TOP SECRET [redacted]

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Summary of Analysis Results on the Special Item as of May 12, 1962

Suspected conditions were simulated on a transpondor similar to the one in use. A pulse-chain generator utilizing various prf's was used to modulate a signal-generator. The generator output was varied and fed in turn to the inputs for producing the wide and narrow pulse output. The transpondor output was then fed to a receiver and the receiver output to a recorder. Time-code signals and 60kc. signals were also placed on the tape so that it can be analyzed automatically if desired. Thus a family of conditions was simulated for the overall system.

Both the above simulated tapes and the real tapes were then analyzed as follows:

They were reproduced at 1/8th speed & fed to an oscillograph having a paper velocity of 64 ips. Thus the equivalent time base obtained on the paper was 512 ips. In addition, Polaroid pictures were made of the simulated samples.

A study of the simulated data revealed the following:

When using the long pulse, a prf of [redacted] and a low input level, the output "stutters" as expected because of intermittent triggering.
When using the long pulse and a prf of [redacted] with a high signal level, the output works fine; no saturation or jitter troubles.
When using the long pulse and prf's of [redacted] cps saturation troubles begin to be in evidence, with some "closely paired" transpondor pulses, which simulate a "pulse of double length" in the receiver output; in addition, a receiver transient effect appeared to emphasize anomalies near the leading portion of the pulse train.

When using the short pulse, a prf of [redacted] and high output level works fine; with no saturation or jitter troubles (corresponds to [redacted] prf at long pulse).
When using the short pulse and a prf of [redacted] trouble begins to develop, much like that described above for the [redacted] prf long pulse case.
When using the short pulse and a prf of [redacted] there was a strong tendency for the transpondor to "divide by two", sometimes for several input pulses in a row, and even on occasion for the entire pulse train.

Next, all of the "live" data was compared with the above results. Instances of the "jitter" effects, the "pulse-of-double-length" and particularly of the "divide-by-two" effects were noted, with both the actual time intervals and the relations of occurrence corresponding quite closely to the short-pulse [redacted] tests above. Notations were made on each of the live chains.
The following conclusions were reached:
It is quite definite that all output is from the narrow-pulse channel.
It is quite definite that the unknown prf is [redacted] and probable that it is in the [redacted] area. It might be possible to tie down the prf some closer by further detailed simulation of the short-pulse channel using a carefully selected family of prf's. Harmonics of the [redacted] area could be investigated. However, it is doubtful that prf could be determined to any high degree of accuracy.

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