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Memorandum M-1153

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Project Whirlwind  
Servomechanisms Laboratory  
Massachusetts Institute of Technology  
Cambridge, Massachusetts

SUBJECT: BI-WEEKLY REPORT, Project 6345, January 19, 1951

To: Jay W. Forrester

From: Project Whirlwind Staff

1.0 SYSTEMS TESTS

1.1 Whirlwind I Systems Test

(H. Ziegler)

During the past two week period efforts have been directed towards increased reliability in the ES row. Transfer characteristics and point of cutoff as determined by TV have been taken on all ES storage tubes. Three tubes were replaced by the new 300 series ("all-dag") storage tubes.

Several tubes were found to be operating with bias voltages that were less than the TV cutoff measured. In practically all tubes the TV cutoff measured was greater -- more negative -- than previously measured and recorded at the time of the ES row line-up last fall. This shift in cutoff plus the fixed bias and HVG gate amplitudes resulted in higher writing currents for both W+ and W-. Because of this many tubes were not being completely erased by a normal W- array over a normal W+ array. When possible this has been corrected by readjustment of bias, gain and HVG gates.

Of the three storage tube replacements, one was for low current, one for a faulty storage surface, and the third because of deflection shifts due to glass charging.

Rather positive proof of glass charging was found in this tube. The deflection shift observed was of an oscillatory nature and of considerable amplitude. By cutting a window in the protective Scotch electrical tape Ely was able to observe -- by the slight fluorescence of the envelope glass -- an area between  $A_2$  and  $A_3$  charging and discharging in a manner similar to the deflection shifting

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1.1 Whirlwind I Systems Test (continued)

observed on TV. Incidentally, as further proof, removing and replacing of the tape had a decided effect on this, apparently due to the change in charge on the glass.

To date operation of the new "all-dag" tubes has been very satisfactory; no tendency to glass-charging deflection troubles has been observed so far. As these 300 series "all-dag" tubes become available they will replace the 100 series tubes now in ES row.

Another interesting development was in digit 15 where it was necessary to increase  $V_{HG}$ . This drift in positive stability probably indicates storage surface deterioration but is only the second case encountered in WWI to date.

(N. Daggett)

The principle trouble affecting operation of tape input-output equipment has been eliminated. The trouble, which manifested itself as a double read or double print operation followed by a skipping of the succeeding order, was traced to incomplete synchronization of the reader and printer completion pulses by the gas tube synchronizer channels. Output pulse time jitter is inherent in the design of the gas tube synchronizer; in this case it occasionally caused marginal operation of the time pulse distributor. This resulted in duplication of one or more time pulses which caused the double read or print noted and, by indexing the program counter twice, caused the next order to be skipped. The difficulty has been eliminated by adding a flip-flop to insure proper synchronization of the completion pulses. Since the jitter mentioned can also cause occasional trouble with any push-button functions which provide a restart, test control is being modified slightly to provide proper synchronization of all restart pulses also.

(T. Leary)

Plans are being made to modify the CR/COR prototype panel for use as a Start Clock Synchronizer to be mounted in rack C14. By providing double Synchronization this will eliminate the possibility of starting up the TPD on the wrong time pulse. This trouble had been found to occur occasionally because of the characteristics of the thyatrons in the Synchronizers.

1.1 Whirlwind I System Test (continued)

(R. L. Best)

The TV display has been d-c coupled to the deflection bus. A -5000volt supply has been installed, making this possible. Separate intensity controls are provided for normal or TV operation, selected by a relay. The relay is controlled by the same circuits which switch the computer from normal to TV.

(H. F. Mercer)

Component Failures in WWI

The following failures of electrical components have been reported since January 5, 1951:

<u>Component</u>	<u>No. of Failures</u>	<u>Hours of Operation</u>	<u>Reason for Failure</u>
<u>Crystals</u>			
D-357	1	5162	Low $R_b$
D-358	2	644	Low $R_b$
	1	3857	Low $R_b$
	11	4000 - 5000	8 - Low $R_b$ 3 - Drift
<u>Tubes</u>			
2D21	1	1566	Mechanical
3E29	1	2466	Mechanical
6AG7	1	3669	Low $I_b$
7AD7	1	3279	Low $I_b$
	1	3314	
	4	5048	3 - Mechanical 1 - Gassy
	1	5620	Gassy
<u>Pulse Transformer</u>			
3:1	1	5249	Intermittent

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1.2 Five Digit Multiplier

(C. N. Paskauskas)

The multiplier has been operating for a period of 41 days without an error -- since the unexplained trouble on 8 December 1950.

The following tubes were removed due to failure in the check gate test:

5 6AS6 check gate tubes

During the period of this report no components or tubes were replaced as a result of marginal checking.

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2.0 CIRCUITS AND COMPONENTS

2.1 Circuits and Components

(J. A. O'Brien)

403 In-Out Register

Specification Sheets and test procedures have been written for the new D-C In-Out Register. Arrangements have been made to do the testing on the prototype with equipment provided by the Inspection and Testing group under the supervision of Ken Olsen. This procedure should facilitate the testing of the final production units.

2.5 Tubes and Components

(H. B. Frost)

The 12AT7 failure mentioned in the last bi-weekly which occurred in a low speed counter unit was found to have low emission. Thus far, the reason for the low emission has not been investigated, and it probably will not be investigated.

The vacuum tube pulse current tester, together with associated power and indicating equipment, has been installed in the vacuum tube test shop. A description and instructions for use are now being written. The equipment will be very useful as soon as the technicians have had an opportunity to familiarize themselves with it.

Work is progressing on a summary and analysis of all tube failures in the multiplier and in WWI.

A great portion of the test equipment requiring tube checks has been processed. The time lag in this work is now low. Shop time in the last period has been devoted in large measure to testing stocks of tubes for use in WWI and test equipment. The total number of tubes in these tested stocks is necessarily quite large because of the number of tube types in use.

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2.7 Relay Operation

(R. E. Hunt)

An E-Note on "A Resume' of Arc Suppression Experience in WWI Circuits" is nearly complete, and will be issued about January 26, 1951.

The paper includes the theory (simplified and somewhat empirical) of the cause and suppression of arcing, and practical data on the application of optimum and partial arc suppression.

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### 3.0 STORAGE TUBES

#### 3.1 Construction

(P. Youtz)

Six storage tubes, ST-307-1, ST-308-1, ST-309-1, ST-310, ST-311, and ST-312, designed to minimize the drift of the high-velocity beam resulting from charged glass surfaces, were constructed for use in Whirlwind. In these tubes the glass was completely dagged and the holding gun had a 1-1/2 inch diameter metal  $A_2$ ' cylinder. Since tubes of this type are operating satisfactorily in ES row, a series of these tubes will be constructed. These tubes will replace the tubes in ES row which have undagged glass.

We are continuing the program to test our techniques for reprocessing to a new all-dag specification the storage tubes with paralyzed cathodes and good storage surfaces. RT-199 and RT-200 are reprocessed tubes with the new holding gun. Both of these reprocessed tubes did not pass the test specifications for Whirlwind. These tubes will be dissected to investigate the failure of the reprocessing techniques.

#### 3.2 Test

(A. Stein)

Pretests were conducted on the television demonstrator unit. The following tubes were pretested and passed:

ST-307-1	ST-309
ST-308-1	ST-310

The following tubes were pretested and rejected for reasons as stated:

ST-306-3:	Resistance of 75,000 ohm between $A_2$ ' and $A_3$ which causes intermittent arcing. Poor cathode emission from HV gun.
ST-311:	High surface leakage. Also low resistance between $A_3$ and collector; measuring 150 ohm.
RT-198	The holding beam density is insufficient to stabilize entire surface. This might be due to the $A_2$ ' cylinder which extends farther than usual into the main body of the envelope

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3.2 Test (continued)

RT-200: High surface leakage. Poor emission from cathode of H.V. gun.

Prior to being reprocessed the following tubes were subjected to the disposal test:

ST-144  
ST-156  
RT-200

Special tests were conducted on RT-198 which uses a split  $G_2$  cylinder to produce H.V. beam cut-off without interrupting the cathode current. Transfer characteristics of this tube were obtained; which compare favorably with those of RT-195, which is a prototype of RT-198.

(C. L. Corderman)

Restoring current tests have been completed on three of the new all-dag ST-300 series tubes. Their maximum positive and negative restoring currents are as high or higher than either the 100 series tubes or the all-dag research tubes RT-187 to RT-194. The improvement is attributed to the new style  $A_2'$  cylinder on the holding guns, drawing SD-36420.

(A. R. Tanguay)

Several unforeseen complications prevented the completion of the TV and Restoring Current Tester on the expected date. R-F feedthrough from the "HV gun pulser" to the signal plate circuits and r-f pickup by the deflection plate leads were the major sources of trouble. Other factors, including "gate and delay" units with poor characteristics were also responsible for the delay. By Friday, the tester was in service.

Four tubes have been tested by M.F. Mann and C. L. Corderman. RT-196 will be tested Monday, to obtain the long awaited restoring current characteristics of an all-dag tube with a new holding gun (long  $A_2'$  metal cylinder) and the extra screen in front of the collector. All tubes removed from WWI will also be checked.

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3.2 Test (continued)

(C. L. Corderman, H. J. Platt)

The following tubes received and passed tests at the STRT: ST305-2, ST-307, ST-308, ST-309 and ST-194.

Various tests are being run on tubes RT-150 and RT-196 both of which possess an extra screen in front of the collector. At present we are in the process of attempting to find optimum writing gates in terms of minimum holding gun time per read using a spot interaction program for a 32 x 32 array.

4.0 INPUT-OUTPUT EQUIPMENT

4.3 Typewriter and Tape Punching Equipment

(J. S. Hanson)

The combination "Blank Preset" and "Word-Complement" timing diagram has become considerably more intricate and difficult to prepare than the previous "Words Only" timing diagram, such that it has been necessary to assemble three separate sets of timing data for (a) the preliminary "Blank"-signal counter preset, (b) the retention of counter preset by any additional "Blank" signal which may follow, and (c) counter action during subsequent normal printing and tape punching cycles.

(R. E. Hunt)

A new auxilliary control is nearly complete for the tape preparation room. This control will greatly simplify, and directly control the following operations:

1. Tape insertions into a checked tape.
2. Tape reproductions.
3. Tape printing.

This will be installed about 1/23/51.

4.4 Input-Output Planning

(F. E. Irish)

Photo-Electric Paper Tape Reader

A breadboard of the crystal gating circuits to be used with the photo-electric tape reader has been built. The crystal gate was used so that d-c coupling could be used out of the amplifiers in the photo-electric unit. Since the maximum pulse repetition frequency for this unit is 250 pulses per second, d-c coupling is necessary to prevent p.r.f. sensitivity. The information pulse is being used as the gating pulse, and the pulse generated by the feedout hole is delayed, shaped into a 40 microsecond pulse, and used as the input pulse to the crystal gates. The output can then be a-c coupled into a vacuum tube gate circuit, where it will gate pulses capable of setting a flip-flop register.

The circuits for delaying the feedout hole pulse and generating the 40 microsecond gate have been designed and the breadboards are being constructed.

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4.4 Input-Output Planning (continued)

(J. A. O'Brien)

Preliminary tests on a single breadboard test circuit indicate that all-electronic switching of the magnetic tape read-record heads is quite feasible.

(E. S. Rich)

Sketches have been worked out showing the principle details for three methods of controlling magnetic tape units. These methods are: (1) relay control of the clutches and relay switching of the heads, (2) flip-flop clutch control and relay head switching and (3) flip-flop clutch control and electronic head switching. A choice among these methods involves consideration of the time required for switching, the amount of space wasted on the tape, reliability of the equipment, and ease of marginal checking. A meeting of the in-out committee is scheduled for January 22 to decide this question.

Since it was reported by Raytheon that imperfections are found in commercial magnetic tapes which can result in loss of one or more digits in a pulse recording, consideration has been given to methods for controlling the recording process by means of index marker signals previously impressed in one of the six channels. It appears that less flexibility in identifying recorded information will be available unless more complicated circuits are used than was originally planned. This problem is also to be discussed by the in-out committee.

A block diagram has been worked out for the E.R.A. photoelectric tape reader. It is planned that this unit will work into a Flip-Flop register (#3) and be controlled by the qr order. The control will be so designed that from the point of view of the computer the characteristics of the photoelectric tape reader will be the same as the Flexowriter reader. This will make it possible for a given tape to be read with either unit by means of the same input program.

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5.0 INSTALLATION AND POWER

5.2 Power Supplies and Control

(J. J. Gano)

D-C Plate Supply Alternator: The effect of shaft oscillation due to load application appears to be much greater than it should be. All steady state measurements in the circuit appear correct. Dynamic measurements will have to be made to determine the fault.

5.3 Video Cabling

(T. Leary)

The fourteen long cables required for connections between the Synchronizers and Test Control are now being postponed until the middle of February when a fresh supply of RG-62/U cable is expected. We have enough cable on hand for ordinary everyday needs. About a half a dozen miscellaneous cables have been made in the last two weeks.

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6.0 BLOCK DIAGRAMS

(B. E. Morriss)

A large part of the previous period was spent in familiarizing myself with Control Matrix output connections and proposed In-Out Diagrams. Work has begun on bringing the Control Matrix and Timing Diagrams up to date.

(J. M. Salzer)

The effect on programming of the use of a pre-indexed magnetic tape was considered. It is proposed that all magnetic tape would be checked for blemishes prior to their use and 1's would be recorded in one of the channels wherever the tape is free of blemishes. In a subsequent recording process, characters would be recorded only in line with these indexes, and another channel would have to be used for indicating where a character has actually been recorded. This means that no special indication for the beginning of a word and of a block is possible, because there are 6 channels, 4 of which store the character.

When the tape is started at a random point for a reading process, the next character read may be any character within any word of any block, and the search program seems to have quite a task. A rather simple procedure would be the identification of a block by a +0 as the first word, the block number as the second and last words. The search program would search for a +0 (4 consecutive 0000 characters) and then start checking the two block identification numbers; the program would be almost identical for forward and backward motion of tape. Actually this program is not much longer than one that would have to interpret the 5-th and 6-th digits, as previously intended. Furthermore, in recording, the computer would have to supply only 4 digits for each character, rather than 6 digits (4 for the character, 2 for the appropriate designation of the character as being the first of a word, of a block, or neither). This would be a distinct simplification of the recording subroutine.

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6.0 BLOCK DIAGRAMS (continued)

(R. P. Mayer)

Most block diagrams (excluding matrix and timing diagrams) have now been revised and are being issued. A memo is being planned which will describe the changes involved. The matrix and timing diagrams are now undergoing revision by Ben Morriss.

A block diagram sketch of Marginal Checking equipment is nearing completion. This sketch will be useful in the investigation of methods of making the program control marginal checking.

A new temporary order, qk, Check Initially, is described on SA-36526. This order is not recommended for use in programs. It can be used to check all of ES to make sure it is cleared.

According to a new proposal, Special Add Memory and Overflow will be cleared on TP 6 of all orders that manipulate the Arithmetic Element except ca, cs, and cm. Thus, if the remembered overflow is not desired it can be cleared by using an order which was previously prohibited under such conditions (see sa of "A Short Guide to Coding"). Any criticisms or suggestions will be welcomed.

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7.0 CHECKING METHODS

7.1 Test Problems

(G. Cooper)

A two-part program to be stored in ES has been prepared for use in marginal checking. The first part is a more elaborate version of Test Program Number Iie including a display to provide a visual check. This part of the program should provide a fairly complete check of the operation matrix. The second part is a combination of Test Sequences Numbers VII, VIII, and IX and also includes a display to provide a visual check. This part of the program has been designed to check the entire Arithmetic Element.

Some experimentation has been done in order to find a program suitable for determining whether the operation of ES can be considered to be satisfactory. To this end, two new versions of the "Bootstrap" program have been written: One of these versions checks the transfer to the new section immediately after each register has been transferred and then, after the transfer of all registers has been completed, checks the entire transfer once again. It also erases a third section of storage and checks that it has been erased. The other version merely checks the transfer after each register has been transferred, then proceeds to write positive in the third section checking the positive readout, and follows it by writing negative in the third section and checking the negative readout. These two versions are ESTPR XIV C and XIV D, respectively. In the event that these programs should prove too strenuous for the present, a short program which remains in one position of the surface and alternately writes positive, checks positive, writes negative and checks negative on the remainder of the surface has also been written. It is ESTPR XVII.

All above mentioned programs will be tried out on the computer as soon as possible.

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8.0 MATHEMATICS

(C. W. Adams)

New techniques of preparing tapes and new input programs have been under consideration. For the time being, tape will be prepared first in standard (Flexo-writer) form on the tape preparation unit. The computer will then be used to convert to binary and then to punch a new tape in a 5-5-6 form, with no complements. The only check on the tape readin will then be a sum, neglecting overflows, of all the words in the program. This sum will be formed by the conversion program and punched at the end of the tape. The read-in program will form the same sum as it goes and check it at the end. The resulting tapes, with only 3 characters per word, will be much quicker and easier to read into the machine. No manual operation will be required to go from the read-in program to the main program.

(J. M. Frankovich)

A new version of the program for the industrial production problem was tried in Whirlwind twice this week. Apparently the program works satisfactorily but it would not stay in ES storage long enough to obtain any results. Work has also begun on another production problem proposed by Mr. Manne and the program should be finished next week. This program tries to find a relationship between the consumption and capacity of a given industry by evaluating the deviation of a predicted capacity from the actual capacity.

(J. D. Porter, F. C. Helwig)

The corrected tape discussed in M-1147 was run on Whirlwind and the results were correct as far as we could determine theoretically. However, the solution still exhibits oscillations in the first few columns which have not yet been explained.

To see if the oscillations were due to the non-linearity of the problem, a tape for the linear case was prepared. This was run on Whirlwind and again exhibited the same oscillations in the first column. However, succeeding columns corresponded closely to expected results.

A new tape has also been prepared for the non-linear case with an improved correction program and scale factoring.

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9.0 FACILITIES AND CENTRAL SERVICES

9.1 Publications

(J. N. Ulman, Jr.)

The following material has been received in the library, Room 217, and is available to 6345 personnel.

6345 Reports

<u>No.</u>	<u>Title</u>	<u>No. of Pages</u>	<u>Date</u>	<u>Author</u>
M-1145	Vacuum Tube Failures During the Month of December, 1950	7	1-1-51	H. B. Frost
M-1147	Bi-Weekly Report, Project 6345, January 5, 1951	19	1-5-51	
M-1149	Materials for Electron Gun Construction	2	1-9-51	R. Shaw
A-112	Distribution of Classified Documents	1	1-17-50	H. Fahnestock

Library Files

	Technology Review: January, 1951	M. I. T.
.004	European Scientific Notes: 15 December, 1950	ONR/London
47	Technical Information Pilot: November 30, December 8, December 11, December 14, 1950	(ONR/Library of Congress)
180	Document Office Bulletin: January 12, 1951	RLE/MIT
232	Physics Today: December, 1950	Amer. Inst. Phys.
559	Technical News Bulletin: January, 1951	Ntl. Bur. Stds.
747	Research Activities of the Institute of Numerical Analysis. Quarterly Progress Report: July through September, 1950	Ntl. Bur. Stds.
748	Projects and Publications of the National Applied Mathematics Laboratories. Quarterly Report: July through September, 1950	Ntl. Bur. Stds.
884	Progress Report No. 14, D. I. C. Project 6694, January 5, 1951	(Servomechanisms Lab., M. I. T.)
963	Signal Corps Electronic Computer Research and Development Quarterly Progress Report No. 4: 4 October, 1950 to 3 January, 1951. Research Division Report No. 51-12	(Moore School of Electrical Eng.)
1088	Programme Organization and Initial Orders for the EDSAC. Reprint from <u>Proceedings of the Royal Soc., A</u> , 1950	D. J. Wheeler
1090	A Magnetic Drum Technique for Telegraph Storage Relay Applications. Publication PX 29119. 25 July, 1949	(Engineering Rsch. Associates)
1091	Patent Agreement: Electronic Computing Device. Patent # 2,428,812, Filed November 25, 1943	J. A. Rajchman
1092	Zator Techniques: Journal of Zator Company. September, 1950	C. N. Mowers
1093	A Contribution to Network Synthesis by Potential Analogy. Technical Report No. 25. June 30, 1949	(T. R. Bashkow Stanford Univ.)

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9.1 Publications (Continued)Library Files (Continued)

<u>No.</u>	<u>Title</u>	<u>Author</u>
1094	Fixed Composition Resistors: Interim Engineering Reports G-1080-2. May 31 and June 30, 1949	{Batelle Memorial {Institute
1095	The Selection of Network Functions to Approximate Prescribed Frequency Characteristics. Technical Report No. 145. March 14, 1950	{Servomechanisms Lab. {M. I. T.
1096	A Preliminary Investigation of Transistors for Computer Circuits. 7 October, 1949	{W. P. Horton {R. M. Kalb {Eng. Rsch. Associates
1097	Low-Frequency Spectrum of Lock-In Amplifiers. Technical Report No. 105. March 26, 1949	R. L. E./M. I. T.
1098	An Algorithm for the Construction of a Polynomial Representing a Given Tabular Function. NOL Memorandum 10972. 22 June, 1950	{F. N. Frenkiel {H. Polachek {Naval Ordnance Lab.
1099	Nel Toroidal Coil Winder for Small Coils: Final Report. NE 050615, Report 132, Problem 3Elb, 22 August, 1949	{J. R. Smith {U. S. N. Electronics {Lab., San Diego
1100	Iterative Processes. AECU-562 (LA-702). September 16, 1949	{J. Blum {Atomic Energy Commission
1101	Provision for Expansion in the SEAC. Report No. 12.3-4R. October 31, 1950	{A. L. Leiner {Ntl. Bur. Stds.
1102	Interpolation and Extrapolation of Stationary Time Series. Reprint from Bulletin of the Academy of Sciences of the USSR. (Written in Russian with a Summary in German)	A. H. Kolmogoroff
1103	High Frequency Loss Loops for Saturable Magnetic Cores. 30 October, 1950	{W. Titman {J. G. Miles {Eng. Rsch. Associates
1104	Integrating Systems of Ordinary Differential Equations. Abstract of Paper given before Association for Computing Machinery, Washington, D. C., September 7-9, 1950. November 20, 1950	{L. H. Thomas {Watson Scientific {Computing Lab./I. B. M.
1105	The Effect of High-Speed Computing on Mathematical Research. Abstract Of Washington Paper. November 20, 1950	{D. H. Lehmer {Univ. of California {at Berkeley
1106	Some Recent Experiments with the Monte Carlo Method Abstract of Washington Paper. December 1, 1950	{J. Todd {Ntl. Bur. Stds.
1107	Application of the SEAC to Linear Coding. Abstract of Washington Paper. December 1, 1950	{G. F. Dantzig {Off. Air Comptroller. {USAF
1108	Some Thermodynamic Tables Obtained on Punched Cards Abstract of Washington Paper. December 1, 1950	{J. Belzer/Cyrogenic Lab. {H. L. Johnson/Ohio State
1109	Initial Testing of a Computer Electrostatic Storage System. M. S. Thesis, 1951	R. W. Read

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9.2 Standards, Purchasing and Stock

(H. B. Morley)

Standards

The following standard has been recently issued:

ASESA List No. 100 - Issue No. 13  
"Armed Services Index of Electro Standards  
(ASESA Specifications, Preferred Parts Lists  
and Standard Lists)"

Procurement and Stock

Work has been started at the Whittemore Building for storage space. Electrical Wiring installation has been started and estimates are being made for the lumber and materials necessary for partitions and shelves. We have been assigned approximately 700 square feet of space which is slightly less than half of our total requirements. This will necessitate continued storage of some of the larger pieces of equipment at whatever designated place we shall have at Fort Heath. An inventory of materials will be made at the time of transfer.

We should like to have material returned to the Stockroom for salvage at regular intervals rather than waiting for a "clean-up" resulting in large quantities arriving at the Stockroom all at once.

We have received a notice stating that on December 27 the National Production Authority issued its Order M-19, effective January 1, 1951, restricting Cadmium Plating to certain specified uses. The Buyer of Cadmium Plated products is required to furnish signed certification to the Seller.

Considerable effort is being made to find alternate suppliers of certain critical materials, such as, plastic film capacitors and other specialized components.

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9.3 Construction

(R. A. Osborne)

Production Report

The following items have been completed since January 5, 1951:

- 6 Video Cables
- 1 In-Out Register Prototype
- 3 D-C Rack Power Strips

The following units are under construction:

- 1 In-Out Switch Register Driver
- 1 In-Out Switch Bus Driver
- 54 D-C Patch Cords
- 1 In-Out Switch
- 1 Power Supply & Connection Panel Prototype

(A. M. Falcione)

1. Block Diagrams: All WWI Block Diagrams have been revised and will be issued during the coming week.

2. Building Drawings: The following Barta Building drawings have been brought up to date:

	<u>Basement</u>	<u>1st floor</u>	<u>2nd floor</u>	<u>penthouse</u>
A. Floor Plan & Layout	R-30376	R-30377	R-30378	E-37573
B. Security Alarm, P.A. and Detex System	R-31055	R-31056	R-31057	
C. Room Numbers and Areas in sq ft.	B-30385	B-30386	B-30387	
D. Fire Extinguishers and Exit Assignments	B-34904	B-34905	B-34906	

3. Class 3.0 Electrical Drafting Standards

There have been many memos and Reports written in the past few years regarding electrical drafting standards; however they have never been incorporated in our Class 3 standards book. During the next few months all data will be compiled and added to the Class 3 standards so that it will be up to date with all revisions and changes. It was issued in 1945 and no revisions have been made since.

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10.0 GENERAL

(N. H. Taylor)

The week of January 8 to 13 was spent visiting the University of Illinois Computer at Urbana and the Engineering Research Associates at St. Paul. Both of these groups have done considerable work in Computer Circuits and have Arithmetic Elements operating well. Both also are working on Electrostatic storage using the Williams technique but the work has not yet reached the Systems level. The ERA magnetic drum storage systems seem to be well developed and usable as a Systems component. A memorandum for internal distribution only, reports the projects underway at these two locations.

(J. C. Proctor)

Mr. Chris E. Christopher of Cambridge has replaced James Mahoney as a Laboratory Assistant in the stock room.

Mr. Robert R. Adams of West Roxbury is a new Junior Vacuum Tube Technician in the storage tube processing laboratory. He is a graduate of Hamilton College, Clinton, New York.

Terminated Non-Staff

James Mahoney  
Sarah S. Rounds

Terminated Staff

Richard Shaw, Jr. has transferred to Building 32.