PRICE/RATIO

A program for the HP 17BII and HP 19BII financial calculators

By Edric CANE



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DOCUMENTATION/RIGHT TO USE

VERSION 1.0

This program is compatible with models: HP 17B HP 17BII HP 19B HP 19BII

Call Edric Cane Seminar for HP 95LX version

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TABLE OF CONTENTS

Page 1:USING THE PROGRAM

APPENDIX ONE:

ACTIVATING THE PROGRAM and REVIEW OF BASIC CALCULATOR KNOWLEDGE

APPENDIX TWO:

KEYING IN THE PROGRAM

Before a software program can be used, it must be keyed in. This is a one time occurence after which the program can be used over and over again for years. To key in a program, see **APPENDIX TWO.**

Each time you return to a program from other parts of the calculator, you must select and activate that program. To select and activate a program, see **APPENDIX ONE.**

TO THE USER

I hope you enjoy this and my other real estate investment analysis programs. I hope they help you buy that property, make that deal, get that commission, and better serve the interests of your clients.

I have put a considerable amount of work and care in writing these programs, testing them, debugging them, improving them and preparing the documentation. It has often been a lonely task, as this is a one-man operation. I have been sustained by the thought of a thousand brokers and investors having access to numbers that would otherwise not be so easily accessible.

This creates a bond between us, author and users. I hope I get feedback, requests for improvements, suggestions for new programs. Though there are limits to my time and, at this stage, no staff or support service, you are welcome to try to reach me and request help if help is needed.

In return, I ask that you honor my copyright, that you purchase the program if you use it, that you do not condone others copying the program from your documentation or calculator. If a year from now there are a thousand professionals using the programs, I deserve to have sold more than just a couple of hundred copies.

My thanks to those who have given me early input, encouragement, and criticism. Chief among those--on all three counts-- is Wes Baker, CCIM and fellow instructor at UCLA Extension, and other members of the Los Angeles and Southern California CCIM chapters.

Edric CANE June 1991

PRICE / RATIO By Edric Cane

A software program for the HP 17BII and HP 19BII calculators

PRICE/RATIO provides intuitive control over the relationship between six important variables used in investment real estate. Each variable is represented by a label that appears in the display when the program is activated. The labels are:

GROSS	GIM	XP/V%	CAP	NOI	PRICE
They repres	ent:	GROSS:	: Gross Scheduled Incom		come.
•		GIM:	Gross Ir	ncome Multi	iplier.
		XP/V% :	Expense	and Vacan	cy Ratio.
		CAP:	Cap. rate, Capitalization rate.		
		NOI:	Net Operating Income.		
		PRICE:	Purchase Price of property.		

The program allows you to master all the relationships that exist between the six values. You do so in two different ways:

> Pick three related variables. Key in values for any two. **PRICE/RATIO** calculates the third.

Pick three unrelated variables. Provide values for the three. **PRICE/RATIO** calculates the three remaining variables.

ILLUSTRATION

I THREE RELATED VARIABLES: WE HAVE DATA FOR TWO. WE SOLVE FOR THE THIRD.

A broker advertises a gross multiplier of 7.6 and a cap rate of 9.5% on a property he wants to sell. What expense and vacancy ratio did he use in preparing the set-up sheet?

KEY IN AS IN FRAME

DISPLAY SHOWS

GOLD	CLEAR DATA
7.6 9.5	GIM CAP XP/V%

XP/V% = 27.80

If I allow 6% for vacancy, this leaves only 21.8% for expenses and I may decide that the set-up sheet does not make adequate provisions for expenses and vacancy.

I may at this stage change any one of the three variables and adjust accordingly any one of the remaining two. For instance:

If I allow 35% for vacancy and expenses, what then is the cap rate?

35	XP/V%
	CAP

CAP = 8.55

II WE HAVE DATA FOR THREE UNRELATED LABELS WE SOLVE FOR THE THREE REMAINING LABELS

A property has a Gross scheduled income of \$271,500. If I apply an expense and vacancy ratio of 39%, what price should I pay for the property to get a 9% cap rate?

GOLD CLE	CLEAR DATA		
271500 39 9	GROSS XP/V% CAP PRICE		

PRICE = 1,840,166.67

Same property. What price if I am satisfied with an 8.5% cap rate?

8.5 CAP PRICE

PRICE=1,948,411.76

A property is listed for \$9,700,000.00. Gross income is \$1,450,000 and NOI \$880,000. What are the ratios?

GOLD	CLEAR DATA
9700000 1450000 880000) PRICE) GROSS NOI GIM XP/V% CAP

GIM=6.69 XP/V%=39.31 CAP=9.07

These examples give some idea of what **PRICE/RATIO** can do and the ease and flexibility with which it operates.

SUMMARY

Before we look at the details.

- 1 All six labels are DATA labels and QUESTION labels.
- 2 But we do NOT key in data for five labels and question for the sixth. Rather the program acts as if it was a combination of separate sub-programs.
- 3 Four groups of three labels are related labels. Within each of these sub-programs, we key in data for two labels and question for the third.
- 4 If we choose three labels that are not related, we may key in data for all three and solve for the three remaining labels.
- 5 In this last case, it may sometimes not be possible to solve for the three remaining labels in random order. If we do not get an answer on the first try, we should solve for another of the three remaining labels and only then come back to the first one.
- 6 We may also combine the two approaches: if we solve for a label using one of the four sub-programs, we may always add data for one extra label and let the calculator solve for the remaining two labels in the display.
- 7 Because each label can be solved from various combinations of data, we should not submit contradictory data to the calculator.
- 8 In particular, we should clear program data (GOLD CLEAR DATA) before moving to a new set of labels.
- 9 We should also avoid "loading the bases" when performing sensitivity analysis but instead limit ourselves to the three or four labels required as data or question for the particular analysis.

THE LABELS

	GROSS GIM	XP/V%	САР	NOI	PRICE
--	-----------	-------	-----	-----	-------

The six labels appear in the display when you activate the program.

The meaning of each label is probably obvious. Let's define them anyway:

GROSS GROSS SCHEDULED INCOME.

This is the annual income that would be produced by the property before any expenses if all units, stores, or office and industrial spaces were rented out and all rents were received.

It is calculated by adding up the annual rents on all the units or spaces, whether actually rented or not. Any other source of income may also be added.

GIM GROSS INCOME MULTIPLIER.

This is the purchase price divided by the gross scheduled income. Also called "multiplier", or Gross Rent Multiplier (GRM) if rental income alone is received or considered. It is called a multiplier because you multiply gross income by the GIM to get the price.

$GROSS \times GIM = PRICE$

XP/V% EXPENSE AND VACANCY RATIO

XP/V% considers expenses and vacancy (and credit loss) as a percentage of gross income. A 6% vacancy and credit loss ratio and a 30% operating expense ratio add up to a 36% expense and vacancy ratio.

XP/V% represents as a ratio what the owner does not actually receive of the Gross income because of vacancies or credit losses, and what he does not actually keep because of operating expenses.

GROSS INCOME

- VACANCY AND CREDIT LOSS
- OPERATING EXPENSES
- = NET OPERATING INCOME

The expense and vacancy ratio is the crucial bridge between gross income and net operating income and between Gross Income Multiplier and Cap rate.

Because the expenses of financing the purchase (debt service) are not a part of operating expenses and are not included here, the ratios and relationships considered here apply to the property independently of the financing that may or may not be used.

CAP CAP RATE or CAPITALIZATION RATE.

The NOI expressed as a percentage of the purchase price.

The Cap rate is the rate of return (Yes, the IRR!) that a buyer would get on his investment:

- If the property was purchased all cash,
- If there were no changes in income and expenses (or at least in the NOI) over the years,
- If the property was kept for ever or netted on sale what it had cost to purchase,
- If we disregarded all positive or negative tax consequences except for the actual expense of the property taxes.

Disregarding tax consequences, if an all cash buyer expects the NOI to increase over the years and expects to make an extra profit on the sale of the property, the Cap rate represents the minimum rate of return independent of these extra benefits.

NOI NET OPERATING INCOME.

As previously defined, the annual income left to the owner after paying for operating expenses.

Where financing is involved, the amount provided by the NOI is used in part to pay for the annual debt service, leaving the owner with the Net Spendable or Cash Flow Before Tax. (See my CAP/Cash-On-Cash and **PROPERTY ANALYSIS** programs for an analysis that considers financing and takes over where PRICE/RATIO leaves off).

PRICE PURCHASE PRICE OF THE PROPERTY.

RELATED VARIABLES

Let's consider a property offered for \$700,000 (PRICE). It has a Gross Income of \$70,000 (GROSS). Clearly, the multiplier (GIM) is 10. There is a very simple mathematical relationship between the three variables:

 $GIM = PRICE \div GROSS$ $GROSS = PRICE \div GIM$ $PRICE = GROSS \times GIM$

As soon as we attribute values to two of the these labels, we no longer have the choice of arbitrarily deciding what the third one should be. We can only calculate a value over which we no longer exercise arbitrary control. The three labels PRICE, GROSS and GIM are related.

With related labels, once we have chosen two values, the third is automatically determined, and the program allows us to calculate it.

There are four groups of three related labels among program labels.

UNRELATED VARIABLES

There are other groupings of three labels that are not related. We may give arbitrary values to all three. We may change one without affecting the value of the others.

Once a value has been given to three unrelated variables, such as GROSS, XP/V%, and CAP, the THREE REMAINING LABELS in the display are fully defined. PRICE/RATIO allows us to fill in the blanks by calculating a value for those three remaining labels, leaving us with a value for all six variables in the display.

The only limitation is that, in a few instances, the labels must be filled in in a specific order: if you try to solve for the wrong label first, you get 0, and must switch to another label before coming back to the one you are interested in.

ANOTHER LOOK AT THE SIX LABELS

The division between related and unrelated labels is not a creation of the program. It is a fact of life that the program merely reflects. It is also a fact of life that, given data for three unrelated labels, the three remaining values that the other program labels represent are fully defined.

So understanding which labels are related, which unrelated, is not an arbitrary requirement imposed by the author of the software. It stems from reality itself. If you do not know that Gross Multiplier (GIM), Expense and Vacancy ratio (XP/V%) and Cap. rate (CAP) are related, you will not think of solving for XP/V% given GIM and CAP.

Before we divide them into groups of related labels, it may help to notice that five labels are related to income and expenses. PRICE stands apart.

INCOME AND EXPENSES					PRICE
GROSS	GIM	XP/V%	САР	NOI	PRICE

If we ignore PRICE and consider the variables related to income and expenses, we notice that two (a dollar amount and a ratio) refer to gross income, two others (again a dollar amount and a ratio) refer to net amounts, amounts adjusted for expense and vacancy.

The expense and vacancy ratio (XP/V%) stands as the crucial link between gross amounts and net amounts.

GROSS VALUES			NET V	ALUES
GROSS	GIM	XP/V%	CAP	NOI

We may now turn to the four groups of related labels by focusing separately on XP/V% and on PRICE. Each is at the heart of two groups.

THE FOUR SUB-PROGRAMS

As the crucial link between GROSS values and NET amounts, XP/V% bridges the gap between the two dollar amounts represented by GROSS and NOI. In the same way, it is the connection between the two ratios GIM and CAP.



So we have XP/V% holding hands with the two dollar amounts: GROSS and NOI for a first set of three related variables. They form, as it were, a sub-program within the program that can be used separately to solve for any one of the three variables.

We get a second sub-program, a second group of related labels as we consider XP/V% holding hands with the two ratios: GIM and CAP.

If we know the value of any two labels in one of these groups of related labels, we can calculate the third.

If we now focus on PRICE, we find PRICE considered in relation to the two variables that represent gross amounts. We have three related variables: GROSS, GIM, PRICE, with GIM expressing--as a multiple--the ratio between Price and Gross.

And we find PRICE considered in relation to the two Net amounts. This gives us three related variables CAP, NOI, PRICE, with CAP expressing--as a percentage--the ratio between PRICE and NOI.

GROSS	GIM			PRICE
GROSS V	ALUES	NET V	ALUES	
		САР	NOI	PRICE

We have two sub-programs related to PRICE:

GROSS	GIM	PRICE
CAD	NOL	DDICE
САР	NOI	PRICE

Given data for any two variables belonging to the same sub-program, we may calculate the third.

- 0 0 0 -

So we are left with four groups of related labels, with each label belonging to two separate groups.

It is not the program that creates these groupings, but reality itself which the PRICE/RATIO program attempts to reflect. It is only by recognizing these groups of labels as related by the reality of their meaning that we will be able to exploit the relationship with the help of the program.

Let's now consider each grouping separately.

CAP XP/V% GIM

As with each sub-program, if we know the values for two of the three, we may calculate the third. So there are three possible combinations.

Let's illustrate with concrete examples.

A property has a gross multiplier of 6. What is the Cap rate if you allow 9% for vacancy and 32% for expenses (a 41% total for expenses and vacancy)?

GOLD	CLEAR DATA	
6 41	GIM XP/V% CAP	CAP=9.83%

A buyer wants a Cap rate of 8.75%. Making allowances for an expense and vacancy ratio of 37%, what gross income multiplier should she look for in available properties?

8.75	САР	
37	XP/V%	
	GIM	GIM=7.20

A seller advertises a multiplier of 7.7 and a Cap rate of 9.8. What expense and vacancy ratio does this reveal?

7.7	GIM	
9.8	CAP	
	XP/V%	

XP/V% = 24.54

NOI XP/V% GROSS

Again, three possible combinations.

What is the NOI if I apply an expense and vacancy ratio of 41% to a Gross scheduled income of \$210,000?

GOLD CLEA	R DATA	
41 210000	XP/V % GROSS NOI	NOI=\$123,900

We may now change any value and recalculate any of the other two.

What is the NOI if a vacancy and expense ratio of 45% is applied?

45	XP/V%	
	NOI	NOI=115,500

If the NOI is presented to the lender as being \$144,000, what is the expense and vacancy ratio?



A change in the rental structure increases the NOI to \$159,000. Based on the same XP/V%, what does that tell us about the gross income?

159000	NOI	
	GROSS	GROSS=231,875.00

GROSS GIM PRICE

Again, three possible combinations, each the result of the simplest of mathematical calculations. Let's look at one:

\$888,000 price and a scheduled gross income of \$126,000. What is the gross multiplier?

GOLD C	LEAR DATA	
888000 126000	PRICE GROSS GIM	

GIM = 7.05

NOI CAP PRICE

Here again, we may key in data for two variables and solve for the third.

A property has an NOI of \$412,000. Find the price if you apply a cap rate of 8.2%.

GOLD CLI	EAR DATA	
412000 8.2	NOI CAP PRICE	PRICE=5,024,390.24

Again, we could solve for any of the three variables, or change any value and play the "What if..." game with such questions as:

- What price would give the buyer a cap rate of 9%?

- What cap rate do we get if we buy for \$4,750,000?

AVOIDING CONTRADICTORY DATA

As we test various assumptions and play out "What if..." scenarios USING THE SAME THREE RELATED VARIABLES, there is no need to clear as we move from one set of data to another or as we change one of the variables and recalculate one of the three.

But notice that we clear program data (GOLD CLEAR DATA) each time we move to another set of labels. The reason is simple.

Each label belongs to two sub-programs and can be calculated from two separate sets of data. Other parts of the program also create other relationships between labels. So each label can be calculated from data in various sets of memories.

For instance, PRICE can be calculated from data in GROSS and GIM and from data in CAP and NOI. It can also be calculated from data in any three non-related label. I should not attempt to solve for PRICE with one set of data defining one value for PRICE and another set of data pointing to a different value.

If there is conflicting data, the program gives priority to the four subprograms, and between sub-programs, to those having labels further to the left. Rather than carefully weighing priorities, the user should not allow conflicting situations to occur. This is achieved by clearing data as indicated above.

THREE RELATED VARIABLES NOT ENOUGH TO CALCULATE THREE REMAINING LABELS

Given data for three related labels only, there is no way we can calculate the three remaining labels. They are still undefined in the same way as a loan payment is undefined unless we know the interest rate.

As soon as we get information on one of the remaining three labels, then all six labels are defined and can be calculated.

INPUT THREE UNRELATED VARIABLES, SOLVE FOR THE REMAINING THREE

Used separately, the sub-programs provide speed and convenience. They allow the broker or the investor to forget about the arithmetic and concentrate on the decisions or negotiations at hand.

The convenience is further increased when we resort to the second feature of PRICE/RATIO:

When three pieces of data NOT belonging to the same sub-program are keyed into the calculator, it is always possible to find a value for the three remaining variables.

For example:

A property advertised for sale at \$8,950,000 has a gross income of \$1,300,000. What is the NOI and the Cap rate if we apply an expense and vacancy ratio of 35%.

GOLD CLE	EAR DATA	
1300000 35 8950000	GROSS XP/V% PRICE GIM CAP NOI	GIM=6.88 CAP=9.44% NOI=845,00

We do not need to be concerned about sub-programs here except to recognize that the three values given as data are unrelated-35% is not the automatic result of the other two numbers and can be changed to any other value.

SOLVING ORDER CAN BE IMPORTANT

In using this feature of PRICE/RATIO, we need to keep in mind one limitation and one precaution. First the limitation:

It is not always possible to solve for the three remaining variables in any order we choose. Sometimes, one of the three cannot be solved first.

If we try to solve for one of the labels that is not directly accessible, we get an answer of 0 (zero), or a display message: "WRONG GUESS. TRY AGAIN". This is no major problem as we may then solve for another variable and come back to the initial label later.

For instance: In the previous example it is not possible to solve first for CAP. We may solve for NOI or for GIM, and then for CAP, but the program returns 0 if we solve for CAP first.

GOLD CLE	EAR DATA
1300000 35 8950000	GROSS XP/V% PRICE CAP GIM CAP
	1101

CAP=0.00 GIM=6.88 CAP=9.44% NOI=845,000

The two linchpin variables PRICE and XP/V% can always be solved in first position and, when given the opportunity, you may want to select one of these as the first of the three variables that you solve for.

AVOIDING CONTRADICTORY DATA II

The precaution, here again, is to avoid contradictory data. Example:

A property is advertised for sale at \$3,250,000 with a multiplier of 6 and a cap rate of 9.25%. Find all the other values.

GOLD CLEAR DATA 3250000 PRICE 6 GIM 9.25 CAP GROSS GROSS=\$541,666.67 XP/V% XP/V% = 44.50% NOI NOI = \$300,625.00			
3250000 PRICE 6 GIM 9.25 CAP GROSS GROSS=\$541,666.67 XP/V% XP/V%=44.50% NOI NOI=\$300,625.00	GOLD CLEA	R DATA	
	3250000 6 9.25	PRICE GIM CAP GROSS XP/V% NOI	GROSS=\$541,666.67 XP/V%=44.50% NOI=\$300,625.00

Here, if we clear previous data before keying in the new data, there is no danger of having contradictory data. However, we cannot at this stage change one of the three original values and expect the program to always recalculate any one of the three output variables accordingly. Let's show why and what can be done about it.

Let's change GIM to 7 and recalculate XP/V%:

Clearly, with a different multiplier, XP/V% should be different...as should the Gross income. Yet XP/V% remains 44.5%. This is because we still have the \$541,666.67 Gross from the previous calculation, and XP/V% was calculated based on unchanged Gross and NOI data instead of GIM and CAP. We have contradictory data in the calculator.

To avoid submitting contradictory data to the calculator:

- Press GOLD CLEAR DATA when you move to a new set of labels.
- Remember that answers based on one set of data can be used as data for subsequent calculations...whether or not you intend this to happen.
- Do not perform sensitivity analysis with the bases loaded.
- If in doubt, systematically press each of the six labels from left to right to recalculate the amounts. All the data values should come out as expected. Let's use this strategy here:

GROSS	GROSS=464,285.71
GIM	GIM=7.00
XP/V%	XP/V% = 35.25
CAP	CAP=9.25
NOI	NOI=300,625.00
PRICE	PRICE=300,625.00

Our input data (GIM, CAP, PRICE) come out with the values we wanted to impose on the calculation and output labels have been recalculated accordingly.

If one of the input labels had an incorrect value, we would correct that value, clear the ouput labels by keying in zeros, and solve for correct answers--which means starting from scratch again with our current data.

Avoiding contradictory data is the equivalent of making sure you have 0 in FV when calculating an amortized payment with the Time Value of Money functions of the calculator.

But the best is to avoid contradictory data in the first place by not performing sensitivity analysis with the bases loaded. Let's consider this particular point.

SENSITIVITY ANALYSIS

A property has a gross income of \$315,000.00. A buyer wants a Cap rate of 9%. How does the ratio used for vacancy and expenses (25%, 30%, 35%) affect the price of the property?

GOLD C	LEAR DATA	
315000 9 25	GROSS CAP XP/V% PRICE	PRICE=2,625,000
30	XP/V% PRICE	PRICE=2,450,000
35	XP/V% PRICE	PRICE=2,275,000

The secret is to concentrate on the three data labels (GROSS, CAP, XP/V%) and the one label that we choose to solve for (PRICE). If we had given in to the temptation of calculating the NOI after first solving for PRICE--an NOI based on a 25% expense and vacancy rate--, the program would have considered that NOI as data and given it priority over XP/V%. PRICE would then remain \$2,625,000. Only by clearing NOI could we then recalculate PRICE on the basis of the new expense and vacancy rate.

The same applies when performing sensitivity analysis on three related labels. We may work with these three labels to our hearty's content as long as we have no data in other labels to interfere with the calculations.

RECALLING VALUES

At any point in time it is possible to recall any or all values in the six memories. With the previous data still in the calculator, let's solve for GIM and NOI and then recall all six values:

RCL RCL RCL RCL RCL RCL	GROSS GIM XP/V% CAP NOI PRICE

GROSS=315,000.00 GIM=7.22 XP/V%=35.00 CAP=9.00 NOI=204,750.00 PRICE=2,275,000.00

With the data "balanced" in all six variables, we could just press the six labels and solve for each variable to get the same answers but it is easier to catch mistakes if we always recall data that has already been calculated rather then recalculating it.

SENDING THE LIST OF VALUES TO THE PRINTER

Pressing **GOLD PRINTER LIST** while pointing the calculator towards the HP infrared printer sends the whole list of variables to the printer.

With the previous data still in the calculator, the printout is as follows:

GROSS=	315.000.00	
GIM=	7.22	
XPZV%=	35.00	
CAP=	9.00	
NO I =	204,750.00	
PRICE=	2,275,000.00	

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APPENDIX ONE

ACTIVATING A PROGRAM

and

REVIEW OF BASIC CALCULATOR KNOWLEDGE

Using programs requires some basic knowledge of calculator procedures. The following pages make a few essential points. Consult OWNER'S MANUAL to supplement, using INDEX as needed. Apart from the software program itself in APPENDIX TWO, all the material in APPENDIX ONE and APPENDIX TWO is generic. It applies to all programs.

This allows me to include these appendices in more than one program documentation, and, if you use these programs, it allows you to know that you won't be missing out on program specific information if you study them only once.

APPENDIX ONE Page 2

PROGRAM ESSENTIALS

- 1 **KEYING IN THE PROGRAM.** Programs (called EQUATIONS or SOLVE EQUATIONS by the calculator and the OWNER'S MANUAL) need to be keyed in before they can be used. This is a one time procedure after which programs can be used over and over for years. Turn to **APPENDIX TWO** for the program and for instructions on keying it in.
- 2 ACTIVATING THE PROGRAM. Existing programs (programs that have been keyed in) need to be selected and activated when you want to use them. This process brings in the display the labels created by the program.

TO SELECT AND ACTIVATE A PROGRAM:

Move to MAIN MENU (GOLD and EXIT key): Display shows: FIN BUS SUM TIME SOLVE (19B:TEXT)	GOLD MAIN
Select SOLVE soft key: You are now on the SOLVE menu showing: CALC EDIT DELET (17B:NEW)	SOLVE
Use up and down arrow keys as needed to select the specific program you want to use.	19B: ↑ ↓ 17B: ▲ ▼
Press CALC soft key to activate the program: The display shows: "VERIFYING EQUATION" as the program is loaded into active memory. Then, program labels appear in the display. You are ready to use the program.	CALC

3 **PROGRAMS SHARE LABELS.** If two different programs have labels with the same name, the corresponding memories are shared by the two programs. As you activate the second program you may find the shared label still retains data left over from the last time you used the first program. To avoid interference, it is wise to clear program memories on a newly activated program by pressing GOLD CLEAR DATA.

MEMORY

With programs in the calculator, you do not want to erase continuous memory. See OWNER'S MANUAL (Index: MEMORY and MEMORY LOST) for details on changing batteries without losing continuous memory and other precautions.

INSUFFICIENT MEMORY

If you get this message, you need to make more memory space by clearing data that you no longer need. A few pointers:

- Press GOLD MEM to check memory allocation.
- Clear lists and numbers from built-in functions by selecting the list or the function menu and pressing GOLD CLEAR DATA.
- On the HP 19BII, if you are going to use programs extensively, do not use the calculator for long lists of telephone numbers or addresses. These have a way of growing and using up precious memory space. (If you decide to clear a list, you might want to sort it and send it to the printer before you clear it).
- Program variables are the memories or boxes corresponding to each label into which the value given to the label can be stored. Variables use up memory space even if cleared of data and even if the program is not in use. Clearing variables on programs is a most efficient memory saving procedure. Think of this clearing process as deflating a kayak before storing it for the winter. The boxes are recreated as needed as each program is reactivate.

• To clear the variables on ALL your programs:

Go to the MAIN MENU:	GOLD MAIN
Select SOLVE option:	SOLVE
Press GOLD CLEAR DATA and follow prompts carefully. You want to delete the variables (19B: VARS), NOT the equations!	GOLD CLEAR DATA
17BII: (See details below)	YES NO
19BII: (See details below)	VARS

ON THE HP 17BII:

In response to the prompt: "DELETE ALL VARIABLES?", I like to press YES NO in rapid succession. The NO is then interpreted by the calculator as the answer to the next prompt: "DELETE ALL EQUATIONS?" This eliminates the possibility of answering YES to this second question, which would result in erasing all the programs.

I also avoid using the DELET label on the SOLVE menu which prompts: "DELETE THE VARIABLES?" and "DELETE THE EQUATION?" but asks the second question first if there are no variables to delete. This change in the order of the prompts on the HP 17BII is an invitation to press YES by mistake and erase that program.

ON THE HP 19BII:

I clear all the variables on all the programs by pressing GOLD CLEAR DATA VARS as indicated above. My finger stays on keys in the left hand column of the calculator and there is little danger of pressing "BOTH" by mistake in response to the prompt: "DELETE ALL VARS, OR BOTH VARS & EQUATIONS?"

With the HP 19BII, I also always clear variables as above on existing programs before keying in a new program or pressing EDIT to change an existing program, as it is not possible to exit out of edit mode if there is not enough memory to activate a program.

LABELS

When activated, the program creates labels in the display. Like built-in labels, each program label gives its meaning to the soft (blank) key immediately below the label. These labels correspond to the variables used by the program. They prompt you as you key in data, solve for an answer, or recall the value given to the variable. For instance:

KEYING IN DATA: Let's imagine there is a DNP% label standing for the down payment ratio. To key in a 20% down payment, key in 20 and press the soft (blank) key immediately below the display label DNP%:

20 DNP%

This puts 20 in the memory called DNP%. Think of that memory as a box in which you now have the number 20. To change the number in that box, just key in another value. It automatically replaces 20.

SOLVING FOR AN ANSWER (ASKING A QUESTION): Just pressing the soft key corresponding to a label calculates its value:

DNP%

The program calculates the value that needs to be in the DNP% box in order to make sense of other requirements. The display shows the answer and identifies it as being the value given to DNP%: "DNP% = 37.09"

RECALLING DATA: To check the value given to a label--without changing it--, recall it. It duplicates its value in the display:

RCL DNP%

You may also send the whole list of labels to the printer by pressing:

GOLD PRINTER LIST

APPENDIX ONE Page 6

DATA and QUESTION

The basic logic of using a program consists in:

- Keying in the DATA
- Asking the

- **OUESTION**
- The calculator provides one or more **ANSWERS**

Because of the specific objectives of each program, not all labels in a program are designed for the three purposes of keying in DATA, answering a QUESTION, and RECALLING values. Some may be used for only one or two of these purposes. Understanding which labels are designed for what purpose goes to the very "philosophy" of each program and is a key to using it efficiently.

Let's consider my four current investment real estate analysis programs.

PRICE/RATIO has six labels, and all six are "data and question" labels.

INCOME PROJECTION is at the other extreme. It has 31 labels and only one can be used to question for answers: the very first one, ?CFAT. Some of the other labels are used exclusiveley to key in data and others only to recall answers. Every time the "question label" is pressed, up to 21 different values are automatically calculated or updated to reflect values for the next year of the projection. So pressing the "question label" five times updates 21 different numbers for the first five years of the projection. To help identify which labels do what, all the labels that can be used only to retrieve answers begin with a question mark.

CAP/CASH-ON-CASH has five top row labels that are "data and question" keys. We can key data into four of the labels and calculate the fifth. They represent the heart of the program. If we choose to use the lower levels of program labels, we use two "data only" labels and six "recall only" labels.

PROPERTY ANALYZER has 13 "data and question" labels. With appropriate data in up to 12 of these labels, we may calculate the value for the one that was left out. 8 more labels are "recall only" labels--also identified by a question mark. Their value is automatically calculated when we solve for one of the thirteen initial labels.

CALCULATOR FUNCTIONS AND SETTINGS

- All **BUILT-IN CALCULATOR FUNCTIONS** remain operational along with program functions.
- Check the choice between ALGEBRAIC and RPN logic for arithmetic operations (RPN is the very convenient approach used by the HP 12C, algebraic is the normal approach used by most calculators). Use GOLD MODES or GOLD MODES MORE for making this choice.
- DISPLAY FORMAT. Because the programs use the decimal point you must select the decimal point (not the comma) to separate whole numbers from decimals (DSP or DISP, then the decimal point label). As this is a financial calculator, you probably want to select two decimals (DSP or DISP, then FIX 2 INPUT). The display format that you select does not affect internal calculations: even invisible decimals are used in the calculations.
- Check the OWNER'S MANUAL for the various CLEARING OPTIONS that you have. GOLD CLEAR DATA clears all the labels in the currently active program or built-in menu. It does not clear register memories.
- With the long lists of variables used by some programs, the **INFRARED PRINTER** becomes an extremely useful tool. There are two essential settings used in connection with the printer. You should tell the calculator if the printer is using the AC adapter or is working on batteries only. You can also instruct the printer to print on single lines or to use double space. Use GOLD MODES or GOLD PRINTER for these settings.

THE CALCULATOR LINE

• The display line just above the labels is the calculator line. Whether labels are built-in calculator labels or program labels, numbers on the calculator line can be stored or recalled from register memories and arithmetic can be performed on them.

YOU DO NOT NEED TO LEAVE AN ACTIVE PROGRAM TO USE THE CALCULATOR FOR ARITHMETIC CALCULATIONS.

- Numbers remain on the calculator line as you switch from one menu to another or from one menu level to another. (On the HP 17BII, you may need to press CLR (Clear, the ON key) if the number is hidden by a display prompt).
- In particular, if you key in a number and realize that you are on the wrong menu level, the number remains in the calculator line as you move to the correct menu level.
- If you recall data from a label, or allow the calculator to solve for that value, and you then want to transfer that amount to another label, you must press STO (store) or INPUT before you press that second label. Otherwise, the calculator thinks that you want to solve for that value instead of keying in new data.

APPENDIX TWO

KEYING IN THE PROGRAM

Keying in a program is a one time occurrence. It may take you as little as 15 or 20 minutes or as long as one hour or more, depending on the calculator, the operator, and whether you make mistakes or not.

Once keyed in, the program can be used over and over for years.

We call PROGRAM what HP in its documentation, and the calculator in the display, call EQUATION or SOLVE EQUATION. Everything that the calculator manual says about HP SOLVE and EQUATIONS applies to keying in and using this program.

Please note that program and documentation are copyrighted and cannot legally be used without purchasing the documentation/right to use. The author has put a considerable amount of time and work in writing these programs and the documentation. He hopes and trusts that fellow professionals will respect his copyright.

APPENDIX TWO Page - 2 -

OPTION

KEY IN THE PROGRAM, OR HAVE EDRIC CANE SEMINARS KEY IT IN FOR YOU

Keying in a program is not difficult. But Murphy is alive and well and programs are not tolerant of mistakes or misinterpretations.

So you may want to key in the program yourself, or you may want to consider letting Edric Cane Seminars key the program in for you.

APPENDIX TWO Page - 3 -

PRELIMINARIES

Keying in a program is a one time occurrence. It needs to be done leisurely because it needs to be done right.

- Take the time to explore the calculator keyboard and basic calculator procedures and editing functions from the OWNER'S MANUAL and basic procedures in APPENDIX ONE.
- Set the display format to the decimal point (DISP or DSP key, then "." soft key). Turn the BEEP option ON (GOLD MODES).
- With the HP 19B/BII models, making ample memory space available is particularly important before keying in a program because you lose the program that you are keying in if you do not have enough space to activate it. (On 17BII models pressing INPUT retains the program as is, with no need to activate it to save it. So you can make more memory space later if needed).

My four investment real estate programs use only 32% of total memory when all four together are properly keyed in and stored, leaving ample room for activating a particular program or using other calculator applications. But activating each individual program requires extra memory space, and editing an existing program requires still more while the old and the new versions are still both in memory.

My advice for 19BII users is to always clear variables on existing programs before moving into edit mode and not to use the calculator for long lists of phone numbers or notes.

- Make sure that you do not misinterpret characters:
 - The parentheses are on a key on the same line as INPUT. Do not confuse with other brackets or with ">" and "<" signs.
 - The digits \emptyset , 1 and the multiplication sign (x) should not be confused with the letters O, I, or X.

APPENDIX TWO Page - 4 -

GETTING READY TO KEY IN THE PROGRAM

Move to MAIN MENU	GOLD MAIN
In the display, you should see the labels: FIN BUS SUM TIME SOLVE	
Press SOLVE:	SOLVE
You are on the SOLVE menu, showing: CALC EDIT DELET (17B: NEW)	
If needed, clear variables on other programs to make memory space, and carefully respond to prompts. You want to delete the variables (19B: VARS), not both the equations and the variables:	GOLD CLEAR DATA
17BII:	YES NO
19BII:	VARS
Prepare to key in a new program: 17BII:	NEW
19BII:	GOLD 🕴

You are now ready to key in the program exactly as in the frames on the following pages, beginning with the first letter of the program name.

You are provided with **TWO IDENTICAL VERSIONS** of the software program: one typeset and cut up in sentences for your convenience (ignore blank lines), the other as sent by the calculator to the printer.

Use keys on the face of the calculator as needed, as well as letters and characters and edit keys on the cover side of the 19BII. On the 17BII the equivalent keys are soft keys and you toggle between alphabet and edit keys by pressing ALPHA or EXIT. (With the 19BII, do not press EXIT while you are keying in a program.)

A REMINDER

This program, in its printed form or transcribed into your calculator, or in any other form whatsoever, is copyrighted software. It cannot be duplicated in any way except by the owner of this documentation/right to use in his/her own calculator for his/her individual use.

You have purchased the right to duplicate the program in your calculator. By keying it in your calculator, or by having someone else key it for you, you are recognizing that this program and documentation was purchased for your exclusive use and that you will not allow or condone others to use it or to acquire a copy of it from your material.

For different people in the same office to use this program, each one must own his/her individual copy of the documentation/right to use.

If you do not agree with these conditions and limitations, do not key in or use this program. Instead, contact EDRIC CANE SEMINARS at (818) 957-3026.

```
PRICE/RATIO/CANE: (GROSS+GIM
+L(L:100-XP/V)+CAP+NOI)x0
+IF(S(GROSS):-GROSS
+IF(GIMxPRICE>Ø:PRICE÷GIM
: IF (XP/V \times NOI > \emptyset : 1 \emptyset \emptyset \times NOI \div G(L) : \emptyset))
:IF(S(PRICE):-PRICE
+IF(GROSSxGIM>Ø:GROSSxGIM
:IF(CAPxNOI>Ø:NOI÷(CAPx.Ø1)
:IF(XP/V%xCAPxGROSS>Ø
:GROSSxG(L) ÷CAP
:1ØØxNOIxGIM÷G(L)))
:IF(S(GIM):-GIM
+IF(GROSSxPRICE>Ø:PRICE÷GROSS
: IF (CAPxXP/V\geq \emptyset: G(L) ÷ CAP:\emptyset))
:IF(S(CAP):-CAP
+IF(NOIxPRICE>Ø:1ØØxNOI÷PRICE
:IF(XP/V%xGIM>\emptyset:G(L)\divGIM:\emptyset))
:IF(S(NOI):-NOI
+IF(GROSSxXP/V%>Ø
:GROSS-GROSSxXP/V%x.Ø1
:IF(PRICExCAP>Ø:PRICExCAPx.Ø1
:Ø)):-XP/V%
+IF(GROSSxNOI>Ø
: ((GROSS-NOI)÷GROSS) x1ØØ
:IF(GROSSxPRICExCAP>Ø
:100-PRICE+GROSSxCAP
:IF(PRICExNOIxGIM>Ø
:100-GIMx(NOI÷PRICEx100)
:100-GIMxCAP))))))))
```

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PRESS: CALC

After you key in the last character of the program, press soft key CALC (17BII, press INPUT then CALC) and wait as the calculator tells you that it is "VERIFYING THE EQUATION".

You should then see **PROGRAM LABELS** appear in the display.

"INVALID EQUATION"

If instead you get the message: "INVALID EQUATION", and the display soon returns to some part of the program itself, you have made a mistake that needs to be corrected. Turn the page to CHECKING THE PROGRAM for details.

"INSUFFICIENT MEMORY"

If you get the message: "INSUFFICIENT MEMORY", you need to make more memory space before you can activate the program. See APPENDIX ONE for details.

THE PROGRAM, PRINTER VERSION

The program on the following page is exactly the same as in the frame on the previous page. It is the program on the previous page as sent to the printer by the calculator itself. Every character on both programs should be exactly the same and you can use either one to key into your calculator.

The major purpose of this second copy is to make it easier for you to double check and spot any discrepancy or misunderstanding.

APPENDIX TWO Page - 8 -

THE PROGRAM

This program is for the exclusive use of:

keyed in his/her calculator, serial number:



At the end, press: HP 19BII: CALC HP 17BII: INPUT CALC

[©] Copyright, Edric Cane 1991

CHECKING THE PROGRAM.

When you press CALC (17B models: INPUT CALC) after having typed in a program, you are initiating a checking process that must be carried out, the first time around, by the calculator and by yourself. The checking process is important because you want to be able to use the program over and over again with confidence, possibly for years.

There are four stages in the checking process:

- 1 The calculator itself "verifies the equation".
- 2 You check that you have the expected labels.
- 3 You check that the program gives the same answers as the rest of the documentation.
- 4 You check that you get the answers you expect to get with your understanding and approach to the problem.

The program may pass each check with flying colors, or you may identify a problem. If you do, you need first to locate the error and then correct it.

We will discuss each stage separately below.

"VERIFYING EQUATION"

Every time a program is activated (CALC), the calculator loads the program into active memory and prepares to solve the equation by arranging it for its own purposes. As it does so, the display shows "VERIFYING EQUATION..." The very first time this takes place, the calculator may not have an equation that it can understand.

- If the equation makes sense, the calculator responds by displaying the program labels and you move on to checking these labels.
- Solution If the calculator cannot understand the equation, it does three things:
- It BEEPS if the beeper is turned on (GOLD MODES BEEP).
- The display shows "INVALID EQUATION" for a few seconds.
- The calculator then goes back to the edit mode of the program, with the cursor resting on the first character that the calculator was unable to interpret in mathematical terms.

You need to identify the error and correct it by editing the program.

Where the cursor stops as the display bounces back to the edit mode is an invaluable indication of the kind of mistake that was made in keying in the program. Maybe the display stopped exactly on the character that was mistyped. You correct the mistake and press CALC again to activate the program. The mistake may also be somewhere else. For instance:

The cursor stops on a closing parenthesis.

- This may mean that you closed one parenthesis too many. Deleting the parenthesis on which the cursor stopped may solve the problem.
- Or maybe you forgot to open a parenthesis earlier on in the program. The best the calculator could do was stop on the first parenthesis that closed without ever having been opened.
- It could also mean that you forgot a colon (:) earlier in the program, and the calculator expects that colon before it allows you to close a parenthesis.

CHECKING THE LABELS

Once the calculator has satisfactorily verified the equation, and you have the program labels in the display, the first thing you should do is count your labels. Flip through the menu levels by pressing MORE MORE MORE as needed, comparing labels to those illustrated in the documentation.

If a label occurs with two different spellings, then you have created two separate unrelated variables that will throw your calculations off. This will often (but not always) result in one label too many in the display menu. Recall the duplicate labels to find which is incorrect, note its position in relation to other labels, and edit.

CHECKING THE ANSWERS

Now you have the correct labels in the display. You need to use them with the data provided in the documentation to test that you get the expected answers. "+" instead of "-", "<" instead of ">", a misspelled variable that did not result in an extra label, etc, etc, etc, result in valid equations that give incorrect answers. You need to be able to duplicate the answers given as illustration in the documentation.

If you do not get the same answer as the documentation, clear the data and try again with the same data. Before you start looking at the program, you want to be sure that the error is not in the data itself.

If the error is not with the data that you keyed in, it is with the program that you typed in. Before you switch into edit mode and look for the error in the program itself, send all the variables to the printer including the wrong answer, or recall the labels systematically and write them down. With most programs, an incorrect intermediate value gives a valuable indication of where in the program the error was made.

FINAL CHECK

A final check before you can use a program with confidence, over and over, probably for years. Test it with your own problems, problems that you have solve longhand in your own way. Maybe the program makes assumptions about definitions, tax laws, or calculations that you are not aware of, that do not apply to your situation, your area of the country, your standard approach to the problem. Maybe tax laws have changed.

At the earlier stages, you should not even entertain the thought that there might be an error in the program or the documentation. But at this stage, you should consider that possibility. The program does not allow you to give up control and responsibility for the numbers that it produces.

This final check and constant critical attention given to the answers provided by the program remain your responsibility even if the program has been keyed in by Edric Cane Seminars. Four complementary software programs by Edric CANE can change your HP 17BII or HP 19BII into an investment analysis powerhouse:

You cannot buy, sell, or broker income properties without having at your fingertips the numbers provided by these programs.

PROPERTY ANALYZER

PROPERTY ANALYZER gives you control over the complex relationships between price, down payment, financing terms, Net Operating Income, and Cash-On-Cash return. Calculate the price if you know the other variables. If you know the price, solve for any one of twelve variables: down payment, cash-on-cash return, rate on one of the loans, term of a loan, amount of a loan, NOI, etc.

PROPERTY ANALYZER allows you to key in up to three loans defined by a dollar amount, the loan-to-value ratio, or as an unknown amount that the program itself determines. It allows you to key in the down payment as a dollar amount or as a percentage of price. At your option, it automatically adjusts property taxes to the new purchase price.

Key data in as prompted by display labels. Press one key to solve for the unknown variable. In the process 10 other values are automatically calculated, including cash-flow-before-tax, NOI, and Cap. rate.

CAP/CASH-ON-CASH

DNP%	COC%	CAP%	Ι%	TERM

CAP/CASH-ON-CASH considers the same area of information as PROPERTY ANALYZER but from a different angle. It is a shorter program that concentrates on the ratios and accommodates only one loan.

It offers five top level labels illustrated above. If you key data into four of the five labels you can solve for the fifth. It's as simple as that. It is ideal for a quick "What if?" sequence leading to an acceptable combination. Given the price or the NOI, lower level labels provide the dollar value for these ratios, as well as loan data and loan constant. PRICE/RATIO

GROSS GIM XP/V%	САР	NOI	PRICE
-----------------	-----	-----	-------

PRICE/RATIO creates six labels and provides intuitive access to all the relationships between these variables. For instance:

A property is advertised as offering a Gross Multiplier (GIM) of 7.6 and a Cap. rate of 9.4. What Expense and Vacancy ratio (XP/V%) was used by the selling party?

7.6	GIM	
9.4	CAP	XP/V%

XP/V% = 28.56

How much should you pay for a property with a gross income of \$159,000 if you apply a 35% ratio for Expense and Vacancy and you want a 9.25% Cap. rate?

159000	GROSS	
35	XP/V%	
9.25	CAP	PRICE

PRICE = 1,289,189.19

INCOME PROJECTION

It puts a specialized spreadsheet in your calculator.

Key in data as prompted by display labels and at the press of a single key the program calculates and updates 20 variables: gross rental income, operating expenses, before and after tax cash flow, balance on the loans, interest for the year, cost recovery, tax liability, etc. Press that same key again and all the values are updated for each successive year. You may recall these values or send them all to the HP infrared printer.

INCOME PROJECTION is so flexible that it even accommodates adjustable rate loans, automatically recalculating the loan payments based on the remaining balance and remaining term when the rate is changed.

It provides an ideal way to fill in CASH FLOW ANALYSIS forms or to get the bottom line fast on various projection scenarios.

PRODUCTS AND SERVICES

PRICE/RATIO	\$34.50
PROPERTY ANALYZER	\$34.50
INCOME PROJECTION	\$25.00
CAP/CASH-ON-CASH	\$25.00
ALL FOUR PROGRAMS:	119.00
Keying in single program:	\$20.00
Keying in the 4 programs:	\$60.00
HP 17BII with one \$25.00 program keyed in:	\$122.95
HP 17BII with one \$34.50 program keyed in:	\$132.45

Additional programs: add cost of the program and cost of keying in. HP 19BII: add \$50.00. Prices include mailing and handling. Overnight mail, add \$10.00. California residents, add sales tax.

As a DISCOUNT package, EDRIC CANE (1) the calculator, (2) the four programs,	SEMINARS offers: (3) already keyed in:
HP 17BII with 4 programs keyed in:	\$239.95
HP 19BII with 4 programs keyed in:	\$289.95

WHICH CALCULATOR TO CHOOSE?

Both are excellent and do the job equally well. The HP 19BII has a few extra features--in particular text handling and 4 line display. I find that I do not need the extra features for real estate and finance and prefer the HP 17BII for its shirt pocket size, easy to read display, more efficient handling of available memory, and greater convenience in handling irregular cash flow data. This, I admit, is a very personal choice.

ORDER by MAIL, PHONE, or FAX, with CHECK or VISA/MC

EDRIC CANE SEMINARS P.O.Box 1213 La Canada, Ca. 91011 (818) 957-3026 Fax (818) 248-8855

Zip: Box: NINE TEN ELEVEN TWELVE THIRTEEN

THANKS for sending in this registration card. This allows us to provide follow-up services such as: Updates, corrections, new applications, new products, etc.

You cannot buy, sell, or broker income properties without having at your fingertips the numbers provided by this program.

	GROSS	GIM	XP/V%	САР	NOI	PRICE
--	-------	-----	-------	-----	-----	-------

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159000	GROSS	
35	XP/V%	
9.25	CAP	PRICE

PRICE = 1,289,189.19



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