Data Day News

Are Your Tomatoes Ripe? Ask the 703 Computer

The U.S. Department of Agriculture Instrumentation Research Laboratory, Beltsville, Maryland, is using a Raytheon 703 IC computer to operate spectrophotometers which measure the spectral absorption properties of intact fruits and vegetables. The spectrophotometer consists of two wheels, one above the other, each of which contains a matched set of 32 interference filters. The radiation passes through a filter in the top wheel, then through the sample and on out through a filter in the lower wheel to a photomultiplier tube. The wheels, locked together, revolve at 200 rpm so that a spectrum is scanned in 0.3 seconds. The 703 computer controls a Raytheon MINIVERTER™ (analog-digital converter and multiplexer) which digitizes the analog signals from the spectrophotometer.

Signal averaging, baseline compensation, and some preliminary data reduction are handled by the computer. Data output is by oscilloscope display, x-y recorder, punched paper tape, and printed page. Tomatoes, apples, cantaloupes, and grapes have been measured with these spectrophotometers. The absorption data are being studied as a means of predicting the interior quality of the samples without cutting them open. Such tests could lead to the development of automatic equipment to sort for interior quality.

Now There's a MINIVERTER™ That Knows The Difference

A MINIVERTER specifically designed to handle differential analog signals originating in high speed data acquisition systems and providing high common mode rejection is now available from Raytheon Computer. The MINIVERTER is Raytheon Computer's trademarked name for a unique data acquisition instrument which combines multiplexing, sample-and-hold amplification and analog-to-digital conversion in a single, compact unit.

The differential version can handle from 8 to 64 analog input channels with common mode rejection of up to 70db on common mode voltages of up to + one volt. Input voltage of up to + 11 volts can be accommodated. Converter resolution can be either 10 or 12 bits.

In addition to number of input channels and resolution, user options include front panel with channel selection and short cycle controls, sign and magnitude and a coupler for the 703 and 706 computers.

Throughput rate for the 10-bit Differential MINIVERTER is 50KHz and 35KHz for the 12-bit model. Accuracy of the 10-bit version is 0.1% · 1 LSB and 0.065% ± 1 LSB for the 12-bit unit.

New Mini-Computer Priced Under $10,000 704 is 16-Bits, 1.5 Microsecond, 4K to 16K; Program Compatible with 703, 706 Computers

Raytheon Computer has entered the mini-computer field with the new 704, a 16-bit, 1.5 microsecond computer selling for under $10,000. The 704 was seen publicly for the first time at the Fall Joint Computer Conference.

The compact 704 accommodates full memory expansion up to 16K as well as all central processor options such as automatic multiply/divide, direct memory access channel, automatic priority interrupt to 16 levels and memory parity. In addition, several card positions are available for special interfaces. The 704 user will be offered optional utility cards with mounted IC sockets for easy implementation of special requirements.

The 704 is aimed at both the OEM multiple computer user and the single machine user, with particular emphasis on such applications as instrument and process control, data communications, and data acquisition problems related to research in the basic sciences.

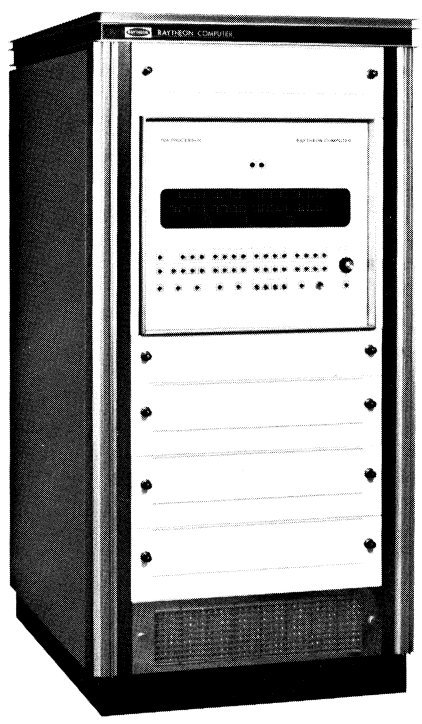
A Raytheon Computer spokesman said a major benefit to 704 users is the machine's compatibility with all software and all peripherals now being used with the company's larger 703 and 706 computers. This gives the 704 unusually powerful capabilities in system and stand-alone applications, since the 703 and 706 have software and peripheral features equivalent to larger computers.

For example, the 704's compatibility with 703/706 software means that users of the new mini-computer have at their disposal a library of more than 300 programs, including over 40 combinations of monitors and executives. Other elements of the software package include real-time FORTRAN IV, conversational FORTRAN, a real-time disc operating system, symbolic assemblers and a wide variety of editing and utility routines.

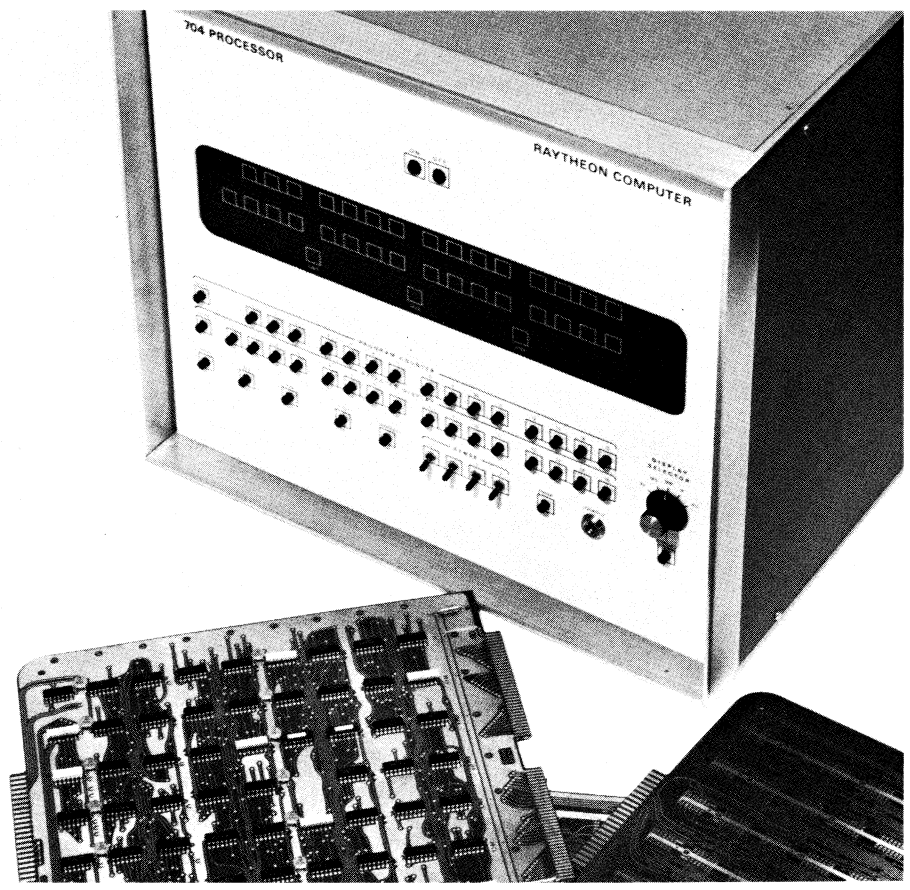
Raytheon has used the same interface philosophy with the 704 as it did with the 703 and 706. Net result, according to Raytheon officials, is ability to use all existing proprietary Raytheon Computer analog instruments such as the MINIVERTER, the MULTIVERTER, as well as other combinations of analog-to-digital converters, multiplexers, sample-and-hold amplifiers and other data acquisition equipment.

Also included in the 704 is the AID interface concept, an applications-oriented technique which provides plug-in modular interface for extensive combinations of standard and non-standard external input and output equipment.

Everybody's got a mini these days, says Barbara Maxwell, as she helps introduce Raytheon Computer's new 704.



704 is also available in rack version with extra room for interfaces and peripherals.



704 IC cards hold all logic and memory. User can choose optional utility cards with mounted IC sockets for special requirements.

Flying Weather Stations Use Raytheon Digital Module System

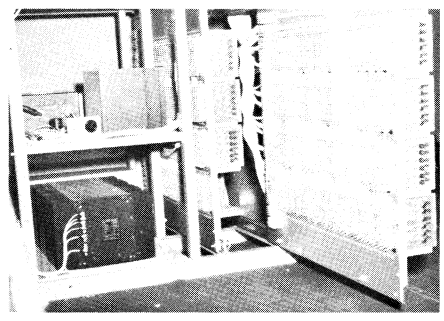
Nine 30-channel Data Logging Systems (DLS) have been developed by Raytheon Computer for use aboard Navy WC0121N reconnaissance aircraft. These planes, sometimes called "Hurricane Hunters," are special versions of the well-known Lockheed Constellation.

The systems accept inputs from temperature, pressure and other meteorological sensors; directional, distance and position information; and visual observation inputs; and digitize them for on-board teletype print-out and for transmission via radio to a ground weather station. Outputs are scaled into pressure in millibars, speed in knots, direction and position in degrees and other meaningful engineering units. The digitized and scaled information is also supplied to the Meteorological Officer aboard the plane.

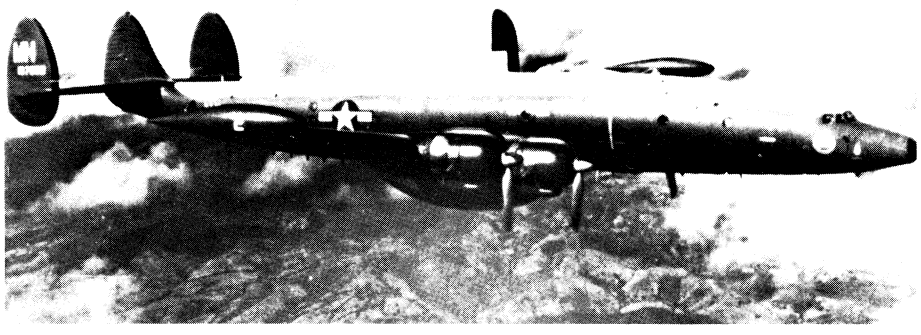
The systems are designed around Raytheon logic modules which perform the digitizing and scaling functions. The modules are housed in two banks, with a 132 modules each.

Output is also provided as 1-2-4-8 weighted BCD that is scanned serially and converted into Baudot code for teletype. The scanning rate is variable; high for cloud contouring; medium for storm reconnaissance; and low for long-range flights.

The systems are presently installed aboard aircraft based in Jacksonville, Florida and Guam. At least eight more are planned for future installation. The first system has been in use since April 1967.



264 Raytheon digital modules are used in airborne weather station.



Flying weather stations look for storms, hurricanes, clouds.

THE COMPUTER AND DATA SYSTEMS USER'S GUIDE TO NEW PRODUCTS AND APPLICATIONS

Data Day News

RAYTHEON COMPUTER

Fall 1969 Edition

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UC Davis Data System Program Uses 703 Computer

The University of California at Davis is developing a new approach to data acquisition for the many experiments conducted on campus. The technique involves use of a Mobile Data Acquisition System, which is moved to the experimental site for initial data processing, with resulting data analyzed later on the central campus computer.

The key to development of the system was availability of a small computer with adequate storage and input-output capabilities to satisfy a variety of experimental situations. For this purpose, the University selected a Raytheon 703, a 1.75 microsecond computer with 8K central memory. To this central processor were added a fixed head disc storage unit (22 millisecond access time); a synchronous 9-channel magnetic tape drive for data and program storage; analog-digital and digital-analog conversion capabilities; and a clock capable of generating automatic interrupts as well as time-of-day information.

With these devices, plus a teletype with paper tape capabilities, it was felt that the system could handle a variety of experimental problems involving multiplexed signals, feedback control and real-time initial analysis of incoming signals.

The concept of mobility was an essential element in design of the system. When the 703 computer system was delivered, technicians at the School of Medicine at Davis designed and installed wheels on the two equipment racks involved. The resulting system consists of fixed wheels at the rear of the housing, and rotating casters at the front. The rear wheels are locked by a positive brake mechanism which is released by a bar located at shoulder height on the cabinet. To move the system, the bar is held down, releasing the brake on the rear wheels, and the system rolled to its new location. When the bar is released, the brake mechanism clamps down, slowing and stopping the unit.

Signal input to the system is handled by various means including multiplexing and direct memory access. In its current configuration the system can accept up to 16 separate channels of input, each of which can be separately multiplexed. In a typical experimental situation, several leads will receive very slow data signals, occurring once a second or even less frequently, at the same time that higher speed data, requiring sampling several hundred times a second are also taken continuously or at regular intervals. Additional data will be fed in from the teletype, indicating changes of experimental conditions.

To add to the versatility of the mobile system, the central campus computer is used to generate code for the smaller 703 system, using a compiler written by computer center personnel. The sophisticated compiler made possible by large computer equipment can thus generate code for the smaller machine either through direct transmission of code through an interface designed at Davis, or through creation of intermediate paper tape instructions.

In a typical application, application programs are developed on the campus computer, stored on disc on the mobile system which is then taken to the experimental site and run independently. The resultant data are then stored on tape for subsequent analysis by interactive routines created for the central computer's graphics research terminal.

As a final step in providing simplified service to non computer-oriented researchers, an experimental design specification system is being created. This will allow a researcher to specify the characteristics of his particular experiment, so they can be translated into instructions for interfacing and operating the Mobile Data System during the experiment. The program system will be developed jointly by the School of Medicine and computer center during application of the system in research in human physiology. It's anticipated that this program will permit researchers in many fields to describe their experiments in terms familiar to them and then rapidly receive correct instructions to operate the computer system data acquisition, feedback control, and preliminary data analysis.

703 Computer Speeds Things Up for Keno Players in Las Vegas

Using a Raytheon 703, Ricca Data Systems, Inc., Santa Ana, California, has successfully demonstrated its new computerized Keno accounting system at the Mint Casino in downtown Las Vegas, Nevada. The system was designed to the specifications and operating criteria of the Mint. The initial demonstration was the first phase checkout of a full operating system to be installed later this year.

Keno is a game of Chinese origin in which a player selects up to 15 numbers out of 80 possible and places a wager, usually from 60¢ to $6.00. The house draws, at random, 20 numbered balls of ping-pong size from a rotating "fishbowl". A player may win as much as $25,000 on a single wager.

The RDS Kenotronic® Accounting System automatically reads in "real-time" player-marked Keno tickets by means of an RDS-designed fiber-optics reader and stores the data via a small high-speed computer in a rotating disc memory. When all player tickets have been processed, and the random numbers have been selected, the computer system instantly prints out the winning ticket serial numbers with their individual winnings, the total amount paid out and the gross receipts of the game.

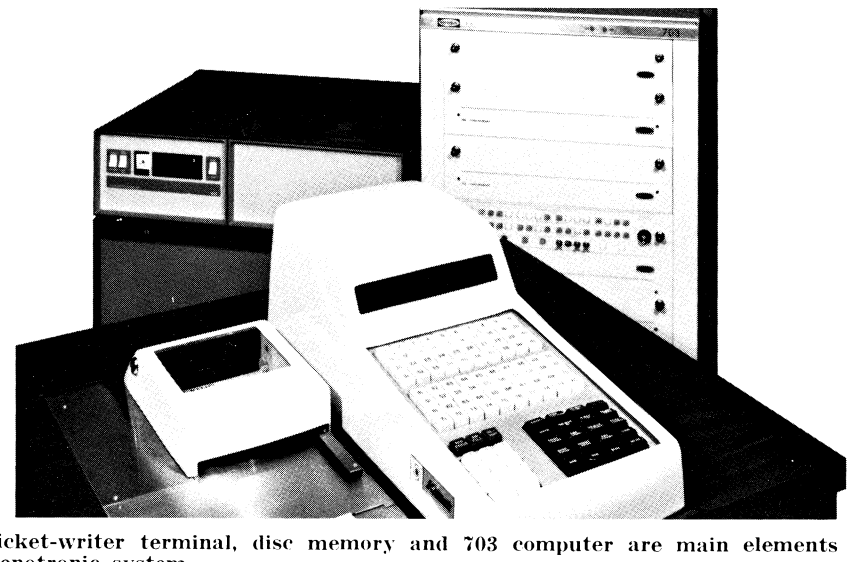
William G. Bennett, Vice President and General Manager of the Mint explained that the RDS Kenotronic system eliminates the inherent problems of hand-written tickets, decreases waiting time between games and facilitates remote play. Mr. Bennett added that the RDS total system concept was developed with management, player and ticket writer in mind, and should make Keno more attractive to all patrons of the Mint.

The system consists of the required number of ticket-writer terminals, and a multiplexer, plus a central computer-driven information storage and retrieval system complete with all related software. Each terminal includes a keyboard, a unique fiber-optics reader and a printer.

In operation, the player marks his ticket with his number selection. He presents this ticket to the ticket writer who collects his money, inserts the ticket into the automatic reader and enters the amount into the terminal. The terminal retains the customer ticket and prints out a receipted copy.

After the last ticket is accepted, the randomly-selected 20 numbers are displayed and entered into the computer. The computer then scans all tickets entered for that game, identifies the winners, calculates amounts won and performs other accounting functions.

A winning patron presents his ticket to any ticket writer, who enters the serial number into his terminal. The terminal then prints out a duplicate copy of the original ticket so that the presented ticket can be verified.



Ticket-writer terminal, disc memory and 703 computer are main elements in Kenotronic system.

Mini-Blocs Simplify Data Systems Design and Assembly

Eight hand-sized MINI-BLOC™ instruments, which simplify data acquisition and processing systems design and assembly, are now available from Raytheon Computer.

One of them, the MINIVERTER™, has been introduced previously and is now offered with price reductions of nearly ⅓. The seven others are new on the market and follow the same concept of packaging IC circuit modules on a connector block, wiring and testing the assembled unit and offering it as a complete, functional instrument, ready to plug in and use. These MINI-BLOC's are priced up to almost 40% less than the total of the separate parts, resulting in a considerable savings to the user.

All units use a combination of the company's M-Series analog and digital DTL or TTL IC logic modules. Most are on 10-connector blocks measuring 4x5x4 inches and can be plugged into Raytheon-furnished or user mounting hardware.

The eight units are:

MINIVERTER

MINIVERTER — Multiplexer, Sample and Hold and ADC. 10, 12-bit binary, 3 digit BCD. Up to 100KHz conversion rate. 16 channels/block, expandable to 64 channels when used in conjunction with MINI-MUX™. A high performance version with a 50 nanosecond, 0.01 accuracy sample and hold amplifier is also available.

MINI-DAC™

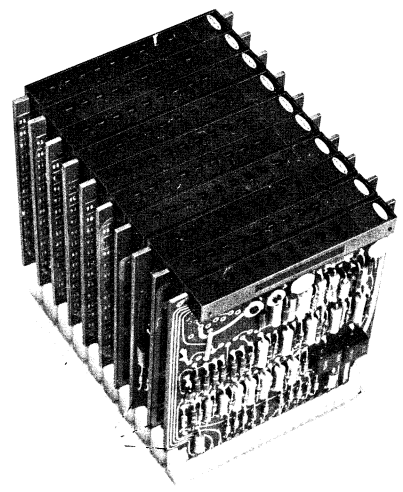
Two types of Digital-to-Analog Converter are available in MINI-BLOC form: 10-bit binary and 12-bit binary. Up to four channels are available per MINI-BLOC. Output voltage range is ± 10 volts full scale at up to 5 ma. Input storage registers are compatible with IC logic levels and binary address decoding for up to 255 channels is provided.

MUX-EXPANDER

Multiplex-expander MINI-BLOC model MMPX02 can be used in conjunction with *any* MINIVERTER to expand the input channel capacity, in multiples of 8 channels, up to 64 channels overall. Two type MCC2 cable cards with analog diode clamps (for overvoltage protection) are included, and a sequence and control card Model MSC9 is provided for control of the multiplexers contained in this MINI-BLOC.

MINI-SAMPLE™

There are two types of Simultaneous Sample and Hold MINI-BLOC's, Models MSHA01 and MSHA02, useful for sampling instantaneous state of several analog voltages. Model MSHA01 contains up to 8 Model MSH1 sample and hold amplifiers and provides 100 nanosecond (maximum) aperture time with 8 microseconds (maximum) settling time. Model MSHA02 contains up to 4 Model MSH2 sample and hold amplifiers and provides 50 nanosecond (maximum) aperture time with 2.5 microseconds (maximum) settling time.



MINI-MUX™

This MINI-BLOC, Model MMPX01 contains up to 32 channels of Analog Multiplex, a high performance sample and hold amplifier (Model MSH2), all required sequence and control logic for both random and sequential operation (1 each MSC8 and MSC9), and an input cable card with diode clamps for overvoltage protection (MCC2). The unit is designed to operate with any Analog-to-Digital Converter at resolutions up to 15 bits binary.

MINI-MEM™

This MINI-BLOC uses active memory card Model MMM10 and is organized in terms of 16-bit words. Memory sizes of 16, 32, 48, and 64 words are available. The active memory provides very fast access to memory with relatively simple control circuits.

BINARY-TO-BCD CONVERTER

This converter is available in four forms: (1) Capable of accepting 8-bit binary input and conversion to 3-digit BCD, (2) Capable of accepting 16-bit binary input for conversion to 5-digit BCD, (3) 24-bit binary to 8-digit BCD, and (4) 32-bit binary to 10-digit BCD. These MINI-BLOC's can be assembled in tandem to increase the binary or BCD word length.

This MINI-BLOC is particularly useful for converting to BCD for display monitoring purposes.

BCD-TO-BINARY CONVERTER

This MINI-BLOC performs the reverse process from that just described and is useful for converting BCD-coded inputs from digitizers such as DVM's to binary form for entry into a processor. Four forms are available: one to convert 3-digit BCD to 8-bit binary, one to convert 4-digit BCD to 16-bit binary, 8-digit BCD to 24-bit binary, and 10-digit BCD to 32-bit binary. These can be connected in tandem to increase word size.

CLIP AND MAIL THIS COUPON FOR MORE INFORMATION

Send to: RAYTHEON COMPUTER
2700 South Fairview Street, Santa Ana, California 92704

Please send me information on:

- ☐ M-Series IC Analog and Digital Modules
- ☐ MULTIVERTER®
- ☐ MINIVERTER™
- ☐ A/D Converters
- ☐ D/A Converters
- ☐ 703 Computer
- ☐ 704 Computer
- ☐ 706 Computer
- ☐ BIAX® NDRO Memories
- ☐ DRO Core Memories
- ☐ Have Representative Call
- ☐ Other _____

Name _____

Title _____

Company _____ Dept. _____

Address _____

City _____ State _____ Zip _____

Telephone _____ Ext. _____

703 Computer Helps Figure International Currency Exchange Rates

Parsons and Williams, a Copenhagen, Denmark firm, participated with Raytheon Computer in a banking seminar in October at Lake Bled, Ljubljana, Yugoslavia.

Main feature of the joint effort was demonstration of a computer controlled "arbitrage" system utilizing a Raytheon 706 computer. This system will be used for real time computation of international currency exchange rates.

Raytheon Computer exhibited a 703 computer at the recent NUCLEX Nuclear Science Seminar and Exhibition at Basle, Switzerland. Several of Raytheon Computer's European representative firms were on hand to help demonstrate the computer and associated equipment. These included: Imex, Paris, France; Computer AG Zurich, Switzerland; and Elettronucleonica, Italy.

There are new titles for two of the people involved in Raytheon Computer's International Marketing. Peter Percival, who headquarters in London with Raytheon Overseas, Ltd., is now Director of Computer Marketing for Raytheon in Europe. In Santa Ana, at Raytheon Computer's home office, John Woodfill has been named Manager of International Sales.

Raytheon Computer is providing a 703 computer to Cambridge University in England. The computer will be used for engineering studies. Raytheon Computer's associate in Germany, ERA, is assisting in installation and interface of the computer with existing equipment.

In Sweden, Scandia Metric AB has installed a 703 computer for demonstration and training at their new facility in Solna, a Stockholm suburb.

Two engineers associated with New Japan Radio, a joint enterprise of Japan Radio and the Raytheon Company, were in Santa Ana recently to study automatic wire wrap techniques. Plans are for the Japanese firm to acquire several wire wrap machines for use in their own production facilities.

Several new international representatives have been appointed by Raytheon Computer. These include: Korea Computers Corp., Seoul, Korea; and Jugo Auto, Beograd, Yugoslavia.

Koopman and Company, the Raytheon Computer representative in Holland, has opened offices in Germany to facilitate sales and service activities in that area.

Now You Can Talk to a 703 Computer

A unique speech input/output device has been designed around a 703 computer by SCOPE Incorporated, Reston, Virginia. The device uses a combination of speech signal analysis and pattern recognition techniques. The 703 is the heart of the digital processing portion of the system, which results from several years of development by SCOPE's Information Sciences Laboratory.

The primary features of the new system are its ability to operate over standard telephone lines, recognition of vocabularies of 100 words or more, and the capability of re-programming on-line for new vocabularies or speakers. Immediate applications in the areas of machine control in hands-busy or hostile environments, computer-aided instruction systems, and inventory control are expected by SCOPE Incorporated. System marketing is in the initial phases.

The 703 recognizes as many as 100 words. It's part of a unique voice input-output device developed by Scope, Inc.

Raytheon Computer booth at a recent U.S. Trade Center Exhibition in Stockholm. A Raytheon 703 computer and modules & equipment were on display during the 5½ days the exhibition was in progress. Attendance reached well over 1000 people, making this one of the most productive shows so far in Scandinavia.