 Falcione

Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: BIWEEKLY REPORT, SEPTEMBER 20, 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 131 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.

In some cases the progress described includes work that was done during the previous two biweekly periods on the limited amount of S&EC time not used in the development and application of the Summer Session Computer. A report on the Summer Session Computer itself including plans for its future use is given under problem #140.

Reports will also be found below on three new problems. Problem #144 seeks to determine the optimum choices of linear combinations of atomic orbitals to represent molecular orbitals. Problem #145 evaluated the integrand of an expression that arises in the calculation of second order temperature diffuse scattering of X-rays from a single crystal of zinc. Problem #146 involves finding the lowest eigenvalue of a matrix which represents the lowest energy of a given state of a nucleus.

1.2 Programs and Computer Operation

100. Comprehensive System of Service Routines: Briscoe, 84.75 hours; Combelic, 16 hours; Demurjian, 22.25 hours; Denman, 46.5 hours; Kopley, 19.5 hours; Porter, 8 hours; WWI, 351 minutes

A modified version of the input program which provides for automatic selection of utility programs on Group 11 has been recorded on Group 11. The routines presently recorded on Group 11 are the 556 read-in program via PETR, the comprehensive system input program, the scope post mortem program, and the 556 read-in program via the mechanical tape reader. Selection of a program is accomplished by using an activate button in combination with an intervention register.

Future plans include the addition of a program to erase Group 0 before reading in. This program will probably be called for by using the second activate button. In addition a parallel procedure for utility program selection by means of special tags punched on the paper tape to be read in is being considered.

Consideration is also being given to the writing of a binary post mortem which will probably be stored on Group 11 and which will use the intervention registers and/or paper tape to specify ranges desired and output modes desired.

Helwig

The three way basic conversion has not worked correctly on direct read-in programs yet. The trouble may have been several incorrect addresses used to select the drum.

Briscoe

101. Optical Properties of Thin Metal Films: Denman, 7.5 hours; WWI, 24 minutes

The completely automatic evaluation of optical constants of thin metal films on WWI has been achieved, with the results printed out in columns which are properly labeled by WWI before each batch of data is considered by the computer. The problem and results are described in a final report dated September 8, 1953. This marks the first time that the theoretical evaluation keeps pace with experimental measurements on thin films. In order to handle the production and organization of results obtained by WWI, Janice Richmond has joined the staff of the Chemistry Department project on a part time basis.

Loeb

106. MIT Seismic Project: Briscoe, 5 hours; Smith, 28 hours; Calnan, 39 hours; WWI, 60 minutes

We modified our prediction program for WWI for the purpose of obtaining greater accuracy in forming Error Curves. We also computed averages of groups of known operator coefficients on a desk calculator and then coded these averages for WWI to derive prediction errors. With these errors and their time averages we formed Error Curves for our analysis in the determination of reflections.

During recent weeks the Geophysical Analysis Group has been plotting and assimilating its previous numerous results. The results indicate that more elaborate studies must be made, and new programming has been started. Broadly these will take the form of various averaging processes and evaluation of computed correlation functions with a view to improving the present structure of the linear operator.

Robinson

108. An Interpretive Program: Zierler, 30 hours; Hazel, 2.5 hours; WWI, 104 minutes

It is expected that the Instrumentation Laboratory report describing this program will be ready in about a week.

The time used during this period was devoted to correcting technical programming errors. The first test problem has now run successfully and it is estimated that about 90% of the errors have been found.

Zierler

112. Lawley's Method of Factor Analysis; Characteristic Vectors (modified): Denman, 8.5 hours; WWI, 24 minutes

The program has been run for assumed ranks of the data matrix of 5 and 6. These results have been checked by hand and appear to be correct. With an assumed rank of 7 for the data matrix, an arithmetic overflow occurred, and the reason for this overflow is now being sought.

Denman

114. Design of Optical Instruments: Mahoney, 20 hours; WWI, 19 minutes

The matrix inversion program mentioned in the biweekly report of 10 August 1953 has worked, inverting a small (3 x 3) matrix. This program has been rewritten to eliminate some errors and will be tested again with a larger matrix. More ray tracing results were also obtained.

Mahoney

116. Torpedo Impulse Response; Convolution: Kramer, 16 hours; Hamilton, 100 hours; WWI, 120 minutes

Thirty-five runs were performed during the last three biweekly periods. Of the 35, 11 gave useful results. Of the unsuccessful results 12 were due to tape errors and 12 were due to programmer's errors. The programmer's errors consisted of wrong scale factors or trouble with the delayed printer program. The delayed printer program is now working properly.

A report on the problem is now being prepared. The only work remaining to be done on WWI will be runs required to complete the report.

Kramer

120. Thermodynamic and Dynamic Effects of Water Injection into Gas Streams of High Temperature and High Velocity; Simultaneous Differential Equations: WWI, 58 minutes

The computations during this period were either continuations or corroborations of previously computed cases. The need for such additional information arose during the preparation of the graphical summary of the results.

Gavril

123. Earth Resistivity Interpretation: Integration of empirical functions: Briscoe, 2.5 hours; Strickland, 20 hours; WWI, 9 minutes

The program for computing Bessel functions has been corrected and is now working properly.

Strickland

126. Data Reduction: Ross, 100 hours; Cundiff, 240 hours; Hamilton, 72 hours; Frankovich, 1 hour; WWI, 254 minutes

The polynomial fit program is now working. A number of runs with data representing the straight lines $y = x$, $y = 10^5x$ and $y = 10^{-5}x$ have been successful. The polynomials that were obtained for these curves were accurate to one part in either one or ten million. However, on some runs, the higher order moments are calculated incorrectly which raises some doubt as to whether the program will be accurate for data which represents high order curves. It is believed that this error is due either to the round off or to faulty PA blocks because: (1) all the moments are calculated by a cyclic subroutine which always calculates the first several moments correctly; (2) for some runs, all the moments have been calculated correctly. Since the error seems to be a function of scale factoring, round-off seems to be the most probable cause. In the near future, tests will be conducted to try to determine the cause of this error. A report will be issued covering the use of the polynomial fit program by the scientist or engineer unfamiliar with Whirlwind. Instructions will be included in this report for preparing data for the polynomial fit program.

In order to aid analysis of errors in the Polynomial Fit Program and future programs, a general purpose Mistake Diagnosis Routine (MDR) has been written and awaits testing. The purpose of the MDR is to interrupt the normal operation of any program at specified "break points". During the interruption, the MDR will print out on direct or delayed printer the contents of the MRA and buffer as decimal fractions with power of ten, and the AC, cycle pair, and the contents of any one or many registers as octal numbers, or any combination of these quantities, with an indication of which break point is being sampled. In addition, counters are included which allow the user to specify that when a break point is encountered, the MDR should follow a pattern of printing out the specified quantities the first m out of every n times. Also the MDR may be instructed to stop at any break point. Up to 128 break points can be used, and all of the properties of the MDR outlined above operate independently for each break point. The only restriction on the program to be sampled is that it have somewhere in quick-access storage a block of 22 consecutive registers free for the storage of a control for the MDR. The program need not be interpreted. For each break point, two coded instructions for the MDR, the program order at the break point, an sp-or-isp-order, and a counter register are the only quantities which must be specified by the programmer besides the addresses of registers to be printed as octal numbers, and the starting address of the available block of 22 registers. The insertion of the MDR has been made almost fully automatic. After testing, an instruction memo will be written, after which the MDR will be available for general use. Although the MDR will considerably slow up any program sampled, intelligent use of it should allow the trouble shooting of a program in one or two test runs. Every effort has been made to ensure fast operation.

Ross

131. <u>Special Problems (Staff training, demonstrations, etc.)</u>: Siegel, .5 hours; WWI, 300 minutes

Computer demonstrations were run for approximately 240 people attending the ACM meetings. These people were also given a Flexowriter demonstration and a tour of Whirlwind I. Several staff members were available for questions.

Kopley

Ten minutes were used in taking pictures of certain utility programs. The results have not been obtained as yet.

Thompson

132. <u>Subroutine Study for the Numerically Controlled Milling Machine</u>: Runyon, 5 hours; WWI, 34 minutes

Of the eleven routines written to date, ten have been successfully tested. Programs for using the successfully tested routines for the preparation of NCMM tapes are now being written.

Runyon

134. Numerical Diagonalization Procedure: Kopley, 1 hour; WWI, 5 minutes

The program now exists as a ready-to-be-used, successful matrix diagonalization routine. A full report will appear in the DCL Quarterly report for the third quarter of 1953.

Meckler

136. Matrix Equations: Arden, 10 hours; WWI, 48 minutes

A routine for the solution of a set of linear equations by an n-step gradient method is being tested.

Arden

137. Investigation of Atmospheric Turbulence: Summers, 60 hours; Block, 48 hours; WWI, 783 minutes

Tape preparation was completed for Flights II, III and IV, and apparently successful auto- and crosscorrelation runs were made on the computer. The original crosscorrelation program tape (#2751m2; scale factor of 1/10) led to overflow for most of these runs and it was necessary to increase the scale factor to 1/14 (tape #3068m0) and then to 1/28 (tape #3068m2) to complete these computations. Some of the crosscorrelations for flights III and IV seemed peculiar and check runs attempting to reproduce computer results have not been entirely satisfactory. The reasons for this are not immediately apparent and this is still being worked on.

D. Ross modified his autocorrelation program to compute for 300 values of the basic time spacing (tape #2345m12; no scale factor). A scale factor of 1/16 has also been introduced (tape #2345m13) but has not been successfully run yet.

It is now felt that the correlation calculations are practcally complete with the exception of some check runs and perhaps a couple of runs for 300 values of the basic time spacing. All that remains to be done is to take the Fourier Transforms of the auto- and crosscorrelation functions for the four flights. This should take about 45 minutes of computer time per flight or a total of about 3 hours of computer time. Unfortunately, the basic Fourier transform program (tape #2235m18) seems to produce cumulative errors in the sines and cosines for larger values of the argument. If this cannot be readily corrected in the program, it may be necessary to take the transforms several times over restricted frequency bands; this would increase the required computer time by a factor of two, bringing it to 6 hours.

It is felt, however, that problem #137 is now more than 2/3 complete in terms of machine time.

Summers

138. Spheroidal Wave Functions: Little, 20 hours; Corbató, 20 hours; Combelic, 8 hours; WWI, 36 minutes

The layout section of the program has been completely tested. This section has now been streamlined and cleaned up and is in the process of b_ing given a final check.

The computational section of the program is fairly well along; sections are still being tested.

It is felt that the programming of the whole problem is about 2/3 complete.

Little and Corbató

139. Line Shape Calculations: Porter, .5 hour; WWI, 85 minutes

The program described previously was modified to permit the evaluation of $F(\mu/a)$ for intermediate values of the two main parameters. The desirability of having these intermediate values became apparent in the processing of the data already obtained.

Porter

140. Summer Session System: Combelic, 160 hours; Frankovich, 64 hours; Gill, 79.5 hours; Kopley, 43 hours; Siegel, 183 hours; Vanderburgh, 31 hours; WWI, 4888 minutes

The "Summer Session Computer" was used in the two-week course (subject no. 6.539) during the period from August 24 to September 4, 1953. Despite several programming errors, the overall operation of the simulated computer was quite satisfactory. Effort is being directed toward locating and eliminating the remaining programming mistakes and toward increasing as far as possible the efficiency of the routines.

It is expected that the extensive set of subroutines which has been developed will be retained as a permanent adjunct to WWI operations. For teaching and staff training purposes, in particular, the elaborate mistake-detection and post-mortem features are very valuable. The computer may be useful, also, for the solution of short problems in which its many desirable attributes outweigh the loss of speed concomitant with the extensive use of interpretive subroutines.

Siegel

142. A Study of Shock Waves: Briscoe, .5 hours; Sydney, 75 hours; Bart, 75 hours; WWI, 200 minutes

We have studied the effects of shock waves in one dimensional solids. In our treatment of the problem, the distributed one dimensional mass system was replaced by a system of discrete masses connected by springs. The response of this system to a time varying load was obtained for various types of loads and for different values of the time increment, Δt, in a series expansion of the equation $F = ma$.

Our solutions agree reasonably well with the theoretical response of a distributed mass system indicating that the method may be used to study the response of distributed multi-dimensional mass systems by expanding the spring-mass system technique to handle the multi-dimensional case.

We have prepared a program to study the two-dimensional case and are testing it at the present time.

Sydney and Bart

144. Self-consistent Molecular Orbitals: Meckler, 15 hours; WWI, 36 minutes

Roothaan has given a procedure for determining best linear combinations of atomic orbitals for the case of a closed shell state, a single determinant many-electron wave function. His equations are the algebraic equivalent of the Hartree-Fock differential equations and are similarly characterized by the discouraging prospect of a self-consistent calculation. However, using Whirlwind, Roothaan's procedure can be mechanized and performed by the machine so that it becomes a fast, repeatable routine. First let us re-express Roothaan's equations in a slightly modified form:

To begin with, there are the one-electron functions which are to be combined in the best possible ways. Let them be orthonormalized. Here we differ with Roothaan who did not require orthogonality. The lack of orthogonality leads to a more complicated type of determinantal equation to be solved and we see no point in adding this difficulty to the non-escapable one of self-consistency. We begin with a well-considered first guess to the molecular orbitals, an orthonormalized set. A general linear combination of these functions is still a general linear combination of the original atomic functions.

This original set of functions is denoted as v_μ and the number in the set by N. If there are 2n electrons in the system, we are to find n linear combinations of the v_μ's

$$\phi_i = \sum_\mu c_{i\mu} v_\mu$$

such that an antisymmetrized many-electron wave function formed with each ϕ_i doubly occupied will be associated with a minimum value of the energy. The expression for the energy is

$$E = 2\sum_{\mu\nu} \rho_{\mu\nu} H_{\nu\mu} + \sum_{\mu\nu\lambda\sigma} \rho_{\mu\nu} G^{\mu\nu}_{\lambda\sigma} \rho_{\lambda\sigma}$$

where

$$H_{\mu\nu} = \int v_\mu^*(1) \left[-\nabla_1^2 + V(1)\right] v_\nu(1)\, d^3x_1$$

$$G^{\mu\nu}_{\lambda\sigma} = 2(\mu\nu|\lambda\sigma) - (\mu\sigma|\lambda\nu)$$

$$(\mu\nu|\lambda\sigma) = \int v_\mu^*(1)\, v_\nu(1) \frac{2}{r_{12}} v_\lambda^*(2)\, v_\sigma(2)\, d^3x_1 d^3x_2$$

$$\rho_{\mu\nu} = \sum_i c^*_{i\mu} c_{i\nu}$$

or in matrix notation

$$\rho = C^+C \qquad (+ = \text{Hermitian adjoint})$$

and the orthonormalization of the ϕ_i's is implied by

$$CC^+ = 1$$

C is an n x N rectangular matrix. ρ is a square N x N. The n rows of C, which are the complex conjugates of the n columns of C, are the n lowest eigenvectors of the matrix

$$K_{\lambda\sigma} = H_{\lambda\sigma} + \sum_{\mu\nu} \rho_{\mu\nu} G^{\mu\nu}_{\lambda\sigma}$$

That is

$$KC^{+} = \Lambda C^{+} \qquad \Lambda \text{ diagonal}$$

We are to pick a ρ, form K, diagonalize it, select its n lowest eigenvectors, form ρ, re-cycle. The thing to realize is that H and G do not change from cycle to cycle. They are the input to the machine, the data to be used over and over again.

The machine is to do matrix-vector multiplication (symbolized as ρ G), matrix addition, matrix diagonalization, magnitude selection and comparison, and many cycles. Even with the type of factorization by symmetry discussed by Roothaan there is a lot to be stored in the machine, but the large amount of high speed storage and the magnetic drum in Whirlwind have made for the pleasant atmosphere of a buyer's market in storage space.

The matrix diagonalization procedure, which is just a sub-routine in the whole self-consistent process, has been programmed and will exist as a separate routine in the Whirlwind library. The present program can handle up to a 31 x 31 real symmetric matrix and a 15 x 15 complex Hermitian matrix. The rest of the linear combinations of atomic orbitals determination is now being programmed and will be first applied to the NH_3 molecule.

Meckler

145. <u>Evaluation of Second-order Temperature Diffuse Scattering from Zinc:</u>
Combelic, 2 hours; Joynson, 4 hours; WWI, 88 minutes

The function that was evaluated for various values of the variable s and parameter t was the integrand of the expression for the second order temperature diffuse scattering of zinc. Experiment has shown that the first order scattering expression is inadequate to account for the total scattering. It was necessary to calculate the second-order correction to see if this might explain the experimental results.

The tape for the problem was typed 8 September 1953 and the following morning, 9 September 1953, data for 14 values of the parameter t were obtained. The problem was completed 10 September when data for 6 more values of t were obtained.

The integration was then completed by graphing the integrand and using a planimeter. An important result of the calculation is the vanishing of second order temperature diffuse scattering at reciprocal lattice points whose x-ray structure factor is zero.

Joynson

146. Largest Eigenvalue of Real, Symmetric Matrix: Siegel, 6.5 hours; Temkin, 5 hours; WWI, 15 minutes

An iterative method for finding the largest eigenvalue in magnitude of a real matrix all of whose eigenvalues are real (this is assured if the matrix is real and symmetric) were programmed. The procedure is to take an initial guess for the eigenvector (we take all the components to be 1), multiply through by the matrix, and then divide through all the components of the new vector by the value, say, of the first component. This value is considered as the first iterative value of the eigenvalue and the resulting vector the associated eigenvector. We use this eigenvector as the next guess and continue this process until the difference between subsequent eigenvalues is sufficiently small.

The results are satisfactory thus far. A test problem was put on which had already been done on a desk calculator and the results of WWI agreed. The program has now been written out in relative-address form suitable for the library of subroutines. The evaluation of the largest eigenvalues of the two matrices, not previously solved by hand, will be undertaken during the next biweekly period. It is the need for these two eigenvalues which originally motivated the construction of the program.

Temkin

1.3 Operating Statistics

Computer Time

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

Programs	19 hours, 05 minutes
Conversion	7 hours, 43 minutes
Magnetic-Drum Test	16 minutes
Scope Calibration	42 minutes
Demonstrations (#131)	4 hours, 29 minutes
Total Time Used	32 hours, 15 minutes
Total Time Assigned	37 hours, 36 minutes
Usable Time, Percentage	86.05%
Number of Programs Operated	131

1.4 Summary of Tape Room Bulletin Board Memoranda (I. Hazel)

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

Magnetic Unit #0

The recording circuits of Magnetic Tape Unit #0 will be locked out around August 17, 1953 in order to protect certain programs which are to be permanently recorded on this tape. For this reason programs should not be written to record on this unit and programmers who are now using this unit for auxiliary storage should change their programs to use some other unit.

Drum

Drum Group 10 is temporarily not available until further notice.

Delayed Print

Any programmer using the old flexo code position AC(2) through AC(7) should be informed that as of September 14, 1953, only the new flexo code position AC(0) through AC(5) will be decoded for delayed print. 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.

CS Automatic Output Routines

In requesting special characters (s, space; t, tab; etc. cf. E 516-2 page 25) using the CS automatic output routines, only the uninterpretive mode (e.g., TOA t) should be used. Do not forget to follow this request by IN if it is desired to go back in the interpretive mode.

Therefore, until further notice it will be illegal to use the interpretive mode (iTOA t, iTOA s, etc.) for special characters.

Real-Time Clock

As of September 22, 1953 the real time clock (value in the accumulator after an si 5) will count at 15 cps instead of 16 cps. The counter is modulo 32,768.

2. COMPUTER ENGINEERING

2.1 WWI System Operation

Magnetic-Core Memory (N. L. Daggett)

On Saturday, August 8, the MTC magnetic memory was put into operation as one of the two storage banks in WWI.

The second bank of magnetic-core storage was installed in WWI on September 5. On September 10, the new core storage control was tied in completely, making the storage cycle independent of ES Control. (Previously the magnetic storage cycle had been slaved to the ES cycle.) The new control reduces storage access time to 9 μsec, making the average time per order approximately 30 μsec instead of the 50 to 60 μsec formerly required.

In the week that the two core banks have been operating, no maintenance has been performed on them other than to measure margins. During this week 3 parity alarms have occurred.

The relatively short time in which this new memory was built and installed is a tribute to the excellent cooperation of the various construction shops, the MTC people, the people who built the memory planes, and the system group. The speed with which production control organized building of the necessary new panels was most gratifying. A number of the systems technicians and engineers worked long hours making necessary changes to receive the new equipment.

2.2 Terminal Equipment

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

The proposed sound-proof enclosure for the delayed-output Flexowriter was completed and placed in service during this period, and it seems to have solved the noise problem in Test Control with the least possible operating inconvenience.

Construction is under way on all but two of the remaining panels needed to complete the delayed-output system.

The cause of the occasional skipping of a line by the delayed punch reported previously was traced to a sneak circuit activated by slippage of the Flexowriter punch clutch, which generated a spurious start-tape pulse. A circuit change was made to prevent this sequence of operation in the event of clutch slippage. A mechanical break down in the punch was found to have been the cause of the abnormal clutch slippage.

The auxiliary rewind circuits were connected to units 3A and 3B and the print-out rewind panel was modified to operate from the auxiliary panels.

Inadequate isolation and transposing of audio wiring called for by the drawings for the newly completed relay-transfer panel has necessitated rewiring part of the panel to reduce crosstalk between computer and print-out.

M-2396 was issued covering discontinuance of the delayed print-out old code in favor of the new code which permits automatic selection of punch-out or print-out from the tape recordings.

Magnetic-Tape Mechanisms (E.P.Farnsworth)

Up to the present time, mechanical adjustment and maintenance of the Raytheon magnetic-tape mechanisms has been performed almost exclusively by Al Perry. The desirability of having more than one such expert becomes most evident during vacation period; the problem was discussed with Lew Norcott because of the appreciable similarity in mechanical precision, mechanical components, and logical application of the tape mechanisms and the Flexowriter equipment. The Flexowriter group recently located and corrected a mechanical difficulty which temporarily disabled unit 2, and they have indicated an interest in taking over some of this work. They plan to familiarize themselves with the tape mechanisms as troubles arise, and we will impart the information which we have collected to date.

The machine shop has turned out a satisfactory splined hub adapter from a stock gear which will permit transferring reels of magnetic tape from NAB hubs to either type of Raytheon reels on a Magnicorder accessory panel. We have requested a second adapter to operate between the two types of Raytheon reels.

The Magnetic-Tape-Mechanism Test Panel was completed by the shop and has been installed in TC17 as a preventive-maintenance and trouble-shooting facility.

Magnetic-Tape System (E. P. Farnsworth)

Unit 0 record circuits have been disabled to protect frequently used programs stored on this unit from accidental erasure. Recordings on this unit are located by means of the rewind button and limit stops consisting of conducting strips of silver micropaint. These recordings will be identified by marking the back side of the tape with a silicone paint being supplied by Dow Chemical. Further recordings can be made on this unit by reconnecting six tagged germanium diodes to the six screw terminals in the reading amplifiers in Rack AX3.

Minnesota Mining and Manufacturing is investigating the availability of 1.5-mil mylar tape from the Dupont pilot plant so they can replace the four reels of spliced mylar magnetic tape which were included in our original shipment of twelve and supply us with additional unspliced reels for spares.

Typewriter and Paper Tape (L. H. Norcott)

Two paper-tape verifiers have been received from the production shop for installation on our Flexowriter tables and delivery to the tape room. During testing, a few circuit modifications were found advisable to increase the reliability of the verifiers. One has already been modified and installed in the tape room; the second should be in operation within a week. A third verifier is now in inspection.

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 August 28 - September 10, 1953:

Number of assigned hours	160
Usable percentage of assigned time	94
Usable percentage of assigned time since March,1951	85
Number of transient errors	45
Number of steady-state errors	4
Number of intermittent errors	3

3. LIBRARY ACCESSIONS LISTS

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

Library Files

No.	Source	Title
2503	MIT, B.S. Thesis, J. Ricketts Jr.	A Study of Single-Pulse Ferrite-Core Stepping Registers
2505 through 2520		Misc. Transistor Reports from the files of N. T. Jones
2521	IRE	Convention Record, March, 1953 Part V - Circuit Theory Part VI - Electron Devices Part VII - Electronic Computers
2472	Repr. ELECT. MFG., 12/49	Magnetic Ferrites
2473	Repr. TELE-TECH, 5/52	Magnetic Properties of Ferrite Materials
2474	UCLA	Electronic Data Processing Machine Requirements
2475	UCLA	A Proposed Electronic Data Handling System for Production Control
2476	Wayne Univ.	A Manual of Coding for the Wayne University Automatic Computer
2491	Lincoln Lab. & RLE	Some Notes on Transistor Circuits
2493	Monrobot Corp.	A Monrobot Electronic Calculator
2494	Computer Rsch. Corp.	An Introduction to Programming
2457	Office of Naval Research	Electronic Computer Development in the Netherlands
2458	Office of Naval Research	Plans for a Computing Machine at the Instituto Nazionale
2462	National Bureau of Stand.	SEAC Multichannel Tape Storage System
2464	Bell Telephone Labs.	Transistors, 6th QPR

LABORATORY REPORTS

No.	Title	Author
R-225	Treatment of Digital Control Systems and Numerical Processes in the Frequency Domain	Ed. by J. Craig, Jr.
M-2184	Marginal Checking Systems Mod II, WWI	J. H. Hughes
M-2397	Joint MIT-IBM Meeting on Memory Core Measurements, Sept. 1&2, 1953	D. Brown
M-2385	Biweekly Report, August 21, 1953, S & EC Gp.	--------
M-2391	Check List for M-Series Reports	
M-2396	Elimination of Delayed Print-Out Old Code	E. Farnsworth

The following Material has been received by the S&EC Group Library, Barta:

No.	Identifying Information	Source
C-92	Material Available in the WWI Library	
C-95	Computers and Automation Vol.2,Nos.3,4.	Berkeley and Associates
C-97	Electronics Seminar - Papers presented at Spring Conference	Life Office Management Association
C-106	Ferrites Speed Digital Computers	ELECTRONICS Reprint
C-121	Technical Progress Report	Univ. of Ill. Graduate Coll. Digital Computer Lab
C-122	Notes on Digital Computers and their Applications Summer Sess. '53	Staff of Digital Computer Lab. MIT
B-258	Introduction to Number Theory	Trygve Nazell Univ. of Upsala '51
B-260	Tables of Chebyshev Polynomials	Nat'l Bur Stan Dec. '52
B-204	Numerical Methods in Engineering	Salvadori and Baron Prentice-Hall 1952
B-13	Methods of Applied Mathematics	F. B. Hildebrand Prentice-Hall 1952
B-14	Advanced Calculus for Engineers	F. B. Hildebrand Prentice-Hall 1950
JMAM	Quarterly Journal of Mechanics and Applied Mathematics Vol VI Part I March 1953	

4. ADMINISTRATION AND PERSONNEL

Terminated Staff (J.C.Proctor)

Stanley Gill

New Non-Staff (R. A. Osborne)

Claire Fleming has joined the 6345 Group as a Technical Assistant

Barbara Fallon is a new Technical Assistant in Group 6345.

Terminated Non-Staff

Roberta McCluskey

Sophia Kostaras