TABLE 3

FORMULAS FOR COMPUTING THE INTEREST-RATE EQUIVALENT OF CARRYING CHARGES ON INSTALLMENT SALES OR BORROWED MONEY
(All installments equal in amount)

Method	*Formula for i or d*	*Rate for example*
Priority[1]	$\frac{2mI}{pn(n+1)-2I}$	0.169
Constant ratio	$\frac{2mI}{(C-D)(n+1)}$	.178
Direct ratio	$\frac{6mI}{[3pn(n+1)]-2I(n+2)}$	.175
Residuary[2]	$\frac{2mI}{[2(C-D)-ph](h+1)}$	.1875
Simple discount or Series-of-payments	$\frac{2mI}{pn(n+1)}$	.167
Simple interest	$\frac{1}{m+i}+\frac{1}{m+2i}+\frac{1}{m+3i}+\cdots+\frac{1}{m+ni}=\frac{C-D}{mp}$	.181
Small loan	$a_{\overline{n}\rvert r}=\frac{C-D}{p}$ All values known except r. After solving for r, then $i=12r$	.175
Present value	Same as small-loan method except $i=(1+r)^{12}-1$	.190

[1] Accurate in the typical case where amount of carrying charge I is less than the periodic payment p. A formula applicable when I is greater than p is given by Ayres in "Installment Mathematics Handbook."

[2] Symbol h represents the integral number of times p is contained in the cash balance $C-D$. In the example, $h=7$

$$\text{since } \frac{C-D}{p}=\frac{150}{20}=7.5.$$

As indicated in footnote 1 to table 3, one of the formulas gives a precise answer only when the finance charge amounts to less than the periodic payment.

The rates shown above can be computed by simple-discount methods if the service charge is omitted from the payments to be discounted. Solving for d in the equations given below, we find that the service charge of $10 is deducted from both sides of each equation, thus causing aggregate payments of only $150 to be discounted to a present value of $140. As shown in the next section, true simple discount requires that all of the payments totaling $160 be discounted to a present value of $150.

Priority method	$\$150=[\$10(1-d/12)+\$10]+\$20(1-2d/12)+\cdots+\$20(1-8d/12)$
Constant-ratio method	$\$150=[\$18.75(1-d/12)+\$1.25]+[\$18.75(1-2d/12)+\$1.25]+\cdots+[\$18.75(1-8d/12)+\$1.25]$
Direct-ratio method	$\$150=[\$17.78(1-d/12)+\$2.22]+[\$18.06(1-2d/12)+\$1.94]+\cdots+[\$19.72(1-8d/12)+0.28]$
Residuary method	$\$150=\$20(1-d/12)+\cdots+\$20(1-7d/12)+\cdots+[\$10(1-8d/12)+\$10]$