1) continuing the argument in order ta deduce that there are no 2×2 arrays satisty the condition. Now instead of placks (11) In the top left corner let us place (1,2) In the top left corner. Thus if we put (1,2) in the top left corner,

then based on the requirement, the top might corner, as well as the bottom left corner, have to be an afficer of the second team and first rank (2,1). Thus

 $\begin{bmatrix} (1,2) & (2,1) \\ (2,1) & -1 \end{bmatrix}$ 

However this cannot be a solution since there is only one possible officer (2,1) where he cannot be repeated. Thus (1,2) connot be placed in the top left corner since it leads to a contradiction. Now gold down the remaining two aptions for the top left corner which are 

for case D where (2/1) is in the top
left corner the top right and bottom
left must be (1,2) which will again
repeat the same officer. This contradiction
for the needed condition to properly
construct such a square will also
occur for case D when (2,1) is in

the top left corner without 1065 of generality. Since the only option is (1) for the top right & bottom left. The refore there are no 2x2 arrays that satisfy the condition.

2) Now If selection 9 military officers from 3 different teams & 3 different can'th to form or 3x3 array.

V5mg (i,i) to still marcate that the officer 13 of i team & i rank. Thus the 9 total distinct officers ore (12) (13) (21) (21) (213) (213) (31) (31) (32) (33)By Placks (1,1) In the first row & first column which is the first entry where such a 3x3 13 numbered by entires of follows:

	2	3
V	5	6
	Z	9

After placing (II) in the first entry

J	2	3
<u> </u>	5	6
	8	9

(1,1) 2 3 M 5 6 1 8 9

We know that entry 2 and entry 4

must be officers that are not in team
I and not rank 1. Thus the possible options

are [2,2) (2,3) (3,2) for entries 2 & 4.

By placing (2,2) for entry 2 and

(2,3) for entry 4 the square becomes:

	2	3
	5	6
	J	9

	(2,2)	3
(2,3)	5	6
	J	9

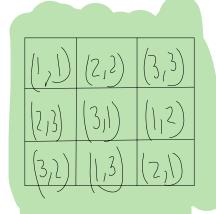
Now observing that in the 7th entry
the officer must be of team 3 and (mk 2.
Also observing for entry 3 the officer
must be of team 3 and rank 3.
Thus the square becomes:

	(2,2)	3
(2,3)	5	6
	8	9

	(2j)	(3,3)
(213)	5	6
[3]	J	q

Observing that entry 5 must either be of team I or 3 but must be of rank I. The 4 remaining officers are (1,2)(1,3), (21), (31), From these M officer (31) satisfies the required condition for entry 5. Thus after solving for entry 5 it is strongly forward observing the solutions for entry 6 and entry 8. Where entry 6 must be of team I and rank 2 so entry 6 is (1,2) Now for entry 8 it must be officer of team I and rank 3 so entry 8 is (1,3). The final entry 9 is the remaining officer (2/1) which also satisfies the condition.

		(3,3)
(2,3)	(31)	6
(3,1)	B	9



Therefore we have shown in a 3X3 case an arrangement that satisfies the given conditions. It is shown that each row and each column contain afficers from different teams and different ranks.

3) was 5 hown in 2/15 custon section to not be solvable since the construction in such a way will lend to a ray or column where an officer is of the same ferm or rank thus leading to controlkhors in the requirements. Therefore it is not possible to construct nn order & Eller square using any 2 different order 4 Latin Squares, This is because the same 1550e observed in problem MIII OCCUT.

Euler square when n = 3. For the
Cobe When n=3 forming a latin
Square with let & shift operations
j 5
1 2 3 2 3 1 3 1 2

Where row Z has speration & 4 row

3 has operation & or from

Now a later square using the right shift

15 r 3 1 2 3

1 2 3

Where row 2 has operation to and row

3 has aperation 12 since 17-1

Thus after overlapping the two results in

$\left(\chi_{1}\right)  \left(\chi_{3}\right)  \left(\chi_{1}\right)  \left(\chi_$			(7,2)	(3,3)
	$\left( \left\langle \left\langle \left\langle \right\rangle \right\rangle \right) \right)$	(2,3)	(3,1)	(1,2)
(3,2) $(3,3)$ $(2,1)$		(3,2)	(1,3)	(21)

This is an Evler square of order 3.

Now for an order or Evler square where or is an odd number. It or is odd and the first lath square is after performing the left shift to the or cous up to performing the right shift for or cous up to performing the right shift for or cous up to performing the right shift for or cous up to performing the right shift for or cous up to performing the right shift for or cous up to perform the the

two aquares are combined, the two Latin
squares will form an Ever square, Ihis
B because by the left shift and

each row and column will have distinct entries thus after combining the two Latin Squares the entries remain unique across the entire square producing an Euler square.

However, observing for when n B even ofter performing 1, r 5hlfs that B for example n=4

2 3 4 2 3 4 1 2 3 4 2 3 4 2 3

		2	3	$\sqrt{}$
<u> </u>	1		2	3
~ 7	3	<u> </u>		
3	2	3	<u></u>	

After combining the two Latin

(1	,  )	(5 15)	(3,3)	$\langle \sqrt{N} \rangle$
		(3,1)		
	3,3)	(4,4)	(11)	(2,1)
(3,3)	4,2]	(13)	(2,19)	(3,1)

This is clearly not an Euler square since many entires repeat more than once this each entry is not district.

This is true for when a 13 even since there will always be repetitions which is a violation of an Euler square therefore this method does not work for even numbers.