SECRET
(When Filled In)

02107

R & D CATALOG FORM

DATE: 9 August 1966

1. PROJECT TITLE/CODE NAME
Twin Light Source Table With Measuring Stage

2. SHORT PROJECT DESCRIPTION
Development and fabrication of a Twin Light Source Table with measuring stage for viewing film chips.

25X1

5. CLASS OF CONTRACTOR
Manufacturer

6. TYPE OF CONTRACT
Fixed Price

7. FUNDS
FY 19 $

8. REQUISITION NO.

9. BUDGET PROJECT NO.
02107

25X1

FY 1967

10. EFFECTIVE CONTRACT DATE *(Begin - end)*
September 1966-January 1967

11. SECURITY CLASS.
A.A. - Confidential
T. - Unclassified
W. - Unclassified

FY 19 $

25X1

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION
DDI/NPIC/P&DS/

13. REQUIREMENT/AUTHORITY
Recent stereoscope developments which cannot be utilized with existing light tables require new source of illumination. This device will satisfy that need.

14. TYPE OF WORK TO BE DONE
Engineering Development

15. CATEGORIES OF EFFORT

MAJOR CATEGORY	SUB-CATEGORIES
Viewing Systems	

16. END ITEM OR SERVICES FROM THIS CONTRACT/IMPROVEMENT OVER CURRENT SYSTEM, EQUIPMENT, ETC.
One prototype light table will be delivered. No existing light table has the physical configuration that is required for utilization with the recently developed rhomboid attachment for the Zoom 70 Stereoscope. 25X1

17. SUPPORTING OR RELATED CONTRACTS *(Agency & Other)*/COORDINATION
Internal and external coordination is being maintained to insure that there is no duplication of effort within the Community.

25X1

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT *(Continue on additional page if required)*
The recently developed Advanced Rhomboid Attachment for the Zoom 70 Stereoscope has found such wide acceptance that large quantities are being purchased for utilization with the existing stereoscopes. Presently no light table is available for viewing film chips and this development will satisfy this deficiency. Not only will the instrument accommodate the new and old configuration of the Zoom 70 but also will accommodate the existing SZ 25X1
25X1 and M-5 Stereoscopes.

19. APPROVED BY AND DATE

OFFICE	DEPUTY DIRECTOR	DDCI

FORM 11-64 2338 SECRET (1-13)

GROUP 1 Excluded from automatic downgrading and declassification

[redacted]

25X1

Proposal No. SME-CG-58

5 March 1966

(S. I. 240, 164)

LIGHT TABLE WITH MENSURATION SCANNING STAGE

"This proposal contains information which is proprietary to the Offeror. Accordingly, this proposal shall not be disclosed outside the Offeree's organization or be duplicated, used or disclosed in whole or in part for any purpose other than to evaluate the proposal; provided, however, that if a contract is awarded to this Offeror as a result of or in connection with the submission of such proposal, the Offeree shall have the right to duplicate, use or disclose the information contained in such proposal to the extent provided in the contract. This restriction does not limit the Offeree's right to use information contained in such proposal if it is obtained from another source."

25X1

[redacted]

Inspection visit of 26 October 1965.

25X1

2. Attendees:

[redacted]

3. The design of the light table was reviewed and the following items were discussed.

25X1

a. Items which [redacted] requested to be changed (for their benefit) and the technical monitor agreed.

1. The brightness range will be 200 to 4000 ft. lamberts operating at a maximum film plane temperature of 95°F in a 70°F ambient. The lamp life will be about 10,000 hours and at maximum brightness the lamp will require approximately 60 milliamps.

2. The positions of the counters have been moved to the corners outside of the instrument, but remain on the same supporting surface.

3. The diameter of the stage transport handwheels have been increased to 3 inches.

4. Both the overall length and overall width have been increased by ½ inch.

b. Requested changes that were not permitted.

1. Moving the "Y" counter and handwheel onto the moving stage. This would require the counter and handwheel to move.

2. Reduction of the speed of motion of the stage. 50 turns of the handwheel will now be required to move the stage 3 inches in either axis.

3. Elimination of the divisions on the last drum counter.

4. Substitution of [redacted] Zoom 70 support ring for the proposed versatile ring. The versatile ring will be retained.

25X1

c. The following measurements will be provided to [redacted]

25X1

1. [redacted]

2. The working distances of the microscopes.

26 October 1967

SUBJECT: Comments on informal operational checkout of Twin Light Source Table/ with Measuring Stage

1. On-Off switch should be located on front of the instrument. A small power indicator lamp of the Dialight variety would also be useful.

4. I measured the "dead zone" of the counters. This was accomplished by positioning a last word counter against the stage and checking the counter when movement was indicated.

X Dead Zone Indication .000.04 ft.

Y Dead Zone Indication .02 ft.

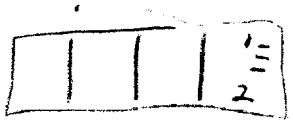
.05

The equivelent of 50 ft. on the counter was checked with actual stage movement. I checked this measurement against my P.I. scale. I could not detect any counter error in either the X or Y directions using this method of measurement.

[redacted]

25X1

Equipment Performance Staff, TDS



25X1

Proposal No. SME-CG-58
5 March 1966

TABLE OF CONTENTS

25X1

LIST OF ILLUSTRATIONS

25X1 [redacted]

Proposal No. SME-CG-58
5 March 1966

SECTION 1

INTRODUCTION

1.1 GENERAL

This revised proposal for the Light Table with Mensuration Scanning Stage has been prepared by [redacted] 25X1
25X1 [redacted] n response to the recommendations resulting from the originally submitted proposal, [redacted] Proposal No. SME-CG-55. [redacted] is particularly 25X1
25X1 well qualified in the engineering technologies which are essential for successful design, development and fabrication of the required light table. Of particular value in the proposed program is [redacted] 25X1
extensive experience in developing equipment for image interpretation systems with mensuration, such as the Multi-Sensor Viewer. Based
25X1 upon this background, [redacted] can offer assurance of repeating of high-quality picture illumination and reliable dimming control in addition to the new-added features.

1.2 BRIEF DESCRIPTION

The Light Table with Mensuration Scanning Stage, as shown in Figure 2-1, is a table top unit which presents [redacted] approach 25X1
to efficiently adding the capabilities of a Mensuration Scanning Stage to the Twin Light Source Stereoscope Light Table. This scanning stage has extremely smooth movement so that the imagery does not jump when viewing through a microscope while moving. The mensuration capability, provided for each axis, has an accuracy of ±0.001"/inch, with the capability for reading or interpolating to the nearest 0.0001".

Additional features of this new viewer are:

1. Elimination of the tilting arrangement of the original Twin Light Source Stereoscope Light Table.

2. Reduced weight and size of Light Table compared to original unit.

3. Increased size of light source and higher brightness to accommodate a wider variety of stereoscopes.

4. An adjustable slide for the microscope/stereoscope support post to allow the light table to accommodate a wide variety of stereoscopes and rhomboid assemblies having different reach and coverage.

The light table is 18-3/4" deep x 20" wide x 6" high at the top of the power supply housing in the rear and 3" high at the scanning stage. The on-off and dimming controls are located on the sides of the power supply housing. The scanning stage controls are located on each side of the light table, approximately 10" from the front, for easy operation while looking through the microscope.

SECTION 2

LIGHT TABLE DESCRIPTION

2.1 OVERALL CONFIGURATION

The Light Table with Mensuration Scanning Stage, as shown in Figure 2-1, is a table top unit which provides the divided viewing surface directly in front of the operator. The viewing controls are conveniently located on the sides so that the top of the power supply housing is smooth and film can be laid upon it without damage. This also provides easy operation without interruption of the viewing operation when actuating the controls. The viewing surface is split about its front to rear centerline, so that each 6-inch x 6-inch viewing area becomes independent light sources when the partition is inserted. This permits stereo viewing with differing densities or with differing scales. The scanning stage is fastened to the sides of the main casting, so as to not inconvenience the operator by further projections toward him. As shown in Figure 2-1, the X and Y positioning controls are conveniently located on the sides, approximately 10" from the front, for easy actuation by the operator while looking through the microscope. The X positioning control is on the left and the Y is on the right. The stage is positioned by precision micrometer lead screws which are geared to mechanical counters so as to provide easy to read digital output measurements of imagery.

2.2 ILLUMINATION SYSTEM

2.2.1 Light Sources

The light sources are similar to those previously used. For increased

NOTES:

1.

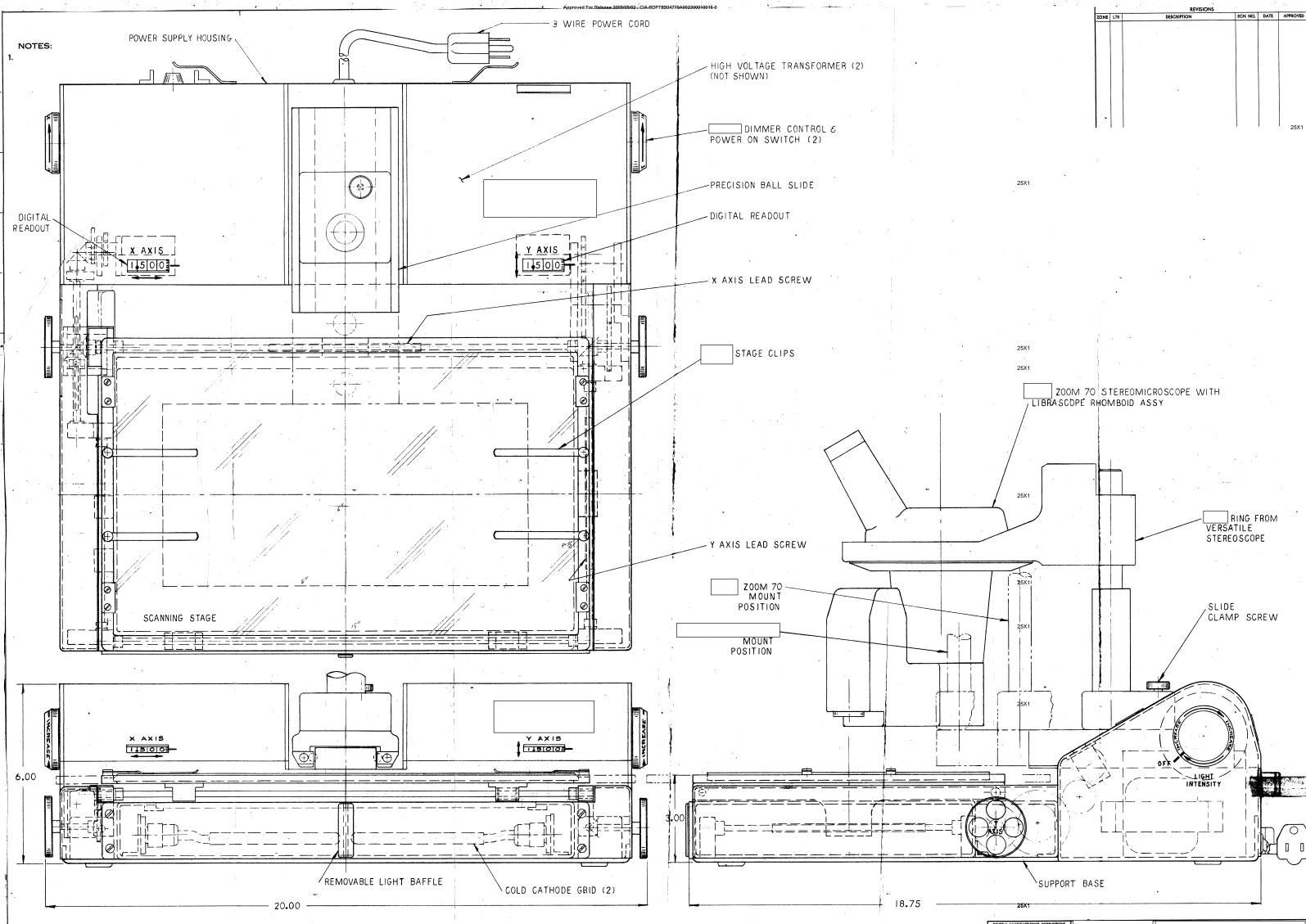


FIG. 2-1

REVISIONS					
ZONE	LTR	DESCRIPTION	ECN NO.	DATE	APPROVED

25X1

NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

DRG		DATE	
ENG.		DATE	
MATL.		DATE	
MFR.		DATE	
ENGR.		DATE	
QA		DATE	
CH. DR.		DATE	
APPD		DATE	
APPD		DATE	

DRG TITLE

FIG. 2-1
OVERALL CONFIGURATION

SIZE	CODE IDENT NO.	DRAWING NUMBER
E	72314	S.I. 240,164

SCALE | WT. ALT. | CALC | SH | SHEET | OF

25X1

coverage it is now proposed to use two 6-inch wide x 6-inch deep viewing surfaces directly adjacent to each other for ideal usage as a larger 12" wide x 6" deep single viewing surface. The two light sources are high intensity, cold cathode grids. These grids are interchangeable, are not potted or encapsulated, and are easily replaced by relatively unskilled personnel using a minimum of the common hand tools. Although the cost of these high intensity, cold cathode grids is considerably greater than that of the standard fluorescent tubes, the advantages obtained result in far greater overall value. These advantages are:

- Service life of 10,000 hours.
- No deterioration from frequent on-off cycling.
- Minimum height can be realized for table top utilization.
- Simpler wiring and circuitry, therefore, much greater reliability and down time.
- Assurance that illumination is always even and uniform since perimeter grid can be made closer.
- Assurance that the light source will age uniformly and not deteriorate rapidly with on-off operation.

As before, the light sources will be sufficiently diffused such that the variation in intensity will not exceed ±5% as the working surface is scanned along a line which is perpendicular to the light grids. The temperature of the light table will not rise more than 15°F after extended use (6-8 hours). The air vents will be baffled to prevent

25X1 [redacted]

light from shining into the operator's eyes or the eyes of anyone in proximity. Since these new light sources will provide higher brightness, 2,500 ft-lamberts as against 2,000 ft-lamberts, there will be about 5 or 6 degrees higher temperature rise. However, the insulation provided by the scanning stage should compensate for this temperature rise. The total viewing area is approximately 12" wide x 6" deep with the diffuser being a single piece of opal plastic. As shown in Figure 2-1, the light baffle, which separates the two grids and prevents light from spilling between the two grid areas, is easily removable. A unique feature is the easily removable light source chassis. It is only necessary to loosen the 4 screws, shown in the front, to slide out the light grid for replacement.

2.2.2 Viewing Light Controls

Another advantage available with the proposed cold cathode grid viewing light sources is the highly reliable dimming control, which can vary the brightness over the entire range without any flickering, as usually occurs with standard fluorescent lamps, particularly at the reduced light levels. The dimmer control, which [redacted] has used successfully in many other applications, see Section 4, utilizes a [redacted] auto-transformer, which varies the input voltage (110 VAC) to the high voltage power supply used with these viewing lights. As shown in Figure 2-1, two separate dimming or brightness controls, which now incorporate the separate on-off controls, are provided on the side surface since the imagery to be stereoviewed might be of different densities and the stereo fusing is easier done when the imagery is presented on a comparable image brightness basis.

25X1
25X1

Each dimming control will vary the intensity of its light source without noticeable flicker at any level of intensity. The two independent controls are conveniently located at the rear sides of the

light table within comfortable reach of the operator from the front, yet not interfering with any of the viewing or mensuration functions.

The light table operates on a nominal 115 volt, 50-60 cps supply, and will use approximately 200 watts of power. The light table is equipped with a 3-wire power cord, not less than six feet long, terminated at one end with a "Deflex" Safety Power Connector (made by the [redacted] 25X1
25X1 [redacted], or its equivalent. The other end is terminated within the light table and is securely mounted to the frame of the light table. The third (ground) conductor in the power cord is grounded to the metal frame of the light table.

2.3 MENSURATION MECHANISM

The proposed mensuration mechanism is the simplest and most economical means of providing X and Y measurements in digital readout form, of the photo imagery, with an accuracy of ±0.001"/inch. As shown in Figure 3-1, digital readout, as a 4-digit number, is provided for each axis. This provides quick and easy accuracy of ±0.001" per inch, with means for reading or interpolating to 0.0001". The lead screws will be ground to micrometer accuracy. An anti-backlash gear train provides the required speed-up to the digital counter, so that the digital presentation corresponds precisely with the distance traveled. The X (horizontal) counter is located on the extreme left and the Y (vertical) counter is located on the extreme right so as to still be readable when longer film strips are used and yet not increase the size of the light table.

2.4 MICROSCOPE MOUNT

The microscope mount shown in Figure 2-1, can be used with either the [redacted] Model II Zoom 70 Stereoscope, the [redacted] Model M-5 Stereomicroscope, or the new [redacted] Stereoscope with its various working distances and modes of operation.

In addition to supporting the [redacted] Zoom 70 as a stereomicroscope and as a stereoscope, it will now have a third mode of operation. This new mode utilizes the [redacted] rhomboid assembly as presented in the [redacted] drawing furnished us. Instead of the old [redacted] ring for supporting the zoom pod, we will now use the [redacted] ring from the versatile stereoscope. This ring must be turned upside-down in order to clear the [redacted] rhomboid assembly. It is our understanding that this ring can be removed and replaced after the support mechanism is turned over so that no additional effort is involved.

The microscope support bar is provided with an adjustable slide having three inches of travel in the Y direction. This slide will be corrosion resistant and incorporates a clamp screw to lock it in the desired position. The slide is designed so as to nest into the power supply housing area when pushed towards the rear so as not to increase the depth of the light source. The slide will utilize anti-friction bearings so as to provide friction free heavy duty linear motion with minimum twist, minimum shake and minimum play.

A separate microscope/stereoscope mounting post is proposed for the [redacted] Zoom 70 so as to provide a higher degree of perpendicularity of optical axis to the Scanning Stage. This mounting post would have a large diameter base extending as high as possible within the working distances of this instrument.

25X1 [redacted]

2.5 SCANNING STAGE

The scanning stage as shown in Figure 2-1 has the film clamped to it in the same manner as previously proposed, with the [redacted] microscope stage clips. In this revised design we now have a 15" wide by 9" deep glass stage supported in a metal frame. This stage is secured to the frame through preloaded ball bushings so that no play or clearances can affect the resolution of the imagery while viewing under a high power magnification. The X positioning mechanism is supported off the Y mechanism so that it moves in the Y direction with the stage. The Y positioning mechanism control wheel is fixed and remains stationary with the basic light source. With this larger movable glass stage the entire light source can be utilized for viewing throughout the specified ranges of travel. Finger holds are provided in the positioning controls for rapid rotation so as to provide a fast slew capability. The final adjustments are considered to be made by small angular adjustments of the control to the exact point required.

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SECTION 3

RELEVANT EXPERIENCE

For this section please refer to Section 4, Relevant Experience of Proposal No. SME-CG-55, dated 27 September 1965.

25X1

SECTION 4

PROGRAM SCHEDULE

For this section please refer to Section 5, Program Schedule and Discussion of Proposal No. SME-CG-55, dated 27 September 1965.

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[redacted]

SECTION 5

QUALITY ASSURANCE AND RELIABILITY

For this section please refer to Section 6, Quality Assurance and Reliability of Proposal No. SME-CG-55, dated 27 September 1965.

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proposal DB File Copy

Proposal No. SME-CG-55
27 September 1965

(S. I. 890, 027)

LIGHT TABLE
WITH
MENSURATION SCANNING STAGE

25X1

[redacted]

25X1

[redacted]

25X1

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[redacted]

Proposal No. SME-CG-55
27 September 1965

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(Continued)

25X1

25X1

LIST OF ILLUSTRATIONS

[redacted]

Proposal No. SME-CG-55
27 September 1965

SECTION 1

INTRODUCTION

1.1 GENERAL

This proposal for the Light Table with Mensuration Scanning Stage has been prepared by [redacted] 25X1
25X1 [redacted] in response to the requirement for providing the additional features of a Scanning Stage and Mensuration to the Twin Light Source Stereoscope Light Table [redacted] Proposal No. SME-CG-55). [redacted] is particularly well qualified in the engineering technologies which are essential for successful design, development and fabrication of the required light table. Of particular value in the proposed program is [redacted] extensive experience in developing equipment for image interpretation systems with mensuration, such as the Multi-Sensor Viewer. Based upon this background, [redacted] can offer assurance of repeating of high-quality picture illumination and reliable dimming control in addition to the new-added features.

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1.2 BRIEF DESCRIPTION

The Light Table with Mensuration Scanning Stage, as shown in Figure 2-1, is a table top unit which presents [redacted] approach to efficiently adding the capabilities of a Scanning Stage to the Twin Light Source Stereoscope Light Table. This scanning stage has extremely smooth movement, even when fast slewing, so that the imagery does not jump when viewing through a microscope. The mensuration capability, provided for each axis, has an accuracy of 0.001"/inch.

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Additional features of this new viewer are:

1. Elimination of the tilting arrangement of the original Twin Light Source Stereoscope Light Table.

2. Reduced weight and size of Light Table compared to original unit.

The light table is 17-1/2" deep x 20-1/4" wide x 6" high at the top of the control panel in the rear. The detachable stereoscope mount extends 9" above the top surface. The on-off controls and dimming controls are grouped on the top of the rear fixed surface at a convenient angle for operation. The scanning stage controls are located on each side of the light table for easy operation while looking through the microscope.

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[redacted]

Proposal No. SME-CG-55
27 September 1965

SECTION 2

FILM VIEWER DESCRIPTION

2.1 OVERALL CONFIGURATION

The Light Table with Mensuration Scanning Stage, as shown in Figure 2-1, is a table top unit which provides the divided viewing surface directly in front of the operator. The viewing controls are conveniently located on the rear inclined top surface, so that all controls are within easy reach of the operator with no obstruction of the viewing surface or interruption of the viewing operation, when actuating the controls. The viewing surface is split about its front to rear centerline, so that each 5-inch x 6-inch viewing area becomes independent light sources when the partition is removed. This permits stereo viewing with differing densities or with differing scales. The scanning stage is fastened to the sides of the main casting, so as to not inconvenience the operator by further projections toward him. As shown in Figure 2-1, the X and Y positioning controls are conveniently located on the sides for easy actuation by the operator while looking through the microscope. The X positioning control is on the left and the Y is on the right. The stage is positioned by precision lead screws having 10 threads per inch, so that ten revolutions of the handwheel will result in one inch of travel. This pitch lead screw provides the best combination of slew speed and sensitivity in that 3.6° of rotation corresponds to 0.001" of travel.

2.2 ILLUMINATION SYSTEM

2.2.1 Light Sources

The light sources are the same; two 5-inch wide x 6-inch deep viewing surfaces directly adjacent to each other for ideal usage as a larger single viewing surface. The two light sources are high intensity, cold cathode grids. These grids are interchangeable, are not potted or encapsulated, and are easily replaced by relatively unskilled personnel using a minimum of the common hand tools. Although the cost of these high intensity, cold cathode grids is considerably greater than that of the standard fluorescent tubes, the advantages obtained result in far greater overall value. These advantages are:

- Service life of 10,000 hours.
- No deterioration from frequent on-off cycling.
- Minimum height can be realized for table top utilization.
- Simpler wiring and circuitry, therefore much greater reliability and down time.
- Assurance that illumination is always even and uniform since perimeter grid can be made closer.
- With individual tubes there is no guarantee that they will age uniformly; they deteriorate more rapidly with on-off operation and when a tube is replaced, it will be much brighter than the others.

25X1 [redacted]

As before, the light sources will be sufficiently diffused such that the variation in intensity will not exceed ±5% as the working surface is scanned along a line which is perpendicular to the light grids. The temperature of the light table will not rise more than 15° F after extended use (6 - 8 hours). The air vents will be baffled to prevent light from shining into the operator's eyes or the eyes of anyone in proximity.

The total viewing area is approximately 10" wide x 6" deep with the diffuser being a single piece of opal plastic. As shown in Figure 2-1, the light baffle, which separates the two grids and prevents light from spilling between the two grid areas, is easily removable. The upper, or working, surface of the glass on the scanning stage protrudes above the surrounding area by at least 1/16". The metal surface immediately surrounding the scanning stage glass has four holes, two on each side, for the insertion of the [redacted] Zoom 70 spring stage clips.

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2.2.2 Viewing Light Controls

Another advantage available with the proposed cold cathode grid viewing light sources is the highly reliable dimming control, which can vary the brightness over the entire range without any flickering, as usually occurs with standard fluorescent lamps, particularly at the reduced light levels. The dimmer control, which [redacted] has used successfully in many other applications, see Section 4, utilizes a [redacted] auto-transformer, which varies the input voltage (110 VAC) to the high voltage power supply used with these viewing lights. As shown in Figure 2-1, two separate dimming or brightness controls, as well as two separate on-off controls, are provided on the top surface, since the imagery to be stereoviewed might be of different densities and the stereo fusing is easier done when the imagery is presented on a comparable image brightness basis.

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Each dimming control will vary the intensity of its light source without noticeable flicker at any level of intensity. The two independent controls are conveniently located at the rear of the light table within comfortable reach of the operator from the front, yet not interfering with any of the viewing functions. The separate on-off switches will incorporate built-in lamps, which indicate when the light source has been turned on. The switch button will be suitably engraved.

The light table operates on a nominal 115 volt, 50-60 cps supply, and will use approximately 200 watts of power. The light table is equipped with a 3-wire power cord, not less than six feet long, terminated at one end with a "Deflex" Safety Power Connector (made

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or its equivalent. The other end is terminated within the light table and is securely mounted to the frame of the light table. The third (ground) conductor in the power cord is grounded to the metal frame of the light table.

2.3 - MENSURATION MECHANISM

The proposed mensuration mechanism is the simplest and most economical means of providing X and Y measurements of the photo imagery with an accuracy of 0.001"/inch. As shown in Figure 2-1, two precision dial indicators are utilized to always provide a readily available and convenient readout of scanning stage position. To avoid increasing the size of the light table and inconveniencing the operator, the Y motion has been limited to 3" of travel whereas 4" of travel is provided in the X direction. The precision quality dial indicators shown are standard proven mechanical instruments, which have a good history of reliable and accurate performance with minimum maintenance requirements.

2.4 MICROSCOPE MOUNT

The microscope mount shown in Figure 2-1, can be used with either the [redacted] Model II Zoom 70 Stereoscope, the [redacted] Model M-5 Stereo- 25X1
microscope, or by use of the clamp type adapter -- any similar stereoscope or microscope of approximately the same size and weight, as before.

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SECTION 3

ALTERNATE SCANNING STAGE DESIGN

3.1 OVERALL CONFIGURATION

An alternate scanning stage design is presented in Figure 3-1. This provides the capability of having 4" of travel in the Y direction as against the 3" travel previously shown. The dimensions of this alternate configuration are 20-1/2" deep X 18-1/4" wide X 6" high. Essentially, it provides minimum width at the expense of depth. As shown in Figure 3-1, the film is now maintained stationary and the stereoscope or microscope is precisely transported over the film. It is considered that this small travel of the microscope while scanning will not be too uncomfortable for the operator. The microscope is supported on precision dovetail slides for added stability. The 10 threads/inch lead screws used for positioning have much greater accuracy. The positioning controls have been slightly relocated, but still provide the same capability of ease of positioning while looking through the microscope.

3.2 MENSURATION MECHANISM

With this alternate configuration, an alternate mensuration mechanism is indicated. As shown in Figure 3-1, digital readout, as a 4-digit number, is provided for each axis. This provides quicker and easier readout to the nearest thousandth of an inch. The lead screws will be ground to an accuracy of better than ±0.0002"/inch, so that one revolution will always transport the microscope precisely 1.0000 ± 0.0002". An anti-backlash gear train provides an exact 10:1 speed-up to the digital counter, so that one revolution of the lead screw results in 10 revolutions of the counter. Each revolution of the counter turns the "thousandth's" wheel for a

25X1

complete revolution and increases the "tens" wheel by 1 digit. Therefore, 10 revolutions of the counter shaft changes the read-out by 100 thousandths. The gears will be precision 3 gearing, having a maximum tooth-to-tooth composite error of 0.0002" and a total composite error of 0.00025". With 72 pitch gears having a tooth-to-tooth spacing of 0.0139", the variation of ±0.0002" represents an angular variation or error of 0.0139/0.0002 = 1/70. Since one revolution (360°) of the counter is equivalent to 10 thousandths of an inch, the variation obtained is 0.010/70 = 0.00014"; less than the pitch error.

NOTES:
1.

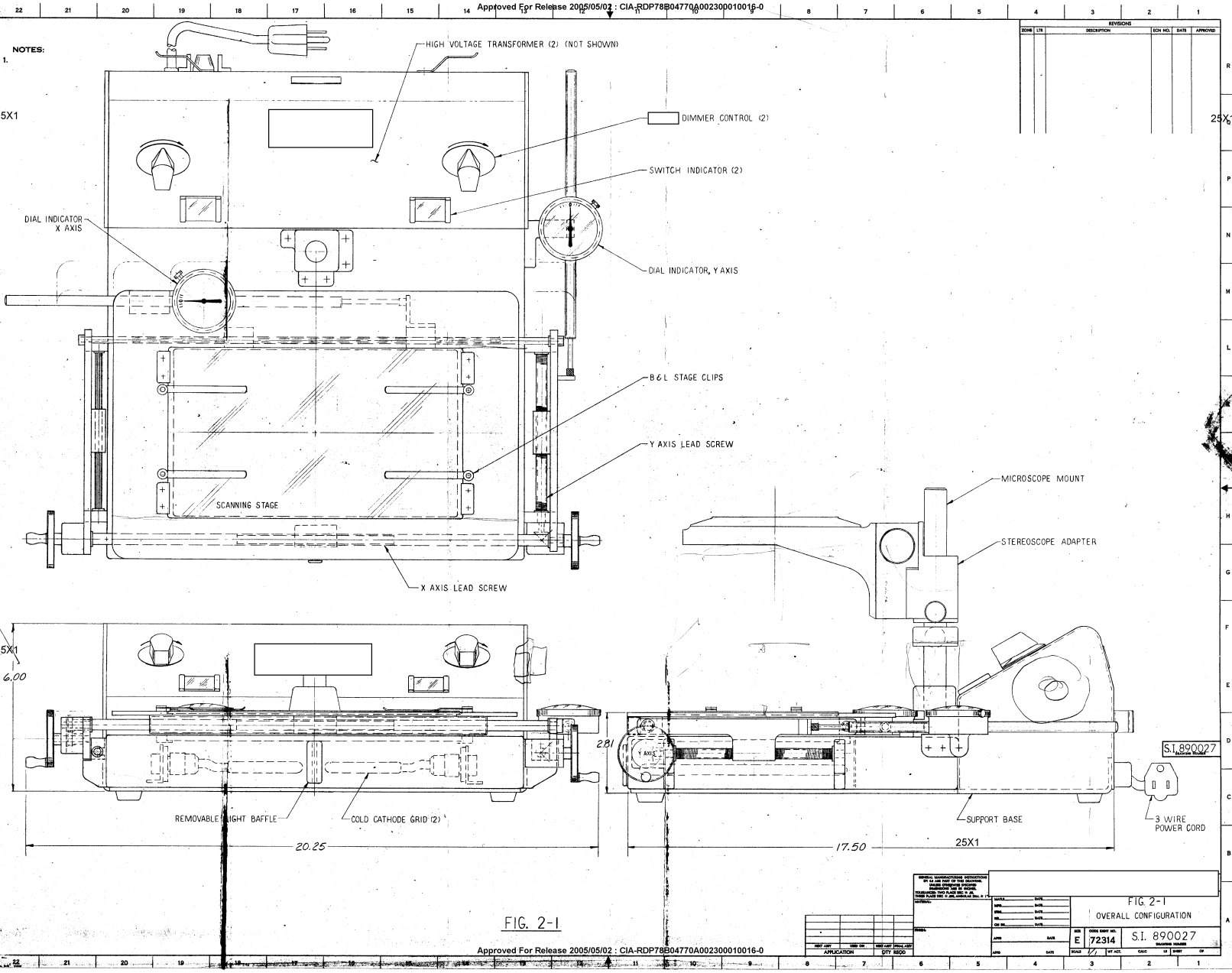


FIG. 2-1

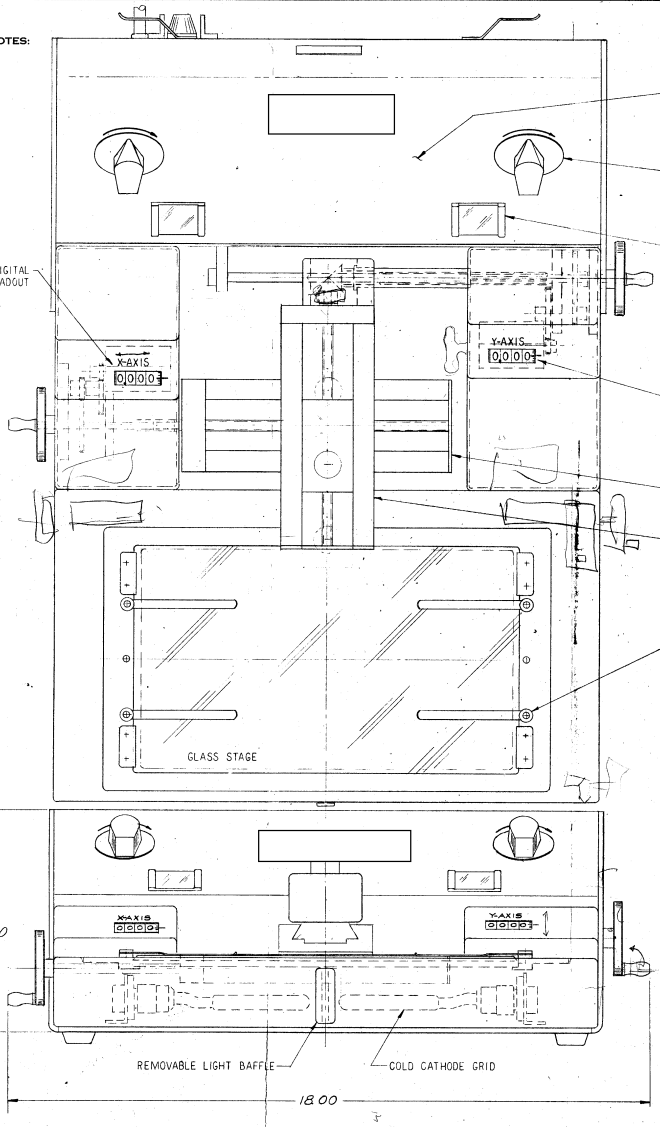
FIG. 2-1
OVERALL CONFIGURATION

S.I. 890027

SIZE E | CODE IDENT NO. 72314 | S.I. 890027

NOTES:

1.



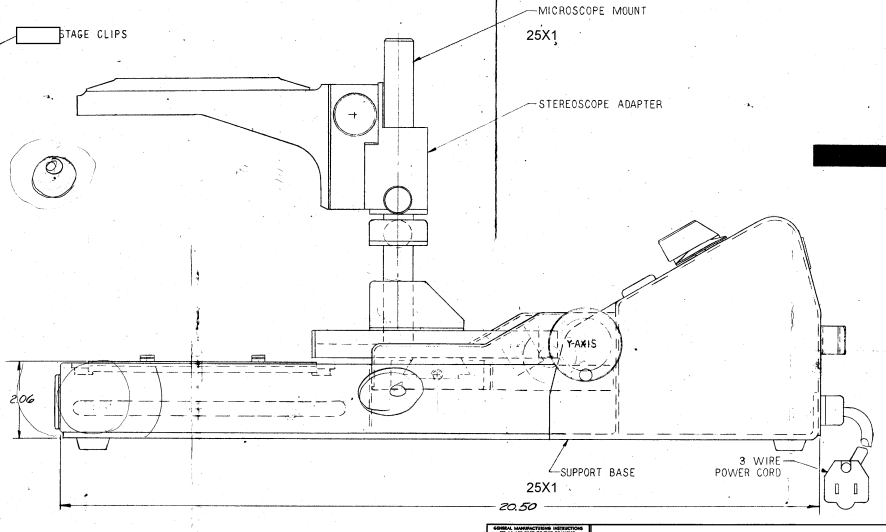


FIG. 3-1

REVISIONS					
ZONE	LTR	DESCRIPTION	ECN NO.	DATE	APPROVED

NEXT ASSY	USED ON	NEXT ASSY	FINISH	QTY REQD
APPLICATION				

SIZE	CODE IDENT NO.	DWG NO.
E	72314	S.I. 890027
SCALE	WT ACT.	SHEET OF

DWG TITLE: FIG. 3-1 ALTERNATE SCANNING STAGE DESIGN

25X1 [redacted]

Proposal No. SME-CG-55
27 September 1965

SECTION 4

RELEVANT EXPERIENCE

4.1 INTRODUCTION

25X1 [redacted] extensive experience in the development of Image Interpretation Film Viewers is a valuable asset in the development of this direct viewing Light Table. In addition to the development of compact cameras, stabilized mounts and film processing units for airborne use, 25X1 [redacted] is continually engaged in the development of precision equipment for the ground based operations of film viewing and interpretation. The exacting demands of this latter technology have imposed on [redacted] engineers a stringent discipline which leads to a critical appraisal of design concepts and the deft execution of the actual design and construction. Of particular significance in developing image interpretation equipment is [redacted] recent and current experience in the development of the Image Interpretation Cell (IIC), wherein close field association with the various Air Force tactical reconnaissance commands has acquainted us with the "working level" P.I. requirements. The IIC was designed and fabricated by [redacted] for the RADC under Air Force Contract [redacted] for the prototype, and [redacted] for the production systems. The IIC is a completely self-contained, deployable, image interpretation system for the generation of forward echelon, accurate intelligence data in the form of Flash and Immediate Photo Interpretation Reports. The IIC was subjected to a series of mechanical and environmental tests which verified the soundness of the product design and its capability for sustained operation in the military environment. Examples of [redacted] Image Interpretation Film Viewer developments which are closely related to this proposed program are discussed below.

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4.2 MULTI-SENSOR VIEWER

25X1 The Multi-Sensor Viewer, [redacted] P/N 1080A1, was developed by
25X1 [redacted] for integrated interpretation and analysis of multi-sensor data.

The MSV, see Figure 4-1, provides simultaneous direct viewing of 70mm to 9-1/2 inch film at four stations. Hard copy print reproduction under normal room light conditions and full mensuration capability, with digital readout, is provided at all four film stations. Stereo viewing with zoom magnification is provided at the two horizontal stations with a slack loop drive on the first station (panoramic channel) for points up to 72" apart. In addition, the TTR projection viewer located on top, enables viewing of 70 X 100 mm film chips at 4X magnification for comparison viewing. The operator may display at random any one of 100 chips contained in a removable magazine. Ten extra chip magazines, each containing 100 chip holders are stored within the MSV.

SPECIFICATIONS

Dimensions (inches):	74 w x 73 h x 40 d (nominal)
Weight (pounds):	1150 (approximate)
Power Requirements:	120/208 VAC, 400 cps, 3 phase, 2200 watts. 120 VAC, 60 cps, single phase, 300 watts.

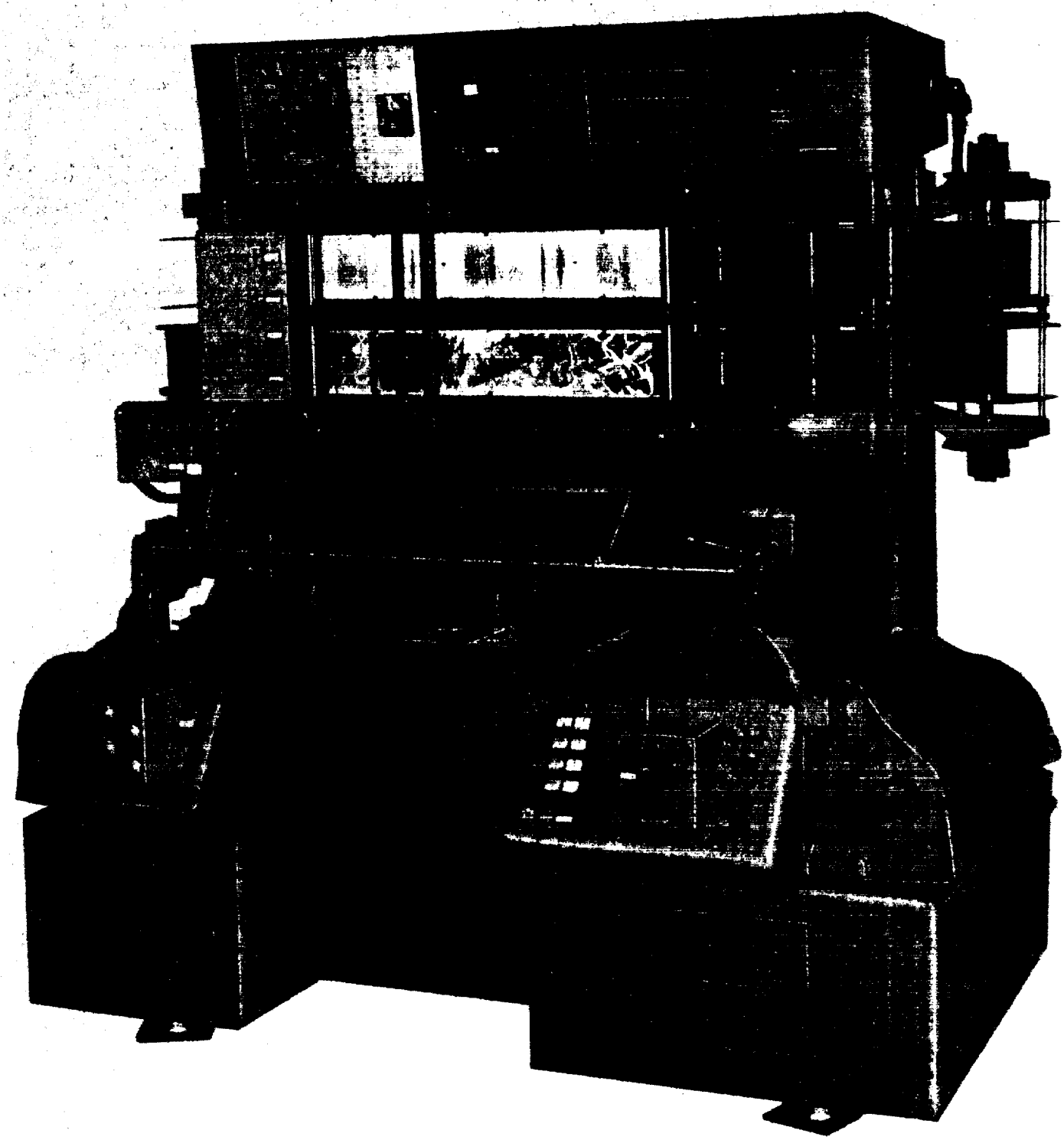

FIGURE 4-1 MULTI-SENSOR VIEWER

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Film Capacity:	70mm rolls up to 1000 ft. (all stations) 5 inch rolls up to 1000 ft. (all stations) 9 inch rolls up to 1000 ft. (frame station only) 70 x 100 mm chips - 100 per magazine (TTR viewer)
Viewing Surfaces:	9-1/2 x 27 inches (frame station) 5-1/2 x 27 inches (SLR and IR stations) 5-1/2 x 12 inches (two at panoramic station)
Viewing Surface Illumination:	Cold Cathode - Adjustable Brightness 40-1000 ft.-lamberts
Vacuum System:	Provided for each viewing surface
Printing:	3 stations with 5 x 9-1/2 inches 1 station with 9-1/2 x 9-1/2 inches
Print Exposure:	1 to 5 seconds
Processing Time:	15 seconds
Film Drive Velocity:	Each station independently adjustable up to 150 FPM, option of individual or ganged drive with 2% accuracy. Reversible individual and master speed control

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Film Footage Counting:	Provided for each station, resettable counters readout to two-tenths of a foot. Accurate to 1% with reversing control to permit adding when metering from either direction.
Mensuration:	X and Y Digital readout to 0.001 inch. Accurate to 0.004"/inch. Crosshair positioned by joystick.
Stereo Viewer:	[redacted] AR26A modified, with zoom magnification range of 2-1/2 to 36 power and image rotation of ±180°.

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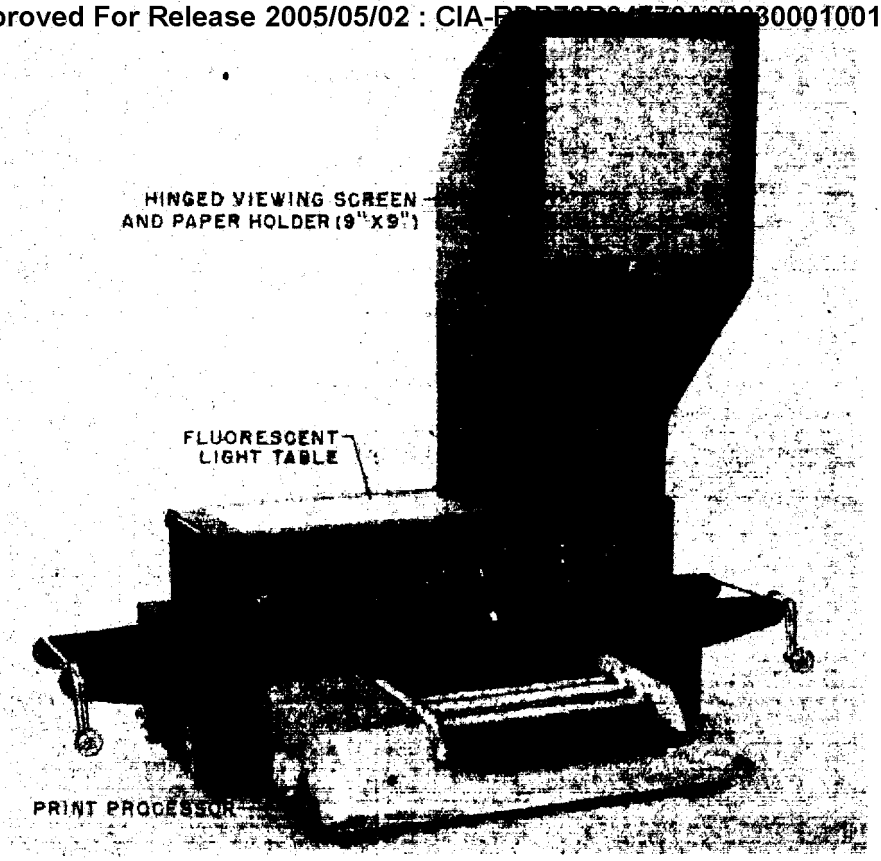
25X1 4.3 [redacted] MODEL F-512 5 INCH VIEWER/PRINTER (PORTABLE)

The Model F-512 Viewer/Printer, see Figure 4-2, is a portable instrument consisting of a light table and base, a print processor mounted within the base, a viewing hood, spool holders and carrying case.

Set up ready for use, less film spools, the F-512 is approximately 24" long, 12" high, and 12" wide, with a 21" high projector hood mounted on the right hand side of the instrument.

The complete encased instrument, ready for carrying, measures approximately 25" x 24" x 12". Weight is approximately 65 lbs.



MODEL F512 VIEWER/PRINTER

25X1

FIGURE 4-2 F-512 WITH COVER ATTACHED READY FOR TRANSPORTATION

Illumination for the light table consists of three fluorescent tubes with a translucent diffusion panel as a viewing surface. A 300 watt projection type filament lamp, used with double condensing lenses and an f/4.5 projection lens, provides illumination for imaging the negative on the 9" x 9" viewing screen.

The print processor is motor driven and has a removable roller assembly. Processing solutions (developer and stabilizer) are in 32 oz. flexible plastic bottles (for durability and light weight).

The purpose of the F-512 Viewer/Printer is to provide a convenient means for--

(a) viewing 5 inch wide aerial negatives in roll form on an illuminated light table.

(b) viewing a 2X enlarged image of each 4-1/2" by 4-1/2" negative, or similar section of a panoramic negative, on a 9" x 9" rear projection screen.

(c) obtaining 9" x 9" positive enlargements of each negative (or stereo pairs) on photographic paper under subdued room light (no darkroom necessary).

4.4 IIC LIGHT TABLE

The Image Interpretation Cell Light Table served as a detailed interpretation station to supplement the activities of the MSV and to provide a working area for detailed interpretation and analysis. As shown in Figure 4-3, it provides direct or stereoscopic viewing of positive or negative film from 70mm to 9-1/2" in width and up to 1000 ft. capacity rolls. The film is secured to the light table by a vacuum hold down

FIGURE 1 – IIC LIGHT TABLE

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system for mensuration or viewing under magnification. A carriage and rails are provided to provide movement in the X and Y direction of the stereoscopes over the 10" x 39" viewing surface.

The Light Source - two argon-mercury grids of serpentine pattern - is embedded in an optically clear, elastomer matrix for protection against mechanical shock and humidity damage. This source will provide diffused "cold" light of a maximum intensity of at least 1200 ft.-lamberts at 70°F. "Cold" light refers to the low heat output of the grid, a 15°F temperature rise over a 4 hour period. Uniform diffusion is accomplished by mounting the plastic diffuser at the correct distance from the grids.

The film under observation can be held securely to the glass top if desired. The top contains front and rear vacuum grooves which are connected to silicone rubber vacuum manifold tubes connecting to the outer edges of the glass top.

When 9-1/2" wide film is being used, the vacuum is applied to both manifolds. For 70mm and 5" wide film, the vacuum is only applied to the front groove, which is covered by the film.

The film reels are held between brackets attached to the table in either the left or right T-rails. Each table is supplied with two sets of Reel Brackets, each set consisting of one crank and one idler bracket. The machine will accommodate single reels of any size from 70mm to 9-1/2" in width up to 1,000 feet capacity. The brackets are equipped with drag brakes, cam operated spindle retractors and full ball bearing suspension in all instances. Segmented nylon rollers at each end of the table provide scratch-free film support. The cranks provide a pivoting detent of the handle so that it can be rotated out of the way when not in use.

SECTION 5

PROGRAM SCHEDULE

The program schedule, as shown in Figure 5-1, will include sufficient time for study, investigation and analysis of the product design configuration finalized at the completion of the first month. Complete and accurate layouts will establish the design parameters and interfaces. All major components and subsystems, optical, mechanical and electrical, will have been selected and specified. Human engineering factors will be thoroughly explored and all operating functions will be checked out. The long lead items, controls, structures and viewing lights will be ordered and detailing will commence in full.

Reproducible manufacturing drawings and specifications will be delivered as shown in Figure 5-1, one week after delivery of the Twin Light Source Stereoscope Light Table.

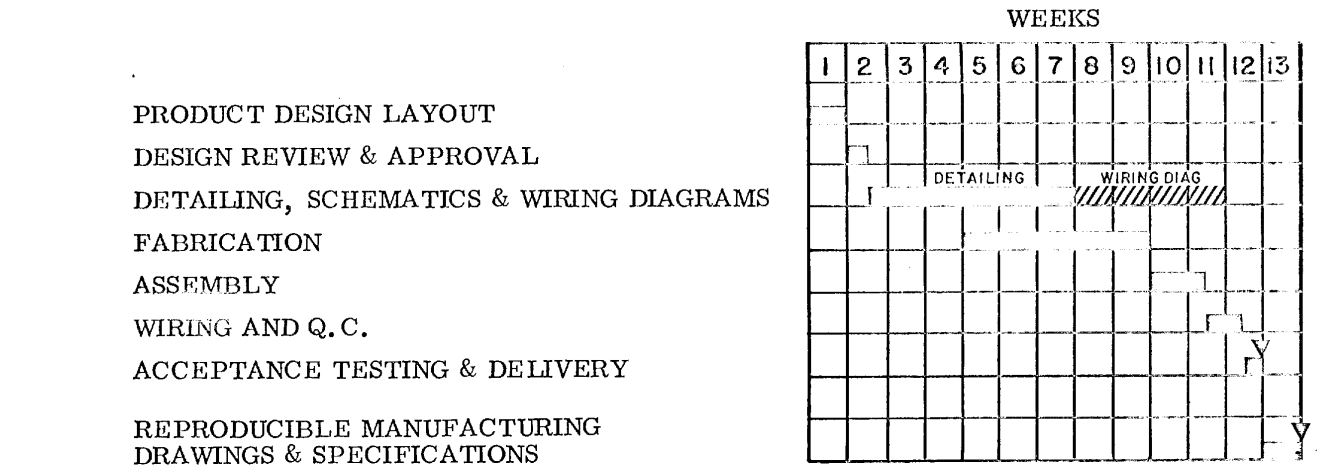

FIGURE 5-1 PROGRAM SCHEDULE

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25X1 [redacted]

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SECTION 6

QUALITY ASSURANCE AND RELIABILITY

6.1 INTRODUCTION

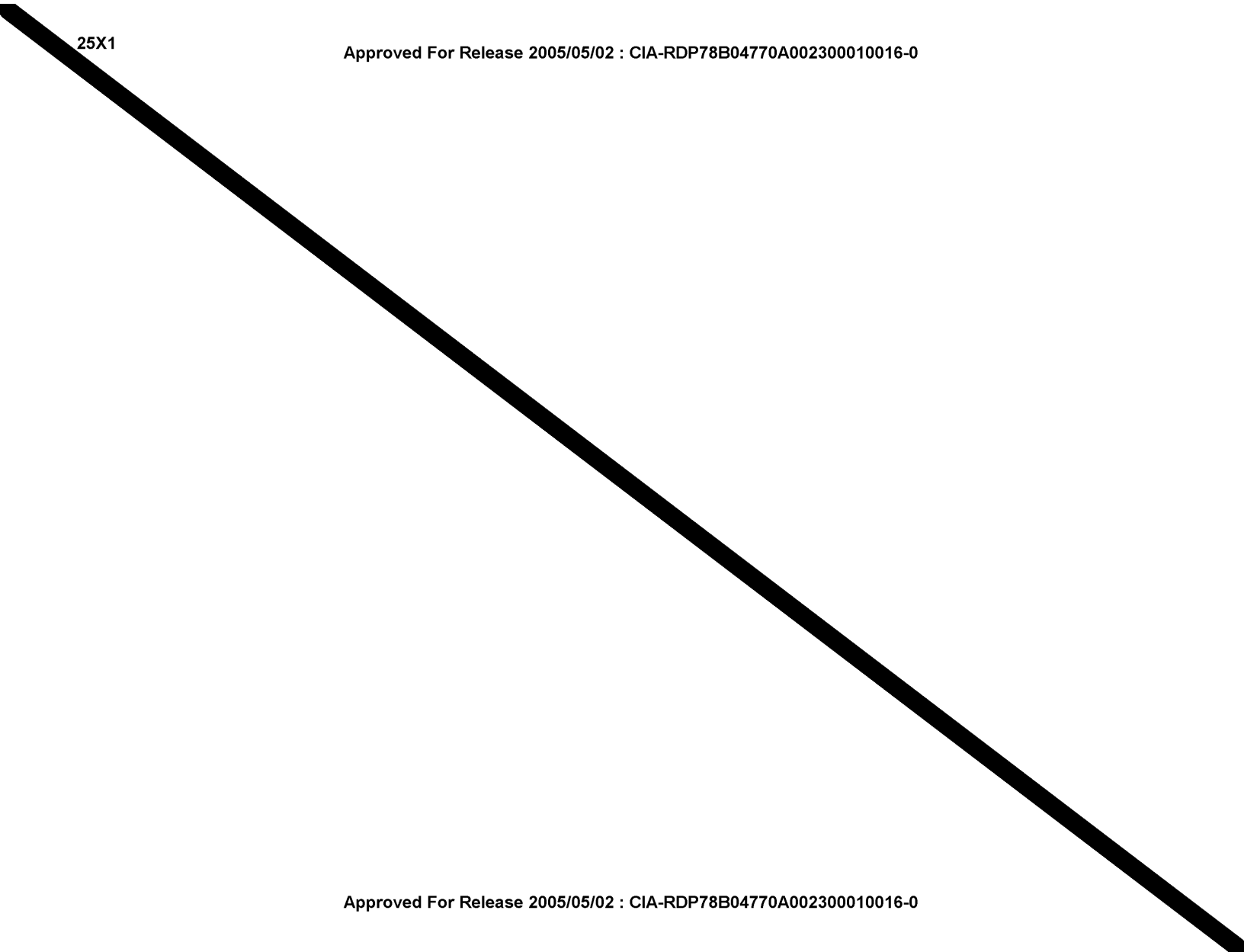
The Quality Assurance and Reliability functions at [redacted] are integrated within the Systems Management and Engineering Department and the Quality Control Department. These Departments report to the General Manager. The degree of responsibility exercised by each with regard to the coverage in these areas depends on the nature of the program. In the case of a developmental type of program where the quantities of equipments are very limited, the primary responsibility for both Quality Assurance and Reliability rests with the Engineering Department. As the quantities increase and the requirements and methods become more firmly established, the responsibility shifts to the Quality Control Department. This section describes the proposed procedure which will be used as a guide in the case of this Twin Light Stereoscope Light Table. 25X1

The Quality Control program at [redacted] now in effect on existing projects is in compliance with MIL-Q-9858. The procedures employed are under the surveillance of the resident Air Force inspector. 25X1

25X1 [redacted] plant is the home office for the [redacted] 25X1

25X1 [redacted] now in effect on existing projects is in compliance with MIL-R-27542. The

25X1 [redacted] reliability organization is shown in Figure 6-1, and its functions are noted in Figure 6-2.



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RELIABILITY ENGINEERING GROUP

1. System and subsystem reliability availability considerations.

2. Development of reliability acceptance criteria - specs.

3. Design of experiments for evaluating the reliability of systems and subsystems.

4. Program design reviews - using digital computer simulation technique, when applicable.

GENERAL RELIABILITY COORDINATION GROUP

1. Preparation of Reliability section of proposals.

2. Assistance to Reliability Engineering Group in reliability prediction, preparation of specifications, design of tests, preparation of reports.

3. Collation of data on parts application - failure report analysis, design review.

4. Dissemination of reliability data - results of tests.

5. Reliability indoctrination.

RELIABILITY REVIEW GROUP

1. Ensure that planned environmental testing is in accordance with applicable specs., or

2. Ensure that environmental tests will provide adequate margin beyond use conditions - when specs. are not adequate.

3. Provide independent review of program.

RELIABILITY STEERING COMMITTEE

1. Review of parts lists to determine that parts of known capability have been specified by the designer.

2. Review of all reported failures and associated analysis.

3. Review of test specifications.

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6.2 QUALITY ASSURANCE

The participation of the Quality Control Department in this program will include the following factors.

6.2.1 Receiving Inspection

Purchased parts will be inspected and tested in accordance with the requirements shown on the purchase drawings. The engineering department will assist with the interpretation and verification of these requirements as necessary.

6.2.2 Electrical and Mechanical Inspection

To be performed on all electrical and electronic assemblies. The light controls will be the major electrical assembly.

6.2.3 Optical Calibration and Alignment Checks

To be performed by the Optical Calibration Laboratory of the Quality Control Department.

6.2.4 Witnessing of Final Tests

To assure that customer specification requirements are met, tests will be performed in accordance with the established test procedures which will be prepared by Engineering.

6.3 RELIABILITY

The reliability effort will consist primarily of the basic factors required to design in a high level of inherent reliability while keeping the usage factor which will degrade it to a minimum. The following effort is anticipated in this connection.

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6.3.1 Design Review

When preliminary design has been completed, basic objectives are to detect design errors, misapplication of parts, ease of maintenance and the role of human factors.

6.3.2 Use of Preferred Parts

Parts which have been used successfully on previous applications under similar conditions of use will be preferred. Parts for which adequate reliability data or history is not available will be avoided.

6.3.3 Human Engineering

The design will be examined to assure that panel layout, visual displays, location and selection of controls are compatible to the physical capabilities and limitations of the human operator.

6.3.4 Usage Factors

Knowledge gained from previous experience with the Multi-Sensor Viewer development, the operation and field use of the equipment will be invaluable in designing into the film viewer those considerations which will forestall the incidence of failures due to the lack of this knowledge.

6.3.5 Failure Reporting and Analysis

When failures occur during check-out operations, a failure report such as shown in Figure 6-3 is required. The reliability engineer will assure that the cause of the failure is ascertained and that suitable corrective action is taken.

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FAILURE REPORT FR No. _____

ITEM DESCRIPTIONS	SERIAL NO.	FAILURE OCCURRED AT	
(System Designation)		Cycles	
		Operating Hrs.	
(Component Name and Part No.)		Cycles	
		Operating Hrs.	
(Part Name and Part No.)		Cycles	
		Operating Hrs.	

TEST DESCRIPTION: (Give circumstances or test procedure during which failure occurred. Environmental Condition.)

Date of Failure _____

TROUBLE DESCRIPTION: (Give symptoms observed, nature of failure, cause of failure, effect of failure on system operation.)

REPAIR DESCRIPTION: (Give repair data and corrective action taken.)

DISPOSITION: REPAIR ☐, Return To Vendor ☐, SCRAP ☐, OTHER _____

REMARKS: (Include reference to previous occurrences)

RELIABILITY REPRESENTATIVE(S)	Prepared By _____ Date _____
S.M.&E. _____	Approved By _____ Date _____
Q.C.&R. _____	Q.C.&R. Concurrence _____ Date _____

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FIGURE 6-3 FAILURE REPORT