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Testing Triple Play at NSA (U)

(U) It doesn't take an especially acute sense of history to realize that some kinds of technological advance will have a considerable impact on the course of the future. If someone develops a lightweight, long-lasting battery for electric automobiles, or a super-efficient, low-cost solar energy cell, or any of a number of other devices you could name if pressed, our lives would be affected considerably. Perhaps the digitization of intercepted voice doesn't pack the same dramatic impact for you, but the development of a successful system for processing digitized voice should have a profound effect on the transcription business.

(U) Anyone who has worked with acoustical magnetic tape can recite a long litany of complaints about the inefficiences of the medium. Just the task of mounting the tape, threading it through to the takeup reel, and waiting until the sound begins, can be annoying. In addition, there often are long gaps between conversations, and finding the start of the next conversation can be a pain. With an accurate tape position indicator, it is possible to make reference to specific points on the tape for subsequent relistening, but one must rewind or go fast forward to locate those points. In any case, this involves waiting with eyes fixed on the changing numbers on the dial, often overshooting the target if one's reflexes aren't all that sharp.

(U) In addition, whether there was anything of interest on the tape or not, when we are through with it we have to wait until it is rewound, stuff it into a tape jacket, and usually make some sort of entry on the jacket.

(U) As long as we remain in this analog mode, our technology is limited by the linear nature of the tape, which commits us to repeated trips over the same unwanted portions to get at the useful material. Some portion of the transcriber's time is invariably wasted in this way.

~~(C-CCO)~~ One of the most sophisticated systems for dealing with large-scale intercept and processing of voice, still in the analog mode, has been the [redacted] series. This system, developed for the Army Security Agency by Sylvania, has played a pioneer role in the employment of computers to help manage the problem of storage and retrieval of intercepted conversations. Two of the [redacted] are at [redacted] where they record the intercept onto temporary storage recorders (TSRs), which also serve as the source for the traffic to be processed by the transcriber, without dubbing onto smaller reels. These TSRs, together with their controlling computers, are the smart idea that significantly increased the stations' output and helped push transcription into the computer world. At the same time they provide the disastrously weak component that frequently breaks down and is the regular subject of the heartfelt curses of those who must depend on the system for their supply of traffic. The analog nature of the recording, and the mechanical problems associated with high-speed tape transports, combined to transform the TSR, yesterday's hero, into today's villian.

~~(C-CCO)~~ Probably sensing that the Army was ready to replace the TSRs with digital recordings, IBM came into the picture with some aggressive R&D. They developed a system that they believed would prove much more reliable by eliminating the causes of frequent mechanical breakdowns, and that would provide, in addition, a number of attractive features not available in any analog system. Using off-the-shelf equipment and algorithms presumably developed for other applications, IBM put together a package called Triple Play to function as a sample *digital* temporary storage recorder and playback system. After a test plan was developed, Triple Play was tried out at the [redacted] sites against the same signals as were being processed through the conventional [redacted]

systems. The reaction of station personnel was most favorable.

~~(C-CCO)~~ The Triple Play package, as it was set up to travel to the field sites and then to NSA, consisted of two transcriber positions and one controller position, the controller playing the role of intercept operator, directing the recording of desired signals and providing essential header information for each conversation. In the field, Triple Play was tied directly to the station's antenna system, but when the package was brought to NSA for testing against traffic processed here, analog tapes were fed into the system to simulate antenna input.

(U) Our interest in testing the system at NSA differed somewhat from that of the Army in testing it in the field. The Army (INSCOM) wanted to see how it fit into the Le Fox system; we wanted to examine it as a system for linking the transcriber to a store of digitized voice traffic. Most plans for the future of voice intercept call for the traffic to be digitized, and a question of some importance is how the transcriber is to be equipped to permit listening to a lot of zeros and ones.

(U) The Triple Play test in NSA was conducted with transcribers who not only worked their regular traffic through the system but brought along their essential working aids so as to create a realistic operational environment. In order to compare the performance of the new digital system with the existing reel-to-reel recorder plus the STEPSTONE word-processing system, the latter equipment was also available for the transcribers' use. All conversations were processed twice, once in each system, and the order of processing was carefully shuffled so as to avoid any bias.

(U) Right from the start it was evident that Triple Play offered some interesting innovations. One was the gap-suppression feature, which eliminated not only the spaces between conversations, but those between sentences, phrases, and even words. As each gap was closed, a record was made of its location and duration, and when the transcriber played the conversation back, he had the option of inserting silences to account for all or part of the suppressed non-voice periods. During the NSA tests, transcribers almost always chose to work with the compacted signal while they were scanning the traffic. Quite understandably, they preferred to spread the conversation out somewhat when writing out a transcription of a portion of the transmission. Having the option to restore all or part of the suppressed portions at the transcription console seemed a most fortunate innovation.

(U) Another feature which worked out very well was the Scanner Title Queue. The transcriber could call to his screen a list of the individual conversations available to him for processing. Each item, in addition to the usual identifying information, showed the length of the conversation as computed by the system, the proportion of voice to non-voice in the transmission, and the priority assigned to the item. The transcriber could, by moving his cursor to the appropriate line on the screen, select a particular conversation for transcription, and it was immediately made available.

(U) Yet another exciting innovation was "Dial-a-Time." This feature permitted the transcriber to mark a particular spot in the conversation for quick reference later on. This was done by entering onto the transcript, on the screen, the precise intercept time to serve as the marker for the word or phrase of interest. This function was carried out by depressing a key at the proper moment to record the time, and, to return to that spot in the conversation, by moving the cursor to that expression of time, now part of the transcript on the screen. This process could be repeated as often as necessary, permitting the transcriber himself or the quality controller to move quickly to points in the conversation that were of special interest or that posed special problems.

(U) For all practical purposes, the transcriber heard no differences in quality between the analog and the digitized versions of speech. While the preference tests which were administered showed a slight preference for the analog, this was probably because, in the NSA test, those same analog tapes had to be re-recorded into digital form to simulate what was done off the air at the field stations. In any case, there appears to be no reason why digitizing the signal should adversely affect hearability.

(U) One of the ways to evaluate Triple Play was to compare the same transcriber's performance on both the IBM system and the conventional configuration of AN/TNH-21 analog tape playback and Delta Data 7000 STEPSTONE terminal for transcription composition and storage. The work of seventeen transcribers was recorded, each one alternating between Triple Play and the conventional system in the R54 laboratory in FANX III. The transcribers had very little difficulty in learning how to use the experimental system, and of course were aware of the fact that a comparison was to be made between the two systems.

~~(C-CCO)~~ A large number of factors were considered, and the statistics do not seem to show any glaring advantage of one system over the other.

However, the improvement in scanning speed appeared to be significant, with Triple Play and its gap-suppression feature providing a 16.3 percent increase in speed. This figure was compiled without including one of the A Group targets, which was different in some basic respects and incompatible with some features of the Triple Play system. It was also realized that Triple Play was designed to perform in the field in an essentially intercept environment, and that it should be modified considerably to allow for the very different operational situation at NSA.

(U) In addition to information derived by observing transcription performances, some interesting points emerged from questionnaires that the transcribers were asked to fill out at the end of their one-week stints in the laboratory. Questions were asked about how the two systems compared generally (performance, fatigue, noise, etc.) and specifically (function buttons, audio controls, CRT legibility, etc.). The transcriber's opinion was also sought in such areas as the value of gap suppression, repeat functions, audio enhancement, text preparation, playback speeds, and scrolling. Many minor modifications to Triple Play were suggested by those who would have to live with such a system. The whole idea of a digital recorder was warmly received by most, pooh-poohed by a few, and rhapsodized over by several.

~~(C-CCO)~~ Some of the comments were bitter. One transcriber admitted that the digital temporary storage recorder (DTSR) was a significant improvement over the present analog system, but coupled that statement with the conviction that his grandson would be lucky to see the improvement actually applied in the transcription shop. Some were startlingly enthusiastic, like the very experienced transcriber who entered onto the CTR, first in Russian and then in English, "With minor modifications, this system will become the best transcription system yet. The savings in time, money and manpower will be tremendous. We want it now!!!" Continuing his comments, this transcriber altered the expansion of DTSR from digital temporary storage recorder to "Discard Tapes, Scrap Recorders."

(U) Very well, then, what's to be done next in the matter of digital treatment of voice intercept? The laboratory test of Triple Play was most encouraging, but scarcely conclusive, since we were dealing with a system which was not really designed for the NSA transcription task, and no matter how hard we tried, we could not really reproduce the operational environment in the laboratory. What is needed now is a digital transcription recorder, designed with the NSA task in mind and benefiting from the lessons learned in the Triple Play experience. After thorough checking in the R54 Lab, it should be subjected to merciless testing in a genuine operational environment. If it survives all this and still promises to be "the best transcription system yet," we will be on our way to making a real impact on cryptologic history.

(U) Jack Gurin, a frequent contributor, admits that he is a propagandist for technology. But he tempers this with the assurance that he also worries about the impact of that technology on the human being sitting in its midst. He has been working on speech problems in the Research Group, R5, and insists that life can be made beautiful for the transcriber.