##
USING SOFTWARE TOOLS TO DEVELOP EFFICIENT SPREADSHEET TEMPL
CONTINUE DOWNWARDS - {HOME} TO BEGIN - (ALT-D) FOR DATA
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" A Study In Loan Amortizations Using LOTUS 1-2-3 "
Prepared For The Phoenix LOTUS 1-2-3 Study Group

by R. M. Ross, Jr.
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Revised -

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This template is designed to explore techniques of extending the potential of several LOTUS 1-2-3 "@-functions", and also to produce a variable term-length loan amortization schedule in which the principal and interest are calculated for each year and then accumulated into ongoing totals. After the completion of the loan term the variables calculate to 'not available', (also LOTUS "@NA"), which avoids the sometimes annoying phenomenon of "negative amortization" when payments continue after the loan balance is fully repaid. The user can print the entire amortization schedule using the (ALT-P) macro command. The first several years of the loan schedule data can be seen in bar-graph form by pressing the 'F10' key on graphics equipped machines. The user is encouraged to experiment with the settings of the graph data-ranges to produce different graphic representations.

The technique used to calculate the actual schedule of amortization is based upon the fact that the outstanding balance on a loan at any given time is exactly equal to the present value of the remaining payments on the loan discounted at the loan interest rate. This is the old familiar "time value of money" theory numerically applied to a practical and common problem. If you are feeling energetic, but rusty on the mathematics of this concept, then I suggest you consult the early chapters of any managerial finance book to find a discussion of the "present value" equations. These basic tools of the world of "Capital Budgeting" are repeatedly able to be

applied directly in LOTUS 1-2-3 to produce excellent results.

We will start by assuming that the life of the loan is no longer than fifty years, and also that the ability to choose between monthly and yearly compounding is a requirement. In addition to these assumptions, it is only required that the loan principal amount, the interest rate, the life, and the base year of the loan be specified. With this information provided we simply use the powerful @PV and @PMT functions of 1-2-3, and we can quickly have a complete amortization schedule calculated and ready to print.

The "twist" of this application lies in calculating the outstanding balance on the loan at the beginning of each year as the discounted present value of the remaining loan payments. With this series successfully calculated we can immediately produce the principal amortized during any year by subtracting that year's beginning balance from the next year's. The interest is then the difference between the total loan payments for that year and the year's principal amount. Voila, we now have a complete loan amortization!

An apparently more subtle issue is faced in making the loan term a variable. We must have our cell formulae extended throughout the entire fifty year range of our maximum term, yet we do not want to have extraneous and unsightly negative amortization occurring after the term of the loan is completed when the term is less than the maximum. This is dealt with by utilizing the conditional @IF command of 1-2-3. It makes it possible to determine whether the term of the loan is complete, and then we can force all subsequent rows to calculate to @NA. The test is done by taking the difference between the current year and the base year and comparing it to the term. If this difference is greater than the term we will have our formula enter the value @NA, otherwise we will have it calculate the appropriate value.

This entire worksheet was prepared using only the formulae in the first two rows. All subsequent rows were produced by simply copying the contents of the second row downward. The judicious use of relative and absolute referencing makes this possible. The formula in the BEGINNING BALANCE column looks difficult, but if you break

it into its component parts it is much easier to understand. It maximizes on formula efficiency to achieve results which otherwise might have required several columns to calculate. NOTE !!! The entire worksheet may be printed by pressing "ALT-P", and a bar graph of the first nine years may be had by pressing "F10". This text may be printed by using the "ALT-T" macro command.

I hope you enjoy this presentation. Feel free to call me if you have any questions or need some help. My office phone number is 941-1766, and my home phone is 945-9799. Also, you are welcome to distribute this worksheet to your friends if you like, but please do not sell it or alter it if you do. Thanks for your attention!!

Rick Ross
Scottsdale, AZ

# # # #
# # # #

*****AMORTIZATION DATA TABLE *****

ENTER LOAN PRINCIPAL AMOUNT HERE --->
ENTER LOAN INTEREST RATE HERE --->
ENTER LOAN LIFE (IN YEARS) HERE --->
ENTER BASE YEAR OF LOAN HERE --->
ENTER COMPOUNDING FREQUENCY HERE
(ZERO = YEARLY, NON-ZERO = MONTHLY) --->
ANNUAL LOAN PAYMENTS (PRINCIPAL + INTEREST)
MONTHLY PAYMENTS (IF APPLICABLE)

# # # #
# # # #

YEAR	BEGINNING BALANCE	PAYMENTS	PRINCIPAL
****	**********	**********	**********
1984	$85000.00	$11312.33	$503.59
1985	$84496.41	$11312.33	$571.68

1986	$83924.73	$11312.33	$648.99
1987	$83275.74	$11312.33	$736.74
1988	$82539.00	$11312.33	$836.37
1989	$81702.63	$11312.33	$949.46
1990	$80753.17	$11312.33	$1077.85
1991	$79675.32	$11312.33	$1223.60
1992	$78451.72	$11312.33	$1389.05
1993	$77062.67	$11312.33	$1576.88
1994	$75485.79	$11312.33	$1790.11
1995	$73695.68	$11312.33	$2032.17
1996	$71663.51	$11312.33	$2306.96
1997	$69356.54	$11312.33	$2618.91
1998	$66737.63	$11312.33	$2973.05
1999	$63764.59	$11312.33	$3375.06
2000	$60389.52	$11312.33	$3831.44
2001	$56558.08	$11312.33	$4349.54
2002	$52208.55	$11312.33	$4937.68
2003	$47270.86	$11312.33	$5605.36
2004	$41665.50	$11312.33	$6363.33
2005	$35302.17	$11312.33	$7223.78
2006	$28078.39	$11312.33	$8200.59
2007	$19877.80	$11312.33	$9309.48
2008	$10568.32	$11312.33	$10568.32
2009	$0.00	#N/A	#N/A
2010	#N/A	#N/A	#N/A
2011	#N/A	#N/A	#N/A
2012	#N/A	#N/A	#N/A
2013	#N/A	#N/A	#N/A
2014	#N/A	#N/A	#N/A
2015	#N/A	#N/A	#N/A
2016	#N/A	#N/A	#N/A
2017	#N/A	#N/A	#N/A
2018	#N/A	#N/A	#N/A
2019	#N/A	#N/A	#N/A
2020	#N/A	#N/A	#N/A
2021	#N/A	#N/A	#N/A
2022	#N/A	#N/A	#N/A
2023	#N/A	#N/A	#N/A
2024	#N/A	#N/A	#N/A
2025	#N/A	#N/A	#N/A

2026	#N/A	#N/A	#N/A
2027	#N/A	#N/A	#N/A
2028	#N/A	#N/A	#N/A
2029	#N/A	#N/A	#N/A
2030	#N/A	#N/A	#N/A
2031	#N/A	#N/A	#N/A
2032	#N/A	#N/A	#N/A
2033	#N/A	#N/A	#N/A

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MACRO TO PRINT
ENTIRE AMORTIZATION SCHEDULE

*	*
/P	PRINT
P	PRINTER
R	RANGE
TABLE~	"RANGE NAM
P	FORM FEED
A	ALIGN
G	GO
/XQ	QUIT

MACRO TO GOTO DATA

*	*
{GOTO}	
DATA~	
/XQ	

#	#	#
#	#	#

	$85000.00
	12.7500%
	25
	1984
	1
	$11312.33
	$942.69

#	#	#
#	#	#

	CUMULATIVE	CUMULATIVE
INTEREST	PRINCIPAL	INTEREST
**********	**********	**********
$10808.75	$503.59	$10808.75
$10740.65	$1075.27	$21549.40

$10663.35	$1724.26	$32212.74
$10575.59	$2461.00	$42788.33
$10475.97	$3297.37	$53264.30
$10362.87	$4246.83	$63627.17
$10234.48	$5324.68	$73861.65
$10088.74	$6548.28	$83950.39
$9923.28	$7937.33	$93873.67
$9735.45	$9514.21	$103609.12
$9522.22	$11304.32	$113131.34
$9280.16	$13336.49	$122411.50
$9005.37	$15643.46	$131416.88
$8693.42	$18262.37	$140110.30
$8339.29	$21235.41	$148449.58
$7937.27	$24610.48	$156386.85
$7480.89	$28441.92	$163867.74
$6962.80	$32791.46	$170830.54
$6374.65	$37729.14	$177205.19
$5706.97	$43334.50	$182912.16
$4949.01	$49697.83	$187861.17
$4088.55	$56921.61	$191949.72
$3111.74	$65122.20	$195061.46
$2002.85	$74431.68	$197064.32
$744.01	$85000.00	$197808.33
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#N/A	#N/A	#N/A
#N/A	#N/A	#N/A
#N/A	#N/A	#N/A
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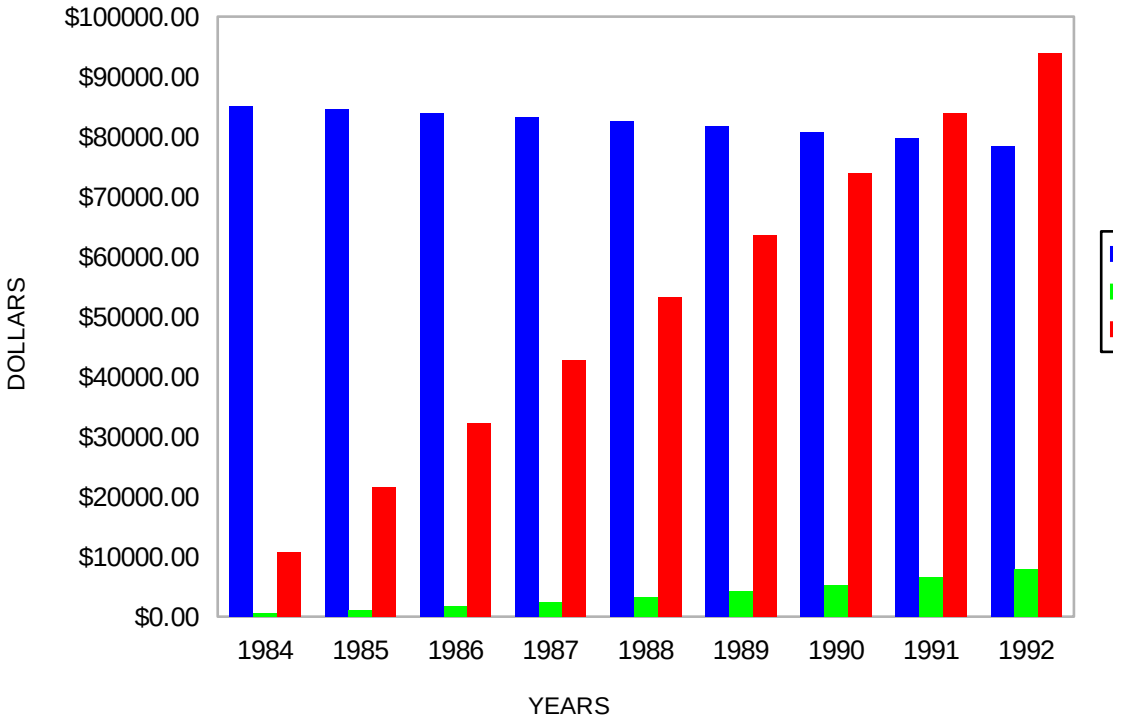
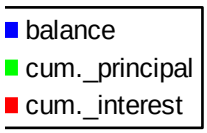
#N/A	#N/A	#N/A
#N/A	#N/A	#N/A
#N/A	#N/A	#N/A

/P
P
R
TEXT~
P
A
G
/XQ

LOAN AMORTIZATION SCHEDULE

by Richard M. Ross, Jr.




balance
cum._principal
cum._interest