6



5th FLOOR

FIGURE 7

SECTION II

MISSION PREPARATION

Prior to the arrival of a Gambit or Hexagon mission recovery vehicle, readiness certification of hardware, systems and material 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 materials 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 5 inches and 9-1/2 inches wide by 1,000 ft. long for Gambit missions and 6.6 inches wide by 1,400 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 100,000 lbs. of powder chemicals and a typical Gambit mission requires 25,000 lbs. of powder chemicals. The Black & White 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 at times photographic performance analysis performed on simulation sensitometric test processors, such as the VSSP (Figure 10).



FIGURE 8 - Chemical Mix Room



FIGURE 9 - Chemical Laboratory

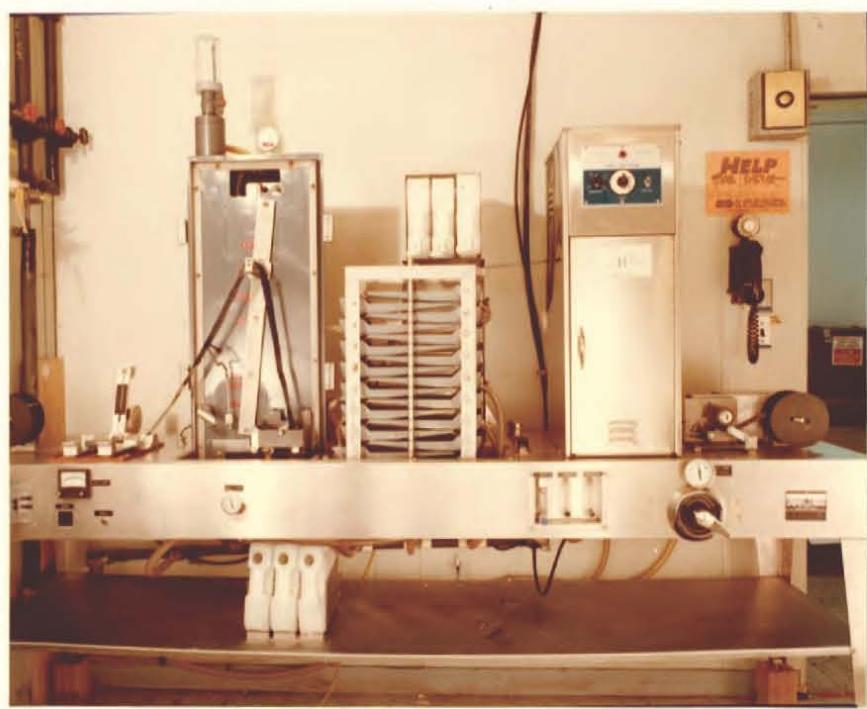


FIGURE 10 - Viscous Sensitometric Strip Processor



## 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

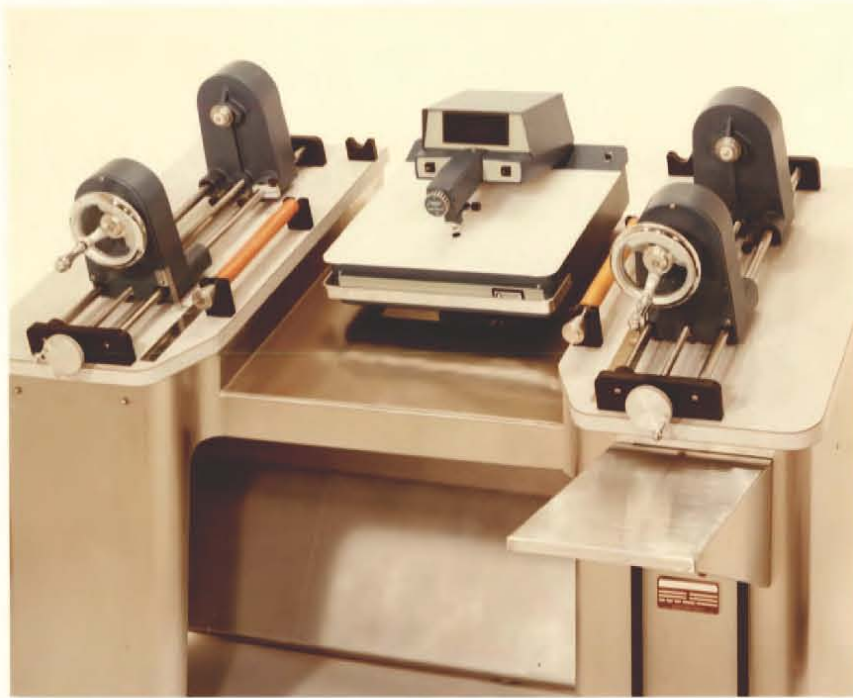


FIGURE 12 - Densitometer



FIGURE 13 - Rawstock Flasher

### MISSION DATA

As a typical mission is flying, data that is needed at certain stages of the Production operations 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

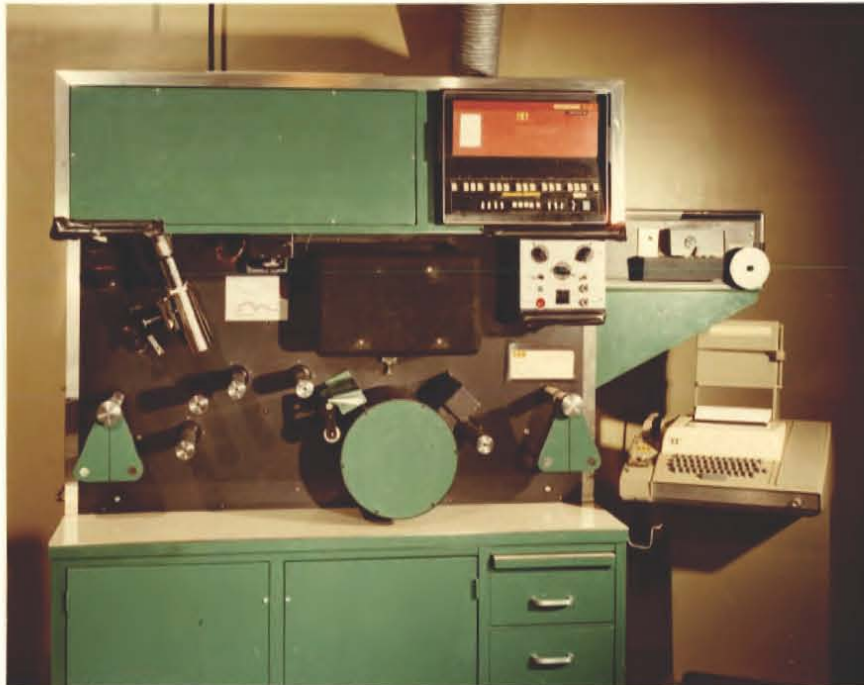


FIGURE 15 - Ident Printer



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.

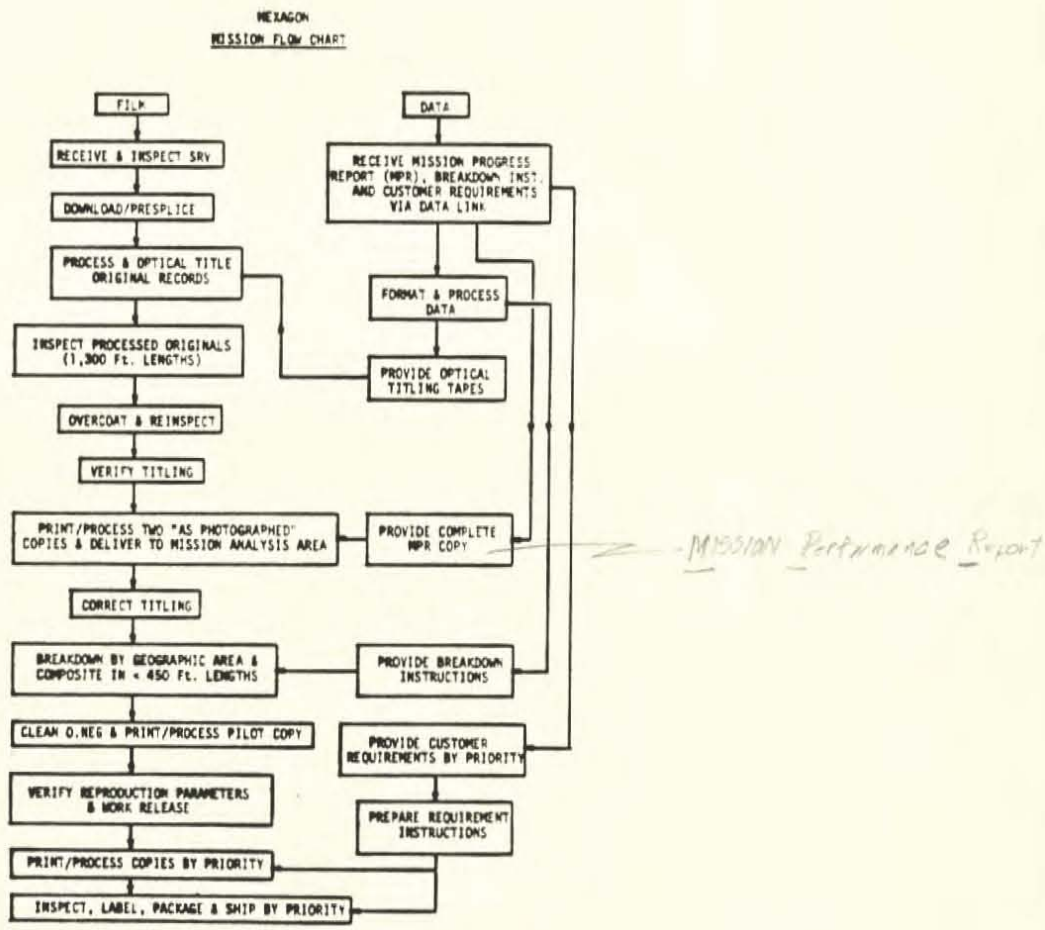


FIGURE 17

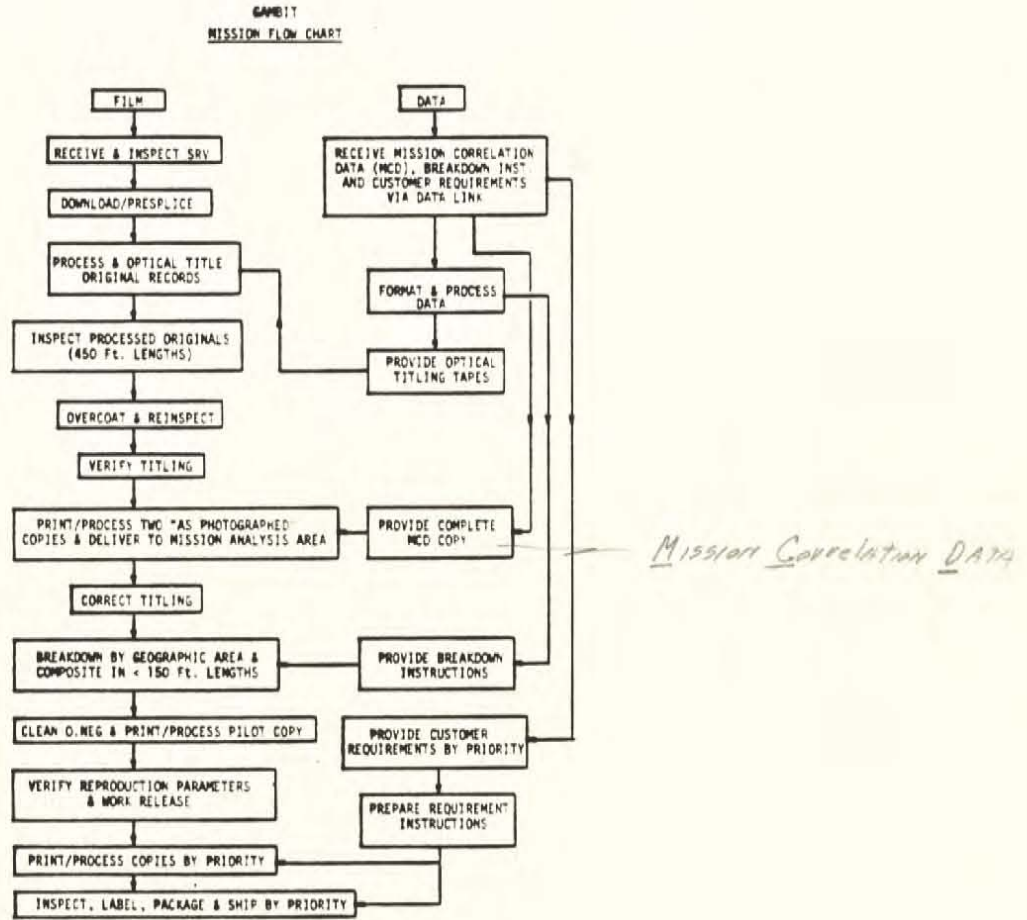


FIGURE 18

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.

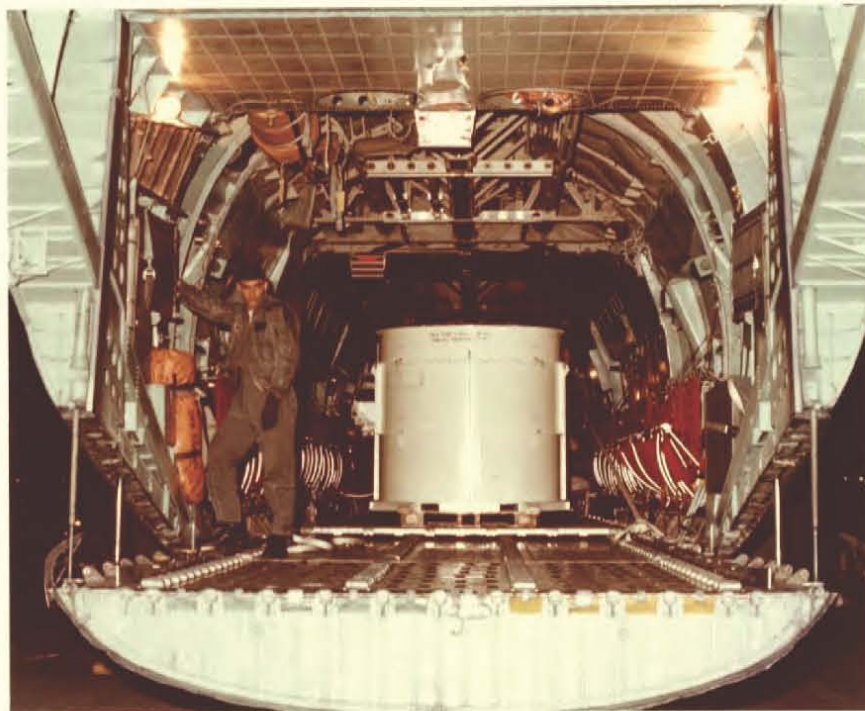


FIGURE 19

Shipping Container in Aircraft

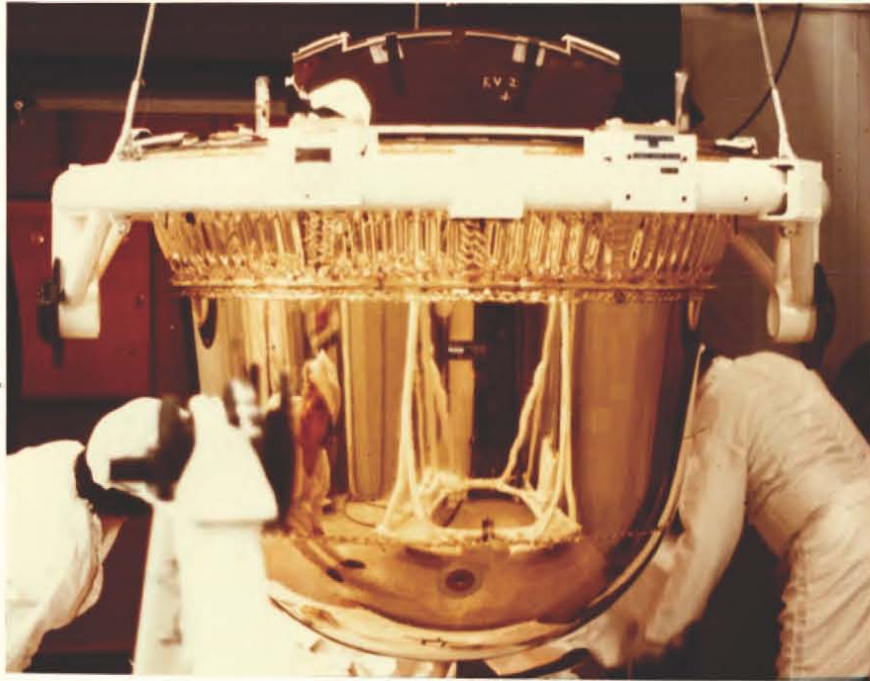


FIGURE 20 - Hexagon SRV



FIGURE 21 - Gambit SRV



### 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 despoiled 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.

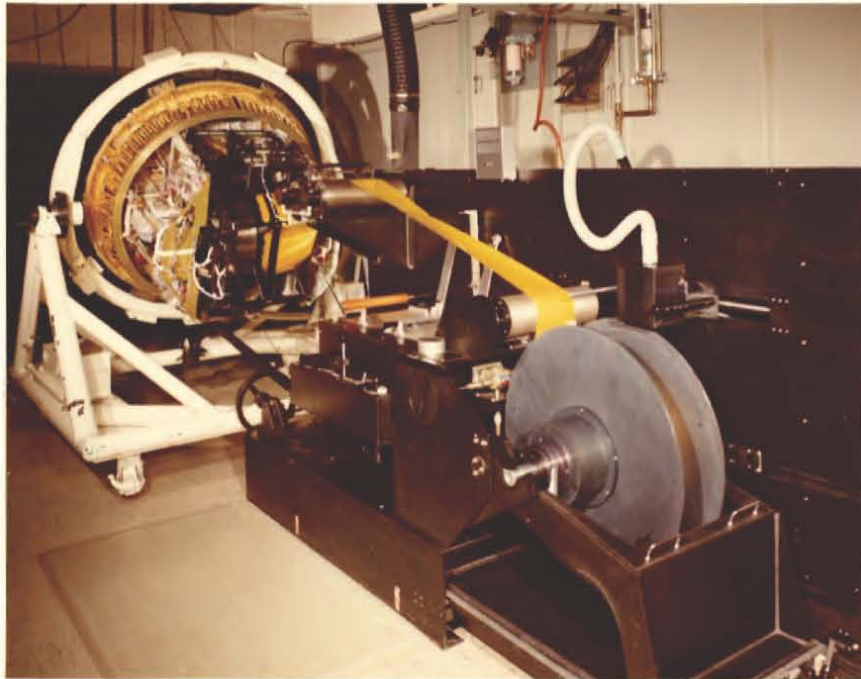


FIGURE 22 - Hexagon SRV Interfaced with Presplice Complex

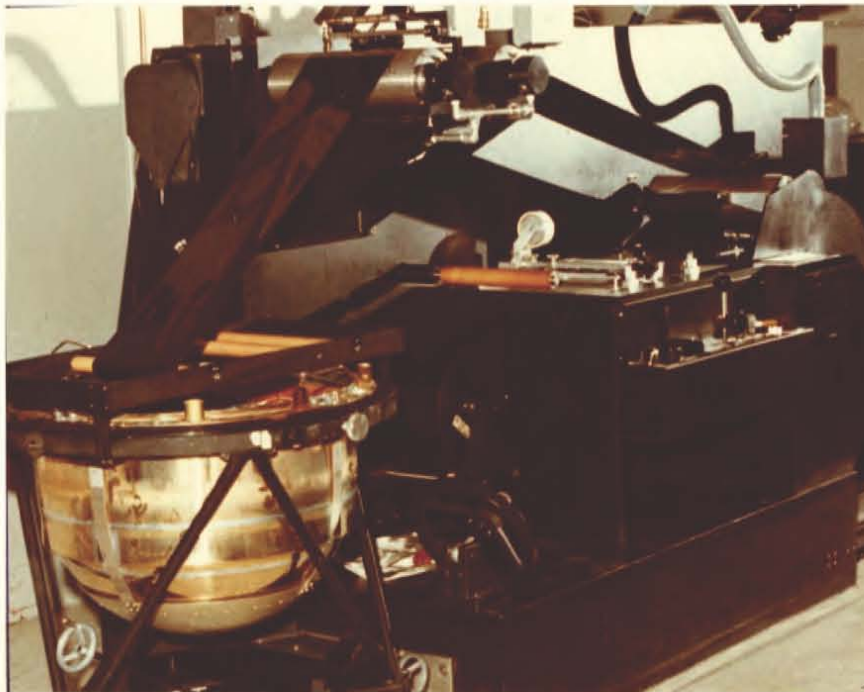


FIGURE 23 - Gambit SRV Interfaced with Presplice Complex

4. ORIGINAL NEGATIVE PROCESSING

There are two Ontario Processors (Figure 24) at Bridgehead for the continuous processing of original negatives of any length. They may be operated simultaneously 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 an Ontario 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. Arrest
3. Fix
4. Wash
5. (Photoflo) *WETTING AGENT*
6. Dry

The viscous developer is applied to the emulsion side of the film by passing through a shell coater. This 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.

*Preliminary Card*



FIGURE 24 - Ontario Processor



FIGURE 25 - Ontario Control/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 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

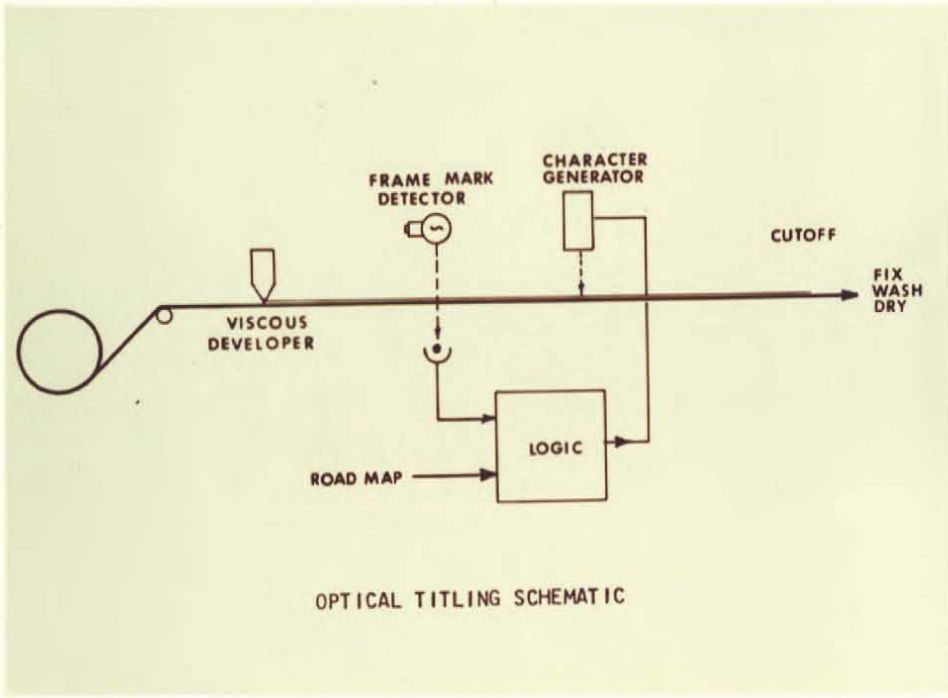


FIGURE 27 - Optical Titling Schematic



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 at the end of an operation (OP) 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 (Figure 31).

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

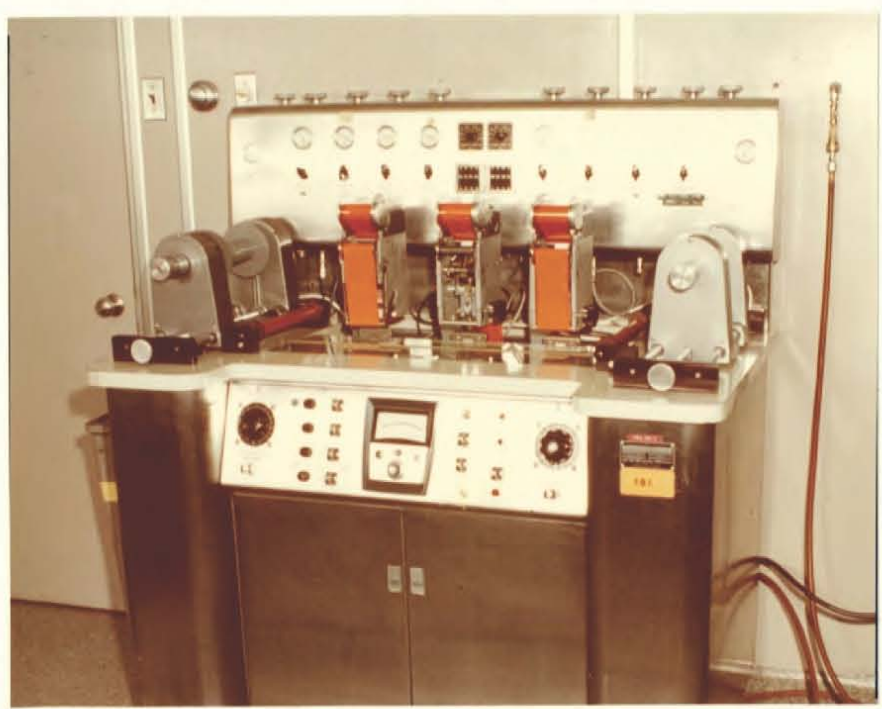


FIGURE 31 - Unimak Titler

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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 26 separate "areas" (see page 55). These pieces of imagery range from a few to over a thousand feet in length. 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 (7,500 ft. per SRV) original record as compared to the Hexagon search system that returns 75,000 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

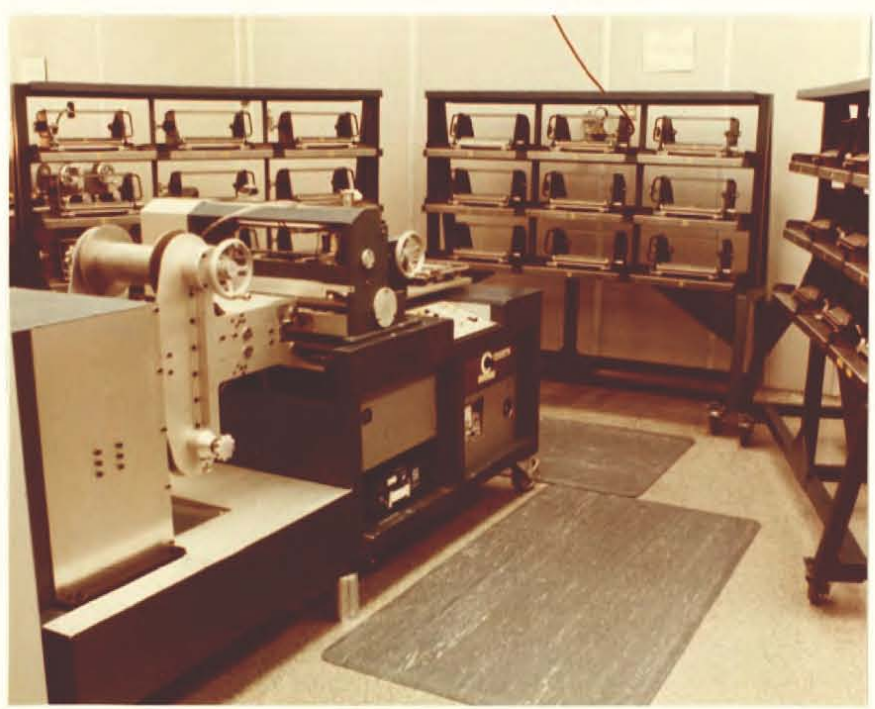


FIGURE 33 - Gambit Geographic Area Breakdown Workplace

## 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 Oneida 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.

The Oneida Printer (Figure 36) is a computer controlled, high intensity, dual lamp printer capable of incremental density and contrast modulation. Exposure and contrast settings are predicted from Cayuga scan data and transferred to the Oneida via a CRT keyboard or programmed floppy diskette. The printer can operate at speeds up to 100 feet per minute on the newer high definition, slower speed duplicating materials. The Oneida provides duplication, with both density and contrast corrections, on a frame by frame basis for Gambit and additionally on an intraframe basis for Hexagon.



FIGURE 34 - Webster Film Cleaner



FIGURE 35 - Cayuga Printer



FIGURE 36 - Oneida Printing Room In White Light  
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 Ontario 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

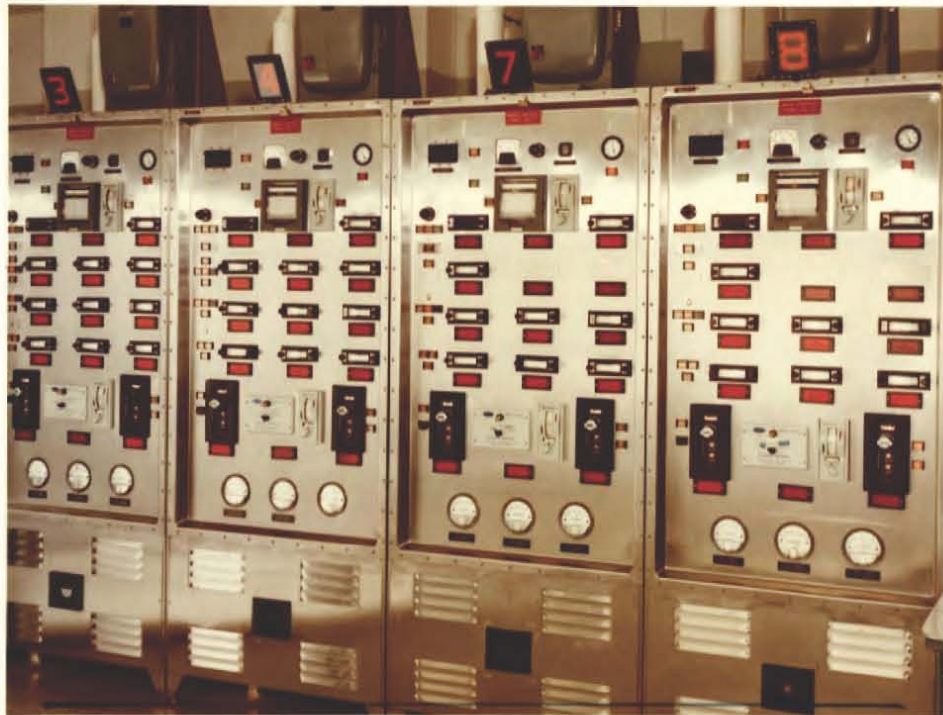


FIGURE 38 - Dalton Monitoring Consoles

## 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 customer 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. The 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 gallon 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 equipment throughput rates are slower compared to current black-and-white operations. This section will cover primarily those elements that differ from black-and-white production. Color production operations formerly located at Lincoln Plant have been consolidated with the black-and-white facilities since January 1977.

2. ORIGINAL CAMERA FILM PROCESSING

There are two prime color processors, the MP<sup>2</sup> (Figure 47) and the CP<sup>2</sup> (Figure 48) at Bridgehead. Both are certified for processing of original color films. Because of workload size, the MP<sup>2</sup> has, in effect, been utilized for the processing of both conventional and false-color infrared color original films at a through-put rate of 6.4 feet per minute.

The film is introduced to the MP<sup>2</sup> in a transport dolly similar to that used in black-and-white processors. All processing stages employ all-liquid deep tank sections and all stages are in total darkness. The sequence of processing steps is:

1. Prehardener
2. Neutralizer
3. First Developer and Optical Titling\*
4. First Stop Bath
5. First Wash
6. Color Developer
7. Second Stop Bath
8. Conditioner
9. Second Wash
10. Bleach
11. Fixer
12. Final Wash
13. Stabilizer
14. Dryer

---

\*Color films are optically titled in a manner similar to that used on the Ontario Processor (see Page 28).

## 2. ORIGINAL CAMERA FILM PROCESSING (CONTINUED)

During the processing operation, which may last for several days, critical machine parameters such as temperatures, solution times and recirculation pressures and transport speed are monitored by a computerized system to assure stable mechanical/photographic control throughout the acquisition processing operation.

## 3. PROCESSING CHEMISTRY

A typical Hexagon RV mission utilizes 5,200 lbs. of dry chemicals and a typical Gambit RV mission utilizes 4,900 lbs. of dry chemicals. While the color film payload has amounted to approximately 4% of the total film load, the number of chemical solutions required for a color process as compared to a black-and-white process (i.e., 9 vs 3) requires a mix-room roughly 75% greater than the size of the black-and-white mixroom (Figure 49).

## 4. COLOR PRINTING

Two types of contact printers are used for color printing. The Rainbow Printer (Figure 51) 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 are used primarily to prepare the duplicate copies for Hexagon Missions.

The Framingham Printer (Figure 52) 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 Cayuga Printer (see Section 10 Black-and-White Printing) is modified optically to permit printing of color materials. One Cayuga Printer, so configured, and a Framingham Printer are used primarily for duplicating Gambit Missions.

## 5. DUPLICATE FILM PROCESSING

The exposed rolls of film from the printing area are processed on the Caledonia Color Production Processor (CP<sup>2</sup>). This processor operates at 20 to 30 feet per minute and is set up to handle the various widths (70 mm to 9-1/2 inch) of color duplicating film normally used in 600 foot length rolls. The transport dolly is positioned as with the MP<sup>2</sup> and black-and-white processors, in total darkness. The sequence of process steps is:



5. DUPLICATE FILM PROCESSING (CONTINUED)

1. Prebath
2. Buffer Wash
3. First Developer
4. First Stop Bath
5. First Wash
6. Color Developer
7. Second Stop Bath
8. Second Wash
9. Bleach
10. Fixer
11. Prewash and Final Wash
12. Stabilizer
13. Dryer

Steps five to eight are under safelights and steps beyond eight are in white light.

During the processing operations, critical machine parameters are monitored by the computerized system which is shared with the MP<sup>2</sup>.

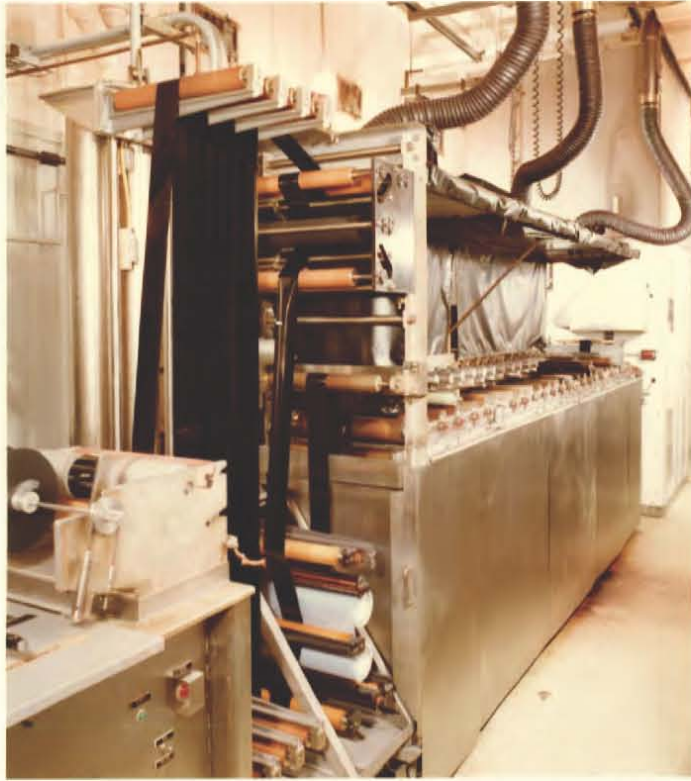


FIGURE 47 - Multi-Purpose Modular Processor (MP<sup>2</sup>)



FIGURE 48 - Caledonia Color Production Processor (CP<sup>2</sup>)



FIGURE 49 - Color Chemical Mix Room

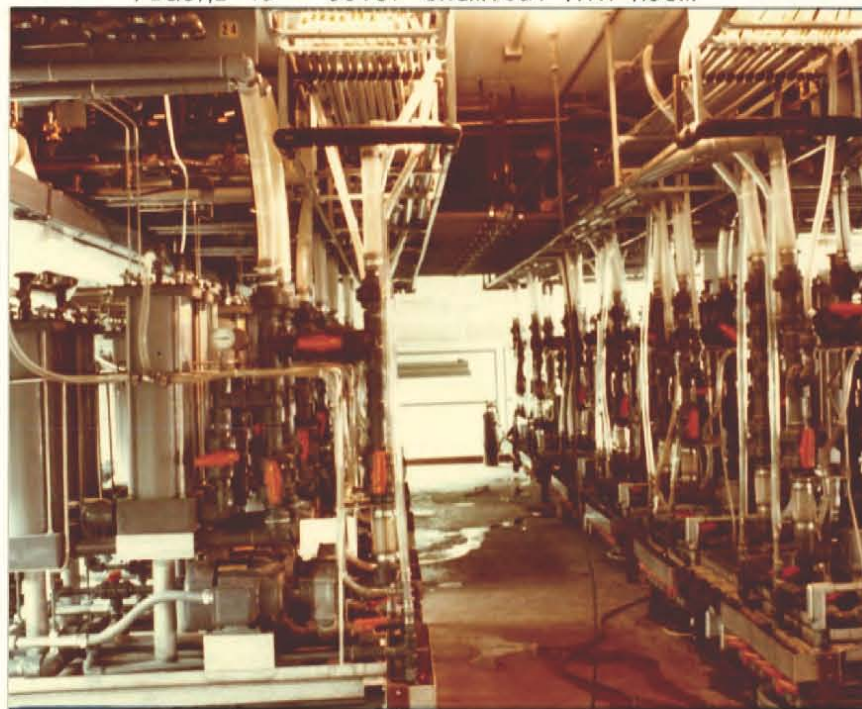


FIGURE 50 - MP<sup>2</sup>/CP<sup>2</sup> Recirculation Equipment  
(Mezzanine)

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GAMBIT  
HEXAGON

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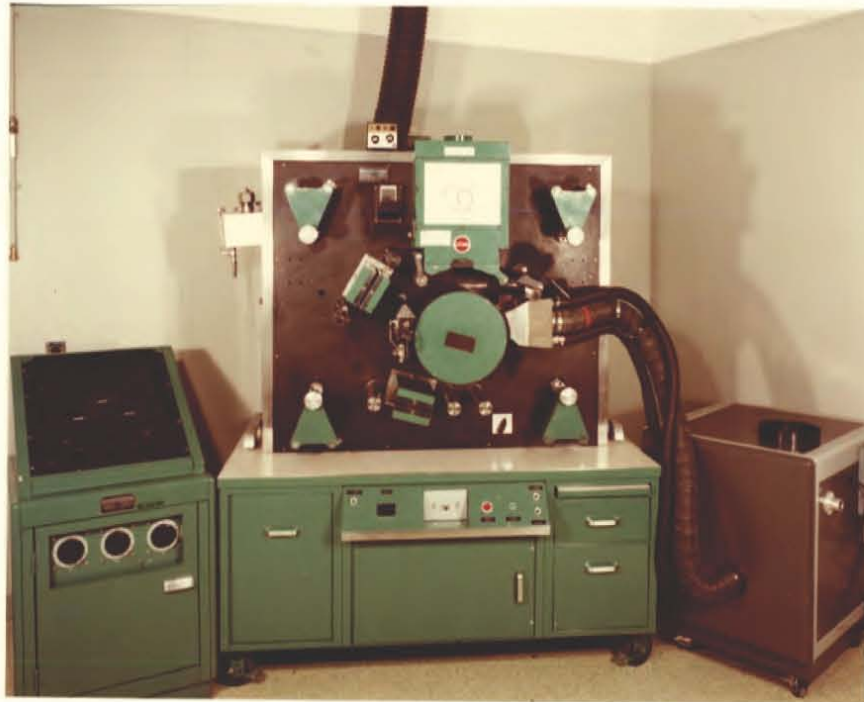


FIGURE 51 - Rainbow Printer

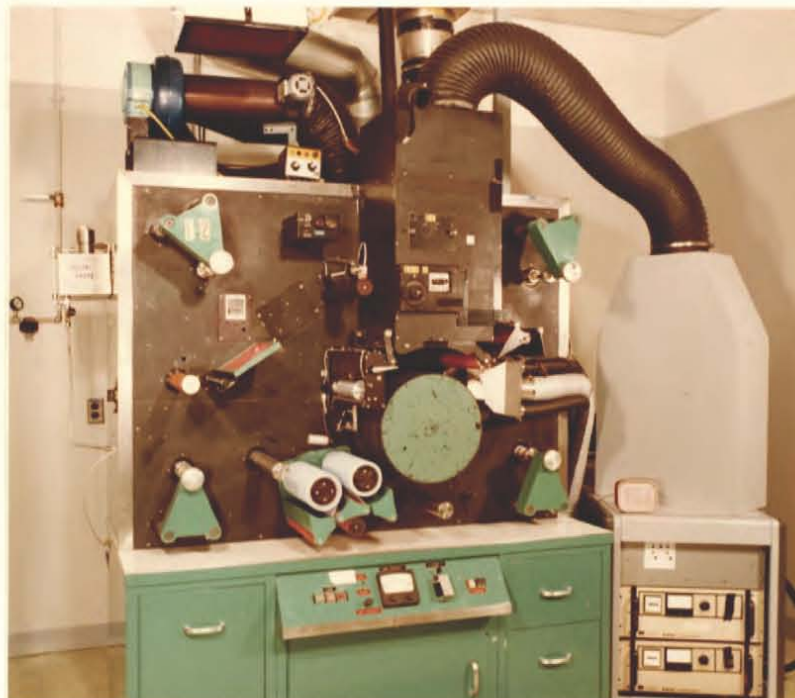


FIGURE 52 - Framingham Printer

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GAMBIT  
HEXAGON

Handle via **BYEMAN**  
Control System Only

7. ENLARGING CAPABILITY

Enlargements of both black & white and color materials are frequently requested by customers to augment the high volume contact reproductions. The Pocatello Color Enlarger (POCE) (Figure 53) 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 54) 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 Startech Processor (Figure 75) or the Kreonite Processor (Figure 55).



FIGURE 53 - Pocatello Color Enlarger (POCE)

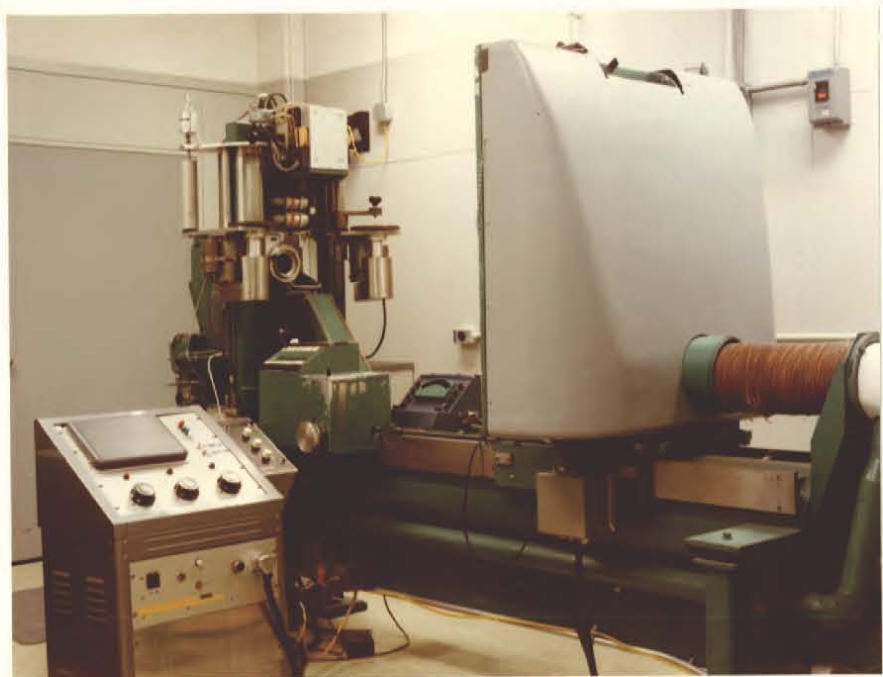


FIGURE 54 - Beacon Precision Enlarger (BPE)



FIGURE 55 - Kreonite Processor

SECTION IV

PRODUCTION CAPABILITIES

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

<u>Mission</u>	<u>SRV/Yr.</u>
Hexagon	4
Hexagon S/T	1
Gambit	2

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

<u>Acquisition Film</u>	<u>Hexagon</u>	<u>Hexagon S/T</u>	<u>Gambit</u>
B&W	72,000	8,000	7,500
Color (Conventional)	1,000	-	150
Color (Infrared)	2,000	-	150

After processing, the Hexagon and Gambit acquisition films are reordered by Geographic Area of the world (Figure 56) 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 56 - Geographic Area Breakdown

TABLE I  
TYPICAL REPRODUCTION REQUIREMENTS PER SRV

<u>Mission</u>	<u>Priority</u>	<u>Number of Customers</u>	<u>Shipping Footage</u>		<u>Cans/Spools</u>
			<u>B&amp;W</u>	<u>Color</u>	
Hexagon	1	1	535,000	5,000	2,000
	2	4	910,000	20,000	3,500
	3	18	920,000	14,000	3,600
	4*	4	3,000	--	25
Gambit	1	1	70,000	3,500	600
	2	3	134,000	4,000	1,300
	3	18	125,000	6,000	1,300
	4	4	1,000	1,500	50
Hexagon S/T	1	6	93,000	--	550

\*B&W from Color only.



In 1978, mission operations were revised to spread the reproduction time over a longer period, thereby reducing personnel requirements. Following this scheme, two twelve hour tricks are scheduled only until Post Flight Analysis requirements are satisfied at which time operations revert to two eight hour tricks supplemented by a "skeleton C trick." Table II shows personnel requirements for this mode of operation.

TABLE II  
PERSONNEL REQUIREMENTS  
(3 - 8 hr. tricks)

<u>Operations</u>	<u>Tricks</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Production	36	36	8
Quality Control	12	12	2
Support (Logistics, Maintenance, etc.)	13	11	5

Figures 57 and 58 reflect revised production timelines based on 1978 and 1979 experience.

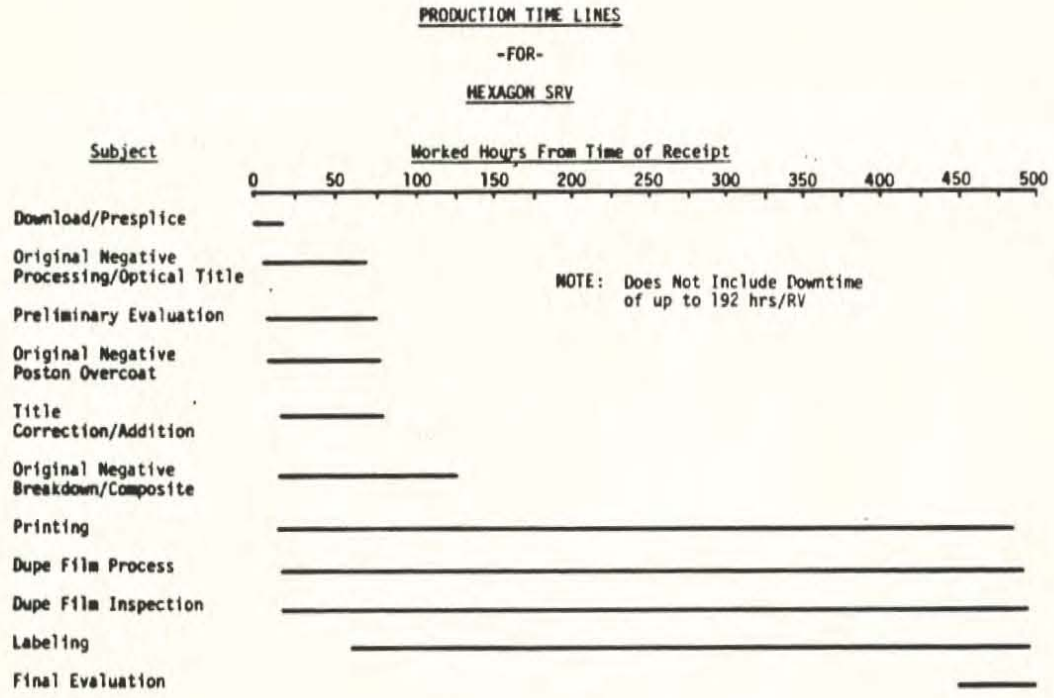


FIGURE 57

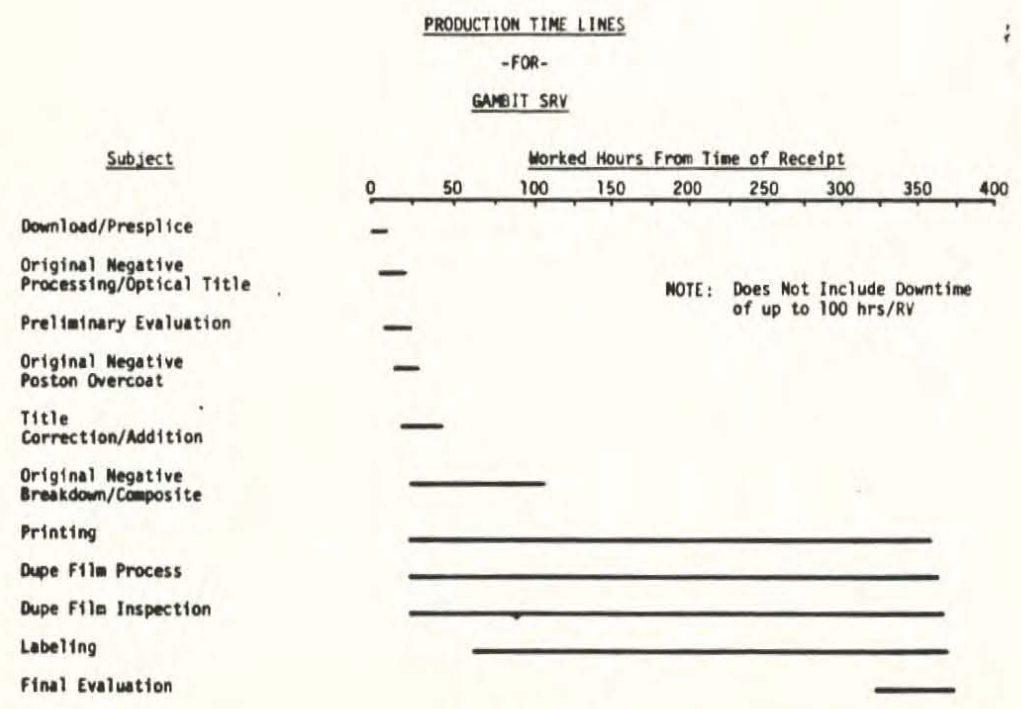


FIGURE 58

SECTION V

MAJOR ITEMS OF EQUIPMENT

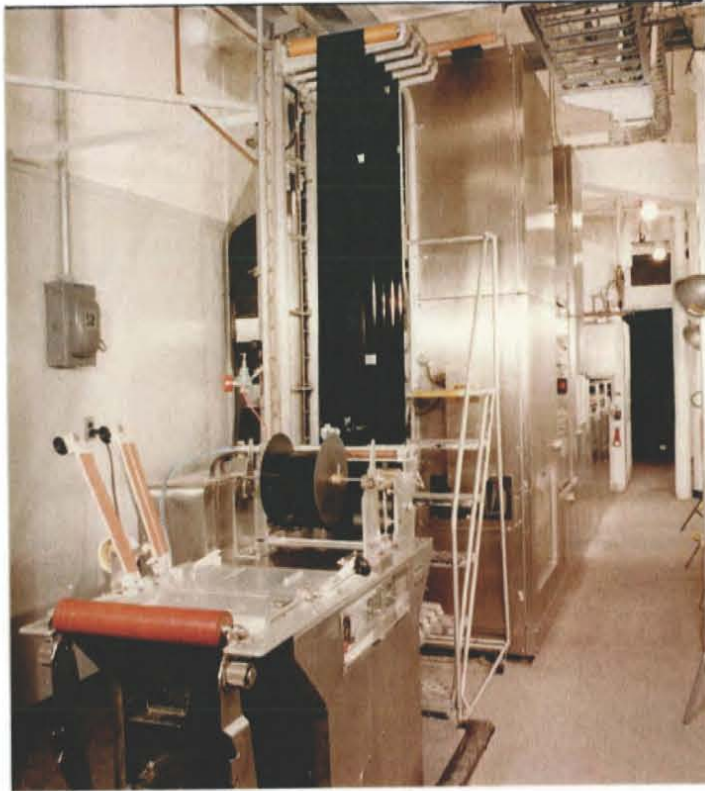
This section describes the major items of equipment used in the Bridgehead Processing Facility:

- Figure 59 - Ontario Film Processor
- Figure 60 - Viscous Dalton Film Processor
- Figure 61 - Multi-Purpose Modular Processor (MP<sup>2</sup>)
- Figure 62 - Caledonia Film Processor (CP<sup>2</sup>)
- Figure 63 - Dundee Processor
- Figure 64 - Color Kreonite Processor
- Figure 65 - Rainbow Continuous Printer
- Figure 66 - Beacon Precision Enlarger (BPE)
- Figure 67 - Cayuga Continuous Printer
- Figure 68 - Framingham Continuous Color Printer
- Figure 69 - Oneida Printer
- Figure 70 - Kingston Continuous Printer
- Figure 71 - Continuous Rawstock Flasher
- Figure 72 - Automatic Continuous Identification Printer
- Figure 73 - Pocatello Color Enlarger (POCE)
- Figure 74 - Precision Enlarger 10-20-40X
- Figure 75 - Startech Processor
- Figure 76 - Miller Holzwarth Flatbed Printer
- Figure 77 - Computer Assisted Machine Control (COMAC)

SECTION V

MAJOR ITEMS OF EQUIPMENT - CONT'D.

- Figure 78 - Presplice Complex
- Figure 79 - G Area Breakdown
- Figure 80 - Camden Inspection Table
- Figure 81 - Editing Table 30-Inch
- Figure 82 - Webster Film Cleaner
- Figure 83 - Unimak Film Titler
- Figure 84 - Intensity Scale Sensitometer, Type 1-B
- Figure 85 - Title Remover Assembly
- Figure 86 - Distortion Analysis System
- Figure 87 - Viscous Sensitometric Strip Processor
- Figure 88 - Poston Coating Machine



ONTARIO  
Film Processor

is a viscous black-and-white processor dedicated to the processing of original 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 50 feet per minute.

FIGURE 59

Viscous DALTON  
Film Processor

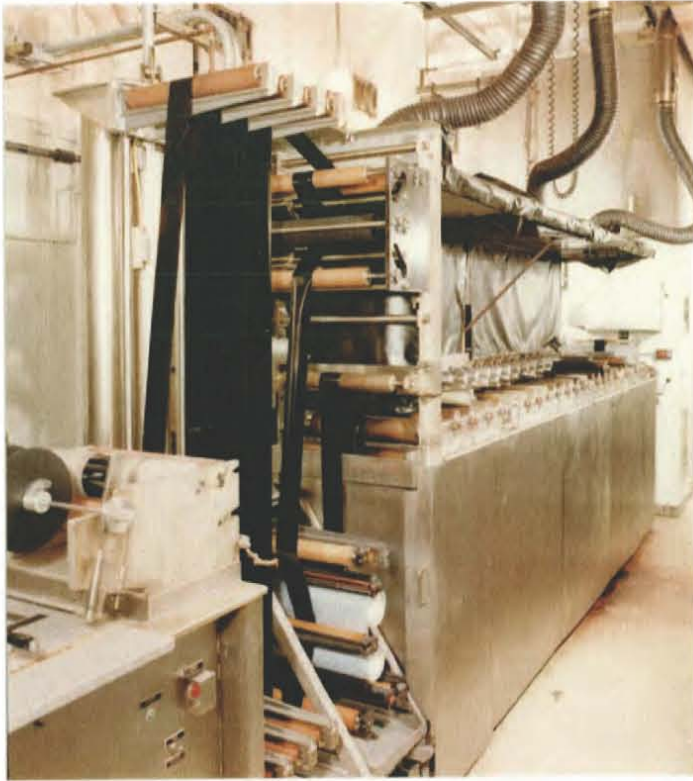
is used to process duplicating film at speeds up to 100 feet per minute. Viscous development makes possible sensitometric effects not readily obtainable by other processing methods.



FIGURE 60

GAMBIT  
HEXAGON

Handle via **BYEMAN**  
Control System Only



Multi-Purpose Modular Processor (MP2)

is an all liquid deep tank processor designed in a modular configuration to permit its use as an extremely flexible experimental processor as well as an original film production machine. It will handle continuous rolls of any length from 70mm to 9.5 inches wide. It has edge-flashing and optical titling capability and a computerized central control and monitoring station. Its maximum speed is 10 feet per minute.

FIGURE 61

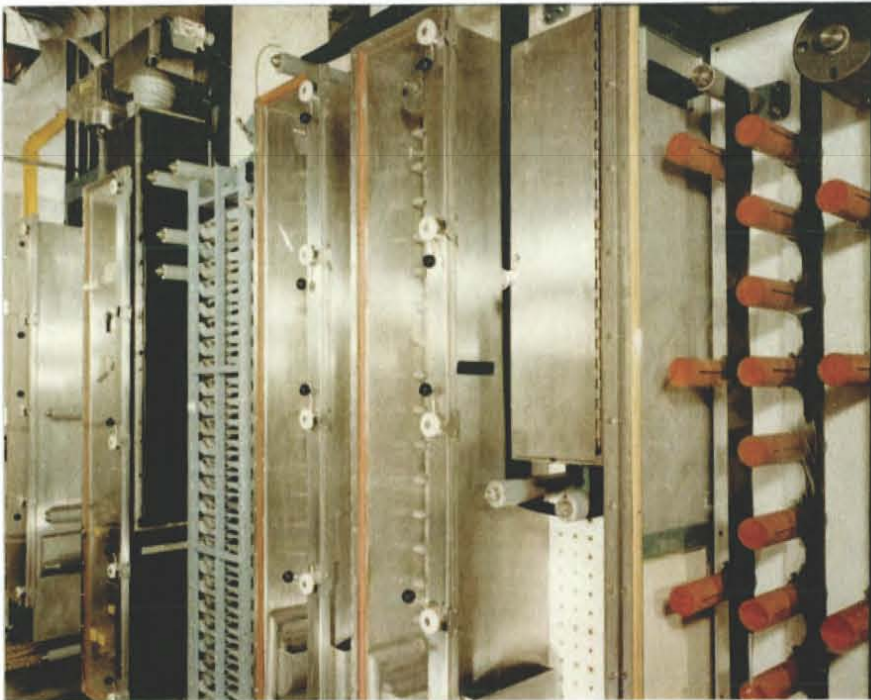
Caledonia Color Production Processor (CP2)

is capable of processing color reversal or negative original and duplicate materials at through-put rates of up to 45 feet per minute. It has edgeflashing and optical titling capability and a computerized central control and monitor station. It is the world's largest wide web color aerial film processor over 63 feet in length containing 108 film racks in 35 deep tank modules.



FIGURE 62

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 63

Color Kreonite  
Processor

is used to process to process color paper prints in support of color contact and enlarging printers. It will handle continuous rolls or sheets of color paper up to 30 inches wide. Processing time is 10 minutes dry to dry.



FIGURE 64

RAINBOW  
Continuous Printer

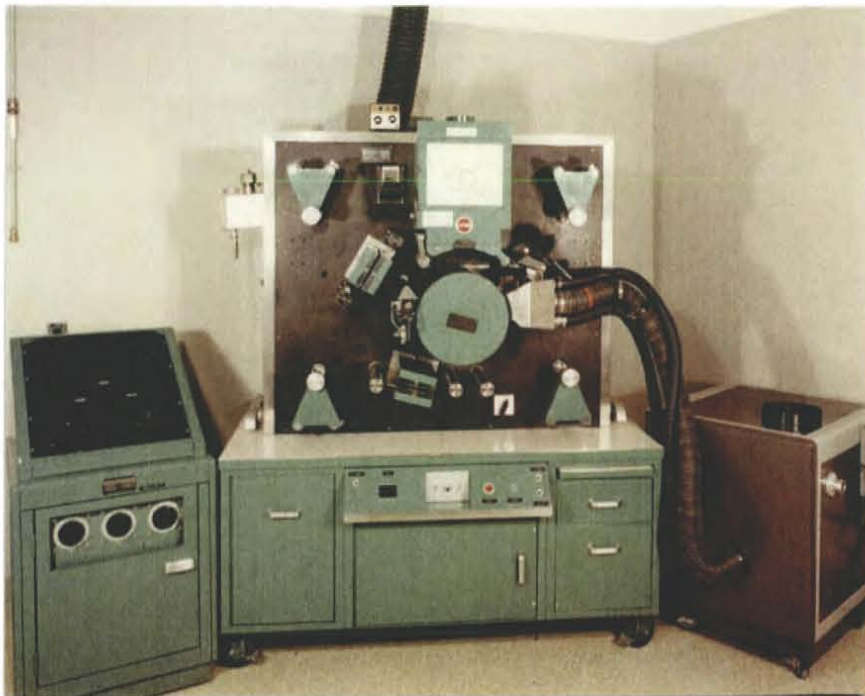


FIGURE 65

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.

BEACON Precision  
Enlarger

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.

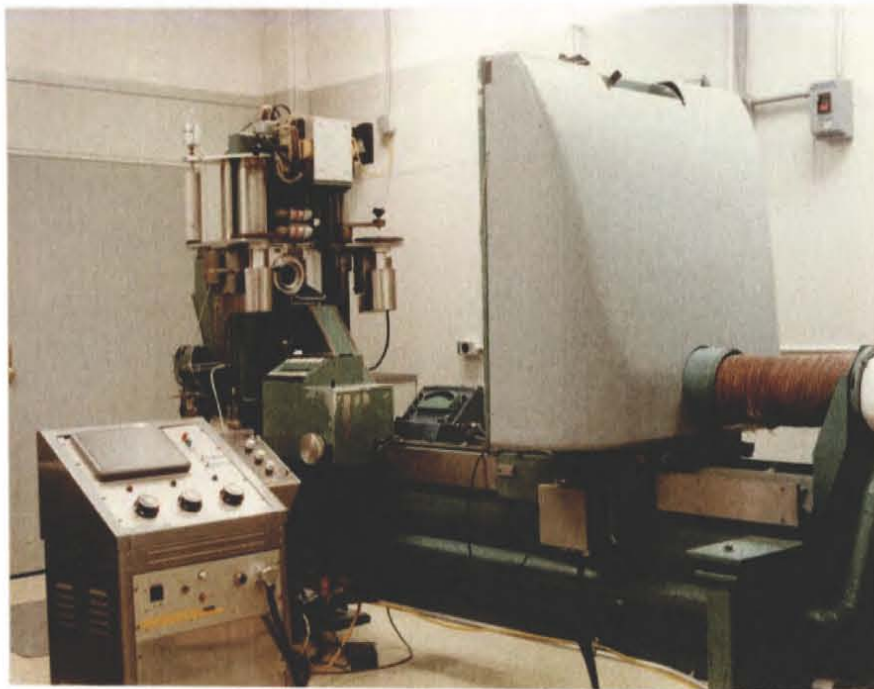


FIGURE 66



**CAYUGA**  
Continuous Printer



is primarily a black & white contact printer with intra-frame 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. It can be modified optically, to permit printing of color duplication materials.

FIGURE 67

**FRAMINGHAM** Continuous  
Color Printer

is a continuous programmable frame-by-frame density controlled printer capable of printing color 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 correction capability. Roll film in standard widths between 70mm and 9.5 inches can be printed on this machine. The Framingham is also utilized to print black and white materials at speeds up to 100 ft. per minute.

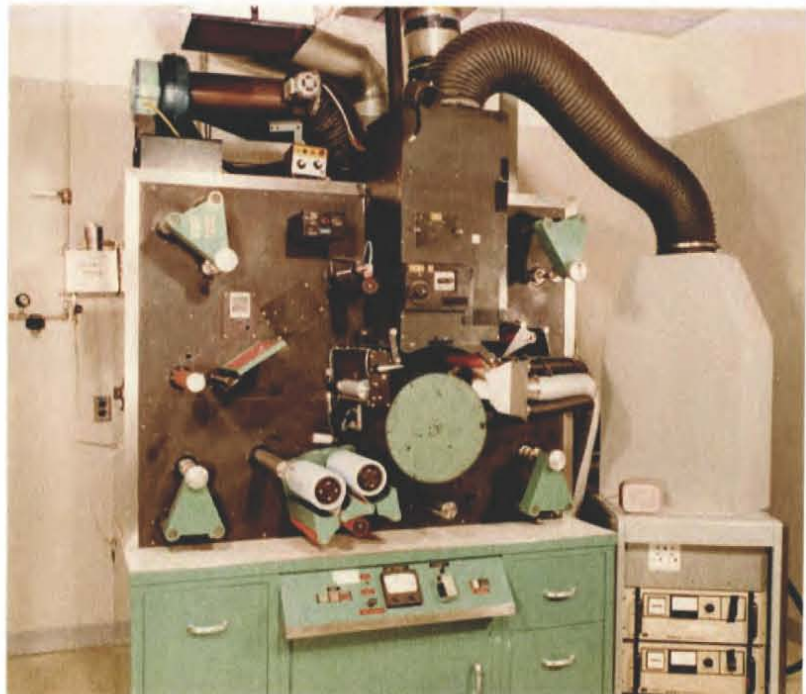
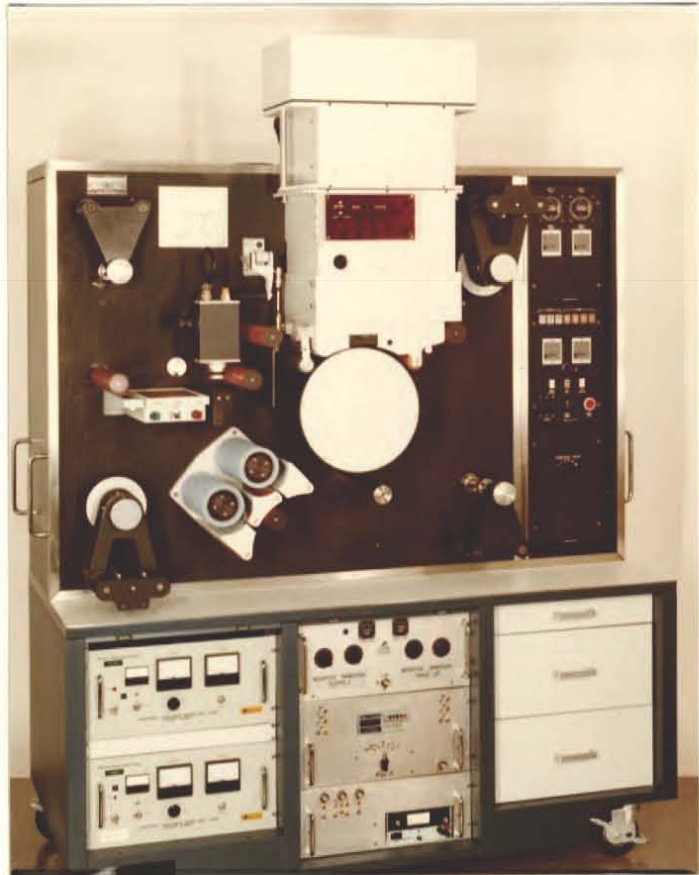


FIGURE 68



ONEIDA Continuous  
Printer

is a computer controlled, high intensity, dual lamp printer capable of incremental density and contrast modulation. The printer can operate at speeds up to 100 feet per minute on the newer high definition, slower speed duplicating materials.

FIGURE 69

KINGSTON Continuous  
Printers

were designed specifically to minimize overall non-linear distortion. Essentially, they differ from conventional continuous printers by incorporating devices such as: A large (20 inch) diameter printing drum, independent casted pressure rollers, precision spools and a constant tension film transport system.



FIGURE 70  
GAMBIT  
HEXAGON



Continuous  
Rawstock Flasher

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.

FIGURE 71

Automatic Continuous  
Identification Printer

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 72  
GAMBIT  
HEXAGON

Handle via BYEMAN  
Control System Only

POCATELLO  
Color Enlarger (POCE)



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 additively by an integrating photometer; titles can be contact printed on the enlargement.

FIGURE 73

10-20-40X  
Precision Enlarger

is a vertical precision enlarger used to print black-and-white transparency and paper prints up to 11 x 14 inches in size.



FIGURE 74

GAMBIT  
HEXAGON

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Handle via **BYEMAN**  
Control System Only

STARTECH Processor

is used to process black-and-white paper and transparency prints in widths up to 30 inches.



FIGURE 75

MILLER HOLZWARTH  
Contact Printer

is a flatbed contact printer used with black-and-white and color materials up to 11 x 14 inches in size.



FIGURE 76

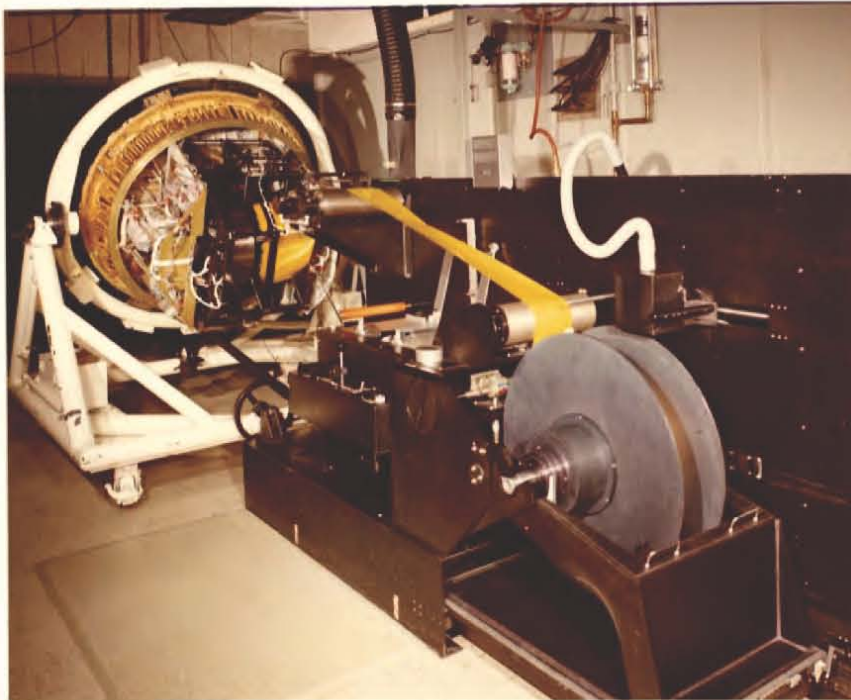


FIGURE 77

Computer Assisted Control (COMAC)

is an off-line computer system used to control printer and duplicate film processors via semi-automatic input from a densitometer to a computer. Final analysis data is output to a CRT and a line printer in alphanumeric and graphic form. System components consist of a computer, 10 megabyte disk, dual floppy disk, cassette unit, paper tape reader, two CRT's, and a line printer.

Presplice Complex



is used for downloading acquisition film from the vehicle payload and for rewinding the web onto spools in preparation for processing. During re-wind, film is manually and electronically monitored for physical damage that might cause a problem during processing. Damaged sections can be removed 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.

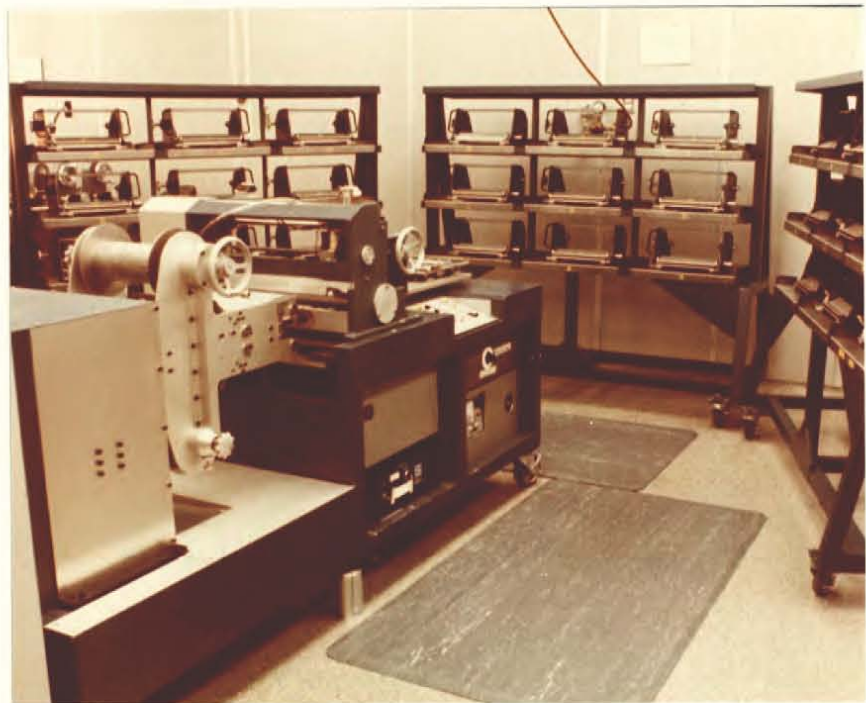


FIGURE 79

**GAMBIT**  
**HEXAGON**

Handle via **BYEMAN**  
Control System Only

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.



FIGURE 80

Editing Table,  
30-Inch

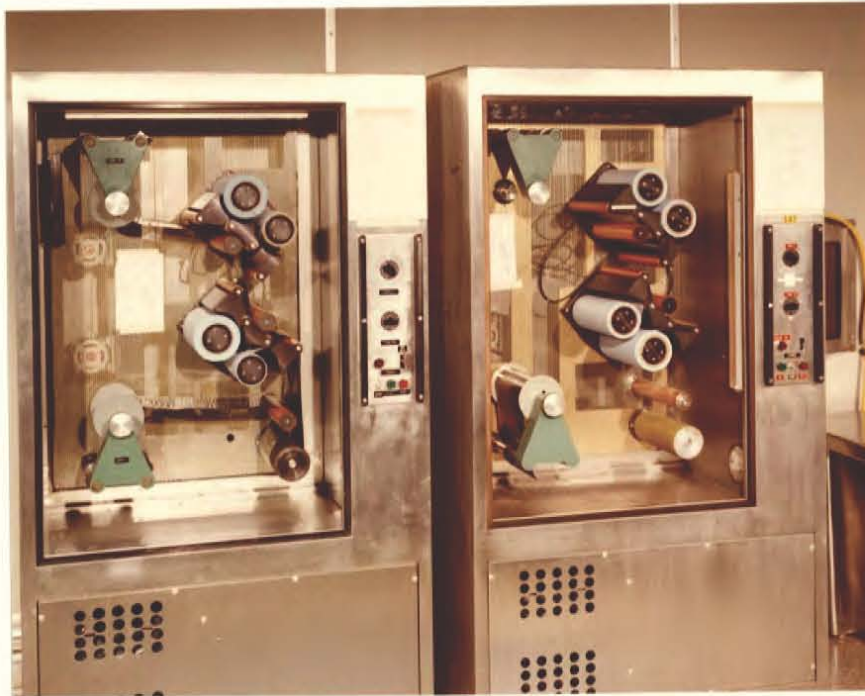
is used for viewing, inspecting, evaluating, and editing both original negative and contact printed duplicates in roll form. Manual rewinds provide close control over film transport to preclude physical damage to valuable acquisition film. Film widths from 70mm to 9.5 inches can be handled on MS 26565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



FIGURE 81



WEBSTER  
Film Cleaner



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

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 MS 26565 spools up to 10-1/2 inches diameter. Titles generally consist of a fixed field of alphanumeric data plus an automatically sequenced frame number. Machine-readable binary-coded frame numbers can be titled.



FIGURE 83

GAMBIT  
HEXAGON

Handle via **BYEMAN**  
Control System Only

INTENSITY SCALE  
SENSITOMETER  
Type 1-B, Model V



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

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

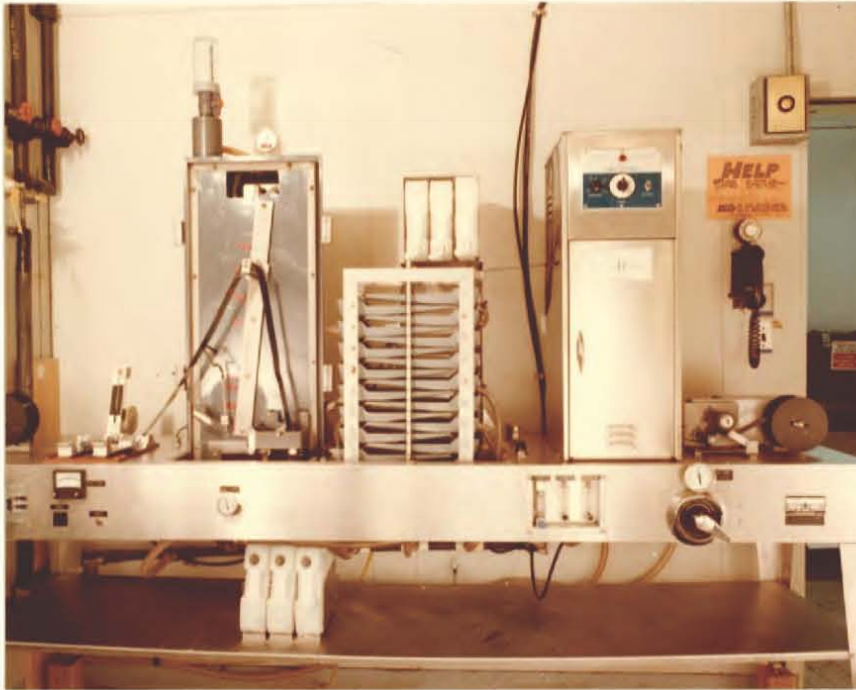


FIGURE 86

Distortion Analysis System

is a near real time computer system used to determine vectors produced on film by a Moire' pattern cancellation effect at a preselected number of prints across the film web. Distortion pattern data is input to the computer in a semi-automatic mode via a digitizer unit. System components consist of a computer, 10 megabyte disk, dual floppy disk, CRT, and line printer.

VISCOUS SENSITOMETRIC  
STRIP Processor  
(VSSP)



is designed to permit processing of short lengths of 70 mm or narrower films, for purposes of evaluating sensitometry obtained from viscous developers.

FIGURE 87

POSTON Coating  
Machine

is used to apply a special gel coating containing matte particles on rolls of processed acquisition films to reduce contact printing artifacts.



FIGURE 88

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HEXAGON

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Gambit                      Hexagon                      .....

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