Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: BI-WEEKLY REPORT, Project 6345, September 1, 1950

To: Jay W. Forrester

From: Project Whirlwind Staff

1.0 SYSTEMS TESTS

1.1 Whirlwind I System Test

(N. H. Taylor)

The emphasis in system testing still remains on the testing of storage tubes in the storage room. The first tube has been tested thoroughly using a revised line-up procedure which establishes safe margin of operation on all variables within the tube. During these tests an effort is being made to understand the variations in the tubes instead of just making them function. This philosophy will take some time now but speed the later work when more tubes are in service and operating problems occur.

During these storage tube tests the computer is being used twelve hours a day as a test set. It gets maintenance attention and marginal checking for 2 to 4 hours a day which is adequate to have the 12 hour period almost entirely free from computer trouble. It is encouraging to note that a 4000 tube system can be run day after day on this basis and obtain efficient operation.

(S.H. Dodd & C.L. Corderman)

Considerable progress has been made in the checkout and line up program of the storage tubes in WWI. One tube, ST159, and its associated digit rack equipment, has been completely checked as having adequate operating margins. Although unforeseen developments will undoubtedly appear as additional tubes are examined, the test procedure is fairly well settled, and it can be said without undue optimism that future testing will procede more rapidly than in the past.

1.1 Whirlwind I System Test (continued)

The following changes which have been recently introduced have given significant improvement in overall performance and in the rapidity and reproductability of determining the best operating conditions.

A. A potentiometer voltage source has been added to the EST output panels to control the suppressors bias. Suppressor bias variation using a scope error display results in an accurate method of determining RF amplifier noise, gain, feedthru signal, and storage tube output signal amplitudes.

B. Test specifications have been revised so that data indicating reliability, with and without a rewrite cycle, can be measured, The results of these tests on a number of storage tubes will be used to decide the desirability of rewrite.

C. A method of measuring spot size in terms of the number of readouts without error, with no holding gun current, shows promise of greater accuracy than present TV techniques. The reading beam current can be calibrated in terms of the number of reads required to make a positive surface negative in the absence of holding gun current.

RF feedthrough from the high velocity gun driving circuits to the signal plate coupling circuits has been causing some trouble. Efforts to reduce this feedthrough has been only partially successful. Further work on this will be necessary with the emphasis toward preventing the feedthrough polarity and gain from changing as a function of wire positions. Partial compensation can be made for a constant feedthrough signal.

(H.F. Mercer)

Component Failures in WWI - The following failures of electrical components have been reported since August 18, 1950:

1.1 Whirlwind I System Test (continued)

Component	No. of Failures	Hours of Operation	Reason for Failure
Crystal			
D-358	1	1594 hours	Drift
	1	534	
Capacitor			
0.001 MFD	1	2170	Open
Tubes			
7AD7	1	4007	Change in characteristics, Low I_E
	1	4206	Leakage, tap short, and low plate current.
	1	4099	Low Plate Current
7823	1	3367	Low Plate Current
6J6	1	4191	Leakage

1.2 Five Digit Multiplier

(R.A. Ouditz)

The multiplier made errors on August 28 and again on August 30.

Marginal check data for this period indicated that no tube or component replacements were necessary and none were made.

2.0 CIRCUITS AND COMPONENTS

2.1 Circuits by System Number

831 Storage Tube Mounts

(W.J. Nolan)

Now that technician time seems to be available it is planned to try a modification to two ST mounts in order to reduce the feedthrough from the HV gun grid. The proposed change includes the following items:

1. Changing the location of 4 of the ground leads on the phenolic panel.
2. Inserting a baffle across the mount just below the ends of the guns.
3. Shielding the transformer on the signal plate coupling chassis.

Although extensive measurements are planned before and after the change it may be difficult to properly evaluate the results as it has been found that leakage varies a great deal between different mounts, between different tubes in the same mount, and with variations in the connection of a tube. Short throw tubes are particularly difficult to shield and although it is expected that the above changes will be adequate for 100 series tubes there is much more doubt about the short throw series.

832 ES Output

Six additional r-f amplifiers with shielded input transformers have been produced. The modification now seems satisfactory for adoption in W.W. although the original WW specs. will not apply because of a 10 % decrease in bandwidth and increased difficulty in alignment, the cause of which is not yet determined. Also, if a major change in system bandwidth is contemplated, it would be desirable to limit the number of amplifiers modified to those actually in use.

2.5 Vacuum Tubes

(H.B. Frost)

Some tentative ideas are being worked out to allow more complete determination of the reasons for tube failure with simple tests. In particular, the large class of tubes retired with "low plate current" will be resolved at least into interface and low emission categories. This can be done at present, but the procedures are too complicated for routine use on all failures.

All life test tubes now active have been completely tested during this period as noted by Irish elsewhere in this section. Preliminary examination of the data shows continuation of the trends noted in R-179, with no major changes.

(F.E. Irish)

During the past two weeks the vacuum tubes which had been on life test (7AD7's, 6AG7's, 6AN5's, and 5687's) were pulse tested and checked for interface formation. The data obtained for these tests was reduced to a summarized form. These tubes had undergone 7800 hours or more of operation at that time.

A method of crystal checking was devised for measuring the back resistance of crystal diodes in the range from 1 to 5 megohms where the present equipment is inadequate.

Plans are being made for a life test of the different types of crystal diodes. At the present it is thought that three different conditions of test will be used. They are:

1. Voltage applied against the forward resistance.
2. Voltage applied against the back resistance.
3. Pulse test possibly simulating the action of a clamping circuit.

2.7 A Coincident-Current Magnetic Memory Unit

(W.N. Papian)

The thesis has been completed and turned in. It contains an introductory chapter which covers, briefly, the multidimensional selection scheme and the elemental mode of operation of the unit. The second chapter attempts to explain the response times of the magnetic cores as mainly determined by eddy-current shielding effects. Chapter III covers some criteria and definitions for assessing the ability of a core to retain information; it also discusses significant signal ratios and presents test results. The last chapter introduces a number of miscellaneous considerations which were only lightly mentioned or postponed until then, but which bear on future problems.

A breadboard was assembled which demonstrates single-turn operation of a core. (See Figure 4 of R-187 by J.W.F.)

Design work is in progress on breadboards needed for test-operating a 2 by 2 planar assembly of cores. These cores will be the 20-μsec metallic type, will have multi-turn coils for the present, and will be "driven" by tubes of the 6AS7 type. The block sketch of the setup, as done by R. Mayer, is SA-36032. It will be easy to add another plane of 4 cores, at some future date, to connect the setup to an 8-core, 3 dimensional, array.

Comments are welcome.

3.0 STORAGE TUBES

3.1 Construction

(P. Youtz)

W. E. Pickett, glass blower for the Storage Tube Group since 15 March 1948, terminated his services with the project on 1 September 1950. L. W. Nelson, who has been working with W. E. Pickett since 30 January 1950, and J. O. Ely will do the glass work for the group. During the past two weeks Ely and Nelson assembled four evaporation tubes and four research tubes in the glass shop. The nonex stems and blown envelopes for the storage tubes will be purchased from the firm of Ryan, Velluto and Anderson.

The four research tubes that were processed this period were Research Tubes 161, 162, 163 and 164. These research tubes were identical with the 100 series storage tubes for WWI except the mosaics were lined up with the deflection plates and the mica spacer was redesigned to give uniform spacing between the screen and mosaic surface.

(R. Shaw)

During the past fortnight, considerable time has been given to the design of jigs to facilitate tube construction. Some parts of a fixture for locating the storage-tube target have been released to the machine shop. Another fixture, for determining deflection plate location, is being temporarily delayed until the suggestions of other members of the group are received. Devices for closer control of envelope length are also under construction.

Envelopes from our new source are being carefully inspected. This practice will be continued until experience shows it to be unnecessary.

3.2 Test

(P. Youtz)

C. L. Corderman and M. I. Florencourt will be on vacation this next bi-weekly period. A. R. Tanguay will be on vacation the second week of the bi-weekly period. H. J. Platt will be working on the TV Demonstration unit during this period.

3.2 Test (Continued)

(A. R. Tanguay)

A standard storage tube has been tested to determine its holding gun restoring currents for several combinations of the variable electrode voltages. Similar tests have been started on ST204 to determine restoring current characteristics peculiar to short throw tubes. There is a noticeable difference between the maximum positive and negative restoring currents of the short throw tube as compared to that of the standard.

The last few days have been spent learning the techniques of the standard testing of storage tubes on the T. V. demonstration. Two recent research tubes (RT161 and RT162), assembled by Ely and Nelson have been tested. RT161 proved satisfactory in every way, with an exceptionally uniform surface. RT162 seemed satisfactory when first tested, but it lost its vacuum overnight; consequently, both heaters were burned out upon reapplication of heater and electrode voltages. The cause of the leak has not yet been determined.

(H. J. Platt and H. B. Frost)

Two modified r-f amplifiers were checked for feedthrough of phase reference signal after modifications had been made. The performance of the amplifiers in this respect was greatly improved.

Tests were made to determine permissable read gate amplitudes for reading a negative spot immediately after the spot had been written, with no intervening holding gun time, using ST152-1. It was found that a reliable negative readout required a RSPG of a volt or so less than the W-SPG when a spot was written to saturation negative potential. However, when not written to the saturation level, the read gate needed to be reduced somewhat, as might be expected. A diode clipper has been constructed to allow study of small differentials in W-SPG and RSPG amplitudes.

Some additional tests were run on RT154, which has 1.5 mil mica with a 100-mesh mosiac. It was found possible to cycle an 8 x 32 array in the good part of the surface using full 32 x 32 density. Operation was not extremely reliable, however. It is planned to examine this tube somewhat further in the next period.

4.0 INPUT-OUTPUT EQUIPMENT

4.1 Eastman Kodak Film Units

(J. A. O'Brien)

Since the last bi-weekly report there has been very little advance toward satisfactory operation of the film units. The filament transformer in one of the high voltage power supplies broke down, and replacements are unavailable at present. We are trying to replace the transformer with one more conservatively rated.

We have received from Eastman Kodak two new timing drums and 1 recording mask for recording wider spots, further apart on the film. We have made a few recordings using these items, but we have not had enough uninterrupted computer time to make all of the adjustments required.

4.3 Typewriter and Tape-Punching Equipment

(R. E. Hunt)

The majority of the last bi-weekly period has been spent going over the flexowriter equipment making modifications to improve reliability. A reader was completely disassembled, several hidden splices were found and corrected, and a complete schematic showing wire colors was made and sent to the drafting room.

A new tape clamp is being worked out for the reader. The one supplied is much too sloppy for the reliability we will expect of these units.

A small wet cleaner was worked out for these units to clean oil-dust mixtures out of cracks and crevices and in inaccessible places. It works extremely well, and will be developed still further if time permits.

(C. W. Watt)

Interim Tape Reader - The relay panel was modified as required by preliminary tests, and the system was tested with the computer. A short program in test storage was used to compare numbers punched on tape with numbers in test storage. Using the qr order (reader under control of computer), error-free operation was obtained. In the "free-running" mode of operation (reader runs independent of computer, and read-ins

4.3 Typewriter and Tape-Punching Equipment - Interim Tape Reader (cont.)

are asynchronous) errors were present. The cause of the errors is obscure, and was not found during the limited computer time available. Some time is being scheduled during an evening next week for further checking.

5.0 INSTALLATION AND POWER

5.1 Power Cabling and Distribution

(C.W. Watt)

A new variable -30 volt circuit has been wired in to all 16 ES racks for the EST output panels.

A +250 fixed voltage circuit to the H.G. Cathode Supply was made variable.

5.2 Power Supplies and Control

(J.J. Gano)

D-C Power Supplies - The 250 volt supply has operated satisfactorily for about 200 hours with the new cushioning circuits. However, no favorable conclusions can be drawn until some time next year when at least 2000 hours are accumulated. There was no thyratron failure on the original set of tubes until after 2000 hours.

Under D-C load conditions, the arc discharge glow of the rejected tubes was compared with that of the twelve tubes still in operation. The rejected tubes all had strong pink glows above the anode, whereas the latter set were clear above the anode except for two or three which had a faint glow. A communication has been sent to the manufacturer requesting further information on the use of tube glow for tube failure prediction. We are also shipping them the rejected tubes for their examination to ascertain cause of failure.

5.3 Video Cabling

(T. Leary)

1. At the request of John Salzer, changes in the cabling arrangements for "PR Read to CB" are being made to facilitate checking the input to the Program Counter. This involves building four new cables and relabelling or eliminating a good many more.

2. In the reconnection of the Program Register as a Program Register, twelve more new cables are involved (mostly in the "Storage Read In" cabling).

3. Approximately five more new cables are needed for various changes of temporary to permanent cabling.

5.3 Video Cabling (continued)

4. As time permits, Larry Holmes is going through rack AD and reducing the bewildering maze of temporary cables.

5. A block schematic showing the video connections concerned with the Interim Tape Equipment is being prepared.

6.0 BLOCK DIAGRAMS

(R. P. Mayer)

The special "change to Pushbutton" and "Restart" circuit for ES testing now has a FF and GT control to prevent interference with "ch. to PB" and "Restart" pulses originating elsewhere. The circuit is shown in dotted lines on the ES Up-to-the-Minute (UTTM) drawing. (At present, the inputs to the dotted-line FF are not as shown on the UTTM, but will be connected that way soon).

7.0 CHECKING METHODS

7.1 Test Problems

(G. Cooper)

Engineering note E-359, "ES Test Programs," has been completed except for the section dealing with ES Test Programs X and XI, which are used as part of the initial adjustment and testing of the storage tubes. These programs are continually being revised as the testing procedure develops. This section will be written when the situation appears to be somewhat more stable than at present.

7.3 Checking Circuits

(J. M. Salzer)

A survey of the various registers indicates that the following circuits are not checked in any transfer:

(1) Program counter input
(2) Step counter input and output
(3) Accumulator output
(4) In-out register output
(5) Flip-flop registers input
(6) Program register input

Discussion of these deficiencies in built-in checking may be of interest to those working on the system or on programs. Some counter-measures are suggested.

(1) As reported in the last bi-weekly report a scheme for checking the PC input had been devised and the requisite system changes are being incorporated.

(2) The SC input is used in sl and sr, while the SC output in sf. Two schemes have been thought of to perform built-in checks on these circuits, but both schemes have weaknesses. One scheme would compare the contents of SC with the complement of the test storage switch during sl and sr. This could only be done both when test storage (rather than ES) is used and when the regular shifting operations (with roundoff) are used, since otherwise the test storage switch is cleared. Although the circuits for gating out the check in other cases are available, the fact that when ES will be used exclusively the SC check will be lacking is a serious weakness. The other scheme would check SC on a cp operation if AC contains a positive number by circulating a 5-digit number in and out of SC and

7.3 Checking Circuits (continued)

making use of the then idle busses and check register. Checking SC on a different operation than when it is used is a minor weakness of this scheme compared with the inconvenience of applying pulses to the right 5 digits of the busses. No decision has been reached on how, and if, to check the SC built-in-wise.

(3), (4), (5), and (6) These circuits used to be checked, but the time and equipment employed in these checks were recently turned over for selective writing and selective checking of ES. As it is not known how long ES will require these features, no changes in built-in equipment are contemplated now. Concerning AC, the programmer may readily do some checking by replacing a few ca x orders in his coded program by the sequence of ca x, ck x. Even this is unnecessary if the program contains a few ck orders at all, since in addition to whatever ck is supposed to check it will also check the AC output. The ck order is being changed to operate this way.

The checking of IOR will be considered when the film equipment is incorporated into the system.

When flip-flop registers are used, they are sometimes checked by the program. This problem is being investigated further.

The PR input is checked when test storage is used; it is only partially checked when ES is used exclusively. This partial check results from the redundant action of program timing on TP 4, which circulates each digit of PR by commanding a read-out and a read-in simultaneously.

It is pointed out that this discussion refers to transfers which involve the bus, and the inputs and outputs mentioned are the circuits connecting the various registers to the bus. No consideration was given to other types of transfers, such as the ones between the AE registers and the ones between EST and PR. Similarly, the various resetting inputs to SC were disregarded.

7.4 Marginal Checking

(R. P. Mayer)

A new form for the daily marginal checking record has been drawn: SB-36051. This form shows at a glance (1) the supply voltage, (2) safe maximum excursion, and (3) whether ES, IO, general, or blank, for each line. Provision is also made for recording the reading of all voltage and current meters.

Due to the recent difficulty with the +48 volt line, voltage and current readings on all supply lines will be taken each

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7.4 Marginal Checking (continued)

morning as part of the daily procedure.

We are rapidly reaching the point when all variation lines will be checked every morning. Roughly half of the ES lines are now being checked. No attempt is being made to check I-O lines, at present.

8.0 MATHEMATICS AND PROGRAMMING

(R. P. Mayer)

A table has been prepared for converting between octal and decimal numbers. The title: "Octal to Decimal Conversion Table, 0 to 6,000" SB-36045. This table provides rapid conversion "on sight" in either direction, and is complete on one page.

A similar table is being prepared for sexidecimal and decimal conversion. This table will go to 16,400 but will be the same physical size as the octal table. Another advantage is that the FF reset switches, and binary numbers in general, are divided into groups of four--fitting the sexidecimal system.

A comma is inserted every third digit for decimal numbers. We have adopted the procedure of inserting a comma every fourth digit for binary. It is then logical to insert a comma every two digits for sexidecimal. Perhaps an apostrophe every third digit would be correct for octal. The above tables will be corrected to follow this plan. Thus:

1,010,110 is decimal
101,0110 is binary
1'010'110 is octal
1,01,01,10 is sexidecimal

(C. W. Adams)

A number of very interesting ideas have been suggested to us by Dr. M. V. Wilkes of Cambridge University, who has had considerable experience with operating his EDSAC. Notably, he has confirmed by experience the feasibility of (a) putting everything onto the program tape, leaving nothing to a manual setting of switches, (b) simplifying coding by a very heavy dependence on well-thought-out conventions and a well-designed library of subroutines, (c) allowing users to learn coding by actually doing their own problems, and (d) eliminating by various methods the effective down-time which can be caused by trouble-shooting errors in programs while the program is in the computer. His philosophy is both a confirmation and an extension of ideas which were independently being developed here. His techniques of simplifying the finding of errors in programming by printing extra information during early runs of the programs are being especially considered with a view to adapting them to our machine.

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8.0 Mathematics and Programming (continued)

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

A report is being prepared summarizing our work on the numerical analysis of the partial differential equation that arose in W. N. Papian's research.

We are also compiling background information on other numerical methods of solution.

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-358	The Technique for Evaporation of a Beryllium Tube	8	8-2-50	T. F. Clough
E-363	Washing Procedures - Series W	27	8-15-50	J. Palermo
E-368	The Distribution of Capacitance on the Beryllium Mosaic Surface	13	8-22-50	T. R. Parkins A. R. Tanguay
E-370	Principle of Operation of Polariscope			
M-1077-3	Preliminary Draft of Test and Line-up Procedure for Storage Tubes (FOR INTERNAL DISTRIBUTION ONLY)	61	8-28-50	J. W. Forrester R. R. Everett
M-1088	Bi-Weekly Report, Project 6345, August 18, 1950	19	8-18-50	
M-1090	Progress Report: Check Problems for Automatic Failure Detection in an Electronic Digital Computer	2	8-2-50 to 8-24-50	R. H. Gould
M-1091	Progress Report: A Study of the Holding Beam in the M. I. T. Electrostatic Storage Tube	2	6-12-50 to 8-31-50	J. O. Ely

Library Files

.004	European Scientific Notes: 1 August, 1950	ONR/London
47	Technical Information Pilot: August 9, August 11, 1950	ONR/Library of Congress
178	Mathematical Tables and Other Aids to Computation: July, 1950	National Research Council
559	Technical News Bulletin: August, 1950	National Bureau of Standards
597	MIT Reports on Research: August, 1950	MIT
747	Projects and Publications of the National Applied Mathematics Laboratories. Quarterly Report: April-June, 1950	National Bureau of Standards
748	Research Activities of the Institute for Numerical Analysis. Quarterly Progress Report: April-June, 1950	National Bureau of Standards

9.1 Publications (Continued)

Library Files (Continued)

No	Title	Author
878	Contribution to the Study of Oxide Cathodes. Tr. from Annales de Radioélectricité, Vol. IV, July, 1949	F. Violet J. Riethmuller Tr. T. H. Briggs
	Behavior of Oxide Cathodes in a Transitional State Tr. from Le Vide, July-September, 1949	C. Biguenet Tr. T. H. Briggs
	Use of Radioactive Elements for Studying the Movement of Alkaline-Earth Metals in Oxide Cathodes Tr. from Comptes Rendus, August, 1949	J. Beydon L. Beaudoin J. Challonsonnet J. Debiesse Tr. T. H. Briggs
879	An Electrostatic Storage Tube System. Technical Report No. 154, March 27, 1950	A. J. Lephakis RLE, MIT
880	A Study of the Characterisitcs of Vacuum Tubes with Oxide Cathodes at Low and High Frequencies Report R-224-49, PIB-169	G. C. Dalman Microwave Research Institute
881	Oxide Cathode Resistance and Rectifying Characteristics. Report R-209-49, PIB-153	G. C. Dalman Microwave Research Institute
882	Dynamic Determination of Usable Storage Densities in Storage Tubes. M. S. Thesis, 1950	N. B. Frost
883	A Survey of the Theory of the Boundedness, Stability and Asymtotic Behavior of Solutions of Linear and Non-Linear Differential and Difference Equations. NAVEXOS P-596. January, 1949	R. Bellman Princeton University
884	Progress Reports Project 6694. Nos. 1 through 9, covering period October 21, 1949 to August 8, 1950	Servo Lab., MIT
893	Recommendations Concerning Basic Design Principles. Engineering Memo. No. 1, Project 6694. Sept, 1949	R. J. Kochenburger Servo Lab., MIT
894	Evaluation of Interferometric Table-Position Measurement. Engineering Memo. No. 2, 6694, Oct., 1949	J. O. McDonough Servo Lab., MIT
895	Proposed Digital Decoder and Subtractor for the Parsons Milling Machine. Engineering Memo. No. 3, 6694, Oct., 1949	R. J. Cypser Servo Lab., MIT
896	Brush-Type Position Indicator for the Parsons Milling Machine. Eng. Memo. No. 6, 6694, Dec., 1949	J. H. Brown Servo Lab., MIT
897	Evaluation of Grating-Type Table-Position Measurement. Eng. Memo. No. 7, 6694, Dec., 1949	J. O. McDonough Servo Lab., MIT
898	Suggested Block Diagrams for Data-Processing System. Eng. Memo. No. 8, 6694, Jan., 1950	J. O. McDonough Servo Lab., MIT

9.1 Publications (Continued)

Library Files (Continued)

No.	Title	Author
899	Tapes for Data Storage. Eng. Memo. No. 9, 6694, Feb. 8, 1950	R. J. Cypser, Servo Lab.
900	Subtraction Arithmetic for Servo Error Detector. Eng. Memo. No. 10, 6694, March 2, 1950	J. O. McDonough, Servo Lab.
901	Analysis of the Instrument Servomechanism with a Discontinuous Transfer Function in the Feedback Path by the Kochenburger Method. Eng. Memo. No. 11, 6694, March 17, 1950	R. J. Cypser, Servo Lab.
902	Study of the Nonlinear Instrument Servomechanism by a Phase-Plane Method. Eng. Memo. No. 12, 6694, May 17, 1950	R. J. Cypser, Servo Lab.
903	Evaluation of a Straight-Line-Coding Method. Eng. Memo. No. 13, 6694, May 4, 1950	E. B. Skolnikoff, Servo Lab.
904	Suggestions for the Decoder Design. Eng. Memo. No. 14, 6694, May 22, 1950	A. K. Susskind, Servo Lab.
905	Specification of Synchronizing-Pulse Frequency for Position Coding. Eng. Memo. No. 15, April 26, 1950	J. H. Brown, Servo Lab.
906	Conversion Between Analogue and Digital Data. Technical Report ONRL-73-50	ONR/London
907	Selection of the Machine Tool Used in the Parsons Project. Parsons Engineering Memo. No. 3	R. H. Marsh

Books

The Mathematical Theory of Communication	W. Weaver, C. Shannon

9.2 Standards, Purchasing and Stock

(H.B. Morley)

Standards - No new or revised standards issued this period.

A revised JAN Preferred List of Electron Tubes dated August 1, 1950 has been received and is on file in the procurement office.

Procurement and Stock - Due to the slow-down in laboratory construction in recent months, it may be found that some items of standard stock are not available in the stockroom in large quantities. Therefore it is requested that engineers contemplating any construction programs check with the stockroom well in advance to insure that adequate stocks of components are on hand or on order.

Any lab personnel having Simpson or similar meters which have not been checked recently, and which are not in use, are requested to return them to the stockroom so that they can be sent to the instrument lab for checking. An effort is being made to have all such meters checked every three months.

Lab personnel are again reminded that there are many items of both standard and non-standard stock which have been salvaged by stockroom employees. This material is segregated in the stockroom into tested and untested stock. This tested stock passes the same inspection as new stock and can be used as such. In many cases it may be possible to locate items in salvage stock which would take several weeks to obtain from suppliers, and it is suggested that personnel check this source for needed items before ordering, particularly if it is for experimental work and if only small quantities are needed.

9.3 Construction

(R.A. Osborne)

Production Report - The following items have been completed and inspected since August 18, 1950.

5 Special Magnetic Core Windings
Modifications to 2 S.T. Mounts
Modifications to 6 E.S.T. Output Panels
1 Cable (Standardizer Amplifier)
2 Low Speed 2^6 Counters (not yet inspected)

9.4 Drafting

(A. M. Falcione)

WWI Master Drawing List has been brought up to date and will be reissued during the next week. It will be the practice to revise this drawing list quarterly unless the number of changes and additions do not warrant it.

Thesis drawings and necessary reproductions thereof for Frost, Papian, and Collier were completed on schedule.

Storage Tube Assembly Drawings, WWI - A complete new set of drawings for this unit (drawn to scale) is 75% complete. Completion is being held up pending further contemplated changes on the Storage Tube.

Barta Building Drawings are now being checked, revised, and data is being consolidated on a few drawings as compared with our present system of many drawings with little information on each.

10.0 GENERAL

(J. C. Proctor)

Non-Staff Terminations

William E. Pickett
Rita Burbank
Helen O'Connor

New Non-Staff

Ann F. Pratt

Mrs. Pratt, the new editorial secretary replacing Nancy Harrison, is from Newton Centre, Massachusetts. She is a graduate of Pembroke College in Brown University, Providence, Rhode Island. Most of her secretarial experience has been in combination with her interest in psychology, which was her major field of study in college. Mrs. Pratt's husband is a graduate student at MIT.