Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: BIWEEKLY REPORT, JUNE 29, 1953

To: Jay W. Forrester

From: Scientific and Engineering Computation Group

1. MATHEMATICS, CODING AND APPLICATIONS

1.1 Introduction

During the period covered by this report 199 coded programs were run on the time allocated to the Scientific and Engineering Computation (S&EC) Group. These programs represent part of the work that has been carried on in 26 of the problems that have been accepted by the S&EC Group. Progress on each of these problems is given below in terms of programming hours, minutes of computer time, and progress reports as submitted by the programmers in question.

Progress on the three comprehensive systems being developed by the S&EC Group is described under problem numbers 100, 140 and 150. The system described under #100 is the one now in use and details may be found in E-516-2. Most of the work on this problem during the past biweekly period has been concentrated on the development of post mortem and output routines. The use of the delayed punch (i.e., punching from magnetic tape) for punching the converted 556 tapes has now been included in the system.

Three new problems were initiated during this period. Problem #138 involves the tabulation of the spheroidal wave functions and is being programmed by J.Little and F. Corbató of the MIT Physics Department. Problem #139 is concerned with the calculation of approximate theoretical line shapes for nuclear magnetic resonance absorption lines. This work is being carried out in cooperation with P. Besag of the Harvard Chemistry Department. Problem #141 has been set up to handle the final developing and testing of routines for the S&EC library of subroutines.

Problem #118 on group communications has been completed. The results will be processed by the Group Networks Laboratory at MIT.

The routines developed by D. Ross for the evaluation of autocorrelation functions have been applied to a medical problem and to a problem on turbulent flow. These applications are described under problem #107.

1.2 Programs and Computer Operation

100. Comprehensive System of Service Routines: Arden, 3 hours; Briscoe, 56 hours; Combelic, 1.5 hours; Denman, 2 hours; Demurjian, 24.5 hours; Frankovich, 16 hours; Hazel, 15 hours; Helwig, 6 hours; Kopley, 32.75 hours; Porter, 9 hours; Vanderburgh, 26 hours; WWI, 596 minutes

The version of the CS which will record converted programs on the delayed output magnetic tape units for later punch-out in 556 form now works satisfactorily. It will be put into daily use when the delayed punch equipment operates reliably.

Helwig and Frankcvich

The generalized decimal (G.D.) number and interpretive instruction post mortem (PM) has been revised to use the new flexo-code positions for the delayed printer. There also exists a G.D. number post mortem for two bank CS. The two bank programmed arithmetic (PA) PM has been incorporated in the 4-way PM. The operators have been informed how to prevent the loss of the programmers' information due to read-in difficulties of the post mortems.

Hazel

Most of this period was spent testing the basic conversion program and trying to find the error in the CS title display for the new si orders.

A memo describing the basic conversion programs has been started.

Modifications in the present basic conversion programs to allow use of the order md and to put in a special character after every 48 feet of punched paper tape were made and checked.

Briscoe

In the future the testing of subroutines for the library of subroutines will be reported on under problem number #141. During this biweekly period, work has been done on the square root routine to allow it to determine the square root of zero correctly independently of the exponent. The new routine has been tested and is working correctly.

The 12 scope post mortem routines have been corrected for use of the new si 4 instruction for the camera (use parameter 0) and for the new decoders (use parameter 1). These parameters are separate tapes and must be read in after the main program. As soon as all of these tapes have been tested on WWI the parameters will be attached to the main tapes and used in the normal manner. This was done so that the original tapes would be available while the corrections were being tested.

Vanderburgh

An automatic scope post mortem has been locked-out on Group 11. This program occupies registers 1000-1230(o) and is dependent upon the read-in program at the beginning of Group 11. This post mortem may be used merely by pressing the read-in button with nothing under the head of PETR and then starting over at 1000(o). This has been written up in greater detail in M-2265.

Kopley

Several test tapes were converted by CS to check the new output blocks. These blocks were written in order to use a common auxiliary block for the scale factored and non-scale factored cases. There were difficulties in conversion because several characters had not been removed in duplicating the tapes in the tape room. These have been corrected.

The program is being checked to determine why there is an irregularity whenever a (24,6) zero is being printed.

Demurjian and Porter

101. Optical Properties of Thin Metal Films: Denman, 6 hours; Loeb, 12 hours; WWI, 13 minutes

An error in the floating addresses referred to was discovered and corrected. Because of some changes in the automatic selection of output routines, the tape was changed and reconverted. Twenty-two iterations were performed without sufficient convergence. In order to check the successive results of the iteration the output routines (iTOA) are needed. An error analysis was postponed until these subroutines are finally tested.

Loeb

102. Scattering of Electrons from Gases: Uretsky, 1 hour; WWI, 24 minutes

The last run reported in the previous biweekly was found to have a tape room error. This error was discovered and corrected and the tape was rerun.

Uretsky

106. MIT Seismic Project: Briscoe, 1.25 hours; Simpson, 35 hours; Robinson, 10 hours; WWI, 240 minutes

During the last two weeks our group received the operator coefficients and concentrated on production runs using the General Prediction program. The results are to be in report form within a month. They consist of 41 sets of errors and error curves and 17 sets of variance curves.

Robinson

107. (a) Autocorrelation and (b) Fourier Transform, Evaluate Integrals: Frankovich, 1.5 hours; Trumper, 6 hours; WWI, 23 minutes

An investigation is being conducted of human and animal intestinal motility under normal and imposed (X-ray) conditions. Intestinal pressure is recorded oscillographically. The records are digitized for autocorrelation and then Fourier transformation, yielding estimates of power spectra.

Of this trial run of two samples, one was autocorrelated during this period. The results are satisfactory, but a re-run at coarser tau-shifts is indicated before performing Fourier transformation.

Trumper

A project, sponsored by the Office of Naval Research under Contract No. N5-ori-07874, is investigating turbulence in water by means of a Pitot-tube pressure-cell combination. In turbulent flow, the velocity is no longer steady. There are velocity fluctuations about the mean velocity which are of a random nature.

For these investigations a record of 30 seconds was considered sufficient to obtain an autocorrelation curve. This correlation curve was acquired by using a mechanical correlator borrowed from the Servomechanisms Laboratory here at MIT.

However, in all of the correlation curves, a periodic component of 8 cycles/sec was observed. In order to determine the major frequencies involved, and also to determine whether the 8 cycle/sec component was due to the beating of two different frequencies, it was decided to obtain a power density spectrum. In order to do this, 300 points were taken at equally spaced intervals on the autocorrelation curve and given to the Digital Computer Laboratory. Since the points on the power density spectrum were just received today, it hasn't been possible to do any sort of analysis.

Tankin

111. Fourier Analysis--Autocorrelation Problem: Hazel, 1.5 hours; WWI, 45 minutes

Various program errors have been corrected and the program has printed out much useful information. However, because of inefficient use of magnetic tape the end of the reel was reached before the print-out was completed. Modifications have been made to use the tape more efficiently.

Block

112. Lawley's Method of Factor Analysis; Characteristic Vectors (modified): Denman, 7 hours; WWI, 14 minutes

The last run indicated that the main program for the solution of the matrix equation worked correctly, although a supplementary check program does not work. In the future, the check program will be investigated and further production runs made with other assumed ranks for the data matrix.

Denman

113. Shear Wall Analogy, Simultaneous Linear Equations: Kopley, 1.5 hours; WWI, 114 minutes

A series of parameters, representing a variety of reinforced concrete shear walls, has been satisfactorily performed on Whirlwind I. An alarm occurred during one performance and the last group of six parameters has not been performed. A report is being written on the investigations carried out to date on this phase of the problem.

Sydney

114. Design of Optical Instruments: Combelic, 4.5 hours; Mahoney, 30 hours; WWI, 95 minutes

The rewritten version of the third-order aberrations program, mentioned in the last biweekly, ran successfully, computing the aberrations of a fifteen-surface optical system for light rays of two colors. The ray-tracing program also worked, tracing five rays. The results obtained from four of the rays were correct, but the fifth ray, which was a special case in that it started at an interior point of the optical system, gave incorrect results.

Mahoney

116. Torpedo Impulse Response; Convolution: Hamilton, 40 hours; WWI, 70 minutes

We are using the Fourier transform program for our data for frequency intervals which are 1/4 as large as for former runs. About one third of these runs have been carried through and processed.

Three runs were also made with a trial acceleration impulse response. These will have to be rerun because the scale factor used was not of the correct magnitude to give good results.

Kramer

118. Quantized Group Communication and Learning; Non-Markovian Stochastic Process: Denman, .5 hours; K. Ralston, 2 hours; WWI, 53 minutes

The run for the last network has been made and the results are being processed. A discussion of the results will appear in the June quarterly report.

K. Ralston

119. Spherical Wave Propagation: Fox, 5 hours; WWI, 39 minutes

A tape correction to increase the mesh spacing was made and a run requested. One trial run was unsuccessful for reasons apparently attributable to magnetic tape and a second run confirmed the source of error. The tape is to be tried again after tape unit #1 is improved.

Fox

120. Thermodynamic and Dynamic Effects of Water Injection into Gas Streams of High Temperature and High Velocity; Simultaneous differential equations: Porter, 5 hours; Gavril, 5 hours; WWI, 323 minutes

This biweekly period has been devoted entirely to continuation of production runs with 22 different combinations of initial parameters having been treated. The results of these computations will be discussed in a later report.

The computational program has been divided into three categories depending upon the size of the Aerothermopressor. These are: 1) small-scale laboratory rig, 2) large-scale unit now under construction, and 3) ideal frictionless unit. For each category, performance curves at various Mach numbers are being obtained. In addition, the effect of variation of each of the eight other parameters is being studied in the case of the small-scale rig in order to compare with experimental results.

The remainder of the computational work on Whirlwind I will be devoted to calculation of the critical Mach numbers for each case together with the insertion of normal shocks on the supersonic branch. Several runs at variable area will be made, and runs with smaller increments will be required to carry significant cases further to completion.

Gavril

121. Determination of Weak Signal plus Noise Probability Functions: WWI, 27 minutes

The program written to carry out one convolution of the probability density function was corrected and run again. The results will be analyzed by Dr. Sponsler when he returns from his vacation.

Porter

123. Earth Resistivity Interpretation: Integration of empirical functions: Vozoff, 10 hours; Briscoe, 5.25 hours; WWI, 23 minutes

After several tests it was found that incorrect output requests were being used. These requests will be corrected and the testing resumed.

K. Vozoff has left MIT for the summer and further work on this problem will be carried on by L. Strickland of the MIT Geophysics Department.

Vozoff

126. Data Reduction: Combelic, 3 hours; Ross, 40 hours; Cundiff, 80 hours; WWI, 35 minutes

The program for fitting polynomials is now working properly but an error in the program to plot the error between the polynomial and the given function still must be located. The program is being rewritten to use higher order integration formulas and unequally spaced points. A program to find the mean and variance and plot a histogram of the errors at each step is being tested.

Ross

127. Finite Bending of Circular Ring Plate due to Edge Moments; two coupled second order non-linear differential equations: Porter, 1 hour; Hicks, 4 hours; WWI, 4 minutes

A successful program was performed giving 90 initial values; however, due to physical considerations some of the values seemed questionable. A modification was then written to obtain some intermediate values in both the known and questionable cases. This program was unsuccessful due to a misunderstanding in tape preparation. It is hoped to correct this modified tape and try again.

Hicks

130. Six-component Distillation, Variable Enthalpy and Equilibrium Data; Simultaneous Non-linear Equations: Combelic, 1 hour; Briscoe, 5.75 hours; Horowitz, 50 hours; WWI, 97 minutes

All coding errors appear to have been eliminated, and a successful solution was obtained, using program 2546m9. This completes the major phase of the problem. It may be desirable to test the validity of the approximations used in formulating the equations by obtaining a number of solutions over a range of input parameters. This can be decided upon O'Donnell's return in October. O'Donnell may wish to test the program further.

Horowitz

131. Special Problems (staff training, demonstrations etc.): Kopley, 2.5 hours; Vanderburgh, 9 hours; WWI, 6 minutes

A lecture-demonstration was held for twenty-five members of Professor Thomas Hill's summer course "Control Problems of the Executive", on June 19 from 3:30 to 5:15 PM. The program was the following:

Dean Arden pointed out and described the components of the computer; Hilda Uchiyamada demonstrated and described five programs on WWI; Sophia Kostaras showed the group some of the Flexowriter equipment in operation; Ed Kopley showed slides and lectured on computers in general and WWI in particular.

Kopley

Three demonstration tapes have been modified for use with the new scope decoders. In order to save the old tapes, new numbers were assigned. They are

2690 which corresponds to 2140-5
2692 " " " 2056-1
2693 " " " 2082-7

Tape No. 2691 has been prepared (corresponding to 2053-1) but has not been tested.

Vanderburgh

132. Revision, Extension and Testing of Subroutine Library Used in Programs for Obtaining Data for the Numerically Controlled Milling Machine; Routine numerical and logical operations: Frankovich, 2.5 hours; Runyon, 20 hours; WWI, 45 minutes

Because of the necessity of making modifications in library subroutines for two-bank operation and because of the failure of a square root routine to handle a zero, not much testing of NCMM library subroutines was obtained. One programming error due to a misinterpretation of the cycle count order was found.

Runyon

133. Non-linear Meson Equation: Finkelstein, 1 hour; WWI, 8 minutes

A program was tested which successfully gave individual solutions of the meson equation being studied. It will now be adapted to give families of solutions.

Finkelstein

134. Numerical Diagonalization Procedure: Arden, 5 hours; WWI, 21 minutes

Errors in the CS routine have prevented a successful testing of the program. These errors have been corrected so that the program can now be tested per se.

Meckler

137. Investigation of Atmospheric Turbulence; Autocorrelation, Crosscorrelation and Fourier Transforms: Summers, 10 hours; Kopley, 1.5 hours; WWI, 32 minutes

Previous data tape errors were corrected. Autocorrelation runs were made with the new data tapes, but nothing was recorded on magnetic tape. This was finally attributed to overloading of the computer by the data at the scale factor used. The autocorrelation program tape has now been modified to divide all ordinates in the data by four (tape no. 2345m6) and new performance requests have been submitted.

A suitable program for crosscorrelation is nearing completion.

Summers

138. Spheroidal Wave Functions: Little, 60 hours; Corbató, 40 hours; Combelic, 4 hours; WWI, 0 minutes

Spheroidal Wave Functions arise when one considers the solutions of the scalar wave equation in spheroidal coordinates. These functions, $S_{ml}(h,z)$, are functions of two variables h and z and two indices m and l. Inasmuch as straightforward tabulation of these functions would be lengthy, the functions are expanded in a series of associated Legendre Polynomials, $S_{ml}(h,z) = \sum_n d_n (h \mid ml) P^m_{m+n}(z)$.

Thus the problem reduces to tabulating coefficients which are functions of one variable and three indices. Because the coefficients are effectively zero for all but a small range of n, the tabulation of these coefficients is feasible. The restricted range of the coefficient also serves as the basis for the calculational method; namely, the rolling-up of two continued fractions, one from each region of zero coefficients, followed by iteration of this procedure until the two continued fractions agree at a joining point.

A program utilizing delayed print-out has been written for the layout of the results in a form suitable for direct photo-offsetting. This program is currently being tested. Another section of the final program which will accumulate the several sets of results required by the layout routine has also been written and will be tested. It is estimated that one third of the programming is done.

Corbató and Little

139. Line Shape Calculation: Porter 3 hours; WWI, 12 minutes

The calculation of theoretical line shapes for nuclear magnetic resonance absorption lines is being carried out to make possible a comparison with experimentally obtained line shapes. In order to obtain a theoretical line suitable for comparison with experimental lines, it is necessary to modify the rigorously derivable ideal theoretical line shape for an isolated methyl group by applying a "broadening function". This is a symmetric function which compensates for the

net accumulated effect of neighboring nuclei on those of the isolated methyl group, and which has the effect of broadening and flattening the idealized theoretical line leaving the area under the curve invariant. Both the so-called "Gaussian"

$$\left(Ae^{-\frac{x^2}{(\beta/a)^2}}\right)$$

and the "Lorentz"

$$\left(\frac{B}{1+\frac{x^2}{(\beta/a)^2}}\right)$$

will serve as broadening functions. We are using the Gaussian. The value of the parameter β/a determines the extent of flattening out. We shall use five values of β/a and shall, for each such value, plot the general line shape curves in the interval (0,3) by plotting values of μ/a against functional values at intervals of 1/10 for the function.

A program for the evaluation of F for one pair of values of β/a, μ/a, using the Gaussian quadrature formula for n = 15, has been written and is under test. The Gaussian quadrature formula is being used because of the bad behavior of the integrand about the midpoint of the interval of integration, especially for the smallest value of β/a.

Besag

140. Summer Session System: Combelic, 7 hours; Denman, 3 hours; Finkelstein, 79 hours; Gill, 50 hours; Rotenberg, 76 hours; WWI, 0 minutes

The Summer Session Conversion Routine is being programmed. New instructions and redefinitions of old instructions for the Summer Session System have been described in M-2227 Supplement-1.

The Summer Session Interpretive program is being planned, but no programming has been done.

Rotenberg, Finkelstein and Gill

150. Drum Comprehensive System of Service Routines: Arden, 25 hours; Combelic, 30 hours; Denman, 2 hours; Frankovich, 40 hours; Helwig, 30 hours; Vanderburgh, 5 hours; WWI, 0 minutes

Discussions are continuing on methods of interpreting a Drum CS program. The program would in all cases be entirely on the drum; only those parts currently in use would be in ES at any given time, along with the double-length PA interpretive routine. Of several methods discussed, two appear to be worth detailed study.

The first of these methods requires two registers for each instruction--the first register contains the operation and information about the appropriate cycle line; the second register contains the drum address. This scheme appears to be relatively fast in operation, but it is wasteful of storage.

The second method is more economical as far as storage is concerned, but requires more time to perform each interpreted instruction. In this scheme each instruction occupies only one register: 6 digits for the operation, 10 digits for

the address. The address sections of all arithmetic operations and of transfers of control refer to entries in a flad table of less than 2^{10} entries. If an instruction refers to a cycle count line, the number of the line is found in the flad table. It appears that 7 cycle count lines will be available.

The flad table is considered an integral part of the program, all of which is stored on the drum. The drum is divided into blocks of constant length and only those blocks currently in use are in ES at any given time. If a new block is needed from the drum, it replaces the ES block which has been least recently used. It is believed that such a "block-phasing" scheme will minimize the number of drum references and lead to an efficient operation.

Combelic

1.3 Computer Time

The following indicates the distribution of WWI time allocated to the S&EC Group.

Programs	39 hours, 36 minutes
Conversion	13 hours, 44 minutes
Magnetic-Tape Test	19 minutes
Magnetic Drum Test	05 minutes
Scope Calibration	73 minutes
Demonstrations (#131)	06 minutes
Total Time Used	55 hours, 03 minutes
Total Time Assigned	61 hours, 51 minutes
Usable Time, Percentage	89%
Number of Programs Operated	199

1.4 Summary of Tape Room Bulletin Board Memoranda (H. Uchiyamada)

(These memos are intended to inform programmers of changes in coding procedure, WWI facilities etc.)

Scope Post Mortems

Attention is called to the fact that all the scope post-mortems tabulated in Bulletin Board Memo #16, have been tested and are now available. A few changes have been made in the addresses in the table. These changes are posted in the tape room.

Post Mortem for PA

On the post-mortem request for a PA printout, the one bank refers only to those tapes converted prior to June 2, 1953. The two bank (with the PA at the end of the second bank) refers to those tapes converted after June 2. This distinction in no way applies to the number of banks used in a program.

New Position of Flexo Code

The old flexo code occupied positions AC(2) through AC(7) and selection of the punch was always manual. The new flexo code occupies positions AC(0) through AC(5). A one in AC(6) selects the 7th hole and a one in AC(7) selects the punch

while a zero in AC(7) selects the printer.

The new FL typewriter (long carriage) for the delayed printer has either manual selection of the punch or automatic punch. When the punch has been programmed using the new code, it should not be checked on the performance request since the punching will be automatic. However, if a punchout is desired without having been programmed or programmed using the old code, it should be indicated under auxiliary equipment (delayed punch) on the performance request.

Programmer's using 2299m5 (delayed printer subroutine) should note that register 9r now contains clc8(dec) instead of clc6. In most cases this may be corrected in programs by means of a manual mod. Subsequently 2299m6 should be used for new programs. When the old code is used for the delayed printer it should be so stated on the performance request. It is assumed by now that all programs are using the latest mod of 2299, which is mod 6.

Drum Group Selection

If a programmer uses several tapes and the drum, he must be aware of the fact that each time a tape is "read-in", the Group Selector Register (GSR) is reset to Group zero, and the Storage Address Register (SAR) is altered to suit the particular tape being read in. The programmer should therefore use si703 for reading from or si707 for recording on the drum, each time the drum is used in a tape that has to be read in, to enable him to reselect his group number and initial drum address. The use of si703 for reading from, and si707 for recording on the drum, enables the programmer to indicate the drum group and initial drum address in which he intends to read or record. The reason for this caution is that the Read-In Program selects Group zero and a variable initial group address.

2. COMPUTER ENGINEERING

2.1 WWI System Operation

2.11 Auxiliary-Drum System (H.L.Ziegler)

Now that more technician help is available, fair progress is being made in the construction and installation of accessory equipment for the drum systems. During the coming biweekly period we expect to start a systematic check of the various ERA chassis. The data obtained from these tests should be useful for future maintenance work and possibly for improvements in circuitry.

(P.W.Stephan)

A small improvement in the auxiliary-drum test tape was made. This is 2658-4; it replaces 2658-2.

The marginal checking of the auxiliary drum has been set up and turned over to the marginal-checking group.

(T.Leary)

The excursions for the auxiliary-drum marginal-checking lines have just been set up so that automatic marginal checking of the auxiliary-drum system is now feasible.

(C.W.Simmonds)

A test panel has been built on a single rack that provides a flexible means of testing both ERA chassis and 24-pin plug-in gate generators (GG Mod.II). It is located at the end of the Drum Bay. When time permits, a program for testing ERA chassis will be put into action.

The 16 cathode-follower circuits being built on an ERA chassis for the video monitoring system will be completed this week. In the meantime, the associated cabling and wiring in the magnetic-drum assembly is being finished. The cathode followers will be mounted in Bay 1. The video monitoring system will be ready for a check-out early in the week of 21 June.

A coincidence detector is being built on an ERA chassis for Bay 1 of the magnetic-drum assembly. The remaining space on the chassis will be occupied by five general-purpose buffer amplifiers. Layouts have been completed, and the circuit is in construction.

2.12 Order Code (J.H.Hughes)

The new order md, multiply digits, is in order position 31 and may be used.

2.13 Flexowriter (L.H.Norcott)

In accordance with the provisions of M-2200, two 12"-carriage Flexowriters have been turned over to MTC in return for two 20"-carriage Flexos. After overhaul, one 20" FL was installed in Test Control for tape-preparation use; the other has been installed in Room 109.

Modification of our FL punches continues. The original 450-ohm-punch magnet assemblies have been replaced with 900-ohm assemblies on all but four punches. These will be modified as soon as new assemblies are received.

2.2 Terminal Equipment

2.21 Numerical Display (F.E.Irish)

The position of the character code has been permanently shifted to a position occupying digits 1 through 7 of the IOR.

The circuits have also been arranged so that the contents of IOR in digits 8 through 15 before the display are in digits 0 through 7 following the display. Having the system operate in this fashion allows the codes for two characters to be stored in one register. The first record order can be followed by a read order to put the code for the second character into a temporary register. A second record order then takes the code from the temporary register and displays the second character.

2.22 Magnetic-Tape System (J.W.Forgie)

For some time difficulty has been experienced in rerecording information on magnetic tape. The trouble is caused by a transient which is recorded on the tape when the system is returned to the read mode after a rerecording operation. This transient may result in an extra pulse which throws the information out of synchronism when it is read back. No way has yet been found to eliminate this transient, but its effect has been greatly reduced by spreading it out on the tape. This spreading is accomplished by slowing down the mode switching signal. To permit this slowing down, a delay counted by in-out control has been changed. Preliminary tests indicate that rerecording is now as reliable as any other mode of operation with magnetic tape.

To facilitate the recording of information for delayed printer and punch, a new si order is being installed and should be available sometime during the week of June 22. This order (si Record for Print-Out) will result in the proper separation of characters on the tape so that no delays need be counted by the program. The si order need be given only once, and all rc orders following it (until, of course, another si is given) will be separated by the optimum delay. The program then merely gives an rc order when each character is determined. The new si order will operate for all units, but, of course, only unit No. 3 has print-out equipment connected to it. The addresses of the new order are as follows:

si Record for Print-Out

		Octal	Decimal
Unit No. 0	FWD	146	102
	REV	147	103
Unit No. 1	FWD	156	110
	REV	157	111
Unit No. 2	FWD	166	118
	REV	167	119
Unit No. 3	FWD	176	126
	REV	177	127

A memo will appear shortly describing the operation of this new order in more detail.

2.23 Magnetic-Tape Mechanisms (E.P.Farnsworth)

Checking of tape-drive capstan-clutch air gaps is proceeding. Of the three units completed so far, two have required additional shimming. The starting and stopping times of these units are now better than six milli-seconds. Units 3A and 3B remain to be checked out by the new method.

Push-button assemblies for the auxiliary control panels have been received, and wiring of the panels is nearing completion.

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

Four programs for testing delayed print-out and automatic punch have been modified for the new code locations. The automatic punch has operated satisfactorily but is failing occasionally at present because of intermittent asynchronous operation of the index-pulse counter apparently caused by thyratron or relay-switching transients, the source of which has not yet been tracked down. Indicator lights for the counter flip-flops and thyratron registers are being added in Test Control rack TC 17 to facilitate marginal checking and trouble shooting. Drawings are being brought up to date, and some of the equipment has been ordered to replace the breadboard panels now in use.

2.25 Buffer-Drum System (K.E.McVicar)

The Buffer-Drum System has been received from ERA and has been installed in Room 156. The wires which had to be cut to allow shipment of the system have been spliced, and power has been turned on.

Some of the circuitry has been checked and present work involves further testing of the system. The dual heads have been checked for signal amplitude and timing and the settings adjusted where necessary.

There was some evidence that the drum received a severe mechanical shock during shipment, and it was feared that possibly the surface had been damaged. We connected the buffer drum up to run with the auxiliary system and check the surface. All the tracks ran satisfactorily with a large margin on the reading amplifiers from which we deduced that the drum surface was not seriously injured.

Two representatives are now here from ERA to supervise the initial tests on the system and assist us in getting our own test program under way.

2.3 Records of 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 June 5-18, 1953:

Number of assigned hours	103
Usable percentage of assigned time	87
Usable percentage of assigned time since March, 1951	85
Number of transient errors	55
Number of steady-state errors	4
Number of intermittent errors	5

3. LIBRARY ACCESSIONS LISTS

The following material has been received in the Library, W2-325.

Laboratory Files

No.	Title	No. of Pages	Date	Author
R-224	Rudiments of Good Circuit Design	13	5-19-53	N. Taylor
E-542	Timing Diagrams for MTC Control	6	5-5-53	R. Hopkins
E-545	Dependence of Coercivity and Stress Hysteresis of Nucleation of Domains of Reverse Magnetization	19	5-14-53	J. Goodenough
E-547	Proposed High Input-Impedance Trigger Circuitry for High-Speed WWII Flip-Flop	5	5-22-53	B. Remis
E-556	A Study of a Two Transistor Flip-Flop	14	4-24-53	E. Cohler
M-2149	A Survey of Time Pulse Distributors	3	5-11-53	A. Heineck et al.
M-2167	First-Order Cancellation Residue in Rectangular Memory Arrays	1	5-15-53	D.A.Buck
M-2188	Programming for and Operation of Oscilloscope and Camera	8	6-4-53	E.S.Kopley
M-2192	Laboratory Personnel	16	6-1-53	
M-2195	Further Work on Nondestructive Read Systems	3	5-27-53	W. Frank
M-2197	Readout and Digit-Plane Driving Systems	6	5-28-53	(W.Canty (S. Fine
M-2202	Marginal Checking and Trouble Location	4	6-1-53	R. Fallows
M-2203	S&EC Operator's Check List	3	5-27-53	K. Campbell
M-2204	MTC Toggle-Switch Storage and Toggle-Switch Storage Switch	2	5-29-53	J. Crane
M-2205	Some Properties of Cathode Interface Impedance	6	5-29-53	H.B.Frost
M-2209	Biweekly Report, June 1, 1953, S&EC	17	6-1-53	
M-2210	May 1953 Storage and Research Tube Summary	5	6-1-53	D.M.Fisher
M-2213	MIT-IBM Standards Committees	1	6-5-53	C.W.Watt
M-2214	Estimated Parts List for Scope Deflection Amplifier	1	6-5-53	H.Zieman
M-2215	Magnetic-Core Matrix Switch Driver	1	6-5-53	D.Shansky
M-2217	Proposal: Wiring and Construction Practice Specifications for Joint MIT-IBM Use	5	6-5-53	C.W.Watt
M-2218	Specifications on Improved Intensification Amplifier	1	6-5-53	H.Zieman
M-2219	Testing of Individual Cores in MTC Memory Planes	5	6-16-53	A.Hughes
M-2224	The Reduction of Inherited Errors in the Runge-Kutta Solution of Differential Equations	3	6-3-53	D. Wong
M-2226	Barta Building Personnel Estimate for 1953	2	6-11-53	H.Fahnestock
M-2227	Summer Session System, I	5	6-9-53	(M.Rotenberg (D.Finkelstein

The following material has been received by the S&EC Group Library, Barta 109

No.	Identifying Information	Source
C-41	Programming Manual for the UNIVAC System Part I 4-23-51	Eckert-Mauchly Computer Co.
C-42	STOPANDPRINT - Ferranti Routine Spec. 1-8-3 (amended Version)	Ferranti Co.
C-43	FLOATCODE and STARTING TAPE - Description of the Routines on the Library Compound Tapes	Manchester U. Computer Lab.
C-44	Coding Examples for the Manchester Electronic Computer	Computation Center McLennon Lab, U. of Toronto
C-45	The Manchester Universal Electronic Computer (Descriptive Lit.-general) 2 copies	Ferranti Co.
C-46	The EDSAC - An Electronic Calculating Machine by M.V.Wilkes & W. Renwick	The University Math Lab Cambridge
C-47	Details of Instruction List	Ferranti
C-48	An Ultrasonic Memory Unit for the EDSAC by M.V.Wilkes & W.Renwick	The University Math Lab Reprinted from Electronic Engineering
C-49	Electronic Calculating Machine Development in Cambridge by M.V.Wilkes	Reprinted from NATURE Vol 164 p557 Oct 1, 1949
C-50	Chapters from the Programmers' Handbook	Manchester Computer U. of Toronto, March 1953
C-51	The EDSAC Computing Machine	Report OANAR-43-49 London
C-52	The Manchester University Digital Computer (brief Description)	Report ONRL-34-50 London
C-53	Introducing the ERA 1101	Engineering Research Assoc, Inc.
C-54	The Manchester Electronic Computer (General Description)	Ferranti Inc.
C-55	Programming for the BESK by G. Kjellberg, O.Karlquist and G. Dahlquist	Lectures given Sept-Dec '52 by the Swedish Board for Computing Machinery
C-56	Introduction to Programming for the ERA 1101 Computer	Engineering Research Assoc, Inc.
C-57	ERA Computation Center	Engineering Research Assoc, Inc.
C-58	Ferranti High Speed Tape Reader (General Description)	Ferranti Inc.
C-59	Programmers' Handbook for Manchester Electronic Computer Mark II	Manchester Computer Lab.
C-60	Introduction to Programming on the Manchester Electronic Digital Computer by D.G.Prinz	Ferranti Inc.
C-61	A Numerical Solution of Schrodinger's Equation in the Continuum by W.Futterman,E. Osborne & D.S.Saxon	Nat. Bur.Stan. Report #2259
C-62	A Generalization of the Theory of the Purely Discontinuous Stochastic Process of W. Fuller by W. Dubrovski	Comptes Rendus de L'Academie des Sciences de l'U R S S 1938 Vol 19, No 6-7 pp439-46
C-63	A Generalization of the Kronecker-Capelli Theorem on a System of Linear Equations by S.N.Tchernikow, Trans by C.D.Benster	Nat. Bur. Stan. Report #2346
C-64	Analytical Differentiation on a Digital Computer by J.F.Nolan	M.S.Thesis MIT May 1953
C-65	Partial Differential and Difference Equations Lectures given by Dr. I.L.Schoenberg	Nat. Bur. Stan. Los Angeles, Calif, Summer Session 1951
C-66	The EDVAC - a Preliminary Report on Logic and Design, by G.W.Patterson, R.L.Snyder, L.P.Tabor, I.Travis	University of Pa. Feb. 16, 1953 Res. Div. Report No.48-2

4. PERSONNEL

New Staff (J.C.Proctor)

Arnold Siegel, a new DIC Staff member assigned to Adams' group, received an AB and BS in EE from Columbia and his MS in EE from Rutgers this month. Siegel has been a research assistant at Rutgers for the past two years, working on electronic circuit design.

Stanley Gill of the University Mathematical Laboratory, Cambridge, England, is working with Adams' group for the summer.

Alfred Sacharias is a Research Assistant assigned to Youtz' group. He received his BS in EE this month from Cooper Union School of Engineering.

Lewis Martin is a Research Assistant also assigned to Youtz' group. Martin received his BS in EE from Colorado A&M this month.

Edward J. Stevens has completed his academic program at Northeastern University and is now a DDL Staff member with Youtz' group.

Terminated Staff

Morrison, C.D.

New Non-Staff (R.A.Osborne)

Barabra Clouther is a new messenger girl.

Arlene Hoffman is a new member of the Telephone Operator-Receptionist Group.

Mary Keefe is a new clerk in the Print Room for the summer.

Wilfred Klemperer is a Cornell student working in Group 63 for the summer.

Robert Lurvey is a Tufts student who has joined Group 63 for the summer.

Eleanor Margolis is a new secretary in Group 65.

Kaye Richey is an MIT student helping out in the Photo Lab for the summer.

Milton Toorans has returned once more to work for the summer in the Sheet Metal Shop.

Gertrude Sanderson has joined Group 64 as a secretary.

Alfred Switendick is an MIT student who will work this summer in Group 63.

Terminated Non-Staff

Patricia Brogan
Werner Frank
Lucy MacFarland
Walter Majkowski
Hilda Mesnick
Harlan Noyes
Robert Schultz
John Shea