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TID/TAB - 75/64
24 April 1964

MEMORANDUM FOR THE RECORD

SUBJECT: Trip Report [REDACTED]

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1. Trip Objectives

a. To examine the new Stereo-Chip Comparator and to evaluate its future usefulness to TAB.

b. To discuss the development of the proposed digitized Stereo-Viewer and Point Transfer Device covering such points as:

- (1) Accuracy
- (2) Possibility of incorporating handwheels in addition to the proposed joystick controls.
- (3) Location of operational controls with reference to operator's position.
- (4) Means and type of digitized readout.

2. Stereo-Chip Comparator

a. A complete examination and evaluation of the Stereo-Chip Comparator was hindered by the fact that the instrument was not completely operational. However, enough of the various components were examined to get a good idea of the instrument's capabilities

b. A brief, generalized description of the instrument is as follows:

(1) Overall Size (including cabinet), 51" X 30" X 46"

(2) Viewing System;

(a) Excellent optical viewing system.

(b) [REDACTED] zoom type stereo viewing head. [REDACTED]

(c) Magnification is continuous from 13X to infinity with interchangeable eyepieces.

(3) Scanning System;

(a) Two $4\frac{1}{4}$ " X $4\frac{1}{4}$ " format viewing stages with vacuum hold down.

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GROUP 1
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downgrading and
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- (b) Left format is fixed with reference to moving carriages while right format is movable over a glass plate. The right format has a double vacuum hold down and is used as a slave for orientation to the left format.
 - (c) Two sets of mechanical handwheels control the XY translational movements. One set is course and for rapid scanning. The other set is for fine movements. (3.6° turn = 1 micron)
 - (d) All measuring done on left format. Right format not digitized.
- (4) Accuracy;
- (a) $\frac{1}{2}$ micron readout is planned but unit is also capable of a one micron or .1 micron readout by turning a switch.
 - (b) Straightness of XY carriages are calibrated to .6 of one second of arc in both directions.
- (5) Digitizer;
- (a) Automatic measuring interferometer utilizing light waves as a standard of measurement.
 - (b) Interferometer is factory permanently adjusted.
 - (c) Instrument is planned for on-line operation utilizing a control panel similar
- (6) Maintenance;

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Instrument was designed for a minimum amount of operator maintenance.

3. From a preliminary evaluation I am convinced that the Stereo-Chip Comparator will prove a very useful instrument. There are, at present, in my opinion, a certain number of features that would need to be changed or adjusted before this unit would prove to be of value to TAB as a production type model. These limitations are as follows:

- a. Small field of view
- b. Unequal inertia in XY handwheel (left set requires approximately $\frac{1}{3}$ more force to move than right).
- c. No limit or safety switches to prevent accidental overtravel of carriages.

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- a. Small field of view
- b. Unequal inertia in XY handwheel (left set requires approximately 1/3 more force to move than right)
- c. No limit or safety switches to prevent accidental overtravel of carriages.
- d. No means of adjusting general illumination lamp
- e. Instrument is sensitive to vibrations
- f. Limited working space area
- g. Reticle is located in eyepieces

These limitations are, at present, carefully being considered by PDS personnel and will in time be corrected. Such things as limited size formats, no provisions for roll film, and measuring limited to left format could also be considered as being features which will limit the unit's use in TAB. However, to change these features would necessitate certain design changes. These changes could be made if it was felt that they were justified. The instrument, as it is now planned, would have limited use in TAB. However, when the prototype is delivered and studied by PDS and ways are found to improve on some of the above mentioned features, TAB could find considerable use for this instrument. Because of its high quality viewing system and excellent accuracy, the instrument could be adapted for accurate, detailed type of projects, and if TAB is to compete with the many Photo Interpreter's who will have this instrument at their disposal, it will be essential that the Branch also have the benefit of the inherent accuracy and viewing systems that are planned for this instrument.

It is therefore recommended that TAB wait until the prototype model is delivered and then evaluate the instrument under actual working conditions and at this time, with the help and recommendations of PDS personnel, make those proposed changes it feels necessary to convert the instrument for our use.

4. Stereoscopic Point Transfer Device

a. The discussions concerning the Stereoscopic Point Transfer Device were in the form of a question and answer session. Following are questions that were asked and their answers as well as can be recalled:

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QUESTION:

Is it possible to obtain the system accuracy you claim in your proposal with a ball lead screw of 2 1/2 mm pitch?

ANSWER:

Yes. According to the manufacturer the same type lead screw as is used on this unit has been made to an accuracy of 1/4 micron. Due to other effects, such as hysteresis and deflections due to various forces from the fiber optic cables, the total system accuracy will be about 2 1/2 microns over 1 mm, 5 1/2 microns over 20 mm with a 1 3/4 micron repeatability. This accuracy does not include the accuracy of the digital readout system. Also the best possible engineering practices are being applied to make the system as rigid as possible, including the modification of the manufacturer's encoder connectors to avoid lateral interferences, plus modification of the system's XY carriage and base castings.

QUESTION:

Will you guarantee the proposed system accuracy?

ANSWER:

We are confident that the basic design of the Stereo-Viewer has sufficient rigidity to provide these, or greater system accuracies. However, because of the larger formats involved there is a high risk in determining what the final accuracy will be. The exact accuracy results will not be known until the system has been tested.

QUESTION:

Is it possible at this date to incorporate XY handwheels in addition to the joystick controls?

ANSWER:

(1) The first reaction to this question consisted of a variety of counter-questions as to why TAB needed the handwheels. The contractors were of the opinion that the joystick would meet all measuring requirements. When the problems that TAB encountered with joystick controls were explained, the contractors agreed to look into the matter. They were of the opinion that the handwheels could be added but because of the problems involved they needed more time to study the matter. It was at this point that it was made very clear

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to the contractors that they were not to incorporate the handwheels without specific instructions from the PDS personnel.

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(2) Since the trip this matter has been discussed with [redacted] 25X1 [redacted] PDS. They are of the opinion that the joystick will meet all of TAB pointing requirements and suggest that TAB go along with the present proposal forgetting the handwheels for the time being. If at a later date TAB finds the joystick unsatisfactory, the handwheels can be added as a retrofit package. This, they stated, would solve many problems including the renegotiating of the contract at this late date.

(3) The many problems involved in adding the handwheels at this time are appreciated and it is therefore recommended that TAB go along with PDS on this matter and to objectively evaluate the joystick. But for the record, it must be stated that I still hold many reservations on this subject. They may prove to have no foundation but as of now I do not believe the joystick will satisfactorily meet all of TAB's pointing requirements. Until the joystick is tested under working conditions, the answer to the many questions involved will personally remain in doubt.

b. The location of the various operational controls with reference to the operator's position was studied by examining the blueprints. All of the controls appeared to be in a functional location. A request was made for a rough copy of these controls so that everyone in TAB could become familiar with their location and function.

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c. The type of digital readout to be used with the instrument was discussed [redacted] He suggested that they essentially use the same type readout as is being used on Stereo-Chip Comparator. The aim being towards standardization.

[redacted]

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Distribution:

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Orig - C/TAB
1 - PDS/ [redacted]

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1 - C/TAB/PS
1 - TID/TAB [redacted]

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NPIC/TID/TAB [redacted]

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