IV. Operations - 1951-66

A. Equipment, Procedures, Circuitry

1. The Early Period - 1951-58

During this period there were many noteworthy changes in cryptographic and terminal equipment techniques. The one-time systems (pad and tape) were the mainstay of secure communications. The strip cipher system, CSP-1700 (rotor), SIGABA and associated systems (rotor), and Hagelin Machines were all phased out by the mid-1950's. The AFSAM-7, later changed to KL-7 (rotors), was used during this period with a number of stations but not to the extent that OTP and OTT (TINYTOT) were employed. The M-19 family of teletype equipment served as the primary terminal equipments. On-line cryptographic systems during the early period consisted of [redacted] (rotor), [redacted] (tape), ASAM (rotor), and AFSAM (rotor).* 25X1 25X1

The Headquarters Signal Center in "L" Building mushroomed in terms of space, personnel, and equipment, and developed an overall capa-

* See Figure 9, p. 83

bility to move huge volumes of messages securely and as rapidly as off-line technology would permit. However, space, personnel, and equipment were never sufficient during the early period.

Although the use of one-time tape and KL-7 type rotor devices steadily increased, the laborious one-time pad still maintained its lofty position as the primary system for off-line encipherments between Headquarters and the majority of field stations.

A severe blow was struck when the 131B-2 one-time tape machine (SIGTOT) was declared vulnerable. This resulted in further disruption of established operating routines and demanded immediate revision of enciphering procedures. The TINYTOT OTT machine was quickly developed to counteract this threat, and it became the primary OTT encryption/decryption device. Other standard equipment suffered the same fate with the same results as technology advanced.

A requirement was levied to establish a COMINT area (later called Special Intelligence or SI) as a separate restricted enclave within the

confines of the S/C, and it was called Special Signal Center Branch. The simultaneous mushrooming of the OCI "Q" Building Facility caused severe hardships since traffic in both facilities increased rapidly and continually, and both of these facilities required that operating personnel have special clearances. Several special projects such as

25X1

[redacted] additionally made heavy inroads on S/C personnel and equipments.

General operating steps used in the encipherment/decipherment process for OTP (including KL-7) and OTT between 1951 and 1958 are presented in charts in Attachment C.* These procedures, with the exception of changes relating to the development of the TINYTOT, remained constant. Both the OTP and OTT systems were slow and laborious. The hourly standard for enciphering OTP messages was 225 groups (literal) with approximately 1,800 groups as the daily standard. The hourly standard for enciphering OTP messages (numerical) was 100 groups as the daily standard. Some relief was obtained with

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* See pp. 18 and 26

the issuance of multiple pad links with up to 16 station systems being employed. The hourly standard for OTT messages was 325 groups with 2,600 groups as the daily standard.* The speed with which a OTP message could be enciphered/deciphered depended largely upon the speed with which the operator was able to write legibly and the degree to which he had memorized the Vigenère Tableau.** The speed with which a OTT message could be enciphered/deciphered was dependent upon the equipment used. The M-19 (SIGTOT, later TINYTOT) was the primary device being used for OTT enciphered messages. The maximum speed of this device was 60 words per minute utilizing the 5 level Baudot Code. The hourly standards above were exceeded once personnel became thoroughly familiar with the system and performed the function repetitively day after day.

It was not uncommon for 24-72 hour backlogs to develop during peak operational or

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* See Figure 10, p. 87

** See Figure 11, p. 88

Figure 10

BASED ON STUDY CONDUCTED CIRCA 1962

GROUPS PER MAN-HOUR

SYSTEM	ENCIPHERING	DECIPHERING
KL-7	200 - 275	400 - 440
OTP	225	150
OFF-LINE TOT	325	800
KW-26	1,800	3,000

APPROX RATIOS

KW-26 VS TOT	5:1	3.75:1
KW-26 VS OTP	8:1	20:1
KW-26 VS KL-7	9:1	7.5:1

NOTE: GROUPS PER MAN HOUR INCLUDE ALL SIGNAL CENTER PROCESSING ABOVE AVERAGES PERFORMED BY EXPERIENCED PERSONNEL ONLY. NEW PERSONNEL PROCESS MUCH LESS.