Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: BIWEEKLY REPORT, January 2, 1953

To: Jay W. Forrester

From: Laboratory Staff

1.0 SYSTEMS OPERATION

1.1 Whirlwind I System

1.11 Operation (F. J. Eramo)

The following is an estimate by the computer operators of the usable percentage of assigned operation time and the number of computer errors for the period 19 - 31 December 1952:

Number of assigned hours	93
Usable percentage of assigned time	93
Usable percentage of assigned time since March, 1951	85
Number of transient errors	28
Number of steady-state errors	1
Number of intermittent errors	11

(S. H. Dodd)

Operation of the computer during the past several weeks has shown a substantial increase in reliability of electrostatic storage. To a certain extent, this is probably the result of the change in deflection-circuit operation and has helped in keeping the percentage of useful computer time during applications at a high value. The reduction in parity alarms caused during normal program operation has tended to emphasize the number of times storage tube surfaces switch positive by making these failures a larger per cent of the storage tube trouble. Roberts and Corderman have been working intensively on this problem, and they have been making some progress recently.

We have been scheduling two installation days per week, making many needed modifications to computer circuits to obtain peak reliability performance. We will continue to have two installation days a week for the next few weeks and hope to have most of the potential troublesome areas in the computer cleaned up before much of the computer operating time is required for checking out the auxiliary drum.

1.11 Operation (continued)

(N. L. Daggett)

Modifications are in progress which will remove approximately 300 unnecessary crystal diodes from the computer. In addition, an even greater number of crystals in grid-clamp circuits will be shunted with resistors to prevent any loss of bias due to grid leakage. These changes will probably take about a month to complete.

(A. J. Roberts)

One cause of storage surfaces switching positive has been traced to the 1000-ohm, 50-watt Koolohm resistors in the holding-gate channel of the gun drivers. In two cases, a short was detected between the resistor terminal and the mounting clamp. The result of this was to leave the holding gun turned on during ES operations. Further investigation seems to indicate that there are several sources of trouble leading to positive switching.

One tube was replaced during this period to provide space for an ion-collector tube. In the next few weeks, a number of tubes will probably be replaced for the same reason.

1.12 Component Failures in WWI (L. O. Leighton)

The following failures of electrical components have been reported since December 19, 1952:

Component	No. of Failures	Hours of Operation	Reasons for Failure
Delay Line			
0.25 μsec	1	1046	Open
Transformer			
3:1 Pulse	1	0	Intermittent open
Tubes			
6AG7	3	10000 - 11000	Low I_b
6AS7	1	6044	Leakage
6L6GA	1	7314	Low I_b
6AL5	1	6000 - 7000	Low I_b
	2	10000 - 11000	Low I_b
5U4G	2	6578	1-Low I_b; 1-gassy
6X4	1	6578	Gassy

1.12 Component Failures in WWI (continued)

Component	No. of Failures	Hours of Operation	Reasons for Failure
Tubes			
VR-150	1	7062	Poor regulation
3E29	2	6000 - 7000	Low I_b
6SL7	1	7062	Low I_b
7AK7	1	14000 - 15000	Short
	1	15000 - 16000	Short
C3J	1	15675	Excessive voltage drop across tube
6Y6G	1	2141	Gassy
7AD7	1	2000 - 3000	High grid cut-off
	3	6000 - 7000	Low I_b
	1	7000 - 8000	Unbalance
	4	14000 - 15000	2-Low I_b; 2-short
6AK5	2	6000 - 7000	Short
	15	10000 - 11000	10-Short; 5-low I_b

1.13 Storage-Tube Failure in WWI (L. O. Leighton)

The following Storage-Tube Failure was reported during this biweekly period:

ST-707-C-1 was rejected after 42 hours of operation because of failure to hold a plus array.

ST-548-1 was removed after 3402 hours of operation to allow installation of an ion-collector tube.

1.14 Storage-Tube Complement in WWI (L. O. Leighton)

Following is the storage-tube complement as of 2400 January 1, 1953:

Digit	Tube	Hours of Installation	Hours of Operation
0 B	ST-619-C-1	10069	1676
1 B	ST-606-1	9599	2146
2 B	ST-603	8322	3427
3 B	ST-601	8524	3226
4 B	ST-516	6641	5109
5 B	ST-716-C-1	11702	44
6 B	RT-344-C-1	10637	1108
7 B	ST-540	7937	3813
8 B	ST-549	8259	3491
9 B	ST-700-C	10917	828
10 B	RT-347-C	10782	964
11 B	ST-709-C-1	11403	342
12 B	ST-604	10827	918
13 B	RT-346-C	10756	989
14 B	ST-624-C-1	10507	1238
15 B	ST-702-C	11113	632
16 B	ST-533	7801	3959
16 A	ST-613	9046	2704

ES Clock hours as of 2400 January 1, 1953 11745

Average life hours of tubes in service 2034

Average life hours of last 5 rejected tubes . . . 1534

During recent weeks many storage tubes have been replaced merely to install as many new-type tubes as possible. Accordingly the figures on tube life are of very much less significance than before this program was started.

2.0 CIRCUITS AND COMPONENTS

2.1 Circuits by System Number

2.13 Arithmetic Elements (A. Heineck, B. Remis)

The past two weeks have been spent designing a high-speed-carry line which uses diode gates. The objective is to improve on the speed of the WWI type.

Cathode-Follower Design (S. Thompson)

The effects of loading the cathode-follower coupled flip-flop with diode gates has been studied. It has been necessary to redesign the cathode follower so that it can supply the power required.

2.14 Input-Output

Display System (J.A. O'Brien)

Concerning the display system, very little progress has been made so far in the design of a better system, due primarily to the lack of time. The present system has been improved by the addition of an amplifier, but it is not completely satisfactory with the present large number of scopes loading the intensify lines. We are still having trouble due to people burning spots on scope faces. This is caused by users neglecting to turn scope beams off in one room while someone else is another room puts on a program that gives too high an intensity to the scopes.

Magnetic-Tape System (J.A. O'Brien)

The magnetic-tape system now includes most of the final components of the automatic print-out system. One more panel, the function of which is now supplied by test equipment is needed; this is under construction. Changes are being made in the print-out system to eliminate the noise pick-up on the coaxial cables. Shielded twisted-pair cables will be used. A considerable number of faults in some of the tape-system panels have been discovered and appear to have been bad in a small way since they were received. The chief trouble in the tape-system now appears to be noise, and an attempt is being made to trace it.

M.I.T.E. (J.A. O'Brien)

We have finally received some plug-in-unit mounting panels and have started the installation of the first M.I.T.E. rack. We have one technician at work on these panels now, and we expect a second man next Monday. After the individual panels are wired they will be assembled in the rack and wired together. It will take about two more weeks to complete the installation of this first rack.

2.14 Input-Output (continued)

(R. Paddock, A. Werlin)

Fourteen plug-in mounting panels have been received to date; several panels have been point-to-point wired and mounted in K-3 rack of room 156. Wiring is continuing, and it is expected that this rack will be completed and ready for video checking by late next week or early the following week.

Video cables have been measured and ordered for the M.I.T.E. Mounting brackets with pots for the switch units have been received for installation with the mounting panels. Indicator-light brackets for the flip-flops are expected to be completed during the next biweekly period.

(J. Dintenfass, T. Sandy)

The In-Out-Switch Drum Matrix has been tested and operates satisfactorily.

2.2 Vacuum Tubes and Crystals

2.21 Vacuum Tubes (H. Frost, S. Twicken)

During this past period, the intermittents tester has been undergoing intensive debugging operations. This has now been essentially completed. At present, the transient-response characteristics are being determined. Indications are that they are quite satisfactory, with pickup times near 1 to 2 microseconds for dead shorts. Modifications to the Model II tube tester to permit installation will be made next week. Calibrations of the tapping intensity remain to be made.

Mr. Cassidy of Tektronix Instruments visited recently. The low-frequency transient response of the 514D scope which has proven troublesome in the past was discussed. He indicated that Tektronix is now working on this problem. A letter was dispatched to the engineer on the project describing our measurements and partial solution.

The 5639 subminiature video pentodes have been tried in the video-probe circuit. About 50% additional gain can be obtained over that available with the 5987 subminiature triode. Both current and dissipation are lower. However, there is about 5% non-linearity at the maximum rated input, which may be embarrassing. Final evaluation has not been made.

Life data on the tubes (7AK7, 7AD7, 6AS6) in the five-digit multiplier has been analyzed. The present clock reading is over 38,000 hours, and there are many tubes over 35,000 hours. In all cases, the data is much better for tubes over 10 to 15 thousand hours, where the failure rates approach those in WWI. Before that time, the failure rates were much higher in the multiplier for the two common types, the 7AD7 and 7AK7. The 6AS6 failure rate appears much higher now than at the time of the several earlier analyses.

2.22 Transistors

Transistor Pulse Standardizer (E.Cohler)

The work on the transistor pulse standardizer is in the finishing stages, and a note on it is in preparation. The circuit operates on input pulses whose amplitudes vary from 2v to 20v and whose widths vary from 0.1 µsec up. The pulse-repetition rate may be as high as one megacycle without appreciably affecting the output waveshape. The output at present is standardized at a 0.15-µsec pulse whose height at no load is 6v. A 1000-ohm load will reduce this voltage to four volts. Both the pulse width and pulse amplitude are relatively independent of the transistor parameters. The circuit has been found to operate with RCA, Transistor Products, and Bell transistors. It requires a transistor whose base resistance is not too high and whose forward emitter resistance in the "on" condition is relatively low. These are the characteristics of most of the above-mentioned transistors, and the circuit is not critical as to transistors. Because of its simplicity, this circuit may be adapted to varied applications in computer circuitry.

Transistor Accumulator (D. Eckl, R. Callahan)

The accumulator has been in operation a total of 2282 hours.

The large d-c power supply refused to restart after being shut down over Christmas. The difficulty was traced by R. Jahn to open or intermittent contacts in several of the interlock relays. These relays are uncovered and of poor quality and are being replaced by standard relays.

A report on the first 2000 hours of operation has been completed and will appear as E-511.

Studies have been started on the flip-flop which are expected to produce a much more satisfactory unit capable of operation at frequencies of 1 mc/sec and higher.

2.3 Ferromagnetic and Ferroelectric Materials

2.31 Magnetic-Core Materials

New Materials (B. Smulowicz)

Pulse tests have been performed on new General Ceramics materials, MF-1348B and MF-1359B, in F-262 form. The results of testing the MF-1359B were particularly good, the switching time being of the order of two microseconds at 0.89 oersteds.

The new special-purpose Model III pulse tester is now operating satisfactorily. An improved and greatly simplified model of the calibrator is used for measuring the current pulse. Work is now progressing on the evaluation of an RCA ferrite, XF-94.

New Metallic Cores from Magnetic Metals (A. D. Hughes)

Results of a preliminary test of 12 cores out of 1,000 1/4-mil, square mu, 5-wrap microcores from Magnetic Metals showed poor results compared with the latest cores from Magnetics, Inc. Signal-to-noise ratios were low, output under simulated operating conditions was unstable with moderate driving currents. However, the cores were quite uniform.

Tests are being made on 24 of these cores for life tests.

Special Pulse Testing (P. K. Baltzer)

A new pulse tester is being assembled for the purpose of special pulse testing. It is first planned to determine the relationship between the coercive force and switching time for the ferrite and metallic cores on hand; also, it is planned to retake the pulse data for Ferroxcube 4B under stressed conditions.

MF-1326B-F-291 Life Test #2 (J. R. Freeman)

Pulse tests are continuing on the 24 cores selected for life tests. Data have been taken at 0.90 ampere-turns to supplement those taken at 0.95 ampere-turns. Presently, measurements of the half-selected zero output versus ampere-turns are being made at various times about the time of maximum disturbed one.

Production Testers (J. W. Schallerer)

Both production testers have been equipped with individual regulated supplies. These power supplies will be modified so as to include a two-stage control circuit. One 150-volt unit already modified was found to vary only .11 volts with a load change of 60 ma to 250 ma.

2.31 Magnetic-Core Materials (continued)

It was discovered this last week that the 6CD6 driver tubes were not cut off completely between current pulses. This resulted in a constant current flow through the core under test. A balancing circuit was designed and used immediately to eliminate this problem. Hal Boyd found that increasing the plate load of the phase inverter in the Model V driver from 10k to 12 k cut off the 6CD6 tubes between pulses. This change is now being made in the Model V drivers used in the production testers.

Production Core Tester (R. F. Jenney)

The production core tester has been completed and is working very satisfactorily with selected cores. There has been a great deal of difficulty with odd-sized cores, however. The cores must pass along a track, the depth of which must be kept within ± 0.002". Otherwise, either oversized cores will not pass or undersized cores will double up and jam.

General Ceramics, our core supplier, has installed an automatic press which will keep the tolerances under better control. The first cores from this press had a small I.D., however. The current-carrying probe which passes through the core under test has been smashing cores and the broken pieces are causing malfunctions. A new probe is being prepared.

It appears, therefore, that the machine will operate satisfactorily only on cores with closely controlled tolerances.

Production Testers (W. J. Canty)

To date, 13,000 MF-1326B, F-291, cores for MTC have been tested. Of these, approximately 7,000 cores have been selected which are acceptable for use in MTC.

Model IV Tester (J. D. Childress)

I spent the last two weeks readying a Model IV test setup for RCA. The equipment will consist of one Model IV core tester and three P-1 power supplies (modified).

Preparation of Ferromagnetic Materials (J. Sacco)

The new variable-ratio die has been received and put into use. The die produces four sizes of toroids with a constant inner diameter of approximately one-quarter inch and outer diameters varying from about five-sixteenths to eleven-sixteenths of an inch.

A number of samples of each size have been pressed from batch DCL-2-1, the original General Ceramics mixture. These were fired for one hour at 1400° C and submitted to Group 63 for hysteresigraph and pulse tests to see if trends in these properties follow with changes in radius ratios.

2.31 Magnetic-Core Materials (continued)

Chemical and Ceramic Facilities (F. E. Vinal)

The laboratory contractor continues to promise that our chemical laboratory will be operating by January 15. Equipment has been arriving at a rapid rate and it appears that we will be able to start operations immediately upon completion of the laboratory as all the chemical-laboratory equipment has been received. The ceramics pilot plant progresses more slowly with respect to both plant and equipment.

A great deal of thought has been given to the details of design and construction of our large high-temperature furnace. In cooperation with the manufacturer, the Harper Electric Furnace Corp. of Buffalo, this study is expected to produce a furnace whose uniformity of temperature in the charge of very small cores has not previously been achieved on any practical scale. Temperature differentials in the charge at 1400° C are not expected to exceed $\pm$ 2° C, and even lesser variations seem possible. The furnace includes provisions for work with inert atmospheres.

2.32 Magnetic-Core Memory

Memory Test Setup I (B. Widrowitz, S. Fine)

Current margins for 3 to 1 selection have indicated improved operation over 2 to 1 selection.

Operational data is being taken so that comparison at a later date with similar data will indicate whether or not core deterioration has occurred.

A sensing amplifier designed by C. Laspina for MTC is being modified for use in this array and will be evaluated later.

Memory Test Setup IV (Ceramic) (J. L. Mitchell, E. A. Guditz)

Work is continuing on combining Memory Test Setup II and Memory Test Setup III into one system. It was erroneously reported in the last report that this new system would be called Memory Test Setup III. It will be called Memory Test Setup IV. The test equipment is mounted and all d-c wiring completed. The remaining work consists of installing video cables and putting the system into operation.

Memory Test Setup II has been dismantled. In its place will be installed Memory Test Setup V. This system will be used to test each of the 32 x 32 memory planes to be constructed for the MTC.

2.33 Magnetic-Core Circuits

Magnetic-Core Matrix-Switch Adder (C. J. Schultz)

In order to reduce the control and driving-current requirements and possibly utilize tubes smaller than the 6Y6, it was decided to increase the number of turns of wire on the control and driving windings by a factor of 2.5. A matrix with these modifications has been constructed, and cursory tests indicate that operation is less satisfactory than with the original matrix.

Stepping Register (G. R. Briggs)

The capacitor type of stepping register, developed by Raytheon and others, enabling a single advance-current pulse to be sufficient for proper operation, is being evaluated for low-speed counting and adding applications. Besides simplifying the driving equipment required, other simplifications lead to savings in both the numbers of cores and diodes required. For counting applications, the 4-core Olsen core-matrix switch plus the carry stepping register can all be replaced by a single core with 3 capacitor-type coupling circuits, one circuit to reset the core itself and the other two to drive the total count-storage stepping register. It appears that an extremely simple counter could be built for low-speed work using this circuit.

For an adder, the capacitor-type circuit poses some problems which make its application difficult. This problem is being considered further.

Use of magnetic-core adding and subtracting will probably require use of a ten's-complement system to avoid the necessity of doing an end-around-carry operation. The ten's complement results can then be converted into nine's complement at low speed by a device which subtracts one. The design of this device is similar to that of a counter.

2.34 Ferroelectric Materials (Woolf)

The interlock system protecting the H.V. circuits has failed and will be remedied within the next biweekly period.

The inhibiting circuit is still not checked due to the failure of the interlock; however, the single-shot multivibrator triggering the inhibitor is no longer marginal. It is expected that the inhibiting circuit will now operate in a satisfactory manner.

The trailing edge of the pulse has been speeded up until it just meets the specifications of 0.1-μsec rise time at 250-volts output.

2.4 Test Equipment

Test Equipment Committee (L. Sutro)

The committee now contemplates removing the +120v supply from Whittemore Building. Five types of standard test equipment used in Whittemore Building draw current from the +120v supply, each for the screen of a 6AG7 RLC peaker. Dick Best is investigating the use of a series-dropping resistor in each of these circuits so that +150v can be used instead of the +120v. If this proves practical, the test equipment using the +120v supply will be modified as it is brought into Test Equipment Headquarters for routine maintenance.

During the year 1952, the committee added to the list of standard test equipment the following ten types and placed orders for the quantities shown at the right.

New Types	Purpose	Quantity Ordered
Core Driver Model V	Gives negative current pulses.	50
Core Driver Model VI	Gives positive current pulses.	12
Scope Coupling Unit	Provides capacitive coupling to plates of 514D.	40
Rack Power Indicator Panel	Places a neon lamp across each d-c supply.	40
D-C Flip-Flop (plug-in)		100
Gate Tube (plug-in)		50
Gate-Buffer Amp. (plug-in)		200
Dual Buffer Amp. (plug-in)		50
Mounting Panel for Plug-ins		65
Burroughs Multivibrator & Gas Tube Pulse Generator, Type 1004AW	Provides pulses at either multivibrator or push button frequency.	Being considered.

Descriptions and circuit schematics of these new units will be issued as supplements to R-215.

Test Equipment Headquarters (L. Sutro)

During this biweekly period, the following work was performed:

Standard Test Equipment		Tektronix Equipment	
Inspected	7	Repaired	5
Tested	51	Adjusted	5
Repaired	7		

2.4 Test Equipment (continued)

Video Probe for 'Scope Use (H. Zieman)

A video probe has been designed and built which will permit the observation of waveforms across circuit elements which are not necessarily grounded at either end. The unit is housed in a 3 x 4 x 5 case which can be bolted to a chassis or rack to provide short leads to the circuit. Since the gain of the unit is dependent on the tube characteristics, a method of injecting a calibrating voltage is being contemplated to make the unit less dependent on varying parameters. Plans are to build ten of these units for distribution in the lab.

2.5 Basic Circuits

5965 Flip-Flops (H. Boyd)

Of the two 5965 flip-flop designs, #2 and #3a, mentioned in the last report, FF#2 was chosen as the better of the two. The choice was made on the basis of circuit stability, tube reliability, and output-waveform characteristics.

Efforts are now being directed toward prf and load optimizing of flip-flop #2. Two types of triggering arrangements (out of 4 initial methods) are being compared, with modifications, to obtain the better of the two methods. Comparisons are being made for operation over 20-µsecs periods as well as continuous operation. Extreme trigger range at high prf's and loading, in conjunction with flat prf response, is the aim in these investigations.

2.6 Component Analysis (C.W. Watt)

Jack Goetz of IBM spent the day Wednesday, December 31, at the lab discussing the various phases of component analysis and how they should be handled. As a first step, it was agreed that component-life information from WWI should be analyzed, together with all similar information that is available from IBM. Using such life data, conferences will be arranged with component manufacturers in order to familiarize them with the requirements of computer components and to acquaint us with life- and reliability-test procedures in use now. With such background information available, it should be much easier to set up rational tests for component reliability and to write reasonable specifications for procurement purposes.

2.7 Memory Test Computer

Block Diagrams and Logic (W. A. Hosier)

A tentative in-out circuit for use with IBM card equipment has been completed in a sketch SB-37384. Little more is likely to be done in this direction for the time being, since it is desired to have MTC operating before what appears to be the earliest date (June) that IBM can deliver the card equipment. We are therefore going ahead on the basis of a tape input and tape output with Flexowriter or IBM typewriter.

Some effort is also going into the process of translating block diagrams into internal wiring instructions for the various units.

In-Out (R.J. Pfaff)

Since we cannot expect delivery of IBM card equipment before June or July, it has been decided to use Flexowriters for interim terminal equipment. Preliminary design work is under way.

Accumulator (H.E. Anderson)

Slight modifications of the panels to be used in the accumulator are necessary. Plans for these modifications as well as the inter-wiring of the accumulator panels are being made at this time. It is anticipated that the accumulator will be the first register of MTC to function. Bob Callahan of the arithmetic-element section is cooperating in establishing acceptance standards for the accumulator.

MTC Control (R.A. Hughes)

The control element has been run for a period of 125 hours during the last biweekly period with only 3 errors occurring. The errors all occurred Friday, January 2, 1953. One was definitely a power-supply transient on the +90 supply which we monitor. The other two are suspected power-supply transients. There have been no component or tube failures during this biweekly period.

Magnetic-Core Memory (W. Ogden)

Design of the memory planes was completed, and construction of the mounting frames is in progress.

A 5-tube plug-in chassis similar to the present 2-tube unit was designed as a package for the sensing amplifiers and is now in the shop. It is hoped that the same type of chassis can be used for the 2-plane drivers.

2.7 Memory Test Computer (continued) (H. Henegar, P. Bagley)

Test specifications for the MTC plug-in flip-flop and the GT-BA, dual gate, parity check, and cathode follower (Mod I and II) panels have been completed.

(J. Crane)

Preliminary calculations show that there is a tendancy for the d-c level to shift when cathode followers are used in series. This problem is being considered for the cathode followers used in toggle-switch storage, MTC.

(P. Bagley)

A system of keeping records is being set up for MTC. It will probably be patterned closely after the WWI records system.

3.0 STORAGE TUBES

3.1 Construction (P. Youtz)

The production rate of storage and research tubes was reduced this biweekly period because of the holidays. Most of the tubes produced were the 700-series storage tubes for replacement in ES row.

Two research tubes, which were storage tubes containing Philips "L" cathodes, were constructed to study storage-tube operation with these guns. One tube was an experimental tube built to study the conversion and activation of Philips "L" cathodes.

Work was continued on the problem of getting more uniform and closer spacing between the collector screen and the storage surface in order to obtain larger operating margins in ES row.

Jack Jacobowitz terminated his work with the group to take a position with RCA at Camden, New Jersey.

3.2 Test

Television Demonstrator (D. M. Fisher)

Seven storage and research tubes were tested this period. ST714-C, ST715-C, ST716-C-1 and ST717-C-2 were acceptable. ST718-C-3 was rejected because of apparent contact between the main collector and the surface, and the tube was dissected. RT367-C-1 was not acceptable for Whirlwind use because of a dark area on the surface which had the characteristics of low secondary emission. RT368-C was rejected because of buckled mica.

Several techniques were investigated for obtaining accurate centering of the high-velocity gun during tube construction. This activity has been postponed until the target structure is made more rigid.

Storage Tube Reliability Tester (R. E. Hegler)

During this last period one research tube and four storage tubes were tested at the STRT. Although ST714-C, ST715-C, ST716-C-1 and ST717-C-2 were all passed as satisfactory, their margins varied considerably. This variation is closely related to the spacing between target and collector. The tubes with the narrowest margins had the widest spacing between target and collector.

RT368-C, which contains a Philips "L" cathode, has wide margins. The larger-than-normal margins may be attributed to a buckled mica which would reduce the target-to-collector spacing. The extent of the current area was limited by the low maximum beam current.

3.3 Research and Development

Pulse Readout (A. J. Cann)

A 6AS6 gate tube in place of the 6AL5 detectors on the end of an r-f amplifier produces a 5-volt output pulse when sensed with a .05 μsecond pulse. The tolerance on the time of occurrence of the sensing pulse to produce no spurious output is about ± .02 μsecond. This seems an easily achievable figure for delay stability in amplifiers and cables. It corresponds to ± 70° phase shift in the r-f system. A 0.5-volt pk. to pk. signal is present at all times due to capacitive coupling from suppressor to plate. It is expected that a 7AK7 will perform no worse.

Target Assembly Design (C. L. Corderman)

One of the problems encountered in storage-tube construction is that of getting the four deflection plates aligned with the sides of the square mica spacer. Whenever the angle between a side of the array of spots and the mica spacer is greater than about five degrees, it is usually necessary to constrict the array size, i.e., the tube is required to operate at an effective density greater than 32 x 32. From an examination of ST718-C-3, which was dissected to inspect the target, it was apparent that some misalignment between the deflection plates and the mica spacer could be caused by a rotation of the target assembly after it has been sealed in.

A modified target assembly has been worked out with F. H. Caswell and J. S. Palermo which should give the assembly a much more rigid mounting. The pertinent changes have been: 1. To reduce the bolt circle of the snubber welds; 2. To use two snubbers at each of the twelve points instead of one; and, 3. To replace the four rods from the collector backing plate to the stem leads with a cylinder approximately 3/4" in diameter and 4 to 5 inches long. The first assembly of this type will be put into RT369-C which will also contain an IBM-85 high-velocity gun. This tube will be used for experimental studies of tube operation when the read-write-gun beam diameter is smaller than that obtained with the standard 5UP gun.

"L" Cathodes (T. S. Greenwood)

During this biweekly period, an "L" cathode gun was processed in a storage tube (RT367-C). With the exception of a relatively long activation time, processing was satisfactory. Unfortunately, when tested in the TVD the surface showed a spot of low secondary emission which it is suspected was caused during aging of the high-velocity gun. In the future precautions will be taken to insure that the beam does not fall on the surface during processing.

The remainder of the period was spent on the preparation of the thesis on the "L" cathode work.

3.3 Research and Development (Continued)

Velocity-Distribution Measurement (C. T. Kirk)

Using an r-f system, readouts of the velocity distribution of the holding beam at A_3 and the collector have been obtained. At present the stray r-f level is much greater than the signal level at the cages. Consequently, initial attempts to obtain readouts from the cages have not been successful.

4.0 TERMINAL EQUIPMENT

4.1 Typewriter and Tape Punch (L. H. Norcott)

Twenty-nine out of thirty rolls of special unoiled black perforator tape received from our tape supplier December 29 were found to be unsatisfactory because they were too translucent. Another supply of tape which meets our needs has been ordered, but until it arrives, it will again be necessary to use our pink oiled tape in the output punch.

4.2 Magnetic-Tape

Magnetic-Tape System (E. P. Farnsworth, J. W. Forgie, S. B. Ginsburg)

Consistently reliable operation of magnetic tape is now being obtained. Two 12AY7 tubes have been replaced during this biweekly period to maintain error-free operation. 12AY7 failures to date have been attributed to flicker shorts, cathode interface resistance, and changes in tube characteristics.

Tape breakages and occasional reading errors during testing immediately after a tape reversal were caused by excessive reel torque in unit 0. Changes in the characteristics of the CK708 crystal diodes in the reel servo-amplifiers affects the reel torque, indicating that the torque should be checked and readjusted weekly.

Work toward the establishment of a marginal-checking routine for magnetic tape is continuing. Several circuit changes have been made to provide better marginal indications.

Magnetic-Tape Print-Out (E. P. Farnsworth)

All final print-out panels except the index-pulse counter have been installed in the computer and are now functioning properly. At least one defect was found and corrected in each major unit. Faults included a wiring error, an open circuit inside a solderless connector, defective relay insulation, a Standards Book misprint, and a sketch error. Noise introduced into the reading amplifiers by pickup in the coaxial video cables between the magnetic-tape heads and the amplifier inputs has been substantially reduced by the substitution of shielded twisted-pair cables in place of the video cables.

Magnetic-Tape Mechanisms (E. P. Farnsworth)

The lathe mandrel for turning new experimental tape-drive capstans has been received from an outside shop by Mr. Gillissen at the Servomechanisms Laboratory, and work on the tape unit in his shop is getting under way. Efforts are being made to have this unit in WWI service within a few weeks so that we can ship two units to Raytheon for the reworking which they have contracted to do.

4.3 Display (R. H. Gould)

Standardizer-amplifiers have been installed between the intensify-selection switches and the 5-inch display scopes in Room 222. This should cure all malfunctions in the intensify system. It has been noticed that the 16-inch display scopes are left unattended with the beam power switch on, the intensity control at maximum, and the intensify switches on. This is how CRT phosphors get burned. The intensity control should always be at its minimum when the scope is not actually in use.

Numerical Display (F. E. Irish)

The details for temporarily installing the numerical display system described in the thesis, "The Display of Arabic Numerals on a Cathode Ray Tube" by this writer, have been worked out. Sections 2.9 and 2.10 of this thesis describe the block diagram of the system as it will be installed for this temporary demonstration. Some minor changes have been made in the block diagram to bring it up to date with the In-Out System, but it essentially will remain unchanged.

4.4 Magnetic Drums (K. E. McVicar)

Preliminary checks on the read-out signal from the 192 tracks on the auxiliary drum resulted in the replacement of three tracks and readjustment of the head on about a dozen others. This work, plus some of the subsequent video checking was done with the assistance of a representative of ERA.

It was found that the delay in the read-sense-pulse circuits had to be lengthened over that required at ERA and this was done on one chassis. Subsequently the delay in the circuit seemed to change again so that the old delay had to be reinserted. Work is presently being done on the source of this delay change.

The auxiliary-drum system has been video checked to the extent proposed in M-1659 with the exception of marginal checking and the cycling checks. A simple marginal-checking system has been installed, and marginal checking is currently in progress.

5.0 INSTALLATION AND POWER

5.1 Power Cabling and Distribution

Room 156 Power Distribution (G. F. Sandy)

The motor-generator set for the Drum Bays in Room 156 has arrived. However, the starter was not with it. Ed Rich is checking with ERA to find out what happened to the starter. Bob Jahn is testing the M-G set to see if it is in proper working order.

5.1 Power Cabling and Distribution (Continued)

Gavitt Mfg. delivered additional cables; more are still to be delivered.

A temporary marginal-checking setup has been installed so that Ken McVicar can test the auxiliary drum. An improved design is to be built for him. Due to a special rheostat that had to be ordered, this improved system will not be installed before January 23, 1953.

5.2 Power Supplies and Control

WWI 500-Volt, 10-Ampere Supply (J. J. Gano)

Using the ripple as a signal, the amplifier gain was found to be about one-half the theoretical value. The feedback loop will be opened at two places and gain-phase measurements made for each section. If these results are satisfactory, the compensating circuit will be calculated, eliminating much of the cut and try.

MITE Power Supplies (J. J. Gano)

The motor-generator set arrived and will be tested under load before replacing the substitute temporary supplies.

Whittemore Building D-C Supplies (R. Jahn)

+90-Volt Supply. Repeated failure of the 90-volt supply has made it necessary to substitute another unit for this voltage. The replacement is a similar Raytheon unregulated supply.

-450-Volt Supply. The -450-volt supply was installed after initial testing. All power supplies except the +90 are now regulated.

Drawings. Drawings to WWI standards have been made from the P.E.C. schematics for the -450- and -250-volt supplies.

Burroughs Power Supply. The power supply used by the arithmetic-element group has failed to start reliably because the open-type interlock relays collect dust and frequently do not close. They are being replaced by closed WWI standard relays.

600-Amp Filament Supply (G. A. Kerby)

Drawings for the regulator are ready to deliver to Floyd Manning for construction.

Test Equipment (G. A. Kerby)

Parts are being ordered for a new sine wave generator which will have an extended frequency range. This will be facilitated by use of a sine wave potentiometer instead of the present crank mechanism.

8.0 MATHEMATICS, CODING, AND APPLICATIONS

8.1 Programs and Computer Operation

After January 1, 1953, WWI time for scientific and engineering computation (S&EC) will be assigned in accordance with the policy described by C. W. Adams in E-484. Consequently, it will be necessary for anyone who desires S&EC time to describe his problem on form DL-518 (obtainable on request) and submit it to Room 218, Barta Building. This problem will then be considered by members of the S&EC staff. If necessary, the author may be called in for discussion. If the problem is deemed feasible, it will then be accepted, given a problem number, and assigned to an S&EC staff member who will serve as a consultant. Requests for S&EC computer time should be made on form DL-527. The amount of time required for the satisfactory solution of a problem is taken into account in determining the feasibility of that problem.

Progress during this biweekly period on each general applications problem is given below in terms of programming hours, minutes of computer time, and progress reports as submitted by the programmers in question.

21. Optical Constants of Thin Metal Films: Denman, 5 hours; Loeb, 4 hours; WWI, 18 minutes

An error in the printout tape was discovered after a run of Tape #2265 produced a check alarm. The rest of the biweekly period was apparently needed for the correction and new conversion. About two hours were spent tracing the error, and about two more on completing the automatic program.

Loeb

40. Input Conversion Using Magnetic-Tape Storage: Briscoe, 52 hours; Frankovich, 52 hours; Kopley, 8 hours; Porter, 7 hours; WWI, 514 minutes

The new version of the comprehensive conversion program which makes use of magnetic tape has been satisfactorily tested and will be placed into use immediately, replacing the paper-tape version now in use. At the moment, the output section of the program (i.e. the part which supplies output subroutines on demand of a programmer) is not yet operative, but success appears imminent.

Difficulties in the operation of the paper-tape version of the comprehensive conversion program have been continuously encountered for the past two weeks, mostly because of the complexity in operating the program during a conversion. These have been reduced by taking greater care during the process, and will for the most part be eliminated when the new program is used.

Plans for the future are to continue to try to get the output section of the program working and to test the new version of the program which corresponds to the direct basic conversion program, making use of two magnetic-tape units.

Frankovich

8.1 Programs and Computer Operation (continued)

45. Crystal Structure: Kopley, 2 hours; Abrahams, 6 hours; Blackmore, 6 hours

Old tape T-897 has been accommodated to the new in-out-system order and the new tape is T-2270.

We will use the new tape for computing Fourier series for various crystals.

Abrahams

46. Torpedo Depth Response: Kramer, 36 hours; WWI, 47 minutes

During this biweekly period two programs, T-2158-8 and T-2158-9, were attempted--one a convolution, the other an integration. Neither worked because of scale-factor errors.

A new scope-display program was written but has not yet been tested.

We plan to continue the present work on impulse response corrections and try to formalize correction procedures.

Kramer

48. Gust Loads on Rigid Airplanes in Two Degrees of Freedom: Brenner, 70 hours; WWI, 91 minutes

Programs for plate and I-beam problems have been tested successfully. A simpler approximation to the I-beam problem has also been tested successfully. About 10% of the program is completed.

Plans for the future are to test magnetic-tape readout and run a series of parameters on I-beam and plate problems.

Isakson

56. Determining Pupil Dates and Two Dramatic Aberrations in Optical-Lens Systems: Combelic, 41 hours; WWI, 56 minutes

The ultimate goal of this problem is to use the Whirlwind I computer to carry out the complete mathematical design of optical systems to meet certain specifications. One aspect of the programming so far has consisted of duplicating a well-known method of tracing rays through optical systems. When this program is completed and thoroughly tested, the thickness of some of the lenses of various systems will be varied, and for each variation the results will be printed and then evaluated by an experienced designer of optical systems.

Simultaneously, a set of sub-programs is being developed for use in the more advanced phase of the problem wherein the optimizing, i.e., the evaluating, of the system is to be done as completely as possible by the machine. This more difficult problem will require extensive use of auxiliary storage to handle, among

8.1 Programs and Computer Operation (continued)

other things, the relatively large matrices involved. Toward this end, considerable time has been spent in developing very general and flexible subroutines for using magnetic tape; these subroutines will be available as part of the Library of Subroutines. Subprograms for matrix multiplication and addition, and for generating the transpose of a matrix have also been written, and some of the tests have been completed.

It is planned to make extensive use of the delayed printer during the entire problem (i.e., programming the computer to record flexowriter code on magnetic tape, for later typing without the use of the computer). A subroutine for doing this with the (24,6) numbers used by the program has been written and is being tested. This subroutine also has separate entry points for delayed printing of a space, tab, and carriage return, thus making possible almost any desired page layout of the final printed copy.

To guard against complete loss of previous data due to computer malfunction, a program has been developed to record periodically the entire contents of storage on magnetic tape; the time between each recording is at the disposal of the programmer. In case of computer malfunction the computer operator needs only to "start over" at the first register of the magnetic-tape read-in program, which is permanently in test storage, and the last previously recorded contents of the 1024 registers will be restored to electrostatic storage. The program will then automatically start computing at the same point it had reached immediately before recording the block just read in.

The above matrix and magnetic-tape subroutines will all eventually be used in the second phase of this problem, but in the meantime other programmers may find their use advantageous. A brief informal memo describing the magnetic-tape subroutines has been written and may be obtained upon request in Room 218 at the Barta Building.

Combelic

57. Runge-Kutta Differential Equation: Hazel, 2 hours; Pitcher, 10 hours, Zierler, 20 hours; WWI, 45 minutes

Mk. 47 Evaluation

~~This problem~~ is an evaluation of the performance of a gun sight. It involves the point-by-point solution of differential equations representing the computer performance and various flight paths.

In the past two weeks, the problem has been put on WWI twice. Both runs ended in arithmetic overflows due to improper scale factoring. The program has been corrected and will be run again.

Pitcher

Fourier Coefficient

26 of the 30 desired coefficients were printed out correctly.

Interpretive Program

This program has run correctly in the past. However, the addition of a new section resulted in a divide-error alarm. An error diagnosis is now under way.

Zierler

8.1 Programs and Computer Operation (continued)

63. M.I.T. Seismic Project: Simpson, 10 hours; WWI, 59 minutes

Attempts were made to analyze several seismic records from the Whitwatersrand area in Africa, and a program for displaying the error curves on the oscilloscope was tried.

There were no satisfactory results from the analysis of the Whitwatersrand records because the program used to compute the error curves gave an overflow alarm. The cause of the alarm has not been determined.

Briscoe

80. Scattering of Electrons: Uchiyamada, 1.5 hours; Uretsky, 2 hours; WWI, 21 minutes

A complete description of the problem is contained in Quarterly Report No. 5 of the Committee on Machine Computation. The present phase of the problem is merely to reprogram the program which was used in the old problem 80. The new program has been assembled, and the read-in and lay-out in storage checked. One run was attempted (see below).

The only run attempted gave a check-register alarm after about 10 seconds of operation. The probable cause of the alarm was an error which was found in the print-subroutine.

The tape room is correcting the error and reconverting the tape. Another run will be attempted as soon as possible.

Uretsky

84. Departure Curves for Various Types of Resistivity Logs in Oil Wells: WWI, 1151 minutes

The calculation of resistivity departure curves has been completed. The results have been sent to Dr. L. de Witte of the Continental Oil Company for final processing.

Porter

87. Autocorrelation: Frankovich, 2 hours; Ross, 15 hours; WWI, 43 minutes

A major modification (T-2301-0) of Autocorrelation program (T-2249-4) has been submitted to the tape room, but will be delayed until T-2249-4 is operative. It uses Simpson's Rule in evaluating integrals.

After much difficulty with CCP, the Fourier Transform program T-2235-5 was tried and two programming errors were found. T-2235-6 is now in process of conversion. T-2249-4 has not been tested yet because of continued parity alarms. The cause is not known.

Plans for the future are to test T-2235-6, T-2249-4, T-2301-0, also, to start a new problem of calculation of hit probabilities for airborne fire-control systems.

Ross

8.1 Programs and Computer Operation (continued)

93. The Transmission Cross Section of Absorbing Spheres Using the Mie Solutions: Demurjian, 2 hours; Terrell, 20 minutes; WWI, 20 minutes

We were not successful in reprogramming a portion of the tape that was giving difficulties. Machine time assigned was relinquished and utilized by another programmer as soon as the error was realized.

Plans are to correct tape and assemble the complete program on one tape and to compute transmission cross sections for selected indices of refraction.

Johnson

Computer time, hours	
Programs	34 hours, 25 minutes
Conversion	19 hours, 1 minute
Demonstration	
Total	53 hours, 26 minutes
Total time assigned	59 hours, 55 minutes
Usable time, percentage	90%
Number of programs operated	86

9.0 FACILITIES AND CENTRAL SERVICES

9.1 Publications

(Diana Belanger)

The following material has been received in the Library, W2-301, and is available to laboratory personnel:

LABORATORY FILES

No.	Title	No. of Pages	Date	Author
M-1768	Rudiments of Good Circuit Design	3	12-22-52	N. Taylor
M-1769	Flexowriter Equipment Allocation	2	12-22-52	L. Norcott
M-1770	Tape Preparation Requisitions	2	12-22-52	M. C. Mackey
M-1774	Visit to Burroughs, Phil., on Dec. 18	5	12-24-52	(B. B. Paine (L. Sutro

LIBRARY FILES

No.	Identifying Information	Source
2161	Multidimensional Magnetic Memory Selection Systems	I. B. M. (Abstract)
2162	The Accuracy of Numerical Solution of Ordinary Differential Equations	Ballistic Rsch. Labs.
2163	Solution of a Set of Complex Linear Equations by an N-Step Method	Ballistic Rsch. Labs.
2165	A Procedure for Semi-Automatic Reduction of Telemetering Data	Jet Propulsion Lab.
2166	Electrons in Perturbed Periodic Lattices	R. L. E.
2168	The Reliability of Redundant Systems	Jet Propulsion Lab.
2169	Elastic Waves Created During Tensile Fracture	U.S. Naval Ordnance T. S.
2170	The Single-Core Magnetic Amplifier as a Computer Element	A. I. E. E.
2171	A Parametric Investigation of Gust Loads on Rigid Airplanes in Two Degrees of Freedom	M. I. T.
2172	The Solution of Ordinary Linear Differential Equations by an N-Step Method	Ballistic Rsch. Labs.
2173	Radio Progress During 1952: Electronic Computers, D. Brown	Proc. I. R. E. (to appear)
2174	A Survey of High-Speed Printers for Digital Computer Output	O. N. R.
2175	Magnetostriction	Int. Nickel Co.
2176	66 Practical Ideas for Metal Problems in Electrical Products	Int. Nickel Co.
2177	Computing Machinery and Intelligence	Mind, October, 1950
2178	On the Convergence of Gauss' Alternating Procedure in the Method of the Least Squares	N. B. S. No. 1857
2179	On the Spectrum of a One Parametric Family of Matrices	N. B. S. No. 1856
2180	Changes of Sign of Sums of Random Variables	N. B. S. No. 1996
2181	Sequential Decision Problems for Processes with Continuous Time Parameter-Testing Hypothesis	N. B. S. No. 2123

9.1 Publications (Continued)

LIBRARY FILES (Continued)

No.	Identifying Information	Source
2182	Four Articles on Numerical Matrix Methods	N. B. S. No. 2007
2183	Final Report on Research on a Non-Return-to-Zero System of Magnetic Digital Storage	Reed Rsch., Inc.
2185	Some Estimates of Confidence Limits of Errors in Evaluating Polynomials and Adding Numbers	Ballistic Rsch. Labs.
2186	Probabilistic Logic	California Inst. Tech.
2195	An Analysis of the Detection Repeated Signals in Noise by Binary Integration	Lincoln Lab.
2196	Boolean Functions of a Real Variable and its Application to a Model of the Digital Computer and Discrete Probability	Lincoln Lab.
2197	Wide-Deviation Frequency-Modulated Oscillator	Lincoln Lab.
2198	The Detection of Pulsed Signals In Noise	Univ. of Illinois
2200	Survey of Norwegian Computing Machine Development	ONR/N. Y.
2202	Air Temperature Near a Rocket Motor Exhaust Flame	NRL/ Washington
2204	Optimum Chemical Reactor Problem	DuPont de Nemours Co.
2209	Solving Linear Algebraic Equations Can Be Interesting	N. B. S. No. 2076
2210	Integrals of the Airy Integral Ai(-x)	N. B. S. No. 1924
2211	Supplement to Bibliographical Survey of Russian Mathematical Monographs, 1930-51	N. B. S. No. 1628A
2212	Use of Continued Fractions in High Speed Computing	M.T.A.C., July, 1952
2213	Solutions of Systems of Linear Equations by Minimized Iterations	N. B. S. No. 2341
2214	Formulas for Numberical Differentiation in the Complex Plane	Journ. Math. Physics, Oct., 1952
2215	The Stochastic Independence of Symmetric and Homogeneous Linear and Quadratic Statistics	Journ. Math. Physics, Sept., 1952
2216	The Thermal Evaluation of Air-Cooled Electronic Equipment	Wright-Air-Dev. Ctr.
2217	Bridge for Measuring the Interface Impedance of Oxide-Coated Cathodes	Nat. Rsch. Council of Canada
2219	A Mathematical Analysis of a Series Circuit Containing a Nonlinear Capacitor	A. I. E. E.
2220	A Graphical Method for Flip-Flop Design	A. I. E. E.
2221	Representation of Events in Nerve Nets and Finite Automata	Rand. Corp.
1875	Fourth Quarterly Progress Report: Development of Electrical-Mechanical Components for Printed Circuit Applications	U. S. Army Signal Corps
2053	Second Quarterly Progress Report: Square Hysteresis Loop Ferrite Development	General Ceramics and Steatite Corp.

9.1 Publications (Continued)

BOOKS

No.	Identifying Information	Publisher
B-236	REAGENT CHEMICALS, ACS SPECIFICATIONS, 1950	American Chemical Soc.
B-237	THE OXIDE-COATED CATHODE, Vol. I, MANUFACTURE 1951	Chapman-Hall
B-238	THE OXIDE-COATED CATHODE, Vol. II, PHYSICS 1951	Chapman-Hall
B-239	NEW RECORDING MEANS AND COMPUTING DEVICES, REPORT OF COMMITTEE ON, 1952, Society of Actuaries	Society of Actuaries
B-240	HANDY TOLERANCE TABLES, A. Michael, Sr., 1952	Handy Length Book Co.

I. B. M. REPORTS

No.	Title	Author
IBM 1	Design Considerations for the Magnetic Matrix Switch - Project HIGH	G. E. Whitney
IBM 2	Analysis of Flux Reversals in Rectangular Hysteresis Loop Magnetic Cores	G. E. Whitney
IBM 3	Analysis of Flux Reversals in Rectangular Hysteresis Loop Magnetic Cores, No. 2	G. E. Whitney
IBM 4	Air Defense Prototype Equipment	J. A. Burke
IBM 5	Summary Report of Magnetic Drum Storage Circuits and Components	J. Ingram
IBM 6	Survey of Magnetic Drum Storage	J. Underhill
IBM 7	Magnetic Drum on the Defense Calculator	J. Williams, Jr.
IBM 8	Report on Drum Read and Write Circuits on the Defense Calculator	N. Albanes J. Helland
IBM 9	Magnetic Drum Read/Recording Head Designs	J. Williams, Jr.
IBM 10	Report on Magnetic Drum Circuits	L. D. Stevens

9.2 Standards, Purchasing, and Stock

Procurement and Stock (H.B. Morley)

During this past biweekly period, an IBM rental order was drawn up, and a procedure established within the Institute for future orders of this type if needed by Digital Computer Lab.

Negotiations are in progress for purchase of additional ERA equipment for experimental use on the auxiliary drum.

Our usual supplier of perforator tape has become unwilling to supply Flexowriter tape equal to past quality, due to difficulty of manufacture and small quantities involved. We are seeking a new and more reliable source.

Standards (H.W. Hodgdon)

A sample electrolytic capacitor coated with insulating lacquer instead of a cardboard insulating sleeve has been received. It appears to be worth consideration, and additional samples have been requested for test and evaluation.

Plans are being made to provide close liaison with IBM on component research and evaluation.

9.3 Construction

Production Control (F.F. Manning)

The following units have been completed since December 19, 1952:

CR#	Qty	Title	Originator
1492-36	75	Pot Brackets for P.I. Mount. Panel	Paddock
1767	100	Video Cables	Test Equip Com.
1788	13	D-C Power Strips	Test Equip Com.
1793	8	Multivibrator Frequency Divider	Test Equip Com.
1795	14	Fil. Power Panel, Mod.III	Test Equip Com.
1900-1B	10	Fusing Strips	Sandy
1911	1	MT Print-Out Index Pulse Counter	Farnsworth
1952-1A	109	P.I. Flip-Flop Mod.	Smead
1952-2A	48	Sub Assy G.T.-B.A. Panels MTC	Smead
1952-5B	10	Dual Gate (Spec. Sub Section	Smead
1952-6D	6	Sub Sect Cathode Follower, Mod.I & II	Smead
1952-21	1	Power Supply Test Load	Farmer
1980	1	Mag. Drum Matrix	O'Brien
1984-12	2	Video Probes Mod.	Test Equip Com.
1984-27	6	Tektronic Coupling Units	Test Equip Com.
2077	1	Rack Power Control Unit (mod.)	Guditz
2075	1	R.F. Amplifier	Di Nolfo

9.3 Construction (continued)

The following units are under construction:

CR#	Qty	Title	Originator
1492-35	75	Indicator Light Brackets	Paddock
1684	21	Mod. Low-Speed 2^6 Counter	Test Equip Com.
1788	5	D-C Power Strips	Test Equip Com.
1795	1	Fil. Transformer Panel	Test Equip Com.
1952-1B	100	F.F.P.I. Units MTC Mod.	Smead
1952-2B	6	Assy. G.T.-B.A. Panel MTC	Smead
1952-6C	3	Assy. Cathode Panel, Mod. I	Smead
1952-57	2	Assy. Cathode Follower, Mod. II	Smead
1984-8	4	Core Driver, Mod. 5	Test Equip Com.
1984-12	18	Video Probes Mod.	Test Equip Com.
1984-28	210	Lamicoid Labels	Test Equip Com.
2007	367	Video Cables	Norman
2053	1	Volt-Meter Box	McCusker
2062	5	Sample Model Board	Watt

Outside Vendors (R. F. Bradley)

Unless a job has special urgency, bids will not be solicited from vendors until graded drawings are available because:

A. Print Room will save duplicate work of preliminary prints.

B. Fifteen days or more are required to process a job (shop work, finish, engrave, collect components) before material can be delivered to vendor.

C. Vendors schedules determine their prices and delivery dates; these can be more accurate from final drawings.

D. Bids can normally be obtained within 3-7 days, i.e. at least 7 days before work could be started by vendor.

P.O.	Firm	Ord.	Del.	Type
L-14099	Advance Machine Tool Co.	1785	502	Machine work
L-33515	G.P. Clark Co.	40	--	Assy, & Wiring
L-33793	G.P. Clark Co.	30	--	" "
L-33372	Dane Electronic Lab.	10	6	" "
L-33372	" " "	30	--	" "
L-33677	" " "	50	--	" "
F-14564	Gavitt Mfg. Co.	580	405	" "
L-33785	Hauman Instrument Co.	7	--	" "
L-33786	" " "	15	--	" "
L-33597	A.J. Koch Co.	10	--	" "
F-10440	Raytheon Mfg. Co.	4022	657	Complete fab.
		6579	1570	

9.4 Drafting (A.M. Falcione)

1. New Drawings	Cir. Sch.	Assy. & PL	Al.Panel
Sensing Amplifier Plug-In Unit (MTC)	C-53071		
Selection Plane Driver Control Sw. (MTC)	C-53341		
Selection Plane Current Control Panel (MTC)	SA-53301		
HV Bias Relay Panel (WWI)	B-53379		
Selection Plane Driver Panel (MTC)	C-53288	D-53375	D-53376

10.0 GENERAL

New Staff (J.C. Proctor)

Philip Gray has been assigned to Nelson's office. He received a BA in Pre-engineering from Ohio Wesleyan in 1950 and an SB in Business Administration from MIT in 1951. For the past year and a half, he has been employed as Materials Manager for Industrial Nucleonics Corporation in Columbus, Ohio.

Dr. Belmont G. Farley, who has been assigned to Group 61, received an AB in Mathematics from the University of Maryland and an MS and PhD in Physics from Yale University. He at one time worked at the Radiation Laboratory here at MIT and was most recently employed at Bell Telephone Laboratory where he worked on the development of the 1734 transistor.

Herbert Benington is a Research Assistant working with Wieser's group. He received an SB in Electrical Engineering from MIT in 1950 and a BA in Mathematics from Oxford University in 1952.

New Non-Staff (R.A. Osborne)

John Anestis is a new Laboratory Assistant in Group 6345.

Hilda Carpenter is a new Laboratory Assistant in the Memory Section of Group 62.

William Cass is a Boston University student working part time in the Applications Group.

Michael Dellarocco is a new Stock Clerk, who will work in the Whittemore Building.

Nicholas Di Mille is a Laboratory Assistant in the Construction Shop.

Robert Lepore has joined Group 63 as a Laboratory Assistant.

10.0 GENERAL (continued)

Gerald Loughman is a new night janitor, who will work in the Whittemore Building.

Roger Prager is an MIT student who will work part time for B. Paine.

Terminated Non-Staff (R.A. Osborne)

Charles Alexander
John Genewicz
Mildred Halley
Leonard Ross
Howard Walker

10.0 GENERAL (continued)

IBM Sub-Contract (A.P. Kromer)

Engineering activity with IBM continues to consist primarily of exchange of information to acquaint the two organizations with the previous work done at the other location. A draft of a proposal for the design of Whirlwind II Computer has been received from the IBM engineers engaged in logical design. This is being reviewed so that comments regarding it may be passed back to IBM in the near future.

In addition to the report mentioned above, we have received the following publications from IBM. These are intended to provide information to the engineers working on the project, but since they contain background information regarding IBM commercial products, they should be regarded as "Industrial Confidential" data and treated in accordance with Memorandum M-1663 (previously issued).

No.		Date	Author
IBM 1	Design Considerations for the Magnetic Matrix Switch	12-5-52	G.E. Whitney
IBM 2	Analysis of Flux Reversals in Rectangular Hysteresis Loop Magnetic Cores (Report #1)	10-3-51	G.E. Whitney
IBM 3	Analysis of Flux Reversals in Rectangular Hysteresis Loop Magnetic Cores (Report #2)	10-11-51	G.E. Whitney
IBM 5	Summary Report of Magnetic Drum Storage Circuits and Components	8-29-52	J.J. Ingram
IBM 6	Survey of Magnetic Drum Storage	6-9-52	J.A. Underhill
IBM 7	Magnetic Drum on the Defense Calculator	5-1-51	J.V. Williams, Jr.
IBM 8	Report on Drum Read and Write Circuits on the Defense Calculator	11-16-51	N.J. Albanes & J.E. Helland
IBM 9	Magnetic Drum Read/Recording Head Designs	4-22-52	J.V. Williams, Jr.
IBM 10	Report on Magnetic Drum Circuits	12-7-49	L.D. Stevens
IBM 11	Drum Synchronization	12-11-49	R.L. Harper

Establishment of a program for testing and standardizing on components has been discussed with Jack Goetz of IBM.

The initial quantity of parts for IBM plug-in units to be used in connection with development work on an arithmetic element have been received.