User's Guide

634C LoanMaker®

Bank of Montreal

www.promsoft.com/bmo

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Template Layout

The eight function keys on the face of the calculator are used to run various programs that are identified by the template to be placed on the calculator.

English

Loans	Qual	Rework	Backup
▮	▮	▮	▮
Mtge	Blend	IRD	Setup/Code
▮	▮	▮	▮

PROM 634C   **Bank of Montreal**

French

Prêts	Qual	Répéter	Précé
▮	▮	▮	▮
Hyp	TMixte	Dédom	Code
▮	▮	▮	▮

PROM 634C   **Banque de Montréal**
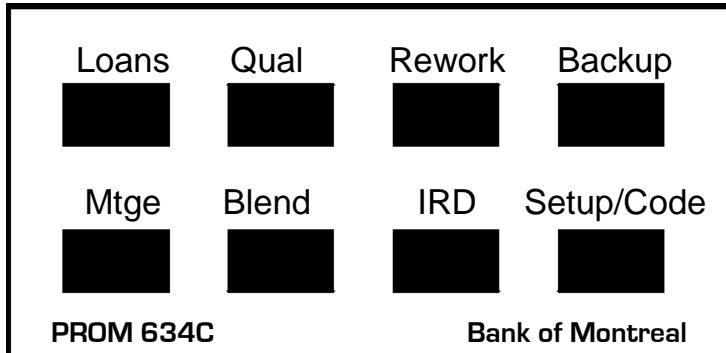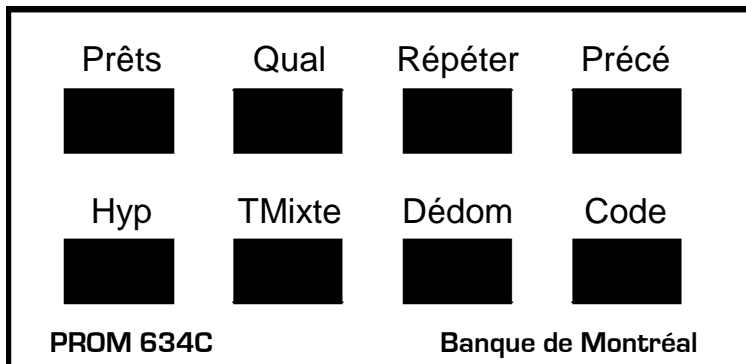
Be careful when installing the template over the calculator's keys. If the template is not aligned correctly, it may keep one or more of the keys depressed. If this happens, the calculator will fail to operate at all. Remove the template and install it again correctly.

Qualify Routines - [Qual] Function Key

Computes total debt service for personal loans and gross debt service for mortgages.

Prompt	User Response
LOAN/MTGE 1/2?_	Enter a "1" for Loan/TDS computation, or a "2" for Mtge/GDS computation. (Default is 1.)

Loan/TDS Routine

`TDS xx%?_`	If the total debt service percentage shown is correct, push [ENTER]; otherwise enter the correct percentage.
`INC/YR xxxxx?_`	Enter the annual income of the borrower.
`MTGE/RENT xxxx?_`	Enter the monthly mortgage or rent payment.
`LOAN/MTH xxxx?_`	Enter any existing monthly loan payments.
`TAX/YR xxxx?_`	Enter the annual property taxes.
`HEAT/YR xxxx?_`	Enter the annual heating costs.
`CONDO/MTH xxxx?_`	Enter the monthly condo fees.[1]
`PMT FREQ 12?_`	If the payment frequency shown is correct, push [ENTER]; otherwise enter the desired payment frequency.

If the resulting debt service payment is greater than $1.00, the program will automatically enter the Loan Amount routine.

Mortgage/GDS Routine

`GDS ##%?_`	If the gross debt service percentage displayed is correct, push [ENTER]; otherwise enter the desired GDS percentage.
`INC/YR xxxxx?_`	Enter the annual income of the borrower.
`TAX/YR xxxx?_`	Enter the annual property taxes.
`HEAT/YR xxxx?_`	Enter the annual heating costs.
`CONDO/MTH xxxx?_`	Enter the monthly condo fees.[1]

If the resulting debt service monthly payment is greater than $1.00, the program will automatically enter the Mortgage Amount Routine.

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[1] Only half of the entered fee amount is used in the calculations.

Personal Loan Routines - [Loans] Function Key

This routine computes a loan payment, amortization period, or available proceeds. The insurance calculation routines have been updated to calculate the new PLP/SLIP Personal Loan Insurance premiums introduced in April of 1999. You can use the Life and Disability codes as you have before to indicate the desired insurance coverage. The interest rate entered should be the "pure" loan interest rate without any adjustment for insurance.

Prompt	User Response
PMT/AM/$ 1/2/3?_	Enter 1, 2, or 3 for Payment, Amortization, or Amount Routine. Default is 1.
AMT xxxxx.xx?_	(Does not appear in the amount routine.) Enter the amount to be borrowed.
PMT xxxx.xx?_	(Does not appear in the payment routine.) Enter the desired payment amount. (If the TDS Routine has passed a payment, just push [ENTER] to use it.)
AMORT (MTH) xxx?_	(Does not appear in the amortization routine.) Enter the amortization period in months.
RATE xx.xx%?_	Enter the interest rate (as a percentage). [2]
PMT FREQ 12?_	If the payment frequency shown is correct, push [ENTER]; otherwise enter the correct frequency.[3]
	(This prompt does not appear if the TDS routine has passed a payment and payment frequency.)
COMP FREQ xx?_	If the compounding frequency shown is correct,

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[2] On older calculators with the old insurance system that was in use prior to April 26th, 1999, the only way to calculate a loan with the new monthly insurance is to add the insurance interest rate increment to the loan interest rate. The 634C/3 version of the calculator has the new PLP insurance routines and you should enter the actual loan interest rate and make the insurance selections at the LIFE? and DIS? Prompts.

Using the insurance interest rate increment method (i.e., adding the increment to the loan interest rate and entering 0's at the LIFE? and DIS? prompts) is not required with the new 634C/3 calculator software.

[3] Allowed frequencies are 1, 2, 4, 12, 24, 26, & 52, corresponding to annual, semi-annual, quarterly, monthly, semi-monthly, biweekly, and weekly payments.

push [ENTER]; otherwise enter the correct frequency.[3]

The following insurance-related prompts appear only in the Find Payment routine:

LIFE 1?_   If the life insurance code shown is correct, push [ENTER]; otherwise enter the correct code.

                               0 - None
                               1 - Borrower only
                               2 - Co-borrower only
                               3 - Borrower & co-borrower

DIS 1?_   If the disability code shown is correct, push [ENTER]; otherwise enter the correct code.

                               0 - None
                               1 - Borrower only

AGE #1 xx?_   Enter the age of the primary borrower. (An entry is required. This borrower is the only one eligible for disability insurance.)

AGE #2 xx?_   If there is a co-borrower, enter his or her age.

Personal Loan Disclosure

PMT-xx	xxxxxx.xx	Payment frequency and amount.
LIFE x	xxxx.xx	Life average premium per payment.[4]
DIS	xxxxx.xx	Disability average premium per payment.[4]

TERM (MTH) xx?_   Enter the interest term in months.[5]

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[4] This "average" premium per payment is computed by subtracting a payment calculated with no insurance from the actual payment including insurance. The calculation is fairly accurate assuming the loan will run for the duration of the amortization period. If the loan runs for a significantly shorter time, the actual monthly cost will be higher. See footnote on actual premium computation.

[5] The interest term entry must correspond to a whole number of payments. In the case of semi-monthly (24 per year), monthly, quarterly, semi-annual, or annual payments, the interest term can be any number of whole periods (3 months, 6 months, or 12 months) that is equal to or less than the amortization period.
   In the case of biweekly (26 per year) payments, the interest term must be a multiple of 6 months (there being exactly 13 biweekly payments every 6 months). In the case of weekly payments, the interest term must be a multiple of 3 months (there being exactly 13 weekly payments every 3 months.) If the amortization period is less

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DAYS TO IAD ##?_    Enter the interest adjustment period in days.
```

AMT	xxxxxx.xx	Amount of loan.
INT	xxxxxx.xx	Interest term costs.
L xxxx	xxxxxx.xx	Life rate and total actual premium.[6]
D xxxx	xxxxxx.xx	Disability rate and total actual premium.[6]
OBLIG	xxxxxx.xx	Total obligation of borrower.
BAL	xxxxxx.xx	Remaining principal balance.
IAD AMT	xxxx.xx	Interest adjustment amount.
# PMTS	xxxx	Number of payments (within interest term).
PMT	xxxxxx.xx	Payment amount.
SEMI %	xx.xx%	Equivalent semi-annual percentage.
BANK OF MONTREAL		
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Computed Amortization Disclosure

AMORT (MTH) xxx	Amortization period in months (computed without insurance).

Computed Amount Disclosure

AMT xxxxxx.xx	Available amount to borrower(s) (computed without insurance).

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than the minimum whole number of payments, i.e. an amortization term of 4 months for a biweekly loan, it is not possible to disclose the loan.

[6] The total actual premium is the sum of the actual monthly premiums. The actual monthly premium is calculated by multiplying the balance for the month by the premium rate (plus sales tax, if applicable). Because the balance of the loan decreases over the life of the loan, the premiums also decrease. Early in the loan, the actual monthly premium will exceed the average monthly premium, and late in the loan, the actual monthly premium will be less.

For example, consider an $11,000 loan for 48 months at 10.5% for a 40-year old Albertan (resulting in a premium rate of $0.45/$1000/month). The payment with life insurance is $284.51, and without it is $281.64. The "average" monthly insurance cost is disclosed as the difference in the payments, $2.87.

The "actual" premium for the first month is $4.95 ($11,000 x 0.45 / 1000). After the first payment is applied, the principal balance reduces to $10,816.69 (first period interest is $96.25). The actual premium for the 2[nd] month is $4.87 ($10,816.69 x 0.45 / 1000). The sum of the actual premiums over the entire 48-month period is $129.94. If the loan only ran for 24 months, the sum of the actual premiums would be $94.92.

Rebate Routine - Subprogram #2

Computes rebates of unearned personal loan credit-insurance premiums.

Prompt	User Response
	Push the [Setup]/[Code] key and enter a "2" to run this routine.
ORIG MTHS?_	Enter the original amortization period (in months) on which the original premiums were based.
REMAIN MTHS?_	Enter the remaining amortization period.
ORIG LIFE?_	Enter the original life insurance premium.
ORIG DIS?_	Enter the original disability premium.

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L REB          xxxx.xx        Life premium rebate.
D REB         xxxxx.xx        Disability premium rebate.
```

The rebate factor is rounded to four decimal places before the rebate is computed.

Residual Value Loan Routine (except Quebec) - Subprogram #4

This routine computes a payment for a loan with a known residual value. The residual value can be entered either as a dollar amount or as a percentage of the loan amount.

Prompt	User Response
	Push the [Setup]/[Code] key and enter a "4" to run this routine.[7]
AMT xxxxx.xx?_	Enter the amount to be borrowed.
RESID ($/%) xx?_	Enter the residual value. Values less than 100 will be accepted as a percentage of the loan amount, e.g, a "37" would result in a residual value equal to 37% of the loan amount.

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[7] If the calculator is setup for any province except Quebec, this routine will run as Subprogram #4. See Setup Routine

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AMORT (MTH) xxx?_     Enter the amortization period in months.

RATE xx.xx%?_         Enter the interest rate (as a percentage).

PMT FREQ 12?_         If the payment frequency shown is correct, push
                      [ENTER]; otherwise enter the correct frequency.[8]

COMP FREQ xx?_        If the compounding frequency shown is correct, push
                      [ENTER]; otherwise enter the correct frequency.
                      (Frequencies allowed are the same as above.)
```

The periodic payment is computed.

```
PMT-xx        xxxxxx.xx
```
Payment frequency and amount.

```
TERM (MTH) xx?_       Enter the interest term in months (must be a
                      whole number of payments).

DAYS TO IAD xx?_      Enter the interest adjustment period in days.
```

```
AMT          xxxxxx.xx     Amount of loan.
INT          xxxxxx.xx     Interest term costs.
OBLIG        xxxxxx.xx     Total obligation of borrower.
BAL          xxxxxx.xx     Remaining principal balance.
IAD AMT       xxxxx.xx     Interest adjustment amount.
# PMTS            xxxx     Number of payments (within interest term).
PMT          xxxxxx.xx     Payment amount.
```

Residual Value Loan Routine (Quebec) - Subprogram #4

In Quebec, the payment and amortization are calculated to meet two criteria: 1) The loan must fully amortize in 84 months or less, and 2) the payoff of the loan at the end of the option term is as close to the entered residual value as possible. In some

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[8] Allowed frequencies are 1, 2, 4, 12, 24, 26, & 52, corresponding to annual, semi-annual, quarterly, monthly, semi-monthly, biweekly, and weekly payments.

cases, the payoff may be significantly less than the entered residual because of the 84-month maximum amortization term.[9]

Push the [Setup]/[Code] key and enter a "4" to run this routine.[10]

AMT xxxxx.xx?_   Enter the amount to be borrowed.

T PREM xxxx.xx?_   Enter the amount of a dealer-provided credit insurance (affects the Effective Rate calculation).

RESID ($/%) xx?_   Enter the residual value. Values less than 100 will be accepted as a percentage of the loan amount, e.g, a "37" would result in a residual value equal to 37% of the loan amount.

TERM (MTH) xxx?_   Enter the term to the option in months.

RATE xx.xx%?_   Enter the interest rate (as a percentage).

xx PMT@	xxxxxx.xx	Amortization and payment amount.
INT	xxxxxx.xx	Interest costs.
OBLIG	xxxxxx.xx	Total obligation.
RES@tt	xxxxxx.xx	Payoff amount at option term.
EFF RATE	xxx.xxx%	Effective rate with T PREM.

Buying Down a Residual Value Loan

After computing a Residual Value Loan[11], push the [Setup]/[CODE] key and enter a code of 41 to compute the present-value buy-down amount. Enter the required interest rate (generally greater than the contract interest rate) to calculate the buy-down amount.

The buydown amount is for the shorter of the amortization or interest term. (In Quebec, the buydown amount is always for the amortization.)

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[9] The maximum amortization can be changed for Quebec. Push the Setup/CODE key and enter a code of 441 to display the MAX AMORT? prompt in this routine. The user can then enter the desired maximum amortization for each loan.

[10] If the calculator is setup for Quebec, this routine will run as Subprogram 4. See the Setup Routine.

[11] This routine works in all provinces.

Buydown/Int Diff Subprogram - Subprogram #1

This subroutine computes the required payments for personal loans[12] in which the interest rate has been "bought-down" for some portion of or the entire amortization term. Calculations are made by two methods: Present value and difference in interest charges.

Prompt	**User Response**
	Push the [Setup]/[Code] key and enter a "1" to run this routine.
AMT xxxxx?_	Enter the amount of the loan.
AMORT (MTH) xxx?_	Enter the amortization period (in months).
REQ RATE % xx.xx?_	Enter the required interest rate percentage.
RATE % xx.xx?_	Enter the actual contract interest rate percentage.
PMT FREQ 12?_	If the payment frequency displayed is correct, push [ENTER], otherwise enter the desired frequency.[13]
TERM (MTH) xx?_	Enter the interest term. This must be greater than 0 and less than or equal to the amortization period.

PMT-xx	xxxxxx.xx	Payment frequency and amount.
PV IDIF	xxxxx.xx	Present-value interest differential.[14]
INT DIF	xxxxx.xx	Difference in interest charges.[15]

These routines may also be used in Auto Finance Centers to calculate dealer reserve where the required rate is <u>less</u> than the actual contract rate. In these cases, the resulting calculations will appear as negative amounts.

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[12] *To buy down a Residual Value Loan, use Subprogram #41.* See Buying Down a Residual Value Loan on page 10.

[13] Allowed frequencies are 12, 24, 26, & 52, corresponding to monthly, semi-monthly, biweekly, and weekly payments.

[14] The present-value interest differential calculation (PV IDIF) is the discounted amount the bank will accept "up front" to give the bank the same return as the "INT DIF" calculation does over the term.

[15] The difference in interest charges calculation (INT DIF) is the straight dollar difference of interest earned between the two rates for the specified term.

Mortgage Routines - [Mtge] Function Key

These routines compute mortgages with true monthly, semi-monthly, biweekly, or weekly payments and either monthly or semi-annual compounding of interest. Accelerated and "Option" semi-monthly, biweekly, and weekly payments can also be computed. The equivalent semi-annual rate of interest is also disclosed.

Prompt	User Response
PMT/AM/$ 1/2/3?_	Enter "1", "2", or "3" for Payment, Amortization, or Amount routine. Default is "1".
AMT xxxxxx?_	(Does not appear in the amount routine.) Enter the amount to be borrowed.
PMT xxxx.xx?_	(Does not appear in the payment routine.) Enter the desired payment amount. (If the GDS routine has passed a payment, just push [ENTER] to use it.)
AMORT (MTH) xxx?_	(Does not appear in the amortization routine.) Enter the amortization period in months.

The following four prompts appear if the Ontario Effective Cost of Borrowing Option is enabled. (See Setup Routine.) If enabled, enter the amounts for the items shown regardless of whether they are paid in cash or deducted from the principal amount of the mortgage. See the Ontario regulation for more information.

COMM?_	Enter any commission amount paid.
BONUS?_	Enter any bonus amount paid.
LEGAL?_	Enter any legal or title fees paid.
OTHER?_	Enter any other fees paid to obtain the mortgage.
RATE xx.xx%?_	Enter the interest rate (as a percentage).
PMT FREQ 12?_	(Appears only in the payment routine.) Enter the desired payment frequency.[16]
ACCEL (0/1/2) x?_	(Appears only in the payment routine and only if the

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[16] Allowed frequencies are 12, 24, 26, & 52, corresponding to monthly, semi-monthly, biweekly, and weekly payments.

payment frequency is 24, 26 or 52.) Enter "1" to compute an "option" mortgage, a "2" for an accelerated mortgage, or a "0" for a conventional mortgage.

`COMP FREQ 2?_`   If the compounding frequency shown is correct, push [ENTER]; otherwise enter the correct frequency. (Default is 2. Frequencies allowed are 2 and 12.)

Find Payment Routine

`LIFE x?_`   Enter one of the following life insurance codes:
> 0 - None
> 1 - Borrower only
> 2 - Co-borrower only
> 3 - Borrower & Co-borrower

`DIS #1  100%?_`   For disability insurance on the primary borrower, enter the percentage of the payment you wish covered.[17]

`DIS #2  100%?_`   For disability insurance on the co-borrower, enter the percentage of the payment you wish covered.[17]

`TAX/YR  xxxx.xx?_`   Enter the _annual_ property tax[18] that you wish to be covered with disability insurance.

`AGE #1 xx?_`   Enter the age of the primary borrower.

`AGE #2 xx?_`   Enter the age of the coborrower.

`PMT-xx      xxxxxx.xx`	Payment frequency and amount (including life insurance and periodic tax payment).
`LIFE x        xxxx.xx`	Life code and premium per payment.
`DIS/MTH        xxx.xx`	Disability premium per month.
`DB#1 yyy    xxxx.xx`	Primary borrower % and periodic benefit.
`DB#2 yyy    xxxx.xx`	Coborrower % and periodic benefit.

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[17] Allowed entries are 50%, 60%, 70%, 80%, 90% and 100%. Enter 0 for no disability insurance.

[18] The annual amount is divided by the number of payments per year to calculate the periodic tax payment. This is added to the mortgage payment to determine the disability benefits and premiums.

AMORT (MTH)	xxx

Recalculated amortization.[19]

TERM (MTH) xx?_   Enter the interest term in months (see footnote 5 on page 4).

DAYS TO IAD xx?_   Enter the interest adjustment period in days.

AMT	xxxxxxx.xx	Mortgage amount.
INT	xxxxxxx.xx	Interest term costs.
OBLIG	xxxxxxx.xx	Total obligation of borrower.
BAL	xxxxxxx.xx	Remaining principal balance.
IAD AMT	xxxxx.xx	Interest adjustment amount.
# PMTS	xxx	Number of payments (within interest term).
PMT	xxxxxx.xx	Payment amount (not including insurance).
SEMI %	xx.xx%	Equivalent semi-annual percentage.
NETADV	xxxxxx.xx	Ontario "Net advance" to be disclosed.[20]
ECB	xx.xx%	Ontario Effective Cost of Borrowing.

TDS/LOAN (Y/N)?_   Push [YES] to run a TDS/Loan routine or [NO] to quit.

Amount Disclosure

T AMT	xxxxxx.xx

Amount available.[21]

Amortization Disclosure

AMORT (MTH)	xxx

Calculated amortization period in months.

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[19] If the mortgage is an accelerated or option type, the amortization term in months is recalculated using the mortgage payment. The recalculated amortization will always be less.

[20] See the Setup Routine to enable the Ontario Effective Cost of Borrowing.

[21] This does not take into account life or disability insurance. For a given payment amount, the available mortgage amount will be less if insurance is elected.

Interest Rate Differential Routine - [IRD] Function Key

       This routine computes the interest differential payment due when a mortgage is paid off prior to maturity.

Prompt	**User Response**
AMT xxxxx?_	Enter the current balance of the mortgage.
PMT xxx.xx?_	Enter the current payment of the mortgage.
PMT FREQ 12?_	If the payment frequency shown is correct, push [ENTER]; otherwise enter the payment frequency.[22]
COMP FREQ 2?_	If the compounding frequency shown is correct, push [ENTER]; otherwise enter the correct frequency.[23] (Default is 2. Frequencies allowed are 2 and 12.)
RATE % xx.xx?_	Enter the current interest rate.
# PMTS TO GO xx?_	Enter the remaining number of payments.
NEW RATE % xx.xx?_	Enter the new interest rate.

INT DIF xxxxx.xx	Interest differential amount (if the amount is less than zero, zero is displayed).

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[22] Allowed frequencies are 12, 24, 26, & 52, corresponding to monthly, semi-monthly, biweekly, and weekly payments.

[23] Allowed compounding frequencies allowed are 2 and 12 corresponding to semi-annual and monthly. Default is semi-annual.

CMHC Routine - Subprogram #3

This routine computes the minimum required downpayment[24] for conventional and CMHC insured mortgages. If the CMHC option is chosen, the CMHC fees are computed.

The mortgage amount is computed from the entered price and downpayment and is passed to the Mortgage Find Payment Routine - [Mtge] function key.

Prompt	User Response
	Push the [Setup]/[Code] function key and enter a "3" to run this program.
PRICE 0?_	Enter the price of the property.
CMHC (Y/N)?_	Push [YES] to compute the minimum downpayment with CMHC insurance, or [NO] to compute it without.
DN PMT xxxxx?_	The minimum downpayment is computed and displayed. To use it, just push [ENTER]; otherwise, enter the desired downpayment amount. If a downpayment less than the computed amount is entered, an error will be reported.
CMHC $ xxxxx.xx	The amount of the CMHC fee is displayed.[25] If no CMHC insurance was selected, this line will be 0.
AMT xxxxxx?_	The adjusted mortgage amount[26] will be displayed; to

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[24]   For conventional mortgages, the minimum downpayment is computed as 25% of the price. For CMHC mortgages, the minimum downpayment is 5% of the price. The minimum downpayment is adjusted upwards to the next whole dollar.

[25]   Rates effective as of July 14, 2003. The CMHC Fee computation is based on the LTV% (loan-to-value ratio). The LTV% is found by dividing the mortgage amount by the price of the property and rounding the result to the nearest hundredth of a percent. The CMHC Fee is a percentage (see table below) of the mortgage amount based on the LTV%. The CMHC Fee is rounded to the nearest whole dollar.

LTV%	Fee
90.01 - 95.00%	3.25%
85.01 - 90.00%	2.00%
80.01 - 85.00%	1.75%
75.01 - 80.00%	1.00%
65.01 - 75.00%	0.65%
00.00 - 65.00%	0.50%

use it, push [ENTER]; otherwise enter the desired mortgage amount. The routine will continue through the standard mortgage routine to find the payment -- see Find Payment Routine on page 13.

Portable Mortgage Routine - [Blend] Function Key

This routine computes a blended interest rate for the Portable Mortgage.

Prompt	User Response
EXIST MTGE?_	Enter the existing mortgage amount.
RATE % xx.xx?_	Enter the existing interest rate.
NEW MTGE xxxxx?_	Enter the new mortgage amount.
NEW RATE % xx.xx?_	Enter the new interest rate.

RATE	xx.xx%	Blended interest rate.
AMT	xxxxxx.xx	Additional funds to be provided.

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[26] The adjusted mortgage amount is the sum of the price and the CMHC fee less the downpayment.

Equivalent Future Rate (EFR) - Subprogram #5

This routine performs a comparison between two renewal options of different terms and interest rates. The short term can be of any length, and the long term is longer than the short term but not greater than the remaining amortization of the mortgage. The long-term rate can be higher or lower than the short-term rate.

The comparison is based over the number of months in the longer term and calculates the future short-term rate that would have to be in effect for the remainder of the comparison period to make the short-term option financially equivalent to the long-term option.

If the actual interest rate in effect for the remainder of the comparison period happens to be exactly the computed equivalent future rate, it does not matter which option (short or long) the borrower takes. If the actual rate happens to be higher than the computed equivalent future rate, the borrower will gain by selecting the longer option. Conversely, if the actual rate happens to be lower than the equivalent future rate, the borrower will gain by selecting the shorter option.

If the investment opportunity interest rate is set to zero, the differences are compared by simple arithmetic. If the investment opportunity rate has a value, the time values of the differences are compared. See Investment Opportunity Rate below.

Prompt	User Response
	Push the [Setup]/[Code] function key and enter a "5" to start this routine.
BAL 0?_	Enter the current balance of the mortgage.
PMT 0?_	Enter the current mortgage payment.
PMT FREQ 12?_	Enter the payment frequency.[27]
INT RATE 0%?_	Enter the current interest rate.
SHORT TERM 0?_	Enter the shorter option interest term in months.
SHORT 0%?_	Enter the interest rate offered for the shorter term.

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[27] Allowed frequencies are 1, 2, 4, 12, 24, 26, & 52, corresponding to annual, semi-annual, quarterly, monthly, semi-monthly, biweekly, and weekly payments.

```
LONG TERM 0?_          Enter the longer option interest term in months.

LONG 0%?_              Enter the interest rate offered for the longer term.

INV RATE 0%?_          Enter the investment opportunity interest rate
                       percentage (see footnote).[28]
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```
┌─────────────────────────────┐
│  AMORT              xxx      │   Remaining amortization.
│  EF RATE        x.xxx%       │   Equivalent future rate.
└─────────────────────────────┘
```

Equivalent Future Rate (EFR) Example

This example shows a practical application of the EFR routine. A borrower has a mortgage with a current balance of $104,930.57, a current interest rate of 9.00%, and a monthly payment of $915.74. The remaining amortization is 253 months.

The borrower is faced with renewing his or her mortgage and is trying to decide between a one-year and five-year renewal term. The one-year term offers a rate of 7.75% and the five-year renewal term offers a rate of 8.25%. We are going to compute the interest rate that would have to be in effect for the four-year period remaining after the one-year renewal term that would put the borrower in an equivalent financial position as taking the five-year option. Clearly, the rate for this four-year period would have to be higher than 7.75% (the short term rate) and even higher than the 8.25% rate. Using an investment opportunity rate (see below) of zero, we calculate the equivalent future rate to be 8.388%.

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[28] The purpose of the investment opportunity rate is to take into consideration the fact that one of the options (usually the shorter one) will have a lower interest rate and consequently a lower payment amount and that the savings could be invested to earn interest.

In the previous example, the long-term option has 60 monthly payments of $866.98, and the short-term option 12 monthly payments of $835.06, followed by 48 payments of $874.53. If the borrower elects the short-term option, he will save $31.92 for each of the first 12 payments, but will pay an extra $7.55 for each of the 48 subsequent payments. The investment opportunity rate is the interest rate that the borrower would receive on this account into which he would make a series of 12 monthly $31.92 deposits followed by a series of 48 monthly $7.55 withdrawals.

At the end of the comparison period, there would be some interest left in this account which the borrower could apply to reduce the principal balance if the short-term option is selected.

The program suggests an investment opportunity rate that is 3.00% less than the short-term rate, however, any rate can be entered. The additional interest that the borrower earns with the investment opportunity rate has the effect of raising the equivalent future rate slightly.

To illustrate that the calculated rate of 8.388% is correct, you can follow through the calculations below using the Mortgage routine in your calculator.

If the five-year renewal option is taken, the monthly payment will be $866.98 and the principal balance at the end of the five-year term will be $93,311.12.

If the one-year renewal option is taken, the monthly payment will be $835.06 and the principal balance at the end of the one-year period will be $102,841.67.

At the end of the one-year renewal period, the remaining amortization is 241 months (253 - 12 = 241). Using the principal balance of $102,841.67 that exists at the end of the one-year renewal period, we calculate the monthly payment for the subsequent four years at the equivalent future rate of 8.388% to be $874.53. The principal balance at the end of the four-year period is $93,331.90.

The total of monthly payments over the five-year period with the short-term renewal option is $51,998.16 (12 x 835.06 + 48 x 874.53 = 51,998.16). With the long-term renewal option, the total is $52,018.80 (60 x 866.98 = 52,018.80). Subtracting these two totals, we find the borrower will make $20.64 more in payments if he elects the long-term option.

However, we also find by comparing the remaining principal balances at the end of the five-year period that he will owe $20.78 less by taking the long-term option (93,331.90 - 93,311.12 = 20.78).

Thus if the interest rate for the four-year period happens to be exactly 8.388%, the borrower is in an equivalent financial position with either choice. (The small difference of $0.14 occurs because the equivalent future rate is calculated to only three decimal places.)

If the borrower thinks that the four-year rate available after the first year will be greater than 8.388%, the long-term option is the better choice. On the other hand, if the borrower feels the four-year rate will be less than 8.388%, the short-term option will be the better choice.

The above computations assume an investment opportunity rate of 0%. If this rate is 4.75%, the equivalent future rate increases slightly to 8.401%. The inclusion of the investment opportunity rate takes into account the timing of the differences in payments. By selecting the long-term option, over the first 12 months the borrower is making a payment each month that is $31.92 higher (866.98 - 835.06 = 31.92). However, for the subsequent 48 months, the borrower will be making a payment that is $7.55 lower (874.53 - 866.98), and at the end of the five years, will owe $20.78 less on the principal balance.

Notes:

RSP/RRIF Routine - Subprogram #6

This routine computes the fund balance and available withdrawals for Retirement Savings Plans and Registered Retirement Investment Plans. It projects the interest earned and retirement fund balance at retirement. You can fund the plan with an initial lump-sum amount, a series of periodic contributions, or both.

The projected fund balance is shown at the selected retirement age. The routine will then project the available withdrawals over a specified period of time.

Contributions and withdrawals can be made at any interval: weekly, monthly, quarterly, and so forth.

The last part of the routine will calculate the fund balance at any age.

Prompt	User Response
	Push the [Setup]/[Code] key and enter a "6" to run this routine. After you have run this routine, you can start it again by pressing the [Rework] function key.
RATE % xx.xx?_	Enter the annual rate at which you expect the fund earn interest or grow.[29]
COMP FREQ 12?_	Enter the desired compounding frequency.[30]
S AMT xxxxxx?_	Enter the starting amount to fund the plan. If there is no starting amount, enter a 0.[31]
CONT AMT xxxxxx?_	Enter the amount of the periodic contribution. If there are no periodic contributions, enter a 0.
CONT FREQ 12??_	Enter the frequency at which you wish to make

---

[29] This is the assumed growth rate (after taxes) for the life of the plan. Conservative entries should be made here to avoid generating unrealistic projections. If you project a substantial change in the growth rate after a certain number of years, you could compute the projections in two passes. Compute the fund balance at the end of the first period using the first rate, then use that fund balance as the Starting Amount for the second period using the second rate.

[30] Allowed interest compounding frequencies are 1, 2, 4, 12, 24, 26, 52 and 365 corresponding to annual, semi-annual, quarterly, monthly, semi-monthly, biweekly, weekly, and daily. If you use the annual option, the effective annual yield will be the same as the entered growth rate.

[31] The starting amount is used when a lump-sum contribution or rollover (from another plan) is made. It can also be used to reevaluate a plan.

periodic contributions to the fund.[35]

`AGE xx?_`	Enter the current age of the plan holder in years.
`RETIRE @xx?_`	Enter the age at which the plan holder wishes to retire. This must be the same or greater than the current age.[32]

```
BAL @xx      xxxxxxxx
TOT CON      xxxxxxxx
TOT INT      xxxxxxxx
ANN YLD       xx.xxx%
```
Fund balance at the selected retirement age.[33]
Total contributions made.
Interest earned to retirement.[34]
Effective Annual Yield.

`# YRS 20?_`	Enter the number of years over which you wish to make withdrawals.
`#/YR 12?_`	Enter the number of withdrawals you wish to make each year.[35]

```
WD AMT        xxxxxxx
```
The amount of each withdrawal.

`SHOW @xx?_`	To view the fund balance at any age, enter that age at this prompt.

```
BAL @xx    xxxxxxxxx
BAL @xy    xxxxxxxxx
BAL @xz    xxxxxxxxx
       ...
```
The fund balance at the selected age.
Continue to push [Enter] to view the balance at the end of each succeeding year.

---

[32] The retirement age is when the stream of contributions stops, and the stream of withdrawals begin.

[33] All amounts are entered and shown in whole dollars. If the calculated fund balance are too large, the message "IN THOUSANDS" will appear briefly indicating that the subsequent numbers are in thousands of dollars.

[34] This is the total interest earned during the contribution phase. Interest continues to be earned at the same rate during the withdrawal phase.

[35] Allowed contribution and withdrawal frequencies are 1, 2, 4, 12, 24, 26 & 52 corresponding to annual, semi-annual, quarterly, monthly, semi-monthly, biweekly, and weekly.

RSP Example #1

A 35-year-old wishes to make monthly contributions of $135.00 each and expects to retire at age 65. He wants to know the maximum monthly withdrawal he could make over the next 20 year. The interest rate is 7%, compounded monthly. There is no starting amount.

The calculated fund balance at age 65 is $165,657. The total of contributions is $48,600 and the total interest earned is $117,057. The effective annual yield (because of the monthly compounding) is 7.229% The monthly withdrawal that could be taken over the next 20 years (until age 85) is $1,284.

RSP Example #2

A 50-year-old wishes to transfer his retirement fund to a new plan, and wants to continue to make quarterly contributions of $2,000.00 each until age 68. The old fund has a current balance of $87,550 (this is entered as the Starting Amount). The assumed interest rate is 8.25%, compounded quarterly.

The calculated fund balance at age 68 is $712,162. The total of contributions is $231,550 and the total interest earned is $480,612. The effective annual yield is 8.509% The quarterly withdrawal that could be made over the next 18 years is $19,075.

RSP Example #3

A 63-year-old wishes to transfer his retirement fund to a new plan, and wants to retire immediately. The old fund has a current balance of $420,578 (this is entered as the Starting Amount, and Periodic Contribution is entered as 0). The assumed interest rate is 5.85%, compounded daily (365 times a year).

The fund balance at retirement is, of course, $420,578, the Starting Amount. No interest is earned during the contribution phase because no periodic contributions are made. The effective annual yield is 6.024%. The weekly withdrawal (52 per year) that can be made over the next 21 years is $669.

RSP Example #4

A 48-year old has just won $5,000,000 in the lottery and wants to put it away for retirement at age 63. He doesn't want to make any additional contributions, but expects the fund to grow at 6.12% compounded monthly. The fund will grow to $12,492,206 by age 63: he can then take monthly withdrawals of $81,406 each over the next 25 years.

RSP/RRIF Calculation Notes

Periodic contributions are considered to be made at the beginning of each period, thus the fund balance at retirement is calculated as of one period after the last periodic contribution. If a starting amount is used, it is considered to be made at the beginning of the first period together with the first periodic contribution.

Periodic withdrawals are considered to be taken at the end of each period. This means there are two periods between the last contribution and the first withdrawal, e.g., if you're making monthly contributions and withdrawals, there are two months between the last contribution and the first withdrawal.

The contribution frequency can be the same or different from the withdrawal frequency (e.g. you could have weekly contributions and monthly withdrawals). Either or both can be different from the growth rate compounding frequency.

You can look at the fund balance at any point in the plan. At the "SHOW @xx?" prompt, enter the age at which you want to know the fund balance. Continuing to push [Enter] will show the balance for each succeeding year. You can push the [Backup] key to return to the "SHOW @xx?" prompt and change the age to start showing balances.

The preceding examples show different applications of this routine. The first illustrates a person starting a new retirement plan. Therefore the starting amount is 0.

The second example illustrates a rollover. The person has a retirement fund already with a balance. The balance is entered as the starting amount. In addition, the person wants to make a serious of contributions to build the fund until he retires.

The third example has no contribution phase. The person has a lump sum, and wants to know how much they can withdraw from the fund making sure it will last the desired number of years.

The fourth illustrates a lump-sum starting amount being used to fund a plan with no subsequent contributions.

Very large funds can be calculated with this routine. If the values are large enough, the message "IN THOUSANDS" in appear briefly indicating that the results are in thousands of dollars. Entered and calculated amounts are rounded to the nearest whole dollar (or thousands of dollars if the amounts are very large).

This routine can also be used to reevaluate a retirement plan. Just use the current fund balance as the Starting Amount, and enter the person's current age. Enter the expected interest rate and stream of continuing contributions to recalculate the balance and available withdrawal stream at retirement.

Battery Replacement & Maintenance
<u>Error Messages</u>

From time-to-time, the program may report an error. The information here provides a more detailed explanation of the error and the corrective action to be taken. Errors take two general forms:

The first type is produced by one of the programs installed in the calculator and usually is the result of a data entry error or an unreasonable result (such as a loan with negative payments). If possible, you will be returned to the prompt that needs to be changed.

AGE REQUIRED	The borrower's age is required -- it is used to determine the insurance plans available.
AMORT TOO LONG	Although the payment entered will amortize the loan or mortgage being computed (See "PMT TOO SMALL" below), it will take more than 480 months. Increase the payment and/or reduce the proceeds and recompute the loan.
	This error can also occur when entering the amortization period in the Rebate and Interest Differential Routines because the entered value exceeds the maximum amortization period.
AMT > LIFE MAX!	The amount of a personal loan exceeds the maximum amount of life insurance and is therefore not eligible for life insurance. The loan is calculated without life insurance.
DOWN PMT < MIN	In the CMHC routine, the entered downpayment is less than the minimum requirement.
INVALID CMP FREQ	The compounding frequency entered is not valid. For loans and residual loans, the compounding frequency may be 1, 2, 4, 12, 24, 26, or 52, corresponding to annual, semi-annual, quarterly, monthly, semi-monthly, biweekly, and weekly compounding. For mortgages, it can be either 2 or 12, corresponding to semi-annual and monthly compounding.
INVALID ENTRY	The entry just made is not allowed. The program will return to the prompt. This can occur in the following

situations: 1) at the start of a Loan or Mortgage Routine, a task other than 1, 2 or 3 is entered, 2) in the Portable Mortgage Routine, the "NEW MTGE" amount is less than the "EXIST MTGE" amount entered, 3) in the Qualify Routine, a task other than 1 (for Loans) or 2 (for Mortgages) is entered, and 4) also in the Qualify Routine, the entered debt service percentage exceeds the maximum allowed.

INVALID INS CODE   The insurance code entered is not valid.

INVALID INT TERM   The interest term entered is not valid. This can occur if the interest term 1) is equal to zero, 2) is greater than the amortization period of the loan or mortgage, or 3) does not correspond with a whole number of payments. This last condition can occur when the payment frequency is weekly or biweekly.

INVALID PMT FREQ   The payment frequency entered is not valid. For loans and residual loans, the payment frequency may be 1, 2, 4, 12, 24, 26, or 52, corresponding to annual, semi-annual, quarterly, monthly, semi-monthly, biweekly, and weekly payments. For mortgages, it can be 12, 26 or 52, corresponding to monthly, biweekly, and weekly payments.

PMT > DIS CAP!   The monthly payment exceeds the maximum allowed payment for a loan with disability insurance and is therefore not eligible for disability insurance. The loan is calculated without disability insurance.

PMT < $1.00   The available payment computed by either of the Qualify Routines is less than $1.00, indicating that the borrower is already at or above his or her maximum debt service.

PMT TOO SMALL   The payment entered will not amortize the loan or mortgage because the periodic interest due exceeds the payment amount. The payment must be increased or the proceeds reduced. (See also "AMORT TOO LONG!" above.)

RATE TOO LOW   The entered interest rate is below the minimum interest rate allowed.

`REMAIN > ORIG`   In the credit-insurance premium rebate routine, the remaining amortization period entered is greater than the original amortization period.

The second type appears as "`ERROR # (IN ###)`" and is a system error whose significance can be determined from the following table. If one of these errors occurs, push the [CA] key to clear the error before starting a routine.

`ERROR 1 (IN ###)`   The batteries may be weak. Try replacing them with new ones. If this error persists, the calculator needs to be returned for maintenance.

`ERROR 2 (IN ###)`   A calculation error occurred because of a divide-by-0 or overflow problem.

`ERROR 3 (IN ###)`   The calculator needs to be initialized.

`ERROR 4 (IN ###)`   Try initializing the Software Cartridge (see below). If this is not successful, return the calculator for maintenance.

`ERROR 7`   A computed or entered number is too large to be displayed. Generally, dollar amounts are limited to $999,999.99. (For transactions over $999,999.99, the amounts can be divided by 10 before being entered into the calculator and the computed results multiplied by 10 to obtain the correct results.)

`ERROR #`   Other errors should be reported with the circumstances under which they occurred.

It is possible to attempt to compute illogical loans with the calculator (for example entering a proceeds amount of 0). Although the program will usually abort with an "`ERROR 2 IN ###`" message indicating an underflow or overflow condition, in a few cases the calculator may "hang" (the display will stay blank and the keys become inoperative). If this occurs, push the [CA] key or turn the calculator off and back on.

Installing Your Name in the LoanMaker

You can install your name (or an identification number, telephone number, or other message) in the LoanMaker Calculator. Once installed, your name will appear briefly each time you start a routine.

To install your name, push the [Setup] key and enter a code of 726 in response to the "CODE?_" prompt. The message "INSTALL NAME" will appear briefly, followed by a single question mark, **"?_"**.

To enter a character (letter, number, or symbol), enter the appropriate code number from the table below and push [ENTER]. The character will appear in the display followed by a question mark. Enter the code number for the next character and push [ENTER] again. Continue entering code numbers for all the characters you wish to enter, and then push [ENTER] when you're done. If you make a mistake, push the [Backup] key to erase the last character.

You can enter up to 16 characters. The first character must not be a space (code 27), however, spaces can be used in any other position.

For example, to enter the name "LARRY 555-1234", enter the code numbers 12, 1, 18, 18, 25, 27, 35, 35, 35, 28, 31, 32, 33, 34.

To remove a name without installing a new one, start the Install Name routine and just push [ENTER] when the "?_" prompt appears.

Character Code Table

|							
A	1	P	16	1	31	(	46
B	2	Q	17	2	32	)	47
C	3	R	18	3	33	+	48
D	4	S	19	4	34	.	49
E	5	T	20	5	35	,	50
F	6	U	21	6	36	/	51
G	7	V	22	7	37	:	52
H	8	W	23	8	38	;	53
I	9	X	24	9	39	<	54
J	10	Y	25	!	40	=	55
K	11	Z	26	"	41	>	56
L	12	(space)	27	#	42	?	57
M	13	–	28	$	43	@	58
N	14	*	29	%	44		
O	15	0	30	&	45		

Replacing the Batteries

The calculator is equipped with a control to adjust the contrast of the LCD (liquid crystal display). As the batteries age, the contrast will need to be adjusted from time to time. Adjust the display contrast with the knob on the right-hand end of the computer (under the On/Off switch). While looking at the display from a position about 70 degrees above the keyboard, first increase the contrast until black squares are clearly visible behind the characters and then decrease the contrast slowly until the squares just disappear.

Contrast control
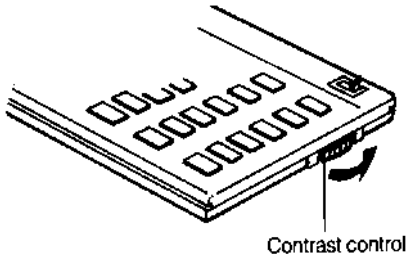
If the display contrast becomes too dim, the batteries should be replaced. The batteries are located inside the back cover--you will need 2 lithium CR-2032 batteries and a small screwdriver to replace the batteries.

Battery cover

Stopper
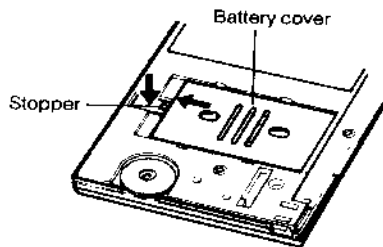
To replace the batteries, turn the calculator off, remove the Software Cartridge, remove the calculator back cover, and the battery cover.
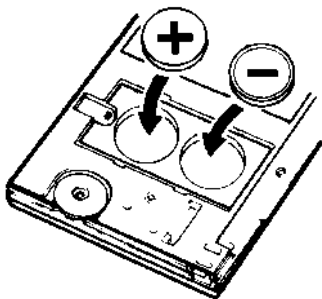
Install the new batteries (be careful to observe the polarity (+ and -) of the batteries when installing the new batteries), and reinstall the battery cover and back cover.

Reinstall the Software Cartridge. You may need to initialize the cartridge before you can use the calculator. See Initializing the Software Cartridge on page 31.

Initializing the Software Cartridge

After replacing the batteries or if you remove the Software Cartridge from the calculator, you may need to initialize the Software Cartridge with the following steps. Software Cartridges have a label on the back side (the side that faces the calculator) which has instructions similar to the following.)
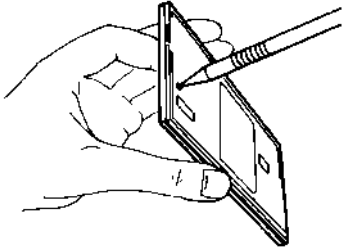
1) Install the Software Cartridge in the calculator. With a pencil or straightened paper clip and the calculator ON, push the "ALL RESET" button on the left side of the back of the calculator. You should see 4 stars in the display (2 on the left, 2 on the right). (On some calculators, there may be a white label over the "ALL RESET" button. If so, gently lift up the lower left corner to reveal it)

2) Push [ENTER]. You should now see a single star at the right edge of the display.

3) Turn the calculator off, wait a few seconds, and then turn it back on. You should see "0." in the display. The calculator is now ready to be set up.

4) Push the [Setup]/[Code] key. You should see "INITIALIZING..." appear (earlier versions may show "CONFIGURING…") for a moment and then, after several seconds, the "CODE?" prompt will appear. Refer to Setup Routine - [Setup]/[Code] Function Key on page 32 to select the correct province and desired language.

Year 2000 Compliant

The routines in this calculator are not date aware. Therefore the routines will run properly in the Year 2000 and thereafter.

Setup Routine - [Setup]/[Code] Function Key

Prompt	**User Response**

CODE?_
1, 2, 3, 4, 5, & 6

Run Subprograms #1 through #6
Enter 1 through 6 to run Subprograms. Once a Subprogram is started, you can use the [Rework] function key to run it again.

Enter "6" to run the new RSP/RRIF Planning Routine.

CODE?_

Select Province and Language.

Select the appropriate code number from the table below.[36]

Province	**English**	**French**
Ontario	416	716
Quebec	633	562
All other	829	916

Code = 15

Change Language

ENG(1)/FRAN(2)?_   Enter a "1" for English, or a "2" for French.

Code = 389

Change Sales Tax Rate

TAX x.xxx%?_   If the sales tax rate shown is correct, push [ENTER]; otherwise enter the desired rate as a percentage (e.g., enter 9.00 for 9%).[37]

Code = 6356

Calculating the Ontario Effective Cost of Borrowing
Enables or disables the calculation of the Ontario Effective Cost of Borrowing in the Mortgage Routine.

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[36] It is important to select the correct province. Insurance premium calculations vary by province, and the results will not be correct if the wrong province is selected. Also, there are two different Residual Value Routines, one for Quebec and another for all other provinces. The Ontario Effective Cost of Borrowing option is activated in Ontario (see code 6356 above to turn this option on or off in any province).

[37] The tax is applied to the credit insurance premium. The rate is set automatically when the province is selected.

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