Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: BIWEEKLY REPORT, November 21, 1952

To: Jay W. Forrester

From: Laboratory Staff

1.0 SYSTEMS OPERATION

1.1 Whirlwind I System

1.11 Operation (D. Morrison)

The usable percentage of assigned operation time and the number of computer errors for the period 7 November - 20 November 1952 as reported by the computer operators is as follows:

Number of assigned hours	106
Usable percentage of assigned time	83
Usable percentage of assigned time since March, 1951	84
Number of transient errors	37
Number of steady-state errors	4
Number of intermittent errors	8

(S. H. Dodd)

The installation of circuits associated with the Power-Supply Control required for operating the new equipment being installed in 156 is complete, and operation is pretty well checked out.

Test Control has been revised to replace some switches with push buttons and thus prevent operators from leaving these switches in an incorrect position.

(N. L. Daggett)

Fluctuations in the output of the holding gun anode supply have been traced to a loose solder-lug in the supply. This had undoubtedly caused the output voltage of the supply to go to an extremely high voltage at times and may account for several troubles encountered in the past.

Close timing on the arithmetic check alarm will be eliminated during the next installation period. 0.25 μsec of delay will be removed by cable changes and removal of a delay line. This will ensure that the arithmetic check alarm pulse always stops the computer on time pulse 4, leaving the control switch and storage switches cleared.

1.11 Operation (continued)

(A. J. Roberts)

Six ion-collector tubes are now operating in the system. There have been no further signs of failure to hold a plus array as was experienced with the first two tubes installed. During the past two weeks no errors were recorded in these tubes. Storage reliability has become increasingly good. Four tubes were replaced during this period.

(S. E. Desjardins)

A video switching panel is being designed which will replace 4 video selector panels now in test control. This panel will be more flexible than the existing set up, will require less rack space, and will also improve the appearance of test control.

Block diagrams are presently being drawn showing the various functions of test control. One drawing for each function will be made (i.e., Start Over, Restart, Cyclic, etc.) and also the over-all system will be diagrammed. These diagrams should facilitate the understanding of test control and aid materially in "trouble shooting."

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

The following failures of electrical components have been reported since November 7, 1952:

Component	No. of Failures	Hours of Operation	Reasons for Failure
Capacitors			
4-30 MMFD ceramic trimmer	1	8404	open
Crystals			
1N34a	1	3092	low R_b
1N34a	1	4220	low R_b
1N38a	1	4220	low R_b
Potentiometers			
10 K ohm 2 watt	1	9657	intermittent operation
	1	8014	faulty contact
Resistors			
10 ohm 1 watt	1	8172	burn out
220 ohm 1 watt $\pm$5%	1	4821	overheated
5 K ohm $\pm$1% 1-watt Nobleloy	4	1 - 4000 - 5000 3 - 5000 - 6000	above tolerance 1 - open 2 - increased in value

1.12 Component Failures in WWI (continued)

Component	No. of Failures	Hours of Operation	Reasons for Failure
Tubes			
7AD7	7	1 - 3000 - 4000	change in characteristics
		1 - 9000 - 10000	change in characteristics
		2 - 13000 - 14000	change in characteristics
		3 - 14000 - 15000	low I_b
3D21A	1	10579	gas
5Y3	2	10579	1 - gas 1 - change in characteristics
6SN7	1	14082	change in characteristics
5687	1	605	broken pin
6AS6	1	10579	change in characteristics
6AS7G	3	9543	2 - low I_b 1 - change in characteristics

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

The following storage-tube failures were reported during this biweekly period:

ST-610-1 was rejected after 85 hours of operation because of failing high-velocity gun.

ST-612 was rejected after 1362 hours of operation because of failure of HG and HVG.

ST-629-C-1 was rejected after 25 hours of operation because of weak HG and HVG and to provide space for a tube equipped with an "ion collector."

ST-519 was rejected after 4293 hours of operation because of loss of holding-gun current.

ST-542 was rejected after 2759 hours of operation because of poor margins and to provide space for a tube equipped with an "ion collector."

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

Following is the storage-tube complement as of 2400 November 20, 1952:

Digit	Tube	Hours of Installation	Hours of Operation
0 B	ST-619-C-1	10069	981
1 B	ST-606-1	9599	1451
2 B	ST-701-C	11023	27
3 B	ST-601	8524	2531
4 B	ST-516	6641	4414
5 B	ST-548-1	8299	2755
6 B	RT-344-C-1	10637	413
7 B	ST-540	7937	3118
8 B	ST-549	8259	2796
9 B	ST-700-C	10917	133
10 B	RT-347-C	10782	269
11 B	RT-349-C	10902	148
12 B	ST-604	10827	223
13 B	RT-346-C	10756	294
14 B	ST-624-C-1	10507	543
15 B	ST-603	8322	2732
16 B	ST-533	7801	3264
16 A	ST-613	9046	2009

ES clock hours as of 2400 November 20, 1952 11050

Average life hours of tubes in service 1561

Average life hours of last 5 rejected tubes 1703

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.

1.2 Five-Digit Multiplier (C. N. Paskauskas)

On 11 November the +150-V supply started giving trouble again with sparking at the brushes.

The multiplier was shut down for an indefinite period to allow moving the power supplies to Room 045 and getting the +150-V supply fixed.

2.0 CIRCUITS AND COMPONENTS

2.1 Circuits by System Number

2.14 Input-Output (J.A. O'Brien)

Work on the In-Out system has been concentrated during this period on the display system. An investigation has been made into the source of noise appearing on the display scopes; no simple solution has been found as yet. It may become necessary to use a balanced line to carry the decoder signals from scope to scope. A new deflection yoke has been tried in one of the 16-inch scopes, and although it has relatively little distortion, its deflection time is extremely long.

The number-display system developed by Irish was set up, outside the computer, to display on a 16-inch scope to show the operation of this type of display to interested parties.

The magnetic-tape system is still being held up by trouble; operation at times is extremely good. The system has operated for several hours on a number of occasions without error, but at other times noise pulses have been found to be originating in the amplifiers. One intermittent tube-socket contact and several tubes have been found to cause some of the noise, but not all sources have been uncovered. The nature of the noise is a single pulse a few times per hour.

The breadboard magnetic-tape print-out equipment has been installed in the computer and appears to work satisfactorily.

The work on the In-Out system required to accommodate the magnetic-drum systems is progressing. The modifications required of existing panels have been specified, and the wiring diagrams of plug-in unit mounting panels needed for additional equipment have been completed. Construction requisitions have been issued on some of the video cables and the data required to specify the remaining cables is being gathered.

The work on plug-in units for the Room-156 installation is slightly behind schedule due to the lack of components. Lately some tests have been made on some ferrite pulse transformers, made by Bob Hunt, in the plug-in units. It appears that these could be used in all cases in place of the presently used Hypersil transformers.

A new rack layout for the M.I.T.E. plug-in units has been completed to take advantage of the deletion of some gate tubes resulting from changes in the magnetic-drum circuits. The wiring diagrams for the new layout are complete, and specifications of the details of the power wiring and video cables are being assembled.

Some changes are being made in the design of the plug-in gate generator to eliminate PRF sensitivity.

2.14 Input-Output (continued)

Two setups for testing plug-in units have been made in the inspection department and separate power is being supplied for the tests by a power supply purchased from Burroughs and which we have modified to provide the proper voltages.

Reports from our correspondent in St. Paul indicate that the testing of the auxiliary magnetic-drum system is almost complete, and that the system should be crated and shipped next week and arrive here during the first week of December. A good many troubles have been found and corrected in the system and it is expected that a good many more are yet to be found.

A test-equipment assembly for initial tests on the drum system has been set up and tested here. A few special items have been made to facilitate the drum testing, and special plugs, connectors, etc. have been ordered as information on their need is received from St. Paul.

(J. Dintenfass)

The prints of some of the existing in-out units have been further modified to accommodate the drums. Units requiring modification are the Synchronizer, I.O.C. Counter, Delay Counter, Alarm Control, and Interlock.

Video-wiring layouts were made for the following new units to be added to the in-out system: Block Control, Synchronizer #1, Reset Control Annex B, G.S.R. Read-In Control, S.A.R. Read-In Control, and Input Control (ADSC).

(T. Sandy)

A ground check was made on the WWI filament bus. When the filament bus should have been isolated from ground, a resistance of 500 ohms was measured between the bus and ground.

All Group 64-IN-OUT Section test equipment which was located in the WWI computer room has been transferred to Room 155.

M.I.T.E. (R. Paddock, A. Werlin)

Rewiring of the three-panel prototype, according to the modified M.I.T.E. Control section as recommended by Ben Morriss, has been completed and testing of the circuits is continuing.

Several 3:1 potted-ferrite pulse transformers have just been received; it is hoped that a counter incorporating gates with these transformers can be tested for pulse propagation in the near future.

2.14 Input-Output (continued)

The PEC-730C power supplies for testing plug-in units have been modified and are now in use. Rack-mounting equipment for the one additional required voltage supply has been designed and is now under construction.

2.2 Vacuum Tubes and Crystals

2.21 Vacuum Tubes (S. Twicken)

The overall appearance and characteristics of the new tube tester mentioned in the last biweekly have been decided upon. Major changes in the new tester will be the addition of a G.R. Vacuum-Tube Bridge, a concave front panel for greater accessibility of controls and meters, plug-in-type meters easily removed for standardization, and some improvements in the design of the power supplies. Sketches and circuit schematics have been turned over to Al Falcione for assignment to a design draftsman.

2.22 Transistors

Life Tests (N.T. Jones)

Processing of data continues. L. Riley is now working on bar graphs of parameter changes that have occurred in the units on life tests.

Switching (N.T. Jones)

Work is being concentrated on the preparation of an MS Thesis proposal on this subject. This proposal will be distributed as an M-note upon completion.

New Measurements (N. T. Jones)

A constant-current collector source is under construction to make it possible to plot emitter characteristics dynamically.

Transistor Accumulator (D. Eckl, R. Callahan)

The total operating time on the accumulator is now 1470 hours.

Collector characteristics of all transistors in the accumulator have now been photographed. It is planned to photograph waveforms of output pulses to make possible a more definite determination of the reasons for unsatisfactory operation. The first "complete" failure of a transistor in the accumulator occurred when a recently inserted transistor gate ceased to function after only a few hours of operation. Inspection of the collector

2.22 Transistors (continued)

characteristics showed the pattern produced by an unformed transistor. There have been other failures, mostly unexplained, but in previous cases there appeared to be very little change in the transistor characteristics.

The difficulties produced by the water cooler (errors recorded each time the motor switched on) appear to have been removed by the installation of a Tobe Filterette on the power line connected to the cooler.

Recently, operation of the accumulator during the evenings has been unsatisfactory. Rough checks made to look into this situation have shown a 25% decrease in voltage-output-pulse amplitude from the gate and delayed-pulse generators used as pulse sources for a 2-degree-centigrade drop in ambient temperature. This information correlates with the fact that no difficulties of this sort were encountered until the past few weeks when the temperature began dropping considerably during the evening.

Circulating Pulse Circuits (R.H. Gerhardt)

The one-shot multivibrator circulating pulse circuit was studied to determine the tolerances. It was found to be very critical of emitter bias, clock amplitude, and clock frequency. Efforts will be directed toward increasing these tolerances.

A four-bit register has been built using the delay-line circuit. Two special transformers failed to work, and it was found that one was open; the other was shorted. The register is now running and has 24 hours on the clock. An examination of the tolerances on voltage levels, clock voltage, and clock frequency will be made. An M-note describing the circuit and the operation of this register is being written.

Transistor-Coupling Circuit (W. Klein, S. Oken)

A report is being prepared on this circuit. Voltage-transfer curves and other pertinent information is being gathered. In the meantime, ways to improve the circuit are being tried. The present circuit gives good performance with transistors having an α_e slightly greater than 1 and a large r_{co} (30 to 40 k).

(I. Aronson)

Paul Bauer of Transistor Products Co. visited the lab and brought along 5 sample transistors designated as type 2C. Results of our standard tests on these units indicate characteristics which are comparable to some of the better transistors we now have.

2.23 Crystal Diodes (I. Aronson)

Twenty-four gold-bonded diodes, "rough" samples loaned by Transistor Products, were tested for static characteristics and reverse-recovery time in preparation for a preliminary report now in progress. At least five of these samples showed better reverse-recovery characteristics than most of the diodes previously investigated.

As soon as this preliminary report is finished, another will be written on the 1N34's, 1N38's, and 1N52's which we purchased from the same company. This second report will receive more thorough treatment since it will deal with finished products rather than rough samples.

2.3 Ferromagnetic and Ferroelectric Cores

2.31 Magnetic-Core Materials

Ferrite Cores (W. J. Canty, J. H. McCusker)

Trips to General Ceramics were made to standardize test procedures, install measurement equipment, and instruct the engineering personnel in the new measurement techniques.

Ferrite-Core Life Tests (J. R. Freeman)

Twenty-four MF-1326B, F-291, ferrite cores have been selected for life tests. The cores have been mounted on a special rack for testing which will enable half of the cores to be checked for shelf life while the remainder are being pulsed.

Production-Core Tester (B. Smulowicz, R. F. Jenney)

Work on the semi-automatic production core tester has been held up because of difficulty in obtaining a satisfactory probe to carry the current and sense windings.

Logic for the new mechanical part of the tester has been designed and construction begun.

Pulse testing has begun on large irregular pieces of ferrite with several holes drilled after firing.

Automatic Curve Plotter (J. D. Childress)

The current stepper has been constructed and is being tested.

Special-Tests Equipment (J. D. Childress)

The special-tests equipment has been set up. There is sufficient logic for various modes of testing. However, only two Model V drivers are now available for use with this equipment.

Scope Calibrators (R. Pacl)

Four additional Comparators are in the process of being constructed. Except for minor changes in the circuitry and parts locations, they are identical to the pilot model recently shipped to General Ceramics.

Neutron Irradiation of Core Materials (P. K. Baltzer)

Initial data has been collected on cores to be sent to Oak Ridge. Various materials were selected; Mo-Perm, MF-1326, MF-1312, MF-1118, MF-666 and Ferramic H. Wherever the number of samples permitted, some were wound

2.31 Magnetic-Core Materials (continued)

to provide for the application of a magnetic field while in the pile. It is planned to irradiate the cores for about 30 days in an air-conditioned chamber, close to room temperature.

Core Stresses (P. K. Baltzer)

Ferramic H cores of the "Wedding Ring" size were imbedded in plastics by R. Hunt for the purpose of applying permanent stresses. The hysteresis loop of the potted core showed that considerable stress was being applied. Further work is being planned along this line.

Acceptance Testing of Ferrites (P. K. Baltzer)

Statistical calculations have been made relative to sampling production batches of ferrite cores, the acceptance of the whole batch from the manufacturer being based on the sample. The data obtained from the testing of two different batches of 1,000 cores was used as the basis for the calculations.

Switching Time in Magnetic Cores (J. B. Goodenough)

As a result of more detailed information from H. J. Williams of the experiments which have been performed at the Bell Laboratories, the qualitative ideas for the mechanism responsible for switching times and the coercive force in magnetic cores have been modified and an additional mechanism has been proposed. Experiments for the further investigation of these ideas are being worked out.

(N. Menyuk)

A study is being made of the effects of various functions upon core response. Equipment for this study has been assembled and it is hoped that it will be in operation next week.

A number of additional memoranda have been written up on Arthur Loeb's magnetism seminar.

(J. H. Epstein)

Attempts are being made to introduce large strains in ceramic samples by rapid cooling in air blast, and to anneal comparison samples by very slow cooling. By measuring the x-ray strain broadening for these two extremes it should be possible to characterize the strain of any sample at least on a relative scale.

2.31 Magnetic-Core Materials (continued)

Chemistry and Ceramic Laboratory (F. E. Vinal)

Contractors have commenced the necessary building changes for the installation of chemical and ceramic facilities. The construction seems to be progressing at a good rate. The laboratory contractor will follow this work with the installation of laboratory-bench and fume-hood facilities. Many items of laboratory equipment are now on hand. Planning for power installations, etc., is under way and conferences have been held on instrumentation for the high-uniformity ceramic furnace.

Variable-Ratio Core Dies (R. E. Hunt)

A set of these dies have been designed for Frank Vinal and will be constructed shortly.

Ball Mills (R. E. Hunt)

The rolls for this unit have been completed in the machine shop and will be sent out for rubber coating in the next few days. The unit itself will be ready for assembly when these return, in a period of about two weeks.

Seminar on Magnetism (A. L. Loeb)

Two notable departures from the regular seminar were the presentation of moving pictures of magnetic-domain wall motion by Williams (Bell Labs.) and of slides (colored and black-white) of ferroelectric domains by F. E. Vinal. In connection with the latter, one period was spent on the phenomenon of ferroelectricity and its relation to crystal structure and of optical and piezoelectric properties of crystals.

Meanwhile, the electronic structure of atoms and of metals constitutes the final topic under discussion before fundamentals of quantum mechanics and exchange forces are taken up immediately after Thanksgiving.

2.32 Magnetic-Core Memory

Memory-Test Setup 1 (Metallic) (B. Widrowitz, S. Fine, R.S. Di Nolfo)

The Memory-Test Setup #1 has been made reliable and ready for the testing of a new memory plane. This plane should be available for test during this coming week.

B. Widrowitz and R.S. Di Nolfo have been able to non-destructively read out of a metallic core by using bursts of RF currents.

Memory-Test Setup I (W. Ogden)

Construction of a new 16 x 16 memory plane is in progress. It will be assembled using metallic cores consisting of 10 wraps of 1/8-mil mo-permalloy tape wound on 1/8"-diameter bobbins.

Memory-Test Setup II(Ceramic) (E. A. Guditz)

It is now understood that much of the spread in amplitude of memory-core output voltages is due to line-to-line variations in the shape of the driving-current pulses. Methods for properly shaping these pulses are being investigated.

Some marginal checking was done on the new memory plane (# 4-MF1326B, F291) and results indicate it is as good as array #2 (MF 1118, F259).

Another memory plane (#5-MF 1326B, F291) identical to plane #4 has been installed in memory-test setup II along with plane #4. It operated successfully as soon as installed. A new sensing panel has been built and test equipment installed so that memory planes #4 and #5 can be operated simultaneously and independently.

Memory-Test Setup III (Ceramic) (J. Mitchell)

Some experiments were performed to compare the shapes of the output current pulses from a given switch core and to find the effect of the comparative shapes on the operation of the switch, and memory. In order to keep the noise output of the core to a minimum it was found that it is necessary to keep the positive and negative pulses equal in magnitude and length. If these pulses are not equal the switch core is operating an a asymmetrical hysteresis loop and this causes distortion of the read pulse. In addition a large noise pulse is seen when the core is biased off.

Sensing-Panel Development (C.A. Laspina)

An a-c-coupled sensing panel for use with the ceramic array has been built and is now being de-bugged. The low-duty factor, a maximum of 15% makes the use of an a-c-coupled panel possible. The inherent difficulties of a d-c

2.32 Magnetic-Core Memory (continued)

amplifier, which was previously desired for the sensing panel, such as long term drift, are eliminated by use of an a-c amplifier. Short-time constant-coupling circuits make the recovery time of the amplifier short without too much droop on the pulses. The use of a large amount of negative feedback makes the gain fairly independent of tube and circuit parameters.

Z-Plane Driver (C.A. Laspina)

The Z-plane driver mentioned in the last biweekly has been changed to provide faster rise times and is now being tested.

Automatic Core Tester (R.E. Hunt)

Work is progressing at a satisfactory rate although we have had some setbacks. The probe seems to be the main difficulty. We received one double-sleeve probe from American Electro Plating on which both sleeves were partially shorted. However, the process still looks promising and we shall try several more probes. We also shall try a single-sleeve probe constructed of brass tubing with a formex coated wire for the current lead. This should get us started. We shall concentrate all our efforts on this job until a satisfactory working unit is achieved.

Olson Switch (J. Raffel)

A square Olson switch was constructed and preliminary tests indicated satisfactory operation. Further tests will be made.

2.33 Magnetic-Core Circuits

Magnetic-Core Matrix Switch Adder (C. Schultz)

A new matrix has been constructed from cores wound with different numbers of turns on the three biasing input windings and the sum and carry output windings. Signal-to-noise ratios have improved over those obtainable from matrices used previously, and pulse-length and switching-frequency limitations are being observed.

829 Pulser (H.K. Rising)

The 829 pulser logic has been set up and tested. With it some tests have been made on junction diodes for possible applications with cores. Particular attention is being paid to the buildup of back resistance after forward conduction.

2.33 Magnetic-Core Circuits (continued)

Pulse Transformers (E.K. Gates)

3:1 and 1:1 ferrite pulse transformers are being made in small quantities which are equivalent to the hypersil pulse transformers used in WWI.

These ferrite transformers are made with Ferramic H cores but preliminary tests using Ceramag 5N (a much less expensive core) indicate that the Ceramag 5N material may be used.

Pulse Generator for Testing Magnetic Cores (H. Zieman)

Tests point out that the slow rise time previously experienced in the experimental pulse generator was due primarily to series-circuit inductance. The physical dimensions of the 4-C35 are such as to make the minimum circuit inductance approximately 0.5 μh. To get a 0.01-μsec rise time with this much inductance would require a 75-ohm load resistor and a 75-ohm pulse-forming network, which in turn would require a 5000-volt d-c supply to produce the desired 50-ampere pulses.

To overcome the use of such a high-voltage supply, the 4C35 will be replaced by a Western Electric mercury relay. This will permit a much smaller physical dimension of the discharge circuit, and thus will reduce the minimum circuit inductance.

The new unit is now under construction.

Stepping Register (G.R. Briggs)

The low-speed all-core stepping register is under investigation. For several reasons the two-advance pulse type of logic has been abandoned and a three-advance pulse drive setup in its place. This enables a single gate core to be substituted for the dual-core gate previously used. A sequence of 3 stepping cores, with the output fed back to the input has been successfully cycling a "one" for the last two days, without spurious "one" buildup. The maximum advance pulse frequency is 100 kc, giving an overall stepping period of 30 μsec. This is in excellent agreement with the theory as presented in E-475. Indications are that the frequency can be further increased.

After the simplest register above has been completely investigated, a much longer register will be set up in order to investigate the driving problems. If these problems can be satisfactorily solved, work will commence on matrix driving from the register, in order to carry out serial logical operations, such as adding and counting.

2.34 Ferroelectric Materials

Preparation of Ferroelectric Material (J. Sacco)

Several specimens have been prepared from pure barium titanate and submitted for tests. These were pressed at 7500 psi and fired for two hours at 1300°C. Other samples prepared from the pure and technical grades of barium titanate have been pressed and are in the process of being fired at temperatures ranging from 1300-1450°C.

At the present time, specimens having a thickness of 1/32 of an inch can be pressed, but mechanical difficulties have been encountered. on lesser thicknesses.

Interlock for Ferroelectric Tester (C. Morrison)

A power-supply interlock has been designed for the new ferroelectric tester. It is now being built. This interlock was necessary because of the use of -450 and -600 voltages, which required a connection of the bench power supply to a floating power supply. The interlock will cut out all the voltages in case of a power failure in any one supply.

Ferroelectric Pulse Tester (J. Woolf)

The negative half of the pulse tester is acting normally up to the point of the output tube. The exact cause of failure for proper action from this point has not been determined. With the addition of -450 in the building the rack will be rewired and the floating supplies discarded. This should help in the elimination of loading on the power supplies.

2.4 Test Equipment

Test-Equipment Headquarters (L. Sutro)

A test-equipment area has now been established on the third floor of Whittemore 3. There you will find:

1. The test-equipment clerk, Lorraine Bruzzese.
2. Three of the technicians who maintain test equipment, Tony Kyrikos, Jim Delmege, and Don Haigh.
3. Spare test equipment.
4. Records showing who has each piece of test equipment and when it was last tested.

Whenever you hand a piece of test equipment to someone else either permanently or for a short loan, please notify the test-equipment clerk, on extension 3471, or write the clerk a memo. Her telephone has not yet been connected but will be soon. Only if we are kept informed of the location of each unit can we recall it and replace it when the time has come to give it a routine check.

Also, whenever you need additional test equipment, have equipment you do not need, or have equipment that needs repair, call or see the test-equipment clerk. At first she will check with me on each request. But before long she will be able to give you as much information as I can.

Out of the second order for Burroughs units that arrived during August, September and October, we have now handed out all of the Flip-Flops, Delay-line Panels, and Rack Power-control Units.

No more of these kinds of units will be available until the third order starts coming in the last week of December.

2.6 Component Analysis (B.B. Paine)

Several model delay lines have been silk-screened on barium-titanate discs, but so far none has been electrically continuous. Further work with silver paints more suited to silk-screen applications may prove more fruitful.

Detailed tests of the sensitivity to short, high-voltage overload pulses of various kinds of precision resistors are in progress as a result of the trouble in WWI with Nobleloy resistors.

2.7 Memory-Test Computer (J.D. Crane)

A physical layout for the toggle-switch storage in MTC has been made. There are 32 registers of 17 digits, the 17th being a parity check on the operator.

2.7 Memory-Test Computer (continued) (H. Smead)

Assembly work has been started on the gate-tube buffer-amplifier, parity-check, and decoder panels. The dual-gate panel will be started in the near future.

The 100 MTC flip-flops have been received and are being inspected.

(D. Shansky)

The memory-driving circuits of MTC have been breadboarded and are now being de-bugged. These circuits include the memory-plane drivers, read (or write) switch, the memory-line selection matrix, crystal-matrix output amplifiers, the cathode-follower matrix drivers, and the address flip-flops. All circuits are operating and attention is now turned to making them operate well.

Plug-in Flip-Flops (C.W. Watt)

One-hundred plug-in flip-flops for MTC have been received from Arthur J. Koch. His workmanship seems excellent, and the units have been going through inspection with little criticism.

Panel Storage (H.E. Anderson)

The latest plans for panel storage call for a total of 64 registers. Four of these will be live registers. The remaining registers will be divided between toggle switches and IBM plug boards. One 32-position switch and a few logical circuits in memory control will be used to select the registers.

Control (H.E. Anderson, R.A. Hughes)

The control has been in operation for the past two weeks and is cycling in a fashion very similar to its anticipated performance when the rest of the computer is available. At present it alternates between program timing and operation timing. It is free running in the sense that after completing a cycle it begins a new cycle automatically. If the circulating pulse is lost for any reason an alarm is given and the control attempts to start itself. Present plans call for placing the control on life test in the near future.

We have been bothered by transients on the lab D-C supplies. A filter panel is being built in an attempt to eliminate them. The following panels were constructed to facilitate control and marginal checking:

2 marginal-checking panels
1 plate hour-meter panel
1 error-counter panel
1 alarm panel
2 crystal mixers

2.7 Memory-Test Computer (continued)

We are presently marginal checking our flip-flops but soon we will be marginal checking all circuits.

Power Supplies (J.J. Gano, R.G. Farmer)

A 50-KVA, 120-208 motor-generator set has been ordered from Electrical Machinery Company. A delivery date of no later than March 1 was emphasized.

Terminal Equipment (R. Von Buelow, R. Pfaff, H.E. Anderson)

While awaiting delivery of IBM punched-card equipment, an interim system is planned using an IBM solenoid-operated electric typewriter for output, and toggle switches and IBM plugboards for input. For read-out, binary information from the A-register will set up a bank of 16 relays. These relays will be divided into five groups of three plus a sign relay. The switching network corresponding to each relay group will perform binary-octonary conversion and will have each of its eight outputs connected to one of the 0-7 solenoids on the typewriter. A stepping circuit will shift the typewriter from group to group.

Three conferences have been held with Messrs. Edwards, Butler, and Houseman of IBM in order to investigate the intricacies of IBM punched-card machines and plugboards.

Magnetic-Core Memory (W. Ogden, W. Papian)

The MF 1326B-F291 ceramic cores performed so well in Memory-Test Setup II that it was tentatively decided to use them for the MTC memory.

Work is in progress to prepare a general layout of the memory and associated equipment.

3.0 STORAGE TUBES

3.2 Test (C. L. Corderman)

Several modifications of the STRT Deflection-Voltage Generators are in progress. One of these changes moves the rest position of the spot from one corner to approximately the center of the array. The other change consists of adding a plugboard for the Decoder flip-flops. This will greatly simplify the process of changing the counting order of the flip-flops.

In place of the present scheme of counting from the smaller to the larger increments of deflection, spot by spot and line by line, we are going to try counting from the largest to the smallest increments, with the horizontal and vertical digits interleaved. Such a scheme should result in less spot interference as caused by the capacitance coupling between squares, but should have little effect upon spot interaction caused by repetitive operation on a single point. If such is the case, some net improvement should be realized by making this change in Whirlwind.

Television Demonstrator (D. M. Fisher)

In collaboration with C. L. Corderman a new standard test procedure has been inaugurated at Pretest. This change was necessary because of modifications made in the storage tube which outmode the old test procedure. The new procedure is described in Engineering Note E-501 and will be available very shortly.

[illegible]ive tubes have been pretested since the last biweekly period. [illegible] ST700-C, ST701-C and ST702-C were satisfactory and RT350-C, RT353-[illegible] sent to the STRT.

Storage-Tube Reliability Te[illegible]ter (R. E. Hegler)

Three research tubes and three 700-ser[illegible]s storage tubes were tested at the STRT during this biweekly period.

RT349-C, ST700-C and ST701-C were satisfactory while R[illegible]350-C and ST702-C were rejected and marginal respectively because of small spot interaction areas. Cage currents of RT350-C indicate this small area could have been due to the high-velocity gun and the tube was recommended for reprocessing.

RT353-C which contained a Philips "L" cathode has a normal spot interaction area. The extent of the current area was limited by low-beam current. At 0 bias the target current was 39 μa.

The block diagram of the STRT is being brought up to date.

3.2 Test (Continued)

Cage Measurements (C. T. Kirk)

In the light of some early experiences with storage tubes which have failed in Whirlwind I, it appears that we cannot expect any drastic changes in beam shape during the life of the tubes. Because of this the test procedure for cage measurements has been revised to give us more information in the region of low target currents (10μa). The scope traces of the cage current are now recorded at 5, 15, and 20μa as well as at the original currents of 10 and 50 μa and the 0 bias current. The cages are scanned for a distance of 100 mils instead of the original 200 mils in order to obtain greater magnification of the beam shape. Beam widths are now being recorded at each value of target current specified. Previously, no beam-width measurements were taken.

A 60-cycle ripple which appeared on one of the linear sweeps was found to have been introduced by a 7AK7 gate tube. This tube was replaced. Also, decoupling resistors were placed in series with the sync output and trace-separation gate output to prevent overloading of some cathode followers in the Cage Measurement Test Unit.

3.3 Research and Development

Video Readout (A. J. Cann)

The amplifier suggested by H. B. Frost has been constructed and looks very neat. It seems to work as expected but tests have not been completed. The basic nature of the readout signal and the transients must be given more cerebration before we can discover a readout scheme which will give the desired separation.

"L" Cathode Research (T. S. Greenwood)

RT353-C was processed and tested during the last period. This tube was reprocessed from ST622-C which had been rejected from the computer because of weak guns. In reprocessing the tube a high-velocity gun with an "L" cathode was used.

Initial tests showed that when the tube was operated d-c-wise at a bias of less than 10 volts, cathode poisoning occurred rapidly. However, normal emission could be restored by operating the tube pulse-wise for short periods. At biases greater than 10 volts both pulse and d-c emission were identical and stable.

The tube was installed in the STRT and was found to have a large spot interaction area which agreed well with that originally found in ST622-C. RT353-C has been left in the STRT for life tests and has now operated for 150 hours without noticeable effect on the emission of the high-velocity gun.

3.3 Research and Development (Continued)

RT350-C was also reprocessed using an "L" cathode in the high-velocity gun. Considerable difficulty was experienced during processing. Six hours were required for full activation, and during aging the emission was found to be very low. The tube was subsequently reactivated and thereafter gave satisfactory emission. The tube has not yet been tested.

RT352 was processed to investigate the possibility of carrying out conversion at lower temperatures than are presently being used. It was found that at 900°C, conversion reaches completion slowly if at all. A temperature of 1050°C to 1100°C appears necessary for satisfactory conversion.

Because of the slow delivery rate on "L" cathodes with imbedded heaters, further effort has been directed toward utilizing our stock of the earlier type "L" cathode. Some difficulty has been encountered in finding a suitable mixture of Al_2O_3 which will have both fluidity and low volume shrinkage on drying. Several trials have been made but a satisfactory mixture has yet to be found.

Velocity Distribution Measurements (C. T. Kirk)

A unit for separating the small cage-current pulse from a large gate has been designed and constructed. The unit is essentially a difference amplifier which has as one input the gate and small cage-current pulses, and an identical gate pulse as the other input. The output is the difference between the two waveforms, i.e., the small cage-current pulse. Preliminary testing shows promise that this method will work quite well.

The laboratory power supply is introducing considerable noise which must be removed by decoupling filters. The circuit can be balanced so that all but the high frequency portions of transients will be cancelled. During the next biweekly period an attempt will be made to cancel or reduce these spiked transients.

Secondary-Emission Measurements (J. Jacobowitz)

A relatively simple unit for making secondary-emission measurements has been completed. Preliminary test results have indicated that normal surfaces should have an apparent secondary-emission ratio of approximately 2.

4.0 TERMINAL EQUIPMENT

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

A new die block and punch for the manual correction of paper tapes has been completed and turned over to the tape room. To minimize breakage of the punches, it is requested that users support the die block firmly on a solid surface before inserting the punch.

A relay and cabling diagram, SD53123, has been prepared to show the connections between the FL output units and the Paper-Tape Output-Selector Relay Panel and the function of the relays used in the Paper-Tape Output-Relay Register and Selector-Relay panels. It is hoped that this sketch may prove an aid in troubleshooting.

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

The cause of intermittent dropouts from one magnetic tape information channel has been traced to a defective amplifier tube socket. One Read/Record Switch and Reading Amplifier panel has been removed from service for bench testing and to study the random noise problem. Channel redundancy is being maintained by series head connections.

The first cases of failure of the magnetic tape reel tension servo-amplifiers occurred almost simultaneously to two of the mechanisms. The trouble was traced to defective CK708 germanium diodes.

One magnetic tape mechanism was modified to operate from the A-C power mains for testing purposes at Building 32. This mechanism was shipped to Mr. Gillissen for fitting of redesigned capstans.

The breadboard magnetic tape print-out equipment has been modified to operate in conjunction with the new In-Out System, and has been set up temporarily in Room 261 for testing. This equipment will be moved to Room 226 for further use, and will soon be replaced by final WWI panels. The printer will be mounted on a wheeled table to permit operation in either Room 261 or Room 226.

4.3 Display (R. H. Gould)

One of the syntronic-instruments deflection yokes has been tested on a 16" display scope. The static tests showed a very pleasing lack of distortion and somewhat greater sensitivity than the CRC yokes now in use. Dynamic tests using the computer to plot a step on the scope showed alarmingly slow response. Two time constants seem to exist in the deflection of the beam. The smallest allows the beam to be deflected about 90% of the maximum in about 50 microseconds. The longer time constant causes the beam to take about 5000 microseconds to be deflected the remaining 10% of the maximum. This very slow response appears only when using the syntronic yoke but could conceivably be caused by the deflection amplifier

4.3 Display (Continued)

and be noticeable only with the more sensitive deflection yoke. Little progress has been made in finding the cause.

Some of the noise on the deflection lines was caused by oscillations of the L-C filter supplying +90V to the decoder output amplifier. The oscillation was stopped by shorting the choke.

(D. J. Neville)

The feasibility of display lights that can be pulsed "on" and "off", without the normally associated flip-flop circuitry, is being investigated. The work is being carried on with NE-16 type indicator lights at present. The immediate problem at hand is construction of a pulse generator, which will have both negative and positive outputs that can be varied in width and height, and has a low output impedance. This type of generator is needed to test the pulse characteristics of the neon bulbs and associated circuits.

4.4 Magnetic Drums (E. S. Rich)

Additional talks on the detailed features of the Auxiliary Drum System have been given during the last two weeks to a group of about 20 staff and technicians primarily from Group 64. So far logical operation and timing have been discussed. Further talks will be given next week covering the power control and initial testing plans.

(S. B. Ginsburg, P. W. Stephan)

During the past biweekly period, the cycling-test setup for the Auxiliary Drum was assembled and tested. The system is working satisfactorily and will be ready for use when the drum arrives.

5.0 INSTALLATION AND POWER

5.1 Power Cabling and Distribution (G. F. Sandy)

Power cabling and distribution in Room 156 is proceeding rapidly. Four men are now working on this full time. We also have a full-time inspector. All the Power-Distribution and Fixed-Voltage Switching Panels have been received and are being wired in. Six Voltage-Variation Panels have been received and are now in inspection. The Rack-Interlock and Fuse-Indication Panels have not yet been received from the vendor. We do not yet have the Filament-Transformer Panels. Gavitt Mfg. Co. will deliver the preformed cables by the week of December 1.

5.1 Power Cabling and Distribution (Continued)

The surface duct installation for test voltages and 115 A-C regulated and unregulated is being installed and should be completed in a day or two. A big hitch developed in trying to supply lighting and power to Room 156. The difficulty has arisen because it is nearly impossible to run any more wireways out of the transformer vault. However, a way has been found which involves going through 5 to 6 feet of wall. Bill Carroll is taking care of this.

5.2 Power Supplies and Control (G. F. Sandy)

Power Supply Control has been completely installed. It seems to be working fine except for trouble that developed with one relay. We hope to fix this during installation on 24 November.

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

The supply has been completely tied into WWI. Drawings are being brought up to date. The remaining vibration in the generator will be analyzed and reduced.

MTC Alternator (G. A. Kerby)

Parts are being ordered and installation planned for this alternator and its regulator.

Whittemore Building D-C Supplies (R. Jahn)

New, regulated power supplies of -300-volts, 15-amp D-C and +250-volts, 50-amp D-C have been installed, replacing the old unregulated supplies. A temporary, unregulated supply for -450-volts, 10-amp D-C is now available on pin 1 of the bench power-connector boxes. (This pin is incorrectly labeled +500 v.d.c.) This temporary supply consists of a floating 150-volt supply in series with the -300-volt supply. A permanent -450-volt supply is scheduled for delivery December 1.

Motor-Generator Sets, WWI (J. J. Gano)

The armature of the exciter for the 400A filament generator was sent out for rewinding because of a burned-out section. Another exciter has been ordered and will serve as a spare not only for this unit, but also for the exciters for the drive motor of the set and for the synchronous condenser in the 120-208-volt regulated laboratory supply.

5.2 Power Supplies and Control (Continued)

Standby D-C Supply WWI (J. J. Gano, R. C. Jahn)

Specifications for an M-G set, in which the generator output voltage can be set to any of the Whirlwind voltages except 500, have been drawn and are being sent to manufacturers for quotation.

6.0 BLOCK DIAGRAMS (B. E. Morriss, G. A. Young)

Effective 1 December the addresses of the si instructions affecting the paper-tape punch and the printers will be changed so that an automatic punching mode can be added. This mode will punch three characters from a 16-digit word in response to a single rc instruction. These characters will be correctly assembled into 16-digit words when the tape is read by the mechanical paper-tape unit or PETR using the word-by-word mode. The new addresses will be:

For the punch

si	204	(octal)	punches	one	character	with	7th	digit suppressed
si	205	"	"	one	"	"	"	" punched
si	206	"	"	three	"	"	"	" suppressed
si	207	"	"	three	"	"	"	" punched

For the printers

si	215	(octal)	Printer #1	print	one	character
si	225	"	" #2	"	"	"
si	235	"	" #3	"	"	"

A note will be distributed describing the changes in more detail.

If an rd instruction is given after an si instruction referring to the scopes the contents of IOR are transferred to AC and a point is displayed corresponding to the settings of the two decoders. This was originally intended to serve as a method of obtaining any information placed in IOR by light guns, but has been used to display points with a constant vertical deflection. This extra display has apparently caused some confusion in displays in which light guns are involved and it has been suggested that IOC be modified so that the display on the rd order is prohibited. Suggestions are invited as to whether this change should or should not be made.

Work is continuing on programs for checking the auxiliary magnetic drum and a memo on the operation of the buffer drum and its associated equipment.

6.0 BLOCK DIAGRAMS (Continued) (J. H. Hughes)

Syl Desjardins and I are writing a report describing the new Test-Control System, what it does, and how it does it. This report will be of interest principally to technicians and engineers. Another report, shorter and simpler, will describe the controls ordinarily used by operators in running programs on WWI.

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.

40. Input Conversion Using Magnetic-Tape Storage: Briscoe, 54 hours; Demurjian, 46 hours; Frankovich, 68 hours; Helwig, 70 hours; Kopley, 54 hours; Porter, 51 hours; WWI, 1031 minutes

As discussed in the last bi-weekly the output adaptation portion of the comprehensive program is divided into four logical phases. These four phases have all been tested individually and have been run successfully as an integrated sequence. Since these programs may be called upon to handle a wide variety of special cases, test runs will continue.

The comprehensive conversion program has been successfully operating for the past week in conjunction with the programmed arithmetic sections. Work is proceeding on combining it with the output subroutine adaptation programs. All of these programs use only the paper-tape readers and punches as they presently work, but by next week the first step towards complete use of magnetic-tape units, with the exception of the initial use of the PETR to read in the Flexo standard tape of the program being converted, will be taken. This will be accomplished by the elimination of the intermediate process of punching out a "logical" information tape, recording the same information instead on one of the tape units.

A programmed arithmetic post-mortem program which will print out the contents of useful registers in the interpretative subroutine is being written.

93. The Transmission Cross Section of Absorbing Spheres Using the Mie Solutions: Demurjian, 4.5 hours

The program has been completed and will be submitted to the Tape Room. The floating-point part of the Master Output Routine is too long for the space available. A shorter routine will be written with less generality and no flexibility to conserve space. This routine will eventually become part of the Master Output Routine under special conditions.

94. Factorization of Integers: Denman, 18 hours; Uchiyamada, 11 hours; WWI, 165 minutes

The final factorization program attempts to factor arbitrary numbers of 3 register length or less. If all the factors of the number are smaller than a certain limit, these factors will be printed. The number then is altered in steps of ± 1 (up to a preset limit), and the resultant number is factored as above. The upper limit on the factors may be changed by modifying the contents of one register. This largest prime factor, as the program now stands, is 599.

8.1 Programs and Computer Operation (continued)

The program has been successfully run in the last bi-weekly period with varying limits set on both the size of the factors and the size of the alterations of the original numbers.

Computer time, hours	
Programs	51 hours, 15 minutes
Conversion	4 hours, 30 minutes
Demonstration	49 minutes
Total	56 hours, 34 minutes
Total time assigned	62 hours, 41 minutes
Usable time, percentage	90%
Number of programs operated	115

9.0 FACILITIES AND CENTRAL SERVICES

9.1 Publications

(Diana Belanger)

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

LABORATORY REPORTS

No.	Title	No. of Pages	Date	Author
E-498	An Electronic Holding Circuit	3	11-12-52	J. A. O'Brien
E-499	Operation of the Block Transfer Orders	15	11-13-52	B. E. Morriss
M-1713	Bi-Weekly Report, November 7, 1952	39	11-7-52	
M-1714	Group 63 Seminar on Magnetism, IX	4	11-10-52	A. Loeb N. Menyuk
M-1718	Group 63 Seminar on Magnetism, Appendix I	4	11-12-52	See above
M-1719	Test Equipment Committee Meeting, Nov. 4	3	11-12-52	L. Sutro
M-1726	14-Channel Ampex Recorder	3	11-20-52	E. S. Rich
A-142	DIC Staff Checks and Check Stubs	1	11-17-52	J. C. Proctor

LIBRARY FILES

No.	Identifying Information	Source
2140	Linearized Theory of Nonstationary Flow at Supersonic Speeds	U.S. Naval Ordnance Test Station
2141	Abbreviations for Scientific and Engineering Terms	A. S. M. E.
2142	JAINCOMP-A's Sister (Clipping)	Washington Daily News
2143	Transmission of Transient Voltages	Bell Telephone Labs.
2146	On Lineal Entire Functions of n Complex Variables	Proc. Amer. Math. Soc., Aug., 1952
2147	Operating Efficiency and Characteristics of the Computing Machines at the Ballistic Rsch. Labs., T. N. 737	Ballistic Research Labs.
2148	Two Applications of Group Characters to the Solution of Boundary-Value Problems	Journal of Research of N. B. S.
2149	On Cauchy-Riemann Equations in Higher Dimensions	See Above
2150	An Expansion Method for Parabolic Partial Differential Equations	N.B.S. T. R. #1629
2151	Acoustic Radiation Pressure on a Circular Disc	N.B.S. T. R. #1800
2152	Configuration Theorems and Coordinates in Projective Geometry, I and II	Institute for Numerical Analysis, Summer, 1952
178	Mathematical Tables and Other Aids to Computation	October, 1952
	Proceedings of the I. R. E.	November, 1952
	Nuclear Science Abstracts	July 15-September 30, 1952

9.0 FACILITIES AND CENTRAL SERVICES

9.1 Publications

(Diana Belanger)

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

LABORATORY REPORTS

No.	Title	No. of Pages	Date	Author
E-498	An Electronic Holding Circuit	3	11-12-52	J. A. O'Brien
E-499	Operation of the Block Transfer Orders	15	11-13-52	B. E. Morriss
M-1713	Bi-Weekly Report, November 7, 1952	39	11-7-52	
M-1714	Group 63 Seminar on Magnetism, IX	4	11-10-52	A. Loeb N. Menyuk
M-1718	Group 63 Seminar on Magnetism, Appendix I	4	11-12-52	See above
M-1719	Test Equipment Committee Meeting, Nov. 4	3	11-12-52	L. Sutro
M-1726	14-Channel Ampex Recorder	3	11-20-52	E. S. Rich
A-142	DIC Staff Checks and Check Stubs	1	11-17-52	J. C. Proctor

LIBRARY FILES

No.	Identifying Information	Source
2140	Linearized Theory of Nonstationary Flow at Supersonic Speeds	U.S. Naval Ordnance Test Station
2141	Abbreviations for Scientific and Engineering Terms	A. S. M. E.
2142	JAINCOMP-A's Sister (Clipping)	Washington Daily News
2143	Transmission of Transient Voltages	Bell Telephone Labs.
2146	On Lineal Entire Functions of n Complex Variables	Proc. Amer. Math. Soc., Aug., 1952
2147	Operating Efficiency and Characteristics of the Computing Machines at the Ballistic Rsch. Labs., T. N. 737	Ballistic Research Labs.
2148	Two Applications of Group Characters to the Solution of Boundary-Value Problems	Journal of Research of N. B. S.
2149	On Cauchy-Riemann Equations in Higher Dimensions	See Above
2150	An Expansion Method for Parabolic Partial Differential Equations	N.B.S. T. R. #1629
2151	Acoustic Radiation Pressure on a Circular Disc	N.B.S. T. R. #1800
2152	Configuration Theorems and Coordinates in Projective Geometry, I and II	Institute for Numerical Analysis, Summer, 1952
178	Mathematical Tables and Other Aids to Computation	October, 1952
	Proceedings of the I. R. E.	November, 1952
	Nuclear Science Abstracts	July 15-September 30, 1952

9.2 Standards, Purchasing, and Stock

Procurement and Stock (H.B. Morley)

2000 Amperex 1N38A crystals have been received as promised. The balance of 3000 are expected for early December.

The shipment of the auxiliary drum from ERA has been arranged for about November 21; additional spares for ERA drum are in process and being ordered.

Previous delivery difficulties reported with the Webster Teletalk for the Cape Cod intercom system are now corrected with the arrival of the hand sets.

During this past biweekly period, Messrs. H.B. Morley and Al Nelson visited the New England Transformer Company, inspecting and appraising their production methods. Delivery dates of overdue items were determined, and by supplying cores from our own stock immediate deliveries of pulse transformers were arranged. It may be profitable, as in this case, to visit other major suppliers to improve deliveries.

There has been a great increase in requests for use of our pick-up truck for "rush" orders, which is overtaxing the service. Requests for rush or emergency pick-up should be carefully considered.

Deliveries continue very slow on transformers, wire, terminal strips, and BNC "Tee" adapters; improvement has been noted in deliveries of some tubes which have been difficult procurement items, such as 5963, 5964, 5670.

Due to increasing expansion of procurement, more file cabinets were needed. A complete change-over of files has been completed.

Standards (H.W. Hodgdon)

Work for this period has been concentrated on standards for connectors. Proposals have been drafted for:

A-C Power Connectors
Power Plugs and Jacks
Telephone and Microphone Connectors
Solderless Wire Terminals

Tentative requirements for a series of multi-conductor panel and cable connectors have been submitted to one manufacturer for evaluation and comment.

An outline is being drafted for a manual of construction and wiring practices.

9.2 Standards, Purchasing, and Stock (continued)

Non-standard values of resistors crop up frequently in prototypes and parts lists. Attention is directed to the Parallel-Resistance Chart in the resistor section of the Standards Book, from which a close approximation to almost any desired value can be obtained with combinations of two standard RMA values.

9.3 Construction

Production Control (F.F. Manning)

The following units have been completed since November 7.

CR#	Qty	Title	Originator
1793	15	Multivibrator Frequency Divider	Test Equip Com
1889-5	1	Rack D-C Switch Panel	Sandy
1900-1B	11	Terminal Strip & Fuse Board	Sandy
1900-3F	8	Power-Distribution Panel	Sandy
1900-3G	1	Filament Bus Panel	Sandy
1912	1	Magnetic-Tape Print-Out Switch Panel	Farnsworth
1983	50	Plug-in Units (Mod.)	Smead
1990	1	Power Supply for Filament-alternator Regulator Mod II	Kerby
2018	1	Metallic-Array Read-Switch Panel	Widrowitz
2019	50	S.T. Mount Detail "E"	Holmes
1900-4D	1	Installation of Overhead Wireway from Room 263-Room 222	F. Sandy
1900-4E	1	Installation of Vertical Wireways from Room 222 to Room 138	F. Sandy
1900-4F	1	Installation of Overhead Wireway from Room 138 to Room 156	F. Sandy

The following units are under construction:

1767	800	Video Cables	Test Equip Com
1793	16	Multivibrator Frequency Divider	Test Equip Com
1788	30	D-C Power Strips (8 Plug)	Test Equip Com
1795		Filament Power Panel	Test Equip Com
1798	1	MTPO Thyratron Power Supply	Farnsworth
1617	1	5-amp 300-Volt Regulator	Kerby
1817	1	Magnetic-Tape Print-Out Control Register	Farnsworth
1900-1B	15	Vertical Fusing Strips	F. Sandy
1952-2A	48	GT-BA Panel Sub-Assy	Smead
1952-6A	48	Cathode-Follower Sub-Assy	Smead
1952-7A	10	Decoder Sub-Assy	Smead
1952-9A	16	Parity-Check Sub-Assy	Smead
1983	as req	Plug-in Unit Modified Issued Units brought up to date	Smead
1952-35	80	Video Cables	Smead
1952-54	30	Delay Lines	Smead

9.3 Construction (continued)

CR#	Qty	Title	Originator
1984-11	35	Two-Way Switch Brackets	Test Equip Com
1984-22	20 ea	Tyrex Line Cords	" " "
1984-24	300	91-ohm Terminators	" " "
1993	1	Tube Tapper Indicator	Twicken
2016	2	Preburn Panel	Frost

Outside Vendors (R.F. Bradley)

A system will be in operation shortly from which the exact status of wiring, assembly, plastic fabrication and machine work jobs on C.R. projects may be obtained by originator or vendor up to point of our internal inspection dept. To make such inquiry, call R.F. Bradley on W-X3476.

The following outline briefly summarizes present activity with vendors on above type work.

Units on order	5,181
Units del. to date	310
Orders active	10
Firms involved	7

	P.O.		Total	Del.	
1.	10440	Raytheon	4012 units	67	Complete fabrication
2.	14234	Koch	50	19	Wiring & Assembly
3.	33429	Koch	50	--	" "
4.	13239	Dane	12	6	" "
	"	"	25	25	" "
	"	"	8	--	" "
5.	33372	"	10	--	" "
	"	"	20	--	" "
6.	14564	Gavitt	580	--	" "
7.	14497	Howe Prod.	100	--	Machine Work
8.	17320	Amer. Assoc	300	167	Plastic Fabrication
9.	Wk. Ord.	Lincoln	6	--	" "
	"	"	6	--	" "
10.	"	"	2	1	" "

Gradual expansion of vendors capable of above work is taking place against increasing demands within the Laboratory.

9.4 Drafting (A.M. Falcione)

1. New Drawings

	Cir. Sch.	Assy & Pl.	Al. Panel
Relay Panel M.C. Control Mod II (WWI)	E-52673	E-53022	E-53023
Core Driver Mod VI (TE)	C-52643	D-52772	C-53064
Marginal Checking Control Panel Mod II (WWI)	D-52822	R-53073	D-53087
Gate Tube - BA Panel (MTC)	D-52594	E-53058	
Power Supply Control Panel #2 (WWI)	D-52305	E-51958	E-52330
Basic Rack Assembly (MTC)		E-53012	

2. Use for Obsolete or Discarded Memorandums

A memo was written to all personnel requesting that all memorandums, reports, etc., which are to be discarded or thrown away, be sent to the Print Room for future use. In our multilith operation procedure we have a need for scrap paper, which is used for absorbing the ink from each master after the initial run has been made. This process is necessary to preserve the master for future re-runs; therefore, this would be a good place for all discarded memorandums to be sent for eventual scrap.

3. Thesis Drawings

All engineers who are writing or plan to write a thesis this term, please contact the Drafting Supervisor at your earliest convenience, so that proper arrangements can be made on your drafting requirements.

10.0 GENERAL

New Non-Staff (R.A. Osborne)

Norbert Cianciulli has joined the Construction Shop as a Laboratory Assistant.

John Doherty is also a new Laboratory Assistant in the Construction Shop.

John Ellsworth is a Northeastern Coop student working in the Storage Tube Group.

Marie Hoer is a new messenger girl at Whittemore Bldg.

Theodore Iossa is a new member of the Drafting Room.

Vincent Michienzi is a new Laboratory Assistant in the Maintenance Group.

10.0 GENERAL (continued)

Victor Matera is a new Laboratory Assistant in the Tube Testing Lab.

George Perkins is another Laboratory Assistant for the Construction Shop.

Terminated Non-Staff (R.A. Osborne)

Dorothy McQuillan
Robert Walsh

IBM Subcontract (A.P. Kromer)

Formal agreement has been reached with IBM regarding all terms and provisions to be covered by our subcontract. The contract has now been submitted to the Air Force for their approval prior to actual signing by IBM. It is expected that the contract will be signed within the next week.

IBM engineers are continuing to make extended visits here in order to become familiar with the work done to date regarding design of the computer and its use in the Systems Application. IBM engineers are working in the general fields of Programming, Logical Design, Magnetic Memory, Terminal Equipment, and In-Out for MTC.