

Investment Evaluation Program

FRED BLEECHMAN

HAVE YOU EVER MADE AN INVESTMENT IN stocks or metals and then wondered some time later if you would have been better off leaving the money in the bank? Or perhaps you'd like to know how much an investment must grow before it equals what you'd make leaving the money in the bank, at regular bank interest. The Investment Evaluation Program, written in TRS-80 Level I BASIC uses only 2464 bytes of RAM (Random Access Memory), so it can be run on the least expensive 4K RAM TRS-80.

The program is very straightforward, and has a handy subroutine for calculating the number of days between any two 20th century dates. The calculations are based on daily compounding of interest; if you want to change to monthly, quarterly or yearly compounding, you'll have to change lines 160, 170, 200, 250 and the subroutine starting at line 500.

Using the program is easy! After carefully entering and checking each line, type RUN and enter.

To illustrate, let's say that on July 20, 1974 you purchased 404 ounces of silver bullion for \$2098.38, including a service charge of 60¢ per ounce and 6% sales tax. You would like to know how the value of that bullion now compares with the same amount of money if it had been left in savings at, say, 5.25% annual interest, compounded daily. The day you want to calculate up to is July 1, 1978.

Set up the program on the computer and enter your name, social security number, 2098.38 invested at 5.25 as the questions are asked. Enter 0 for the days calculation, then enter 7,20,74 for the start date and 7,1,78 for the end date. The computer will tell you the number of investment days is 1442. Enter this number and the computer will print out, after about 40 seconds, the total interest (\$483.58) and the new principal of \$2581.80. (Don't mind the 16¢ error in addition of the interest and new principal. As a matter of fact, even the interest calculated is slightly off, due to rounding-off during the 1442 multiplications!)

Enter 404 for the number of ounces of silver bullion and the value of silver per ounce on the calculation end date—say, 5.28. The computer now displays that your investment is worth \$2133.12 and that you have now lost \$448.676 (there's that slight inaccuracy again!) compared to having left your money in your savings account. It also tells you that silver on that date would have to be worth \$6.39058 per ounce for you to just break even!

You can then press break to end the program, or perform another calculation. This same program can also be used to determine the future value of stock, bonds, gold, silver, etc., for break-even at some future date if you plan a particular investment. **R-E**

R-E will publish reader letters telling how to adopt this program to run on other hobby computers. Let us hear from you.

```

100 CLS:P.
105 REM * COPYRIGHT 1978 FRED BLECHMAN * FOR TRS-80 I-4K *
110 P." INVESTMENT EVALUATION":P.:P.
112 P."THIS PROGRAM COMPARES AN INVESTMENT WITH PUTTING THE"
113 P."SAME AMOUNT OF MONEY IN A SAVINGS ACCOUNT WHERE IT EARNS"
114 P."DAILY INTEREST. IF YOU WISH TO CHANGE THE PERIOD TO"
115 P."MONTHLY OR YEARLY, CHANGE LINES 160,170,200 & 250. . . ."
116 P." . . . .AND THE SUBROUTINE STARTING AT LINE 500."
120 P.:P.
125 IN."WHAT IS YOUR FIRST NAME";A$
126 IN."WHAT IS YOUR SOCIAL SECURITY NUMBER";B$
130 A=0:B=0:C=0:D=0:E=0:F=0:G=0:H=0:I=0
131 J=0:K=0:L=0:M=0:N=0:O=0:P=0:Q=0:R=0
132 S=0:T=0:U=0:V=0:W=0:X=0:Y=0:Z=0
140 IN."WHAT IS THE DOLLAR AMOUNT INVESTED";P
150 IN."WHAT IS YOUR REGULAR SAVINGS INTEREST RATE(%)"R
155 P.
160 P."HOW MANY DAYS ARE INVOLVED? IF YOU WANT THE NUMBER"
170 P."OF DAYS CALCULATED (20TH CENTURY ONLY) ENTER 0";D
180 IF D=0 GOSUB 500
185 IF D=0 GOTO 155
186 P.
190 P." . . . .PATIENCE! . . . I'M CALCULATING THE ANSWER. . . ."
195 P." (TAKES ME ABOUT 10 SECONDS FOR 365 DAYS)"
200 S=R/36500:V=P
205 REM * CALCULATE INTEREST AND ADD TO PRINCIPAL *
210 FOR X=1 TO D
220 I=V*S:V=V+I:T=T+I
230 NEXT X
235 P.
240 P." THE TOTAL INTEREST IS";T
250 P."THE VALUE OF $";P;"AFTER";D;"DAYS AT";R;"% IS";V
255 P.
256 REM *COMPARE PRESENT VALUE OF INVESTMENT TO SAVINGS *
260 P."HOW MANY SHARES,BARS,OUNCES,ETC.,DO YOU OWN?"
265 IN." (TO RECALCULATE INVESTED AMOUNT,ENTER 0)";H
270 IF H=0 GOTO 130
275 P.
280 IN."WHAT IS THE PRESENT VALUE OF EACH SHARE,BAR,ETC.";M
290 Q=H*M
295 P.
300 P."YOUR INVESTMENT IS NOW WORTH $";Q;"A$";
310 Z=V-Q
315 P.
320 IF Z>0 P.A$;"-";B$;"YOU HAVE LOST $";Z;"COMPARED TO SAVING!"
330 IF Z<0 P.A$;"-";B$;"YOU HAVE EARNED $";-Z;"MORE THAN SAVINGS!"
335 P.:P."THE 'BREAK-EVEN' POINT IS $";V/H;"SHARES,BARS,ETC."
340 P.:P."PRESS BREAK TO END PROGRAM. . . . ."
350 GOTO 130
360 END
500 REM * SUBROUTINE FOR CALCULATING DAYS *
510 DATA 0,31,28,31,30,31,30,31,31,30,31,30,31
520 REM * DETERMINE NUMBER OF DAYS FROM 0 TO START *
525 P.
530 IN."WHAT IS THE INVESTMENT START DATE(M,D,Y)";A,B,C
540 E=A
550 GOSUB 1000
560 F=F+B
570 G=F+C*365
580 REM * DETERMINE NUMBER OF DAYS FROM 0 TO END *
590 IN."WHAT IS THE INVESTMENT END DATE(M,D,Y)";J,K,L
600 E=J
610 GOSUB 1000
620 F=F+K
630 N=F+L*365
640 REM * CALCULATE AND ADD LEAP YEARS *
650 O=INT((L-1900)/4):U=INT((C-1900)/4):W=O-U
660 X=(N-G)+W
665 P.
670 P."THE NUMBER OF INVESTMENT DAYS IS";X
680 RETURN
1000 F=0
1010 FOR X=1 TO E
1020 READ Y
1030 IF Y=28 THEN IF (L/4)-INT(L/4)=0 THEN Y=29
1040 F=F+Y
1050 NEXT X
1060 RESTORE
1070 RETURN

```



BUILD

Digital Timer for your Darkroom

The ideal timer for today's darkroom. This one counts down in your choice of minutes and seconds, or seconds only.

RAYMOND G. KOSTANTY

LAST MONTH WE INTRODUCED THIS unique digital darkroom timer. In this issue we will complete the article, presenting the remaining construction details and final setup, test, and operating steps.

As stated, the timer's internal capacity is 8 digits. To alert you that more than 4 digits have been entered, the output of IC16-10, which is high if any digit is present, is combined with D5 in IC16 and used to unshort LED 3 (allowing it to light) if any digit is present in the D5 position.

In the minutes/seconds range, 41 must be subtracted each time a whole number of minutes (2:00, 5:00, etc.) is displayed. The zero-zero detector output, IC14-1, goes high if a zero is present in both D8 and D9 positions. Pin 11 of IC4 is low when a zero is detected. Recalling that D8 goes high before D9 does, IC15-4 will be high during D8 if a zero is present. Latch IC15-d remembers this high and enables IC14-6, the J input to a flip-flop. If the zero is also present during D9, IC15-3 will go high and clock IC14. This makes IC14-1 go high and enables IC8-13, which changes the normal —, delay, blank and 1 sequence to the required —, delay, 4 and 1 sequence. Latches IC14-a and IC15-b and d are reset each time IC6-3 is high.

Counter IC1 divides the 60-Hz square-wave generated on the power supply

board by 6 to produce 10 Hz. The PAUSE switch halts timer operation by grounding the base of Q1 and the clock pulses into IC1.

On the power supply board, Fig. 4, a 555 IC is connected as an astable oscillator to generate the audio tone when gated on by the signal at input K. The tone's frequency is inversely proportional to R6, R7 and C2.

The relay directly switches the line voltage to the low-power safelight outlet when de-energized, and indirectly switches line voltage via the triac to the high-power enlarger outlet when energized. The maximum load that can be connected to the enlarger outlet is determined solely by the triac rating. Heavier safelight loads can be driven by adding a second triac as shown in the Fig. 4 inset.

Transistor Q1 amplifies the half-wave rectified 60-Hz signal applied to its base and converts it to an approximate square-wave.

Assembling the timer

Start assembly with the power supply. The board will accommodate speakers up to 2½ inches in diameter, but will be supplied with mounting holes for a 2-inch speaker. If using a larger speaker, drill one No. 28 hole (hole S in Fig. 9) such that the part of the hole closest to the speaker center is just tangent to the diameter of the speaker. Solder all small

components into their appropriate locations. If using a 309K as IC1, fasten it with two No. 6-32 × ⅜ screws with the head of one of them in firm contact with the foil which serves as the connection to the case of IC1, and install R1 and R2. Clip leads 1 and 2 to about ⅛ inch. Resistors R1 and R2 are not used when a 340-8 is used as IC1.

If the timer is to be used on 60-Hz power, do not use D2 or D3, but instead solder a jumper in the D2 position. (For 50-Hz operation, use a transformer with a 50-Hz or 50 to 60-Hz primary, and use D2 and D3, which will change the output of Q1 to 100 Hz. On the main board, cut the connection from IC1-1 to IC1-6, and jumper IC1-1 to IC1-13 to change IC1 to a decade divider to give the required 10-Hz output.) Mount the transformer with two No. 6-32 × ⅜ screws, again with the heads on the foil side. Solder the transformer, relay and IC2 in place. The IC may be soldered without a socket. The triac doesn't need a heat sink for loads up to 150 watts, and is supported by its leads. For loads between 150 and 600 watts, mount the triac on a heat sink whose thermal resistance doesn't exceed 3 °C-per-watt. In each of the three speaker holes, install a 6-32 × ⅜ screw, heads on the foil side, and fasten one nut firmly to each screw. If the holes were properly drilled, the speaker should be able to rest on the nuts just installed. Install one additional