

Air Force junks custom-built computers in 473L command information system

Pentagon official says special-purpose data processing equipment for large command-and-control systems is outdated by the time it's operational; industry-sponsored machines are cheaper and do the job better

"We bought three Edsels. It was a bad mistake but we're doing something about it."

The Air Force colonel at the Pentagon was referring to three large-scale, custom-made computers, built to be the backbone of 473L, the top Air Force command information system.

Whether the fault lies with the Air Force or the manufacturer isn't clear.

The computers were incompatible with the way the 473L was evolving, the colonel explained. Also, he said, the system was not reliable once it got to the Pentagon. A third problem, he cited, was that the manufacturer, the Librascope division of General Precision, Inc., had decided to quit the large-computer business, leaving the Air Force without technical support or a follow-on computer. Librascope denies this. It says it has no plans to leave the large, special-purpose computer field.

The solution, decided upon about a month ago, was to junk the Librascope computers. Other government agencies can pick them up if they want to—"possibly for some kind of research."

Two of the three computers are at the Pentagon and the third is at the Librascope plant in Glendale, Calif., for development of peripheral equipment including a self-diagnostics program. The three machines cost \$7.2 million.

Other companies affected by the Air Force decision are the International Business Machines Corp. responsible for systems analysis and programing; ITT Federal Laboratories, a division of International Telephone & Telegraph Corp., for the display system; and Bunker Ramo Corp. for communi-

cations consoles and display buffers. Mitre Corp. is technical advisor to the Air Force Electronic Systems division, Bedford, Mass., which manages development and procurement of the 473L system.

Replacement. In place of the Librascope computer, which the company calls the L-3055 and the military has designated the AN/-FYQ-11, the Air Force will rely on the smaller capacity 1410 made by IBM. The 1410 has been operating for two years in the Pentagon as part of a scaled-down 473L for training purposes and to provide an interim capability.

Program plans had called for the larger L-3055 eventually to take over full system operation. Instead, additional 1410's will be installed alongside the existing machines,

advancing the system beyond an interim capability. According to the Air Force, the two additional 1410's—which cost about \$900,000 each—will give 75% to 90% of the performance expected with the FYQ-11. They will be used until follow-on development of the 473L begins in the 1970's.

I. Incompatibility

The Air Force and Librascope hold widely divergent views on the cause of problems and, in some cases, appear not even to know what action the other has taken.

A Librascope official—who, along with Air Force officials, asks that his name not be used—says the company had not, as of Sept 12, received official word that its computer had been pulled out of the

Last of the breed

The Air Force experience with its headquarters command system apparently was the final blow in a series of losing bouts with tailor-made military computers.

Says Leo E. Berger, a high civilian official at the Pentagon: "In Sage (Semiautomatic Ground Environment), we developed the AN/FSQ-7 and 8, in the Strategic Air Command's 465L system we developed the AN/FSQ-31, in the 473L, the AN/FYQ-11, and other computers in other systems. In each instance, during the time it has taken us to accomplish all the steps from specification to operation of these military computers, industry-sponsored hardware development has produced a commercial off-the-shelf model with greater speed and capacity which was cheaper and more advanced."

Berger, who works for Maj. Gen. Gordon T. Gould, Jr., director of Command Control and Communications at Air Force headquarters, revealed this bit of military intelligence at the national meeting of the Armed Forces Communications and Electronics Association in Washington. Except for certain mobile and airborne requirements, he said, experience with existing systems teaches that optimum use should be made of "proven families of modular off-the-shelf, commercially available computers."

According to Berger, time was wasted and costs soared further when the Air Force tried to check out unproven hardware with equally unproven, newly developed software. The third lesson is that it is a mistake to acquire hardware from one company and the software which makes it perform from another company. "It is most difficult," he says, "to pin down responsibilities when either the hardware or the software fails to perform according to specification or advertisement."

... Librascope and the Air Force agree the 473L system wasn't well thought out ...

473L system. He did say, however, that such a move is expected.

As for incompatibility, Librascope points out that this isn't its fault. The company charges, and the Air Force admits, that the 473L system was not thought out properly on a long-range basis.

If Defense Secretary Robert McNamara's program definition phase contracting requirement had been in effect when the computers were ordered, they probably would have remained compatible with the 473L system as it grew. One purpose of program definition is to spell out long-range requirements.

According to the Air Force, the computers for 473L were the first procurement made under the Pentagon's two-step formal advertising procedure. After the unpriced technical proposals were screened, three companies were asked to put price tags on their proposals: Librascope, IBM and the Burroughs Corp. Librascope's bid was lowest. Under the two-step procedure, says the Air Force, the government agency is required to select the lowest bid, since only companies with acceptable technical proposals are invited to bid.

Another example of lack of forethought was equipping the major commands with IBM 1410 computers because the computer in the interim system at the Pentagon was 1410. The units would later be incompatible with the Librascope computer at headquarters. The 1410's were installed at the headquarters of the Tactical Air Command, the Military Airlift Command, Air Defense Command, U.S. Air Forces in Europe and the Pacific.

Software packages for the command computers were developed from the software already prepared for the 1410 in the Pentagon.

To make these computers compatible with the Librascope computer would have required a massive job of program writing, says the Air Force. Of the \$42 million spent on 473L, the largest dollar amount went into programming. IBM, the programming subcontractor, received \$21.5 million

in the last five years for systems analysis and for writing programs to Air Force specifications. A final \$2-million payment is still due.

The IBM contract to provide software for the Librascope computer is being terminated and the Air Force is using its own personnel to work on the 1410 programming at the present time. The Air Force estimates that software for the expanded 1410 system will be completed in September of 1968. Programming for the full system using the L-3055 was scheduled to be ready by November, 1967.

Still another software package would have been needed for the follow-on system for the 1970's and this would have to be compatible with other military networks as well as with the existing 473L.

II. Reliability

As for reliability, Librascope says that although they've received no word that there are maintenance problems, the Air Force made a mistake in not contracting Librascope to do the maintenance work.

Although Librascope does not say that inexperience of the Air Force's maintenance personnel was responsible for any malfunctions, the spokesmen do comment that, if Librascope's self-diagnostics program had been in operation at the Pentagon the Air Force would not have had any problem keeping the equipment going.

The company points to the swing-out plates on which disk memory heads are mounted. These plates are critical, says a Librascope spokesman, and only designated persons at the Librascope plant may handle them. Yet the Air Force turned them over to regular maintenance personnel, says Librascope. The company does not admit, however, that the disk memory was giving the Air Force trouble.

Expensive. The Air Force claims an 18-month delay in delivery cost the government additional money in keeping programmers on the payroll.

According to Librascope, the company received a contract to

build three systems in June, 1962. The first machine was delivered in June, 1964—one year late. It was accepted by the Air Force in October, says Librascope, and the second machine, delivered in September of the same year, was accepted in December. In April, of 1965, Librascope says, the third system was completed and stayed in Glendale.

Librascope claims that add-on requirements by the Air Force were costly, sometimes constituting major design changes. The company gives this example: originally, the tape drives were intended for off-line duty where some bit error could be tolerated. Then they were made on-line and in that mode the same amount of bit error could not be tolerated. New electronics had to be installed in the drives subsystem.

The Air Force says, however, that it paid for all the changes it asked Librascope to make.

III. Predecessor.

About eight years ago, Librascope designed another large, special-purpose computer, the L-3020, for the Federal Aviation Agency. Six were ordered and three delivered to FAA's National Aviation Facilities Experimental Center at Atlantic City, New Jersey. FAA realized before the last three came in that the memory capacity was far too small for the agency's new plans. The other three computers were diverted to the Air Force and two of the computers FAA already had were sent to Utah State University. Two of those the Air Force got were sent back to Librascope to help develop the L-3055.

According to Librascope, the L-3020 helped generate wiring diagrams for the L-3055 and was used as a design aid in other ways. But there was very little transfer of design concept, one spokesman says. The 3020, he points out, is a very limited machine designed for a special purpose—air traffic control. The 3055, according to Librascope, is much more flexible and could probably be converted to general-purpose applications at a reasonable cost. Even some of the basic design concepts, such as circuit card layout, are radically different in the two machines, Librascope says.