Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: BI-WEEKLY REPORT, June 20, 1952

To: Jay W. Forrester

From: Laboratory Staff

1.0 SYSTEMS OPERATION

1.1 Whirlwind I System

(D. Morrison)

Operation

The following is an estimate by the Computer operators of the percentage of the assigned time usable and the number of errors due to the Computer for the period 6 June to 19 June 1952.

Number of transient errors	18
Number of steady state errors	2
Number of intermittent errors	37
Number of assigned hours	142.5
Percentage of assigned time usable	90
Percentage of assigned time usable since March 1951	84.4

(S. H. Dodd)

A new set of resistors has been installed in the storage tube mounts, replacing the Nobleloy current monitoring resistors, and in addition, the heaters in the clamp tubes in the signal plate drivers have been changed to a d-c voltage level equal to the cathode voltage. The combination of these modifications has substantially reduced the number of times positive switching of the storage surfaces has been encountered.

The Photo-electric Tape Reader has been giving us consistent mechanical trouble during the past few months. Efforts to adjust operating conditions to eliminate this trouble have been unsuccessful and the general conclusion is that the Photo-electric Tape Reader's mechanical design is inadequate. C. W. Adams has been asked to obtain detailed information on procurement of Ferranti Photo-electric Tape Readers while he is in England. In addition

1.0 SYSTEMS OPERATION

1.1 Whirlwind I System (con't)

(S. H. Dodd)

a conference will be held with operators of a 1101 computer during their visit here next week to discuss their experience with their Photo-electric Tape Readers.

The addition of freon to the air conditioning system and an adjustment of operating pressures has corrected the air conditioning troubles encountered recently.

During the last few weeks we have been making measurements of storage tube gate amplitudes in all digit columns on a schedule of 3 times a week. We have found very little change between readings and will now make these measurements once a week only.

(N. Leighton Daggett)

Resistor failures in the storage tube circuits have been reduced by replacing the offending Nobleloy resistors with carbon resistors. Those Nobleloy resistors which are critical (in the deflection circuits) will be replaced by boro-carbon resistors which Paine's tests have shown can withstand heavy transient overload without damage. A new make bulb with a much more rugged filament weld has been obtained for the photoelectric reader. This should eliminate the frequent lamp replacement that has been necessary in the past.

(H. L. Ziegler, A. J. Roberts)

Storage reliability has increased considerably during this bi-weekly period. Several gate adjustments were made in directions determined by data taken during applications periods. The RF pulser was modified to give a more stable phase reference amplitude, and results have been very satisfactory.

We are still troubled by failures of Nobleloy resistors in the deflection circuits. These resistors are being replaced by IRC resistors where failures occur. Shifts on the order of 10 volts in gate amplitudes have been noticed and steps are being taken to locate the cause of the trouble. Two tubes were replaced during this period because of insufficient range of margins and severe after-storage. Some additional data has been taken for the study of rewrite time.

1.0 SYSTEM OPERATION

1.1 Whirlwind I System (con't)

(S. E. Desjardins)

A revised block schematic of Test Control (E-36038) is being prepared in view of the coming replacement of some of the test equipment with standard WWI panels. This move will release from use at least one of the Test Control racks and will make more accessible for maintenance the equipment to be located in the computer room.

Seven DC-IO Register panels will be modified to accomplish the functions now done by the standard test equipment to be removed from the console room.

(L. O. Leighton)

Component Failures in WWI

The following failures of electrical components have been reported since June 6, 1952:

Component	No. of Failures	Hours of Operation	Reason for Failure
Capacitor			
1MFD 600 V oil filled bathtub	1	6503	oil leakage
Crystal			
D-357	3	11309	2 - Drift 1 - Back Resistance (Drifting)
Resistors			
* 5000 ohm, 1 watt ± 1% Nobleloy	11	½ - 100 - 200 1 - 300 - 400 1 - 1000 - 2000 3 - 2000 - 3000 5 - 3000 - 4000	increased in value increased in value increased in value open 2 - open 3 - increased in value

1.0 SYSTEM OPERATION

1.1 Whirlwind I System (con't)

(L. O. Leighton)

Component	No. of Failures	Hours of Operation	Reason for Failure
* 2500 ohm ½ watt ± 1% Nobleloy	1	2647	open
* 1000 ohm 1 watt ± 1% Nobleloy	3	1 - 3	open
		1 - 33	open
		1 - 3518	open
Tubes			
2C51	5	0	Mechanical
7AD7	13	4 - 3000 - 4000	3-Mechanical; 1-Low I_b
		1 - 6000 - 7000	Low I_b
		4 - 7000 - 8000	2-Low I_b; 2-Mechanical
		1 - 8000 - 9000	Low I_b
		2 - 9000 - 10000	2-Mechanical
		1 - 11722	Mechanical
7AK7	1	10881	Mechanical
6AS6	1	1081	Mechanical
CJ5	1	6550	Change in Characteristics
715B	1	0	Change in Characteristics

* Hours of operation and number of failures were estimated from WWI records for May 7 thru June 20, 1952

1.0 SYSTEM OPERATION

1.1 Whirlwind I System (continued)

(L. O. Leighton)(continued)

Storage Tube Failures in WWI

The following Storage Tube Failures were reported during this bi-weekly period:

ST520 was rejected after 1509 hours of operation because of severe after storage.

ST524 was rejected after 648 hours of operation because of inadequate margins.

Storage Tube Complement in WWI

Following is the storage tube complement of Bank B as of 2400, June 19:

Digit	Tube	Hours of Installation	Hours of Operation
0	RT-233	4722	3476
1	ST-521	7059	1139
2	RT-247	5198	3000
3	ST-537	7758	440
4	ST-516	6641	1557
5	RT-237	4714	3484
6	ST-534-2	7469	729
7	ST-540	7937	261
8	ST-505	6176	2022
9	ST-519	6624	1574
10	ST-536	7736	462
11	ST-542	8148	51
12	RT-258	5207	2991
13	ST-517	6493	1705
14	ST-541-1	7961	237
15	RT-255	5150	3048
16	ST-533	7801	397

ES Clock hours as of 2400 June 19, 1952 - 8198

Average life hours of tubes in service - 1563

Average life hours of last 5 rejected tubes - 1088

1.0 SYSTEM OPERATION

1.2 5 Digit Multiplier

(C. N. Paskauskas)

The multiplier was shut down 7 - 9 June to permit work on the Lab. Regulated A. C. supply. Operation has been error free since 2 June.

During the period of this report the following were replaced as a result of marginal checking:

1	6AS6	Gate Tube	(21983 hrs in service)
1	6AG7	Buffer	(24364 hrs in service)

2.0 CIRCUITS AND COMPONENTS

2.1 Circuits by System Number

2.14 Plug-In Units

(C. W. Watt)

The first 100 plug-in units scheduled to be built in our shop have been finished, and are now being video tested in inspection. The mounting panels for these plug-in units are being assembled. It is expected that these will be completed in about two weeks time.

Drawings of all the units have been brought up to date, and during the next two week period a vendor will be selected to assemble the production quantities of the plug-in units.

2.2 Vacuum Tubes and Transistors

2.21 Vacuum Tubes

(S. Twicken)

Work on plate current decay noted in previous reports is continuing. It has been possible to eliminate the decay in several 6AG7's and 3E29's by drawing a rather large grid current for 15 minutes, more or less. This coupled with the fact that the decay appears to be independent of plate and screen voltages indicates that grid emission may be a contributing factor. The decay has been caused to recur, to a lesser extent, by running the tube with high heater voltage, grounded grid, and floating screen and plate.

H. B. Frost has been on vacation during the period covered by this report.

2.22 Transistors

(N. T. Jones)

Circuits for a transistor tester are being bread-boarded for checking. The plan is to build one or more units (black boxes) whereby all our standard measurements may be made by pushing a button and reading the parameter value directly from a meter. α, r_{co}, and V_{c34} circuits have been built and operated satisfactorily.

A large shipment of Bell A1698's was received. First measurements indicate that these units are quite uniform and nearly 2/3 pass our original specifications of $r_{co} > 15K, \alpha > 2.0$ and collector current rise and fall time $< 0.2\mu s$. All but a few percent pass the requirements as relaxed for GE. This is much better than the GE passing rate of 15%. Statistics of parameters are planned as a memorandum when the measurements are completed.

2.22 Transistors (Continued)

(D. J. Eckl, R. J. Callahan)

The power supply mentioned in the last bi-weekly has been completed and is now installed. This will relieve the load on the battery supply.

The control unit trigger circuit has been installed by Leo Riley. This circuit was designed to overcome the effects of contact bouncing, and it appears to solve this problem satisfactorily.

The gate circuits in the test accumulator are continuing to present difficulties. The main problem is one of impedance matching when attempting to drive one gate from another. This problem is now being investigated.

(I. Aronson)

A test set has been completed in bread-board form for measuring alpha and r_{co} directly. This unit is quite simple to operate and gives rapid results. (One hundred and fifty-eight alpha's were measured in forty-five minutes.)

A numbering system has been set up for the new transistors we received this week, and the actual numbering has been started by R. G. Schmidt.

The last group of 147 GE transistors are almost completely finished as far as the measurements are concerned. Dorothy Smith will probably finish them by 5 o'clock today.

(A. Heineck)

The two transistor flip-flop currently being used in the test accumulator has been modified considerably. No diodes are needed in the modified flip-flop and only one supply voltage is required. This should be contrasted with the 6 diodes and 3 supply voltages previously needed.

The new flip-flop has operated satisfactorily (rectangular waveform) at 2 megacycles per second, with RCA transistors. At 5 megacycles per second the circuit still changes state but the waveform is very poor.

(R. H. Gerhardt)

The first week of this bi-weekly period was spent developing a single transistor flip-flop that would complement with unidirectional pulses at a common point. It was found that this circuit was very critical to bias voltages and transistor characteristics and was, therefore, abandoned.

2.22 Transistors (Continued)

(R. H. Gerhardt) (Continued)

The second week was spent continuing the study of the Felker system of bit-storage.

(W. A. Klein)

Work on the complete dc analysis of the large signal equivalent circuit of the transistor has been nearly completed, but has been all but halted. A new problem, that of driving a matrix switch using transistors, has been begun. Among the questions to be answered are the following: Is there an upper limit to the size of a matrix so driven and if so, what is it? What is the set up time of this switch? Can it drive directly coupled transistor gates? At present a driver circuit is being designed and tested. It is expected that this circuit will provide satisfactory performance.

2.3 Ferromagnetic and Ferroelectric Cores

(E. A. Guditz, W. Ogden)

Ceramic Array #1

Measurements were made of ONE-ZERO ratios of output voltage for various modes of operation. The results show that the ratios are better for non-cyclic modes of operation.

Investigation into the conditions which would produce the worst possible ONE-ZERO ratio resulted in the taking of considerable data concerning the difference between a half-selected ONE and a half-selected ZERO. This data indicates that a difference does exist, but that its effect on the array output is masked by other variations in core outputs, largely those due to differences in core characteristics.

(B. Widrowitz)

16 x 16 Metallic Array

An investigation was made to determine the effectiveness of the cancellation of pulses induced in the sensing winding by the "non-selected" cores. Particular attention was given to the differences between the "non-selected" outputs of cores containing ONE's and these outputs when the same cores contain ZERO's. Patterns were stored that caused these "non-selected" outputs to augment or diminish the ONE output of a selected core in such a way that extremes were shown.

2.3 Ferromagnetic and Ferroelectric Cores (Continued)

(B. Widrowitz) (Continued)

Preliminary tests with a 2-to-1 selection ratio indicate that these effects may present an upper limitation on the number of cores that may be sensed by a single sensing winding.

(G. R. Briggs)

An attempt was made to make a core gating circuit operate, by applying gating pulses of long rise and fall times, in a ferrite stepping register. It was hoped that by thus keeping the output voltage during gating of the device small enough, this voltage would not interfere with information transfer. This failed because it was found that the gate-core output upon pulsing the stepping-register cores was the largest contributing factor to the spurious information generation.

Several other schemes using conventional cores were tried, but with no success. It is felt that future progress lies in the direction of different core geometry. A special 4-window core known as a "cross valve" has been constructed of ferramic-H, and is being investigated.

(P. Baltzer)

Magnetic-Core Testing

The set-up for submitting ferrite memory cores to a life test, has been completed. Initial data is now being collected on these cores before placing them under test.

It is planned to extend the present life test arrangement to include metallic memory cores.

Equipment for performing the logic for a new core pulse tester has been designed and is under construction.

(A. Katz)

Video Probe

Study of the probe has been continued on a part-time basis. The gain and high-frequency response appear to be adequate for our purposes, but the low-frequency response less satisfactory. Parasitic oscillations in the probe have been eliminated by inserting resistors in series with the grids.

2.3 Ferromagnetic and Ferroelectric Cores (Continued)

(A. Katz) (Continued)

Eddy Current Shielding

A conference between members of the Magnetic Memory, Magnetic Materials and Math Groups and Frank Browne (Transducer Corporation) was held to determine the methods of attack on the eddy current shielding problem. The results of this meeting are set forth in Memorandum M-1529.

(J. L. Mitchell, K. H. Olsen)

Ceramic Array and Switch II

A new sensing panel has been installed in Ceramic Array II, and improvements have been made on the set-up flip-flops. Some changes in the logic of the system were tried in an effort to improve the operation of the system. The tolerances of the terminating resistors on the memory core driving lines were checked and a number were replaced so that better measurements can be made.

R-121, A Magnetic Matrix Switch and its Incorporation into a Coincident-Current Memory, is being completed in the print room.

(R. L. Best)

The various core pulse testers have been assigned the following model numbers in order to keep them straight:

Model I is the tester made by W. Papian for his thesis two years ago, and uses 3E29 tubes in the output.

Model II is a thyratron core tester which uses a lumped-parameter delay line to form the current pulse.

Model III is a high-current general-purpose tester capable of current pulses of over 3 amperes, using 4-6CD6's in parallel to obtain this current. It has a maximum rise time of 0.15 microseconds, and was primarily designed to test ferramic cores.

Model IV is a self-contained tester capable of 1-ampere pulses with 0.15 microsecond maximum rise time. It was primarily designed for testing metallic cores, and uses 2-6CD6's in parallel for the maximum pulse current.

2.3 Ferromagnetic and Ferroelectric Cores (Continued)

(J. McCusker)

Magnetic Core Testing

Ferrite cores which are to be placed on life test have been tested for pulse characteristics. Discrepancies between pulse tests at General Ceramics and here on the same core have been explained by the effects of current rise-time, current pulse length, and the geometry of the sensing coil on the output voltages of the core.

(J. H. Baldridge)

Determinations of total iron have been made in several materials, mainly ferric oxide of high purity. Different analytical methods for determination of manganese are being tested. A solution of ceric sulfate for oxidimetric use has been prepared and standardized.

(G. Economos)

Torroids of the square-loop body 62-13IIA have been prepared and fired in air as before without a muffle. The difficulty in reproducing the best square-loop torroid is believed due to the need of introducing strains in the fired specimen. In the muffle, there is excellent temperature uniformity as shown in test runs. By firing without a muffle, the specimens get direct radiation on one side and are shaded on the other. This could cause the strains which appear to be desirable. The results of electrical tests are being awaited before proceeding with another group of specimens.

3.0 STORAGE TUBES

3.1 Construction

(P. Youtz)

All of the efforts of the construction group during this last bi-weekly period were directed toward producing 600-series storage tubes as replacements for Bank B. The 600-series tubes were designed to give closer collector-to-mosaic spacing than the 500-series tubes by the use of a smaller mica target. The shrinkage of these tubes continues to be about 50% because of the buckling mica targets. Intensive efforts will be made during this next bi-weekly period to eliminate this fault.

The new activation unit and the new ion gauge control units under construction in the electrical shop continue to be delayed because of the vendor's failure to deliver the meters on schedule.

P. Youtz spent the latter part of this bi-weekly period attending two conferences on Electron Tubes and Devices at Ottawa, Canada, and the University of Illinois. Useful information was obtained on Philips "L" cathodes and electron beams.

3.2 Test

(R. E. Hegler)

During this bi-weekly period, eight tubes were available for pretest: ST545-2, ST546, ST547-1, ST548-1, ST549, ST550, ST600 and ST601.

ST548 and ST601 were satisfactory. ST545-2, ST546, ST547, and ST600 were rejected because it was very hard to write minus in the center of the target area. ST549 and ST550 were marginal because of a high minimum write-minus signal-plate gate.

On ST545-2 it was impossible to write an array. If a single positive spot was written anywhere on the surface, the entire surface would switch positive. In the tube notebook, it was noted that the beryllium on this target was thin. Apparently, if it is too thin the beryllium will migrate during the processing, filling up the moats and lowering the surface resistance. Preliminary investigation indicates that this could be the case in ST545-2.

3.2 Test (continued)

(T. S. Greenwood, C. L. Corderman)

During this bi-weekly period ST542, ST543-3, ST548, and ST549 were tested and sent to Whirlwind. All of the tubes were satisfactory although there was considerable variation between tubes. ST542 and ST543-3 had rather small spot interaction areas on a voltage basis while the area on a current basis was about normal. In fact, since areas on a current basis have been taken, there is a strong indication that most previously observed variations can be attributed to variations between guns. This is not universal since an occasional tube has shown an area on a current basis which, while not much larger, is considerably more symmetrical. Generally, this is a more desirable condition. ST549 was one of these tubes. ST548 had a normal area on both current and voltage bases.

Early in the period an experimental setup was made to determine the feasibility of speeding up the testing of spot interaction by using equipment which makes an automatic gate adjustment in accordance with the error pattern. However, the slight saving in time may not justify the considerable amount of equipment that is needed.

Some changes involving accessibility of controls have been made in the STRT and seem to offer considerable improvement.

C. L. Corderman spent the latter part of this bi-weekly period attending two conferences on electron tubes and devices.

(T. S. Greenwood)

Life test on the Philips "L" cathode tubes, RT264 and RT265, continues. During this bi-weekly period, a bias failure occurred and the tubes were pulsed from zero to +45 volts for an undetermined length of time (not in excess of two days). As a result of this over-drive, the emission of RT265 showed a very slight decrease with full recovery in one day after restoration of normal conditions. RT264 lost about one-half of its emission and has not quite fully recovered at the end of five days.

The total life at present is:

RT264 -- 5140 hours
RT265 -- 4929 hours.

3.2 Test (continued)

(T. S. Greenwood) (continued)

The Philips "L" tube, RT316-R1, as reported in the last bi-weekly report, continued to have unstable emission of very small magnitude. To obtain any emission, it was necessary to operate the filaments at about 14.0 volts and as a result the filament burned out at the end of about 300 hours. The data obtained on the tube was not too significant because the high temperatures used caused a grid emission that apparently contributed a very large percentage of the total beam current.

It is hoped that in the near future some investigation of the processing techniques of other laboratories can be made.

(A. J. Cann)

Most of the Alignment Demonstrator is now functioning properly. With the exception of error indication in some of the programs, all of the normal programs operate satisfactorily. The shift program works but has a tendency to lose "ones." I have not yet tried the spot interaction program.

The following component failures occurred:

1. One 8W WW resistor (operating at 3W) opened.

2. One plug-in relay (Clare, type J) failed to make contact when warm. It was found that the armature travel was barely enough to operate the contact when cold. This was corrected by bending the arm a little.

Some minor circuit changes were made and the accelerating voltage on the display scopes was lowered to increase the size of the display. A possible improvement in the logic of the checking circuit has become apparent and will be tried next week. It should prevent false error indication during the first frame, and at the same time save equipment.

(J. Jacobowitz)

An attempt to examine the effect of holding-gun ON-time on the ion shift of the high-voltage beam gave no useful results. This was due, partly, to the fact that at low holding-gun ON-times the spot expands because of the influence of the read beam when

3.2 Test (continued)

(J. Jacobowitz) (continued)

insufficient time is allowed for stabilizing negative areas. However, some simple calculations of the time required to ionize sufficient amounts of gas indicate that this is a process which may reach an equilibrium after as little as 300 μsecs. Thus, unless one reduces the holding gun ON-time below this value, there should be no variation in ion density and so no change in deflection shift. Interpreted in this light, the results of the past two weeks assume some significance. These results indicated essentially no change in deflection as the ON-time was reduced, until the ON-time became a few hundred μsecs.; at this point, visual examination of the spot indicated that it was growing.

The effects upon ion production of varying V_{A3} were also observed. Since V_{A3} does not have a predominant effect, only enough quantitative data was taken to verify the fact that if the beam is directly on a spot for a given V_{A3}, it is moved off the spot as V_{A3} is changed. The change in V_{A3} to make this effect observable is rather small. In fact, if the beam is positioned to the border between a positive spot and its negative background, then a change of $\pm$ 5 volts is easily enough to change the readout polarity to that of a positive or negative area. However, since this effect is most likely due to the field distortion of the A3 cylinder itself and not caused by ions trapped in the body of the tube, it will not be examined in greater detail at this time.

Experimental research on the effects of gating V_{A3} during reading conditions could not be carried out as planned because of equipment troubles which are being investigated and remedied.

The theoretical investigation concerning beam deflection by ions has proceeded to a point where it seems possible to make a decision about the advisability or inadvisability of using machine techniques for the solution of the problem. That is, the effects of diffusion have been considered, and the concentration of ions at any point has been shown to vary exponentially with time, at a time constant of about 11 μsecs. for a gas having a molecular weight of 34. An explicit solution for the concentration as a function of time, radius from the center of the tube, and the assumed original shape of the ion cloud, has been obtained. Although this has been based on an assumed cylindrical symmetry, some thought has convinced me that this boundary condition is not as unrealistic as it first seemed. In fact, it now seems that, after a short time, cylindrical symmetry is more apt to exist than the conical geometry as previously supposed. This is because the concentration of ions must actually

3.2 Test (continued)

(J. Jacobowitz) (continued)

vary axially, at first. Hence, an axial current will flow in addition to a radial current which varies inversely with the axial distance. During the initial phase after the holding gun is turned off, this current will bring about a redistribution of ions into an essentially cylindrical arrangement.

Using this new information about the continuous variation in ion concentration, the deflection problem has been set up for a thin, well-focused, high-velocity electron beam. At present the solution seems too difficult for hand computation, but certain approximations may be investigated.

Further thought on the design of a new research tube has brought to light the following considerations:

1. The most important characteristics to be investigated are the velocity and current distribution of the holding beam, the velocity distribution of secondaries from the collector, and the lower-switching voltage of a positive array.

2. All these phenomena, except the distribution of secondaries, should be investigated under varying pressures, among other things.

3. Previous investigations of the holding beam, using 13 cages arranged in the form of a cross, have revealed that almost no additional information is obtained from the cages along one arm of the cross. On the other hand, previous investigators have noted that measurements were somewhat difficult because they did not have enough cages in a line.

Considering these three points, it seems advisable to build a tube which can be operated directly on the vacuum system. This tube should contain about 9 cages arranged along one diameter, the holding gun to be very carefully aligned with the center cage, and the portions of the surface not occupied by cages to be covered with a normal mosaic.

4.0 TERMINAL EQUIPMENT

(E. S. Rich)

K. McVicar and I visited Engineering Research Associates, St. Paul, on June 10 and 11 to discuss progress on the magnetic drum systems. Several details of circuits and construction were considered. A report on the trip has been written and is being published as an M-series memorandum.

(J. A. O'Brien)

An investigation is being made into the possibility of obtaining a Ferranti photoelectric tape reader, and at present the prospects are very poor. The New York office is quoting possible delivery in early 1953 on 7-hole readers.

Some thought is being given to the characteristics of an "ideal" photoelectric tape reader, and as to how these characteristics might be obtained.

4.1 Typewriter and Tape Punch

(L. H. Norcott)

Initial testing of the tape comparer by the tape preparation personnel showed several minor bugs existed in the comparer which have since been corrected. During the de-bugging process the comparer was speeded up 25% to its present speed of 800 lines per minute, at which speed the tape room reports it has been operating satisfactorily.

The search for an opaque paper tape which will satisfy the requirements of both PETR and the new "FL" punches still continues. A sample of an experimental light weight black oiled tape from Paper Manufacturers Co. was tested on PETR and found to be too translucent for our purposes. Sample rolls were also received from Commercial Controls Corp. for testing but examination shows them to be identical with the samples from Paper Manufacturers Co.

Intermittent malfunctioning of one of the old style punches has been traced to a combination of worn plating on the punch magnet armatures and residual magnetism in the armature knockoff bails. All of the armatures on this punch have been replaced and the troubles have been eliminated. The other old punches will also be so treated as soon as the replacement armatures are received from the manufacturer.

4.2 Magnetic Tape

(E. P. Farnsworth)

The magnetic tape print-out equipment can now punch out paper tape while simultaneously printing information which has been recorded on magnetic tape. The printer may be made inoperative to permit punching any code including 5-5-6 or Flexowriter code, etc. Use of this equipment for preparing converted paper tapes will reduce computer conversion time by a factor of 15. Memorandum M-1534 covering this use of the magnetic tape print-out equipment has been issued to Group 61 and to the Mathematics and Applications Groups.

(K. E. McVicar)

The Record-Pulse Generator and Transient Control Panels for the final magnetic tape system have been installed in the interim system. As many of the circuits on these panels as are adaptable to the interim system are being used in order to provide further testing.

Plans are being made to install the other final system panels as soon as they are received.

(S. B. Ginsburg)

The interim magnetic tape system operated during the past bi-weekly period without error or trouble.

An automatic control network has been inserted into the system and the tape unit can be completely controlled from the console room, once power has been applied. The "Magnetic Tape Control Panel" is mounted in TC12. Pushing the "Erase" button will erase the tape completely from end to end. The "Start Over" button will not erase the tape, but will return the tape to the beginning of the reel. The "Stop" button will stop the tape in the mode in which the tape was last running. The "Complement" button will place the tape system into the mode opposite to the mode in which the tape was last running. It is therefore possible to erase only part of the tape by pushing the "Start Over" button and then "Complement". The neon lights indicate the motion of the tape and the mode of operation. If the "alarm" light is on, push the "Start Over" and the alarm will eventually clear.

5.0 INSTALLATION AND POWER

5.1 Power Cabling and Distribution

(Ferrell Sandy)

Three racks for magnetic tape units were installed in test control. The power wiring to these racks is being installed and should be completed in the near future.

The racks for room 156 have been ordered.

5.2 Power Supplies and Control

(Ferrell Sandy)

The time delay circuits for applying the D.C. power to WW1 have been redesigned to allow a greater time delay between the application of one voltage and the next. The actual changes will be made in the near future.

A fuse indication system for those fuses in room 041 that are not now being indicated is under consideration. A proposal for such a system should be forthcoming soon.

(G. A. Kerby)

Continued with the construction of new rectifiers, WW1 filament supply change-over, and WW1 power supply expansion.

The bench-box indicator-light arrangement has been revised.

(J. J. Gano)

Whittemore D. C. Supplies

During a visit to Power Equipment Company at Galion, Ohio and Detroit, the modifications that we had made to secure considerable improvement in the performance of our d.c. supplies were discussed . They agreed to incorporate all the changes in the supplies remaining to be delivered.

(R. Jahn)

Whittemore Building D. C. Supplies

The bleeders on the -150 which provide -15 and -30 volts result in poor regulation of the latter voltages. A separate unregulated supply will be connected until the final supplies are delivered.

5.0 INSTALLATION AND POWER

5.2 Power Supplies and Control (con't)

(R. Jahn)

Whittemore Building Power

A comparison of records of the 120-208 and the 230-volt lines shows that they have almost identical regulation, each varying from 112 volts minimum to 122 volts maximum on weekends and nights. A peculiar transient noticed on each line is under investigation.

5.3 Video Cabling (T. Leary)

All the cables which can at present be specified for the In-out equipment in Ax4 and Ax5 have been measured and will presumably be constructed in the next bi-weekly period.

Work has just been started on the video cabling for the magnetic tape control panels.

6.0 BLOCK DIAGRAMS

(J. Hughes)

I shall be on leave for the next four weeks. Anyone who has questions or business to do with WWI block diagrams should see Ron Mayer in the Whittemore Building.

The new set of consolidated timing diagrams are available in the print room as a D-size sketch, SD-37315.

8.0 MATHEMATICS, CODING, AND APPLICATIONS

8.1 Programs and Computer Operation

Progress during this bi-weekly period on each general applications problem is given below in terms of programming hours spent by laboratory personnel (exclusive of time spent by outsiders working on some of the problems), minutes of computer time used, and progress reports as submitted by the programmers in question.

4. Floating Point and Extra Precision Interpretive Subroutines (Programmed Arithmetic, PA): Frankovich, 13.5 hours; WWI, 13 minutes

Tests have continued on the new (24,6,0) programmed arithmetic interpretive subroutine. Several errors in the 5-5-6 tape of the (15,15,0) PA and OT subroutines were discovered and corrected. The correct modification of the tape is listed in the utility tape memorandum.

11. Point-by-Point Scope Plotting of Alpha-Numerical Characters (Output Camera, OC 1): Frankovich, 3 hours; Kopley, 12 hours; WWI, 29 minutes

Tests have begun on the new output display subroutine which will display up to 36 (24,6,0) numbers in decimal form on the display tape.

13. Point-by-Point Scope Plotting of Calibrated Axes (Output Camera, OC 2): Mackey, 4 hours

21. Optical Constants of Thin Metal Films: Neeb, 13 hours; WWI, 260 minutes

Several programming errors have been found in the program for infrared reflection. These have been corrected and the program is still being tested.

23. Print Out of Contents of Storage (Post Mortem Error Diagnosis, PM): Kopley, 15 hours; WWI, 32 minutes

A post mortem program that will display the contents of ES as octal instructions is being tested. This mode of output is approximately 175 times as rapid as the flexowriter post mortems. All camera-control operations are automatic. All the programmer need do is indicate the address of the first register and the address of last register of a bank of consecutive registers to be displayed. These are set up on Flip-Flops # 4 and # 1 respectively. The first word of each column will give the address of the following word.

Another post mortem is being written that will display octal integers, fractions and decimal integers, fractions.

8.1 Programs and Computer Operation (continued)

24. Matrices, Determinants, and Systems of Linear Equations: Aronson, 21 hours; Carr, 12 hours; WWI, 229 minutes

A memorandum is being written to give a thorough account of the various programs now available to users and will be ready during the next bi-weekly period. Several methods are available for solution of systems of linear equations and matrix inversion.

Further testing of the Gauss Relaxation and Jordan Elimination routines is underway. The object is to determine the characteristics of these methods as applied to a wide variety of problems and to determine what improvements can be made in the routines.

The matrix inversion method of Shur-Schultz has been used to invert a 5x5 matrix, the Wilson "pathological" 4x4 matrix, and an 8x8 matrix with the errors, $e_{ij} = (A\,A^{-1})_{ij}$, being on the average 3×10^{-7}, 15×10^{-7} respectively. The 8x8 inversion employed two iteration cycles, each of two iterations length. The time for each inversion was approximately 30 seconds.

26. Subroutine Orientation Procedures: Frankovich, 10 hours; WWI, 37 minutes

Two versions of the Runge-Kutta method have been programmed as subroutines using the (24,6,0) number system. One $N + K_1$, the other $8N + K_2$ storage registers, where N is the number of 1_8 and order differential equations to be solved. The choice of the one to be used will depend upon allowable round-off error and storage requirements.

28. Ambipolar Diffusion: Gilmore, 10 hours; WWI, 276 minutes

Dr. David Rose of the Bell Telephone Laboratory in Murray Hill, N.J., and Mr. Robert Minnick of Harvard University have sent word to us that results from the present program have been satisfactory. They are now interested in varying their numerical method slightly and trying some new parameter values. It is believed that the data from these parameters will entirely satisfy the authors.

29. Library Subroutines: WWI, 4 minutes

30. Digitally-Controlled Milling Machine Program: Frankovich, 7.5 hours; WWI, 49 minutes

Most of the new tape preparation program has been satisfactorily tested. The "point-by-point" computation program has been completed, as well as the original wing template computation program. Both will be tested this week.

39. Subroutine Library Editing: McQuillan, 6 hours

8.1 Programs and Computer Operation (continued)

40. Input Conversion Using Magnetic Tape Storage: Frankovich, 17 hours; Gilmore, 20 hours; Helwig, 18 hours; Kopley, 3 hours; Combelic, 6 hours; WWI, 50 minutes

The magnetic tape conversion program is in the process of being programmed. Our plans have been set and the "red tape" of carrying them out is now our main concern. We have hopes of having it ready by July 1.

42. Spherical Waves - Numerical Integration of Hyperbolic Partial Differential Equations via Characteristics: Carr, 3 hours

45. Crystal Structure: Aronson, 13 hours; WWI, 8 minutes

Two sets of crystal structure factor data were submitted during the past period. One set has been processed and the other is being prepared.

The indoctrination course in coding has been successfully completed.

47. Partial Differential Equations of Engine - Part I: Tsai; WWI, 281 minutes

The program for the study of the dynamics of an inlet pipe of a single cylinder engine is now completed and is giving results which are in very good agreement with those obtained experimentally. The results are obtained photographically from oscilloscope display on WWI. This proves to be a satisfactory way for obtaining results. The problem is now a matter of running the program under a wide range of conditions, not only to test the program itself, but also to obtain useful information.

48. Gust Loads on Rigid Airplanes in Two Degrees of Freedom: Helwig, 7 hours; WWI, 319 minutes

The programs for the solution of the gust load equations which select and print only the maximum values of the dependent variables are working and a production schedule of runs has been started. Runs 1-9 have now been completed.

51. Magnetic Tape Programming: Kopley, 18 hours; WWI, 48 minutes

Several magnetic storage and output subroutines are being held up because of the confusion in the "minimal delay" time required between certain magnetic tape operations. Several parameters have been written that should test these delays fairly accurately.

52. Oil Reservoir Depletion Analysis by Iteration: Kopley, 16 hours; Porter, 25 hours

In checking the programs involved in the solution of this problem, a few program errors were found. These errors have been corrected and we are now ready for out first trial run.

8.1 Programs and Computer Operation (continued)

52. (continued)

Dr. Shreve of the Carter Oil Laboratory has informed us that his group is carrying through the calculations for the first few time steps on desk machines. They will now follow the same procedure that we have programmed for WWI.

53. Solution of Schrodinger's Wave Equation which Contains a Singularity at the Origin: Gilmore, 6 hours

This problem's present program is about to be modified for an oscilloscope display output in order to easily observe the behaviour of the solution for several eigenvalue parameters.

54. Optimizing the Use of Water Storage In a Combined Hydro-Thermal Electric System: Demurjian, 7 hours; WWI, 106 minutes

The delay routine was rewritten with a shorter total of time for the delay and by using FF 0 as the counter register the previous difficulties caused by spot interaction were avoided.

The program was tested and two successful passes were completed. The results are being evaluated before the program is allowed to go further.

57. Runge-Kutta Differential Equations: Carr, 12 hours; WWI, 35 minutes

A tri-diagonalization program, to bring an arbitrary matrix by a series of unitary operations into tri-diagonal form, has been satisfactorily tested, and is in use. So far now a final method for obtaining the eigenvalues by this scheme is available. A second program giving the complete diagonalization form has worked, but is being rewritten and retested to give eigenvectors as well. Another program has been tested satisfactorily to give the largest eigenvalue and eigenvector; this is being extended to give all eigenvectors and eigenvalues. Within the next bi-weekly period this problem should be completely solved. A memorandum is being written explaining specifications of the various programs.

59. AEC Positron-Electron Calculation: Carr, 3 hours

60. Calculation of Deuteron Energy Levels: Combelic, 32 hours; WWI, 1 minute

The program for calculating the potential function and redording on magnetic tape is completed. This program, and the magnetic tape read-in program will be on a loop so that they can be read in automatically when needed. The remainder of the programming is virtually completed and preliminary runs will be made during the next bi-weekly period.

63. MIT Seismic Project: WWI, 125 minutes

8.1 Programs and Computer Operation (continued)

63. (continued)

Several programs, including ones for autocorrelations, cross correlations, and predictions, are being used to analyze seismic records.

67. A Method for Obtaining the Characteristic Values of Symmetric Matrices by Direct Diagonalization: WWI, 73 minutes

The direct diagonalization scheme for obtaining the eigenvalues of symmetric matrices has successfully diagonalized a 4x4 test matrix. The program has been extended to give eigenvectors as well, thus providing a complete solution to the eigenvalue problem. Further tests are to be run.

70. Correlation of Solvolysis Rates: Carr, 3 hours; Demurjian, 16.5 hours; WWI, 157 minutes

The program was modified to reset a SP instruction that was being by-passed whenever the search of the lattice would find a zero at the end of a line. The program was run with this change and failed to satisfy the convergence criteria after two hundred iterations. The number of complete iterations are now being recorded in FF #0 so that we may have a visual estimate of the progress being made.

The program was changed to have a print out of results after the completion of each of the first three iterations. These were alike to those obtained by hand computation.

A new program was written to utilize different values in this seven-teen-by-twenty lattice and a larger value was used for a more rapid convergence. This will be tested shortly.

Professor Swain has introduced a simpler approach to this same problem using a six-by-six lattice. In the forthcoming period this will be tried to see if it justifies further labor.

71. Optimum Operation of a Chemical Reactor: Helwig, 1 hour; WWI, 259 minutes

72. Master Output Routine: Demurjian, 14.5 hours; Kopley, 2 hours

The method has been altered to a floating address scheme using preset parameters. The different output modes and the deviations within the modes for the various types of output desired will all be in separate blocks. These will be erased by the superimposition of the mode desired for the routine.

We have had many good ideas proposed by members of the group. These are all being evaluated and many will be eventually used. (i.e. if the new conversion program makes it feasible.)

8.1 Programs and Computer Operation (continued)

73. Demonstration Program: McQuillan, 36 hours; Mackey, 43.5 hours; Kostaras, 11 hours; WWI, 55 minutes

Work has continued on this problem with the satisfactory completion of two of the programs. Three of the other programs are now under test and we are awaiting the photographs.

74. Optimization of Strip Mining Techniques: Demurjian, .5 hours

75. Solution of Algebraic Equations: Carr, 2 hours; WWI, 11 minutes

78. Program to Facilitate the Solution of Algebraic Equations Using Graeffe's Method with Ratio Test: Frankovich, 2 hours; WWI, 328 minutes

79. Tracing Rays Through Spherical Lens: Carr, 1 hour ; Mackey, 2.5 hours; Combelic, 20.5 hours; WWI, 349 minutes

The original program went through successfully and the results obtained helped point up the fact that certain engineering restrictions would have to be relaxed; viz., orientation of the characterizing line and location of the energy source. According to the angular criterion used as a basis for either printing or rejecting results, 31 sets of (17) rays appeared. The path length spread for each set was outside of tolerance limits, but the angle condition was not violated. A source position different from the one originally used, (30 inches from the end of the lens) was indicated throughout as the most desirable.

In view of these results and the speed with which they were obtained a request was made (and granted) that we complete the solution to this problem by modifying the original program so that it would include more designs, various source positions, a different orientation for the characterizing line and both sets of criteria for lens rejection or acceptance. This time only those lenses will be printed, therefore, which will definitely be of use in our engineering problem. In this way a great deal of the work of getting a final acceptable lens design has been obviated.

81. Solution of $u'' = -\lambda e^{-x^2} u$: Gilmore, 6 hours; WWI, 5 minutes

Miss Betty Campbell and her associates in the Joint Computing Group of MIT are attempting to generalize the programming of the differential equation $u'' = -\lambda e^{-x^2} u$ so that it can be made into a subroutine with preset parameters.

83. Multicomponent Distillation Problems:

In general this problem involves the development of programs for the solution of various types of continuous multicomponent distillation problems. These problems arise in the field of chemical engineering, particularly in the design of equipment for separating liquids, e.g., in petroleum refineries. Rigorous solutions involve iteration, using energy and material balances and equilibrium data.

8.1 Programs and Computer Operation (continued)

83. (continued)

A program has been developed and tested for solving the problem of the distillation of three components. This involves the determination of (1) the number of "theoretical plates" necessary for a particular separation, and (2) the product concentrations, some of which are unspecified.

The work is continuing. Research will be done concerning one of the limiting conditions of the operation, where the number of theoretical plates necessary for the separation approaches infinity as a limit.

TOTAL COMPUTER TIME USED FOR PROGRAMS: 61 hours, 34 minutes

TOTAL COMPUTER TIME USED FOR CONVERSION: 4 hours, 9 minutes

TOTAL COMPUTER TIME USED FOR DEMONSTRATIONS: 1 hour, 28 minutes

TOTAL COMPUTER TIME USED: 68 hours, 42 minutes

TOTAL COMPUTER TIME AVAILABLE: 73 hours, 39 minutes

USABLE TIME PERCENTAGE: 93.4 %

TOTAL # OF PROGRAMS OPERATED: 199

8.2 Subroutine Library

Below are listed all subroutines which have been suggested, worked on, or completed during this bi-weekly period.

Completed

LSR #	Tape #	Title	Programmer
OC 2.3t	T 850-6	Octal Instruction Scope Display	Kopley
OC 2.5	T 891-2	Octal Integers Display	Kopley

Being Tested

OC 2.3	T 850-7	Octal Instruction Scope Display	Kopley
OC	T 1337-0	Octal Instruction Scope Display Post Mortem	
OC	T 939-0	(24,6,0) MRA Decimal Display Layout	Kopley
MT	T 1249-4	Magnetic Tape Record	
MT	T 1250-5	Magnetic Tape Read	Kopley
MT	T 1272	Magnetic Typewriter Output	Kopley
MT	T 1300	Moving Magnetic Tape Backward	Kopley
MT	T 1301-3	Read Magnetic Tape	Kopley
MT	T 1302	(24,6,0) MRA Magnetic Tape Record	Kopley

8.2 Subroutine Library (continued)

LSR #	Tape #	Title	Programmer
MT	T 1341	Magnetic Tape Record C(AC)	Kopley
MT	T 1303	(24,6,0) MRA Magnetic Tape Read	Kopley
MT	T 1322	Magnetic Typewriter Output	Kopley
MT	T 1342	Magnetic Tape Read C(AC)	Kopley
	Being Written		
OC		Octal, decimal fractions, integers scope display post mortem.	Kopley

8.3 Procedures

(J. Gilmore)

A memo has been issued which lists all the utility programs available to the WWI operator. This memo will be modified every two months in order to keep programmers up to date.

9.0 FACILITIES AND CENTRAL SERVICES

9.1 Publications

(Anola Ryan)

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

LABORATORY REPORTS

No.	Title	No. of Pages	Date	Author
R-211	A Magnetic Matrix Switch and its Incorporation into a Coincident-Current Memory (M.S. Thesis)	97	6-6-52	K. H. Olsen
R-212	Ferroelectrics for Digital Information Storage and Switching	62	6-5-52	D. A. Buck
E-441-1	Standardized Transistor Parameter Measurements	13	6-10-52	N. T. Jones
M-1493	Air Conditioning Recommendations for Room 156 and Provision for Possible Future Air Conditioning Requirements in the Barta Building	9	5-27-52	J. H. Newitt
M-1499	The Interim Magnetic Tape System	25	5-23-52	S. B. Ginsberg K. E. McVicar
M-1512	Laboratory Personnel	10	6-1-52	
M-1513	Utility Programs Available to WWI Operators	7	6-17-52	J. T. Gilmore
M-1514	Outline of Present Interim Operation of WWI Input-Output Equipment	10	6-10-52	F. E. Heart
M-1516	Use of the Interim Magnetic Tape Print-Out Equipment	4	6-6-52	E. P. Farnsworth
M-1517	Bi-Weekly Report, June 6, 1952	34	6-6-52	
M-1519	A High-Speed Flip-Flop Circuit Using Junction Transistors (M.S. Thesis Proposal)	7	6-9-52	A. M. Heien
M-1520	Major Failures of Components in WWI, August 1951 - May, 1952	2	6-11-52	B. B. Paine
M-1522	Identification of Assigned Stock for Experimental Work of Breadboards	1	4-17-52	C. W. Watt
M-1523	Requisitioning Tubes from the Tube Shop for Assemblies	1	4-17-52	C. W. Watt
M-1524	Procedures for Processing Rough Draft and Final Parts Lists	2	5-14-52	F. F. Manning
M-1525	Pulling of Stock in Emergencies	1	5-15-52	C. W. Watt
M-1526	Incoming Materials Inspection	1	5-20-52	C. W. Watt

9.1 Publications (Continued)

LABORATORY REPORTS (Continued)

No.	Title	No. of Pages	Date	Author
M-1527	Procedures and Record-Keeping in the Component Inspection Group	3	6-10-52	B. B. Paine
M-1529	Conference On Magnetic-Core Switching Phenomena	3	6-16-52	A. Katz
M-1377-2	Internal Documents on Ferromagnetic and Ferroelectric Cores	3	6-10-52	W. N. Papian
M-1531	Interior Wall Coating (DAG)	2	6-17-52	J. S. Palermo
M-1532	Assembly Work by an Outside Vendor	2	6-18-52	C. W. Watt
M-1533	Operating the Interim Magnetic Tape System	5	6-18-52	K. E. McVicar

LIBRARY FILES

No.	Identifying Information	Source
748	Projects and Publications of the National Applied Mathematic Laboratories	Nat. Bur. Standards
782	Guided Missiles Accessions List	June 9, 1952
1497	Military Doctrine of Decision and the Von Neumann Theory of Games, Rand Corp. (Recl.)	Col. O. G. Haywood, Jr.
1577	Fourth Quarterly Progress Report	Ferrite Development, Gen. Ceramics and Steatite Corp.
1872	Computational Methods Useful in Analyzing Series of Binary Data, Offprinted: Amer. Journal Psych.	E. B. Newman
1875	1st and 2nd Quarterly Progress Reports: Development of Electro-Mechanical Components for Printed Circuit Applications: Oct. 15, 1951; Jan. 14, 1952; April 14, 1952	U. S. Army Signal Corps Procurement
1876	Some Mathematical Remarks on the Boolean Machine	I. S. Reed, Project Lincoln
1877	Research Activities of the Institute for Numerical Analysis; January-March, 1952	Nat. Bur. Standards
1878	A Logical Calculus of the Ideas Immanent in Nervous Activity (Bulletin Math. Physics)	W. Pitts W. S. McCullough
1879	Electrically Conductive Glass is Useful for Heating Applications (Materials and Methods)	
1880	The Synthesis of Two-Terminal Switching Circuits (Bell System Technical Journal)	C. E. Shannon
1883	Demand Bibliography of Selected Readings of ASTIA Holdings (Icing)	Armed Services Technical Agency
1885	A Multichannel PAM-FM Radio Telemetering System Meteor Report No. 21	Research Lab. of Elect.

9.1 Publications (Continued)

LIBRARY FILES (Continued)

No.	Identifying Information	Source
1886	Some Properties of the Ba_2SiO_4 Oxide Cathode Interface	Research Lab. of Electronics
1887	Deterioration of Oxide-Coated Cathodes Under Low Duty-Factor Operation	Research Lab. of Electronics
1888	Printed Circuit Techniques: An Adhesive Tape-Resistor System	B. L. Davis, National Bureau of Standards
1889	Instruction Book for Decade Scaling Unit, Type YYZ-1	General Electric Co.

BOOKS

No.	Identifying Information	Publisher
B-211	Tables of Arctangents of Rational Numbers, National Bureau of Standards	U. S. Govt. Printing Office, 1951
B-212	Tables of the Exponential Functions of e^x, National Bureau of Standards	U. S. Govt. Printing Office, 1951
B-213	Technical Reporting, Joseph N. Ulman, Jr.	Henry Holt & Co., 1952
B-214	Proceedings-Industrial Computation Seminar, C. Hurd	International Business Machines, 1950
B-215	Proceedings-Computation Seminar, C. Hurd	International Business Machines, 1951

PERIODICALS

Physics Today, June, 1952

Physics Abstracts, May, 1952

Science News Letter, June 7, 1952

Proceedings of the I. R. E., June, 1952

Industrial Distribution, June, 1952

9.0 FACILITIES AND CENTRAL SERVICES

9.2 Standards, Purchasing and Stock

Procurement and Stock

(H. B. Morley)

New personnel have been added to the stock-room group to help with the increasing work load. This is reflected many-fold in the purchasing group, which may shortly need added personnel.

Re-assignment of duties of present stock-room personnel is being made to carry out our system of perpetual inventory and for close cooperation with production control.

Project personnel are asked to bear with us during the time it will take to train our new people, and to work the bugs out of the systems.

Personnel requisitioning material for purchase should allow a maximum lead time, due to governmental administrative requirements, especially certifications, and production directives. Emergency needs usually mean premium prices and special handling by the supplier, whose good will we need, and who becomes annoyed if we cry "wolf". While in many cases it is possible to get materials "yesterday", this should be the exceptional condition.

When requisitioning material from the stock-room, only enough for immediate needs should be taken to prevent a sudden depletion of stock in any category, which prevents others from filling their needs.

Stock-room stock boxes, with or without material in them, must not be removed from the stock-room. If a similar box is needed, one may be provided by requisitioning in the usual way.

The new standards do not show the minimum stock needed for each item. A committee is being formed to determine proper minimae, bearing in mind the work to be constructed, rate of growth, and delivery time lag, and other varying and unknown factors.

Any material being retained for private assigned stock, can now be accepted by the stock-room. The added space available there is sufficient, and should help release the valuable space taken up by private stock piles.

Standards

(H. W. Hodgdon)

In an effort to prevent the Standards Committee from becoming

9.0 FACILITIES AND CENTRAL SERVICES (con't)

9.2 Standards (con't)

(H. W. Hodgdon)

over-burdened with excessive detail, it has been decided to delegate some of the work to sub-committees, who will work through coordinators, usually without formal or scheduled meetings. A sub-committee on New Components will be comprised of representatives from all laboratory groups, who will work with Paine on new items to be considered for standards. Tentative organization:

Paine - coordinator
Olsen
Holmes
O'Brien
Best
(Magnetic Group)
(Shops)
(Others as required)

Another sub-committee will be concerned with problems relating to Procurement, Stock, and Production Control. Tentative organization:

Kates - procurement coordinator
Pugliese - stock coordinator
Morley
Nelson
McEachern

It is not intended to restrict attendance at regular Committee meetings, but rather to keep the basic committee to a size that will permit functioning without cumbersome detail and lengthy discussions. Details of specialized problems can be sorted out by the sub-committees and presented to the regular committee in the form of proposals. As always, all laboratory personnel are welcome to attend Standards Committee meetings, particularly if they have any views to offer affecting standards.

Davison, part-time student who has been doing much of the detail work in preparing standards sheets, will not be with us through the summer. He is being replaced by Robert Beale, M.I.T. student who will work full time until classes start in the fall.

9.3 Production Control

(C. W. Watt)

A memorandum, M-1502, has been distributed, covering the responsibilities of the engineers in the production of electronic equipment in our

9.0 FACILITIES AND CENTRAL SERVICES

9.3 Production Control (con't)

(C. W. Watt)

shops. This is intended to be a guide to getting something built, and the rules set forth therein should be followed closely to permit Production Control to work most efficiently.

A series of other memos, covering details of work inside the Production Control and Procurement groups has been issued, and will be added to as detailed procedures are agreed upon.

(F. F. Manning)

The following units have been completed since June 6, 1952.

CR#	QTY	UNIT TITLE	ENGINEER
1492-10	3	Panels for Testing Mod. II Plug-In Units	Wanlin
1588	5	Mounting and Cabling power lab benches	Gano
1609	1	In-Out Switch Magnetic Tape Matrix	O'Brien
1763	40	D. C. Power Cables (Test Equipment)	Nickerson
1764	4	D. C. Rack Power Cables (Lab. Equip.)	Eckl
1765	40	RG 62/u Coaxial Cables (Lab. Equip.)	Eckl
1772	100	RG 62/u Coaxial Cables (Test Equip.)	Nickerson
1777	1	Kiln Firing-Time Controller plus Labels	Buck
1779	1	Magnetic Tape Control Block Mark Memory (Modification)	O'Brien

The following units are under construction.

CR#	QTY	UNIT TITLE	ENGINEER
1561	1	Standardizer Amplifier	Mercer
1415	5	Storage Tube Mounts	Dodd
1614	1	Vacuum Tube Process Power Supply	Palermo
1615	2	ION Gauge Control Chassis	Palermo
1591	1	Magnetic Tape Control Block Mark Detector and Shaping Circuit	O'Brien
1560	1	Fuse Indication Panel	Mercer
1492-3	44	Gate Buffer Amplifier Plug-In Unit Mod. II	Watt
1609	1	In-Out Switch Magnetic Tape Matrix	O'Brien
1704	2	Core Pulse Amplifier (Breadboard)	Brown
1492-6	32	D. C. Flip-Flop Plug-In Unit Mod. II	Watt
1770 & 1780	4	Generator for 4 Independent Pulses	Briggs
1704	2	Core Pulse Distribution (Breadboard)	Brown
1608	1	Magnetic Tape Control Mode Switching Flip-Flop	O'Brien
1699	100	91 ohm Terminators	McVicar

9.0 FACILITIES AND CENTRAL SERVICES

9.3 Production Control (con't)

(F. F. Manning)

CR#	QTY	UNIT TITLE	ENGINEER
1598	200	91 Ohm Terminators	Papian
1504	500	91 Ohm Terminators	Mercer
1709	1	Filament Alternator Regulator	Kerby
1633-3	50	A. C. Circuit Breaker Boxes	Hepp
1492-8	5	Mounting Panel Plug-In 19"	Watt
1702	1	Delay Line	Baltzer
1762	1	Core Pulse Distributor (Breadboard)	Brown
1768	65	Clip Leads	Baltzer
1768	100	Video Cables	Baltzer
1492-7	1	Mounting Panel Plug-In 26"	Watt
1771	5	Inductance Boxes	Platt
1283	1	10 amp, 600 volt Rectifier	Hunt
1783	1	Core Driver Mod. I	Boyd
1648	1	Magnetic Core Tester	Brown
1647	1	Magnetic Core Tester Driver	Brown
1773	7	Modify D C Outlet Boxes (Lab. Equip.)	Nickerson
1771	5	Capacitor Boxes	Platt
1778	3	Rack Power Control Units	Corderman
1781	4	Decode Resistor Box	Platt
1762	1	Core Pulse Amplifier	Brown
1766	200	2" Terminal Boards	Manning
1639	6	Magnetic Tape Control Read Record Switch and Reading Amplifier	O'Brien

9.4 Drafting

(A. M. Falcione)

1. New Drawings:

Title	Cir. Sch.	Ass'y	Al. Panel
Magnetic Tape Control Unit Selector Ampl.	D-51428	D-51429	D-51430
Paper Tape Output Selector Relay Panel	D-50983	D-51156	D-51500
Paper Tape Output Relay Register	D-50984	E-51401	E-51400
Fixed Voltage Sw. Panel Mod. II	D-51550	D-51551	D-51553

Plug in units Mod.II have all been modified as to method of engraving and assembly and new prints have been distributed to those concerned.

2. WWl Bill of Materials

WWl Bill of Material dated June 2nd 1952 has been compiled and distributed.

10.0 GENERAL

Building Operation

(H. Fahnestock)

Hal Mercer is taking over responsibility for building operation. He will try to help you with your problems on space, desks, benches, telephones, moving, and maintenance

(J. C. Proctor)

New Staff

Howard K. Smead, assigned to work with Taylor, received his BS in EE at MIT in 1951, and completed his MBA in Industrial Management at the University of Pennsylvania this June. During the summer of 1951, he was associated with the Institute as a DIC staff member and while working for his Masters' was a part-time engineer with the Catalytic Constructions Corp.

Homer C. Peterson, who will work with Wieser, received his AB in mathematics from Colorado State College in 1942 and his MA in the same field from the University of Denver in 1948. He has been further associated with that University as an instructor of mathematics during the last four years.

Donald M. Fisher, to work with Corderman, received his BS this month from the American Television Institute. Prior to his academic training, Fisher worked as a technician with RCA Service Co. During the period of 1946 to 1948, he served as an Electronics Technicians Mate with the US Navy.

Louis T. Brock, who will be doing general administrative work under Proctor, received his BS in Industrial Relations from Northeastern University this month. From 1944 through 1947, he served with the U. S. Army.

Theodore J. Sandy, assigned to O'Brien's group, received his BS in EE from the Case Institute of Technology this month. Prior to his academic work, Sandy was an Electronics Technician with the U. S. Navy for two years.

Robert B. Paddock, to work with Taylor and O'Brien, received his SB in EE from Northeastern University this June. Prior to, as well as during this time, he was associated with General Radio Co. From 1942 through 1946, Paddock served as communications officer in the U. S. Air Force.

10.0 GENERAL (con't)

(J. C. Proctor)(con't)

Dee J. Neville, assigned to Wieser's group, received his BS in EE this month from Utah State College. During the previous three-year period of 1945 to 1948, he was an Aviation Electronics Technician with the U. S. Navy.

Charles T. Kirk, who has been assigned to work with Taylor, received his BS in EE this month from Tufts and will continue his academic training here at the Institute in September. Prior to his work at Tufts, Kirk was an Electronics Technicians Mate with the U. S. Navy.

Saul Fine, to work with Taylor, received his BS in EE this month from the University of Rhode Island, and will pursue further academic training at the Institute this September. From 1947 through 1949, Fine was associated with the New England Technical Institute as an Instructor, and from 1939 through 1945, with the U. S. Army as a Radar Repair Operator.

Norman N. Alperin will work with Wieser's group. He received his BS in EE from Syracuse University this month and immediately prior to his academic study in 1948 was associated with the Wire Recorder Corporation of America.

David Shansky, assigned to work with Best in Taylor's group, received his BS in Physics from Brooklyn Polytechnic in 1950 and has been working as a candidate for his MS in EE from Stevens Institute Night School since 1950. At the same time he has been associated with the Specialty Engineering Division of Specialty Assembly and Packing Co. as a Project Engineer until this month.

Ann B. Ward, to be working with Wieser, received her MS in Mathematics from Brown University this month. She has been at Mount Holyoke College as an Instructor of Physics since 1950 and was previously at Brown University as a Research Assistant in Applied Mathematics.

Walter G. Drogue, assigned to work with Rathbone, received his BA in English and History from Yale in 1932 and his Masters of Education in 1948 from Boston University. From 1934 to 1941, Drogue was associated with the New Britain Connecticut High School and has been similarly associated with the Swampscott High School until this month.

John D. Crane, Jr., to be working with Taylor's group, received his BS in EE from Utah State College this month. From 1946 to 1948 he was self-employed as a farm supervisor and served with the US Air Force during the immediate preceding two years.

10.0 GENERAL(con't)

(J.C. Proctor)(con't)

Richard S. DiNolfo, to also work with Taylor, received his BS in EE this month from the University of Michigan. He will further his academic training at MIT this September.

Terminated Staff

Stanley Hepp
Harold A. Donko
Alexander M. Stein

Terminated Non-Staff

Frank McCorrison
Sherman K. Grinnell
Robert P. Kyle
Donald B. Main

New Non-Staff

Milton Torrans is an MIT student assigned to the sheet-metal shop for the summer.

Three people have joined Mr. Morley's group: William Caldwell is the new truck-driver, and James Carey and Mather W. DiCarlo are new stock clerks.

Rosemary Parkins is a college student who will work in the Print Room for the summer.

John E. Mulkern has been assigned to work with Grant as a laboratory assistant.

Leo M. Piecha is a full time summer student technician assigned to work with Taylor's group.

Arthur P. Hill has recently assumed his duties as an administrative assistant working with Wieser.

Salvatore Caso, a full-time summer student technician, is working with Watt.