OSU

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Programmable Calculator
DECISION MAKER SERIES

FARM TRUCK AND AUTOMOBILE COST ANALYSIS

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Costs of operating farm trucks and automobiles have been magnified in recent years by rising costs of gasoline and diesel fuel. More recent increases in interest costs have increased the ownership costs of trucks and automobiles. In times past, frequent errands to town or from one farm to another were of little consequence. And, a farm or ranch might easily justify owning several types of vehicles to fit very specific needs. But, in the current situation several hundreds or even thousands of dollars may be required to cover costs of owning and operating farm trucks and automobiles.

Decisions concerning owning and operating farm vehicles should be made following a logical decision making process. First, it is important to determine which type or types of vehicles will fulfill current needs. If there are specific needs for a car, pickup, and truck, it is unlikely that it will be profitable to operate without either of the three. But, a pickup may serve the same purpose as a car in many cases, thus cutting ownership costs though operating costs may be higher. And, there are many different types and sizes of cars, pickups, and trucks. Each type and size will mean a different ownership and operating cost level that must be paid by the farming or ranching operation.

Farmers or ranchers need to be able to accurately evaluate the total costs of owning and operating alternative types and sizes of automotive equipment if they are to be able to make wise equipment decisions. Estimates of purchase costs and interest rates are readily available from dealerships. Estimates of salvage values at the end of specific periods of operation may be estimated from reference books of used vehicle values. Prices of fuel, insurance, license, and taxes, etc. are easily estimated from current list prices. Miles driven per year, miles per gallon of fuel, maintenance costs, etc. may be estimated from past use of similar vehicles or from dealer information.

The difficulty comes from translating all these factors into meaningful overall comparison figures. However, these calculations can be made easy by the use of the programmmable calculator. Such calculators can quickly and easily convert all of these individual costs into total cost per year and cost per mile of operation. These figures in turn allow meaningful comparisons of truck or automobile purchase alternatives and consequently allow better farm vehicle decisions.

The following vehicle cost analysis program is designed for use on a Texas Instruments TI-59 calculator with printer. It will print the inputs with labels. It will compute and print vehicle cost per year and cost per mile.

Input required

		STORAGE REGISTER	LABELS
1.	Beginning value, for new item, cash paid plus value of trade-in, for currently owned item, current value ($)	01	BVAL
2.	Ending value, estimated value of item at time of disposal ($)	02	EVAL
3.	Miles per year (miles)	03	MI/Y
4.	Years of ownership (years)	04	YRS
5.	Miles per gallon (miles)	05	MPG
6.	Fuel price ($/gallon)	06	FP/G
7.	License and Taxes ($/year)	07	LITX
8.	Insurance ($/year)	08	INSU
9.	Maintenance and repairs ($/year)	09	MAIN
10.	Interest rate (%/100)	10	INTR
11.	Tire life (miles/set)	11	TIRL
12.	Tire cost ($/set)	12	TIRC

Output

The program will print the input with labels. It will compute and print cost per year (TC/Y) and cost per mile (C/MI). TC/Y and C/MI can be recalled from storage registers 13 and 14, respectively.

Input

		Keys Pressed
Beginning (current) value ($)	BVAL	8000 STO 01
Estimate of ending value ($)	EVAL	1000 STO 02
Miles per year	MI/Y	10000 STO 03
Years of ownership	YRS	5 STO 04
Miles per gallon	MPG	20 STO 05
Fuel price ($/gal)	FP/G	1.4 STO 06
License and Taxes ($/yr)	LITX	100 STO 07
Insurance ($/yr)	INSU	350 STO 08
Maintenance and Repairs ($/yr)	MAIN	200 STO 09

Interest rate ($/100)	INTR	14 STO 10
Tire life (years)	TIRL	40000 STO 11
Tire cost ($/set)	TIRC	280 STO 12

Output

Press A

WHEELS ?
```
 8000.   BVAL
 1000.   EVAL
10000.   MI/Y
    5.   YRS
   20.   MPG    TC/Y = Cost per year ($)
  1.4   FP/G  is stored in register
  100.   LITX   13.
  350.   INSU
  200.   MAIN   C/MI = Cost per mile ($)
 0.14   INTR        is stored in
40000.   TIRL        register 14.
  280.   TIRC

3394.000  TC/Y
   0.339  C/MI
```

Worksheet

Enter program and labels. Program may be stored in BANK 1, on card 1, side 1. Labels may be stored in BANK 4, on card 1, side 2. (Data may also be stored in BANK 4 along with the labels.) Only one card is needed.

Item	Units	Keys Pressed	Display	Your Values		
BEGINNING VALUE	$	8000 STO 01	8000.			
ENDING VALUE	$	1000 STO 02	1000.			
MILES PER YEAR	MILES	10000 STO 03	10000.			
YEARS OF OWNERSHIP	YEARS	5 STO 04	5.			
MILES PER GALLON	MILES	20 STO 05	20.			
FUEL PRICE	$/ GALLON	1.4 STO 06	1.4			
LICENSE AND TAXES	$/YEAR	100 STO 07	100.			
INSURANCE	$/YEAR	350 STO 08	350.			
MAINTENANCE AND REPAIRS	$/YEAR	200 STO 09	200.			
INTEREST RATE	%/100	.14 STO 10	0.14			
TIRE LIFE	MILES/ SET	40000 STO 11	40000.			
TIRE COST	$/SET	280 STO 12	280.			
COMPUTE OUTPUT	COST/ MILE	A	0.3394			
	COST/ YEAR	RCL 13	3394.			

Equations

$$Depreciation = (BVAL - EVAL) \div (YRS)$$
$$Tires = [(MI/Y \times YRS) - TIRL] \div TIRL \times TIRC \div YRS$$
$$Fuel = MI/Y \div MPG \times FP/G$$
$$Interest\ (opportunity\ cost) = average\ investment \times INTR$$
$$= (BVAL + EVAL) \div 2 \times INTR$$
$$TC/Y = Depreciation + Tires + Fuel + Interest + LITX + INSU + MAIN$$
$$C/MI = TC/Y \div MI/Y$$

References

Bailey, Varel G., Gail Sieck, and James McGrann. "Motor Vehicle Cost Analysis." Iowa State University Cooperative Extension, Ames, FM 1730 (29), December, 1978.

McGrann, James M. "Motor Vehicle Cost Analysis." Texas Agricultural Extension Service, College Station, April, 1980.

Note

This program does not consider the income tax consequences of ownership. In general, for business vehicles, the after tax costs of ownership would be less than those computed. For example, depreciation, fuel, tires, maintenance, repairs, license, insurance, and interest paid, are income tax deductible items for vehicles used in the business. The OSU TI-59 "LOAN?" program may be used to calculate interest payments. The OSU TI-59 "ACRS DEPRECIATION" program may be used to calculate depreciation schedules.

Summary

The worksheet illustrates only one cost situation. The real value of programmable calculators come from their ability for analyzing numerous alternatives. Thus, worksheet space is provided suggesting alternative cost analyses. This allows program users to quickly evaluate such alternatives as costs of used versus new vehicles, costs of currently owned versus newly purchased vehicles, cost of two different vehicles capable of the same function, and operating costs of a number of different vehicles currently owned. It is necessary to develop realistic estimates of required inputs such as beginning or current and salvage values, fuel efficiency, repair and maintenance costs, and mileage for each vehicle evaluated. But, the calculator does all the "pencil pushing" once the appropriate numbers have been entered.

There are no guarantees of the "best" decision. There is always a risk that vehicles will perform differently than expected, that depreciation will exceed expectations, or that repair bills will run higher than anticipated. But, the odds of a good decision may be greatly increased by evaluating logical alternatives in a systematic way before a decision is made. Programmable calculators make such evaluations practical and easy.

For general information on hand-held computers see OSU Fact Sheet 306 "Farm and Ranch Decisions Aided by Hand-Held Computers."

Program Listing

Store in BANK 1, on card 1, side 1.

000	76	LBL	051	12	B	102	43	RCL	124	13	13

```
000  76 LBL        051  12  B        102  43 RCL       124  13  13
001  11  A         052  53  (        103  10  10       125  69 OP
002  98 ADV        053  43 RCL       104  85  +        126  06  06
003  69 OP         054  01  01       105  43 RCL       127  55  ÷
004  00  00        055  75  -        106  07  07       128  43 RCL
005  43 RCL        056  43 RCL       107  85  +        129  03  03
006  15  15        057  02  02       108  43 RCL       130  95  =
007  69 OP         058  54  )        109  08  08       131  42 STO
008  01  01        059  55  ÷        110  85  +        132  14  14
009  03  3         060  43 RCL       111  43 RCL       133  43 RCL
010  06  6         061  04  04       112  09  09       134  29  29
011  00  0         062  85  +        113  95  =        135  69 OP
012  00  0         063  53  (        114  42 STO       136  04  04
013  07  7         064  43 RCL       115  13  13       137  43 RCL
014  01  1         065  03  03       116  58 FIX       138  14  14
015  00  0         066  65  ×        117  03  3        139  69 OP
016  00  0         067  43 RCL       118  98 ADV       140  06  06
017  00  0         068  04  04       119  43 RCL       141  98 ADV
018  00  0         069  75  -        120  28  28       142  22 INV
019  69 OP         070  43 RCL       121  69 OP        143  58 FIX
020  02  02        071  11  11       122  04  04       144  91 R/S
021  69 OP         072  54  )        123  43 RCL
022  05  05        073  55  ÷
023  01  1         074  43 RCL
024  02  2         075  11  11
025  42 STO        076  65  ×
026  00  00        077  43 RCL
027  01  1         078  12  12
028  42 STO        079  55  ÷
029  59  59        080  43 RCL
030  01  1         081  04  04
031  06  6         082  85  +
032  42 STO        083  43 RCL
033  58  58        084  03  03
034  76 LBL        085  55  ÷
035  12  B         086  43 RCL
036  73 RC* IND    087  05  05
037  58  58        088  65  ×
038  69 OP         089  43 RCL
039  04  04        090  06  06
040  73 RC* IND    091  85  +
041  59  59        092  53  (
042  69 OP         093  43 RCL
043  06  06        094  01  01
044  01  1         095  85  +
045  44 SUM        096  43 RCL
046  59  59        097  02  02
047  44 SUM        098  54  )
048  58  58        099  55  ÷
049  97 DSZ        100  02  2
050  00  0         101  65  ×
```

Label Codes

Store in BANK 4, on card 1, side 1.

Code	Storage Register
4323171727.	15
14421327.	16
17421327.	17
30246345.	18
45353600.	19
30332200.	20
21336322.	21
27243744.	22
24313641.	23
30132431.	24
24313735.	25
37243527.	26
37243515.	27
1137156345.	28
1115633024.	29
0.	30