

Artist's drawing depicts the new "ERA 1103" general purpose computing system, the first of which will be completed in mid-1954. The giant machine features electrostatic, magnetic tape, and magnetic drum memory systems, part of a complete data processing system. Application possibilities include: automatic process control, air traffic control and air defense, aircraft simulation, automatic data reduction, general industrial and economic planning, and mathematical computation.

## the Orbit

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### Desks, Phone Numbers, Dust Settle as Move is Completed

Where is Project 2021? Where's Bob? What happened to the Cabinet Assembly group? These are a few of the questions asked concerning the recent rearrangement of projects and departments at the Minnehaha plant. Building 4 moves include W.C. Norris' switch to J.E. Parker's former office and Bob Sorenson's move from the balcony to the office Norris last used. Fred Hargesheimer has the office next to Carl Swanson.

#### Changes in Building 5

In Building 5, Industrial Relations office now has the area recently occupied by W.F. Winget's Contract Administration group. Bob Kraemer has Gowan Miller's old office while Hyme Meirovitz is in the office formerly used by Personnel Records. Identification photos and fingerprints will once again be taken in Building 5, in the room adjoining Hyme's

office.

Several changes have been made in Building 6 also. Dick Clover and Gerry Ferber now reside in Room 614 and Sales Engineers Dick Daly, Graham Smith, and Bob Curtiss have Room 611. Adjoining them in Room 612 are Bill Drake and Chuck Ewert of Sales Promotion. Bill Winget, and Tom Myers occupy Room 608 and Herman Woertz, Auditing, has Room 603.

#### Moves in Main Plant

Changes in the Main Plant include Dr. Rubens move to Room 1248 and Cabinet Assembly's acquisition of Room 2202.

Projects in new or expanded locations include: Project 1087, Room 1134½; 2021, Room 2211; 2036, Room 2213; 2033, Room 2317; 2029, Room 615; 3029, Room 2120; Task 32, Room 2220; and Project 1086, Room 2209.

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### Safety Shoes Now Compulsory for Steel Stores, Move, Crating Crews

A proposal initiating the compulsory use of safety shoes by Move Crew, Crating, and Steel Stores employees, has been approved by the Plant Protection Committee.

The proposal, which is now in effect, states that foot injuries have been occurring quite frequently in those departments. Many such injuries could have been prevented if proper safety shoes had been worn, the proposal stated.

The plan also states that the company will pay half the cost of the shoes purchased by those required to wear them.

The company would also make commercial discounts available to all other employees who wish to purchase safety shoes, even

though it is not compulsory for them to do so.

Requisitions for purchase of the footwear for new employees, as well as those presently employed, will be made by the Safety Coordinator not more than once each year for each employee.

Supervisors of the Move Crew, Crating department, and Steel Stores are authorized to enforce the wearing of safety shoes by all male employees under their supervision.

Safety Coordinator, Robert Kraemer, submitted the proposal on February 5, to the committee composed of G.J. Miller, C.H. Allen, K. Pryor, A.E. Bode, and J.H. Boekhoff.

### "ERA 1103" Opens Way to Automatic Process Control

Plans for construction of two new ultra-high speed general purpose electronic digital computing systems have just been announced by ERA and Remington Rand Inc.

Officially designated the ERA 1103, the computer system contains the latest general purpose electronic computer designed, developed, and built by ERA since its organization in late 1946.

#### Project Engineers Assigned

Thus far, only key personnel have been assigned to the project which will operate under the Director of Tele-

computing Systems, Dr. Arnold A. Cohen. They include Frank C. Mullaney, project supervisor, and Noel T. Stone and Robert P. Murnane, project engineers. Completion of the first machine is scheduled for mid-1954.

#### Uses ERA Developments

The ERA 1103 incorporates many of the features developed by ERA in its active research and development programs in the computer field. Included in this category are: magnetic drum storage, unitized plug-in chassis construction, and preventive diagnostic features.

Calculating with lightning-fast speed, the ERA 1103 is capable of adding 16,700 ten-digit numbers in one second. A billion (1,000,000,000) is a ten-digit number! The ERA 1103 employs, in addition to magnetic drum storage, electrostatic storage whose data may be read out within a few millionths of a second, and magnetic tape storage which features compact, virtually unlimited storage capacity.

#### Memory Units Store Data

These memory facilities store the data, and control circuits handle the counting of information in the computer while the problem is being solved.

Typical of many ERA designed and built computers are the ERA 1103's circuits and controls which are planned to make use of preventive diagnostic procedures. Artificially severe conditions are created so that weak components may be recognized and located before they

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### ERA - Lakers Night Set for March 8

An "ERA Night" has been set for the Minneapolis Lakers vs Milwaukee Hawks basketball game scheduled for Sunday March 8, at the Minneapolis Auditorium.

The Lakers' ticket office has provided a block of 144 main floor seats at a price of \$1.40 per seat. Tickets are now on sale in the Employee Services office (Room 6, Building 5).

"The success of this event will indicate the employees' desire for continuation of ERA Nights in baseball and other Twin Cities recreational activities," Bob Kraemer, Employees Services Manager said.

### Rating, Review Policy Clarified

The revised Management Policy, which has been in effect since last October 1, calls for the separation of merit rating and salary review periods.

An individual employee's salary is reviewed six months after employment and every six months thereafter and is based primarily on the employee's performance as reported by the merit rating.

The merit ratings for on-the-clock employees are conducted each June and December. Off-the-clock employees are rated in March and September until four ratings have been made. Thereafter, ratings are conducted only in March. These ratings are used in salary and promotion review, but do not constitute a salary recommendation in themselves.

### Notice

Employees of the Minnehaha plant who fail for any reason to pick up their pay checks on Fridays, may get them anytime the week following in Room 603, Building 6.



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## Gyros Can Fly Sky High in Plant 2's Weather Machine

Unprotected from the heat and humidity of a tropical air base, the interior of an American bomber at rest reaches a temperature of 160F. Rain, which has fallen for the last 15 days, makes everything in and around the aircraft wet.

### And Then Into the Wild Blue Yonder

Then the weather clears - engines roar into life and in a short time the bomber is soaring through the skies at 55,000 feet where the temperature is less than -65F.

If the heating and pressurization systems fail, a temperature change of 225 degrees will have taken place within the plane in the short time since its takeoff. Yet the crew must rely on delicate instruments subjected to this rapid temperature and humidity change to guide them through unmarked and perhaps hostile skies.

### Tests Simulate Reality

Duplicating such environmental as well as flight extremes is the function of a group of unusual test devices installed in ERA's St. Peter Street plant where Direction Gyro Indicators are built for installation in United States Air Force planes.

Recently a rigorous series of Air Force acceptance tests for ERA's first production model gyros was completed at Plant 2. Included were a series of tests in a large 'weather machine', the largest of many test devices used at the plant.

The weather machine, which got its severest test during the acceptance tests of the gyro, is ten feet high, eight feet square, and cost \$10,000. Automatically controlled refrigeration units and heaters produce temperature extremes within the 36-inch diameter by 30-inch deep test chamber from -65F to +200F. Humidity ranges from 20 to 95 percent as possible, temperature permitting. When a simulated altitude of 55,000 feet is reached within the chamber, a pressure of more than six tons is exerted against the access door.

### Flight Motions Created

The gyros, mounted on a motor driven table which oscillates to imitate the pitch and yaw of aircraft in flight, were placed

in the test chamber. The chamber was then sealed and the tests begun.

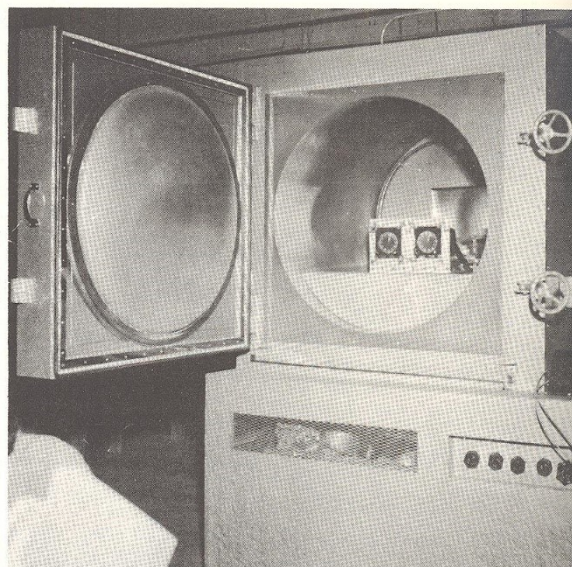
A low temperature test was one of the series. The gyro was first chilled by subjecting it to two days of -85F temperature, after which the surrounding air was warmed to -65F and the instrument allowed to adjust to the new temperature for one day. At the end of the 24-hour warmup, the gyro was started and tested for accuracy on the oscillating table. Miniature snow flurries occurred occasionally during this phase of testing.

The high temperature phase of testing called for the gyros to be left in 165F temperature for one day before tests on the table were begun. Similar flight motion tests, created by the moving table, were conducted at a simulated altitude of 55,000 feet.

### And It Rained for 15 Days

Perhaps the most grueling, yet most interesting phase of the acceptance tests in the chamber were the humidity tests which subjected the gyros to 15 days of intense humidity. Fog was created in the chamber by raising the temperature to 160F during an 8-hour period and then allowing the chamber to cool to 100F during the following 16 hours.

The cooling cycle condensed the moisture out of the air and created a dense fog. Moisture added to the air during each heating cycle insured a continuous drenching of the units.



Two test gyros emerge from Plant 2's weather machine which produces temperatures from -85F to +200F and creates 15-day rains. The chamber can also simulate conditions found at an altitude of 55,000 feet for test purposes.

This prolonged exposure to hot, moist air had no effect on the operation of the gyro's internal mechanism which is sealed in an air-tight, helium-filled housing. The external surfaces of the gyros were painted with two types of test paint, one of which wrinkled and peeled and was therefore rejected. The other paint tested proved satisfactory.

### Instrument Passes Tests

The successful completion of these acceptance tests has proven ERA's ability to produce an intricate instrument (some parts rotate at 20,000 rpm) that will operate within strict tolerances even while being subjected to extremes of temperature and humidity as were the bomber's instruments in the realistic example presented at the beginning of this article. Once again the watchword of ERA - reliability - has been demonstrated.

## Jack Hill Speaks To Accountants

'High Speed Magnetic Record Keeping' was the subject of a speech made by Jack Hill, Staff Electrical Engineer, to the Northwest Chapter of the National Machine Accountants Association.

Hill's talk, given late last month at the Leamington Hotel in Minneapolis, was designed to fit the thinking of tabulating department supervisors and managers. Mainly concerned with ERA's magnetic drums, the talk was illustrated by the use of cards, tapes, and lantern slides.

The group is a national organization of tabulating department heads whose aims are mutual self-education in the field. P.L. Richmond and W.F. Seymour also attended.

## ERA 1103-

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appear as causes of operational failure. This feature results in a high degree of immunity to failure during actual operation and is a major contribution to the system's high efficiency.

Among the potential applications of the ERA 1103 are, in addition to automatic process control: air traffic control and air defense, aircraft simulation, automatic data reduction, general industrial and economic planning, and scientific-mathematical computation.

### For Automatic Process Control

In automatic process control, the ERA 1103 will probably find its most significant industrial application. As a prelude to the ultimate goal of the auto-

matic factory this new computer will make it possible to apply automatic processing to an oil refinery or a chemical plant.

In such an installation, the machine would receive data on the product processing through 'sensing' devices at various stages of the plant's operation. This data would be processed in the computer in accordance with instructions previously fed in, governing such things as temperature, time, and mixture.

### For Oil Refining

If desired, the computer can receive data based on the analysis of the crude oil being processed, for example, and in turn regulate the operation in such a way that the refinery will produce the highest dollar volume obtainable. The complete control of the plant can be affected, producing the optimum

refinery output in accordance with varying economic as well as industrial processing conditions.

### For Air Traffic Control

The ERA 1103 also can be used to solve the highly critical problem of air traffic control at large and increasingly congested metropolitan airfields by automatically keeping track of aircraft in flight. The computer would be able to anticipate congestion, based on data received along the air routes, and perform computations immediately, thus providing the instructions for changes in air speeds, approach patterns, and arrival and departure times.

The ERA 1103 also can be used in aircraft design and development, in effect simulating a

proposed design mathematically to obtain information on flight characteristics before an aircraft is built. Wind tunnel test data can be fed directly to the computer and flight characteristics of the model under test automatically computed.

### Has 4,500 Vacuum Tubes

This entirely new machine will be housed in chrome-trimmed cabinets of advanced design that occupy an area slightly smaller than the first floor of an average home.

Despite its anticipated weight of 10 tons and an electronic complexity of 4,500 vacuum tubes, the ERA 1103 in operation will require less electrical power than four double-oven electric ranges.



The February `1953 Orbit newsletter donated to the VIP Club by W. 'Curt' Nelson. Curt's history includes work developing the power supply for the 1104 computers. The article scan was by Lowell Benson. The original of this newsletter will be archived at the Charles Babbage Institute on the University of Minnesota's West Bank campus.

To learn more about the 1103, the 1101 predecessor, and the ensuing computer series, read <http://vipclubmn.org/Articles/HISTORY1100series.pdf> written by UNISYS Fellow, Richard Petschauer.

Also, see page 13 of [http://vipclubmn.org/Articles/NSA-HGPEDC\\_1964.pdf](http://vipclubmn.org/Articles/NSA-HGPEDC_1964.pdf) for specifics of the 1103 development that started in 1950 after the delivery of the 1101 (ATLAS I).