Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: BIWEEKLY REPORT, NOVEMBER 2, 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 213 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 20 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.

A new format has been introduced for presenting these progress reports. It is hoped that a more complete description will be provided thereby for each problem. The significant changes in the format include the following:

(a) The problem numbers may now be followed by an upper case letter A, B, C or D. The absence of such a letter indicates that the problem originated within and is being solved by the S&EC Group. The letters themselves denote whether a problem is being carried out for academic credit (e.g., thesis work) and whether the problem is sponsored, that is, whether some organization (outside of M.I.T.) is contributing to the financial support of the problem. The letter A indicates that a problem is neither for academic credit nor sponsored, B indicates that it is just for academic credit, C indicates that it is sponsored but not for academic credit, and D indicates that it is both for academic credit and sponsored.

(b) The titles of the problems have been expanded into abstracts to enable the reader to determine the physical and mathematical contents of each problem. These abstracts will be repeated in each biweekly report. Programmers will continue to write their biweekly reports describing the progress during the period covered (with the exception of their initial reports which should describe the nature of the problem, the numerical procedure to be used, and the results desired).

(c) On the line following the abstract is the name of the person (or persons) supervising the problem or directing the project supporting the problem. The laboratory or institute department is also indicated. In future reports it is planned to include on this line the specific project numbers.

(d) On the following line are listed the names of the persons actually carrying out the work on WWI. The name of the author of the biweekly report submitted for the problem has been underlined. In problems (e.g. #100 and #140) where more than one person has contributed a biweekly report, the author's name is inserted at the end of his report. The programmer's laboratory or department affiliation will be indicated only when it differs from that of his supervisor. The following abbreviations have been introduced to describe the programmer's staff position:

D.I.C. ; Division of Industrial Cooperation

CMMC ; Committee on Machine Methods of Computation

Res. Assist. ; Research Assistant

The time indicated for each programmer has been reported by him as the time he has spent during the biweekly period on the given problem.

(e) On the line beginning with DCL (Digital Computer Laboratory) will be found the names of staff members of the S&EC Group who have spent the indicated amount of time on the problem. Also on this line will be found the amount of WWI computer time consumed by the problem during the period in question.

1.2 Programs and Computer Operation

100. Comprehensive System of Service Routines, developed by the S&EC Group at the Digital Computer Laboratory for the input conversion of suitably prepared punched paper tapes. When so requested, these routines automatically provide a program with suitable programmed arithmetic, cycle counting, and output facilities.
:DCL Staff, Combelic, 1 hour; Denman, 56 hours; Demurjian, 9.5 hours; Frankovich, 20 hours; Helwig, 25 hours; Hazel, 10.5 hours; Kopley, 7 hours; Porter, 29 hours; WWI, 198 minutes

The comprehensive system has been modified so that the basic conversion program will be recorded on unit 0 preceding the first pass of the CS. The input program has been modified to provide two entry points for basic conversion (one using the photoelectric tape reader and the other using the mechanical reader). Using either of these entry points will result in the basic conversion program being read from unit 0 into storage. These modifications have been successfully tested and will be incorporated into the various programs.

An error in a modification to the read-in program has been discovered. This caused an initial ca0 in a 556 tape to be treated as an illegal character. This mistake will be corrected as part of the preceding modification of the read-in program.

Consideration is being given to the rewriting of the programmed arithmetic section of the comprehensive system.

Helwig

The comprehensive system (CS) is being modified so that the display scope will no longer be used during conversion. The title of a tape being converted will be recorded on the delayed output equipment along with the converted program. If no unassigned flads (floating addresses) are used in the program, then the table of flads will also be recorded on this equipment. However, if any unassigned flads are requested, a table of these will also be printed.

An error in the generalized decimal number conversion has been corrected.

All the changes described above will take effect the next time CS is recorded on magnetic tape unit 0.

Frankovich

The flad table is now being printed out on the delayed printer instead of being displayed on the scope. This means that a flad table will be available at the same time the 556 tape is made which will save the programmer unnecessary delay. Also, the table has been changed to give the absolute addresses in the decimal instead of the octal number system.

The program for the generalized decimal number post-mortem has been moved so that it is now located at the end of the second bank of high-speed storage. The programmer may now have any G.D. numbers in the range 40(32) through 3203 (1667) printed out.

Hazel

The possibility of using the character generator for output and post-mortems is being explored. Results thus far have been fairly satisfactory. The system, as it exists, is not particularly well suited for using both the character generator and the point-wise display without recalibration.

The present set-up, though far from ideal, may have some limited uses. However, one can readily envision a future development of the system which would permit switching from one system to the other merely by executing the appropriate output instruction.

Kopley

Eight chapters of CS Manual I have been written. The first four chapters have been revised, corrected, and are now available for limited distribution. Chapters 5 through 8 are in the process of being corrected and revised.

CS Manual I is designed to provide an introduction both in programming and in the logic of the Comprehensive System.

Porter

101 C. Optical Properties of Thin Metal Films on transparent backings are determined and printed out automatically by this program; the input data consist of the observed reflection and transmission coefficients, the index of the backing, the wavelength and the sample thickness. The program calculates by means of an iterative procedure and prints out the index of refraction and the absorption coefficient of the film, the rate of variation of these constants with reflection and transmission, and the film's conductivity and dielectric constant.
:for Professor L. Harris , Chemistry Department
:by Dr. A. L. Loeb (DIC), 15 hours; J. Richmond(DIC), 20 hours
:DCL Staff, Denman, 1.5 hours; WWI, 130 minutes

During the past biweekly period the emphasis has been placed on running the very thinnest films (thickness less than 100 A°), which give alarms. Heavier films have, with one exception, given reasonable results without difficulty. As the thickness of the films decreases the optical constants become indeterminate. The alarms have been analyzed and traced to this indeterminacy. Thus the scope post-mortems provided very useful results for a mathematical analysis of the accuracy afforded by the experimental measurements made on the very thinnest films.

On the heavier films data published by F. Goos were used, and the results from WWI compared with Goos' own calculation. Goos only made the calculation for part of his results, and so we filled in the gaps. On the samples for which Goos did calculate constants he only calculated one set of constants, while we were able to utilize front and back reflection to get separate sets. Goos' experimental results give quite a discrepancy for the optical constants obtained from front and from back reflection; this indicates that his backings were not properly cleaned.

106 C. MIT Seismic Project is concerned with the development of methods for locating deep reflections from underground strata in seismic prospecting. The basic method is one of prediction by means of an optimum linear operator.
:for Professor P.M.Hurley, Geology and Geophysics; Professor G.Wadsworth, Mathematics Department
:by E.A.Robinson (Res. Assoc.), H.Briscoe, 18 hours; S. Simpson, 15 hours; W. Walsh, 15 hours
:DCL, WWI, 266 minutes

In production runs this week 13 error curves and 12 spectra were computed, and 19 new matrices were set up from the cross products of readings from seismic traces.

A program which uses the delayed printer to produce a continuous plot of a long list of positive numbers has been written and tested. The ordinate is represented by the number of spaces from the left hand margin, and the abscissa changes by a fixed interval, determined by a carriage return, between each point. The values of the numbers are also printed out, as decimal fractions, along the right side of the page.

A program to check the change in the average of the readings of a seismic trace going down the trace was used on all traces that have been taped. This gives a check on the reading of the traces since the average should be constant.

Three attempts to solve a matrix using a program now in the subroutine library were unsuccessful, twice due to tape errors and the third time for an undetermined reason.

108 C. An Interpretive Program is being developed that will accept algebraic equations, differential equations, etc. expressed on Flexowriter punched paper tape in ordinary mathematical notation (within certain limits imposed by the Flexowriter) as input and automatically provide the desired solution.
:for Dr. J.H.Laning Jr., Instrumentation Laboratory,
:by J.H.Laning Jr.(DIC), 40 hours; N. Zierler (DIC), 40 hours
:DCL Staff, Hazel, .5 hours; WWI, 19 minutes

The program now carries out the automatic computation of special functions satisfactorily. J.H.Laning, Jr., has written routines to compute logarithms, exponentials, the hyperbolic functions and a routine for the automatic solution of differential equations. These routines will be incorporated into the main program in the near future.

112 C. Lawley's Method of Factor Analysis is applied to a correlation matrix obtained from psychological tests and grades given at the Naval Academy. This requires the solution of a modified eigenvector equation for this matrix and is accomplished by an iteration of Hotelling's method for solving an eigenvector problem.
:for Dr. F. M. Lord, Educational Testing Service,Princeton, N.J.
:DCL Staff, Denman,2 hours; WWI, 6 minutes

After correcting the scale factoring of certain numbers, the matrix problem was run again with an assumed rank of 8 for the correlation matrix. No alarms occurred and these results are now being examined at the Educational Testing Service.

119 B. Spherical Wave Propagation produced by the sudden release of a spherical distribution of compressed air in the atmosphere is being studied by numerical means. This involves replacing a set of non-linear hyperbolic partial differential equations in 2 independent and 2 dependent variables by a set of difference equations written along characteristics. An iterative procedure is used to solve these equations.
:for Professor C.C.Lin, Mathematics Department
:by A. Ralston, CMMC, 5 hours
:DCL, WWI, 52 minutes

Work on the problem as originally stated is now complete. Physical checks applied to the results indicate a high-degree of accuracy. For the initial density distribution used, the expected shock wave did not materialize. On the contrary, after one outward wave from the center and one inward wave to the center the state of the system was near equilibrium and there was every indication that what disturbances were left would quickly die out.

In the future it is planned to try different initial density distributions in an attempt to read a shock.

126 C. A Data Reduction Program for use in the Servomechanisms Laboratory is being developed in separate stages to be combined at a later date. The first stage is concerned with devising a program to fit polynomials to arbitrary empirical functions using a least squared error criterion. The procedure makes use of Legendre polynomials and matrix multiplication.
:for J.E.Ward, Servomechanisms Laboratory, DIC No. 7138
:by D. Ross (DIC) 60 hours; D.Hamilton(DIC),66 hours; R.Turyn(DIC)80 hours
:DCL Staff, Frankovich, .5 hour; WWI, 202 minutes

During this period substantial revisions of the Mistake Diagnosis Routine (MDR) were made to correct two logical errors and reduce the number of restrictions on which orders can be replaced by break points. Test runs have checked all but one section of the program and have disclosed some pitfalls in the application of the MDR. Since the MDR now will satisfy the needs of most users, problem 126 included, no further developmental work on the MDR is contemplated. A report describing fully the application of the MDR is almost finished and will

be published as Servomechanisms Laboratory Report 7138-ER-1 without delay. Copies will be available from the Whittemore library. Persons who desire copies from the initial distribution may call extension 2141 and leave their name and room number.

A program for Lagrange Interpolation using the n-point, equal spacing formula has been written. The program is written in terms of preset parameters which specify the number of points (n), the number of distinct functions which are to be interpolated at the value of their common independent variable which is in the MRA upon entry to the routine, and the pattern in which the given functional values are stored. The program may be considered to interpolate values in an m-dimensional vector function. Initial tests have not been successful and reasons are being sought.

A post-mortem routine to print, as generalized decimal numbers, arbitrary blocks of (24,6) numbers stored anywhere in the computer or on the drum has been written and is ready for conversion. The locations of the blocks are specified by an easily prepared Flexo tape to be read by the mechanical tape reader either by initial and final address (octal or decimal) or by initial address (octal or decimal) and block length (decimal only). Drum groups are specified decimally. H. Denman's (24,6) print routine is being used for output.

132 C. Subroutines for the Numerically Controlled Milling Machine are being revised, and tested. The resulting set of routines can be used when desired to obtain the necessary data. The subroutines involve routine numerical and logical operations.
:for Professor W.M.Pease, Servomechanisms Laboratory
:by J.H.Runyon (E.E.Res. Assist.), 35 hours
:DCL Staff, Frankovich, 1 hour; WW1, 90 minutes

Two more library subroutines were successfully tested. This completes the testing of the basic set of subroutines. Three subroutines for finding points on the series 16 symmetrical wing section, camber line, and asymmetrical wing section were written and are being tested.

A rather baffling error in one of the routines successfully tested was traced to a change in the "icx" order which had not been noted.

A tape for the supersonic nozzle was obtained. This tape has 2530 milling machine blocks. The run which produced it took 17 minutes of which approximately five minutes were required for output using delayed printing and punching. The punching of the tape requires about forty minutes. This tape is for a 45° segment of the nozzle. Since the nozzle is formed by rotating a given cross section through 360°, the entire nozzle can be obtained from the 45° segment by interchanging milling machine axes. Time spent in actual cutting is expected to be approximately 26 hours.

136 Matrix Equations. Various methods have been studied for the solution of a set of linear algebraic equations. A variation of the Hestenes-Stiefel conjugate gradient method has been programmed and tested for insertion in the S&EC Library of Subroutines
:DCL Staff, Arden, 2 hours; Helwig, 10 hours; WW1, 4 minutes

Tape 2624m11 will be included in the WW1 library of subroutines. This program will solve a set of linear equations which are stored on the drum in the form of an augmented matrix in column order, i.e., the first column of

coefficients and so on for n columns of coefficients (where n is the number of equations in the system) and finally the column of the non-homogeneous parts of the equations. Two preset parameters must be specified:

zm1 = 2n

zm2 = initial drum address of stored data

The program itself occupies 145 registers, and 13 + 4zm1 registers of temporary storage are required. The original matrix is unaltered by the program. The program operates on an initial guess stored in zm1 registers beginning at 13t + zm1 and calculates an approximate solution, which is stored in zm1 registers beginning at 13t + zm1. The error resulting from the substitution of this solution in the original equations is also calculated and is stored in zm1 registers beginning at 13t +2zm1. This approximate solution can very often be improved by simply re-entering the routine without altering the contents of the zm1 registers beginning at 13t + zm1.

The program must be entered and is left in the interpretive mode.

137 D. Investigation of Atmospheric Turbulence as a noise input to airborne control systems is being studied as a stationary random process. Hence the methods of generalized harmonic analysis may be used to describe the turbulence in terms of its power spectral density.
:for Professor R.C.Seamans, Aeronautical Engineering, Instrumentation Lab.
:by R.A.Summers,10 hours; N. Zierler, 5 hours; C. Block, 4 hours:
:DCL, WWI, 160 minutes

The 100-200τ autocorrelation functions for runs I, II, III, and IV were completed using data tapes clearly marked to indicate the fifth block of data. Agreement with the 0-100τ functions was satisfactory for runs II, III, and IV, but not run I. The reason for the discrepancy in run I is not known at the present time.

In the Fourier transform program of problem 107, an error was found in T-2235p9 and corrected in T-3263p0, but the apparently spurious negative bias in the power spectra is still observed. In order to determine whether this bias really occurs in the data or is due to a program error, N. Zierler has utilized the generalized program of problem 108 to compute the Fourier transform. This is a program of considerably higher accuracy, but, due to the increased machine time required, it will probably be used only once or twice as a check on the more rapid transform program of problem 107. The Fourier transform has not yet been successfully computed by the method of problem 108.

Completion of problem 137 now depends on satisfactory operation of the Fourier Transform program.

138 B. Spheroidal Wave Functions are solutions of the scalar Helmholtz equation separated in spheroidal coordinates. A program has been developed for tabulating the solutions of the first kind in terms of the coefficients of their expansion in associated Legendre functions. These coefficients are determined by applying an iterative procedure to the difference equation approximation of the corresponding separated ordinary differential equation.
:for Professor P.M.Morse, Physics Department
:by F.J.Corbató,(Res.Assist. CMMC), 100 hours;J.C.Little(Res.Assist.CMMC)
:DCL Staff, Combelic, 3.5 hours; WWI, 83 minutes

A complete program for this problem has now been tested successfully. The program has already been used to investigate the extreme values of the parameters and the results indicate a possible minor modification in the normalization conditions. This theoretical consideration will be settled shortly and then full production is anticipated.

The following significant difficulties were encountered:
(1) When a programmer desires to use more than one buffer and therefore uses the auxiliary buffer subroutine, the PA section of CS is altered so that it refers to this subroutine. Consequently if this buffer subroutine is read over by another routine (e.g., by exchanging it temporarily with a routine that has been stored on the drum), the PA may not operate satisfactorily. To avoid this difficulty the programmer should regard the auxiliary buffer subroutine as an integral part of the PA.
(2) During conversion, a "ca 0" is punched out every 48 feet of punched tape and, if by chance this falls after an "sp block", the "ca 0" is erroneously interpreted as an illegal first character of the next block. The correction needed to avoid this difficulty will be incorporated into the read-in program (cf. problem #100).

140. Summer Session System consists of a conversion program, on interpretive routine, and mistake diagnostic routines stored in WW1. A special mnemonic instruction code has been developed for use with this system thus simulating a computer with characteristics quite different from those of WW1. This Summer Session (SS) computer was developed for the use of students participating in the MIT 1953 summer session course on "Digital Computers and Their Applications". The SS computer is being used in the E.E. Department course 6.535 and is available to programmers with suitable problems.
:DCL Staff, Siegel, 50 hours; Combelic, 50 hours; Denman, 5 hours; Frankovich, 12 hours; Helwig, 25 hours; Hoy, 59.5 hours; WW1, 548 minutes

The summer session (SS) computer was used by the students in Course 6.535 for a five-hour computation period. The operation of the computer was satisfactory in every respect. Copies were retained of all post-mortems produced during the computation for a study of the types of mistakes made by the novice programmers.

The program for recording the "SS computer" on a magnetic tape unit and for reading it directly from magnetic tape to the drum has been written and tested. It is expected that the SS computer will soon be permanently recorded on Unit 2.

A subroutine is being written for automatically recording the title of the program on those output media which the programmer has selected before the performance of the program. This will permit positive identification of typed results and oscilloscope displays obtained using the computer.

The extirpation of minor and obscure mistakes in the computer subroutines continues.

141. S&EC Subroutine Study has been undertaken for the final testing of subroutines selected for incorporation into the Library of Subroutines. Although very little effort is going into the specific development of subroutines, programs that have been written for other S&EC problems and seem to be of general use will be suitably modified for the S&EC Library.
:DCL Staff, Arden, 23 hours; WW1, 33 minutes

A subroutine for solving systems of linear equations by a method developed and described under problem #136 has been written and successfully tested. The subroutine will be incorporated in the WWI library.

A subroutine adding a format to subroutine tape 2756m5 has not yet run successfully.

142 D. A Study of Shock Waves has been undertaken in two dimensional solids subjected to impulsive loads. The analysis approximates the solid by a two dimensional grid with concentrated masses at nodal points. The response of this system is computed from a finite difference approximation to the differential equations of motion of this system.
:for Professor C.H.Norris, Department of Civil and Sanitary Engineering
:by R. Bart(DIC),60 hours; S. Sydney (Res. Assist. CMMC), 60 hours
:DCL Staff, Kopley, 1 hour; WWI, 1436 minutes

Final results for the analysis of a two-dimensional solid under the action of a parabolically distributed dynamic load have been obtained. The cooperation and assistance given by members of the staff to the programmers during the course of this problem is greatly appreciated. A copy of the report on this project will be submitted to the Digital Computer Laboratory by S. Sydney and R. Bart of the MIT Department of Civil and Sanitary Engineering.

143 D. The Vibrational Frequency Spectrum of a Copper Crystal is to be determined by solving a 3 x 3 secular determinant, each term of which consists of a finite Fourier Series of 12 terms. This equation must be solved for 25,495 different values of the wave-propagation vector.
:for Professors B.E.Warren and J.C.Slater, Physics Department
:by E.H.Jacobsen(Res. Assist.),8 hours; F.J.Corbató(Res. Assist.CMMC),
:DCL Staff, Combelic, .5 hour; WWI, 16 minutes

Most of this period has been spent on evaluating a double-integral (for 27 values of a parameter) which is concerned with the "second order diffuse scattering" of X-rays. Both integrations involve some thirty values of the integrand. The integration uses Simpson's rule and an inverse tangent routine devised by Donn Combelic. The program is proceeding satisfactorily.

144 C. Self-Consistent Molecular Orbitals are the optimum choices of linear combinations of atomic orbitals determined through a process described as a self-consistent field approximation. The numerical procedure involves matrix-vector muliplications, vector additions, and matrix diagonalization.
:for Professor J.C.Slater, Physics Department
: by Dr. A. Meckler(DIC, Solid State and Molecular Theory Group),5 hours
:DCL Staff, Arden, 13 hours; WWI, 28 minutes

The program has been held up because of the transfer of a zero to a register which is to hold a divisor. Various manual modifications are being used which will partition the program in an attempt to learn the time and place of this unwanted transfer.

147 C. Energy Bands in Crystals are being studied by finding solutions of the corresponding second order linear differential equation satisfying boundary conditions at the origin. The solutions are found approximately by using the Gauss-Jackson formula for forward integration. The solutions and their first derivatives are to be combined in a sum, the weighting factors being functions of an independent parameter.
:for Professor J.C.Slater, Physics Department
:by Dr. D.J.Howarth(DIC, Solid State and Molecular Theory Group),24 hours
:DCL Staff, Arden, 9 hours; WWI, 83 minutes

The routine to calculate the logarithmic derivative of the wave function and to repeat the process for a succession of all the parameters has been tested and made error free. The final part of the program, to compute a weighted sum of these functions, is being tested.

1.3 Operating Statistics

Computer Time

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

Programs	56 hours, 22 minutes
Conversion	10 hours, 15 minutes
Magnetic-Drum Test	21 minutes
Scope Calibration	1 hour , 21 minutes
Magnetic Tape Check	03 minutes
Total Time Used	68 hours, 22 minutes
Total Time Assigned	71 hours, 14 minutes
Usable time,percentage	95.9%
Number of Programs	213

2. COMPUTER ENGINEERING

2.1 WWI System Operation

2.11 Core Memory (N. L. Daggett)

Now that the Core Memory has been moved to its final position, and a new air-conditioning duct installed, the work of putting in permanent video and power wiring can begin. The Core Memory Control has already been mounted in rack EO with complete marginal-checking coverage available. Transfer of the control was accomplished very smoothly thanks to the fine job of preparation done by the various systems technicians involved.

(L.L.Holmes, A.J.Roberts)

The installation of permanent wireways, video cabling, and power wiring in the Core Memory region will be done on regular installation days and will probably be completed by November 9.

2.12 Drum Parity-Check System (L.L.Holmes, A.J.Roberts)

At the conclusion of the installation day of November 2, the necessary changes to the present system to include a parity check of the magnetic drums will be completed. Room 156 changes might not be done at that time.

The former Read-In Interlock panel has been converted to the IOR Aux., Mod II, and will be located in rack C3. The Parity Auxiliary panel will be replaced by a plug-in-unit mounting panel.

2.13 WWI Service File (D.A.Morrison)

Another extension to the WWI Service File has been set up. Room 222 has been supplied with a file cabinet to hold drawings pertinent to the equipment located in Room 222. Libby Leighton will supervise the filing of the drawings. Requests for drawings in Room 222--WWI Service File--should be made to Julie Dickie.

2.14 Test Programs (S. E. Desjardins)

The last biweekly period was spent in developing a five-order read-in program for use in the five flip-flop registers. This program blocks in a leader tape placed in front of the test tape to be read in. The leader tape contains a read-in program which then reads in the tape in question. If the regular read-in program is used, the leader tape is ignored, and the test program is read in.

Work was also done on an "inchworm" program combining the inchworm facility with a Core Memory test program. More work needs to be done on this.

2.15 Magnetic Drums (H. L. Ziegler)

After several days of concentrated effort by Phil White, all relays on one Group Selector chassis were induced to operate and release within the required time limits. This chassis, originally removed from service because of faulty

operation, performed quite satisfactorily when returned to service in the auxiliary drum. A second chassis is now being tested and adjusted in the Test Rack.

Because of the maintenance difficulties, poor reliability, and the not-too-great life expectancy (computer-wise) of these relays, various alternate methods of group selection are being considered. At present the straightforward method of individual writers for each group seems most practical.

(K. E. McVicar)

The replacement auxiliary drum has been installed in the system and has been thoroughly tested. The heads have all been readjusted by an ERA representative, and we now get uniform readout signals. Preliminary checking indicates that the new copper-clad head pieces do not expand significantly with temperature variations, and no attempt is being made to temperature-control the new drum.

Work on a parity system for the auxiliary drum is proceeding satisfactorily. The necessary hardware has been ordered or is being made in the shop. The electronic assemblies are now being constructed, and the bay wiring is being started. It has been decided to do group selection of the parity digit by means of crystal selection of separate writers instead of using the relay-switching system used in the information digits. This decision was the result of the previously reported trouble we have been having with the relays and the estimated relay life based on latest data concerning programming needs for group switching.

A review of relay switching for group selection is being made in light of the expected relay life and time consumption with present program requirements.

2.16 Fairchild Camera (L.H.Norcott)

Recent intermittent failures of the Fairchild Camera to index were apparently caused by a faulty tube in the automatic camera-control panel. No failures have been logged since the tube was replaced.

2.2 Terminal Equipment

2.21 Ferranti PETR (J.P.Stirman)

Preliminary tests on the tape reader have been satisfactory so that a breadboard is now being constructed for testing in WWI.

The brake and clutch circuits are able to stop the tape, from maximum speed, in less than one millisecond. Tests on the reader circuit have shown that the circuit is insensitive to parameter variations within $\pm$ 25% of nominal values. These conclusions are derived from performance curves which plot tolerance vs.

supply voltage. The minimum performance level was set at a signal-output level of at least +1 volt and a no-signal output of less than -20 volts.

2.22 Magnetic-Tape System (E.P.Farnsworth)

The reel of acetate-base tape on unit 3B has broken repeatedly under normal operating conditions, and the original mylar reel was replaced. Although some improvement in acetate strength is gained by maintaining it in an atmosphere of high humidity, all users of the Raytheon Tape Units seem to have the same tape-breakage trouble. 3M is continuing efforts to obtain 1200-foot by 1.5-mil mylar sheets from Dupont on a priority basis so that they can supply us with additional spare reels.

Programmers making "permanent" recordings on unit 0 are being requested to make duplicate recordings on a spare reel of tape on unit 1. Since units 0 and 1 are now interchangeable by means of the newly-installed locking switch, the existence of a duplicate recording for unit 1 will eliminate any inconvenience which could be caused by failure of the read/record head or tape on unit 0.

2.3 Drafting

2.31 New Multilith Masters (A. M. Falcione)

The attention of all secretaries is called to the new form multilith masters which are now available in the stock room. This form is made by Multilith and is pre-printed with non-reproducible ink having the proper image area for typing reports, memos etc. The dotted image is to be used when a report is being written for two-sided printing; this image applies to even-numbered pages. A more detailed memo will be written to all secretaries regarding this subject in the very near future.

3. LIBRARY ACCESSIONS LIST

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

Library Files

No.	Source	Title
2545	Willow Run Rsch.Ctr.	A Comparison of Real and Simulated Automobile Suspension Systems
2548	Lincoln Lab.	An Application of Matrix Theory to the Tracking and Smoothing Equations
2553	Ballistics Rsch.Lab.	The Propagation of Error in Numerical Integrations
B-268	John Wiley	Principles of Transistor Circuits
B-269	McGraw-Hill	Electronic Analog Computers
B-270	Prentice-Hall	Partial Differential Equations in Engineering Problems

Laboratory Files

No.	Author	Title
M-2416		S&EC Biweekly, 9-20-53
M-2425	G. Young	Digital Techniques for Sorting by Areas in a Plane
M-2440		S&EC Biweekly for October 5, 1953
M-2441		Laboratory Personnel for October 1953
M-2459	R. Pfaff	Marginal Checking for Circuit Designs

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

Library Files

No.	Author	Title
B 270	K.S.Miller	Partial Differential Equations in Engineering Problems

4. ADMINISTRATION AND PERSONNEL

New Non-Staff (R. A. Osborne)

Tilda Finnochio is a new secretary in the Purchasing Department.

Roseanne Gillette is a clerk who has transferred from the Bursar's office to work in the Print Room.

Michael Solomita is a new Laboratory Assistant in Group 6345.

Terminated Non-Staff

Vincent Cuzziere
Robert Kyle
Lois Rutland
Marlene Wise