

A History of NASIC

NATIONAL AIR AND SPACE INTELLIGENCE CENTER

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

CIRC—The Information System whose Magic Number is Ten Million!

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CIRC (Central Information Reference and Control) was the Foreign Technology Division's (FTD's) first textual information system. Indeed, it was one of the earliest sophisticated, large-scale information systems in the world.

So what's the reference to 10 million? Well, we fed CIRC its 10-millionth record in the late 1990's, and one of its records saved the US Air Force \$10 million in developing stealth technology. Not bad.

In the early days, the collection of intelligence publications in FTD's library was small enough for the library staff to know where to find all the documents. When the collection grew too large for that—and before the technology “gods” had invented search engines, online library catalogs, and information systems—the library staff started a cross-reference file of intelligence publications by writing a few bibliographic items and some keywords they picked out from the document on 5-x-7-inch index cards. These cards were used by library staff to find documents. There was a similar process for books, journal articles, and other unclassified, open-source materials.

In the late 1960's, FTD built CIRC and, in its first iteration, digitized the 5-x-7-inch cards. CIRC used the search engine STAIRS (Storage and Information Retrieval System), written by the German office of IBM. (We verified that the Germans wrote it when someone

tried to query for the Massachusetts Institute of Technology and added the abbreviation “MIT” to the query. He kept getting a syntax error. We finally realized that STAIRS was reading it as the German word for “with,” which was a proximity operator meaning “in the same sentence with,” which we had shortened to “sen” at FTD.)

CIRC-II was launched in the early 1970's and was an amazing system for its time, especially for the open-source records. A contractor was producing approximately 20,000 records per month from books, journals articles, conference papers, patents, and state standards from mostly foreign-language publications. The indexer would read the item in the original language and then create the CIRC record by filling in bibliographic elements; an extract/abstract; and, most notably, the PFLN information. PFLN stood for personalities, facilities, locations, and nomenclature.

Although technology was too slow for full text records, the indexer would pick up every single personality mentioned in the source (not just authors), every single facility (not just corporate source), every single country of information, and every single equipment designator and descriptor. In addition, they indexed attributes of and relationships among the PFLN. So, for example, they might pick up, “The MiG-21 aircraft was manufactured at MAPO,” or that a photo of N-G Basov was available.

Along the way, CIRC began storing messages from the communications center and the JPRS (Joint Publication Research Service) records from FBIS (Foreign Broadcast Information Service) in its own data bases, and added some utility data bases (to more easily find the PFLN and translations, and to expand codens into publication titles).

In the late 1990's, the Air Force mandated that we get rid of mainframe computers. So we switched to SGML-tagged records in a client-server system using the RetrievalWare search engine. With faster computers and (relatively) cheap storage, the original CIRC record paradigm was no longer necessary. We ditched the manually intensive PFLN indexing for full text records. More significant for the analysts was the addition of hypertext links in the records to a PDF of the original pages. That allowed analysts to see all of the formulae, graphics, and photographs, not to mention the original language, in the source document.



A Russian book on cybernetics by V.M. Glushkov, and its CIRC record displayed on an ISS-3 computer.



Dr Pyotr Ufimtsev in the Fall of 1954 when he started his work on the diffraction theory after his graduation from the university.

Now in 2006, we will soon be making another quantum leap with a switch to XML-tagged records stored in Unicode, so that users will be able to query the foreign language text using non-Roman alphabets. We've come a long way, baby!

Back to the \$10-million record. In 1971, FTD's Translations Branch completed a translation of the 1962 book *Method of Edge Waves in the Physical Theory of Diffraction*, by Pyotr Ufimtsev, chief scientist of the Moscow Institute of Radio Engineering (MITT). The record was (and still is) stored in CIRC. Denys Overholser, a mathematician and radar specialist at Lockheed Martin's Advanced Developments Program (a.k.a., the Skunk Works) read it and realized how

Ufimtsev's theory could be applied to what we now call "stealth" technology.

Whereas the main idea at the time had revolved around *absorbing* radar, Dr. Ufimtsev used a 100-year-old mathematical formula to show how the geometric configuration of a two-dimensional object could *diffract* radar. Mr. Overholser used the translation to write software to predict the radar cross section of an aircraft constructed of flat (i.e., two-dimensional) panels. Mr. Overholser told his boss, Ben Rich, that he could have the software ready in 6 months. Mr. Rich told him he had 3 months. In fact, it took Mr. Overholser and a partner only 5 weeks to turn Dr. Ufimtsev's formula into usable code.

Thus the F-117A Stealth fighter was born! How important was Mr. Overholser's contribution? Mr. Rich calculated that the savings in research time amounted to \$10 million. Amazingly, Dr. Ufimtsev never realized the impact of his book until he came to the United States in 1990 to teach electromagnetic theory at UCLA.

This story has inspired many fiction and nonfiction books and television programs.



Foreign Technology Division played a pivotal role in the development of the F-117A aircraft.