

NATIONAL SECURITY AGENCY  
Washington 25, D. C.

COURSE	Military Cryptanalysis, Part I
LESSON 9	Syllabary squares and code charts
TEXT ASSIGNMENT	Par. 80

1. The following cryptogram is suspected to begin with the words "REFERENCE YOUR MESSAGE NUMBER THREE FIVE FOUR DATED ONE SEVEN SEPTEMBER." Solve the text, and reconstruct the cryptosystem employed.

C R D S C	R J S I S	K S J T Y	C L S K R	C Q E R B	Y J Q I R
K P K O J	R C R S D	T F S D J	T Y C D P	F R D X B	R C S F S
J S C S J	U F R J Q	F K K P K	U P D D O	F O X B P	L C R R B
D U K P I	S L S J S	K O K R G	O J N L P	K P C O F	S P F J P
C R R B F	T J N L R	A Y J S H	T F O X B	Q C K R H	T E S D Y
L R H U K	U P C F O	J N L R C	N L U F T	J S E O J	S F X C U
Y F E S K	P J S H K	B K P F B	X X B F Y	S C D P K	S K U C R
J W O C S	L R B K O	K R F X J	U L P B R	Q C K S K	V B Q C P
J P C P J	U J R C S	O E J R F	P J S H U	B O B R K	W P C R I
H V O B J	P K R F Y	D O R D D	U K P D T	B P L P H	T F O X B

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2. The enemy is using a system incorporating a 10 x 10 bipartite square within which there are inscribed letters, digits and syllables. The row and column coordinates are invariable, but a different internal chart is used each day. The chart for 16 December was reconstructed and found to be based on the key word PYRAMIDS as follows:

	0	1	2	3	4	5	6	7	8	9
0	P	Y	R	RA	RE	RED	RES	RI	RO	A
1	1	AL	AN	AND	AR	ARE	AS	AT	ATE	ATI
2	M	ME	I	9	IN	ING	ION	IS	IT	IVE
3	D	4	DA	DE	S	SE	SH	ST	STO	B
4	2	HE	C	3	CA	CE	CO	COM	E	5
5	EA	ED	EN	ENT	ER	ERE	ERS	ES	EST	F
6	6	G	7	H	8	HAS	HE	J	Ø	K
7	L	LA	LE	N	ND	NE	NT	O	OF	ON
8	OR	OU	Q	T	TE	TED	TER	TH	THE	THI
9	THR	TI	TO	U	V	VE	W	WE	X	Z

The next day the following cryptogram, suspected to contain the word CROSSROADS, was intercepted. Solve the text, reconstruct the chart for the day, and determine the internal key word:

20 88 50 58 95 63 62 30 69 69 94 15 58 92 07  
 84 73 60 35 77 95 61 38 78 30 50 66 94 15 44  
 84 62 12 12 20 38 31 42 67 67 93 52 01 83 10  
 32 02 79 10 36 84 72 94 44 68 79 54 78 69 50  
 58 95 58 79 62 14 30 50 71 94 35 87 79 97 58  
 02 02 10 78 47 22 97 58 88 09 84 53 03 01 93  
 44 78 79 79 78 30 50 79 57 55 59 54 08 54 94  
 72 89 72 60 82 72 94 44 92 07 79 82 05 10 79  
 94 10 10 02 58 28 97 58 02 02 43 69 05 96 50  
 93 50 58 95 63 58 07 11 21 50 71 94 35 84 27  
 . 30 54 87 50 35 68

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3. The following two messages were encrypted by means of the Aggressor code chart illustrated in Fig 100 of the text, but with a different set of coordinates. It is suspected that both messages end with the signature ENRIQUE VALENZUELA. Reconstruct the plain texts and recover the coordinates of the chart.

MESSAGE "A"

AT FH XL MK ZU AL CO TG QT KQ RD KN KL EL DR  
JP XT RO GY RJ UA SG BW AT HX OD DV IX SR BD  
LI CE XL JA VL TA ET UY NV QL KH WD AL YG PT  
DI LG YR LU EF NY ZR QQ LX SY UV

MESSAGE "B"

AL IQ QT MB VU EL UA TX XL PQ RJ WG IM GG XC  
AT DR NP QT JB WD KZ EQ LA UG WJ AL YX PL OZ  
SR LZ AG YG XH FG YY UP

4. The following message was encrypted by means of the Aggressor code chart illustrated in Fig. 100 of the text, but with a set of non-variant coordinates. Reconstruct the plain text and recover the sequences for the row and column coordinates.

EO BO JO BO EO IO AY IT JO DO EO AZ JO IQ AU  
KU EO FQ AQ JO JZ JQ JY EO JS JO JT JS EO AX  
AN AQ LX JO BO FU DU IP EO HQ BQ GQ JP AS IR  
CZ AT JO BW EO JS JO HZ JP IZ HX KV EO FV JO  
LR EO FV DT DS LS ET LT JS KB BW JX ET MW JX

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5. The following 30 messages, intercepted on low-level ground nets, have been selected for study because of homogeneous characteristics. Solve the texts and reconstruct the cryptosystem employed. (A condensed table of the repetitions contained in these messages is included on pages 10-12.)

No. 1 INL DE ETN 1630 08 Aug 53

77 05 19 39 45 39 89 19 59 25 49 32 35 22 35

90 00 45 95 60 81 55 05 90 32 62 00 92 08 78

95 50 36 05 79 60 92 58 90 95 42 93 05 27 88

65 00 21

No. 2 INL DE ETN 1633 08 Aug 53

77 05 19 19 45 39 89 69 09 25 49 32 35 22 35

97 45 95 60 37 62 05 10 50 11 00 61 78 95 07

05 88 31 95 13 05 29 19 89 45 95 20 49 43

No. 3 INL DE ETN 1636 08 Aug 53

77 05 19 69 45 39 89 69 09 25 49 32 35 22 35

97 45 73 32 15 55 95 74 05 82 92 46 21 95 50

70 65 05 45 95 28 05 62 41 07 11 10 45 88 61

95 49 05 90

No. 4 SIA DE BYE 0805 10 Aug 53

77 05 09 89 45 09 49 09 09 25 39 09 32 35 22

35 97 45 95 99 00 88 05 60 68 90 95 34 05 78

32 35 04 23 92 85 61 95 46 05 90

No. 5 LQS DE QEI 1836 11 Aug 53

77 05 79 29 45 39 49 69 09 25 39 39 32 35 22

35 90 00 45 95 87 05 56 73 32 15 55 95 37 05

82 92 46 78 95 91 05 27 06 28 66 00 91 80 53

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No. 6 ALU DE YUT 1644 12 Aug 53

77 05 69 19 45 39 89 79 09 25 39 19 32 35 22  
 35 97 45 95 22 05 80 46 96 24 95 76 05 27 95  
 08 67 39 82 05 45 95 50 75 05 71 26 00 18 34  
 22 61

No. 7 QEI DE INL 1256 20 Aug 53

77 05 19 19 45 39 19 59 09 25 19 09 32 35 22  
 35 97 45 95 20 68 05 46 22 31 72 56 72 58 80  
 50 90 51 54 37 95 46 05 27 95 60 97 05 90 88  
 31 55 50 35

No. 8 USO DE SIA 0917 21 Aug 53

77 05 39 39 45 09 99 39 59 25 19 39 32 35 22  
 35 97 45 95 25 05 60 23 52 95 68 05 21 95 10  
 05 92 52 90 78 38 48 35 10 00 95 97 05 90

No. 9 OAY DE NBQ 2357 27 Sep 53

77 05 99 69 45 19 69 59 09 25 19 29 96 80 93  
 60 17 40 45 95 98 05 57 80 40 74 63 00 95 76  
 05 27 95 08 15 05 46 80 10 55 95 39 82

No. 10 NBQ DE OAY 0010 28 Sep 53

77 05 09 39 45 09 09 09 59 25 19 49 96 80 93  
 60 17 40 45 95 50 15 52 05 10 50 11 98 59 09  
 09 95 01 78 19 05 27 95 21 69 05 49 49 89 64  
 94 14 30 76

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No. 11 OAY DE ALU 1008 29 Sep 53

77 05 39 79 45 39 09 09 09 25 19 99 96 80 00  
 52 60 17 40 45 95 99 05 62 34 55 50 35 95 23  
 05 20 35 31 06 60 38 06 95 41 05 92 74 01 79  
 04 95 83

No. 12 UBO DE TOB 2219 29 Sep 53

77 05 69 99 45 19 19 39 59 25 19 99 96 80 00  
 52 60 12 76 45 95 60 63 31 05 56 21 95 50 24  
 65 05 45 95 04 05 56 01 95 80 38 93 05 27 22  
 46 63 95 27

No. 13 ETN DE SIA 2347 30 Sep 53

77 05 19 39 45 19 69 79 09 25 69 09 96 80 93  
 60 12 76 45 95 71 08 14 05 50 35 00 27 95 85  
 05 37 17 95 86 66 11 05 45 95 88 05 87 24 90  
 17 56 96 24

No. 14 TOB DE BYE 2142 30 Sep 53

77 05 49 99 45 19 39 69 59 25 69 09 90 52 80  
 93 60 17 40 45 95 53 05 01 95 11 60 57 05 96  
 21 22 95 45 05 25 37 04 63 17 95 86 05 01 62  
 43 90 90 95 45

No. 15 BYE DE YUT 1818 10 Oct 53

77 05 89 09 45 39 49 39 09 25 39 09 50 62 01  
 17 40 45 95 61 05 79 19 59 95 12 05 72 45 95  
 10 05 92 74 95 29 05 45 95 82 05 78 97 40 35  
 62 00 54 90

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No. 16 BIA DE USO 1629 17 Oct 53

77 05 79 59 45 39 89 19 59 25 39 29 50 62 01  
 12 76 45 95 44 60 66 05 13 90 95 32 05 56 36  
 21 22 95 75 13 05 79 59 49 64 94 95 21 69 05  
 59 99 19

No. 17 ALU DE LQS 2001 19 Oct 53

77 05 69 29 45 39 99 59 59 25 39 99 57 62 00  
 50 17 40 45 95 02 05 33 95 41 05 67 80 50 00  
 90 10 50 11 98 78 95 50 09 05 45 88 61 95 35  
 05 14 72 10 55

No. 18 LQS DE YUT 0905 12 Nov 53

77 05 39 89 45 09 99 09 09 25 39 19 26 08 60  
 17 40 45 95 18 26 05 90 95 71 05 56 01 90 92  
 75 66 40 88 40 90 16 95 69 05 27 19 03 32 62  
 30 95 80

No. 19 SIA DE ETN 1314 14 Nov 53

77 05 39 89 45 39 69 39 09 25 39 79 70 50 08  
 60 12 76 45 95 26 35 05 52 75 42 32 35 90 98  
 45 95 33 48 05 61 45 95 88 05 60 68 90 92 60  
 80 76 16 92 08

No. 20 INL DE SIA 1116 25 Nov 53

77 05 19 79 45 39 39 39 09 25 19 59 26 15 52  
 60 17 40 45 73 32 15 55 95 30 31 03 06 72 10  
 05 92 74 45 95 16 05 72 57 40 35 80 98 95 06  
 84 97 05 90

No. 21 YUT DE BYE 1348 04 Dec 53  
 77 05 59 89 45 39 69 79 59 25 79 67 13 60 17  
 40 45 95 31 47 05 45 95 32 05 56 01 91 30 52  
 95 61 05 49 69 09 45 95 16 06 05 19 83 95 33  
 05 47 01 44

No. 22 OAY DE INL 1956 06 Dec 53  
 77 05 79 09 45 39 99 59 09 25 89 72 52 13 60  
 12 76 45 95 60 81 40 12 05 72 96 08 40 36 95  
 58 05 90 78 95 90 05 90 28 92 72 45 95 28 05  
 26 40 60 36

No. 23 QEI DE YUT 1710 07 Dec 53  
 77 05 69 19 45 39 29 09 59 25 29 67 62 52 60  
 17 40 45 95 51 32 05 37 95 59 05 01 95 46 05  
 63 95 08 57 05 45 95 60 28 05 71 26 00 18 34  
 22 61

No. 24 EIB DE BQT 1207 05 Jan 54  
 77 05 69 09 45 39 19 09 09 25 59 02 34 35 31  
 55 45 95 72 60 05 03 50 50 80 95 17 05 54 97  
 92 10 10 95 89 05 56 78 95 19 05 76 70 96 62  
 01 40

No. 25 NLE DE IAQ 1519 11 Jan 54  
 77 05 79 29 45 39 59 39 09 25 39 39 02 32 70  
 35 31 55 45 95 92 41 54 00 89 05 50 80 63 35  
 24 92 10 95 96 05 26 21 95 66 05 86 60 92 98  
 35 96



No. 26 QSN DE TNY 1034 12 Jan 54

77 05 19 69 45 39 09 69 09 25 39 19 02 34 35  
 32 40 55 45 95 50 81 56 12 05 72 49 95 58 05  
 90 95 90 05 16 09 89 09 09 88 31 81 00 54 36  
 80 31 30

No. 27 YEO DE UTA 0932 23 Feb 54

77 05 39 89 45 09 99 19 59 25 19 69 82 52 12  
 40 35 31 55 45 95 60 37 73 05 72 95 39 05 66  
 35 24 76 14 00 00 76 55 82 92 46 95 64 50 57  
 05 90

No. 28 SOL DE AYS 1440 13 Mar 54

77 05 19 39 45 39 79 69 59 25 39 69 60 31 18  
 45 95 92 57 05 90 80 53 90 93 44 95 39 30 05  
 12 50 60 12 56 52 31 10 55 95 92 05 60 23 70  
 56

No. 29 LUI DE OBU 1846 30 Mar 54

77 05 69 09 45 39 49 79 09 25 69 09 60 31 62  
 42 45 95 08 83 00 71 94 05 01 95 53 27 05 62  
 43 90 90 56 37 77 32 12 10 92 94 95 38 05 73  
 32 72

No. 30 BQT DE UTA 0503 31 Mar 54

77 05 09 39 45 09 59 09 09 25 69 39 84 40 62  
 42 45 95 79 05 01 95 22

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FOR PROBLEM 5

The first column designates the particular dinome; the second column shows the frequency of the particular dinome; and the third column indicates the messages (with occurrences of more than one shown in parentheses) in which the particular dinome is found.

00	22	1(3), 2, 4, 5(2), 6, 8, 9, 11, 12, 13, 15, 17(2), 23, 25, 26, 27(2), 29
01	14	10, 11, 12, 14(2), 15, 16, 18, 21(2), 23, 24, 29, 30
02	4	17, 24, 25, 26
03	3	18, 20, 24
04	4	4, 11, 12, 14
05	134	1(4), 2(4), 3(5), 4(4), 5(4), 6(5), 7(4), 8(5), 9(4), 10(4), 11(4), 12(5), 13(5), 14(5), 15(6), 16(5), 17(5), 18(4), 19(4), 20(4), 21(6), 22(5), 23(6), 24(5), 25(4), 26(4), 27(4), 28(4), 29(4), 30(2)
06	6	5, 11(2), 20(2), 21
07	2	2, 3
08	10	1, 6, 9, 13, 18, 19(2), 22, 23, 29
09	55	2, 3, 4(5), 5, 6, 7(2), 8, 9, 10(6), 11(3), 13(2), 14, 15(3), 17, 18(3), 19, 20, 21, 22(2), 23, 24(3), 25, 26(5), 27, 29(3), 30(4)
10	15	2, 3, 8(2), 9, 10, 15, 17(2), 20, 24(2), 25, 28, 29
11	6	2, 3, 10, 13, 14, 17
12	12	12, 13, 15, 16, 19, 22(2), 26, 27, 28(2), 29
13	5	2, 16(2), 21, 22
14	4	10, 13, 17, 27
15	6	3, 5, 9, 10, 20(2)
16	5	18, 19, 20, 21, 26
17	14	9, 10, 11, 13(2), 14(2), 15, 17, 18, 20, 21, 23, 24
18	4	6, 18, 23, 28
19	40	1(2), 2(3), 3, 6(2), 7(4), 8, 9(2), 10(2), 11, 12(3), 13(2), 14, 15, 16(2), 18(2), 20(2), 21, 23, 24(2), 26(2), 27(2), 28
20	3	2, 7, 11
21	9	1, 3, 8, 10, 12, 14, 16(2), 25
22	16	1, 2, 3, 4, 5, 6(3), 7(2), 8, 12, 14, 16, 23, 30
23	4	4, 8, 11, 28
24	7	5, 6, 12, 13(2), 25, 27
25	32	1, 2, 3, 4, 5, 6, 7, 8(2), 9, 10, 11, 12, 13, 14(2), 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30
26	8	6, 18(2), 19, 20, 22, 23, 25
27	11	1, 5, 6, 7, 9, 10, 12(2), 13, 18, 29
28	5	3, 5, 22(2), 23
29	9	2, 5, 9, 15, 16, 17, 23(2), 25
30	6	10, 18, 20, 21, 26, 28
31	15	2, 7(2), 11, 12, 20, 21, 24, 25, 26(2), 27, 28(2), 29
32	22	1(2), 2, 3(2), 4(2), 5(2), 6, 7, 8, 16, 18, 19, 20, 21, 23, 25, 26, 29(2)
33	3	17, 19, 21
34	6	4, 6, 11, 23, 24, 26

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35	34	1(2), 2(2), 3(2), 4(3), 5(2), 6(2), 7(3), 8(3), 11(2), 13, 15, 17, 19(2), 20, 24, 25(3), 26, 27(2)
36	6	1, 14, 16, 22(2), 26
37	8	2, 5, 7, 13, 14, 23, 27, 29
38	4	8, 11, 12, 29
39	58	1(2), 2, 3, 4, 5(3), 6(3), 7, 8(4), 9, 10, 11(2), 12, 13, 14, 15(3), 16(2), 17(2), 18(2), 19(4), 20(3), 21, 22, 23, 24, 25(4), 26(2), 27(2), 28(4), 29, 30(2)
40	22	9(2), 10, 11, 14, 15(2), 17, 18(3), 20(2), 21, 22(3), 23, 24, 26, 27, 30
41	4	3, 11, 17, 25
42	4	1, 19, 29, 30
43	3	2, 14, 29
44	3	16, 21, 28
45	78	1(2), 2(3), 3(4), 4(2), 5(2), 6(3), 7(2), 8(2), 9(2), 10(2), 11(2), 12(3), 13(3), 14(4), 15(4), 16(2), 17(3), 18(2), 19(4), 20(3), 21(4), 22(3), 23(3), 24(2), 25(2), 26(2), 27(2), 28(2), 29(2), 30(2)
46	10	3, 4, 5, 6, 7(2), 9, 12, 23, 27
47	2	21(2)
48	2	8, 19
49	16	1, 2(2), 3(2), 4, 5, 10(3), 14, 15, 16, 21, 26, 29
50	25	1, 2, 3, 6, 7(2), 10(2), 11, 12, 13, 15, 16, 17(5), 19, 24(2), 25, 26, 27, 28
51	2	7, 23
52	13	8(2), 10, 11, 12, 14, 19, 20, 21, 22, 23, 27, 28
53	4	5, 14, 28, 29
54	5	7, 15, 24, 25, 26
55	14	1, 3, 5, 7, 9, 11, 17, 20, 24, 25, 26, 27(2), 28
56	13	5, 7, 12(2), 13, 16, 18, 21, 24, 26, 28(2), 29
57	7	7, 9, 14, 20, 23, 27, 28
58	3	1, 22, 26
59	26	1, 7, 8, 9, 10(2), 12, 14, 15, 16(4), 17(2), 20, 21(2), 22, 23(2), 24, 25, 27, 28, 30
60	34	1(2), 2, 4, 7, 8, 9, 10, 11(2), 12(2), 13, 14(2), 16, 18, 19(3), 20, 21, 22(3), 23(2), 24, 25, 27, 28(3), 29
61	9	2, 3, 4, 6, 15, 17, 19, 21, 23
62	15	1, 2, 3, 11, 14, 15(2), 16, 17, 18, 23, 24, 29(2), 30
63	6	9, 12(2), 14, 23, 25
64	3	10, 16, 27
65	3	1, 3, 12
66	6	5, 13, 16, 18, 25, 27
67	4	6, 17, 21, 23
68	4	4, 7, 8, 19
69	29	2, 3(2), 5, 6, 9(2), 10, 12, 13(2), 14(2), 16, 17, 18, 19, 21(2), 23, 24, 26(2), 27, 28(2), 29(2), 30
70	5	3, 19, 24, 25, 28
71	5	6, 13, 18, 23, 29
72	13	7(2), 15, 17, 20(2), 22(3), 24, 26, 27, 29
73	5	3, 5, 20, 27, 29
74	5	3, 9, 11, 15, 20
75	4	6, 16, 18, 19

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76	12	6, 9, 10, 12, 13, 16, 19(2), 22, 24, 27(2)
77	31	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29(2), 30
78	10	1, 2, 4, 5, 8, 10, 15, 17, 22, 24
79	18	1, 5, 6, 11(2), 13, 15, 16(2), 19, 20, 21(2), 22, 25, 28, 29, 30
80	20	5, 6, 7, 9(3), 10, 11, 12(2), 13, 14, 17, 18, 19, 20, 24, 25, 26, 28
81	4	1, 22, 26(2)
82	7	3, 5, 6, 9, 15, 27(2)
83	3	11, 21, 29
84	2	20, 30
85	2	4, 13
86	3	13, 14, 25
87	2	5, 13
88	10	1, 2, 3, 4, 7, 13, 17, 18, 19, 26
89	17	1, 2(2), 3, 4, 6, 10, 15, 16, 18, 19, 21, 22, 24, 25, 26, 27
90	34	1(3), 3, 4(2), 5, 7(2), 8(2), 13, 14(3), 15, 16, 17, 18(3), 19(2), 20, 22(3), 26(2), 27, 28(2), 29(2)
91	3	5(2), 21
92	21	1(2), 3, 4, 5, 8, 11, 15, 18, 19(2), 20, 22, 24, 25(3), 27, 28(2), 29
93	7	1, 9, 10, 12, 13, 14, 28
94	4	10, 16, 29(2)
95	111	1(3), 2(4), 3(4), 4(3), 5(3), 6(4), 7(3), 8(4), 9(4), 10(3), 11(4), 12(5), 13(4), 14(5), 15(5), 16(4), 17(4), 18(4), 19(3), 20(3), 21(5), 22(4), 23(5), 24(4), 25(3), 26(3), 27(3), 28(3), 29(3), 30(2)
96	11	6, 9, 10, 11, 12, 13(2), 22, 24, 25(2)
97	11	2, 3, 4, 6, 7(2), 8(2), 15, 20, 24
98	6	9, 10, 17, 19, 20, 25
99	14	4, 8, 9, 11(2), 12(2), 14, 16, 17(2), 18, 22, 27

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