Interest-Only Loan

The monthly interest is derived from the principal and, hence, is constant throughout the entire loan, independent of the balance or net value of the loan. (Note: The derivation below assumes that the interest rates are in their original multiplicative forms, not in percentages.)

Let
$P = Principal$
$n = Duration\ in\ months$
$a = Annual\ interest\ rate$
$i = Monthly\ interest\ rate = \frac{a}{12}$
$I_1 = Initial\ monthly\ interest = Pi$
$T = Net\ value\ or\ total$

$$\sum_{k=1}^{n} I_k = Cumulative\ monthly\ interest$$
$$= I_1 + I_2 + I_3 \cdots I_n$$

$Since\ I_1 = I_2 = I_3 = \cdots = I_n$,

$$\sum_{k=1}^{n} I_k = I_1 + I_1 + I_1 \cdots I_1$$
$$= nI_1$$
$$= n(Pi)$$

$$\mathrm{T} = P + \sum_{k=1}^{n} I_k$$
$$= P + nPi$$
$$= P(1 + ni)$$

The net value equation can be manipulated to recalculate the monthly interest rate, the duration, or the principal.

$$i = \frac{\left(\frac{T}{P} - 1\right)}{n}$$

$$n = \frac{\left(\frac{T}{P} - 1\right)}{i}$$

$$P = \frac{T}{ni + 1}$$