

Digital Computer Laboratory  
Massachusetts Institute of Technology  
Cambridge 39, Massachusetts

SUBJECT: BIWEEKLY REPORT, NOVEMBER 15, 1954

To: Jay W. Forrester

From: Scientific and Engineering Computation Group

1. MATHEMATICS, CODING AND APPLICATIONS

1.1 Introduction

During the past two weeks 217 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 32 of the problems that have been accepted by the S&EC Group.

1.2 Programs and Computer Operation

<u>Problem No.</u>	<u>Title</u>	<u>WWI Time</u>
100	Comprehensive System of Service Routines	733 minutes
106 C.	MIT Seismic Project	67 minutes
108 C.	An Interpretive Program	49 minutes
120 D.	The Aerothermopressor	46 minutes
122 B.	Coulomb Wave Functions	16 minutes
123 C.	Earth Resistivity Interpretation	61 minutes
126 C.	Data Reduction	81 minutes
131.	Special Problems (Staff training, etc.)	31 minutes
132 C.	Subroutines for the Numerically Controlled Milling Machine	28 minutes

141.	S&EC Subroutine Study	37 minutes
155 D.	Synoptic Climatology	217 minutes
159 D.	Water Use in a Hydroelectric System	270 minutes
162 C.	Determination of Phase Shifts from Experimental Cross-Sections	22 minutes
166 C.	Construction and Testing of a Delta-Wing Flutter Model	27 minutes
167 D.	Products of Batch Distillations with Holdup	75 minutes
168 C.	Indicial Downwash behind a Two-Dimensional Wing	3 minutes
172 B.	Overlap Integrals of Molecular and Crystal Physics	12 minutes
180 B.	Crosscorrelation of Blast Furnace Input-Output Data	6 minutes
183 D.	Blast Response of Aircraft	150 minutes
184 D.	Scattering of Electrons from Hydrogen	281 minutes
193 C.	Eigenvalue Problem for Propagation of E.M. Waves	17 minutes
197.	Three Address Computer	58 minutes
198.	Student Problems Coded for SAC and TAC	14 minutes
199 C.	Laminar Boundary Layer of a Steady, Compressible Flow in the Entrance Region of a Tube	59 minutes
203 C.	Response of a Five Story Frame Building under Dynamic Loading	3 minutes
204 C.	Exchange Integrals between Real Slater Orbitals	4 minutes
207 C.	Check for REAC	146 minutes
213 D.	Industrial Process Control Studies	14 minutes
216 C.	Ultrasonic Delay Lines	7 minutes
217 A.	Variation-Perturbation of Atomic Wave Functions and Energies	34 minutes
218 C.	Transformation of Integrals for Diatomic Molecules	5 minutes
222 B.	Helicopter Rotor Stability	18 minutes

### 1.3 Computer Time Statistics

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

Programs	42 hours, 47 minutes
Conversions	0 hours, 0 minutes
Magnetic Drum Test	34 minutes
Magnetic Tape Test	52 minutes
Scope Calibration	30 minutes
Test Storage	21 minutes
Demonstrations	31 minutes
Total Time Used	45 hours, 35 minutes
Total Time Assigned	52 hours, 13 minutes
Usable Time, Percentage	87.2%
Number of Programs Run	217

## 2. COMPUTER ENGINEERING

### 2.1 WWI System Operation (S.H.Dodd)

Computer operators estimate that 94% of assigned operation time was usable during the past biweekly period. Most of the lost time is attributed to component failures and circuit designs which are considered weak. Only about 2% of the lost time was attributed to troubles of an unexplained nature.

Work is in progress to improve some of the circuits in the buffer-drum system to increase reliability. Pulse amplitudes are being raised at critical locations, and a new writer is to be installed on the status tracks to reduce the amount of writing between the slots.

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

Several interrupting failures resulted in decreased computer reliability during this period. There were 25 interrupting incidents during assigned applications time. The failures were mainly of a type which could not be detected by marginal checking. Some of the more important difficulties are listed below:

1. An open terminating choke in a crystal mixer caused intermittent failure to read information into the storage switch. The occurrence of the trouble was a function of the repetition rate of the program.
2. Core memory became inoperative after a Cambridge Electric power failure. The trouble was traced to an intermittently open cathode

in a 6BL7 in the selection circuits, a faulty tube socket for a cathode follower driving the selection circuits, and a blown fuse in another cathode-follower line.

3. Several auxiliary-drum parity alarms caused a considerable loss of time. A design change is being made in the reading amplifiers to correct this difficulty.

4. The margins on the buffer section of the buffer drum are very low. All available systems time will be spent on correcting this situation.

5. The -30-v supply to the auxiliary drum was accidentally shorted. This resulted in "writing between the slots" in almost every track of the drum. One hour and thirty minutes were used to erase the drum.

## 2.2 Terminal Equipment

### Typewriter and Paper Tape (L.H.Norcott)

We are still having trouble trying to obtain a satisfactory opaque tape for our Flexowriters. Two cases of a sample black tape were rushed to us from the paper processor while the dye was still tacky. This tape perforates satisfactorily for a time, but it soon gums up the punches so badly that they have to be removed from service. The manufacturer is now working to eliminate this tackiness.

Larry Holmes and Al Roberts are investigating the possibility of using less opaque tapes with PETR.