Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: BI-WEEKLY REPORT, April 28, 1950

To: 6345 Engineers

From: Jay W. Forrester

1.0 SYSTEMS TESTS

1.1 Whirlwind I System Test

(N. H. Taylor)

We have reached a point in system testing where integration of the In-Out equipment with the computer is about to begin. In a recent final tie-in, it became obvious that a revision of the In-Out test control was necessary to allow a testing sequence which would better indicate the nature of trouble. The In-Out activity in the last period has centered around the problem of making this testing system work adequately.

The Whirlwind system group has continued to clean up loose ends and improve operating margins. Some attention has been given to transients which occur in the power switching of certain racks which have caused errors in computation. Improved decoupling in several power lines has helped this situation considerably.

The storage group has attempted to run all 16 of the storage tubes in a cyclic testing sequence in this period. 12 of 16 digit columns run reasonably well and an investigation has commenced to uncover the difficulties with the others. To make such investigations easier, a probe is being supplied for each Storage Digit Column. This will allow the display in the Control Room of any digit column either statically on TV, or dynamically while cycling.

1.1 Whirlwind I System Test (Continued)

(R. Read)

On the third day after the end of the recent shutdown, ES row was again operating as it had been at the start of the shutdown. The troubles which occurred were principally due to misadjustments in the HV power supplies. The output tubes (715C) in the RF Pulser were observed to be excessively gassy under CW conditions; static tests on the tubes did not reveal the gas, but decreasing the grid resistance in the output stage removed the trouble.

A WWI filter panel was modified for use in ES and In-Out test control, and installed just after operations resumed. High-current chokes replaced the standard type in the test control supply lines which required them. This step has been very successful in filtering the large transients which are introduced onto the bus by switching in the marginal checking generator. Our work is now proceeding largely independently of the marginal checking routines in WWI.

On April 21, the 16 tube complement of the ES row was installed. A minimum of adjustments in operating conditions were made in order to indicate promptly to some degree how critical the tubes will be in the system. Eight tubes immediately cycled for short periods. After a few hours, 12 tubes were cycling. Since there is no obvious difficulty in cycling the tube which had been cycling when it was alone in the row (digit 0), the transition to the full tube complement can be considered to have gone smoothly, at least in this respect. Marginal checking data on the operation of digit 0 has not been analyzed.

Marginal checking of the PR and ES control revealed several poor flip-flops which were corrected. One type of trouble, encountered in ES counters and due to faulty wiring when panels were modified, was discovered by marginal checking but could not be detected by the static (flip-flop) grid-to-grid voltage test with tubes removed. The test due to R. Best, which includes cutting off both tubes of the flip-flop by tying its cathode to +90 through 1000Ω, gave an indication of unbalance.

Dick Best has joined the ES Systems group, and is presently working on the video probe and television modification problems.

1.1 Whirlwind I System Test (Continued)

(H. F. Mercer)

The following failures of electrical components have been reported since April 14, 1950:

COMPONENT	NUMBER OF FAILURES	HOURS OF OPERATION	REASON FOR FAILURE
Crystals:			
D-357	2	1000-1200	Drift
	1	2639	Drift
D-358	2	0-500	Low back resistance
	12	1000-1500	Drift
	1	1500-2000	Drift
	2	2000-2500	Drift
	5	2500-3000	Drift
Pulse Transformer:			
3:1	1	2739	Open primary
Tubes:			
3BP29	1	2958	Change in characteristics
6Y6	1	2200	Mechanical
7AD7	4	500-1000	3 - Change in characteristics 1 - Mechanical
	2	1000-1500	Mechanical
	2	2000-2500	Change in characteristics
	5	2500-3000	4 - Change in characteristics 1 - Mechanical

1.2 Five-Digit Multiplier

(E. S. Rich)

Two errors were recorded on the multiplier on April 25 following an error-free run of 17 days. During the past two

1.2 Five-Digit Multiplier (Continued)

weeks considerable work was done to improve operating margins, and at the time of the errors it was felt that the system should have been in better operating condition than it has been for the past few months. For this reason, it appears that an extensive study would have to be made if any improvement in reliability were to be realized. Logical steps in this study would be to determine the effects of introducing noise pulses at various points in the system and arranging circuits to monitor the various supply voltages for presence of video transients. Because of lack of manpower, work of this sort is being carried on only at a very low level.

2.0 CIRCUITS AND COMPONENTS

2.1 Circuits by System Number

400 put-Output Element

(J. A. O'Brien)

The test equipment set up for simulating step-by-step recording has been installed and tested. This equipment has been used to advanta-e in several cases for locating faulty flip-flops. During the power shut down all of the COR and IOR flip-flops were inspected and adjusted for proper d-c balance. Since then pulse amplitude measurements have been made at every coaxial jack in the In-Out Element. These measurements have brought out some voltage losses that were unexpected and we are now in the process of tracking down the cause.

810 ES Control

(R. L. Best)

A new amplifier is being designed to drive the deflection plates on the television tube in ES control. This amplifier will be d-c coupled to the ES deflection buses.

832 EST Output Gate Tube Panel

(R. L. Best)

A circuit is being designed to convert V^4, the gate tube for the complement output of bank B, into a cathode follower, to feed the R-F amplifier output to the television tube in ES test control.

835 ES Drivers

(W. J. Nolan)

Further work on the r-f pulser breadboard has resulted in increasing the output to 85 volts with a fair probability that this can be further increased to the 95 or 100 volts. This should be available from the circuit with good tubes. Allowing for reasonable tube deterioration, this would provide a reliable 75 volts output.

2.5 Tubes and Components

(H. B. Frost)

Vacuum Tube Studies - Some experimental tests are contemplated which should remove the ambiguity between pulse tests made on the special RCA tubes with passive cathode and bridge measurements made by Dr. Nergaard of RCA on other tubes of the same lot. Dr. Nergaard finds an effective cathode series impedance whereas pulse tests made by Project Whirlwind show no interface.

During this period tube shop time has been devoted to testing of replacements and to WWI maintenance tube testing. In addition, 25 of the new binary scaler units have been marked for tube identification and the 12AT7 tubes tested and marked. One defective 12AT7 was replaced (tap short).

3.0 STORAGE TUBES

3.1 Construction

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

Three storage tubes with 40 mesh mosaics (ST157-1, ST159 ST160) for use in WWI were processed.

Three research tubes were processed. The first, RT137, was designed to investigate the effect of the angle of incidence of the holding beam. This tube had a 100 mesh beryllium mosaic, the holding gun in the side neck and the high velocity gun in the center neck.

The second research tube, RT138, was constructed to study the effect of close and uniform screen to mosaic spacing. Seven mica spacers .0045" thick were used to guarantee the uniform spacing after processing.

The third research tube, RT141, was a special cathode-ray tube with a 3R gun modified with a special compensating lens.

(W. E. Pickett)

Glass Components - As planned, the construction of storage tube envelopes was carried out and we now have on hand enough of these envelopes to take us through the next two periods. We have on hand an excess of the two-arm envelope assemblies, but it puts the stock pile in excellent condition as this is the most difficult to construct.

The envelope for RT141 was constructed during this last bi-weekly period and the gun assembly was sealed into the envelope. This is a 5" CR type envelope to replace RT133 which imploded on the pump during processing. No difficulties were encountered during the construction of RT141.

At the present time the supply of evaporation tube envelopes is excellent. This is the first time in quite awhile that we have had on hand a good supply of evaporation tube envelopes.

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

(J. S. Palermo)

Mechanical Components - An aluminum insulated warming cabinet has been received during the past week. This cabinet is located

3.1 Construction (Continued)

in the Filtered Air Room and it will be used to store subassemblies prior to the construction of target assemblies.

All mechanical components necessary for tube target construction are in a good inventory status. Eight complete sets of dagged envelopes are now in the storage tube laboratory and six more double-arm dagged envelopes will be delivered tomorrow. Twenty-two signal plate frames have been received, completing all outstanding orders of components requisitioned. In addition, twenty-two sheets of target mica were accepted and machined today, which should meet the normal requirements for the month of May.

A mica target of four different thicknesses assigned to ET352 was prepared after considerable difficulty. Although the target has been accepted at this time, further disposition will depend on results after silver and beryllium evaporation processes. This information will be presented in the next bi-weekly report.

(R. Shaw)

A layout is in process of a tube with a tilting storage assembly for studying the effect of holding-beam angle of incidence.

(J. O. Ely)

In a test of the pumping equipment of vacuum system #4, an ultimate gauge reading of 5×10^{-8} mm Hg was reached in the test manifold with liquid nitrogen on the trap. After the pump test, the complete evaporation assembly was re-installed on the base plate and, in addition, a glass baffle which may be cooled by use of various liquid refrigerants was constructed and installed over the diffusion pump throat. In a subsequent test run, an evaporation of silver was carried out at pressures below 2×10^{-6} mm Hg using liquid nitrogen to cool the baffle.

Work was begun on the problem of eliminating the sagging of evaporation cup heaters. This sagging has not prevented production of satisfactory storage surfaces, but better control of evaporation rates can be achieved if the heater retains its original shape through the evaporation period.

A second assembly of four holding guns arranged around a single high-velocity gun and mounted on an 18-pin stem is under construction. This structure will be used in a storage tube (RT) to be constructed in the near future.

3.2 Test

(M. I. Florencourt)

Three new storage tubes (ST157, ST158 and ST159) passed standard tests.

Three storage tubes (ST153, ST155 and ST 156) passed WWI static acceptance tests.

Three research tubes were given initial tests. RT135, a tube with four quadrants of 60 mesh beryllium, each of a different % beryllium, corroborated results on RT134, a tube with four 40 mesh quadrants:

1. Maximum operating V_{HG} increased as the % of beryllium increased.

2. Output signal increased with % beryllium.

In addition, upper stability voltage decreased with % beryllium.

Mesh	% Be	Max. operating V_{HG}	Upper stability voltage
60, .003	67.3	225V V_{HG}	395V V_{HG}
.0045	53.3	215	425
.006	41.0	205	440
.0075	30.3	190	560

(C. L. Corderman and M. I. Florencourt)

Tests on RT137, a normal 100 mesh ST except that the gun positions were interchanged, showed that the area of the surface at which holding-beam electrons arrived with the greatest angle of incidence was the least stable for negative areas. For V_{HG} above 75V, the writing of a positive spot within the area above caused block switching, while for the other side of the surface a V_{HG} of 140V was required for this effect to take place. Also, crescent-shaped negative spots were obtained in the area having the highest holding-beam incidence.

In checking the possibility of low leakage resistance in the apparent bad area, it was found that the leakage pattern for a given holding beam off time was considerably influenced by the d-c level of the signal plate. By noting the leakage time for several signal plate voltages a value for the volume resistivity of $2\text{-}3 \times 10^{14}$ ohm-cm was determined. A further test to investigate surface leakage will consist of finding the leakage time

3.2 Test (Continued)

for a single square at the opposite polarity from the background with the signal plate fixed at the potential of the square. If the square assumes the background polarity during the holding beam off time, the existence of surface leakage will be undeniably exhibited. With a knowledge of the capacitance between mosaic squares an estimate of this surface leakage resistance can be made.

Initial test observations of RT138 revealed that it had good negative stability around the circumference of the surface and excellent uniformity of both positive and negative spots. This RT has a 100 mesh-2 mil mosaic with a uniform collector to surface spacing of 4-5 mils being maintained by seven spacer beads. However, since previous 100 mesh tubes have shown some deterioration of negative stability over the first few weeks of operation, the net worth of the close and uniform collector to surface spacing is not definitely established.

(A. R. Tanguay)

Measurement of the capacitance between beryllium squares on the target mosaic is proceeding more slowly than was expected owing to the nature of the problem; that is, a field approach to the problem is required.

The greatest difficulties encountered are the acquisition of pertinent experimental data and its correct interpretation. Since there is now good agreement between calculated and measured values of capacitance between parallel adjacent and corner-to-corner squares, it is hoped that the remainder of the desired answers will soon be available. These results will be reported in an engineering note.

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

Storage Tube Reliability Tester - Measurements of spot sizes made for RT126-2 and ST136-R1 for positive spots on negative background, and for negative spots on positive background. Erasing time for positive spots on negative background was also determined. High-velocity gun transfer characteristics were run for use in interpretation of the spot size data.

For these same tubes the minimum readable spot size was determined. For ST136-R1 this was one mosaic square, for RT126-2 about 30 mils diameter. Cycling tests were made using writing charges which gave 1-4 square positive spots on ST136-R1 and about 40 mil spots on RT126-2. Both tubes would cycle under these conditions.

3.2 Test (Continued)

ST152-1, ST151 and ST147 were dynamic tested for WWI. All were satisfactory.

(K. E. McVicar)

An investigation of variations in collector spacing as they affect the amplitude of the readout signal is being made. Several tubes are being checked in an attempt to corroborate the theoretical analysis by experimental evidence. This is somewhat difficult since the changes in collector spacing during tube processing are unknown. In some instances credible correlation has been obtained between the theoretical and experimental data; in at least one case there was no correlation at all.

Detailed measurements of tube geometry are being continued in the compilation of the data necessary to interpret the readout traces which have been photographed. Because of the tedious nature of this work it is being done only when no other tasks are convenient.

The increase in current to the collector and A_3 when the beam is deflected towards DJ4 in some tubes is being investigated. It has been tentatively ascribed to secondary emission from the tube wall, and a measurement of the velocity of the electrons thus emitted indicates that they should serve to subtract from the signal output.

3.4 Unclassified

(H. E. Rowe)

An attempt is being made to determine the potential of the mica between positive and negative beryllium squares, considering the effects of both surface leakage and of secondary emission due to the holding beam from the mica. Using transmission line techniques an expression relating the potential and the distance may be derived. The secondary emission ratio of mica, δ, is involved implicitly in this expression; and in order to obtain a numerical solution, some curve must be fitted to the experimentally determined δ, which is not too well established. Two points on this curve, first crossover and the maximum of δ, were obtained from "Advances in Electronics"; linear and exponential curves were fitted to this data.

If δ is assumed to be a linear function of V, an analytic solution for the problem may be found. However, this linear approximation is poor above the lowest voltages. With an exponential δ-curve of the form $\delta = A(1-e^{-BV})$, the solution of the problem

3.4 Unclassified (Continued)

may be reduced to the evaluation of an integral. C. W. Adams has coded the problem for the computer and this code has been tried out. It may prove possible to obtain the desired solution in this manner.

When fully worked out, this data may give some indication as to the effect the width of the mica plays in the static operation of the storage tube.

(C. L. Corderman)

Design of a control system for the electronic TV deflection unit is underway and checkout of the output amplifier continues.

4.0 INPUT-OUTPUT EQUIPMENT

4.3 Typewriter and Tape Punching Equipment

(F. A. Foss)

Tape Preparation Equipment - A timing study of the tape-preparation unit design has revealed that approximately 240 milliseconds will be required per character typed by the operator. The tape reader commences its 360 degree cycle 70 milliseconds after the typewriter has initiated the overall cycle. The tape punch commences its 720 degree cycle 40 milliseconds after the tape reader has started its reading cycle. The typist can therefore type a maximum of 4 characters per second (40 words per minute).

A report on the operation and design of the tape preparation unit is now being written.

(J. S. Hanson)

Relaying and timing circuits are now being developed for preparing a typed copy of information read directly from the computer IOR without the necessity of preparing a punched tape. Heretofore, the tape punch had initiated most of the timing pulses for the punching of tape with or without the preparation of a typed copy, but it is now intended that the circuits associated with the tape reader furnish the desired functions as well as to delay operations during such machine functions as carriage returns and tabulation.

5.0 INSTALLATION AND POWER

5.1 Power Cabling and Distribution

(C. W. Watt)

The only work done on the computer during the past two weeks has been minor maintenance, and a few slight relay wiring modifications. An effort is being made to eliminate the troubles in the marginal checking system as they are uncovered during the routine daily checking period. 17 circuits that were inoperative because of dirty relays were serviced.

The preparation of maintenance drawings and instructions is occupying much of our time. This task will have high priority for the next few weeks.

5.2 Power Supplies and Control

(R. E. Hunt)

Marginal Checking - The marginal checking control panel is now complete and will be installed Saturday, April 29, 1950. The multimeter on this panel was checked on all scales against a standard meter. The overall accuracy is within 5% but the repeatability from scale to scale is within 2%.

Considerable work is being done to bring the marginal checking record drawings up to date.

ES Power Supply Control - This control was installed a week ago. Two difficulties were encountered. Changes to be made April 29, 1950 should result in satisfactory operation as specified.

Consideration is being given to a filament voltage interlock for the system.

(J. J. Gano)

D.C. Plate Supply Alternator - The breadboard regulator is ready for testing in the system.

5.3 Video Cabling

(T. Leary)

Information for essentially all of the cables originally designed by Sylvania has now been consolidated in the Master

5.3 Video Cabling (cont.)

Video Cabling Schedules. The cabling schedules for many of the cables designed here still refer to a C-size assembly drawing for a large part of the information about the cables, and these schedules will be modernized as time permits.

The assignment sheets for the various register-drivers are being brought up to date.

Sixteen video-probe cables (1077-1092) are being built by the shop. Also to be built is a set of cables to provide sync. pulses in the E-row for use with oscilloscopes.

6.0 BLOCK DIAGRAMS

(R. P. Mayer)

New Timing Diagrams, and diagrams showing changes for operation ck, have been distributed. Diagrams showing temporary operations and connections are being prepared.

During a discussion of logical orders, several other possible orders were mentioned. A memo describing a number of possible new orders is being written. There is not enough room in the control switch to include all the suggested orders, so that some decision must be made at some later date. People who do any programming for WWI, or for study purposes, are urged to give some thought to these possible orders - or to any other possible orders that seem useful - in an effort to point out any new orders which can be especially useful in further programming. It should be pointed out that any coded programs which use non-standard orders will not work on WWI, except by special arrangement.

7.0 CHECKING METHODS

7.1 Test Programs

(J. M. Salzer)

Several test sequences, designed specifically to test the permanency of particular flip-flops, were run on the computer. The accumulator and most of the arithmetic control were checked and the margins compared with those obtained by manual means. The correlation between the automatic and manual margins proved to be poorer than in the case of the program counter, which was tested some time ago.

Three reasons can be cited to explain the discrepancy. First, the manual tests were performed over a month ago. Second, the test program picks out the weakest spot in the link which might not be the particular flip-flop of interest. This is corroborated by the fact that the margins in the automatic run were either equal or lower than those of the manual run. Third, there still remains some question on the satisfactory interruption of the program with the present test setup.

(G. Cooper)

Test Sequence II has been changed in order to increase its effectiveness against those failures in which a flip-flop will retain one type of information for a limited time only (as discussed in the previous bi-weekly). This modified version (Test Sequence II-1) is now being used in the routine measurements of margins and has demonstrated its superiority over the original version.

7.2 Display Programs

(C. W. Adams)

The second decoder, a non-holding type designed by J. A. O'Brien, has been installed, in breadboard, in WWI to provide vertical deflection. The decoder which has been in use previously (Ely's design) is now being used to provide horizontal deflection. Temporary operation gh: h-axis set has been wired in as operation #00110 = 6. The gh operation reads the contents of AC into the horizontal decoder and into storage. Operation gd: display reads into the new vertical decoder and into storage and displays a spot on the oscilloscope.

7.2 Display Programs (cont)

The horizontal decoder holds information permanently and as many spots can be displayed at as many vertical positions as desired. More work remains to be done to give really good results using the new decoder.

An improved version of a program to display a curve on calibrated axis has been written. Another program was written on the spur of the moment to display Lissajous figures. A modification of this program permitted a display resembling the sweep of a PPI scope.

7.4 Marginal Checking

(G. Cooper)

The routine measurement of margins is continuing. Some patterns are beginning to show through the haze. It has been possible to link several trends in the data with their probable cause. Some correlation with margins obtained by other methods (automatic marginal checking and J. M. Salzer's test problems) seems to be in order at this point.

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-340	Current Density Distribution and Spot Diameter in Cathode Ray Beam	10	4-17-50	H. Rowe, A. Tanguay
E-342	An Investigation of the Possibilities for Improving Pentode-Gate-Tube Circuits (Abstract of SM Thesis)	3	4-26-50	C. A. Rowland
M-1024	ES Systems Planning	2	4-13-50	R. W. Read
M-1025	Bi-Weekly Report, April 14, 1950	24	4-14-50	
M-1026	Progress Report: An Investigation of the Effect of the Angle of Beam Incidence on Electrostatic Storage Tube Performance	2	4-1-50 to 4-14-50	K. McVicar
M-1027	Progress Report: Dynamic Determination of Usable Storage Densities in Storage Tubes	2	3-20-50 to 4-12-50	H. B. Frost
M-1028	Progress Report: A Co-Incident Current Magnetic Memory Unit	2	4-1-50 to 4-24-50	W. N. Papian

Library Files

	RCA Review: March, 1950	RCA
.004	European Scientific Notes: 1 December, 1949; 1 March, 1 April, 1950	London ONR
47	Technical Information Pilot: March 28, March 31, April 6, April 18, 1950	ONR, Library of Congress
180	Document Office Bulletin: April 14, April 28, 1950	RLE, MIT
232	Physics Today: April, 1950	Am. Inst. Physics
519-9	High-Efficiency Deflection and High Voltage Circuits for Short Metal Kinescope: Application Note 142, March 31, 1950 (RCA-16GP4)	RCA
519-10	Use of Sharp-Cutoff Miniature Pentode RCA-6CB6 in Television Receivers: Application Note 143, March 31, 1950	RCA

9.1 Publications (continued)

Library Files (continued)

No.	Title	Author
599	Electrical Characteristics of the Interface: Section from Quarterly Progress Report, U. of Missouri Physics Department	A. S. Eisenstein
690	Econometrica: July-October, 1949 Programming of Interdependent Activities: I. General Discussion; II. Mathematical Model	M. K. Wood G. B. Dantzig
691	Characteristics of High-Efficiency Deflection and High-Voltage Supply Systems for Kinescopes: Publication Number ST-545	O. H. Schade RCA Labs.
692	Pencil-Type UHF Triodes: Publication Number ST-498 RCA Labs.	G. M. Rose D. W. Powder W. A. Harris
693	Factors Governing the Choice of a Number Base for Use in a Digital Computer: Project Thumper Report #55413. General Electric Company	Aero. and Ordnance Systems Divisions, G. W. Hobbs
694	A New Electronic Telegraph Regenerative Receiver: AIEE Paper 50-6	B. Ostendorf, Jr.
695	Some Fundamental Considerations Concerning Noise Reduction and Range in Radar and Communication: Proceedings of the Institute of Radio Engineers, Vol. 36, No. 5, May, 1948	S. Goldman
696	Spurious Signals Due to Noise in Triggered Circuits: Technical Report No. 24, 12-10-47	Cruft Lab., Harvard D. Middleton
697	Design of a Circuit to Approximate a Prescribed Amplitude and Phase: Technical Report No. 54, November 24, 1947	R. M. Redheffer RLE, MIT
698	New Duo-Cone, 15-Inch Loudspeaker. Reprint from October, 1949 Audio Engineering	H. F. Olson J. Preston D. H. Cunningham
700	Accelerated Life Testing of Vacuum Tubes. Signal Corps Engineering Labs.	J. Rothstein

9.2 Standards, Purchasing and Stock

(H. B. Morley)

Standards - No new or revised standards issued this period.

JAN-26A Specification replacing JAN-26 changes the wattage ratings of most wire-wound power type resistors. WWI standard resistors affected are:

RW31	-	was 8 watt,	now 10 watt
RW20	-	was 22 watt,	now 15 watt
RW22	-	was 48 watt,	now 37 watt

Appropriate notations will be made in standard sheets.

Procurement and Stock - The inventory of numbered equipment has been completed, and a detailed report submitted to Mr. Boyd. The next stockroom "project" will be a survey and clean-up of surplus stock at Ft. Heath and in basement storage in an effort to dispose of stock and equipment no longer needed. This will permit more efficient use of available storage facilities.

The storage tube mount boxes have been received from the Millen Company, and are ready for silk screening. All material for assembly of the mounts is on hand with the possible exception of some small hardware items.

Orders have been placed with Endicott Corporation for approximately sixty more plastic relay covers.

Replacement parts for any pieces of WWI or laboratory equipment is a stockroom function, and such parts should be kept there, rather than in "private stocks". Personnel should advise this office of any such stocks which should be carried.

9.3 Construction

(D. V. Mach)

The storage tube lab decoder is now about 80% complete and should be finished shortly, barring interruptions, i.e., alignment of storage tube mount or r-f amplifiers, etc.

Additional changes have been made in the breadboard of the new r-f pulser design, in the interest of improving output.

9.3 Construction (continued)

(R. A. Osborne)

Production Report - The following items have been completed and inspected since April 14, 1950.

8	R-F Amplifiers
1	Marginal Checking Control
1	Amplifier for ES Test Control
2	Windings of Special Magnetic Cores
20	Coils and Transformers for R-F Amplifiers (Spares)
12	Coils and Transformers for ST Mounts (Spares)
	Modification of one D-C Filter Panel

In addition to the above 59 cables and 32 coils have been made for the final lot of ST Mounts.

(L. Prentice)

Machine Shop - Alteration of the cathode spraying machine is about one-half complete. This will be finished during the next period. While the work load has been light, work on hand will bring it up to normal during the next two weeks.

Sheet Metal Shop - Setup of this shop is 95% complete. Work has been started on sheet metal parts for 16 storage tube mounts. These parts should be completed during the next period.

9.4 Drafting

(A. M. Falcione)

New drawings have been made for the 201 Storage Switch, Switch Panel (Serial #2) and are numbered as follows:

Circuit Schematic:	R-35620
Assembly:	R-35621 with PL
Al Panel:	E-35622
Power Cable:	D-35623

The WWI Master Drawing List and the rack layout associated drawings are now being brought up to date with all the latest additions and revisions. Revised sets of drawings will be issued soon.

9.4 Drafting (continued)

Mrs. June Wagner, a new employee, has been assigned to the print room temporarily. She will devote the coming week to WWI slides. All the present slides will be renumbered, using a new numbering system. Mrs. Wagner will then spend approximately 3 weeks with Mrs. Ryan in the library in order to become acquainted with that work.