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THE ADDITIVE GROUPS OF LOCAL NEARRINGS OF ORDER 64

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A nearring with identity is called local if the set of all its non-invertible elements is a subgroup of its additive group. The list of all local nearrings of order at most 31 can be extracted from the package "Sonata" [1] of the computer system algebra GAP [2].

The list of all local nearrings of order 64 with 2-generated additive groups can be found in [3] and [4]. There exist 267 non-isomorphic groups of order $64 = 2^6$, of which 5 groups are of exponent 32 and 27 groups are of exponent 16. Among them, only 2 groups of exponent 32 and 8 groups of exponent 16 are additive groups of local nearrings.

Let $[n, i]$ be the i-th group of order n in the SmallGroups library in GAP. We denote by C_n and D_n the cyclic and dihedral groups of order n, respectively.

As a direct consequence of Theorem 1 [3], we have the following assertion.

Proposition 1. The following groups of exponent 32 are the additive groups of local nearrings of order 64:

IdGroup	Structure Description	Number of LNR
[64, 50]	$C_{32} \times C_2$	257
[64, 51]	$C_{32} \rtimes C_2$	257

Theorem 1. The following groups of exponent 16 are the additive groups of local nearrings of order 64:

IdGroup	Structure Description	Number of LNR
[64, 26]	$C_{16} \times C_4$	11467
[64, 27]	$C_{16} \rtimes C_4$	11467
[64, 29]	$(C_{16} \times C_2) \rtimes C_2$	28185
[64, 30]	$(C_{16} \rtimes C_2) \rtimes C_2$	4433
[64, 44]	$C_4 \rtimes C_{16}$	28500
[64, 45]	$C_8.D_8 = C_4.(C_8 \times C_2)$	1920
[64, 183]	$C_{16} \times C_2 \times C_2$	exact number is unknown
[64, 184]	$C_2 \times (C_{16} \rtimes C_2)$	exact number is unknown

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2. The GAP Group, GAP – Groups, Algorithms, and Programming, Version 4.11.0; 2020. (https://www.gap-system.org).

3. *Raevska I., Raevska M., Sysak Ya.* Local nearrings of order 64 // International mathematical conference "Groups and Actions: Geometry and Dynamics, dedicated to the memory of professor Vitaly Sushchanskyy" (December 19–22, 2016, Kyiv, Ukraine). Book of abstracts. — Kyiv. – 2016. — P. 43.

4. *Raievska, I., Raievska, M. and Sysak, Y.*, LocalNR, Package of local nearrings, Version 1.0.2 (2020) (GAP package), https://gap-packages.github.io/LocalNR.

АДИТИВНІ ГРУПИ ЛОКАЛЬНИХ МАЙЖЕ-КІЛЕЦЬ ПОРЯДКУ 64

Знайдені всі неізоморфні групи порядку 64 з експонентою 16, які є адитивними групами локальних майже-кілець.