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Full Text of Report On Technical Study Of Tape Erasure

In response to your request we have made a comprehensive technical study of the White House tape of June 20, 1972, with special attention to a section of buzzing sounds that lasts approximately 18.5 minutes. Paragraphs that follow summarize our findings and indicate the kinds of tests and evidence on which we base the findings.

Magnetic signatures that we have measured directly on the tape show that the buzzing sounds were put on the tape in the process of erasing and re-recording at least five, and perhaps as many as nine, separate and contiguous segments. Hand operation of keyboard controls on the Uher 5000 recorder was involved in starting and again in stopping the recording of each segment. The magnetic signatures observed on the tape show conclusively that the 18.5-minute section could not have been produced by any single, continuous operation. Further, whether the footpedal was used or not, the recording controls must have been operated by hand in the making of each segment.

The erasing and recording operations that produced the buzzing section were done directly on the tape we received for study. We have found that this tape is 1814.5 feet long, which lies within a normal range for tapes sold as 1800 feet in length. We have examined the entire tape for physical splices and have found none. Other tests that we have made thus far are consistent with the assumption that the tape is an original and not a re-recording.

A Uher 5000 recorder, almost surely the one designated as Government Exhibit No. 60, was used in producing the 18.5-minute section. Support for this conclusion includes recorder operating characteristics that we measured and found to correspond to signal characteristics observed on the evidence tape.

The buzzing sounds themselves originated in noise picked up from the electrical power line to which the recorder was connected. Measurements of the frequency spectrum of the buzz showed that it is made up of a 60 cycles per second fundamental tone, plus a large number of harmonic tones at multiples of 60. Especially strong are the third harmonic at 180 and the fifth harmonic at 300 cycles per second. As many as 40 harmonics are present in the buzz and create its "raucous" quality. Variations in the strength of the buzz, which during most of the 18.5-minute section is either "loud" or "soft," probably arose from several causes including variations in the noise on the power line, erratic functioning of the recorder, and changes in the position of the operator's hand while running the recorder. The variations do not appear to be caused by normal machine operations.

Can speech sounds be detected under the buzzing? We think so. At three locations in the 18.5-minute section, we have observed a fragment of speech-like sound lasting less than one second. Each of the fragments lies exactly at a place on the tape that was missed by the erase head during the series of operations in which the several segments of erasure and buzz were put on the tape. Further, the frequency spectra of the sounds in these fragments bear a reasonable resemblance to the spectra of speech sounds.

Can the speech be recovered? We think not. We know of no technique that could recover intelligible speech from the buzz section. Even the fragments that we have observed are so heavily obscured that we cannot tell what was said.

The attached diagram illustrates the sequence of sound events in the 18.5-minute section. Also illustrated is a sequence of Uher operations "erase-record on" and "erase-record off" that are consistent with signatures that we measured on the evidence tape. The five segments that can be identified unequivocally are labeled "1" through "5." In addition, the diagram shows four segments of uncertain ending.

In developing the technical evidence on which we have based the findings reported here, we have used laboratory facilities, measuring instruments, and techniques of several kinds, including: digital computers located in three different labortories, specialized instruments for measuring frequency spectra and waveforms, techniques for "developing" magnetic marks that can be seen and measured directly on the tape, techniques for measuring the performance characteristics of recorders and voice-operated switches, and statistical methods for analyzing experimental results.

In summary we have reached complete agreement on the following conclusions:

1. The erasing and recording operations that produced the buzz section were done directly on the evidence tape.
2. The Uher 5000 recorder designated Government Exhibit No. 60 probably produced the entire buzz section. uced the entire buzz ection.
3. The erasures and buzz recordings were done in at least five, and perhaps as many as nine, separate and continuous segments.
4. Erasure and recording of each segment required hand operation of keyboard controls on the Uher 5000 machine.
5. Erased portions of the tape probably contained speech originally.
6. Recovery of the speech is not possible by any method known to us.
7. The evidence tape, insofar as we have determined, is an original and not a copy.