HP-80
APPLICATION NOTES
PUBLISHED AS A SERVICE FOR USERS OF THE HP-80 FINANCIAL POCKET CALCULATOR

JANUARY 17, 1974 NO. 80-008

YIELD AND PERIODIC PAYMENT AMOUNT CALCULATIONS FOR LEASES WITH A BALLOON PAYMENT OR RESIDUAL VALUE

GENERAL

The calculations described in this note assume that the lease payments are ***annuity due*** (i.e., payments are made at the beginning of the payment periods) and the balloon payment or residual value occurs ***at the end of the last payment period.***

The symbolic values listed below will be used to demonstrate the keystroke sequences that follow.

A = number of payment periods in a year

B = number of years (and/or fraction of a year as appropriate)

C = annual yield rate expressed as a percent

D = periodic payment amount

E = initial value at the beginning of the lease

G = balloon payment or residual value amount

ANNUAL YIELD RATE FOR LEASES WITH A BALLOON PAYMENT OR RESIDUAL VALUE

The HP-80 yield to maturity calculation for bonds is used to solve this type of problem. The initial value of the lease corresponds to the bond price. Periodic lease payments correspond to bond coupons, and the balloon payment amount or residual value compares to the redemption (face) value of the bond.

The HP-80 bond calculations have built-in assumptions which are specifically tied to bond calculations.

Some of these are:

Bond coupons are paid semiannually

Time is entered in days

Bond price is expressed as a percent of redemption value

To change these assumptions and use another set of conditions, the data must be adjusted. This is the reason for all the numerical data entries (i.e., 365 [×] , 2 [÷]) and the [RCL] [÷] sequence in the general symbolic keystroke solution shown below.

Since the bond algorithm is being used, the same operating limits as expressed in Appendix D of the HP-80 Owner's Handbook apply. For this application these limits can be expressed as follows:

The absolute value of the number entered for [PMT] must be greater than .125 and less than the value entered for [PV] . The absolute value of the number entered for [PV] must be greater than 20 and less than 5000.

HEWLETT hp PACKARD 19310 Pruneridge Avenue, Cupertino, California 95014, Telephone 408-996-0100

5952-6107 01/74

Keystrokes:

1. G [SAVE ↑] D [−] 100 [÷] [STO]
2. A [SAVE ↑] B [×] 2 [÷] 365 [×] [n]
3. D [SAVE ↑] [SAVE ↑] 2 [×] [RCL] [÷] [PMT]
4. [x⇄y] E [x⇄y] [−] [RCL] [÷] [PV]
5. [▨] (gold key) [i] A [×] 2 [÷] ⟶ C

Example:

A local truck dealer has offered to lease an off-highway diesel truck for $80,000.00 (E), requiring equal monthly (A=12) payments of $1,625.00 (D) for 5 years (B) and a purchase option payment of $8,000.00 (G) due one month after the last payment. What annual yield will be realized on this contract if the purchase option is exercised?

Procedure:		*See Displayed:*
1.	8000 [SAVE ↑] 1625 [−] 100 [÷] [STO] ⟶	63.75
2.	12 [SAVE ↑] 5 [×] 2 [÷] 365 [×] [n] ⟶	10950.00
3.	1625 [SAVE ↑] [SAVE ↑] 2 [×] [RCL] [÷] [PMT] ⟶	50.98
4.	[x⇄y] 80000 [x⇄y] [−] [RCL] [÷] [PV] ⟶	1229.41
5.	[▨] (gold key) [i] 12 [×] 2 [÷] ⟶	11.03
		(an annual yield rate of 11.03%)

PERIODIC PAYMENT FOR LEASES WITH A BALLOON PAYMENT OR RESIDUAL VALUE

The balloon payment or residual value of a lease in effect reduces the value on which the lease payments are based, thus lowering the payment amount necessary to achieve the desired yield. The following keystrokes find this adjusted initial value and then solve for the periodic payment amount.

Keystrokes:

1. A [SAVE ↑] B [×] [n] C [SAVE ↑] A [÷] [STO] [i]
2. G [FV] [PV]
3. E [x⇄y] [−] 1 [RCL] [%] [+] [÷]
4. A [SAVE ↑] B [×] [n]
5. [x⇄y] [RCL] [i] [x⇄y] [PV]
6. [PMT] ⟶ D

Example:

Find the monthly (A=12) payment required for 5 years (B) to achieve an annual yield of 10% (C) if the cost of the equipment is $63,000.00 (E) and it will have a residual value of $6,300.00 (G) at the end of the lease.

Procedure:		*See Displayed:*
1.	12 [SAVE ↑] 5 [×] [n] 10 [SAVE ↑] 12 [÷] [STO] [i] ⟶	0.83
2.	6300 [FV] [PV] ⟶	3829.07
		(Present value of the residual value)
3.	63000 [x⇄y] [−] 1 [RCL] [%] [+] [÷] ⟶	58681.92
		(Adjusted initial value)
4.	12 [SAVE ↑] 5 [×] [n] ⟶	60.00
5.	[x⇄y] [RCL] [i] [x⇄y] [PV] ⟶	58681.92
6.	[PMT] ⟶	1246.82
		($1,246.82 monthly payment)