

## UNIT 19 *Lorenz Cipher Machine*

## Overhead Slides

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### **Overhead Slides**

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# OS 19.1

## *Codes for Enciphering*

A	11000	B	10011	C	01110	D	10010	E	10000	F	10110	G	01011
H	00101	I	01100	J	11010	K	11110	L	01001	M	00111	N	00110
O	00011	P	01101	Q	11101	R	01010	S	10100	T	00001	U	11100
V	01111	W	11001	X	10111	Y	10101	Z	10001				

3	00010	4	01000	8	11111	9	00100	+	11011	/	00000
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# OS 19.2

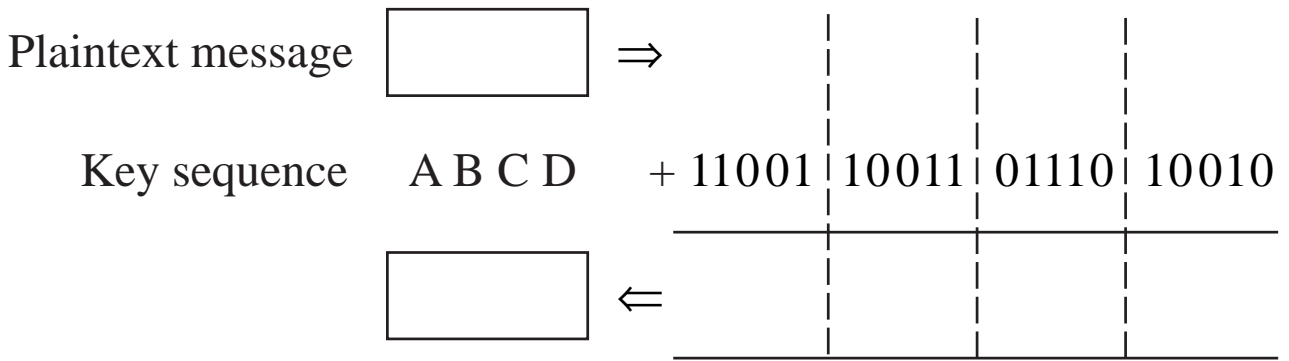
## Teleprinter Addition Table

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	9	8	+	4	3	/
A	/	G	F	R	4	C	B	Q	S	3	N	Z	8	K	+	Y	H	D	I	W	9	X	T	V	P	L	U	M	O	E	J	A
B	G	/	Q	T	O	H	A	F	8	L	P	J	S	Y	E	K	C	W	M	D	V	U	R	9	N	3	X	I	4	+	Z	B
C	F	Q	/	U	K	A	H	G	3	S	E	M	L	4	P	O	B	9	J	V	D	T	X	W	+	8	R	Z	Y	N	I	C
D	R	T	U	/	3	9	W	X	K	4	I	+	Y	S	Z	8	V	A	N	B	C	Q	G	H	M	O	F	P	L	J	E	D
E	4	O	K	3	/	N	+	Y	U	R	C	W	X	F	B	Q	P	J	9	Z	I	8	L	M	H	T	S	V	G	A	D	E
F	C	H	A	9	N	/	Q	B	J	I	4	8	Z	E	Y	+	G	U	3	X	R	W	V	T	O	M	D	L	P	K	S	F
G	B	A	H	W	+	Q	/	C	M	Z	Y	3	I	P	4	N	F	T	8	R	X	9	D	U	K	J	V	S	E	O	L	G
H	Q	F	G	X	Y	B	C	/	L	8	+	I	3	O	N	4	A	V	Z	9	W	R	U	D	E	S	T	J	K	P	M	H
I	S	8	3	K	U	J	M	L	/	F	D	H	G	R	V	T	Z	N	A	P	E	O	Y	+	W	Q	4	B	X	9	C	I
J	3	L	S	4	R	I	Z	8	F	/	9	B	Q	U	W	X	M	E	C	+	N	Y	O	P	V	G	K	H	T	D	A	J
K	N	P	E	I	C	4	Y	+	D	9	/	X	W	A	Q	B	O	S	R	8	3	Z	M	L	G	V	J	T	H	F	U	K
L	Z	J	M	+	W	8	3	I	H	B	X	/	C	V	R	9	S	O	Q	4	Y	N	E	K	U	A	P	F	D	T	G	L
M	8	S	L	Y	X	Z	I	3	G	Q	W	C	/	T	9	R	J	P	B	N	+	4	K	E	D	F	O	A	U	V	H	M
N	K	Y	4	S	F	E	P	O	R	U	A	V	T	/	H	G	+	I	D	M	J	L	8	Z	B	X	3	W	Q	C	9	N
O	+	E	P	Z	B	Y	4	N	V	W	Q	R	9	H	/	C	K	L	X	3	8	I	J	S	F	D	M	U	A	G	T	O
P	Y	K	O	8	Q	+	N	4	T	X	B	9	R	G	C	/	E	M	W	I	Z	3	S	J	A	U	L	D	F	H	V	P
Q	H	C	B	V	P	G	F	A	Z	M	O	S	J	+	K	E	/	X	L	U	T	D	9	R	4	I	W	3	N	Y	8	Q
R	D	W	9	A	J	U	T	V	N	E	S	O	P	I	L	M	X	/	K	G	F	H	B	Q	8	+	C	Y	Z	3	4	R
S	I	M	J	N	9	3	8	Z	A	C	R	Q	B	D	X	W	L	K	/	Y	4	+	P	O	T	H	E	G	V	U	F	S
T	W	D	V	B	Z	X	R	9	P	+	8	4	N	M	3	I	U	G	Y	/	Q	C	A	F	S	E	H	K	J	L	O	T
U	9	V	D	C	I	R	X	W	E	N	3	Y	+	J	8	Z	T	F	4	Q	/	B	H	G	L	P	A	O	M	S	K	U
V	X	U	T	Q	8	W	9	R	O	Y	Z	N	4	L	I	3	D	H	+	C	B	/	F	A	J	K	G	E	S	M	P	V
W	T	R	X	G	L	V	D	U	Y	O	M	E	K	8	J	S	9	B	P	A	H	F	/	C	I	4	Q	N	3	Z	+	W
X	V	9	W	H	M	T	U	D	+	P	L	K	E	Z	S	J	R	Q	O	F	G	A	C	/	3	N	B	4	I	8	Y	X
Y	P	N	+	M	H	O	K	E	W	V	G	U	D	B	F	A	4	8	T	S	L	J	I	3	/	9	Z	R	C	Q	X	Y
Z	L	3	8	O	T	M	J	S	Q	G	V	A	F	X	D	U	I	+	H	E	P	K	4	N	9	/	Y	C	R	W	B	Z
9	U	X	R	F	S	D	V	T	4	K	J	P	O	3	M	L	W	C	E	H	A	G	Q	B	Z	Y	/	+	8	I	N	9
8	M	I	Z	P	V	L	S	J	B	H	T	F	A	W	U	D	3	Y	G	K	O	E	N	4	R	C	+	/	9	X	Q	8
+	O	4	Y	L	G	P	E	K	X	T	H	D	U	Q	A	F	N	Z	V	J	M	S	3	I	C	R	8	9	/	B	W	+
4	E	+	N	J	A	K	O	P	9	D	F	T	V	C	G	H	Y	3	U	L	S	M	Z	8	Q	W	I	X	B	/	R	4
3	J	Z	I	E	D	S	L	M	C	A	U	G	H	9	T	V	8	4	F	O	K	P	+	Y	X	B	N	Q	W	R	/	3
/	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	9	8	+	4	3	/

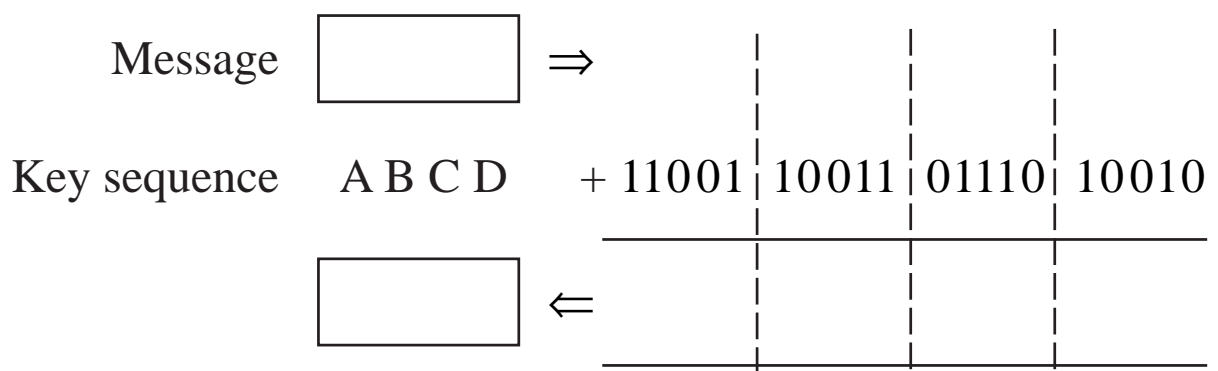
# OS 19.3

## *Encipher and Decipher*

### Encipher

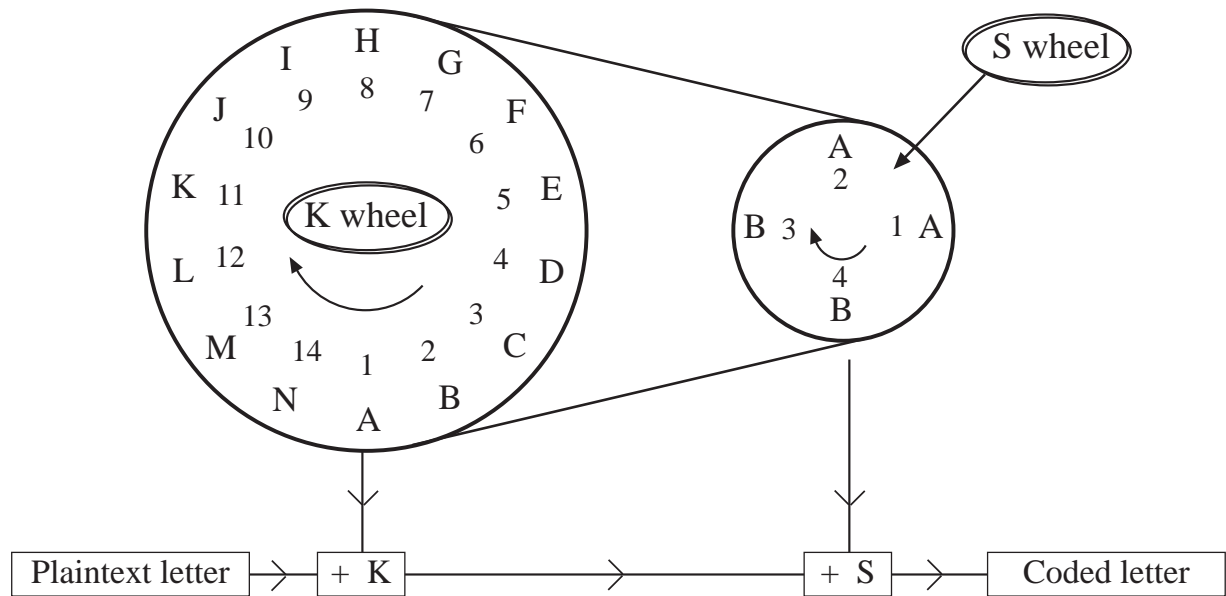


### Decipher



# OS 19.4

## Simplified Lorenz Cipher Machine



For example,

$$T + \square + \square = T + \square = \square$$

$$H + \square + \square = H + \square = \square$$

$$E + \square + \square = E + \square = \square$$

$$THE \rightarrow \square$$

**OS 19.5***Method for Deciphering*

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1. In **Z**, the coded message, add together the 1st and 2nd characters, then add together the 2nd and 3rd characters, and so on, and call this new sequence  $\Delta\mathbf{Z}$  (the 'delta Z' sequence).
  2. For each starting position, in turn, of the **K** wheel, take the key sequence **K** and also determine  $\Delta\mathbf{K}$ .
  3. Add  $\Delta\mathbf{Z}$  to  $\Delta\mathbf{K}$  to form a new sequence (one for each starting position of the **K** wheel).
  4. Note the number of '/'s in this sequence.
  5. The position of **K** which gives the most '/'s in  $\Delta\mathbf{Z} + \Delta\mathbf{K}$  is likely to be the actual starting position of the **K** wheel (the theory for this is given in Appendix 2).
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## OS 19.6

*Printout for all Positions of K*

K = 1

 $\Delta Z + \Delta K = \text{HK8XGIVSH3G++4/CCASAIGWDMSUUHP898AKR3RG3HVHJTD/A4O/XG}$ 

K = 2

 $\Delta Z + \Delta K = \text{B8TBE84GXZDS9QFVEUVGGSGTK+OLBIT/9GWYEWDPJJB+8F+GVUD9D}$ 

K = 3

 $\Delta Z + \Delta K = \text{DTH4OAXW94QGZGXZSMUISNAAZ9F8DDH+XINMO/QDVIDH+P4IECTQQ}$ 

K = 4

 $\Delta Z + \Delta K = \text{IHK+9MHRQM3KMRLYVS+BNYTXCZ/KIFK4EBSSJV3MWPIT/KVB3QAD3}$ 

K = 5

 $\Delta Z + \Delta K = \text{4KPU+YFBDAX4NSPCUB9TYIC4+MT/4PPVVTMPYEXZAB4JBWETZ9XPX}$ 

K = 6

 $\Delta Z + \Delta K = \text{BPROLNVUPPTLAEFQ+IFDIOZQPN89BKREQDK3RHTENXBLSN3D4G4AT}$ 

K = 7

 $\Delta Z + \Delta K = \text{/RYZJ8/OA+/XUGHJ9KHGOU9GIA+8/YW3CGZQ8B/C3I/CGSZGMSQC/}$ 

K = 8

 $\Delta Z + \Delta K = \text{MYM3OE8FCJKBMA3HFPU9ULDRDU/IMNMZX9C4LDKRW8MZWM49ATGVK}$ 

K = 9

 $\Delta Z + \Delta K = \text{AMS+IVR/V9J4S8QXHSB+L8BSFMBGASS4A++K4IJZRAAORKM+PXRZJ}$ 

K = 10

 $\Delta Z + \Delta K = \text{RSPSBJUTZ/T+B/V9U+IC8KPEPSSSRMPMMCP8F4T3PMREBZAC+FSYT}$ 

K = 11

 $\Delta Z + \Delta K = \text{WP3GNIQ8Y+DUIDUOB9WAK/LGKGBGNWK3ADAITDBDHDYWLUCPAJ4ECD}$ 

K = 12

 $\Delta Z + \Delta K = \text{/3QKEPO+C4YOKTHDIZVW/9DAWIWY/ZQP9WDHL/YJ/N/NO++W9IGQY}$ 

K = 13

 $\Delta Z + \Delta K = \text{VQ44ZBM/QVRZPARPWMCM98T8NKRIVC4+HMFJKMR4B8VWFPJM/XAJR}$ 

K = 14

 $\Delta Z + \Delta K = \text{E4KLVXUBJEA3SXYAVNEO8IN/SPBOE+KJ+OPPQAA+REEI/I9O+98HA}$