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NPIC/TSG-209/71

6 OCT 1971

MEMORANDUM FOR: Executive Director, NPIC

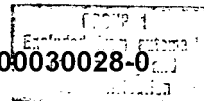
SUBJECT : Report on [] MLT 1540 Status

1. In June 1970, a contract was negotiated with [] for the production of a total of 440 light tables. Of this total, 267 units were purchased for NPIC. All of the NPIC units have now been delivered. A detailed breakdown by component of the total purchase package is attached.

2. The first units delivered exhibited a number of minor engineering design problems and gave considerable evidence of poor quality control during the assembly and inspection stages. Through the cooperative efforts of ESD, RED, and SC&PB/SS, pressure was brought to bear on the contractor to rectify these discrepancies within the terms of the production contract.

3. By May 1971, the major problems had been brought under control to the extent that the units, in the main, were in operable condition for the arrival of the first [] Prior to this time, the units had undergone considerable operational use within IEG on other imagery. As anticipated, a number of engineering "bugs" were surfaced under this continuous operational utilization. Engineering fixes were made as expeditiously as possible--some units being modified in-house while others were re-fitted prior to delivery.

4. These engineering modifications range from minor items (such as increasing the capacity of certain resistors and switching to "slow blow" fuses) to the major redesign and upgrading of certain electronic components in the illumination control system circuit boards. Also accomplished was an improvement in the internal ventilation of the table required to reduce electronic failures due to excess heat. The majority of these breakdowns were minor and resulted in the operational loss of the tables for only short periods of time. However, through a constant analysis of equipment failures and with engineering changes being quickly incorporated where the failures have been repetitive rather than

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random, the overall tables have been considerably upgraded and should have generally improved service life as a consequence. A detailed breakdown covering the type and significance of these maintenance problems is attached.

5. One of the areas of initial TSG concern was the new (unproven) light source--there were a number of early lamp failures. These failures were apparently due to defective tubes. Data gathered to date has not surfaced a significant problem with only 20 lamps having to be replaced. There may be additional areas of component failure surfaced as operational hours build up on the equipment; however, there is no way of predicting which items (or when) on the basis of our present limited operational history. ESD's preventive maintenance program which started on 1 September, with 21 units serviced as of 23 September, should help minimize future down time; however, there is currently no indication of a decrease in failure rate. There are presently 10 in-operative units in IEG awaiting spare parts and six additional tables in use which are not at optimum condition due to lack of replacement parts. Every effort is being made to expedite delivery of replacements for the components involved.

6. There remain three areas of concern: (1) vibration, (2) defocusing (when scanning), and (3) high magnification viewing. These problems are difficult to completely solve because they are basically interrelated.

a. Vibration causes a blurring of the image and a loss of resolution as observed through the optics. The problem is being studied by Towards this end, a new (stiffer) beam has been designed and soon will be put under test and evaluation; this should minimize the problem. The problem has been partially solved by ESD, on an interim basis, by clamping the current beam--thereby shortening its effective length. However, this restricts the X travel of the stereoscope. Investigative work is continuing in this area.

b. Some defocus problems have occurred when the microstereoscope is moved over the total imagery format at higher magnifications. Proper focus, and its retention, is a function of (1) proper focusing procedures by the operator, (2) proper alignment of the table and

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microstereoscope components, and (3) the inherent depth of focus of the objective lens--this decreases as magnification increases. TSG has studied this problem and we will be making a detailed report to IEG in the near future. Solution of this problem lies in reducing the individual contributing sources of error to a minimum. ESD has already taken care of those problems which are correctible through alignment, while RED is investigating some minor engineering modifications to the Zoom 240/Mod 28 Rhomboids viewing system and to the 1540 microscope mount. The need for additional operator training is evident.

c. The high quality of the [] and the newness of the detail observed have combined to lead the PI's to view the imagery at magnifications which were never anticipated; i.e., 15x to 120x vice 7x to 60x (with most viewing to be done below 30x magnification). The higher ranges were never encompassed in the design of the 1540. It is doubtful that they should be. A number of interim solutions are currently under investigation to permit IEG to extend the magnification range to the extent practical. In this area, too, a detailed report is being prepared for IEG.

7. At this point, it is essential to reemphasize that these problems, along with other factors (such as film flatness), are highly interrelated. If these higher magnification ranges are, in fact, desirable, then the optical viewing system and the light table must be treated as a total system and designed in unison for the best overall compromise. Vibration, depth-of-focus, illumination intensity, film flatness, field-of-view, eye relief, all come in to play and make the problem more difficult as optical magnification is increased. Some recently completed [] work has given us new insight into the part the eye plays in this problem. Other parametric studies will determine the optical characteristics required in such an optimized viewing system. It is predictable that certain of these factors can be taken care of by modifications to existing equipment; however, further emphasis on the upper magnification range will require the Center's giving serious consideration to a second generation viewing system or a studied move from roll to cut film for certain critical applications.

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8. Summary data from our computer based failure record system are attached.



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Attachment:
As stated

Distribution:
Original - Addressee
1 - NPIC/TSG/RED
2 - NPIC/TSG/Chief ✓
2 - NPIC/TSG/ESD

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NPIC/TSG/ESD (6 Oct. 71)

Attachment to
NPIC/TSG-209/71

Summary Data on IS MLT 1540

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1. Delivery status under the NPIC joint procurement contract.

<u>COMPONENT</u>	<u>QUANTITY</u>	<u>STATUS</u>
NPIC	267	Delivered
Navy	11	Delivered
AF	71	Delivered
IAS	16	Delivered
Army	17	No information available at present (8 passed through NPIC receiving inspection)
DIA	46	To be modified by contractor before delivery (10 in)

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2. During the period 1 February 1971 through 31 August 1971, 482 failures occurred. The corrective maintenance required has been classified into three groups; those repairs which required new or modified parts, those which required an adjustment, and miscellaneous repairs. Explanatory notes (numbers in parenthesis) are presented for items having the greatest frequency of occurrence.

REPAIRS WHICH REQUIRED REPLACEMENT PARTS

<u>QUANTITY</u>	<u>ITEM REPLACED</u>
5	Bearing
3	Control Box

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<u>QUANTITY</u>	<u>ITEM REPLACED</u>
48	Fuse (1)
6	Gear
1	Knob
20	Lamp (2)
4	Latch
12	Motor
24	Pin (3)
42	Printed Circuit (4)
24	Transistor (5)
10	Transistor & Fuse
3	Transformer
14	Switch
18	Multiple Components due to Heat (6)
15	Other Replacements

REPAIRS WHICH REQUIRED ADJUSTMENTS

<u>QUANTITY</u>	<u>ITEM ADJUSTED</u>
8	Chain
31	Clutch (7)
11	Defective Connections
1	Film Guides
1	Gears, Align
2	Glass, Level
8	Mercury Switch
5	Rollers
25	Tach (8)
72	Tighten Loose Knobs, Switches, Covers, etc. (9)
13	Pod Clamps
26	Other Adjustments

MISCELLANEOUS REPAIRS

20	Lubrication
5	Misc. Service
5	Operator Error

EXPLANATORY NOTES

- (1) Fuses (48) - The type of fuse now being used has been changed from a fast blow type to a slow blow type.
- (2) Lamps (20) - Under warranty. This is a relatively low amount considering there are 24 per table.
- (3) Pins (24) - Pins are designed to shear rather than damage motor gears. [] claims operators do not seat the film spools properly before using motor drive. 25X
- (4) Printed Circuits (42) - Listed as replacements, the PC cards for the most part were repaired by replacing defective components on the card. Cards have to be returned to [] for repair due to the lack of spare parts. 25X
- (5) Transistors (24) - Failures are being analyzed by []
- (6) Multiple Components due to Heat (18) - [] has installed modifications to eliminate this problem. Problem hasn't occurred (for 3 months) since modifications were installed (Para. 3d. & 3e.).
- (7) Clutch Adjustments (31) - [] is supposedly correcting this problem by improved quality control. X1
- (8) Tach Adjustments (25) - Has so far been a one time adjustment.
- (9) Loose Knobs, Switches, Covers, etc. (72) - [] has started using Loctite on set screws. Repairs done in-house have been a one time adjustment. X1