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FOREIGN COMPUTER CAPABILITIES

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Foreign Computer Capabilities

USSR AND EASTERN EUROPE

The USSR and the East European Communist countries are estimated to have a total of somewhat less than 7,000 digital computers. About 700 of these are in the East European countries and the USSR is estimated to have 5,000-6,000 units. Recently, the USSR has increased imports of digital computers, especially those designed for data processing uses, but the imported computers make up only a small portion of the total Soviet computer inventory. More than half of the computers in the East European countries are imported Western models and about a third are Soviet models. Poland, East Germany, Czechoslovakia, and more recently Hungary have produced a few different small models comparable to some Western models produced in about 1961. Poland has been the most successful with domestic models comprising about 70% of their estimated total of about 180-200 computers. East Germany also has begun production of a domestic computer comparable to the IBM 1410. Czechoslovakia still appears to be in the initial stages of producing a licensed version of the GE - Bull 140, and Rumania's acquisition and planned licensed production of the French IRIS-50 has not yet begun. The best computers in Eastern Europe, including some third generation models from the US, are those imported from the Free World under COCOM regulations.

Most of the computers in the USSR are of rather limited capability and, in spite of their relatively large numbers, they represent only a modest total computing power. From the standpoint of support to advanced nuclear weapons developments, the most important known Soviet model is the BESM-6 which provides arithmetic speeds near those of the CDC 6400 but which has overall capabilities closer to those of the CDC 3600. The Soviets are capable, at least on a laboratory basis, of building a few computers comparable to the CDC 6600 and they may have a few such computers which have not been revealed for security reasons. The Soviets are making strong efforts to increase rapidly the numbers of computers available and to make better computers and related equipment. Two new series of computers intended to be compatible with the IBM 360 models have been announced. One series, called the ASVT, uses printed circuits to provide

computers with capabilities roughly comparable to the IBM 360/30 and 360/40. The other series on which only fragmentary information is available, is called the RYAD series and reportedly will employ integrated circuits. The RYAD series is intended to serve as a basic for standardizing data processing efforts among the Soviet Bloc countries. Various East European countries are to cooperate in supplying parts and software for the RYAD series. Announced plans to have production of the RYAD series in 1970 indicates that prototype models comparable to small- to medium- scale models in the IBM 360 or ICL series 4 probably have already been built.

The East European countries could probably achieve limited production of a few types of small third generation computers in the next few years, but their research and industrial bases probably are too limited to support a continuing progression of good, serially-produced models. The main needs for computers in the East European countries within the next few years probably will be for models at or below the IBM 360/50 in capabilities although some larger computers might be desired for use in time sharing systems. It is doubtful that any of the East European countries will, in the near future, undertake any developments of very large fast models like those usually associated with the design of advanced nuclear weapons. Even if Soviet efforts to establish cooperative developments are successful, these countries probably will still continue to seek Free World computers and production technology.

There is no positive information on the digital computers in any Soviet military systems nor on the computers actually used in Soviet development of nuclear weapons and delivery systems. It is doubtful that even these priority programs have involved computers as sophisticated as those used in some US applications. Soviet nuclear, missile, and space successes indicate, however, that they have been able to meet their needs in past developments. It is believed they will be able to continue to provide more and better computers to satisfy future military needs, but the overall Soviet computer capabilities probably will continue to be well below those of the US for the next several years.

FRANCE

With a total of about 4,520 computers, including 49

large scale machines, France is among the European leaders in the use of computers. French companies have developed a few models of general purpose computers and several special purpose types, but most of the successful production models have been licensed versions of US designs. Economic problems forced the merger of France's largest computer company with the US General Electric Company to form the GE-Bull company.

In efforts to gain an independent computer capability, the French Government participated in formation of a consortium of French companies under Plan Calcul. This group has displayed a prototype model, the IRIS-50, which is comparable to the IBM 360/40, but planned production has not yet been achieved. Successful production under Plan Calcul has involved licensed versions of computers designed by Scientific Data Systems of the US. Plan Calcul has publicized intentions to develop very large scale computers competitive with the largest and fastest US models. The main quantative needs in France, however, are for smaller types and economic considerations could prevent Plan Calcul from making any significant number of large machines.

In spite of news statements to the contrary, France probably has enough large computers to support the design of refined nuclear weapons, provided they can supply adequate programs and make efficient use of computers installed outside as well as inside nuclear facilities. Among the large scale computers installed in France are several CDC 6600, CDC 6400, CDC 3600, IBM 7094, and Univac 1108 models, as well as an IBM 7030 model. French concerns like Electronic Marcel Dassault also have demonstrated abilities to make special purpose computers for airborne applications.

France's computer capabilities probably will continue to involve the use of some US designs and some US parts for the next several years. Efforts are underway to undertake the development of a super computer in a cooperative of French, British, and German companies. This approach could succeed eventually but probably not for several years due to difficulties in establishing the appropriate combination of efforts.

WEST GERMANY

In the development, production, and application of

computers, West Germany is Europe's leader. West Germany is a leading center for computer production by subsidiaries of US companies as well as by German companies. One of the leading German companies which produces licensed versions of the RCA Spectra 70 series, also encompasses facilities of Zuse KG, which was Germany's first computer company. West German computer capabilities are further apparent in the TR 440 model made by AEG Telefunken. This model, first delivered in 1968, is competitive with all but the very largest and fastest US models. West Germany also maintains a strong industrial research base that supports the continuing strength of their computer capabilities.

West Germany's present total of more than 5,700 computer installations, including 55 large scale models, is growing rapidly. These assets along with their ability to provide new, large scale computers as needed would be more than adequate to support the development of advanced types of nuclear weapons. Past broad experience in building computers for control applications and a variety of special purpose computers for military uses should also enable West Germany to readily supply computers suitable for use as on-line components of weapons delivery systems.

JAPAN

Japan's past computer capabilities have been based largely on US technology. Other than IBM Japan, the computers produced by 5 of the 6 Japanese manufacturers have been based on designs licensed by US companies. Even the independent company, Fujitsu Limited, employs some circuits of US design origin as well as some licensed designs for peripheral devices. Currently Japan is equal to the leading European countries in making and using computers. The Japanese companies also are rapidly moving away from a technical dependence on the US although economic considerations probably will cause them to continue many licensing and cross-licensing arrangements with US companies. Foreign models, mostly US, make up about half the estimated total of 4,575 computers in Japan. The number of computers installed is being expanded rapidly but there is a continuing decline in the portion of foreign computers in the total inventory. In the development and production of circuits and components, Japan is superior to other non-US Free World countries, and is an important supplier of many of the advanced components and circuits used by US computer

companies.

The Japanese government supports and protects the country's thriving computer industry. In addition to giving Japanese products preferential treatment in domestic markets, the government also supports some advanced development projects. An example is the very large computer currently being developed by a consortium of the Fujitsu, Nippon Electric, and Hitachi Companies. These companies are fully capable of developing and building large fast domestic models that would be suitable for use in nuclear weapon design although the present large computer project appears directed more toward time sharing problems. Other large domestic models like the NEAC 2200/700 and the FACOM 230/60 also could be used for large scientific problems like those in nuclear weapons programs. Experience gained in the production of highly reliable computers for military systems, such as those being built in cooperation with the Hughes Company for the air defense system, also enhance Japanese abilities for providing good computers for other military systems.

Japanese companies are aggressively pressing the expansion of foreign markets for their computers, including increased emphasis on sales to the USSR and East Europe Communist countries as well as continuing sales to Communist China. With increased freedom from US restrictions due to licensed designs, Japan could become an important source of advanced computers and related technical assistance for less well developed countries.

ISRAEL

Israel currently has a total of 110-120 digital computers. These include such large imported models as the CDC 6400 at the Israeli Ministry of Defense, one at the Hebrew University, and two large, domestically developed, Golem I models at the Weizman Institute of Science. The complex of the two Golem computers provides about the equivalent computing power of one of the large computers like the CDC 6600 model now used for US designs of advanced nuclear warheads. Israel appears to have available sufficient mathematical talent for providing the programs and codes needed to use computers in advanced weapons designs. A faster, large scale computer, the Golem II, now being developed is scheduled for completion in 1970.

Israel's only commercial computer company, Elbit Computers in Haifa, has produced a few models of specialized computers and a small general purpose model called the Elbit-100. Fifty or so of the Elbit-100 computers have been sold, mostly in Europe. Elbit is trying to expand its computer production abilities through licensing and cooperative arrangements with US and West European companies. These production efforts probably will concentrate on small computers and on ancillary equipment for computers for the next several years. Israel also has discussed possible licenses of the design of the Golem computers for production in other countries. Any construction of large scale computers in Israel probably will be confined to laboratory type efforts for the next several years. Using some imported specialized components and test instruments, Israel probably could now design and build a few computers for on-line use in missile systems. For economic reasons, Israel is likely to continue to depend on imports to satisfy most of its needs for general purpose computers. There probably will be a continuing emphasis on expanding capabilities for the design and application of computers. Israel could become a major center for the development of software for new computers including contractual developments for foreign manufacturers. Israel might also attempt to satisfy some computer needs by providing foreign manufacturers with designs and software in return for hardware.

INDIA

India has had modest computer research and development projects at the Tata Institute of Fundamental Research and at the Bhabha Atomic Research Center, but most Indian applications have depended on imported computers. The CDC 3600 model at the Tata Institute is one of the largest and fastest of India's computers. No descriptive details are available on the computer developed by the Bhabha Atomic Research Center, which was to be delivered as a domestic production model in 1970. India also has made some computer ancillary devices under license and has nogotiated with US and European companies for licenses to produce electronic components and circuits for both domestic use and export. Several Indian facilities have received technical advice and also a few models of computers and related devices from the USSR. The computers and computational talent at such facilities as the Tata Institute probably would be adequate to support very modest nuclear weapon development efforts

only at the expense of other projects.

India is pressing for the development of a domestic production capability, largely based on foreign designs, for electronic components, circuits, and devices. By 1980, they could establish a capability for producing licensed versions of small scale and some medium scale computers.

UNITED ARAB REPUBLIC

The UAR has imported a few Western computers and some low performance Soviet models like the Minsk 2. No UAR development of computers or of related equipment is known and capabilities for the effective use of computers probably are still dependent on foreign assistance.

COMMUNIST CHINA

Through imports as well as domestic production, Communist China probably can supply computers adequate for high priority R&D needs related to the limited number of strategic weapons programs they are currently estimated to have under way. They would need more and better computers than they are now estimated to have if they intend to significantly increase the number and variety of simultaneous high priority projects. The main Chinese need, at present, probably is to gain the ability to produce appropriate types of high quality computers in sufficient quantities to permit large scale deployment of new strategic weapons. Although the Chinese have continually sought information on computer production technology, there is no evidence that the acquisition of large numbers of computers for general purpose uses is an immediate goal. Purchase of more than one copy of any one foreign model has been rare. They have, however, concentrated on importing the most advanced types of equipment available. Prior to the Cultural Revolution, Communist China had developed at least two models of large scale, transistorized computers as well as some smaller models. One of the larger models, the DJS 121, may have been a production prototype comparable to some Western production models of about 1959. Another of the models displayed in early 1966 also indicated that the Chinese were experimenting with logical organizations that would permit the development of even more powerful computers. Information is too fragmented for reliable quantative estimates,

but it is believed that Chinese progress in developing and building new computers has continued. In addition to their value for applications, their several models of transistorized computers indicate the existence of experience that can be applied in exploiting and reproducing foreign developments.

Through imports as well as other sources of technical information, the Chinese have had access to detailed descriptions of Free World computers that incorporate sophisticated logical structures. On a laboratory basis, they probably could copy logical design features of some models, such as the British KDF-9, to build a few fairly complex, large computers for military development projects. They also probably can build additional copies of the large transistorized digital computers developed by the Institute ofComputation Techniques in Peking. The Chinese have not openly demonstrated capabilities for producing miniaturized, ruggedized models of types suitable for uses in strategic missile systems and in strategic airborne applications. Some of the component production equipment and instruments that have been imported from Free World countries may be aimed at satisfying these needs. Some of the engineering design features of the best digital and analog computing equipment that has been imported from Japan and Western Europe could also serve as the basis for Chinese development of computers suitable for use in on-line strategic military systems. They probably would need to continue imports of some special types of components and instruments to support construction of any very advanced computers.

SWEDEN

Although Sweden has several hundred computers, most are small to medium scale types. The only significant manufacturer of computers is DATASAAB which makes the medium scale D 21 and D 22 models. DATASAAB also has made some small computers for airborne and industrial control applications. Sweden has, however, been an important supplier of peripheral devices including magnetic tape units and punched tape equipment that are used with many foreign computers.