main.c

Run

```c
#include <stdio.h>
#include <string.h>
#include <ctype.h>
#define SIZE 5
#define MAX_LEN 200
char matrix[SIZE][SIZE] = {
    {'M', 'F', 'H', 'I', 'K'},
    {'U', 'N', 'O', 'P', 'Q'},
    {'Z', 'V', 'W', 'X', 'Y'},
    {'E', 'L', 'A', 'R', 'G'},
    {'D', 'S', 'T', 'B', 'C'}
};
void find_position(char letter, int *row, int
    *col) {
    if (letter == 'J') letter = 'I';
    for (int i = 0; i < SIZE; ++i)
        for (int j = 0; j < SIZE; ++j)
            if (matrix[i][j] == letter) {
```

Output

Clear

```
Prepared plaintext:
    MUSTSEEYOUOVERCADOGANWESTCOMINGATONCEX
Ciphertext: UZTBDLGZPNNWLGTGTUEROVLDBDUHFPERHWQSRZ


=== Code Execution Successful ===
```

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```
19                  *col = j;
20                  return;
21              }
22  }
23  void prepare_text(const char *input, char
        *output) {
24      int len = 0;
25      for (int i = 0; input[i]; ++i) {
26          char ch = toupper(input[i]);
27          if (ch < 'A' || ch > 'Z') continue;
28          if (ch == 'J') ch = 'I'; // Replace J
                with I
29          output[len++] = ch;
30      }
31      char formatted[MAX_LEN];
32      int j = 0;
33      for (int i = 0; i < len; i++) {
34          formatted[j++] = output[i];
```

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```
    for (int i = 0; i < len; i++) {
        formatted[j++] = output[i];
        if (i + 1 < len && output[i] == output[i
            + 1]) {
            formatted[j++] = 'X'; // pad with X
                if repeated letters
        } else if (i + 1 < len) {
            formatted[j++] = output[++i];
        }
    }
    if (j % 2 != 0) formatted[j++] = 'X'; // pad
        if odd length
    formatted[j] = '\0';
    strcpy(output, formatted);
}
void encrypt_pair(char a, char b, char *out1,
    char *out2) {
    int row1, col1, row2, col2;
```

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```
    char *out2) {
46      int row1, col1, row2, col2;
47      find_position(a, &row1, &col1);
48      find_position(b, &row2, &col2);
49
50      if (row1 == row2) {
51          *out1 = matrix[row1][(col1 + 1) % SIZE];
52          *out2 = matrix[row2][(col2 + 1) % SIZE];
53      } else if (col1 == col2) {
54          *out1 = matrix[(row1 + 1) % SIZE][col1];
55          *out2 = matrix[(row2 + 1) % SIZE][col2];
56      } else {
57          *out1 = matrix[row1][col2];
58          *out2 = matrix[row2][col1];
59      }
60  }
61
62  int main() {
```

```
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Output

Clear

```
60  }
61
62  int main() {
63      const char *plaintext = "Must see you over
            Cadogan West. Coming at once.";
64      char prepared[MAX_LEN];
65      char ciphertext[MAX_LEN];
66
67      prepare_text(plaintext, prepared);
68
69      printf("Prepared plaintext: %s\n", prepared
            );
70      int len = strlen(prepared);
71      for (int i = 0; i < len; i += 2) {
72          encrypt_pair(prepared[i], prepared[i +
                1], &ciphertext[i], &ciphertext[i +
                1]);
73      }
```

```
Prepared plaintext:
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Ciphertext: UZTBDLGZPNNWLGTGTUEROVLDBDUHFPERHWQSRZ


=== Code Execution Successful ===
```

main.c

Run

Output

Clear

```
66
67      prepare_text(plaintext, prepared);
68
69      printf("Prepared plaintext: %s\n", prepared
            );
70      int len = strlen(prepared);
71      for (int i = 0; i < len; i += 2) {
72          encrypt_pair(prepared[i], prepared[i +
                1], &ciphertext[i], &ciphertext[i +
                1]);
73      }
74      ciphertext[len] = '\0';
75
76      printf("Ciphertext: %s\n", ciphertext);
77
78      return 0;
79  }
80
```

```
Prepared plaintext:
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Ciphertext: UZTBDLGZPNNWLGTGTUEROVLDBDUHFPERHWQSRZ


=== Code Execution Successful ===
```