

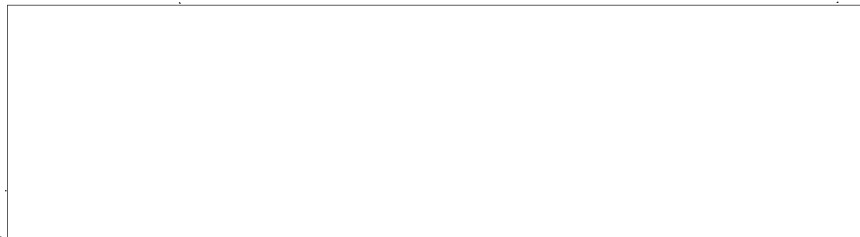
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STATUS REPORT  
for Period  
1 July through 31 July 1968  
Submitted under Contract to  
U. S. Government



File No. 11038

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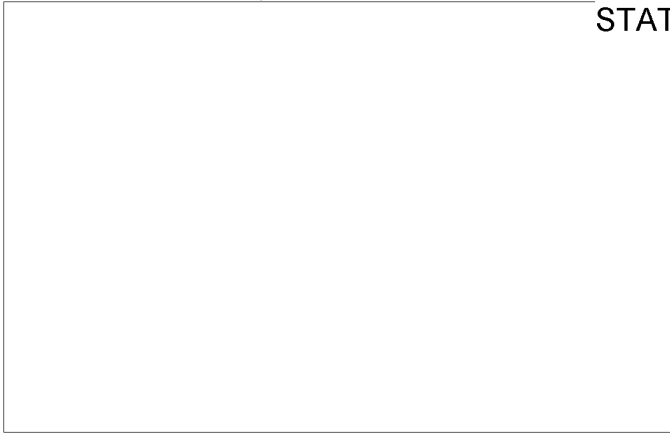
This document is presented as the Monthly  
Status Report under contract to the U. S.

Government



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The report period represented herein covers  
the period 1 July through 31 July 1968.



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APPENDICES

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PROGRAM STATUS

Summary as of July 31, 1968

Scheduled percentage of program completed - 20.9%

Actual percentage completed this date - 18.1%

The percentage of planned completion actually achieved this month has been diluted by 1) delay by the prospective Image Analysis System subcontractor in preparing an acceptable proposal (problem of adequate acceptance testing), and 2) a strike at the French optical subcontractor's plant (resolved in June) causing a delay in initial progress.

Program management is applying major effort in these two areas and it is planned that the difference between scheduled and actual performance will narrow in future reports.

manufacturing continues to maintain the schedule with the majority of parts completed and in inventory.

STAT

Clean room construction is progressing, and bids have been received for the required equipment.



Task 1            Statements of Work, Specifications, Report Preparation

Scheduled percentage of completion      17.4%

Actual percentage this date                17.4%

This task is on schedule in accordance with the overall program plan. All revised and new specifications will be transmitted as they are prepared.

Task 2      Scheduling and Planning

Scheduled percentage of completion      17.4%

Actual percentage this date                      17.4%

Detailed schedules for machine assembly are completed. The test schedules are currently being prepared.

Task 3            Test and Inspection Procedures

Scheduled percentage of completion            13.0%

Actual percentage this date                      13.0%

Test and inspection procedures have been prepared for the acceptance of vendor furnished equipment. These procedures have been incorporated into the purchase orders which have been issued.

Task 4

Management, Administration, Supervision

Scheduled percentage of completion 17.0%

Actual percentage this date 17.0%

Management has met with

STAT

the computer programming subcontractor, and with the optics subcontractor during this report period. The results of these meetings are reported under Task 43 and Tasks 16, 17 and 18.

Task 5      Meetings

Scheduled percentage of completion      17.0%

Actual percentage this date                      17.0%

No meetings with customer representatives were  
scheduled or held during the month of July.

Task 6      Facilities Requirements

Scheduled percentage of completion	27.0%
Actual percentage this date	25.0%

The modification to  facilities is progressing according to plan. During the report period, the construction phase of the clean room has been completed, and the load distribution pads and isolaters installed. The air conditioning and cooling system ducting layout has been completed, and bids have been submitted to contractors.

STAT

Bids are also being received for the air conditioning and ancillary equipment.

Installation of the electrical wiring will be started during the next report period.

Specification No. 11, Installation requirements for the Ultra High Precision Stereocomparator, has been revised to incorporate the changes outlined in the minutes of the Technical Review Meetings which were held during the month of June 1968.

Some slippage has been experienced during this report period due to a strike in the area. It has been necessary to ask for bids for fabricators of ductwork from contractors outside of the strike area.

Task 7

Main Frame and Structural Elements

Scheduled percentage of completion 90.0%

Actual percentage this date 90.0%

The main frame assembly which was scheduled for delivery on July 8 was delayed until August 1 at  request. The delay was requested in order to provide additional time to complete the clean room modifications.

STAT

Task 8      Skin

Scheduled percentage of completion      0.0%

Actual percentage this date                      0.0%

As reported previously, the release of drawings for manufacture and assembly of the skin panels is scheduled for September 8, 1968.

No work has been done on this task during the month of July.



Task 9            Granite & Ways Assembly for Stages

Scheduled percentage of completion	80.0%
Actual percentage this date	65.0%

A field engineering trip was made to  to monitor the preparation of the granite. The base granite has been rescheduled for delivery in two parts - August 9 and August 16.

STAT

During the initial grinding of the granite slab, the vendor broke several of his grinding tools. This necessitated re-scheduling to a later delivery date.

The casters and jacks for handling have been fabricated.

Task 10      Air Bearings

Scheduled percentage of completion      50.0%

Actual percentage this date                      50.0%

As reported previously, the air bearings and mounts have been fabricated and are in storage awaiting final assembly to the stages.

No work was performed on this task during July.

Task 11      Stage Drives

Scheduled percentage of completion      30.0%

Actual percentage this date                      30.0%

As reported previously, the mechanical components for the stage drives have been fabricated and are in storage awaiting assembly to the stages. The castings also have been placed in storage awaiting assembly.

The electronic chassis for the stage drives are presently in process by the fabricator. Several field engineering trips were made during the month of July, and it was learned that the sheet metal work has been completed and also the PC boards. The fabricator is now in the process of painting and silk screening the panels. Work is now in process on the wire harnesses.

Most of the components scheduled for July 30, 1968 for the chassis have been received.

The delivery date for the finished chassis has been set at September 8, 1968.

Task 12      Film Drive and Transport System

Scheduled percentage of completion      35.0%

Actual percentage this date                      35.0%

As previously reported, the mechanical components for the film drive and transport system have been completed and are in storage pending assembly with the platen frame.

The electronic chassis for the film drive are presently in process by the fabricator. Several field engineering trips were made during the month of July to check on the fabricator's progress. One-third of the chassis required by the film drive are now in the painting and silk screening process.

Most of the components scheduled for July 30, 1968 have been received. The delivery date for the finished chassis is scheduled for September 8, 1968.

Task 13

Film Platen and Film Clamping

Scheduled percentage of completion 11.0%

Actual percentage this date 11.0%

The drawings covering the film platen have been released to the  shop for fabrication.

STAT

Specifications and designs covering the glass platen are being extensively reviewed in order to obtain the proper glass and finish. During this period, a substitute glass will be available for testing of the film platen.

Task 14 Film Cooling

Scheduled percentage of completion 12.0%

Actual percentage this date 12.0%

is in the process of working with the optical subcontractor regarding the air control equipment to be supplied by . As information is received, detailed drawings are being prepared for fabrication.

STAT

STAT

The specifications for the air supply and refrigeration have not yet been finalized. We are currently working with the customer's consultant regarding these requirements.

Tasks 16,  
17 and 18

Viewing Optics, Viewing Illumination,  
and Reticle Projector and Illumination

Scheduled percentage of completion 25.0%

Actual percentage this date 11.0%

A monitoring visit was made to  optical  
subcontractor, during the month of July. A copy of the trip report  
is included as Appendix I.

STAT

Task 20      General Platen Illumination

Scheduled percentage of completion      27.0%

Actual percentage this date                      27.0%

All of the mechanical components for the general platen illumination system have now been manufactured, and are in storage awaiting final assembly.



Task 21      Optical Bridge and Supports

Scheduled percentage of completion      40.0%

Actual percentage this date                      40.0%

In order to be compatible with the overall program schedules, the machining and heat treating of the castings have been rescheduled for delivery August 15, 1968.

The assembly of the bridge is scheduled for the month of August.

Task 22      Interferometer Assembly

Scheduled percentage of completion      20.0%

Actual percentage this date                      20.0%

The mechanical assemblies for the interferometer assembly have been received and are in storage awaiting final assembly.

The lasers have been received and are being checked out and tested. The mirrors have been ordered, and the quoted delivery of late August still stands.

The artwork for the PC boards for the interferometer assembly has been given to the fabricator, and the scheduled delivery date is August 22, 1968.

Task 23      Optics Drive Assembly

Scheduled percentage of completion      18.1%

Actual percentage this date                      13.0%

The PC boards for approximately 10% of the electronic chassis for the optics drive assembly are now in the process of being painted and silk screened. Work is in process on the wire harnesses.

During the last monitoring visit at  information was obtained which required minor changes to be incorporated in the optics drive assemblies so that they would interface smoother with  design.

STAT

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Task 24      Image Analysis System

Scheduled percentage of completion      25.4%

Actual percentage this date                      6.0%

Components for some of the [ ] supplied electronic chassis have already been ordered and delivery schedules set up.

STAT

The auto brite assembly to be interfaced with the Image Analysis System has been completed by the [ ] shop with the exception of one part which is being fabricated by an outside firm.

STAT

A meeting has been set up with [ ] on August 15, 1968 to negotiate the final subcontract for the Image Analysis System.

STAT

Task 26      Digitizing Logic Subassembly

Scheduled percentage of completion	26.0%
Actual percentage this date	20.0%

The electronic components for the digitizing logic subassembly are in the process of being fabricated. The sheet metal work and the work for the PC boards has been completed. The fabricator is now in the process of painting and silk screening the panels.

is experiencing difficulty in obtaining compatible delivery dates for special connectors which are used in this chassis. Every effort is being made to better the quoted delivery dates.

STAT

Task 27      Metric Readout

Scheduled percentage of completion      25.0%

Actual percentage this date                      25.0%

One of the electronic chassis for the metric readout has been received. The card wiring has been completed, and the computer program for checking the wiring has been prepared and received. Work is in process now at  to check out the chassis with the wiring diagrams.

STAT

Additional work is being performed on this chassis by the  shop.

STAT

Task 28      Output Logic and Interfaces and Systems

Scheduled percentage of completion      15.0%

Percentage complete this date              15.0%

The electronic chassis and components for the output logic system are being fabricated.

During the field engineering trips which were made in July, it was learned that approximately 25% of the components for the chassis have been received by the fabricator.

Deliveries for the finished chassis are scheduled for early November.

Task 29      Cabling

Scheduled percentage of completion      26.0%

Actual percentage this date                      12.0%

A substantial proportion of the cabling hardware ordered has been received.

About 9% of the cables released for manufacture have been completed.

This task will be re-scheduled during the next reporting period in order to take into account the long delivery dates quoted for specialized connectors.



Task 30      Control Console and Chair

Scheduled percentage of completion      30.0%

Actual percentage this date                      30.0%

As reported previously, the control console base has been manufactured and is in storage awaiting assembly.

The switch assembly for the display panel is scheduled for delivery on August 15, and the power supply assembly is scheduled for November 1.

The fabrication of the sheet metal components is being done in the  shop.

STAT

The components for the mechanical portion of the control console have been ordered. The final assembly schedule requires completion on October 14, 1968.

Task 32      Computer

Scheduled percentage of completion      50.0%

Actual percentage this date                      50.0%

As previously reported, delivery of the  Model DDP 516 computer is scheduled for 27 August 1968.

STAT

The manufacturer reports that this delivery date will be on schedule.

Task 33      Electronic Racks and Control Cabinets

Scheduled percentage of completion      30.0%

Actual percentage this date                      17.0%

The majority of the material for the drawers has been fabricated in the  Shop.

STAT

At the request of the  Shop, the delivery dates of the electronic cabinets were moved up to meet the scheduled delivery of the electronic chassis. Delivery of certain connectors required in the electronic cabinets has been quoted at ten or more weeks.

STAT

Task 34      Utilities, Vacuum and Air Systems

Scheduled percentage of completion      17.0%

Actual percentage this date                      17.0%

The utilities cabinet has been purchased and delivery has been promised for August 15, 1968.

The drawings covering the mechanical components have been released for fabrication.

Task 35

Vibration Absorption and Leveling

Scheduled percentage of completion 60.0%

Percentage completed this date 60.0%

The isolation system has been received from the vendor and has been installed in its final location in the clean room.

Task 36      Overall Assembly

Scheduled percentage of completion      0.0%

Actual percentage this date                      0.0%

Planning for overall assembly and test which was done during the design phase is being reviewed.

Because of the delay in the delivery of the main frame, the first sub-assemblies will not begin until August 1968.

Task 37      Radio Frequency Noise Suppression

Scheduled percentage of completion      0.0%

Percentage completed this date      0.0%

As previously reported, the installation of the RFI equipment is scheduled to begin 9 September 1968.

No work was performed on this task during the month of July.

Task 38      Environmental Control

Scheduled percentage of completion	30.0%
Actual percentage this date	30.0%

During the month of July, [ ] has worked with      STAT  
[ ] the environmental air conditioning consultant,      STAT  
who has almost completed the design of the air conditioning system.

See Task 6, Facilities Requirements, with which is  
incorporated the environmental control system.



Task 39      Reliability Analysis

Scheduled percentage of completion      0.0%

Actual percentage this date                      0.0%

No work was performed on this task during  
the month of July.

Task 40      Installation

Scheduled percentage of completion      0.0%

Actual percentage this date                      0.0%

During the June meeting with the customer and the customer's air conditioning consultant, it was agreed that various items pertaining to the site preparation would require resolution.

These items were clarified by  and an itemized list of the action taken was sent to the customer and to the air conditioning consultant. A copy of this list is attached as Appendix

STAT

Task 42 Breadboards and Test Services

Scheduled percentage of completion 0.0%

Actual percentage this date 0.0%

No work was performed on this task during  
the month of July.

Task 43      Computer Programming and Services

Scheduled percentage of completion      12.0%

Actual percentage this date                      12.0%

      [ ] management met with [ ] representatives      STAT  
on July 11, 1968. [ ] presented their quote for computer      STAT  
programming and services at this time.

      [ ] Specification No. 9, Computer Program Require-      STAT  
ments for the Ultra High Precision Stereocomparator, was discussed,  
and revisions mutually agreed upon by both [ ]      STAT

      The formal subcontract was prepared, and a copy  
has been sent to the customer for approval.

      [ ] has worked closely with [ ] during July      SSTAT  
to review the functional requirements of the computer program. This  
aspect of the task has essentially been completed.

Task 44      Preacceptance Test in Fabrication Plant

Scheduled percentage of completion      0.0%

Actual percentage this date                      0.0%

No work was performed on this task during the  
month of July.

Task 45      Acceptance Test in Fabrication Plant

Scheduled percentage of completion      0.0%

Actual percentage this date                      0.0%

No work has been performed on this task during  
the month of July.

Task 46

Acceptance Test after Installation

Scheduled percentage of completion 0.0%

Actual percentage this date 0.0%

No work has been performed on this task during  
the month of July.

Task 47 Instruction Manual and Drawing Submittal

Scheduled percentage of completion 0.0%

Actual percentage this date 0.0%

No work has been performed on this task during  
the month of July.



Task 48      Spare Parts List

Scheduled percentage of completion      0.0%

Actual percentage this date                      0.0%

No work has been performed on this task during  
the month of July.

Task 49

Operator Training

Scheduled percentage of completion 0.0%

Actual percentage this date 0.0%

No work has been performed on this task during  
the month of July.



TRIP REPORT

Company Contacted:

STAT

Contacted by:

Date Contacted:

Week of July 22, 1968

Job No.

342

The purpose of this visit was to perform the first review of the work of the fabrication of the Stereocomparator under Job #342.

1. Removal of Condenser

had misinterpreted one of the  drawings showing the slot in the "T" shape granite stage. The slot actually runs parallel and beneath the optical bridge, whereas  had believed the slot ran at 90 degrees to the optical bridge.

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The  design for removal of the condenser was dependent on the slot running at 90 degrees to the optical bridge. Since this was not so, the condenser could not be removed from the Stereocomparator without a complete dismantling of the optical bridge. It was pointed out to them that certain minor changes in the flange dimensions of the condenser mounting, together with a technique for disassembly, would allow removal of the condenser, by removal of the glass platen only.

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The removal of the glass platen would require removal of the platen holder, which in turn, supports the film drives, and film holders. This is, of course, a substantial amount of disassembly; however, compared to the removal of the optical bridge, the work required is minor.

2. Removal of Infrared Heat

To remove infrared from the main illumination system, [ ] has arranged a mirror that reflects infrared but transmits visual light energy. This is located immediately after the primary condenser. The mirror reflects the heat back towards the 450 watt high pressure Xenon enclosed arc lamp.

STAT

The system contains three additional mirrors of the so-called "cold" mirror type whereby the infrared energy is transmitted and removed from the system and the visual energy is reflected by the mirror.

3. Tooling for Final Testing

[ ] has designed an arrangement for mounting the [ ] supplied optical bridge, together with the necessary mounting supports for the illumination system and other portions of the Stereocomparator. The design is based on the use of a reinforced concrete form, essentially appearing similar to our Stereocomparator with built-in mounting plates for the various elements of the Stereocomparator optical system.

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They have built a complete wooden model of 1/4 scale for the design they envisioned. The model was very well constructed and painted to show the various elements of the system.

4. Microswitches

It was pointed out to [ ] that they had installed microswitches on several of the devices such as the filter wheels and

STAT

the image rotator which were capable of infinite rotation in either direction. This made very little sense in that the purpose of the microswitch was to limit rotation and so in these instances the microswitches would have no function, and would have to be disconnected. [ ] agreed to eliminate and not use microswitches in this type of application.

STAT

5. Brakes

[ ] was requested to eliminate brakes on all of the servo drives. There was some question about the necessity for brakes, but [ ] agreed to provide for the brakes but not actually to install them. They would be supplied, in any event by [ ] and so the effect on [ ] would be nil.

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6. Data for [ ]

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The [ ] had requested [ ] to provide them with (a) the linear amount of de-focussing, (b) focal length for the system, (c) the F number, (d) the numerical value of the aperture. This information was provided by [ ] in the form of tabulations and other data as was indicated. (See Appendix IV.)

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7. Platen Glass

[ ] has found difficulty in procuring platen glass to their specifications. To ease this situation [ ] had been requested to change the refractive index of the main platen glass from a value of 1.467 to a value of 1.516. They stated that this would upset their

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optical design and that consequently, they will attempt to provide [ ] STAT  
with suitable material at an added cost to their present program.

[ ] was shown [ ] drawings C-4263 and C-4263A. They STAT  
stated that the specifications could not be achieved in France. They  
said, however, that it should be possible to design and build platens  
that would be perfectly satisfactory for the performance of the  
Stereocomparator. They will provide a cost quotation and a delivery  
schedule, but it may take some time because of difficulty in obtaining  
information during the [ ] plant shut-down during the month of STAT  
August. Six months was mentioned as a possible procurement schedule.

8. Drawing Submittal for Completion of Job #302

[ ] was told to send to [ ] one complete set of STAT  
transparencies of all drawings related to the design of the Stereocomparator.  
In addition, they are to send two prints of all drawings revised since the  
submittal of previous drawings, or to be revised during the fabrication  
phase of the Stereocomparator.

9. Sliprings

[ ] drawing D-8190 shows the connecting plug looking STAT  
upwards as the slipring is mounted to the anamorph system. [ ] STAT  
cannot interface with the slipring assembly in this position. There is  
a main portion of the anamorph frame which interferes with the plug. It  
is possible for them to utilize an arrangement whereby the plug looks  
downwards. [ ] must perform the proper interface arrangement since STAT

at this point in time [ ] cannot perform a re-design of the STAT  
anamorph frame. [ ] will provide a slot in the part to be used STAT  
by [ ] for wiring access. See drawing C-5181 revised 7/10/68. STAT

10. Zoom Counter Weight

At the request of [ ] has agreed to mount a STAT  
weight of 0.434 kg to the main zoom upper element to counterbalance  
the zoom assembly.

11. Main Zoom Driving Motor

[ ] has provided for a new motor for the main zoom, STAT  
their drawing 4960 extract was presented as a layout for examination  
only. [ ] proposal is to use a F9M2 Servalco motor with a STAT  
Servo-tek tachometer SA 740.A7, and a gear reducer PIC U211 with a  
one divided by 80 ratio.

12. Drawing Errors

Over the months, drawing errors have been found by [ ] STAT  
in the [ ] drawings. They are mostly errors of procedure whereby STAT  
two drawings have been called out with the same drawing number, or  
figures transposed in the numbers, or the wrong paper size called out,  
that is the prefix letter would be in error. In addition, some dimensional  
errors were found. [ ] is going to correct all drawing errors and STAT  
reissue drawings with the appropriate revisions.

13. Lamp Mounting Insulation

There was an error in the design of the insulation for



mounting the main illumination lamp. The material and design had been for a steel part and this would have made an electrical problem as the high tension terminal of the lamp would have been connected to the ground.

[ ] realized their error and a new drawing will be prepared. STAT

14. Unused Drawing Numbers

Of the many drawing numbers assigned to [ ] at the beginning of the design project, a substantial number remain unused. STAT

[ ] has beginning blocks of numbers and so the unused numbers STAT

are scattered through this spectrum. They will be turned back to [ ] STAT

later on in the fabrication program. [ ] does not wish to release STAT

the drawing numbers until they are sure they will not require them later.

15. High Tension Cable for Lamps

[ ] has asked for a specimen of the electrical cable STAT to be used for the illumination lamps, both the 450 watt and the reticle

lamps. [ ] has agreed to send them a 12" length of the appropriate STAT material.

16. Lamp Mounting

[ ] drawing A-7804 shows a part for mounting the lamp STAT for the main illumination system. The lamp is held in position by a set

screw bearing against the part. [ ] is to revise the part to make it STAT strong enough to withstand the force of the set screw.

17. 450 Watt Lamphouse

[ ] was told that they must provide an enclosure for STAT

the main illumination lamphouses, with attachments for the [ ] supplied STAT ventilation system. That is, there would be tubing connectors in and out of the lamphouse arranged to cool the lamp ahead of the first condenser system. The connector fittings would be 5 centimeters in diameter and would look downwards.

18. Lamp Power Supplies

[ ] will require the use of the [ ]-supplied power STAT supplies for the various illumination systems during their acceptance testing. [ ] must send these units to [ ] in plenty of time for STAT their sub-system check-out.

19. Lamphouse Enclosure

[ ] had prepared Sketch SK 563 covering necessary changes STAT to [ ] drawing E 7785. The sketch was submitted to [ ] with STAT an explanation for the changes.

20. Illumination System Casting

[ ] had prepared Sketch SK 509A covering necessary changes STAT to [ ] drawings E 7637 and E 7638. The sketches were submitted to STAT [ ] with an explanation for the changes. STAT

21. Optical Switching Arrangement

There are various diaphragms and apertures associated with switching between the 40mm and 80mm objectives of the main illumination systems. [ ] has designed Geneva drive mechanisms for these STAT switching motions so that the proper over-travel and specific positioning of the optical parts will be achieved.

22. Adjustable Diaphragm

The variable diaphragm aperture for the main illumination system is controlled by a cam with two special profiles. One profile relates to the 40mm objective lens and the second profile relates to the 80mm objective lens. It is thus necessary for the drive mechanism to select the appropriate profile as the respective objective lenses are turned into position. In addition, there are different dead zones at the two ends of the cams and a dead zone at the center of the cam. These dead zones are related to the cam driving mechanism and not to the condenser positioning function.

The driving system for the cam rotates through 360 degrees with no provision for over-travel. In addition, there is a severe space limitation and the potentiometer was required to be of minimum diameter. This dictated a miniature 10-turn potentiometer which was found to be available in the CIC catalog with an accuracy range of 0.1%. This potentiometer would be geared into the system in a ratio of 10 to 1, using precision servo type gearing.

There is no provision for over-travel in the system. This situation would have to be corrected by proper commands from the main zoom system to which the diaphragm servo is slaved.

[ ] had provided a F5C2 Servalco motor for driving the diaphragm. This motor operated from three volts d.c. and was not compatible with the [ ] servo system which developed 12 volts d.c. Because of the space problem, it was not possible to use one of the

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regular Globe motors with built-in gears and tachometer. It appeared that there were other motors available with sufficient power and of an adequately small size. The re-design will be made by

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23. Main Zoom Servo

In studying the servo system of the main zoom, it was found that there were no provisions for switching between cam segments on the servo items slaved to the zoom, nor did the gearing for the main zoom potentiometer conform to the zoom driving cam. That is, the cam required 720 degrees of motion to give the zoom lenses full travel.

The zoom potentiometer also rotated 720 degrees. This would have resulted in the same output appearing twice in each cycle of the cam. There was likewise no provision for over-travel. The  design also included a small Globe motor which did not have the capability of producing full travel of the zoom system in the three seconds that had been stipulated for all systems.

STAT

A new motor was therefore provided in the design, a Servalco F9M2.  is required to perform revisions to the mechanical design of the zoom drive and potentiometer system. The new system will include one set of potentiometers rotating 360 degrees as the cam rotates 720 degrees for the purpose of zoom position readout and zoom servo control.

STAT

In addition, there will be a set of potentiometers revolving 180 degrees as the cam rotates 720 degrees. These potentiometers are for the purpose of controlling the slave servo systems on the diaphragm

and condenser systems. These latter potentiometers must be of a type where the position of the sliding contact can be adjusted with respect to its driving shaft. This is to accommodate the individual position of the slave cams.

In order to provide a means for controlling over-travel [ ] will provide a pair of microswitches, one at each end of the cam travel. These are arranged so that 12% before the end of the cam travel the additional microswitch will be activated. This will provide a means for reducing the drive velocity as the end of the cam position is reached.

STAT

Because of the additional potentiometers required for the control of the diaphragm and condenser systems and including the additional microswitch contacts, a larger Cannon plug has been specified to [ ] The new plug was an MS-3102 A-36-2011-66. This plug would contain 52 No. 16 contacts, with four No. 12 contacts and provides for a reasonable number of spare contacts.

STAT

24. Main Zoom Potentiometers

The same system of linear potentiometers is required for the control of the diaphragm and for control of the condenser for the main illumination system. These potentiometers turn at 1/4 the speed of the main zoom cam, that is, the potentiometers turn closely 349 degrees for 720 degrees of revolution of the zoom cam.

Two potentiometers are required for the film condenser. One is switched by the objective lens turret to operate when the 40mm objective lens is in the system. The other is switched by the turret to

operate when the 80mm objective lens is in the system. The two potentiometers are independently adjustable, one to the other, with respect to the driving shaft. They are arranged so that the output of one potentiometer reads in the range of 0 to 5 volts while the output of the second potentiometer reads in the range of 5 to 10 volts. The exact voltage values are functions of the condenser drive cam over each of its two ranges. A similar arrangement is required for the adjustable diaphragm driving cam. On a theoretical basis, a single pair of potentiometers would drive both the condenser and the diaphragm; however, this would allow no flexibility whatever in trimming the system, and is felt to be an unwise restriction. Four potentiometers have been required, therefore, for each of the main zooms. The model CIC Series 170 or 200 (clamp lug mounting) would be satisfactory for this purpose.

The potentiometers for the balance of the servo systems would be arranged to turn one revolution (approximately 347 degrees) for two revolutions of the zoom cam, or 720 degrees. The suggested stack of potentiometers would be of the multiple cup type:

- 1) One with a special taper for brightness control with respect to film peaking.
- 2) A linear potentiometer for the reticle zoom 10X command to the servo system.
- 3) An exponential potentiometer for the main zoom position readout to the computer servo system.
- 4) An exponential potentiometer for the panel meter as a readout for the zoom magnification.

- 5) A logarithmic potentiometer for the purpose of automatically maintaining optimum control of the servo gage.
- 6) And lastly, a linear potentiometer with no particular assignment.

This latter group of six potentiometers could be similar to the CIC Series 117.

25.  Drawings - Illumination STAT

drawing numbers relating to the illumination system and the problems of servo control are as follows: STAT

- Condenser Cam - C 7495
- Diaphragm Cam - C 7572
- Main Zoom Cam - B 5066
- Main Zoom, Cam and Potentiometer - B 4690
- Reticle Zoom 10X Cam - B 7085

26. Anamorph Ratio Readout

The anamorph system function of shaft angle versus anamorph expansion has not yet been computed by  and therefore there is no data upon which to base the ordering of the special readout potentiometer system for the anamorph. This information should be available in October 1968. STAT

27. Condenser Drive

The condenser drive for the main illumination system is provided by  with a dual position cam essentially identical to STAT

that used for the diaphragm control. The cam contours would be entirely different but the general arrangement would be identical. This system is also equipped with a 10-turn linear potentiometer.

28. Illumination System Cooling

[ ] had no provision for cooling the filter wheel assembly. Infrared energy coming from the lamphouse could be entirely absorbed by the high density filter wheel elements. STAT

Further to the problem of cooling, [ ] had designed an open system with reference to the mechanism of the illumination system. [ ] was asked to provide a suitable mounting means for an enclosure to be provided by [ ] In this enclosure would be the appropriate air cooling connections. [ ] will study the situation and make the appropriate interface recommendations. STAT  
STAT  
STAT  
STAT

29. Filter Wheel Density Requirements

[ ] stipulated to [ ] that the following filter density specifications were to be used by them in their design of filter wheels. Each disc is to have a clear area whereby there will be no absorption of light other than that due to the material of the filter disc itself. The balance of the filter wheel which consists actually of two filter wheels working in opposite directions, is to be equipped for linear density change with respect to the position of the wheel. This cannot be done in the region of the transition between the zero density portion of the wheel and the beginning of the absorption region. A short transition STATT



angle will be employed so that the deviation of the system from a linear density function will be at a minimum.

- a) Main Illumination System - Density Range 0 to 5.1
- b) Filter wheel for the ocular system - Density Range 0 to 1.0
- c) Reticle filter wheel - Density Range 0 to 3.0

30. Reticle Illumination

[ ] has decided in consultation with the [ ] Company that the XBO 75 watt high pressure Xenon lamp would be unsatisfactory for illumination of the reticle. The reason given was that the arc is short and of high intensity and does not remain in a fixed position within the envelope of the lamp. This would present optical difficulties in that there would be flicker which would cause intensity changes to the reticle spot. It is therefore being recommended that a lamp with a straight mercury high pressure vapor arc of 100 watts rating be utilized instead.

STAT

This presents a problem in that there is no red light present in the mercury spectrum and consequently when the red filter is switched into position, the reticle spot will not be red but will be dark. The only solution at the moment seems to be to change the color of the reticle to yellow. [ ] is to do some thinking on this subject and see if the problem could be resolved in any other way. At the moment the 75 watt lamp is unsuitable and the lamp wattage is presently set at 100.

STAT

31. Termination of Contract with [ ] for Job #302

STAT

The [ ] representative signed off the #302 contract as having

STAT

been formally completed by [ ] This was done on July 25, 1968. STAT

[ ] has certain minor deficiencies which they have agreed to make STAT  
up during the #342 contract. The completion of Job #302 requires:

1) That [ ] prepare a final report. They antici- STAT  
pate that they will be able to do this in October 1968.

2) [ ] is to furnish [ ] one reproducible tracing STAT  
of all completed designs and on certain designs not yet complete they  
will send the tracings when the work is finished. [ ] should receive STAT  
these drawings in September and October 1968 with a possibility of a  
few drawings in August.

3) [ ] is to furnish [ ] with copies of all revised STAT  
drawings as they are revised. This will be a continuing effort and will  
extend through the life of the #342 job.

4) [ ] is to revise their servo data sheets: This STAT  
work should be received by [ ] in October or the beginning of STAT  
November 1968.

32. Fabrication Progress Review

The fabrication effort involves different personnel than the  
design effort and it is necessary at the start for [ ] to arrive at an STAT  
understanding with this new group of supervisors to achieve a working  
relation. [ ] therefore requested [ ] to establish a monitoring STAT  
procedure whereby certain of their personnel would be available for  
detailed review of their program and effort in a manner similar to that  
which was done for the design contract. A meeting was arranged by

[redacted] whereby specific assignments were made to certain of their people. STAT



STAT

These people were told by [redacted] that a detailed review of the work program with respect to each of the scheduled milestone dates will be required on a routine basis. At the time, physical evidence of work performed and hardware items produced would have to be demonstrated as part of the monitoring effort. Technical difficulties would be reviewed and any interface problems would be discussed. The design department would be called in to assist with any problems of a technical nature. STAT

It is clear that it will take a few of these monitoring visits to establish a rapport similar to that achieved with the design group.

A. In regard to the optical situation, they stated they had purchased 80% of the optical glass and that due to the excessive workload at [redacted] the glass had been sent to [redacted] for inspection and polishing and refractive index determination. STAT

B. In the mechanical area, approximately 30 patterns had been made for various castings.



SUBJECT: [redacted] Schedule

STAT

Optics:

Procurement: 80% completed, remaining 20% by the end of July.

Quality Control: Preliminary polishing operations in order to check the homogeneity of the glass material. (Search for bubbles, flaw, etc.)

Machining: The characteristics related to the indices have not yet been defined.

Mechanical:

Procurement:

- Various casting patterns planned for the system = 30
- Casting ordered and expected to arrive July/August = 17

Including: 5 - illumination assembly  
 8 - viewing assembly  
 4 - reticle projection assembly

- The remaining 13 patterns have not been ordered because final prints are not yet available.
- Actual castings will be ordered as soon as we receive the patterns.
- The ordinary bearings related to the illumination assembly have been ordered. As far as the precision bearings are concerned, we are consulting with [redacted]

STAT

Preparation:

60 mechanical parts related to the illumination assembly are ready to be sent to the shop.

**Page Denied**

APP. III

Clarification of items discussed during June 24-25 meeting (reference Minutes of Meeting, June 24 and 25, 1968 attached).

- Item 1 The [ ] furnished air compressor is powered by a 1-1/2 HP motor. STAT  
Power requirements are 220v, 3 phase. The compressor is 38" long,  
16" wide and 32" high.
- Item 2 The compressor requires 1/2" tubing to customer-furnished dryer.
- Item 3 The [ ] furnished vacuum pump is 34" long, 24" wide, and 16" STAT  
high. The motor is 3 HP, 220v, 3 phase.
- Item 4 There are two vacuum pumps requiring two 1" pipes from pumps to  
machine utilities panel at rear of the Stereocomparator.
- Item 5 The [ ] isolation equipment does not require any special STAT  
temperature or humidity conditions. Plant air pressure recommenda-  
tions are for 85-125 psi. Flow requirements are 2 cf/hour maximum.
- Item 6 The film cooling supply air should be 72°F ± 0.5°, with relative  
humidity of 55% ± 5%. Pressure requirement is 35 psig with 20 cfm  
flow.
- Item 7 Drawings E6711 and E7889 (attached) show the detail of air  
supply and exhaust through the cabinets. It will be noted that  
the utilities cabinet requires cooling on one side only. Flange  
connections will be supplied by [ ] STAT
- Item 8 Pressure drop through all cabinets will be 1/2".
- Item 9 Details of process air connections and locations will be provided  
prior to July 15.
- Item 10 Track dimensions and location will be provided with process air  
connection details (Item 9).
- Item 11 [ ] Specification No. 11 has been revised to reflect this change. STAT  
A copy of the revised specification is enclosed.
- Item 12 (See Item 11 above.)



APP. IV

## 1) 40mm Objective

 $\phi$  = Diameter of aperture = 1mm

	F	F/ $\phi$	1/3 Field	2/3 Field	Edge of Field
200X	1.25	1.25	0.00050	0.0012	0.0015
123X	2.03	2.03	0.00080	0.0033	0.0061
65.2X	3.83	3.83	0.0029	0.0088	0.022
37X	6.75	6.75	0.0080	0.041	0.082
20X	12.5	12.5	0.031	0.15	0.31

## 2) 80mm Objective

100X	2.5	2.5	0.0031	0.0093	0.078
61.5X	4.06	4.06	0.0047	0.019	0.034
36.6X	6.83	0.011	0.046	0.046	0.93
18.5X	13.5	13.5	0.044	0.18	0.36
10X	25.	25.	0.15	0.56	1.1

Notes:

- This table gives: 1) The focal distance of the system for every magnification  
 2) The number of apertures F/ $\phi$  (but  $\phi=1$  and F/ $\phi=F$ )  
 3) The curvature of the image at 1/3, 2/3, from the edge of the field in the plane object.

All the data is given in millimeters.

Comments:

- 1)  $\phi$  is the diameter of aperture of the system and it is constant  
 $\phi = 1$  mm for every magnification.  
 2) The number of aperture is  $f = \frac{F}{\phi}$ , then in considering that  
 $\phi = 1$   $f = F$ .