On the recurrence ((((P*2-d)*2-d)*2-d)...) on Poulet numbers P having a prime factor d

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Abstract. In this paper I note two sequences of Poulet numbers: the terms of the first sequence are the Poulet numbers which can be written as P*2 – d; the terms of the second sequence are the Poulet numbers which can be written as (P*2 – d)*2 - d, where P is another Poulet number and d one of the prime factors of P. I also conjecture that the both sequences are infinite and I observe that the recurrent relation ((((P*2 – d)*2 – d)*2 – d)...) conducts sometimes to more than one Poulet number (for instance, starting with P = 4369 and d = 257, the first, the second and the third numbers obtained are 8481, 16705 and 33153, all three Poulet numbers).

Sequence I:

The terms of this sequence are the Poulet numbers which can be written as P*2 – d, where P is another Poulet number and d one of the prime factors of P. I conjecture that this sequence is infinite.

The terms of the sequence I:

: 1105 = 561*2 – 17;
: 2701 = 1387*2 – 73;
: 7957 = 4033*2 – 109;
: 8481 = 4369*2 – 257;
: 15841 = 7957*2 – 73;
: 16705 = 8481*2 – 257;
: 31609 = 15841*2 – 73;
: 33153 = 16705*2 – 257;
: 46657 = 23377*2 – 97;
: 62745 = 31417*2 – 89;
: 129889 = 65281*2 – 673;
: 181901 = 91001*2 – 101;
: 323713 = 162193*2 – 673;
(...)

Sequence II:

The terms of this sequence are the Poulet numbers which can be written as (P*2 – d)*2 - d, where P is another Poulet number and d one of the prime factors of P. I conjecture that this sequence is infinite.

The terms of the sequence II:

: 4369 = (1105*2 – 17)*2 - 17;
: 10585 = (2701*2 – 73)*2 – 73;
: 16705 = (4369*2 – 257)*2 – 257;
: 31609 = (7957*2 – 73)*2 – 73;
: 33153 = (8481*2 – 257)*2 – 257;
: 60787 = (15709*2 – 683)*2 – 683;
: 126217 = (31609*2 – 73)*2 – 73;
: 164737 = (41665*2 – 641)*2 – 641;
: 196093 = (49141*2 – 157)*2 – 157;
: 241001 = (60701*2 – 601)*2 – 601;
: 256999 = (65077*2 – 1103)*2 – 1103;
: 271951 = (68101*2 – 151)*2 – 151;
: 318361 = (80581*2 – 1321)*2 – 1321;
: 452051 = (113201*2 – 251)*2 - 251;
: 481573 = (121465*2 – 1429)*2 – 1429;
: 486737 = (123251*2 – 2089)*2 – 2089;
: 745889 = (188057*2 – 2113)*2 – 2113;
(...)

Observation:

The recurrent relation ((((P*2 – d)*2 – d)*2 – d)...) conducts sometimes to more than one Poulet number.

Examples:

: for P = 4369 and d = 257, we have:

: 4369*2 – 257 = 8481, a Poulet number;
: (4369*2 – 257)*2 – 257 = 16705, a Poulet number;
: ((4369*2 – 257)*2 – 257))*2 – 257 = 33153, a Poulet number;

: for P = 7957 and d = 73, we have:

: 7957*2 – 73 = 15841, a Poulet number;
: (7957*2 – 73)*2 – 73 = 31609, a Poulet number;
: (((7957*2 – 73)*2 – 73))*2 – 73)*2 – 73 = 126217, a Poulet number.