Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: BI-WEEKLY REPORT, April 14, 1950

To: 6345 Engineers

From: Jay W. Forrester

1.0 SYSTEMS TESTS

1.1 Whirlwind I System Test

(H. Fahnestock)

During most of this period the computer was shut down to permit completion of the power wiring for the ES row with permanent power supplies, switching, voltage variation and metering. A considerable number of temporary video cables were replaced with final cabling throughout the system. When the computer was restarted, proper operation was immediately obtained.

Before the shutdown some of the eccentricities of the automatic marginal checking system were improved, but further work is necessary to make the system trouble-free.

After the shutdown a group of Navy visitors asked us to put in the computer a program which they had written out themselves in the Whirlwind code. The answer, which we had not been given, checked with the results of their hand computation. The program consisted of 15 orders for the solution of a quadratic by Newton's method.

(H. F. Mercer)

The following failures of electrical components have been reported since March 31, 1950:

1.1 Whirlwind I System Test (Continued)

Component	Number of Failures	Hours of Operation	Reason for Failure
Tubes:			
3E29	1	2217	Mechanical
6Y6G	3	2141	Change in characteristics
7AD7	3	423	Gassy
		883	Change in characteristics
		2794	
715B	1	623	Mechanical

1.3 Five-Digit Multiplier

(E. S. Rich)

Single errors occurred in the operation of the multiplier on April 5 and on April 7. As in the cases of other isolated errors, no cause for them could be found. Attempts have been made to discover some pattern in the times at which these errors occur or some correlation with the marginal checking data or with events taking place in the building but so far these attempts have been unsuccessful.

2.0 CIRCUITS AND COMPONENTS

2.1 Circuits by System Number

835 R-F Pulser

(W. J. Nolan)

A breadboard of a supposedly improved output circuit for the r-f pulser has been under test spasmodically for the last three weeks. Of its three objectives -- more output, better rise time, and automatic regulation of pulse output -- it achieves the middle one, has so far proved unsatisfactory on the first, and has not been tested for the last. Part of the difficulty is believed to arise from the attempt to include circuits more satisfactory for TV operation. A new set of coupling circuits are now being designed without consideration for TV readout. The physical size of the system, necessitated by the use of four 715-B tubes in push-pull parallel may also be contributing to the reduced output.

2.5 Vacuum Tube Studies

(H. B. Frost)

Tests have been completed on two groups of life test tubes after 500 hours. 7AD7 tubes of L9B production which were operated on accelerated life test were found to develop cathode interface resistance comparable to those developed by the F8B production. On this basis, they should be satisfactory for WWI replacements. Tests of 5687 tubes, lot 3229-52, have shown no interface after 500 hours. This is the first group of 5687 tubes other than four engineering samples which have given this result. However, some material is deposited on the anode of the normally-off section during the life test which decomposes rapidly when this section draws plate current and causes cathode poisoning. This also was observed in the engineering samples. The indications are that the life conditions should be changed so that the duty cycle is intermediate, rather than all or none as at present. A new lot of 5687 tubes have been received, and tubes of this lot will be run in parallel with those mentioned above during the second 500 hours of the test.

Engineering Note E-338 has been issued on test results of productions F8B and L9B 7AD7 tubes. Tests before and after preburning are considered. As to overall utility, the two productions are about equivalent.

2.5 Vacuum Tube Studies (continued)

Tubes have been issued for additional r-f amplifiers for WWI, also for modifications in FSO. Testing of new tubes is continuing as rapidly as possible for replacement purposes.

Mr. Jerome Rothstein of Evans Signal Laboratory visited on April 4. Problems associated with cathode interface resistance and with accelerated life testing were discussed. A copy of Mr. Rothstein's talk on accelerated life testing to the recent I.R.E. convention has been received and will be circulated to interested parties.

3.0 STORAGE TUBES

3.1 Construction

(F. H. Caswell, T. F. Clough and P. Youtz)

Three storage tubes with 40 mesh mosaics (ST155, ST156, ST158) for use in WWI were processed.

Three research tubes were processed. The first two tubes were designed with four-sectioned mosaics to investigate the effect of the mica moat width and the fraction of uncoated mica on storage tube performance. The tubes had the following characteristics:

Quadrant	Mosaic Size	Mica Moat Width	Percentage of Mica
RT134			
1st	40 mesh	.0022	15.4
2nd	40 mesh	.0045	32.6
3rd	40 mesh	.006	42.2
4th	40 mesh	.010	64.0
RT135			
1st	60 mesh	.003	32.7
2nd	60 mesh	.0045	46.7
3rd	60 mesh	.006	59.0
4th	60 mesh	.0075	69.7

The third research tube RT133 with the 3R gun modified with a special compensating lens imploded on the exhaust system. The gun and tube will be rebuilt.

One hundred wire mesh with .001 wire has been ordered to continue the mosaic size studies.

(W. E. Pickett)

Glass Components - During this last bi-weekly period the supply of storage tube envelopes was reduced slightly, but we still have on hand enough envelopes to take us through this next bi-weekly period. The stock pile of these envelopes was reduced because time was spent in fabricating research tube envelopes and special glass components. It is planned during this next period, although a vacation day is scheduled, to build the stock pile of storage tube envelopes up to a four-weeks' supply. It is the plan of the glass shop to try to have a month's supply of storage tube envelopes on hand at all times.

3.1 Construction (Continued)

RT133 was assembled in the glass shop during this last bi-weekly period with no difficulties. This is the 6" diameter tube which has the physical appearance of a flat face projection TV tube. On 14 April 50 this tube imploded on the vacuum system during processing. The last implosion of one of these tubes took place on 28 April 49. We have had an implosion a year during the construction period of this storage tube program. This is an unusually low rate of implosions for a program involving the construction, processing and handling of a large glass evacuated envelope. However, all persons handling these tubes must appreciate that a possibility of an implosion with its attendant flying glass is always present, and a feeling of false security in the handling of these tubes should never replace the alert attitude this situation requires.

During this last period a number of storage tubes were cut open for salvage. As a result, more room can be allocated on the storage tube rack, and therefore the safe storage of finished storage tubes will be greatly increased.

At this date the supply of evaporation tube envelopes is depleted. The glass shop will give highest priority during the next period's spare time to the fabrication of these envelopes. Within a few days the supply of these envelopes should be sufficient for our construction schedule.

The work on the small bell jar, liquid air trap and ion gauge assembly was completed and turned over to John Ely for use in testing the vacuum of system #4.

In general, the work in the glass room progressed without difficulties.

(J. O. Ely)

The past two weeks were spent in giving vacuum system #4 a thorough overhaul and cleaning. After the system was reassembled, a pressure of 2×10^{-6} mm of mercury was attained in a large bell jar sealed to the base plate by a neoprene gasket. During the test run in which this pressure was attained it was possible, for the first rime, to show conclusively that a major source of leakage was the gasket seal between the bell jar and base plate. Means of improving the seal at this point are currently under consideration.

Further testing of the pumping system alone, using a 4 1/2" bell jar with a liquid nitrogen trap and an ion gauge tube attached is now in progress. The bell jar of this test setup has been sealed over the throat of the diffusion pump with glyptal cement. After

3.1 Construction (Continued)

prolonged pumping, a pressure of 1.2×10^{-6} mm of mercury has been attained without cooling the trap and it seems likely that this is near the ultimate pressure for the pump itself, since it is better than the manufacturer's rating. With liquid nitrogen applied to the trap, a pressure of 8.0×10^{-8} mm of mercury has been reached, but this is not the ultimate pressure and the test is continuing to determine the ultimate pressure in a closed system with the trap cold.

Since it has been shown possible to secure such a greatly improved vacuum with the cold trap, design of a liquid-nitrogen-cooled baffle to replace the water-cooled baffle now in use will be completed as soon as possible. It is expected that improvement of the bell-jar-to-base-plate seal, plus installation of the liquid-nitrogen-cooled baffle will complete work necessary to make vacuum system #4 suitable for evaporation of both silver signal plates and beryllium mosaics.

(R. Shaw)

Drawings of the metalwork for the new annealing oven are completed. Notebook sketches will be adequate for the balance of the construction, since this will be done by the storage tube group.

A layout is being made of a square storage tube target assembly which may utilize the available space within the envelope more efficiently than a round target.

A summary of all storage assemblies -- proposed or actually constructed -- is in preparation.

3.2 Test

(M. I. Florencourt)

Four storage tubes passed standard tests; they were ST153 through ST156.

Four tubes were given WWI static acceptance tests: ST147, ST149, ST151 and ST152. ST147 had been tested before, but its getters were then flashed. A recheck of pressure and operating voltages, etc. were made after two more weeks of shelf life. ST149 was also given static tests. This tube was put in STRT before it passed the transfer tests. All the tubes tested were accepted.

3.2 Test (Continued)

General testing was done on RT134, a research tube containing four quadrants of different sized 40 mesh mosaics, wire size varying from the standard .002" to .010". General observations were as follows:

1. maximum operating V_{HG} varied approximately as follows for the four quadrants:

40 mesh,	.010	280V V_{HG}	36.0% Be
	.006	310V	57.8%
	.0045	340V	67.4%
	.0022	360V	84.6%

2. maximum operating V_{HG} is a function of the percentage of mica in a quadrant; for pure mica (e.g. in the crossbars separating the quadrants) maximum operating $V_{HG} \ll 100V$, $\approx 70V$.

3. with a high enough V_{HG}, writing a positive spot on a negative background will cause all the mica in a quadrant to switch positive without switching the Be positive except where the spot was written.

4. Spot size (+ on -) increases with mesh spacing (% mica)
   Spot size (- on +) decreases with mesh spacing (% mica)
   Spot size (+ Be on + mica) decreases with mesh spacing (% mica)

5. Output signal varies with % beryllium

(H. B. Frost, C. L. Corderman and H. E. Rowe)

Storage Tube Testing on STRT - During this period standard tests have been continued on ST201, ST136-R1, ST148 and ST142. ST142 has been passed as suitable for WWI, ST136-R1 has been retested after changes in the compensating networks for deflection and passed also. ST201 had been tested previously and passed; however, continued testing with this tube revealed a leakage current to grid 1 which caused the operating bias to be much higher than normal. Transient errors associated with this tube are believed connected with the above leakage. Consequently, ST201 was rejected. ST148 was found to have an area of 20 mosaic squares which would not switch independently. This prevented proper operation, thus ST148 was rejected.

Spot growth tests were run on RT126-2, the single-neck tube. A maximum size of 0.25 in. was found with continued writing using an 80 microamp beam writing for 12 microseconds with 12 microseconds holding gun time between each writing operation. A single-shot write using the same beam current had a diameter of 0.09 in. Under the same continuous conditions as above, but with a 10

3.2 Test (Continued)

microamp beam, the diameter attained was 0.17 in. In this case the single-shot diameter was 0.06 in.

RT125-2, a 100 mesh tube with a collector spacing varying between 2 and 14 mils, was checked on the STRT. Tests included positive and negative spot growth on opposite polarity backgrounds, and the continued writing on a deflection position while varying the centering voltage so as to write either a horizontal or a vertical line.

In the spot growth tests, three different spots on the surface, and two values of V_{HG} (75 and 100 volts) were used. The spot positions were selected to give a collector spacing of approximately 4 mils both at the center and the edge of the surface, and a spacing of about 12 mils at the edge of the surface.

For all spot positions, the negative spot growth was slightly greater than for positive writing, even though the size of single write negative spots was less than single write positive spots. Both polarities of spot growth were considerably greater for the edge positions on the surface than for the center position. In fact, the amount of spot growth seemed to depend essentially upon the radial distance of the spot rather than the collector to surface spacing. This suggests that either the holding-beam current-density or incidence angle play an important part in spot growth.

During these tests it was observed that for a V_{HG} of 100 volts, the edge spots frequently exhibited block switching when writing positive or crescent-shaped spots when writing negative. These observations led to the second set of tests described above in which positive or negative lines were written across the surface. From these tests it was found that a ring around the edge of the surface, approximately 1/2" wide, was decidedly unstable for negative areas. This instability ring was reduced in size as V_{HG} was lowered, and was also influenced by the third anode potential but not in any discernably regular manner.

Further research tubes under construction should help in isolating which of the three factors is predominate in causing instability around the edges of 100 mesh mosaics; a non-uniform collector to surface spacing, a variation in the holding-beam current-density, or the difference in incidence angles of the holding-beam electrons to various parts of the surface.

As a part of Frosts' thesis investigation, studies will be made of the reading current necessary for various sizes of spots, using RT126-2 and a WWI ST mount with standard tube. Spot interaction in a 3 x 3 array will also be studied.

3.2 Test (Continued)

(K. E. McVicar)

An investigation of the geometry of the target and high velocity gun in the individual storage tubes under study is being made. The purpose of this investigation is to determine the variation of the placement of these elements from the positions specified in the drawings.

In addition, measurements have been made of the variation in deflection plate current and collector current with deflection angle to ascertain the portion of the signal fluctuations which could be attributed to deflection plate current. At the same time, any other changes in the beam current with deflection angle, not due to deflection plate interception, are being studied.

(A. R. Tanguay)

Tests are being conducted to determine the total capacitance between a beryllium square on the mosaic surface and its surroundings, that is, the adjacent squares and the signal plate.

For small values of current, the current between two metallic squares in an electrolyte is simply related to the capacitance between the squares. By calculating the capacitance between a beryllium square and an equal portion of the signal plate, and by measuring the current between two scale models of the squares in an electrolytic tank, a calibration of the setup can be obtained with which it is proposed to determine the desired value of capacitance.

(D. M. Collier)

Master's thesis research on the problem of deactivation of storage-tube cathodes under standby conditions continues to be largely concerned with data analysis and with the writing of a thesis report. The work of the past two weeks was concerned with the following:

1. Data from the temperature study (completed at the time of the last bi-weekly report) has been analyzed. Graphs from this data and drawings of the research tube (RT78) are now being drafted for the final report.

2. Evaluation of data from the deactivation study is still under way. The mass of data and the large number of calculations and of corrections necessary makes progress in this phase much slower than was anticipated.

3.2 **Test (Continued)**

3. Considerable library research has been done so that recent developments elsewhere shall not be overlooked. Drafting of the thesis report is progressing insofar as an incomplete analysis of data will allow.

4.0 INPUT-OUTPUT EQUIPMENT

4.1 Eastman Kodak Units

(J. A. O'Brien)

Eastman Kodak Reader Recorder - A new test equipment block diagram has been devised for use in testing the film units with the Input-Output Element. We hope that the new arrangement will permit us to simulate a step-by-step or pulse-by-pulse mode of operation which will allow us to observe in more detail the manner of operation of the equipment.

The new test equipment has been cabled into the console racks and tests will start immediately.

4.3 Typewriter and Tape-Punching Equipment

(F. A. Foss)

Tape Preparation Equipment - Block diagrams of the tape preparation unit are nearly completed. A block diagram has been assigned to each of the six possible modes of operation: check, bypass, error, retype, override and step-feed.

The sketch of the circuit schematic of the tape preparation unit is completed except for the numbering of relay pins and the setting of impedance values of some components.

(J. S. Hanson)

Output Printer and Punch - Circuit modifications are being continued to:

(a) set up the relay registers by means of d-c voltages of the correct polarity on the control grids of the relay gas tubes, so as to punch the "2" and "5" code holes for each number and complement cycle of the binary mode (representing a "one" digit) and to add the "3" and "6" code holes whenever a "zero" appears in place of the "one". This scheme preserves the error checking features of the gas-tube relay registers and permits the punch to signal the computer for a new digit while the punching cycle is being completed.

(b) convert the inherently faster tape punch to a slave unit and thereby transfer control of the system to the tape-reader and printer whenever a typed copy is wanted along with the punched tape. If only the punched tape is wanted, then the speed of the system can be restored to that of the tape punch (165 words per minute), otherwise the printer-reader speed limits the system to 80 words per minute.

4.3 Typewriter and Tape-Punching Equipment (cont)

(c) proportion more effectively the available operating time per punching cycle so as to avoid critical relay timing wherever possible.

5.0 INSTALLATION AND POWER

5.1 Power Cabling and Distribution

(C. W. Watt)

The computer was shut down Wednesday, April 5, to permit installation of ES Power Supplies, Power Supply Control, and the HV Distribution System. The work was finished Monday, April 10. Tuesday, Wednesday, and Thursday morning were spent checking out the wiring that had been put in, and the system was turned over to the systems engineers Thursday afternoon, in operating condition. Little trouble was encountered in getting the various parts of the system into operation.

5.2 Power Supplies and Control

(J. J. Gano)

The d-c supplies, filament supply, and marginal checking supply are now completely installed and cabled.

Filament Supply - The overvoltage relay has been set to trip at 118 volts on the computer bus. At this voltage the trip will operate within two seconds. At higher voltages the delay is less. Previously, the overvoltage relay had been connected to the output of the alternator. As the load increased, resulting in a higher voltage drop in the supply line, the output voltage of the alternator would be increased to maintain 115 volts at the computer bus. Thus the margin on the relay was reduced, unless it was reset. To avoid the minor inconvenience of resetting, the connection of the relay was moved to the computer bus. This reconnection was possible, because, as shown by test, the light seal-in coil of the overvoltage relay closed before the heavier contact opened.

Marginal Checking Supply - The field of the generator had developed an undetected intermittent short just before the shut-down period. When operation was restored, the short occurred as soon as power was applied. The generator had been operating with one-half the field winding of each of two poles. The short was located across two halves of one of the windings. In order to restore the system to operation, the two halves of the field winding on the other pole were used. Despite this dissymmetry, operation appears satisfactory. However, when a computer shut-down of at least two days occurs, the machine should be sent out for rewinding with wire having a higher insulation resistance.

5.2 Power Supplies and Control (cont)

(R. E. Hunt)

The last bi-weekly period has been spent in preparation and installation of the ES Power Supply Control and High Voltage Distribution System.

The system is now installed and operates correctly excepting a bias interlock on the ES Power Supply Control. This situation will be remedied at the earliest opportunity.

5.3 Video Cabling

(T. Leary)

During the past two weeks information for video cables 1-250 has been transferred from assorted assembly drawings, construction sheets, and parts lists to Master Video Cabling Schedule forms, and new schedules for these cables are being issued as time permits.

6.0 BLOCK DIAGRAMS

(R. P. Mayer)

A timing diagram for new operation ck is among those timing diagrams now being issued. Matrix diagrams, and other block diagrams, are being changed to include this new operation.

Note E-332, Forming End-of-Block Spaces on Film in Normal Operation (Mayer and Adams), proposes a method of ensuring that proper block-spaces are formed when film is being recorded.

Block diagrams are being worked out to allow each piece of information in ES to be checked with identical information in a different section of ES before being used.

Codes using several suggested logical orders are being compared with similar codes using present standard orders. The new proposed orders are:

lm, logical multiply (0x0 = 0, 1x0 = 0, 1x1 = 1, for each individual digit)

la, logical add (0+0 = 0, 1+0 = 1, 1+1 = 0, for each individual digit)

co, count ones (counts the number of ones in AC, and stores count in register x)

cd, conditional digit (same as cp, but senses AC 15 rather than AC 0)

dl, displace left (same as sl, but digits shift into AC 0)

7.0 CHECKING METHODS

7.1 Test Programs

(G. Cooper)

The new test sequence (Number VI) for checking the gate tubes of the arithmetic element has been run successfully. This run disclosed valuable information regarding the techniques of trouble location using test sequences. Several attempts to locate tubes which had been removed went awry because the action of the sequence was imperfectly understood. This indicates that more careful preparation is required for the future use of test sequences.

Some work has been done on writing a program which can be used for a study of spot interaction in storage tubes. A code has been written which can be used for this purpose, but it is far too clumsy with respect to changing the conditions of the test.

(J. M. Salzer)

Test sequences were written for the checking of part of control, test storage, and the arithmetic element. These sequences assume that the particular unit being tested is periodically complemented; however, in certain cases complementing of the flip-flops becomes too impractical and in such cases the clear and set inputs are used. At any rate, the programs test the flip-flops for permanency. In an effort to find a common feature in these diverse sequences, I think it will be possible to simply stop the computer after particular time pulses for 100 or 200 μsec during these sequences and check every flip-flop.

G. Cooper's investigation in connection with the shift-control flip-flop seems to corroborate the need of testing flip-flops for permanency. Perhaps, two check programs are to be used in the over-all checking of the computer; one at regular high-speed, the other at high-speed with the periodic interruption at certain time pulses.

(R. H. Gould)

An analysis of Test Program Number I, as described in E-295, shows that approximately half of the gate tubes and most of the flip-flops in the arithmetic element are checked by the program. A detailed report will probably be published after further analysis of the program.

7.4 Marginal Checking

(G. Cooper)

A certain amount of processing of the marginal checking data obtained with the test sequence has been carried out. The results are quite interesting. It was discovered that the arithmetic control flip-flops tend to fail by not retaining information for the required period, i.e., they will switch from 0 to 1, but will return to 1 before they are pulsed again. Attempts to correlate the period for which the flip-flop will retain information with the margin of failure cannot be too successful because of the presence of restorers. One point of interest is the fact that #307.02 showed an increase in both its margin and the period for which it retained a 1 when the D-357 clamp crystals were changed to D-358 crystals. However, this flip-flop still had the smallest margin of all the arithmetic control flip-flops.

8.0 MATHEMATICS AND PROGRAMMING

(C. W. Adams)

A recent group of visitors who had some familiarity with the Whirlwind order code presented us with a coded program for a very simple problem which they had worked out for their own amusement. This program was put into WWI test storage and the computer gave them the result they expected -- perfect agreement -- in a few hundred microseconds. This is the first program written outside this laboratory to have been run on WWI. We hope the complete success in this first attempt is a good omen.

An informal summary of the Rutgers Conference on automatic computing machinery has been written and is being circulated (M-1020).

A brief note on the "differential analyzer approach" to programming a digital computer, yielding a simple but rather crude program, is being written up.

Considerable time has been spent in the preparation of a form for use by people writing coded programs. This form is to be printed and bound into tablets. In theory, everyone writing programs, even rough drafts, will use this form. The form is intended to be sufficiently flexible for various modes of writing so that it will be a help rather than a hindrance to anyone writing a program. The paper on which the form is printed will be sufficiently transparent to permit reproduction by Ozalid process. Then, if any of the programs written on these forms turns out to be useful, but not useful enough to warrant typing it on hecto masters, the handwritten form will be in a fairly standard, neat and reproducible form.

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

No.	Title	No. of Pages	Date	Author
R-178	Marginal Checking as an Aid to Computer Reliability	12	3-28-50	N. H. Taylor
E-332	Forming End-of-Block Spaces on Film in Normal Operation	4	3-21-50	(R. P. Mayer (C. W. Adams
E-336	Secondary Emission from Beryllium Surfaces at Low Incident Electron Energies (Abstract of SM Thesis)	1	4-3-50	H. E. Rowe
E-337	Accelerated Life Test for Cathode Interface in Receiving Type Tubes	3	4-3-50	E. S. Rich
E-338	Test Results of L9B and F8B Productions of 7AD7 Tubes	1	4-11-50	H. B. Frost
M-1014	Bi-Weekly Report, March 31, 1950	25	3-31-50	
M-1016	Vacuum Tube Failures During March, 1950	3	4-3-50	H. B. Frost
M-1019	March 1950 Storage and Research Tube Summary	2	4-5-50	M. Florencourt
M-1020	Conference on Automatic Computing Machinery, Rutgers University, March 28-29, 1950	16	4-6-50	(D. R. Israel (C. W. Adams
M-1022	Systems Planning	3	4-11-50	N. H. Taylor

Library Files

	Proceedings of the IRE: April, 1950	I. R. E.
	Technology Review: March, 1950	M. I. T.
	Binary Octal Marchant Calculator	Raytheon
	Summer Electronics Symposium: Microwave Electron Tubes; Semiconductor Electronics. 1950	(University of (Michigan
180	Document Office Bulletin: March 31, 1950	RLE, MIT
271	Investigations for Design of Digital Calculating Machinery: Progress Report Number 7; November 10, 1949 to February 10, 1950	(Computation Lab. (Harvard Univ., (H. Aiken
360	Servomechanisms Laboratory Library Accessions List: April 1, 1950	(Servo Lab., (MIT
559	Technical News Bulletin: April, 1950	(National Bureau (of Standards

9.1 Publications (continued)

Library Files (continued)

No.	Title	Author
678	Vapor Pressure of Inorganic Substances: II. B_2O_3. Technical Report Number 4, Project RF-281, The Ohio State University Research Foundation. November 16, 1949	R. Speiser, S. Naiditch, H. L. Johnston
679	Handbook of the Research Laboratory of Electronics Document Office	RLE, MIT
680	A System for Air Traffic Control in the Terminal Area: 21 November, 1947	Electronics Dept., Hughes Aircraft Co.
681	"MADDIDA" — General Theory (Abstract by author of paper given before Association for Computing Machinery, Rutgers University, March 28-30, 1950)	F. G. Steele, Northrop Aircraft, Inc.
682	Upper Atmosphere Research Report No. IX: A Sun-Follower for the V-2 Rockets: Naval Research Labs. Report 3522, August 11, 1949	H. L. Clark, Optics Division
683	A New Class of Switching Tubes for Digital Applications	J. Katz, University of Toronto
684	Development of the California Digital Computer: University of California, February 1, 1950	D. R. Brown, P. L. Morton
685	A Printing Telegraphy Tape-to-Page Translator: AIEE Transactions Preprint from Vol. 69, 1950; Paper No. 50-13	AIEE, A. E. Frost
688	Correlation of Pulsed and D-C Electron Emission from an Oxide Cathode: Technical Report Number 73, June 29, 1949	R. B. Bien, RLE, MIT

9.2 Standards, Purchasing and Stock

(H. B. Morley)

Standards - New standards issued this period:

6.195-5 Filament Transformers
6.192-2 Power Transformers
6.192-1 High Voltage Transformers

Procurement and Stock - Receiving and shipping facilities have been moved into the stockroom proper, providing a more compact setup and allowing more efficient use of personnel.

The inventory of equipment has been completed except for the final typing of shortage lists, etc.

High speed tape handling and magnetic recording mechanisms have been ordered from Raytheon for October delivery.

While it is realized that laboratory personnel may have occasion to enter into discussion and negotiation with vendors on special problems, it is requested that this office be notified in advance of such action, and be kept advised of progress. This request is made so that proper steps can be taken to insure that any charges sent to the Institute will be covered by an approved purchase requisition and order. This also applies to certain types of service and repair which may result in charges. In most cases, machine service men who call to make repairs and adjustments should be given a purchase order number at the time of the call. This number can be obtained through this office, and will insure proper identification of subsequent correspondence and charges.

9.3 Construction

(D. V. Mach)

Work on the Storage Tube Laboratory decoder continues, interrupted occasionally by storage tube mount alignment, etc. But on the whole it is progressing rapidly, being approximately 40% complete.

To date 23 mounts have been R. F. aligned, 22 of which have also been video aligned. The 24th mount will follow shortly since the ST is now available.

9.3 Construction (continued)

(L. Prentice)

Machine shop - Twenty-four backing plates are approximately 50% complete. They are the last item of a second order.

Two machinists have been employed for the past week moving and making changes in the sheet metal shop.

Sheet metal shop - This shop has been moved to the first floor from the basement and will be completely set within a week. The move has interfered very little with the current production of panels. Guards were completed and installed for both M.G. sets during the shutdown. Three Fixed Voltage Switching panels and the marginal checking panel and parts were completed.

(R. A. Osborne)

Production Report - The following items have been completed and inspected since March 31, 1950:

1. Marginal checking generator panel.
2. Windings of Special Magnetic Coils.

Note: The small amount of construction during this period is due to the transfer of all shop personnel to installation work during the shutdown for computer wiring installation April 5th to April 12th.

9.4 Drafting

(A. M. Falcione)

1. 104 Control Switch/201 Storage Switch, Switch Panel Dwgs.

   New drawings are being made for the 201 Storage Switch, Switch Panel because of the modifications necessary on this unit only. New drawing numbers will be issued in the near future.

2. Work Load

   The work load is heavy.

10.0 GENERAL

(H. R. Boyd)

Staff Terminations

Chester A. Rowland

New Non-Staff

Mrs. June A. Wagner of Mt. Vernon, New York, and wife of a Harvard student, is a new Laboratory Assistant B who will work in the Print Room and as a substitute in the Library. Mrs. Wagner is a graduate of Wells College in New York and has had experience as a social case worker and librarian.

Miss Helen P. McLaughlin of Stoneham, Massachusetts is the new Procurement Department secretary. She will replace Betty Mitchell who in turn will replace Ann Connor who has resigned. The major part of Miss McLaughlin's secretarial experience has been with Lever Brothers.

Non-Staff Terminations

Richard H. Corzine
Kenneth J. Grinnell