DIGITAL COMPUTER NEWSLETTER

The purpose of this newsletter is to provide a medium for the interchange among interested [illegible] information con-[illegible]

OFFICE OF NAVAL RESEARCH · MATHEMATICAL SCIENCES DIVISION

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Approved by
The Under Secretary of the Navy
16 August 1954

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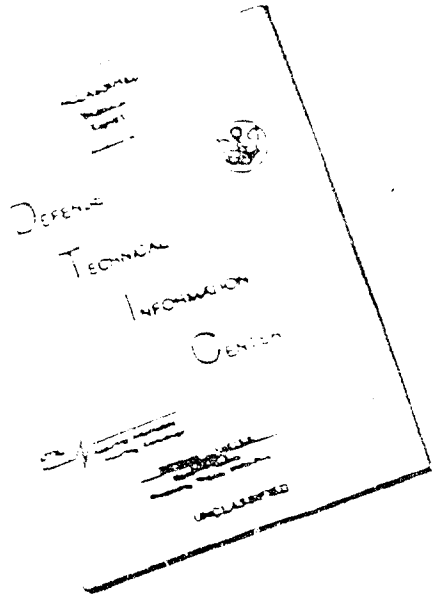

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COMPUTERS, U.S.A.

ADALIA COMPUTATIONS, LTD MONTREAL, CANADA

An ALWAC electronic digital computer has been installed at Adalia Computations Ltd., Montreal, Canada. The computer, manufactured by Logistics Research, of Redondo Beach, California, will be used by Canadian universities, business and industrial firms for solving complex problems and scientific research.

AIR FORCE ARMAMENT CENTER, ARDC, EGLIN AFB, FLORIDA

A Datatron has been installed at the Air Force Armament Center and is at present being utilized by the Arma Corporation for one of their projects. Armament Center personnel are learning to program for this computer which may be used for computations on future Air Force Armament Center projects.

Acceptance tests for the Air Force Armament Center's 1103 High Speed Printer have been started recently at Remington Rand Univac's Plant in St. Paul, Minnesota. Although the Uniservo tape units can theoretically record information approximately ten times faster than the same information can be printed in the on-line mode, tests with an 1103A indicate that only a four-to-one advantage is gained due to an "overhead" time required for calculations within the computer. The printer is scheduled to be shipped to the Armament Center about 1 December 1956 and should be operating by the first of the year.

An external, digital magnetic tape from a Doppler Velocimeter has been read into the 1103 Computer. This is one of the first steps toward Automatic Data Reduction to be completed at the Air Force Armament Center.

Another step in this automatic data reduction process is the receipt of an analog-to-digital converter built by Victor Adding Machine Company. This device will play its digital output directly into the 1103 by means of the computer's external registers and should be in operation about 1 January 1957.

NEW DEVELOPMENTS - ELECOM 125 SYSTEM
UNDERWOOD CORPORATION, LONG ISLAND, N. Y.

Underwood Corporation's Electronic Computer Division has announced a number of additional standard and optional features offered as part of production-line ELECOM 125 Systems.

ELECOM File Processor

The File Processor can now perform the following standard operations

Select-Collate
Substitute-Select

in addition to the previously announed sequence, collate, select, collate and select, separate (one output tape), separate (two output tapes), and manual standard operations.

As an optional feature, the following combinational operations, which the File Processor performs simultaneously, are now available:

Collate-Separate
Substitute-Separate
Collate-Select-Separate
Substitute-Select-Separate

High-speed punched-tape readers and punches may be attached to the ELECOM File Processor as optional features.

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ELECOM 125 Computer

Internal Memory - The ELECOM 125 Computer's main memory has been increased to 4,000 ten-digit words standard, with optional capacities of 6,000, 8,000 or 10,000 words. In addition, 50 words standard or 100 words optional rapid-access memory are now available.

Magnetic-Tape Operations - Magnetic-tape input and output to the Computer have been increased to the standard rate of 6,000 digits per second.

Input or output of magnetic tape proceeds in parallel with computation, but an additional optional buffer is available allowing both input and output of magnetic tape in parallel with computation.

High-speed Punched-Tape Operations - High-speed punched paper tape read into the ELECOM 125 Computer, at a speed of 400 characters per second, utilizes the buffer unit, so that punched-tape reading proceeds in parallel with internal operations. The same is true of high-speed punched-tape output from the Computer, which proceeds at the rate of 60 characters per second.

Base Registers - Two four-digit Base Registers ("B Boxes") are now included as standard equipment in the ELECOM 125 Computer.

Interconnection Panel

The Interconnection Panel has been redesigned allowing the interconnection of 16 Magnetic-Tape Units to the main operational units of the ELECOM 125 System by means of push-button operation. A typical arrangement might connect ten Tape Units to the ELECOM 125 Computer, five Tape Units to the ELECOM File Processor and one Tape Unit to the ELECOM High-Speed Line Printer.

Although a single Interconnection Panel provides for on-line operation of only 16 Tape Units in the ELECOM 125 System, additional Tape Units can be used independently for such off-line operations as tape preparation, tape-to-tape conversion, etc.

The use of additional Interconnection Panels will allow the interconnection of additional File Processors, Computers, Line Printers, and Magnetic-Tape Units.

Auxiliary Equipment, ELECOM 125 System

ELECOM High-Speed Line Printer - The recently announced 900-line-per minute ELECOM High-Speed Line Printer will be available in line widths varying from 48 to 120 characters, the price of the unit being determined by the width of line desired.

Paper-Tape Code Translators - Code translators, to accept or furnish data punched in five-, six-, seven- or eight-hole codes as input and output with the ELECOM 125 System are available as optional equipment.

FLAC- RCA SERVICE COMPANY, INC., PATRICK AIR FORCE BASE, FLORIDA

"The operating record for the period 25 July 1956, through 20 November 1956, was as follows:

Function	No. of Hours	% of Total Time
Production Data	1240.5	43.75
Code Checking and Data Analysis	301.8	10.64
Preventative Maintenance	107.7	3.90
Unscheduled Maintenance	298.8	10.55

Function	No. of Hours	% of Total Time
Scheduled Engineering	230.1	8.12
Good Idle Time	75.1	2.64
*Unscheduled Computer Time	578.0	20.40
	2833.0	100.00

The new 4096 48-bit word high-speed magnetic core memory has been delivered by Telemeter Magnetics, Inc., and is now undergoing tests and check-outs. A new memory driver system was delivered by Technitrol Engineering Co., and checked out. This system will receive serial information from the FLAC AU and presents it in parallel form to the new memory, and vice-versa. Complete computer system (FLAC I) tests cannot be completed until the present FLAC AU is relocated in the new Technical Laboratory Building.

A new FLAC high-speed input-output selection system was designed, fabricated and installed by the Range Contractor. It will permit the computer under programmed control to communicate with fifty (50) input-output devices, thus providing extreme versatility for the reduction of large quantities of missile test data.

IBM

NEW PRODUCTS - - - - 305 RAMAC (Random Access Memory Accounting Machine) is built around the IBM disk memory, the prototype of which was announced in May 1955. The 5,000,000 digit memory used in 305 RAMAC was developed at the company's laboratory in San Jose, Calif. A manufacturing plant is now under construction in San Jose, as well as a new laboratory and other facilities, which will in part be used to make 305 RAMAC equipment and other random access devices. RAMAC units are now being built in San Jose and will be delivered to customers this year. Several already are under test at various customer installations.

The memory consists of 50 magnetic metal disks arranged in a vertical stack. Both sides of the disks are used for recording data, so 100 disk faces are available for storage. There are 100 recording tracks on each disk face, and each track will hold five 100-character records. Access to these records is gained by an arm that moves vertically and horizontally under electronic control. Information flows to and from the memory on the access arm in 100-character lots. The entire stack rotates at 1,200 RPM, so that any address in the memory can be located in milliseconds.

RAMAC uses punched card input and punched card and printer output. It relies upon a combination of stored program and control panel wiring for instructions to carry out its data processing operation.

COMPONENTS OF 305 RAMAC. Besides the disk memory unit, the principal components are:

370 Printer—Used for the automatic preparation of printed reports. Continuous forms are positioned in the printer automatically by a punched tape in the tape-controlled carriage.

323 Card Punch—Used only as an output device. Information flows to it directly from one of the tracks of the drum memory in the processing unit. It punches up to 100 cards a minute.

305 Processing Unit—Contains a magnetic drum for working storage, a magnetic core buffer memory through which information is transferred, and the control circuits for data

*Unscheduled Computer Time is all time for the report period not formally scheduled, or time that FLAC is not operating for reasons other than any listed above.

handling and arithmetic. The drum stores program instructions and furnishes temporary working storage to rearrange the information in records. It also contains sections used for accumulating, multiplying, and inquiry output. The magnetic core buffer holds up to 100 characters for the transfer of information from the magnetic drum or a track of the disk memory.

380 Console—Control center of 305 RAMAC is the operator's console. Input to the system is accomplished through a punched card reader incorporated in the console unit. Through a transmittal keyboard, the operator can ask the machine's memory for specific stored facts such as inventory position or earnings-to-date figures. Answers are automatically typed on a typewriter at the Console. Corrections to data in memory are also made through the keyboard, and indicator lights keep the operator posted on the status of processing at all times.

650 RAMAC. The latest addition to the 650 is the IBM 355 random access memory—a storage medium in which any group of data may be reached quickly and directly, without search.

Up to four 355 memory units may be connected to the 650 system. A 355 is a stack of 50 metal disks, each two feet in diameter. Both sides of the metal disks are treated so that 100 disk faces are available for storage. On each disk face there are 100 concentric data tracks. Six-hundred digits of recorded data may be stored in each track. In other words, each track holds 60 words with signs.

Each 355 unit has a capacity for 6,000,000 digits. With the maximum of four units, the 650 can have available, therefore, 24,000,000 digits stored in a random access memory. This is the equivalent to a file of records stored on 300,000 punched cards.

To process file data, the information stored in the memory is read from and written into the data tracks on the magnetic disks by access arms. The magnetic disks in each unit continuously rotate past three independent access arms at 1,200 RPM, and each arm can move to any data track.

The access arms move under instructions stored in the 650. A seek instruction sends an arm to the addressed data track. A read instruction causes the access arm to read the addressed data track into immediate access storage (the 653 magnetic core memory). A write instruction causes the arm to write into the addressed data track the information that is in immediate access storage.

Feature of the 650 RAMAC important to "in-line" processing is the facility for quick communication with the system, with minimum interference with the routine operating procedure, to inquire into the status of records or to enter new information. This is done through the 838 Inquiry Station. The 838 uses a modified IBM electric typewriter from which inquiries and data can be sent to the 650 and to which the 650 can send replies. Ten inquiry stations are available for each 650 RAMAC system. Each is connected to the system by a cable 50 feet in length and the ten available stations, connected in series, provided a maximum of 500 feet from an inquiry station to the 650 machine area.

The inquiry or information to be sent to the 650 is typed on a form at the inquiry station at the same time that it is transmitted to the processing unit. The 650 stored programming processes the inquiry and transmits the reply back to the inquiry station where it is typed on the form. Complete flexibility and positive control of inquiry station operation is provided by a plastic program tape at each station operating in conjunction with the 650 stored program. The program tape also provides flexibility in the format of the printed document at the inquiry station.

APR (Automatic Production Recording System)

APR equipment, providing a fully-integrated system designed specifically for the automatic collection of production data at the source of manufacturing operations, fills a need in industry wherever continuous process production line methods or job shop operations are in use.

The system's flexibility stems from the sixteen, newly-developed basic components, or "building blocks," which are assembled in appropriate combinations to meet the requirements of widely-varying production recording applications. They include automatic and manual input units, pre-punched card readers, printing card punches, control console, and remote typewriters. Each system consists of the components required on the basis of the number of production points to be covered and the nature of the manufacturing operation.

APR works along these lines:

Measurements made by such commercially-available instruments as mechanical or electronic sensing devices, strain gauges, thermocouples and other variable voltage devices are read electrically. Then, if necessary, they are converted to digital or numeric form suitable for input to the storage unit, or for output via the tape perforator, card punch or automatic typewriter. An on-demand or time programmed read-out can be initiated at any stage for visual display of data which is being accumulated in storage.

Non-variable, identifying data, such as machine and man number can also be introduced into the system from rotary switches on the console or remote control panels, by portable keyboards, or by card readers which read data from IBM pre-punched cards.

The functions of storage in APR are performed by accumulator panels and counter panels which count and store impulses representing measurable data such as count of units or weight of the product.

Heart of the system is the programmer. This component coordinates the flow of information from the input and storage elements to the output units to provide printed and punched records for the particular application.

Output is recorded either by an automatic typewriter, a card punch or a tape perforator. The typewriter produces a printed record of current production information which is primarily for "on-the-spot" use in the production area. The tape perforator produces five-channel alphanumerical punched tapes which are automatically converted to IBM cards when processed by tape-to-card punches. The tapes contain complete instructions for directing the tape-to-card punches as well as the codes that represent data to be punched into the cards.

A reel 8" in diameter, containing approximately 300 feet of paper tape, will hold punched information equivalent to about 350 eighty-column IBM punched cards. Inexpensive and compact, these reels are easily stored or mailed to data processing facilities. Tape-recorded information also may be transmitted over regular telegraphic systems from one location to another.

IBM - STRETCH - AEC

The U. S. Atomic Energy Commission and International Business Machines Corporation have signed a contract under which IBM will begin developing STRETCH, a general-purpose super-computer, for installation at Los Alamos Scientific Laboratory.

The precise mathematical functions required of the machine will be determined by a group of scientists of IBM and of the Los Alamos Scientific Laboratory, which is operated for the Atomic Energy Commission by the University of California. The study group is engaging now in a mathematical survey to define the nature of the problems the computer will encounter, and the mathematical functions needed to solve them.

General performance specifications for STRETCH outlined in the contract would make it between 100 and 200 times faster than any comparable general-purpose calculator available today, and also would permit it to solve problems of much greater scope and complexity.

The designation STRETCH was selected for the endeavor to symbolize the technological advances which will be represented by the development of the most advanced computer possible in the shortest period of time.

As one indication of its capacity, the calculator is planned to operate in a realm of figure-work in which multiplications of 12 to 15 digit numbers will take place at more than 500,000 a second, and additions at about two million a second.

NAVAL AIR TEST CENTER, U. S. NAVAL AIR STATION, PATUXENT RIVER, MARYLAND

Addition of a Model 543 Magnetic Tape Control Unit and a Model 544 Data Reader (Magnetic Tape Storage Unit) to the Naval Air Test Center "Datatron" Computer installation was started on 1 October 1956 and completed on 19 October 1956. For the convenience of the Electro-Data Corporation equipment installation team, the Computer was operated on a 6.5 hour shift for most of this period. This first Data Reader will be used primarily for storage of computer programs. An additional DataReader is being ordered to increase the storage capabilities and the versatility of the computer system.

Benson-Lehner Corporation semi-automatic data reduction equipments (Electroplotter, Oscar and two Boscars with Decimal Converters) at the Naval Air Test Center, are being modified to provide compatibility with the "Datatron" through the incorporation of punched paper tape input-output devices.

Personnel from the Naval Air Test Center have attended two-day Evaluation Conferences and five-day Introductory Coding Courses conducted in Washington, D. C., by the ElectroData Corporation.

The operating statistics for the three calendar months ending 31 October 1956 are as follows:

	August		September		October	
	Hours	%	Hours	%	Hours	
Useful Time	186.5	93.7	190.7	97.1	134.9	82.3
Down Time	12.6	6.3	5.6	2.9	29.1*	17.7*
Total Time	199.1	100.0	196.3	100.0	164.0	100.0
			Analysis of Useful Time			
Code Checking	36.9	18.5	31.9	16.2	20.1	12.3
Production Computing	114.3	57.4	133.5	68.0	85.0	51.8
Demonstrations	-----	----	0.3	0.2	-----	----
Schedule Preventive Maintenance	23.2	11.7	18.3	9.3	23.9	14.6
Idle	12.1	6.1	6.7	3.4	5.9	3.6
Total	186.5	93.7	190.7	97.1	134.9	82.3

NAVY ORDNANCE SUPPLY OFFICE, MECHANICSBURG, PENNSYLVANIA

On 1 July 1956, the Ordnance Supply Office installed an IBM Type 650 Magnetic Drum Data Processing Machine. The 650 installed is a basic punched card input/output machine, composed of the Type 650 Model 2 Console, equipped with alphabetic device; Type 655 Power Unit; and Type 533 Read Punch Unit, equipped with one additional digit selector (punch feed), half time emitter (read feed), and two groups of five 2-position pilot selectors.

Selection of this machine was based on the primary application developed for the inventory control procedure at this office. As the inventory manager of the Ordnance Supply Segment of

*The increase in "down time" during October was caused by modifications to the "Datatron" for the installation of the Tape Control Unit and the DataReader.

the Navy Supply System, the Ordnance Supply Office collected, consolidated, and publis[illegible] status information received from all reporting activities in the Ordnance Distributive Sys[illegible] This Consolidated Stock Status Report was the basis for "supply actions" initiated by supply analysts through a manual analysis of this report. The consolidation and publication of this report was accomplished with the use of conventional EAM equipment. The limitations of the conventional EAM equipment precluded anything more than the application of a very basic formula for computing a "Required or Excess" stock position at each echelon of supply. This required that the stock analysts perform a series of routine arithmetical operations and comparisons in the course of initiating intelligent supply actions during their manual review of the report. As can be expected, each analyst had a wide latitude in applying these arithmetical comparisons, which resulted in inconsistency of supply actions. These routine arithmetical operations and comparisons were documented, analyzed, and certain ones selected for programming on the 650 machine. Testing this approach to inventory control procedures led into further refinements which currently provide the following advantages:

(1) Automatic selection of "potential supply action items" by the 650.

(2) Identification of these potential supply actions into specific types of supply actions, i.e., procure, expedite, reallocate, redistribute, etc.

(3) These potential supply actions, in the form of "stock action cards," accompany the printed report to the stock analysts and immediately identify those items in the report requiring supply action. Formerly, this determination was made by a manual analysis of each item in the report.

The Ordnance Supply Office is currently considering further refinements to this program which will extract various financial and inventory control statistics prohibited formerly due to the limitations of conventional EAM equipment. Statistics which provide the intelligence for effective inventory management, such as monetary values of range and depth, stock items, line items, of each of the stock status reporting elements by various classifications, i.e., fraction code, active versus inactive, not ready for issue, etc., are possible as by-products of this inventory control application.

BALLISTIC RESEARCH LABORATORIES, ABERDEEN PROVING GROUND

In July of this year the 1024 word electrostatic memory of the ORDVAC was replaced by a 4096 word static magnetic memory. The magnetic memory was produced by Telemeter Magnetics, Incorporated, a subsidiary of International Telemeter Corporation. Installation and initial checkout were accomplished in about six weeks by Computing Laboratory personnel after which time the manufacturers representatives corrected some "bugs" in the memory before final acceptance tests were run. With the exception of some power supply difficulties, the memory has been completely trouble-free. No machine errors have been traced to the memory.

RAYDAC, NAVAL AIR MISSILE TEST CENTER, POINT MUGU, CALIFORNIA

Further progress has been made in the development of new high-speed input-output equipment. The input facilities should be in use by April 1957. These will include direct coupling to the RAYDAC of the following equipment:

(1) An IBM 077 Collator which will permit the reading of IBM Cards into the computer at rates up to 240 cards per minute.

(2) A Ferranti Mark II Paper Tape Reader which will permit reading 200 characters per minute from paper tape directly into the RAYDAC.

(3) Magnetic Tape Reproducers which will allow direct entry into the RAYDAC of telemetering and tridop data as recorded on magnetic tapes during tests.

Computing and programming services are available for the solution of problems originating at other Government activities and with prime contractors to the Department of Defense. These services may be obtained by contacting the Bureau of Aeronautics, Code AV-3125.

PHILCO

The Philco Corporation has announced the TRANSAC (Transistorized Automatic Computer), a universal high-speed, airborne computer—until now destined only for the big bombers because of size and weight - may be miniaturized for use in Navy jet fighter planes.

Developed by Philco for the Navy Department's Bureau of Aeronautics, the new control computers can process a typical aircraft problem involving many hundred different instructions and solve it in 1/30th of a second. One of these computers will be delivered to the U. S. Naval Air Development Center, Johnsville, Pennsylvania.

The new, universal, airborne computers, TRANSAC C-1000 and TRANSAC C-1100, are possibly the first completely transistorized, expandable, control systems. The use of its "direct-coupled" circuity has eliminated diodes, vacuum tubes and many other component parts traditionally found in digital computers. In the arithmetic section of the computer, all elements required for addition, subtraction, multiplication and division of a binary digit are combined on a single, replaceable, printed-circuit card supporting only transistors and resistors. The precision and capacity of a TRANSAC computer can be increased by simply adding more 'plug-in' cards.

WHIRLWIND I - M.I.T. (For July, August and September, 1956)

Applications. During the past 3 months, the Scientific and Engineering Computation Group, in conjunction with various departments at MIT, processed 80 problems for solution on Whirlwind I. The problems are described in the Project Whirlwind Summary Reports submitted to the Office of Naval Research and cover some 16 different fields of application. The results of 29 of the problems have been or will be included in academic theses. In these 29 problems, there are represented 21 doctoral theses, 8 master's and 2 bachelor's. Twenty-five of the problems have originated from research projects sponsored at MIT by the Office of Naval Research.

WWI Reliability. (1 June - 24 September 1956). The following is the WWI Computer Reliability for the past quarter:

Total Computer Operating Time in Hours	2572.2
Total Time Lost in Hours	32.9
Percentage Operating Time Usable	98.8
Average Uninterrupted Operating Time Between Failure Incidents in Hours	22.3
Total Number of Failure Incidents	114
Failure Incidents per 24 Hour Day	1.06
Average Lost Time Per Incident in Minutes	17.3
Average Preventative Maintenance Time Per Day in Hours	2.2

High-Speed Memory. The storage facilities available at WWI include magnetic tape units, magnetic drums, and magnetic core memory. The access time to both the tape and drum storage is long in comparison to that required of the core memory. To meet these demands, the high-speed core memory facilities have been expanded by a factor of three. The addition of 4096 registers raises the high-speed core memory complement to 6144 registers (each register is composed of 17 bits). The WWI computer is designed to employ a 16 bit word in which 5 bits form the instruction and 11 bits address the desired register. Therefore, one-third of the registers (2048) can be actively engaged in problem solving, while the remaining two-thirds are passive. However, through use of a new computer instruction, change core memory fields (cf), it is possible to activate or deactivate any of the six core memory fields (a field is composed of 1024 registers) in 20 microseconds. The cf instruction provides several flexible features in

having computer pulses interrogate the address bits for the cf instruction to determine if any of the following actions are to be performed:

(1) program pass control to the succeeding register or to any other register.

(2) replace a single field, both fields, or leave the field assignments unchanged.

(3) assign any of the six fields to appear as fixed addressed registers 0 - 1023 or 1024 - 2047.

To further assist WWI users in solving real time problems, the core memory access time has been reduced from 8 to 7 microseconds.

Reorganization. Sometime this spring an IBM 704 machine will be installed in the new MIT Computation Laboratory. At that time a new administration unit, the MIT Computation Center, will be inaugurated. During the spring many members of the staff of the present project will transfer to the staff of the Center and by next summer, Whirlwind will be withdrawn from general use in research and will be turned over to Project Lincoln for its full-time use. At that time the present, ONR-sponsored, project will terminate. As part of the transfer of activities, no part-time ONR research assistants were appointed this academic year; IBM research assistants were appointed instead.

COMPUTING CENTERS

NAVAL PROVING GROUND, DAHLGREN, VIRGINIA

The Naval Ordnance Research Calculator (NORC) has completed one year of three-shift operation. During the first ten months of 1956 the machine was available 86 percent of the scheduled operating time. Several new instructions have been added during the past quarter, including one for reading the contents of the address modifier registers. In addition, emphasis has been placed on improvement of input-output facilities. A contract for a high-speed cathode ray tube printer-plotter, to be on-line with NORC, is in the final stages of negotiation. Delivery is expected one year from date of contract.

The Aiken Dahlgren Electronic Calculator (ADEC) is being maintained on one shift for use as needed.

The Aiken Relay Calculator (also known as the Mark II), built by the Harvard Computation Laboratory and delivered in 1948, is being retired after long and valuable service for the Bureau of Ordnance.

COMPUTERS, OVERSEAS

THE ARMAC (Automatische Rekenmachine Mathematisch Centrum) - Amsterdam

The ARMAC is an automatic digital computer of medium-speed which was designed and built at the Mathematical Centre at Amsterdam. The design of this machine started in March 1955 and it was put into service in June 1956.

Specifications

I General:

The ARMAC is a fixed point binary electronic computer

Wordlength: 34 binary digits.

Positive numbers are represented by a zero followed by 33 binary digits, negative numbers are represented by inverting each bit of the corresponding positive number.

Instructions are single-address and contain 17 bits (5 function digits and 12 address digits).

Two instructions are stored in a memory location.

II Arithmetic unit:

The ARMAC is a serial machine. It contains 2 arithmetic registers, A and S, which may be used interchangeably for all operations except multiplication. These registers consist of flip-flops.

Division must be programmed.

No built-in arithmetic checks are provided.

III Memory:

a. Magnetic drum with 112 tracks of 32 words each. These memory locations are numbered from 512 to 4095. The drum is aluminum, coated with ironoxyde and rotates at 4500 r.p.m.

b. Immediate-access magnetic core matrix consisting of 16 "tracks" of 32 words. These locations are numbered from 0 to 511. At present only one "track" has been installed. Transport instructions are provided for copying a whole track from the drum into this fast store and vice versa.

c. Another 32-word core matrix is used as a buffer to reduce the average time needed for obtaining an instruction from the drum. The operation of this buffer is automatic. Special instructions are provided for writing the contents of A or S in a specified location of this buffer.

Two parity digits are used to check all transfers of numbers and instructions from the memory.

IV Input:

a. Photo-electric Ferranti taporeader (150 characters/second).

b. Manual decimal input is possible by means of a keyboard.

c. Manual input of a binary number can be accomplished by a set of 34 toggle-switches on the console.

V Output:

a. IBM Electric typewriter (9 characters/second).

b. High-speed Creed Tape Punch (25 characters/second).

VI Speed:

a. Basic frequency: circa 100 kc/s.

b. Short instructions (additions etc.): 416 μsec.

c. Multiplication: 5.4 msec.

d. Transport instructions: 14.6 msec.

e. The number of performed instructions per second is between 2400 and 1000 depending on the structure of the program.

VII Power consumption:

circa 12 kW.

VIII Components:

about 1200 valves and about 9000 germanium diodes.

ELLIOTT BROTHERS (LONDON) LTD.

The well-known Elliott 402 Electronic Digital Computer has been modified to include increased drum storage capacity of 4976 words (39 tracks of 128 words each except track 0). At the same time the overall size of the computer has been reduced.

A high-speed punch card output device is now under development that will punch all columns of 80 column cards, 1 column at a time, at speeds of 120 cards per minute. This will be a suitable output device for all Elliott Computers.

ISTITUTO NAZIONALE PER LE APPLICAZIONI DEL CALCOLO - ROME, ITALY

Computer maintenance

During the first year of maintenance (June 1955 - June 1956) the average weekly efficiency of the computer was 89.1%.

The rates of valve replacement and fault time causes are given below in approximate figures.

Type of valve	% of valve subst.
6AL5	5
EF55	15
EF50	45
12AT7	35
EF91	35
VC/RX/266	70

Type of fault	% of fault time
Power supplies	23
Valves	17
Other component fail.	3
Construct. failures	3
Basic waveforms	3
C.R.T.	19
Drum	4
Input/Output	12
Other causes	5
Unidentified causes	11

It has been noted that EF50's and 12AT7's are the types of valves which usually give most trouble. The EF50's suffer generally from poor emission, even, sometimes, when new. The 12AT7's suffer from open circuited heaters.

Experience has proved that efficiencies averaging between 95% and 100% can be obtained if the hands of the engineers are not too often inside the computer and therefore it is better to carry out preventive maintenance and modifications in short and intensive spells.

New overflow instruction

The logic and the electronics for a new "overflow" instruction were recently designed in Rome and the physical circuitry was built in the FINAC. At present the new instruction is working and at full disposal of FINAC mathematicians.

The OVERFLOW instruction (code 01110) is: "Test the setting of the OW flip-flop; if the flip-flop is set, transfer control to the instruction whose address is specified and reset the OW flip-flop, otherwise use the instruction next in numerical order in the usual way."

The OW flip-flop is set whenever one of the following events takes place:

(1) The result of an addition or subtraction in the accumulator (operation codes 10000, 10001, 10100) is not arithmetically correct (e.g.: B/// //// + B/// //// = J/// ////, which with the usual convention means 1 + 1 = -2).

(2) The result of the addition or subtraction of the multiplier's output to the previous content of the accumulator is not arithmetically correct (operation codes 11101, 11001).

(3) The result of a multiplication (multiplier's output) is not arithmetically correct (e.g.: F/// //// x F/// //// = L/// //// //// ////, which with the usual convention means 1.5 x 1.5 = -1.75) (operation codes 11101 and 11001).

(4) Minus 2 (i.e. a 1 in the most significant digit position of a long line followed by all 0's) is complemented on its way to the accumulator or to the multiplier (operation codes 10001 and 11001): in fact the result is still -2.

(5) An excess positive shift is carried out, while the accumulator's content is different from nought.

(6) A normal positive shift is carried out and the digits "falling out" on the left of the accumulator's most significant digit are not all equal to each other and to the digit in the most significant digit position of the result.

Whenever the keys Clear All Stores or Clear Main Stores are depressed the OW flip-flop is reset.

When the OW flip-flop is set a neon lamp is lit on the console.

The components involved in the construction of the new circuitry and in the modification of the existing circuits are the following:

36 valves (10 pentodes, 14 double triodes and 12 double diodes), 10 capacitors, 10 crystals and 140 resistors. A whole new chassis is needed.

New engineers routines

A new test, known as SHORTEST and contained in one track, can test the drum reading out and checking or else writing and checking 8 different patterns in any number of tracks specified on the STORE keys. Addresses of failing tracks may be printed out. The same 8 patterns are used in a phasing routine incorporated in the same test.

A new engineers input has been derived from WINGSTEDT'S: in the new version the directory is written automatically, according to directions set on the STORE KEYS, and the whole drum may be filled using it. There are special facilities to use this program to test the tape reader.

THE PILOT DIGITAL CALCULATOR-TATA INSTITUTE OF FUNDAMENTAL RESEARCH, BOMBAY, INDIA

As a first step in the physical realisation of a full-scale electronic digital calculator, a pilot machine has been designed and set up at the Tata Institute of Fundamental Research, Bombay. Work on the design of the pilot calculator was initiated early in 1955 and at the time of writing (November, 1956) several test-routines involving pseudo-random number sequences have been successfully programmed on the calculator. Some of the more important design features of the pilot machine are given below:

Machine Type:	Parallel, Asynchronous, Binary (fixed binary point).
Word Lengths:	11 bits (including the sign). Numbers are stored as absolute values with sign, restricted to the range (-1, 1).
Memory:	A ferrite-core matrix memory, with a capacity of 100 words has been wired in the form of a 2 dimensional array with 11 rows and 100 columns. (This memory is soon to be replaced by an expanded one of 256 words of 12 bits each, wired in the form of a 3-dimensional array. The expanded memory is currently being tested before incorporation in the pilot machine.)
Orders:	4 bits are assigned for the order code. The list of 15 built-in orders includes addition, subtraction, multiplication, division, transfer, shift, store, input, output, transfer control (conditional, unconditional) and stop.
Input - Output:	Punched tape, currently being used with a Ferranti photo-electric tape reader and an Olivetti reperforator (Type T2-PS) and a page-printer.
Total Power:	Approximately 10 K.W.
Size:	The main part of the pilot machine - excluding the power supplies and the input-output units - has been assembled in 4 steel racks, 7' x 8-1/2' x 2' each.

A fast, versatile logical adder has been developed. It is soon to be incorporated in the pilot machine.

Work on the logical and engineering design of the full-scale machine is progressing.

IBM UNITED KINGDOM LONDON DATA PROCESSING CENTRE

The first IBM data processing Centre in the United Kingdom will be opened shortly in London, at the head office of IBM United Kingdom. The centre will be based in the first instance on a type 650 computer. This will be used to provide a computing service to science and commerce. The installation will be under the direction of Dr. M. P. Barnett.

COMPONENTS

ELECTRODATA ELECTRONIC FILING UNIT

An "electronic filing" device—using short lengths of magnetic tape to provide compact storage and rapid access to almost unlimited volumes of business information—has been

announced by Burroughs' ElectroData Division. Used in conjunction with a Datatron electronic computer, the new DATAFILE system supplies 10 times the maximum file capacity of any other data processing equipment now available. Each DATAFILE stores 80-million characters in a single memory unit the size of an ordinary deep-freeze. Up to 10 DATAFILEs can be integrated into one computer system—stretching its memory to 800-million characters.

Fifty 250-foot tapes inside each unit magnetically store the business records at hand. Information is calibrated into addressable blocks of 200 characters each. The tapes, housed in static-free metal bins, move backward or forward over guide-rods at 60 inches a second.

At a single program command from the computer, twin read-write heads are propelled beneath the tapes and stop at the designated position to read or write 1 to 100 blocks of information, at the rate of 46 milliseconds per block. The computer automatically processes the records selected—e.g., invoices, sales commissions, insurance policies—and restores them to their previous locations.

Tape capacity is effectively doubled through the use of two parallel lanes of six information channels each, interlaced across the tape's width. This offers unique flexibility for organizing records within a single unit—serially, in parallel or at random. Tapes can be written-on repetitively for spot-updating of information. Perforations at the end of each tape actuate a vacuum switch which automatically stops the tape. Combined with block addressing, this prevents loss of information due to tape "run-out." DATAFILE can search its tapes independently, leaving the computer free for other data processing.

Records are stored in DATAFILE in the same decimal form as used with the Datatron computer. A built-in checking code and automatic editing process precludes transient errors, such as those caused by dust particles.

According to ElectroData officials, orders already have been placed for over 50 DATAFILE systems. Production at the firm's Pasadena plant will increase to 15 units per month during 1957.

LIBRASCOPE, INC., GLENDALE, CALIFORNIA

NEW EQUIPMENT. Librascope announces a Punched Tape Converter designed for reading information stored on a punched paper tape and converting the information into electrical signals suitable for the control and actuation of a Librascope X-Y Plotter, Model 200-A. The converter accepts as inputs output tapes from the Electrodata and LGP-30 digital computers, at the present time. Modifications to provide compatibility with other commercial plotters as to Converter output are in the planning stage. Relay operated, accuracy 0.1%. A feature of this unit is the versatility of format control; information need not be in rigid, specific form in order to be transmitted to the plotter.

Their Punched Card Converter for the same X-Y Plotter has been re-packaged. The Converter is relay operated, and accepts, then converts, three decimal digit and sign, two channel IBM punched card data to an analog form for input to the plotter. Cards can be fed manually through IBM reading brushes singly, or read automatically at rates up to 50 cards per minute with an accuracy of 0.1%. Operates with IBM Reproducing Punch, Type 519, and IBM Gang Summary Punch, Type 523.

ANALOG-DIGITAL CONVERTERS (Shaft position to digital). Librascope is now making special read-out equipment to be used with the Analog-digital converter to feed information to Flexowriters, Clary typewriters, or punched tape and punched card converters.

LGP-30. Three companies are now working on various aspects of Librascope's General Purpose 4096 word memory Computer, introduced in 1955. Librascope in Glendale, Calif. continues to manufacture the LGP-30. The Royal McBee Corp. of New York is responsible for sales and services. The Royal Precision Co., Port Chester, N. Y. maintains liaison between the two firms.

Recent installations of the LGP-30 have been made at the California Institute of Technology, Pasadena, Convair, San Diego, Link Aviation in New York and the Callory Chemical Co. in Indiana.

LOGISTICS RESEARCH INC.

A NEW HIGH-SPEED PAPER TAPE INPUT-OUTPUT UNIT console, consisting of a 400 character per second photoelectric reader and a 60 character per second punch, makes possible an 1800 percent increase in the input speed of the ALWAC III-E Electronic Digital Computing System.

This new high-speed unit provides rapid read-in and punch-out of data on paper tape and greatly increases the volume of productive computing time because the speed of the computer is not delayed by slower input and output devices. The new console also increases the system's range of applications, now extended to include unlimited storage of data (inventory, payroll, personnel, sales, production and accounting records) on inexpensive paper tape.

Modular construction of the new high-speed paper tape unit permits the purchase of either punch or reader if application does not require both.

A new ALWAC CARD CONVERTER automatically translates alphabetically and decimally coded data recorded on cards into binary "language" understood by the ALWAC Code. This Card Converter makes possible the direct and automatic transfer of data from cards to computer for processing. The processed data can then be recorded on cards or tape for storage.

RCA MEMORY UNIT

RCA has announced that a new memory, consisting basically of thin, printed plates of special magnetic material perforated with small holes, has been developed by a research group under the direction of Dr. Jan A. Rajchman. RCA believes the new device lends itself to extremely simple molding production techniques, in contrast to the relatively complex process of threading thousands of tiny cores onto a wire matrix to produce the magnetic core device. The small plates used in the new system are made of a special RCA-developed ferromagnetic material, a ceramic-like substance that can be molded in any desired size or shape, and hardened by heating. The experimental units produced at the David Sarnoff Research Center are less than an inch square and contain 256 holes, permitting the storage of 256 bits of information in each plate. With this new plate system, the plates themselves are insulators and the holes can be joined by conductors using the highly efficient printed circuit technique in place of the complex storage and readout windings of the previous core system.

THE 1092-BU-7 BUFFER STORAGE UNIT-TELEMETER MAGNETICS, INC.

TELEMETER MAGNETICS, Inc. has just completed production of a new coincident-current magnetic core storage unit. This unit, the 1092-BU-7 has unique properties which make it ideal for application as a temporary store, buffer or delay unit in data processing, computing and automation systems. It has a capacity of up to 1092 characters, each of which may be up to 7 binary digits in length. The 7 bits of each character are loaded and unloaded from the memory in parallel. The characters are introduced into the store sequentially and are immediately available at the output in the same sequence as the loading sequence. In other words, the store has the unique feature of always being ready to deliver the earliest stored character regardless of whether the total number of characters in the store is 1 or 1092.

The new storage unit is completely transistorized. No vacuum tubes are employed and all components are derated according to the best computing equipment practices so that the highest possible reliability is obtained. The power supply is self contained, requiring 115 volts, 60 cycles, 2 amperes. The unit is extremely compact, fitting a standard relay rack approximately 21" high.

Minimum time for loading or unloading operation is 14 microseconds per character with 6 microseconds being required to switch from a loading to an unloading operation. Such switching may take place at any time in response to load and unload sync signals. There is no fixed block length for either loading or unloading. The unit emits a "FULL" signal when its capacity has been exceeded and an "EMPTY" signal after the last character has been delivered. The available capacity can be increased beyond 1092 characters by combining 1092-BU-7 units with the CU-7 Control Unit.

Telemeter Magnetics, Inc. continues the work of International Telemeter Corporation in the data processing field. The company which has produced high-speed ferrite core memories for the Rand Corporation, Ballistic Research Laboratory and Argonne National Laboratory, among others, is currently launching a line of commercial data processing components. Among these components are a 1,024 character buffer store and a data converter.

MEETINGS AND SEMINARS

AUTOMATIC CODING SYMPOSIUM AT FRANKLIN INSTITUTE, PHILADELPHIA

"Automatic Coding" will be the theme of digital computer symposium to be held at Franklin Institute in Philadelphia on January 24th and 25th, 1957.

A program has been arranged that should be of wide interest to users and potential users of modern digital computing equipment. The greater part of the two-day meeting will be given over to lectures and discussions. However, those who attend will have time to observe a demonstration of the Institute's recently completed UNIVAC Computing Center.

The lecture sessions of the Symposium will be held in the Institute's Lecture Hall. Since the Hall's capacity is limited, advance registration is recommended. A registration fee of $35 will be charged to cover all sessions, UNIVAC demonstration, luncheon and dinner the first day, luncheon the second, and a copy of the Proceedings of the Symposium.

PROGRAM

"Print I - An Automatic Coding System for the IBM 705"
R. W. Bomer, International Business Machines Corp.

"Automatic Coding Experience at the General Electric Company's UNIVAC Installation in Louisville"
Richard M. Peterson, Major Appliance Div., G. E. Company

"Debugging Automatic Coding"
Charles Katz, Remington Rand UNIVAC Div., Sperry Rand Corp.

"Omnicode, A Common Language Programming System"
R. C. McGee, Automatic Programming, G. E. Company (Richland, Wn.)

"A Mathematical Language Compiler"
A. J. Perlis, Computation Center, Carnegie Inst. of Technology

"The Procedure Translator, A System of Automatic Programming"
H. H. Kinzler, Electronic Installations, Metropolitan Life Ins. Co.
Mr. Moskowitz, Electronic Research Bur., Metropolitan Life Ins. Co.

"A Mechanized Approach to Automatic Coding"
E. C. Yowell, National Cash Register Company

"A Matrix Compiler for UNIVAC"
L. C. McGinn, Analysis Section, Franklin Institute Labs.

For further details, write: Automatic Coding Symposium, Franklin Institute, 20th and Parkway, Philadelphia 3, Pennsylvania. Or telephone LOcust 4-3600, Extension 282.

PURDUE UNIVERSITY - LAFAYETTE, INDIANA

SYMPOSIUM

An advanced symposium on digital computer research was held at Purdue University Thursday and Friday, November 8 and 9.

The morning of November 8, Dr. Paul Brock, head of Purdue's Computer Laboratory, chaired a program in which the following addresses were made: "The Role of a University in an Industrial Society," by Dr. C. F. Kossack, head of the Purdue Mathematics Department; "On Administration of Research," by Dr. R. A. Morgen, assistant to the Purdue president for research and research director of the Purdue Research Foundation; and "Report on the Purdue Computer Research Program," by Dr. Brock.

That afternoon, Dr. Irving Burr of the Purdue Mathematics Department chaired the second session, at which Dr. P. O. Dwyer, of the University of Michigan, discussed "Some Modern Linear Techniques in Practical Problems," and Dr. S. N. Alexander of the National Bureau of Standards talked on "Re-evaluation of Computing Equipment Needs."

The morning of November 9, under the chairmanship of Dr. Robert M. Baer of the Purdue Mathematics Department, Dr. John W. Mauchly, of Sperry Rand Corp. discussed "Information Retrieval."

In the afternoon, two sessions were held. The first, a round-table on operational procedures, was under the direction of Dr. Alan Perlis, formerly of the Purdue faculty and now of Carnegie Tech. The second session, a round-table on equipment maintenance procedures, was chaired by Dr. John R. Clark, also a former Purdue staff member, now associated with Farnsworth Electronics Company.

A select group of leaders in the computer research field was present at the symposium.

COMPUTER LECTURES. Industry, government and education today are relying so much on digital computers of all kinds that there is a serious shortage of personnel trained to handle these complicated electronic machines. In addition, there are so many different makes and models of computers that no one university can introduce its graduate students in statistics to all of them right on the campus.

Purdue University has come up with an idea aimed at solving this problem. Starting Tuesday, Oct. 23, representatives of nine different companies manufacturing digital computers have been coming to the campus to describe 17 different machines.

Companies represented include Remington-Rand, Inc., International Business Machines, Inc., Radio Corp. of America, Underwood Corp., General Electric Co., Bendix Aviation Corp., Royal Precision Corp., Litton Industries, and North American Aviation. The machines to be described include Univac, Ramac, Univac Scientific, IBM 650, Bizmac, Elecom, Erma, G-15, LGP-30, DBA and Recomp.

The introductory lecture in the series was given Tuesday, Oct. 23, by Prof. Paul Brock, head of Purdue's Computer Laboratory. The seminar will conclude with a discussion of advanced coding techniques on May 2, 1957, and a summary by Professor Brock on May 16.

UNDERWOOD CORPORATION, LONG ISLAND, NEW YORK

EXECUTIVE SEMINARS—An Autumn series of Executive Seminars on the ELECOM 125 System has been announced by Underwood-ELECOM.

Featuring a new two-and-one-half-day format, the seminar-type discussion groups are aimed at informing intermediate and high-level management about the essentials of the ELECOM 125 System. The opening session covers an overall description of the ELECOM 125 System and the analysis of a typical application. Following this introduction, the next session is devoted to an analysis of applications from the floor. The windup session features a description and discussion of the ELECOM 50 Electronic Accounting Machine and the Underwood Dataflo System.

The initial seminar held in New York City featured applications from the group dealing with inventory and accounts receivable, aircraft production control, accounts receivable for a factoring organization and sales cost accounting.

Future Executive Seminars will be held in:

Denver	January 9-11
Toronto	January 23-25
Houston	February 13-15
Chicago	March 13-15
Washington	April 10-12
New York	May 8-10

To acquaint members of the public utilities, insurance, and brokerage and banking professions with the capabilities of the ELECOM 125 System for business data-processing in their particular fields, ELECOM will hold a series of special seminars covering applications in these industries.

The first of these five-day seminars will be devoted to the public utilities industry and is scheduled to be held at the Underwood-ELECOM Data Processing Center in New York City, January 28-February 1, 1957. An insurance seminar is tentatively set for the end of March 1957, with a brokerage and banking session scheduled for the end of May 1957.

A special feature of these meetings will be the actual running of programmed applications peculiar to the industry under consideration on the ELECOM 125 System installed at the Data-Processing Center.

Attendance at ELECOM Executive Seminars is by invitation. For details on enrollment contact Clarence M. Sidlo, Training Director, Underwood Corporation, Electronic Computer Division, 35-10 36th Avenue, Long Island City 6, New York.

MISCELLANEOUS

IRE SUBCOMMITTEE ON DIGITAL COMPUTER LOGICAL AND BLOCK DIAGRAM SYMBOLS

The Institute of Radio Engineers has undertaken the job of recommending standards for digital computer block diagram symbols. The IRE Technical Committee 8 on Electronic Computers has established a SUBCOMMITTEE 8.9 ON DIGITAL COMPUTER LOGICAL AND BLOCK DIAGRAM SYMBOLS. This group has been in operation since early this year.

To extend the area of representation beyond its membership, the sub-committee is selecting a limited number of correspondents who represent manufacturers, government agencies, and universities. These correspondents, although they do not ordinarily attend mettings,

receive copies of all subcommittee papers including minutes of meetings and copies of all proposals. They are expected to voice their opinions and provide a check upon committee decisions. In this way the subcommittee expects to ensure that its decisions receive adequate review throughout the industry.

The subcommittee will also be pleased to establish contact with other interested parties and to receive suggestions or copies of existing companies standards. Communications may be addressed to the chairman at IRE Headquarters, 1 East 79 Street, in New York City.

Membership of the subcommittee is as follows:

G. W. Patterson, Chairman
The Moore School of Electrical Engineering
University of Pennsylvania

J. S. Murphy, Vice Chairman
ElectroData Division, Burroughs Corp.

C. F. Lee, Secretary
Remington Rand Univac, Philadelphia

M. P. Marcus
International Business Machines Corp. Endicott

R. P. Mayer
Lincoln Laboratories, MIT

R. J. Nelson
Case Institute of Technology

A. J. Neumann
Office of Naval Research

J. J. O'Farrell, IBM
Representing ASA Subcommittee Y14.15

G. E. Poorte
Radio Corporation of America

IBM - EDPM INSTALLATIONS

International Business Machines Corporation has installed, approximately as of date, the following quantities of intermediate and large-scale electronic data processing machines:

Type 650 MDDPM	486
Type 701 EDPM	16
Type 702 EDPM	14
Type 704 EDPM	30
Type 705 EDPM	32

Under the Educational Contribution Plan of IBM, by which educational institutions may under certain circumstances receive as a contribution a major portion of the usual monthly machine charge, the following schools have received Type 650s:

University of Wisconsin
Stanford University
Wayne University
North Carolina State College
Cornell University
University of Rochester
Massachusetts Institute of Technology
University of Michigan
Georgia Institute of Technology
Ohio State University
University of Indiana
University of Washington
Carnegie Institute of Technology

In addition to these, 14 schools have Type 650s on order under this plan. Schools which have ordered large-scale IBM machines under this plan are Massachusetts Institute of Technology (704), and UCLA (705).

INTERNATIONAL BUSINESS MACHINES CORP., NEW YORK, NEW YORK

Dr. Emanuel R. Piore has joined International Business Machines Corporation as director of research.

Dr. Piore was formerly chief scientist of the Office of Naval Research. His most recent post was research vice president for AVCO Manufacturing Corporation where he was engaged mainly in the direction of scientific programs. He remains a consultant for that firm.

At IBM, Dr. Piore will head a company-wide research effort presently being carried on in laboratories located in New York and California and in Zurich, Switzerland. His headquarters will be in New York City.

NAVY—BUREAU OF ORDNANCE, DATA PROCESSING ANALYSIS BRANCH

The Bureau of Ordnance has established the Data Processing Analysis Branch (Code AdB), the functions of which are to develop and administer throughout the Naval Ordnance Establishment a flexible data processing program encompassing management problems in the field of logistics, excluding scientific applications. Heading this Branch is Capt. V. H. Conradt-Eberlin USNR. Mr. Ed Roberts, who recently headed EXOS Data Processing Branch of the Administrative Office of the Navy Dept. is Assistant Branch Head. Mr. B. Griffis heads the Automated Systems Analysis and Training Section.

Analyst-Programmers assigned include both Civilian and Military personnel.

The Bureau's first Electronic data processing machine application is in the Expendables area, a major logistical problem covering the field of ammunition.

OFFICE OF NAVAL RESEARCH, WASHINGTON, D. C.

The Office of Naval Research, Information Systems Branch (Code 437) continues to expand its activities in the Computer and Information Theory Field. The Branch now consists of, Dr. Marshall C. Yovits, Head, and Mr. Gordon D. Goldstein, Program Officer.

Mr. Albrecht J. Neumann, formerly in the branch has assumed new duties with ONR's Office of the Development Coordinator, Navy. His Code (923) is primarily concerned with Navy wide coordination of the Research and Development program in the field of electronic computers and data handling.

Dr. Yovits was formerly a member of ONR's Electronic Branch, and Mr. Goldstein was formerly with the David Taylor Model Basin's, Applied Mathematics Laboratory.

Effective with this issue of the NEWSLETTER, Mr. Gordon Goldstein and Mr. A. Neumann will act as joint editors. All communications should be addressed to Code 437.

The Pratt & Whitney Division of the United Aircraft Corporation, East Hartford, Conn., has awarded a contract to Fischer & Porter Co., Hatboro, Pa., for an Automatic Data Reduction System for use in its engine test cells at the Willgoos Gas Turbine Laboratory at East Hartford. This contract represents the largest single undertaking of its kind in the industry to date. Scheduled installation is summer of 1957.

The system will be capable of digitally recording pressure, temperature, flow, speed and miscellaneous parameters from a number of test cells simultaneously. The record will be automatically typed on a digital log sheet and also punched on IBM tabulating cards. Raw data will thus be immediately available for insertion into a digital computer test analysis.

Accurate recording of large numbers of pressures has long been a major problem associated with the testing of aircraft engines, engine components and airframes. Manual reading of manometer boards has proven to be time-consuming, costly, and of questionable accuracy. Photographing manometer boards offered an advantage in that all manometers were "read" simultaneously, but otherwise suffered all disadvantages previously mentioned.

Early data reduction techniques employed individual transducers for each pressure point, but this required continual extensive calibrations. Switching small groups of transducers between various pressure lines reduced the number of transducers required but introduced unacceptable pressure lags through the pneumatic lines from components being tested.

The Fischer & Porter multiple pressure measuring system "reads" all pneumatic signals simultaneously, employing a single, high-accuracy transducer which converts pneumatic signals directly to digital form. This transducer has an accuracy of 0.05% of full scale, permitting the system to handle wide bands of pressures in each range. The system is continuously of self-checking. Unitized constructions and special testing circuits with indicating lamps simplify maintenance. Thermocouple and other electrical signals will be handled in a manner similar to the pressure section; many components and plug-in chassis will be interchangeable.

TELEMETER MAGNETICS, INC., LOS ANGELES, CALIF.

During September and October, TELEMETER MAGNETICS, Inc. delivered two magnetic-core memories; one to Patrick Air Force Base in Florida, and the other to the Weizmann Institute of Science in Israel.

Both memories store 4096 words. The memory for Weizmann operates in a parallel mode; the one for Patrick, in a parallel-serial mode.

UNDERWOOD CORPORATION - LONG ISLAND CITY, NEW YORK

DELIVERY OF SANDIA AND TEXAS MACHINES - - - Since last summer, Underwood ELECOM has delivered to customers its second ELECOM 125 Computer and its first ELECOM 120A Computer of the current production schedule.

The ELECOM 125 was shipped to the Sandia Corporation at Albuquerque, New Mexico, and represents the second ELECOM shipped to Sandia in the last six months.

The ELECOM 120A was delivered to the Texas Company at Houston, Texas. The machine, a scientific computer similar to its commercial counterpart used in the ELECOM 125 System, is equipped for base-register and floating-decimal operation and will be used for calculations attendant geophysical oil exploration. Acceptance of the ELECOM 120A by the Texas Company was based on two eight-hour periods of automatically programmed machine operation and four hours of magnetic-tape operation. During the machine-test periods, each instruction order the computer was built to perform was successively tested and verified by a typeout on the supervisory control typewriter. Similarly, tape-handling instruction orders were used to check the operation of the tape units proper, as well as the associated tape-control circuitry in the computer.

ELECOM 50 FILM STRIP - A film strip with sound narration on the ELECOM 50 Electronic Business Data-Processing Computer was recently released by Underwood Corporation.

Created to tell the story of the ELECOM 50 in easy-to-understand language, the film strip illustrates how Underwood ELECOM has combined the techniques of electronic digital computation and integrated data processing to produce a fast, efficient, low-cost electronic business data-processing computer which in a single operation can compute, record, analyze, and report.

The film strip should be of considerable interest to business and professional groups concerned with the application of computers and integrated data processing to such everyday accounting procedures as payroll, sales and cost analysis, inventory control and retail sales audit to mention a few.

Not only will Underwood make the film strip and sound narration available to interested groups, but it will also provide trained personnel to discuss the ELECOM 50 at greater length with the group.

Also included in the film strip is a brief description of several of Underwood Corporation's new Dataflo components which are building blocks for Underwood integrated data-processing systems.

Further information on the film strip or speaker can be obtained by writing direct to Mr. C. S. Saltzman, Sales Manager, ELECOM 50 and Integrated Data Processing, Underwood Corporation, 1 Park Avenue, New York 16, New York.

ELECOM 125 ELECTION PREDICTION—As its first official assignment Underwood ELECOM's new ELECOM 125 System successfully predicted the outcome of the presidential election, Election Day, November 6, before an audience of twenty million Americans over ABC's combined television and radio network. In its inaugural appearance at the new Underwood Data-Processing Center at Underwood Headquarters, One Park Avenue, New York City, the ELECOM 125 made its initial prediction at 8:05 P.M. when it forecast a landslide for President Eisenhower and "less than 100 electoral votes for Stevenson," on the basis of a popular vote of 900,000.

The Computer later predicted 71 electoral votes for Stevenson at 9:05 P.M. compared to the final total of 74 which Mr. Stevenson received. Computer programs for the Election Night predictions were by Louis Bean, well-known political analyst, and Dr. Leon Nemerever, Chief of ELECOM's Programming Department.

Statistics on past presidential elections dating back to 1916 were analyzed and fed into the Computer. On Election Night, Teletype returns of the 1956 popular vote received at the Data Processing Center were evaluated and programmed into the computer, and on the basis of a comparison of this information with the previously stored data on previous elections, the computer made its early but extremely accurate electoral-vote prediction.

After a night of errorless trouble-free performance, the ELECOM 125's parting printout at 2:35 A.M. for its nationwide television and radio audience was "I've racked by electronic brain and still say 71 electoral votes for Stevenson."

ELECOM FORMS FIELD SERVICE DEPARTMENT - Formation of a new Field Service Department to maintain ELECOM computing systems in the field was recently announced by Underwood Corporation's Electronic Computer Division.

The new department has been organized primarily to provide trained field-service representatives to maintain ELECOM electronic digital computing systems, such as the ELECOM 125, at existing and future installations. Contractually required for all leased equipment, the service will also be available to purchasers of ELECOM data-processing systems.

During and immediately after a nominal nine-month training course, the typical field-service representative will spend time debugging and testing all or portions of the machine to which he will be assigned in the field. Toward completion of machine testing, the field-service

representative will inspect the customer's installation site for adequate power and air-conditioning facilities.

After installation of the ELECOM data-processing system has been completed, the service representative will take charge of the equipment and run the customer's acceptance test.

In order to adequately cover every possible phase of maintenance service to ELECOM electronic business data-processing systems, it is planned to locate not one but two field-service representatives at each customer's installation. One man will be an "expert" on the central computer, while the other will be a data file processor specialist. However, both men will be qualified to maintain any part of the entire system.

As a necessary adjunct to the operation of the customer service teams, ELECOM will provide periodic supervisory visits at each installation to assure continued high maintenance standards.

On-call consulting service will be available to purchasers of ELECOM systems who maintain their own equipment for the purpose of maintenance inspection, equipment modification, or other purposes. This service will also be available to lessors.

CONTRIBUTIONS FOR DIGITAL COMPUTER NEWSLETTER

The NEWSLETTER is published four times a year on the first of January, April, July and October and material should be in the hands of the editor at least one month before the publication date in order to be included in that issue.

The NEWSLETTER is circulated to all interested military and government agencies, and the contractors of the Federal Government. In addition, it is being reprinted in the Journal of the Association for Computing Machinery.

Communications should be addressed to:

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