

# Elementary cryptanalysis. Abraham Sinkov

## Introduction

### Chapter 1 Monoalphabetic Ciphers Using Direct Standard Alphabets

- 1.1 The Caesar Cipher
- 1.2 Modular arithmetic
- 1.3 Direct standard alphabets
- 1.4 Solution of direct standard alphabets by completing the plain component
- 1.5 Solving direct standard alphabets by frequency considerations
- 1.6 Alphabets based on decimations of the normal sequence
- 1.7 Solution of decimated standard alphabets
- 1.8 Monoalphabets based on linear transformations

### Chapter 2 General Monoalphabetic Substitution

- 2.1 Mixed alphabets
- 2.2 Solution of mixed alphabet ciphers
- 2.3 Solution of monoalphabets in five letter groupings
- 2.4 Monoalphabets with symbols as cipher equivalents

### Chapter 3 Polyalphabetic Substitution

- 3.1 Polyalphabetic ciphers
- 3.2 Recognition of polyalphabetic ciphers
- 3.3 Determination of number of alphabets
- 3.4 Solution of individual alphabets, if standard
- 3.5 Polyalphabetic ciphers with a mixed plain sequence
- 3.6 Matching alphabets
- 3.7 Reduction of a polyalphabetic cipher to a monoalphabet
- 3.8 Polyalphabetic ciphers with mixed cipher sequences
- 3.9 General comments about polyalphabetic ciphers

### Chapter 4 Polygraphic Systems

- 4.1 Digraphic ciphers based on linear transformations matrices
- 4.2 Multiplication of matrices-inverses
- 4.3 Involutory transformations
- 4.4 Recognition of digraphic ciphers
- 4.5 Solution of a linear transformation
- 4.6 How to make the Hill System more secure

### Chapter 5 Transposition

- 5.1 Columnar transposition
- 5.2 Solution of transpositions with completely filled rectangles
- 5.3 Incompletely filled rectangles
- 5.4 Solution of incompletely filled rectangles-probable word method
- 5.5 Incompletely filled rectangles-general case
- 5.6 Repetitions between messages; identical length messages

Appendix A Table of Digraphic Frequencies

Appendix B Log Weights

Appendix C Frequencies of Letters of the Alphabet

Appendix D Frequencies of Initial Letters of Words

Appendix E Frequencies of Final Letters of Words

Solutions to Exercises

Suggestions for Further Reading

Index

Supplement-Computer Programs by P. L. Irwin

I. Trigraphic Frequency Distributions

II. Index to Coincidence

III. Matching Alphabets

IV. Trigraphic Frequency Distribution for Individual Alphabets of a Periodic Polyalphabetic Cipher

V. Digraphic Frequency Distributions