Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: BI-WEEKLY REPORT, PROJECT 6345, July 21, 1950

To: Jay W. Forrester

From: Project Whirlwind Staff

1.0 SYSTEMS TESTS

1.1 Whirlwind I System Test

(N. H. Taylor)

It has been decided to make a rather major change in the mode of operation of storage tubes when operated with the computer. These changes will undoubtedly improve the margins of operation and also the reliability of the system.

The first, selective write, is a plan in which the computer is asked before each writing operation to investigate the contents of a particular storage area to see if the writing operation is necessary. If so, the writing operation proceeds to charge the spot in question; if not, it is left alone. Any tendency to spot interaction or spot growth should be greatly minimized by this scheme.

The second change, separate W+ and W- gate amplitudes, will improve the margin of writing minus so that little chance of residual positive areas remains. These areas have been sources of error in the present system.

The system will be ready for further testing July 25th with these changes made.

(R. W. Read)

The first three days of the past period were devoted to improving reliability of the storage tubes. A program devised by Adams, which cycles the "Powers of X" display problem through the storage registers, was used successfully.

1.1 Whirlwind I System Test (continued)

The weaknesses found by this program seemed to coincide with data taken in the previous test programs. The fact of consistent weaknesses is encouraging, since it indicates that our work has shown real progress. The problem was not used long enough to allow much analysis.

Since July 12, the plans for installing a Selective Writing system and dual writing gates (write plus and write minus) have been drawn up and carried out to a large extent. The modification should be completed by Tuesday, July 25.

(H. F. Mercer)

Component Failures in WWI

The following failures of electrical components have been reported since July 7, 1950:

Component	No. of Failures	Hours of Operation	Reason for Failure
Crystals			
D-357	2	1811	Drift
D-358	1	436	Low back resistance
	1	587	Low back resistance
	4	1000-2000	2 Drift 2 Low back resistance
	1	3391	Drift
Tubes			
7AD7	2	1855	1 Change in characteristics 1 Gassy
	3	3600-3700	Change in characteristics
Pulse Transformer			
1:1	1	961	Open

1.2 Five-Digit Multiplier

(E. A. Guditz)

The Multiplier has made errors only once since the last report. This was on July 12 at 0717. The cause was not determined.

On July 11 the Multiplier was checked for unwanted r-f radiation. None was found.

As a result of marginal checking the following tubes were replaced during this period: 1 - 7AD7, 4 - 6AS6's.

2.0 CIRCUITS AND COMPONENTS

2.1 Circuits by System Number

855 ES Drivers

(W. J. Nolan)

A circuit has been operated which provides fairly smooth, stable control of the output of the r-f pulser from about 30 volts to the maximum of over 100. With the output at 75% of maximum the system can accept a 25% decrease in plate current of the output tubes or driver tubes with negligible change in output.

The greatest difficulty at present appears to be lack of satisfactory tubes for the feedback circuit. A double-ended triode or tetrode having characteristics comparable with a 3E29 is needed. A 3E29 structure with the screen-cathode bypass condenser removed and the beam forming plates either eliminated or brought out to a separate pin would be quite satisfactory. The need for a similar tube for use as a video cathode follower has frequently been felt before on this project. As usual, it can be observed that tube manufacturers take great pains to make tubes of very little versatility. Maybe they figure that in that way they save themselves from having to make so many.

At present, pairs of 7AK7's in parallel are being used for the feedback circuit. Preliminary tests indicated that they would not be damaged by the operating conditions although this application requires that one have the courage to regard ratings as something that should be increased by an order of magnitude or so when designing the circuit. The only tube which could operate within ratings and which also has a suitable electrode structure for this application is the 715. Besides the fact that it is big and inconvenient to use, the Boston Edison Company might have to expand the L Street station to supply heater power.

2.7 A Coincident-Current Magnetic Memory Unit

(N. L. Daggett)

A panel has been designed which will simplify starting a program on the computer by making available several

2.7 A Coincident-Current Magnetic Memory Unit (continued)

commonly needed functions from a single push button. Toggle switches will permit any combination of the following functions to be obtained by pushing the button once: ES Erase, Clear Alarm, Stop Alarm to CPC, and Start Over.

On the same panel, but functionally unrelated, a push button will feed 1 megacycle clock pulses to the computer complement line for unstalling flip-flops.

3.0 STORAGE TUBES

3.1 Construction

(P. Youtz)

During the first week of this bi-weekly period, the storage tube construction group continued its accelerated construction program to get a complete complement of acceptable storage tubes so that spares would be available for all of the sixteen storage tubes in ES Row. We constructed three storage tubes with 40 mesh mosaics for use in WWI (ST175, ST176, ST177) and one research tube, RT143. RT143 is a 100 mesh mosaic, stubby storage tube to study the effect of holding beam incidence angle. The storage assembly in this tube is mounted on pivots and actuated by a pendulum linkage.

The storage tube construction group will be on vacation the first two weeks of August. At the beginning of the second week of this bi-weekly period it was decided to concentrate the remaining two weeks before vacation on the construction of two research tubes in which all known parameters are selected to give optimum storage density. The tubes will have the following characteristics:

1. The beryllium mosaic will be a 100 mesh with a .001" mica moat on thin mica (.004" thick).

2. Precautions and measures will be taken to provide uniform spacing of .010" between screen and target.

3. The high velocity gun will be selected for accurate alignment of the apertures and uniform deflection plate spacing.

One of these tubes, RT159, has been constructed and turned over to the test group.

(R. Shaw)

Most of the available 5U guns have been withdrawn from stock in order to measure deflection plate spacing and estimate accuracy of alignment. The few remaining ones are being left untouched in case it should be found that the measuring process had damaged or contaminated the guns. A memorandum summarizing the results is in progress.

A layout of a self-jigging electron gun has been completed. Since its alignment is dependent on the accuracy and rigidity of dielectric rods, samples of synthetic sapphire and ground glass rods are being obtained for test purposes.

3.1 Construction (Continued)

It has been pointed out that a large number of the getter shields are being lost because of breakage during assembly. Cardboard models have been made of several alternate designs which eliminate the need for bending the mica. Mica prototypes have been made of the best of these. They will be tested in research tubes before storage tube drawings are changed.

The reduction of the storage surface dielectric thickness has aggravated the problem of maintaining a flat storage surface. This matter is still under consideration.

3.2 Test

(M. I. Florencourt)

ST175, ST176, and ST177 were given standard tests. The surface of ST176 is questionable; several small areas have higher crossover voltages and significantly different operating characteristics compared with the rest of the surface. H. B. Frost suggests that the tube be checked in the SMRT before it is mounted.

ST170, ST172, and ST174 were transfer-tested. ST172 was rejected for several areas on the surface with shorted mosaic squares. (ST171 must have further gun-electrode leakage tests before transfer tests, and ST173 is in use for special HG restoring current tests.)

RT154 is a short throw tube with a 100 mesh, .002" mosaic surface on .0015" thin mica. Negative areas on the tube are stable and maximum operating V_{HG} is very high ($>400V$). The tube will not be usable for dynamic tests because of two large areas with much different capacitance (air inclusions in mica); however, the tube was valuable in determining that mica thickness is a determining factor in maximum operating V_{HG} for small mosaics.

RT155 is a short throw, plain mica tube to be used for HG restoring current tests. Radial, inward switching of positive spots was noted, the extent of switching being a function of V_{HG}.

RT143 is a 100 mesh tube with an inclinable storage assembly. Qualitative tests indicate that maximum operating V_{HG} (and negative edge stability) is a function of holding beam angle of incidence. Further tests must be made.

3.2 Test (Continued)

(C. L. Corderman)

The entire period has been devoted to the investigation of reading with a high signal plate gate. This study has proceeded logically along the two following lines:

a. Adjustment of the high-velocity gun parameters to write and read both positive and negative spots with adequate safety margins.

b. Adjustment of the holding-gun parameters to maximize the positive holding-beam restoring current. This is desirable since the high read signal plate gate allows only positive areas to be discharged appreciably by the reading beam.

The writing gate times and amplitudes were arrived at by running spot size vs writing-time tests, with beam current, focus voltage, and write minus signal-plate gate amplitude as parameters. From these tests it was determined that:

1. A write negative charge approximately twice that for writing positive was desirable (About four times the beam current and one half the writing time.)

2. A focus voltage ≃50 volts less than "best focus" gave a more sharply saturated curve of positive spot size vs writing time.

3. The influence of writing negative around a positive spot was directly dependent upon the write minus signal-plate gate amplitude and as a suitable compromise this gate should just bring areas saturated under the writing beam down to the negative stability point.

Read-out conditions were established by finding the allowable range in read signal-plate gate amplitude and by using r-f amplifier gain and r-f pulser settings to give ≃5 times saturated read-out signals.

Using the standard conditions from the tests above, the criteria for operation has been the number of consecutive reads possible on a positive spot before it is "written" negative by the reading beam. This number is determined by the ratio of charge taken off per read operation to that replaced by the holding gun between reads.

After reviving the holding-beam restoring current test setup to allow the insertion of meters in all circuits and to reduce the

3.2 Test (Continued)

possibility of intermittent connections exhaustive tests were carried out on ST155 to determine the effect of each electrode voltage upon the restoring current to the surface. It was ascertained from these tests that by a suitable adjustment of the electrode voltages the restoring current could be increased by at least a factor of five from that presently obtained. The two most important changes to realize this increase are to raise the A_2 dag from +40 volts to +1000 volts and the A'_2 dag from +200 to +1000 volts.

A check in the TV Demonstrator indicated a poorer holding-beam distribution (i.e., more variation over the surface) with the increased voltage on A'_2. With the present tubes it is not convenient to raise the A_2 dag voltage since G_2 of the high-velocity gun is connected to A_2 internally. Quantitative read-out tests on the STRT with new electrode voltages where possible will show if a modified holding-beam distribution can be tolerated.

(A. R. Tanguay)

Work is continuing in the preparation of an Engineering Note describing theoretical and experimental studies of storage tube surface capacitances. Various RT notebooks have been consulted in an attempt to unify the conclusions reached. These results have been satisfactory.

There are indications that the capacitance ration C'/C (square-to-square over square-to-signal plate) has a minimum at some value of moat width for any constant mica thickness. This ratio also varies directly with mica thickness so that a proper choice of moat size for any reasonably small mica thickness would result in optimum stability characteristics.

(H. J. Platt)

On July 18th I was assigned to the test group of the storage tube group of Project Whirlwind.

At present I am working with M. I. Florencourt learning how static tests are made on storage tubes.

4.0 INPUT-OUTPUT EQUIPMENT

4.1 Eastman Kodak

(J. A. O'Brien, D. Hageman)

The new CR tube replacement in the film unit mentioned in the last bi-weekly report was found to have a slightly curved trace which made it impossible to illuminate equally all of the holes in the recording mask, because of this the tube was replaced with the tube from the second film unit. After the optical adjustments were made this new tube seemed to operate O.K.

During this past week the E. K. unit has been operated several times tied into the computer. Due to the fact that there is some trouble in the in-out control we have not been able to evaluate the performance of the E. K. unit as presently modified.

The modifications are being made on the second E. K. unit to bring it up to date.

4.3 Typewriter and Tape-Punching Equipment

(C. W. Watt)

Tape Preparation Unit - A secretary, Dorothy Lenihan has been instructed in the use of this equipment during the past week. A modified version of the scale-of-two counter used for printing every other line of checked tape was tested and found satisfactory.

Input Tape Reader - Construction began on schedule and the panel should be finished by August 1.

(R. E. Hunt)

Tape Output Unit - The last bi-weekly period has been spent in the design of this unit from an outline developed by J. Hanson.

At the present time I have a nearly complete circuit schematic and layout of the physical equipment has been begun this date.

4.3 Typewriter and Tape-Punching Equipment (Cont'd)

The equipment as conceived will consist of a control panel which will initially be housed in the test console and a remote control panel which will be on the same table as the flexowriter units. All the units will be cabled to the remote control panel (five 33-wire cables and one 24-wire cable) and the remote control panel will be cabled to the control panel by one 33-wire cable.

All switching (except code combination switching) will be done at the remote control panel or on the units themselves. All of the 16 possible combinations will be available by the operation of the following four switches:

1.	Print	-	Printer off.
2.	Punch	-	Punch off.
3.	Tape Input	-	WWI Input.
4.	Words and Complements	-	Words only.

(J. S. Hanson)

Output Typewriter and Punch - Circuit details of the gas tube relay register are being reworked in order to eliminate undesirable transients of large amplitude which occur on the +B line whenever the gas tubes are fired or extinguished. The gas tube relays are being shunted with R-C circuits so as to critically damp oscillatory transients set up in the coils at the time the gas tubes are extinguished, and the contacts which remove plate voltage from the gas tubes thus see only a resistive load.

5.0 INSTALLATION AND POWER

5.1 Power Cabling and Distribution

(C. W. Watt)

The week of July 31 through August 4 has been assigned to installation and modification work in WWI. Equipment to be installed includes:

1. Input Tape Reader.
2. D-C Reset insertion panel.
3. S.T. Erase panel.
4. Wireway to future control room.
5. Miscellaneous video cabling.

Maintenance work on air conditioning power systems will be performed, and many modifications to WWI panels will be made, as noted in Taylor's memo of July 20. Please notify Watt of any needed work before July 27, 1950.

5.2 Power Supplies and Control

(J. J. Gano)

D-C Power Supplies - The anode to cathode voltages across the thyratrons of the + 250 volt and + 150 volt supplies were observed with a fast sweep scope. On the 250 volt supply, the rate of application of inverse voltage after current conduction exceeded the tube manufacturer's rating of .75 volts per microsecond by six to eight times. On the 150 volt supply the rate was three or four times. This excessive rate may be the cause of frequent failures of the tubes on the 250 volt supply. The values of the components in the cushioning circuit designed by the power supply manufacturer will be varied this week and in order to reduce the rate.

5.3 Video Cabling

(T. Leary)

The 31 cables involving the resets of one of the Flip-Flop Storage Registers mentioned in the last bi-weekly are now being built by the shop. The Video Connection Panel, now called the "Input Connection Panel", is complete except for the lamicoid labelling strip.

The change to "selective write" in ES has produced numerous cabling changes. Thirty-four cables must be made or rebuilt; the termination markings or cable numbers of 39 other cables must be changed; and 34 cables must be removed from service. The new cables, cable numbers, and termination markings are now being made.

A "D-C Reset Insertion Panel" is being designed. This panel will make possible the controlling of any of the Flip-Flop Storage Register D-C resets by equipment such as the Tape Input Reader with a minimum of connection changes in Test Control.

6.0 BLOCK DIAGRAMS

(R. P. Mayer)

The Block Diagrams for WWI are now being revised to show:

1. Selective writing of spots in Electrostatic Storage,

2. Operation of each of the writing beams at one of two different intensities depending on polarity of spot being inserted,

3. A-Register acting only as an A-Register, instead of as Program Register.

An Engineering Note is being written describing points 1 and 2.

A memo describing the present Test Control and its operation is being planned.

7.0 CHECKING METHODS

7.1 Test Problems

(John M. Salzer)

A program was worked out for the checking of the various alarm circuits. An Engineering Note is being written explaining the procedure to be used.

(R. H. Gould)

Analysis of the possible failures in clock pulse control has not had as promising results as that of the TPD. Since the CPC is directly concerned with the operation of In-Out and electrostatic storage this equipment must be in use to detect many of the failures in the CPC. Also failure of many of the crystal rectifiers in the CPC matrix have no effect except in push button operation and so cannot be found automatically. Despite such discouragement the analysis will be continued.

(G. Cooper)

Although work on the Engineering Note dealing with programs for testing ES has been rather spasmodic, it is expected that it will be completed during the next period. A second Engineering Note giving a description of trouble location procedures to be applied to WWI and discussing the interpretation of the symptoms which may be encountered will be started upon completion of the ES note.

8.0 MATHEMATICS AND PROGRAMMING

(C. W. Adams)

Programs for making use of the interim paper-tape terminal equipment are still being worked on. No insuperable difficulties have been encountered, but considerable time is required to try to reach an optimal solution. For example, in writing the binary tape input control program, one must consider at least the following factors:

1) The program must fit into test storage, but it should try to leave as much of test storage unused as possible so that test storage can be used for other things. This is especially true of the flip-flop storage registers (see the discussion of manual intervention below).

2) Two kinds of checking could be, and perhaps should be, performed by the computer. First, the input tape can be prepared with a complement after each character, and the computer could check this complement against the character. Second, at the end of each full binary word there can be a carriage return character on tape, and the computer could check that such a character does occur to insure that no characters have been erroneously inserted or omitted. Checking complements and position both add to the complexity of the input control program.

3) Three modes of binary input are being considered. These are the binary mode, in which each typed character represents only 1 binary digit; the sexadecimal mode, in which each character represents 4 binary digits; and the 6-5-5 or 6-6-4 mode in which the 16 digits of a word are divided between three characters as indicated. Are all these modes useful? If not, which should be discarded?

4) If more than one mode is maintained, and it seems likely that it will, then there will be a separate program needed for each different mode. This is undesirable; one program should if possible be made to suffice, with the necessary changes between modes being made automatically by the computer.

5) In the binary and sexadecimal modes, the extraneous digits in each character must be discarded either by the tape reader or the computer. The tape reader has been designed with a mode selector switch which, in each mode, permits any desired digits from tape to be put in any desired digit column in the computer, but this requires a manual operation to change from one form of input to another. This would add a manual operation to the process of putting a conversion program into ES in binary or sexadecimal form and then using that conversion program to

8.0 Mathematics and Programming (continued)

read in and convert a program which was prepared in Flexowriter-coded form. It is possible, however, to avoid a manual operation if the 6-5-5 or 6-6-4 mode is used, since all six digits from tape are put into the computer in this mode as well as in the Flexowriter-coded mode.

It is hoped that a reasonably satisfactory binary tape input control program will be completed and written up within a few days.

Before real programs can be run in electrostatic storage, it is necessary to develop techniques for manual, on-the-spot control to permit detection and correction of program errors and for manual variation of many parameters. A proposal involving the use of two flip-flop storage registers associated with a manual intervention subroutine (to be stored in ES) has been written up and discussed with a group of interested people. Copies of the informal memo which summarizes the proposal can be obtained from Room 214.

Practical programs are being written by Porter and Helwig, and by other groups, for use as soon as tape equipment and ES become available. As soon as the details of the binary tape input and manual intervention programs are completed, much of the necessary preparation of punched paper tape can be undertaken. A considerable amount of manual conversion to binary or sexadecimal form will be needed in the early stages, until the computer can be made to do that job itself (some form of output device is likely to be needed to make that feasible). However, the mathematically-trained secretary assigned to tape preparation (Miss Lenihan) will be able to perform this task, probably with greater speed and reliability than if it were to be done by the individual programmers.

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

A survey was made of numerical methods for solving partial differential equations of the parabolic type. A method essentially due to Crank and Nicolson was selected and applied to the following equation:

$$\frac{\partial^2 H}{\partial x^2} - \sigma \frac{\partial B}{\partial t} = 0$$

where $B = f(H)$. This equation arose in W. N. Papian's study of the growth of flux in the cross section of a thin ribbon of magnetic material. Because of the nature of $f(H)$ this equation is in general non-linear and cannot be solved in a simple manner.

A program is now being prepared to carry out the necessary calculations utilizing electrostatic storage.

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
E-345	The Transition Region Between Negative and Positive Regions on Storage Tube Surfaces	18	6-15-50	H. E. Rowe
M-1064	Bi-Weekly Report, July 7, 1950	23	7-7-50	
M-1066	June, 1950 Research and Storage Tube Summary	4	7-12-50	M. Florencourt
M-1068	Progress Report: Check Problems for Automatic Failure Detection in an Electronic Digital Computer	2	6-12-50 to 7-7-50	R. H. Gould

Library Files

	RCA Review: June, 1950	RCA
	Technology Review: April, June, 1950	MIT
	Proceedings of the IRE: July, 1950	IRE
.004	European Scientific Notes: 1 June, 15 June, 1950	ONR/London
47	Technical Information Pilot: June 9, June 27, 1950	ONR/Library of Congress
180	Document Office Bulletin: July 7, 1950	RLE, MIT
431	The ANACOM, A Large Scale General Purpose Analog Computer: Abstract of Paper given before Assn. for Computing Machinery, Rutgers U., March 28-29, 1950	D. L. Whitehead, Westinghouse Elec.
559	Technical News Bulletin: July, 1950	Ntl. Bur. St'ds.
600	Quarterly Progress Report: July 15, 1950	RLE, MIT
681	"MADDIDA" - Design Features: Abstract of Paper given before Assn. for Computing Machinery, Rutgers U., March 28-29, 1950	D. E. Eckdahl, Northrup Aircraft
699	A Machine Method for Solution of Systems of Ordinary Differential Equations: Abstract of Paper given before Assn. for Computing Machinery, Rutgers U., March 28-29, 1950	R. F. Clippinger, B. Dimsdale, Aberdeen Pvg. Gd.
765	The Theory of Digital Handling of Non-Numerical Information and its Implications to Machine Economics: Abstract of Paper given before the Assn. of Computing Machinery, Rutgers U., March 28-29, 1950	C. M. Rogers, Zator Co.
766	Design Features of a Magnetic Drum Information Storage System: Abstract of Paper given before Assn. for Computing Machinery, Rutgers U., March 28-29, 1950	J. L. Hill, Eng. Research Associates

9.1 Publications (Continued)

Library Files (Continued)

No.	Title	Author
767	Optical Ray Tracing Problems and the Card Programmed Calculator: Abstract of Paper given before Assn. for Computing Machinery, Rutgers U., March 28-29, 1950	D. P. Feder B. F. Handy Ntl. Bur. Standards
768	A Digital Computer for Solution of Simultaneous Linear Equations: Abstract of Paper given before Assn. Computing Machinery, Rutgers U., March 28-29, 1950	S. Lubkin Electronic Computer Corp.
769	Data Utilization for Surveillance Radar: January, 1950	Data Utiliza'n Lab. Griffiss A. F. Base
770	Simulation of Tactical Air Control: April, 1950	Data Utiliza'n Lab. Griffiss A. F. Base
771	Transient Response Curves of $KG(s) = \frac{K(T_1 s + 1)}{2^2 (T_2 s + 1)}$	J. O. McDonough Servo Lab., MIT
772	Proposed Standards on Television: Methods of Testing Television Receivers: 50 IRE 17.S1, June, 1950	IRE
773	Acoustical Terminology: Final Draft of Section I. General. Also Preliminary Standards of Electroacoustics: Definitions of Electroacoustic Terms (Z24-1) 1948.	IRE
774	Proposed Standards on Wave Propagation: Definitions of Terms, 1950. 50 IRE 24.4 PS5	IRE
775	Method of Measurement of Spurious Radiation Frequency Modulation and Television Receivers. Standard on Radio Receivers. 50 IRE 17 PS1	IRE
776	Intelex: Automatic Reservation System, Remotely Controlled	Federal Telephone & Radio Corp.
777	Electronic Miniaturization. Terminal Report Model V, Miniature I-F Amplifier. Electronics and Ordnance Division, 18 May, 1950	R. K-F Seal Ntl. Bur. Standards
778	A Low Frequency Generator. Memo No. 4-57. February 14, 1950	J. J. Burke, Jet Propulsion Lab., Cal. Tech.
779	Load-Life Characteristics of Fixed Composition Resistors. Atomic Energy Commission MDDC-1553, February 27, 1945	G. Landsman Argonne Ntl. Lab.
780	The Control of Atmospheric Beryllium in a Metallurgical Laboratory. Atomic Energy Commission AECU-415 (SEP-23), August 24, 1949	N. P. Pinto Sylvania Electric
781	An Investigation of the Effect of Angle of Beam Incidence and Beam Deflection on Electrostatic Storage Tube Performance (SM Thesis) June 30, 1950	K. E. McVicar

9.2 Standards, Purchasing and Stock

(H. B. Morley)

Standards - No new laboratory standards issued this period.

Military Specifications (JAN) recently issued:

Proposed Revision of National Military Specification Moisture-Resistance-Test, for Material Items used in Electronic, Communication and Electrical Equipment - JAN-M-745.

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

Procurement and Stock - The anticipated shortages and longer delivery times of many items becomes much more of a reality. This fact is confirmed by many dealers and manufacturer's representatives locally. This situation will probably be agravated by user stockpiling.

Although it is not the present intention of this laboratory to increase its stock material expenditures indiscriminately, nevertheless, considerable thought should be given to needs for components that will probably become more critical to procure, such as tubes, crystals, resistors, capacitors, relays, connectors and raw metals, such as steel and tungsten, etc.

In general, the new responsibility of Materials Control Department to include purchasing is working smoothly although work load is steadily increasing. The number of orders processed for this bi-weekly period was above the average. Stockroom and transportation facilities are functioning without any appreciable difficulties.

9.3 Construction

(R. A. Osborne)

Production Report - The following items have been completed and inspected since July 7, 1950:

4 D.C. Filter Panels
8 Video Cables
1 Gun Leakage Test Set
Modification of 18 Gun Drivers
2 D.C. Register Panels

9.3 Construction (continued)

(L. Prentice)

Machine Shop - The balance of an order for 24 signal plate frames, and the optical centering fixture, have been completed.

The past week has been spent in making experimental parts to manufacture glass spacers.

Sheet Metal Shop - There has been more work for this shop during this period; several chassis and panels have been completed. A new wireway for WWI is one half completed. Some 40 mica getter should have been hand cut. This item is now under redesign and 2 sets of mica parts of new design have been delivered.

9.4 Drafting

(A. M. Falcione)

S.T. Memo Distribution - Arrangements have been made with P. Youtz to allow Miss B. Cooke to distribute (and assemble where necessary) all memos for the Storage Tube Group. The print room will do the printing and reproduction work only. This change will help decrease the overload on the print room personnel.

Drafting Load - At the present time the load is moderate, however the summer vacation schedule for the next 6 weeks will change the picture considerably. There is a considerable amount of drafting to be done on block diagram revisions and theses.

10.00 GENERAL

(J. C. Proctor)

New Non-Staff

Miss Alice D. Monroe has returned to work on the Project. Formerly secretary to Proctor, Osborne, and Ulman, she will now work in the administrative office.

Miss Marguerite C. Mackey of Boston will be the secretary in the vacuum tube shop. She has a B.S. degree in Mathematics from Emmanuel College, secretarial training from Boston University, and clerical experience.

Staff Termination

George C. Sumner

Non-Staff Termination

Angus W. Mackiernan
Helen A. Martin

(H. Fahnestock)

Electronic Computer Division Organization - A Technical Organization Chart is available in the print room to those requesting copies. The drawing number is D-35911 (B-reduction).