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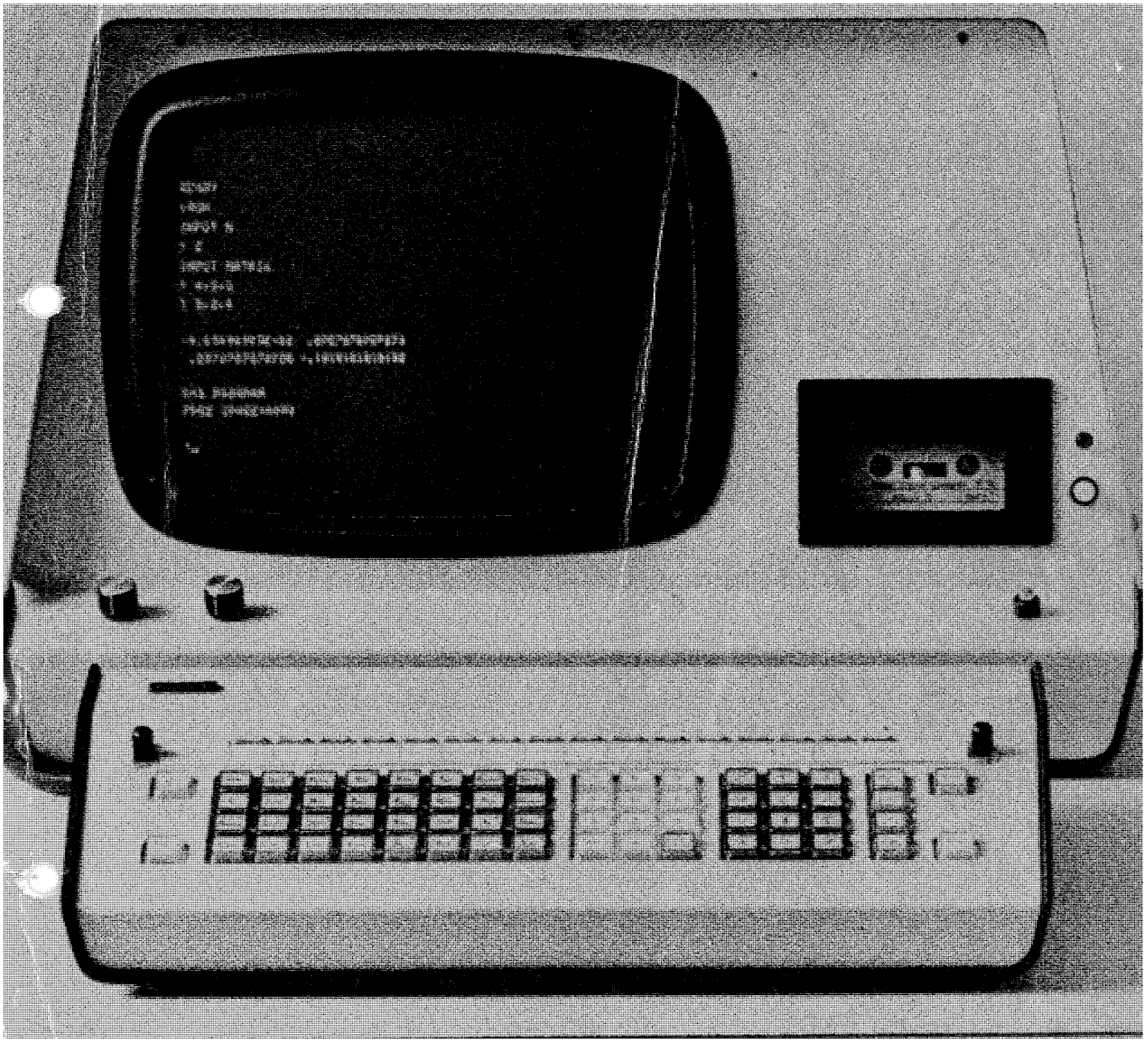

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2200 General Library

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GLBR 22B

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INTRODUCTION

Programs of varying complexity and from different fields have been included in this library to provide a sample of the usefulness and versatility of the 2200 series calculators. Programs have been selected bearing in mind their use and possible application. Each one contains a set of instructions which is easy to follow; at least one example per program has been given to facilitate checking and enhance comprehension.

In loading the program tapes advantage may be taken of SKIP and BACKSPACE features. These two features and their use are explained on a following page.

Programs are designed to display all output on the CRT. However, they may be adapted for printing the output on either the 2201 (typewriter) or the 2221 (Hi-Speed Printer).

Note: All operating instructions assume you are at the beginning of the block you desire.

If you wish to load programs that are separated by other blocks, you may use one of two methods.

(1) LOAD each block until you reach the desired block. This would require the repetition of 4 keystrokes for each block between your current position and your desired position. The 4 keystrokes would be:

[CLEAR] , [CR/LF] , [LOAD] , [CR/LF]

This method would require you to REWIND the tape if you desire a block which you have passed.

(2) Using the SKIP feature will allow you to go from one block to another with less work, and the BACKSPACE feature will allow you to "back-up" to a block that you have passed.

a) SKIP - Subtract from the Block # corresponding to where you wish to be, the Block # corresponding to your current location then subtract 1. This is the # of files to skip to place you at the beginning of the desired block.

For Example,

The last block loaded was 4; you wish to load block 12.

12 - 4 - 1 = 7

Key S, K, I, P, 7, F, [CR/LF]

b) BACKSPACE - Subtract from the block # corresponding to your present location, the block # corresponding to your desired location then add 1. This is the # of files to backspace to place you at the beginning of the desired block.

For Example,

The last block loaded was 12; you wish to load block 4,

12 - 4 + 1 = 9

Key B, A, C, K, S, P, A, C, E, 9, F, [CR/LF]

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To change output device from 2216 (CRT display) to 2201 (typewriter) or 2221 (Hi-Speed Printer) the following procedure is used:

1. Choose what output is to be displayed or typed.

2. Insert a statement with the following information:
   For CRT display
   Statement # SELECT PRINT 005
   For Typewriter (2201)
   Statement # SELECT PRINT 211
   For Hi-Speed Printer (2221)
   Statement # SELECT PRINT 215

It may be advisable to change print to the CRT at the end of the program.

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BUSINESS & FINANCE

BLOCK	PROGRAM TITLE
1	NUMBER OF SEMI-ANNUAL PERIODS BETWEEN TWO DATES (360 DAY/YEAR)
2	BOND DOLLAR PRICE
3	BOND YIELD (BASIS)
4	DISCOUNT & PRICE ON DISCOUNT COMMERCIAL PAPER
5	INTEREST BEARING COMMERCIAL PAPER
6	NUMBER OF DAYS BETWEEN TWO DATES
7	MORTGAGE PAYMENT
8	DAY OF YEAR
9	ANNUITY
10	ANNUAL DEBT PAYMENT
11	PRESENT INVESTMENT
12	NOMINAL INTEREST RATE
13	EFFECTIVE INTEREST RATE
14	INVESTMENT WITHDRAWAL
15	INITIAL INVESTMENT
16	SUM TOTAL FROM A SINGLE INVESTMENT
17	PERIODIC INVESTMENT
18	SUM FROM PERIODIC INVESTMENT
19	DEPRECIATION CHARGE (DECLINING BALANCE)
20	DECLINING BALANCE DEPRECIATION RATE
21	SALVAGE VALUE
22	AVERAGE GROWTH RATE & PROJECTED SALES

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WANG 2200 SERIES PROGRAM

NUMBER OF SEMI-ANNUAL PERIODS BETWEEN TWO DATES (360 DAYS)
TITLE

PF.02-2200.01A-00FI-1-0 6/1/73
NUMBER DATE
2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Calculates the number of semi-annual periods between two dates (360 day-year)

BLOCK	SAVE "NAME"	BYTES REQUIRED
1		308

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PROGRAM DESCRIPTION

Calculates the number of semi-annual periods between 2 dates, based on a 360-day year.

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

Determine the number of semi-annual periods from March 3, 1967 to March 3, 1978.

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — FIRST DATE?
4. Key MONTH , DAY , YEAR [CR/LF] — 4. Key 3 , 3 , 1 9 6 7 [CR/LF]
5. INSTRUCTION — SECOND DATE?
6. Key MONTH , DAY , YEAR [CR/LF] — 6. Key 3 , 3 , 1 9 7 8 [CR/LF]
7. Read: — SEMI-ANNUAL PERIODS = 22
8. INSTRUCTION — MORE INPUT? (1 = YES, 0 = NO)

If you have more input Key 1 [CR/LF] and go to Step 3. Otherwise, Key 0 [CR/LF] and go to Step 10.

9. Key 0 [CR/LF] or Key 1 [CR/LF] — 9. Key 0 [CR/LF]
10. — END PROGRAM

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WANG 2200 SERIES PROGRAM

BOND DOLLAR PRICE

TITLE

PF.02-2200.01A-00FI-2-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Calculates the dollar price of a bond whose maturity is $\geq$ 6 months.

BLOCK	SAVE "NAME"	BYTES REQUIRED
2		1278

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PROGRAM DESCRIPTION

This program calculates a dollar price for a bond whose maturity is $\geq$ 6 months.

The program requests an increment value, the inputed yield is decreased by a value 5 times the increment value and the dollar price for 11 yields, ranging from (yield - 5* increment) to (yield + 5*increment) in increments of the increment value, is calculated.

I. Dollar Price (for maturities between 6 months and 40 yrs., 3 mos.

$$\text{price} = \frac{C(T-1)}{2} + \frac{R + \frac{100C}{Y}\left[\left(\frac{Y}{200} + 1\right)^{N+1} - 1\right]}{\left(\frac{Y}{200} + 1\right)^{N+T}}$$

where C = Coupon
Y = Yield
R = redemption value (100 unless otherwise stated, ((Call Price)))
N = number of whole semi-annual periods.
T = fractional number of semi-annual periods (omitting odd days)

The dollar price is calculated at the two months bracketing the time to maturity; then the interpolation for the odd number of days is applied.

EXAMPLE:

Settlement Date: 5/3/70 = 5(30) + 3 + 70(360) = 25353
Maturity Date: 2/21/89 = 2(30) + 21 + 89 (360) = 32121

D_{SM}: Number of days between settlement date and maturity date = 6768

$\frac{6768}{30}$ = 225.6 (months) (fractional portion of a month used for interpolation)

$\frac{225}{6}$ = 37.5 (semi-annual periods

where N = 37 (whole semi-annual periods)

and T = .5 (fractional number of semi-annual periods)

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PROGRAM DESCRIPTION (Cont)

To find dollar price:

1. Solve equation where N + T = 37.5

2. Solve equation where N + T = 37.66666666
   (add 1 month $\left(\frac{1}{6}\right)$ to 37.5)

3. Interpolate for the .6 month remaining - round off the answer three places after decimal point.

when N + T = 37.5 the dollar price is 81.973(A)

N + T = 37.66666666 the dollar price is 81.933 (B)

then B = A = -.04; (.6) (-.04) = -.024

Dollar Price = A + (-.024) = 81.949

NOTE: If C = Y (coupon = yield), then the dollar price for all non-callable bonds is stated as 100 (par).

II. Dollar Price for Long-Term Bonds

This is calculated in the same manner as a dollar price for bonds with maturities between 6 months and 40 years 3 months except that the interpolation is between semi-annual periods (instead of months). Instead of adding 1/6 to N+T before solving the equation a second time, add 1 to N+T.

EXAMPLE

Settlement Date: 5/3/70 = 5 (30) + 3 + 70 (360) = 25353
Maturity Date: 2/28/11 = 2 (30) + 28 + 11 (360) = 4048

D_{SM} = Number of days between settlement date and maturity date = 4048 - 25353
= -21305 (since this is a negative value, add 36000 . . 14695 days)

$\frac{14695}{180}$ = 81.6388888888 (semi-annual periods)

where N + T = 81

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PROGRAM DESCRIPTION (Cont)

To find dollar price:

1. Solve equation where N + T = 81

2. Solve equation where N + T = 82
   (add 1 semi-annual period to 81)

3. Interpolate for the odd days remaining (.6388888888) - round off the answer three places after the decimal point.

when n + t = 81 the dollar price is 101.725 (A)

n + t = 82 the dollar price is 101.730 (B)

then B - A = .005; (.6388888888) (.005) = .003194444444

Dollar Price = A + (.003194444444) = 101.728

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

Find the dollar price for a bond given the following data:

Settlement date = 1/1/72
Maturity date = 1/1/92
Coupon (%) = 7
Yield = 5
Increment of .5

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — ENTER SETTLEMENT DATE IN THE FORM MMDDYY
4. Key SETTLEMENT DATE [CR/LF] — 4. Key 1 0 1 7 2 [CR/LF]
5. INSTRUCTION — ENTER COUPON (%)
6. Key COUPON (%) [CR/LF] — 6. Key 7 [CR/LF]
7. INSTRUCTION — ENTER MATURITY DATE IN THE FORM MMDDYY
8. Key MATURITY DATE [CR/LF] — 8. Key 1 0 1 9 2 [CR/LF]
9. INSTRUCTION — ENTER YIELD
10. Key YIELD (%) [CR/LF] — 10. Key 5 [CR/LF]
11. INSTRUCTION — ENTER INCREMENT VALUE
12. Key INCREMENT VALUE [CR/LF] — 12. Key . 5 [CR/LF]

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13. Read:

		YIELD TO MATURITY	$ PRICE TO MATURITY
	1	2.500	170.485
	2	3.000	159.831
	3	3.500	150.039
	4	4.000	141.033
	5	4.500	132.741
	6	5.000	125.102
	7	5.500	118.058
	8	6.000	111.557
	9	6.500	105.552
	10	7.000	100.000
STOP	11	7.500	94.862

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WANG 2200 SERIES PROGRAM

BOND YIELD (BASIS)

TITLE

PF.02-2200.01A-00FI-3-0 — 6/1/73

NUMBER — DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Calculates the basis of a bond whose maturity $\geq$ 6 months.

BLOCK	SAVE "NAME"	BYTES REQUIRED
3		1818

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PROGRAM DESCRIPTION

Calculates the yield (basis) of a bond whose maturity $\geq$ 6 months.

The program requests an increment value, the inputed $ Price being decreased by a value 5 times the increment value and the yield for 11 dollar prices, ranging from ($ price - 5 * increment) to ($ price + 5 * increment) in increments of the increment value, is calculated.

The yield is calculated by the Newton-Rhapson Method:

$$B = A - \frac{F(x)}{F'(x)}$$

where $F(x)$ = $ price formula - Price

$F'(x)$ = 1st derivative of $ price formula - Price

For information on interpolation see Bond Dollar Price Program.

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

Find the yield for the following data:

Settlement Date	= 6/15/72
Maturity Date	= 6/15/92
Coupon (%)	= 7
Dollar Price	= 125.102
Increment Value	= .7

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — ENTER SETTLEMENT DATE IN THE FORM MMDDYY
4. Key SETTLEMENT DATE [CR/LF] — 4. Key 6 1 5 7 2 [CR/LF]
5. INSTRUCTION — ENTER COUPON (%)
6. Key COUPON (%) [CR/LF] — 6. Key 7 [CR/LF]
7. INSTRUCTION — ENTER MATURITY DATE IN THE FORM MMDDYY
8. Key MATURITY DATE [CR/LF] — 8. Key 6 1 5 9 2 [CR/LF]
9. INSTRUCTION — ENTER $ PRICE
10. Key $ PRICE [CR/LF] — 10. Key 1 2 5 . 1 0 2 [CR/LF]
11. INSTRUCTION — ENTER INCREMENT VALUE
12. Key INCREMENT VALUE [CR/LF] — 12. Key . 7 [CR/LF]

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13. Read:

	YIELD TO MATURITY	$ PRICE TO MATURITY
1	5.243	121.602
2	5.194	122.302
3	5.145	123.002
4	5.096	123.702
5	5.048	124.402
6	5.000	125.102
7	4.952	125.802
8	4.905	126.502
9	4.858	127.202
10	4.812	127.902
11	4.766	128.602

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WANG 2200 SERIES PROGRAM

DISCOUNT & PRICE ON DISCOUNT COMMERCIAL PAPER
TITLE

PF-02-2200.01A-00FI-4-0 6/1/73
NUMBER DATE

2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Calculates the discount and net cost on discount commercial paper.

BLOCK	SAVE "NAME"	BYTES REQUIRED
4		304

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PROGRAM DESCRIPTION

Calculates the discount and net cost on discount commercial paper.

$$\text{Discount} = P\left(\frac{R}{100}\right)\left(\frac{M}{360}\right)$$

$$\text{Cost} = P - \text{Discount}$$

where:

P = principal

R = discount rate

M = days to maturity

NOTE: Calculations made on an actual no. of days/360-day year basis.

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right.

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OPERATING INSTRUCTIONS	EXAMPLE
	Find the discount and cost of $450,000 commercial paper due in 40 days, purchased at 5.25%.

1.	Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]	
2.	Key [RUN] [CR/LF]	
3.	INSTRUCTION	PRINCIPAL?
4.	Key PRINCIPAL [CR/LF]	4. Key 4 5 0 0 0 0 [CR/LF]
5.	INSTRUCTION	DISCOUNT RATE (%)
6.	Key DISCOUNT RATE (%) [CR/LF]	6. Key 5 . 2 5 [CR/LF]
7.	INSTRUCTION	DAYS TO MATURITY?
8.	Key DAYS TO MATURITY [CR/LF]	8. Key 4 0 [CR/LF]
9.	Read:	DISCOUNT = 2625 COST = 447375
10.	INSTRUCTION	MORE INPUT? (1 = YES, 0 = NO)
11.	Key 0 [CR/LF] or Key 1 [CR/LF]	11. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 12.

12.	END PROGRAM

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WANG 2200 SERIES PROGRAM

INTEREST BEARING COMMERCIAL PAPER
TITLE

PF.02-2200.01A-00FI-5-0 6/1/73
NUMBER DATE
2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Calculates the interest rate and accrued interest at maturity on interest bearing commercial paper.

BLOCK	SAVE "NAME"	BYTES REQUIRED
5		334

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PROGRAM DESCRIPTION

Calculates the interest rate and accrued interest at maturity on interest bearing commercial paper.

$$\text{Interest Rate, } I = \text{Discount} * \frac{360}{M * \text{PRICE}}$$

$$\text{Accured Interest} = P * I * \frac{M}{360}$$

where:

$$\text{Discount} = P * \frac{R}{100} * \frac{M}{360}$$

Price = P - Discount

P = principal

R = discount rate

M = days to maturity.

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

Find the interest rate and accrued interest at maturity of a $250,000, 30-day note offered at 5.5% discount.

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — PRINCIPAL?
4. Key PRINCIPAL [CR/LF] — 4. Key 2 5 0 0 0 0 [CR/LF]
5. INSTRUCTION — DISCOUNT RATE?
6. Key DISCOUNT RATE (%) [CR/LF] — 6. Key 5 . 5 [CR/LF]
7. INSTRUCTION — DAYS TO MATURITY?
8. Key DAYS TO MATURITY [CR/LF] — 8. Key 3 0 [CR/LF]
9. Read: — INTEREST RATE = 5.525324403514
   ACCRUED INTEREST = $1151.109250733
10. INSTRUCTION — MORE INPUT? (1 = YES, 0 = NO)
11. Key 0 [CR/LF] — 11. Key 0 [CR/LF]
    or
    Key 1 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 12.

12. END PROGRAM

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WANG 2200 SERIES PROGRAM

NUMBER OF DAYS BETWEEN TWO DATES
TITLE

PF.02-2200.01A-00FI-6-0 6/1/73
NUMBER DATE
2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Calculates the actual number of days between two dates.

BLOCK	SAVE "NAME"	BYTES REQUIRED
6		738

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PROGRAM DESCRIPTION

Calculates the actual number of days between two dates.

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

Determine the number of days between January 1, 1960 and January 1, 1970.

1.	Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]	
2.	Key [RUN] [CR/LF]	
3.	INSTRUCTION	FIRST DATE (M, D, Y)?
4.	Key MONTH , DAY , YEAR [CR/LF]	4. Key 1 , 1 , 1 9 6 0 [CR/LF]
5.	INSTRUCTION	SECOND DATE?
6.	Key MONTH , DAY , YEAR [CR/LF]	6. Key 1 , 1 , 1 9 7 0 [CR/LF]
7.	Read	NO. OF DAYS = 3653
8.	INSTRUCTION	MORE INPUT? (1 = YES, 0 = NO)
9.	Key 0 [CR/LF] or Key 1 [CR/LF]	9. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 10.

10. END PROGRAM

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WANG 2200 SERIES PROGRAM

MORTGAGE PAYMENT

TITLE

PF.05-2200.01A-00FI-1-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Computes the monthly payment and total interest on a loan.

BLOCK	SAVE "NAME"	BYTES REQUIRED
7		712

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PROGRAM DESCRIPTION

Computes the monthly payment and total interest on a loan.

$$M = \frac{P * \frac{I}{1200}}{1 - (1+I)^{-N}}$$

$$T = N * M - P$$

where:

M = monthly payment

T = total interest

P = principal

I = annual interest rate (%)

N = no. of payments

If requested, a mortgage table listing principal outstanding, interest and principal repayment for each month in the life of the loan will be printed out.

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

Principal = $20,000

Annual Interest Rate (%) = 5.5

Term = 20 yrs. 3 mos.

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION — PRINCIPAL?

4. Key PRINCIPAL [CR/LF] — 4. Key 2 0 0 0 0 [CR/LF]

5. INSTRUCTION — ANNUAL INTEREST RATE (%)

6. Key ANNUAL INTEREST RATE (%) [CR/LF] — 6. Key 5 . 5 [CR/LF]

7. INSTRUCTION — LOAN PERIOD (YEARS, MONTHS)?

8. Key YEARS , MONTHS [CR/LF] — 8. Key 2 0 , 3 [CR/LF]

9. Read — MONTHLY PAYMENT = $136.65

TOTAL INTEREST = $13205.95

10. INSTRUCTION — DO YOU WANT MORTGAGE TABLE? (1 = YES, 0 = NO)

11. Key 0 [CR/LF] — 11. Key 1 [CR/LF]
    or
    Key 1 [CR/LF]

If you do not want table, go to Step 14.

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OPERATING INSTRUCTIONS (Cont)

12.

MONTH	PRINCIPAL OUTSTANDING	INTEREST	PRINCIPAL REPAYMENT
1	20000	91.67	44.98
2	19955.02	91.46	45.19
3	19909.83	91.25	45.4
4	19864.43	91.05	45.6
5	19818.83	90.84	45.81
6	19773.02	90.63	46.02
7	19727	90.42	46.23
8	19680.77	90.2	46.45
9	19634.32	89.99	46.66
10	19587.66	89.78	46.87
11	19540.79	89.56	47.09
12	19493.7	89.35	47.3

13. After each 12 months are displayed the program will stop. To continue, Key [CONTINUE], [CR/LF].

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

DAY OF YEAR

TITLE

PF.02-2200.01A-00FI-7-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Computes the day of the week that a given date falls on.

BLOCK	SAVE "NAME"	BYTES REQUIRED
8		635

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PROGRAM DESCRIPTION

Computes the day of the week that a given date falls on.

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

Determine what day of the week did August 25, 1949 and December 12, 1951 fall on.

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION

ENTER MONTH, DAY, YEAR (FOR EXAMPLE: 1, 21, 1972)
TO END PROGRAM ENTER 0, 0, 0

4. Key MONTH , DAY , YEAR [CR/LF]

4. Key 8 , 2 5 , 1 9 4 9 [CR/LF]

5. Read

THURSDAY

6. INSTRUCTION

ENTER MONTH, DAY, YEAR

If you wish to determine more data, continue as in Step 4. Otherwise, Key 0 , 0 , 0 [CR/LF] and go to Step 7.

Key 1 2 , 1 2 , 1 9 5 1 [CR/LF]

WEDNESDAY

ENTER MONTH, DAY, YEAR

Key 0 , 0 , 0 [CR/LF]

END PROGRAM

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WANG 2200 SERIES PROGRAM

ANNUITY

TITLE

PF.06-2200A-00FI-1-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Calculates the accumulated amount of an annuity.

BLOCK	SAVE "NAME"	BYTES REQUIRED
9		308

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PROGRAM DESCRIPTION

Calculates the accumulated amount of an annuity by:

$$\text{Amount} = R * S_{\overline{n}|i}$$

where:

R = amount of each payment

$$S_{\overline{n}|i} = \frac{(1+i)^n - 1}{i}$$

i = interest rate/period

n = term of annuity (time from beginning of 1st payment to the end of the last)

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OPERATING INSTRUCTIONS

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION
4. Key R [CR/LF]
5. INSTRUCTION
6. Key i [CR/LF]
7. INSTRUCTION
8. Key n [CR/LF]
9. Read:
10. INSTRUCTION
11. Key 0 [CR/LF]
    or
    Key 1 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 12.

12.

EXAMPLE

R = $1000

i = 4-1/2%

n = 14 years

AMOUNT OF EACH PAYMENT

4. Key 1 0 0 0 [CR/LF]

INTEREST RATE/PERIOD (%)

6. Key 4 . 5 [CR/LF]

TERM OF ANNUITY

8. Key 1 4 [CR/LF]

AMOUNT = $18932.11

MORE INPUT (1 = YES, 0 = NO)

11. Key 0 [CR/LF]

END PROGRAM

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WANG 2200 SERIES PROGRAM

ANNUAL DEBT PAYMENT

TITLE

PF.06-2200.01A-00FI-2-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Calculates the annual debt payment.

BLOCK	SAVE "NAME"	BYTES REQUIRED
10		458

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PROGRAM DESCRIPTION

Calculates the annual debt payment by:

$$CR = (P-L)\left[\frac{i\,(1+i)^N}{(1+i)^N - 1}\right] + Li$$

where:

CR = annual debt payment

i = annual interest rate

N = life of study period (yrs.)

L = prospective net salvage value at end of N yrs.

P = price or first cost

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

What would the annual debt payment be on a $25,000 computer with a salvage value of $2000 after 15 years if the cost of money was 6.8%/yr?

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — PRICE
4. Key PRICE OR FIRST COST [CR/LF] — 4. Key 2 5 0 0 0 [CR/LF]
5. INSTRUCTION — ANNUAL INTEREST RATE (%)
6. Key ANNUAL INTEREST RATE [CR/LF] — 6. Key 6 . 8 [CR/LF]
7. INSTRUCTION — LIFE OF STUDY PERIOD (YRS)
8. Key LIFE [CR/LF] — 8. Key 1 5 [CR/LF]
9. INSTRUCTION — PROSPECTIVE NET SALVAGE VALUE AT END OF STUDY PERIOD
10. Key SALVAGE VALUE [CR/LF] — 10. Key 2 0 0 0 [CR/LF]
11. Read: — ANNUAL DEBT PAYMENT = $2629.47
12. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)
13. Key 0 [CR/LF] — 13. Key 0 [CR/LF]
    or
    Key 1 [CR/LF]

If you have more inputs, go to Step 3. Otherwise, go to Step 14.

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

PRESENT INVESTMENT

TITLE

PF.06-2200.01A-00FI-3-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Finds the present amount necessary to provide a sum S after N years.

BLOCK	SAVE "NAME"	BYTES REQUIRED
11		402

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PROGRAM DESCRIPTION

Finds the present amount necessary to provide a sum S after N years.

$$P = \frac{S}{\left(1 + \frac{i}{M}\right)^{NM}}$$

where:

P = present amount

S = sum after N years

M = no. of compounding periods/yr.

N = total years of investment

i = yearly interest rate

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

How much would you need to invest at 5.85% compounded quarterly to yield $12,000 at the end of 17 years?

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — SUM AFTER N YRS.
4. Key DESIRED SUM [CR/LF] — 4. Key 1 2 0 0 0 [CR/LF]
5. INSTRUCTION — NO. OF COMPOUNDING PERIODS/YR.?
6. Key NO. OF COMPOUNDING PERIODS/YR [CR/LF] — 6. Key 4 [CR/LF]
7. INSTRUCTION — ANNUAL INTEREST RATE (%)
8. Key ANNUAL INTEREST RATE (%) [CR/LF] — 8. Key 5 . 8 5 [CR/LF]
9. INSTRUCTION — NO. OF YRS. OF INVESTMENT
10. Key LIFE OF INVESTMENT [CR/LF] — 10. Key 1 7 [CR/LF]
11. Read — PRESENT AMOUNT = $4470.99
12. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)
13. Key 0 [CR/LF] or Key 1 [CR/LF] — 13. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 14.

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

NOMINAL INTEREST RATE
TITLE

PF.13-2200.01A-00FI-1-0 6/1/73
NUMBER DATE

2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Finds the nominal interest rate for a given principal invested for N years compounded M times/year amounting to sum S.

BLOCK	SAVE "NAME"	BYTES REQUIRED
12		354

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PROGRAM DESCRIPTION

Finds the nominal (stated) interest rate for a given principal invested for N years compounded M times/year amounting to sum S.

$$i = M(S/P)^{NM} - M$$

where:

i = nominal interest rate

M = no. of compounding periods/year

P = principal

S = sum at end of N years

N = no. of years.

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

If you invested $1000 for 2 years and got back $1116, what would be the nominal interest rate if it was compounded monthly?

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — PRINCIPAL?
4. Key PRINCIPAL [CR/LF] — 4. Key 1 0 0 0 [CR/LF]
5. INSTRUCTION — NO. OF COMPOUNDING PERIODS/YR.?
6. Key NO. OF COMPOUNDING PERIODS/YR [CR/LF] — 6. Key 1 2 [CR/LF]
7. INSTRUCTION — SUM AT END OF N YEARS?
8. Key SUM AFTER N YEARS [CR/LF] — 8. Key 1 1 1 6 [CR/LF]
9. INSTRUCTION — NO. OF YEARS?
10. Key N [CR/LF] — 10. Key 2 [CR/LF]
11. Read: — NOMINAL INTEREST RATE = 5.50010952
12. INSTRUCTION — MORE INPUT? (1 - YES, 0 = NO)
13. Key 0 [CR/LF] or Key 1 [CR/LF] — 13. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 14.

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

EFFECTIVE INTEREST RATE

TITLE

PF.13-2200.01A-00FI-2-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Finds the effective interest rate for a principal invested for N years amounting to sum S.

BLOCK	SAVE "NAME"	BYTES REQUIRED
13		288

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PROGRAM DESCRIPTION

Finds the effective (actual) interest rate for a principal invested for N years amounting to sum S.

$$i = (S/P)^{1/N} - 1$$

where:

i = effective annual interest rate

P = principal

S = sum at end of N years

N = no. of years

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

If you invested $1000 for 2 years and got back $1,116, what would be the effective interest rate?

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — PRINCIPAL?
4. Key PRINCIPAL [CR/LF] — 4. Key 1 0 0 0 [CR/LF]
5. INSTRUCTION — SUM AFTER N YRS?
6. Key SUM AFTER N YEARS [CR/LF] — 6. Key 1 1 1 6 [CR/LF]
7. INSTRUCTION — NO. OF YRS?
8. Key N [CR/LF] — 8. Key 2 [CR/LF]
9. Read: — EFFECTIVE INTEREST RATE = 5.64090117
10. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)
11. Key 0 [CR/LF] — 11. Key 0 [CR/LF]
    or
    Key 1 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 12.

12. END PROGRAM

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WANG 2200 SERIES PROGRAM

INVESTMENT WITHDRAWAL
TITLE

PF.06-2200.01A-00FI-4-0 6/1/73
NUMBER DATE

2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Finds the amount that can be withdrawn from an initial investment M times/year for N years, leaving nothing at end, if the interest rate is I.

BLOCK	SAVE "NAME"	BYTES REQUIRED
14		430

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PROGRAM DESCRIPTION

Finds the amount that can be withdrawn from an initial investment M times/year for N years, leaving nothing at the end, if the interest rate is i.

$$R = P \left[\frac{i/M}{(1 + i/M)^{NM} - 1} + \frac{i}{M} \right]$$

where:

R = amount of withdrawal

P = initial investment

i = nominal annual interest rate

M = no. of withdrawals/year

N = no. of years.

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

How much could you withdraw each month for 4 years from a $12,000 investment leaving nothing at end if it were invested at 5.5%?

1.	Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]	
2.	Key [RUN] [CR/LF]	
3.	INSTRUCTION	INITIAL INVESTMENT?
4.	Key INITIAL INVESTMENT [CR/LF]	4. Key 1 2 0 0 0 [CR/LF]
5.	INSTRUCTION	ANNUAL INTEREST RATE IN THE FORM X.XX?
6.	Key A.I.R.(%) [CR/LF]	6. Key 5 . 5 [CR/LF]
7.	INSTRUCTION	NO. OF WITHDRAWALS?YR.?
8.	Key NO. OF WITHDRAWALS/YR. [CR/LF]	8. Key 1 2 [CR/LF]
9.	INSTRUCTION	NO. OF YRS.?
10.	Key NO. OF YEARS [CR/LF]	10. Key 4 [CR/LF]
11.	Read	AMOUNT OF WITHDRAWAL = $279.08
12.	INSTRUCTION	MORE INPUT (1 = YES, 0 = NO)
13.	Key 0 [CR/LF] or Key 1 [CR/LF]	13. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 19.

14.	END PROGRAM

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WANG 2200 SERIES PROGRAM

INITIAL INVESTMENT

TITLE

PF.05-2200.01A-00FI-5-0 6/1/73

NUMBER **DATE**

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Finds the investment necessary to enable one to withdraw a given amount, m times/year for N years.

BLOCK	SAVE "NAME"	BYTES REQUIRED
15		416

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PROGRAM DESCRIPTION

Finds the investment necessary to enable one to withdraw a given amount, m times/year for N years.

$$P = R \left[\frac{(1 + i/M)^{NM} - 1}{\frac{i}{M} (1 + i/M)^{NM}} \right]$$

where:

P = initial investment

R = amount of withdrawal

i = nominal annual interest

M = no. of withdrawal periods/year

N = no. of years

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

How much would you need to invest at 5.5 so that you could withdraw $250, 9 times/yr. for 4 years leaving nothing at the end?

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — AMOUNT OF WITHDRAWAL?
4. Key AMT OF WITHDRAWAL [CR/LF] — Key 2 5 0 [CR/LF]
5. INSTRUCTION — ANNUAL INTEREST RATE (%)?
6. Key A.I.R. (%) [CR/LF] — 6. Key 5 . 5 [CR/LF]
7. INSTRUCTION — NO. OF WITHDRAWALS/YR.?
8. Key NO. OF WITHDRAWALS/YR. — 8. Key 9 [CR/LF]
9. INSTRUCTION — NO. OF YEARS?
10. Key NO. OF YEARS [CR/LF] — 10. Key 4 [CR/LF]
11. Read: — INITIAL INVESTMENT = $8056.79
12. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)?
13. Key 0 [CR/LF] or Key 1 [CR/LF] — 13. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 14.

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

SUM TOTAL FROM A SINGLE INVESTMENT

TITLE

PF.06-2200.01A-00FI-6-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Finds the sum total from a single investment

BLOCK	SAVE "NAME"	BYTES REQUIRED
16		382

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PROGRAM DESCRIPTION

Finds the sum total from a single investment by:

$$S = P\ (1 + i/M)^{NM}$$

where:

S = sum at end of N years

P = principal

i = annual interest rate

M = no. of compounding periods/yr.

N = no. of years.

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

If you invested $3001.82 at 5.85% compounded quarterly, what would be the sum after 17 years?

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — INVESTMENT?
4. Key INVESTMENT [CR/LF] — 4. Key 3 0 0 1 . 8 2 [CR/LF]
5. INSTRUCTION — ANNUAL INTEREST RATE IN THE FORM X.XX?
6. Key A.I.R. (%) [CR/LF] — 6. Key 5 . 8 5 [CR/LF]
7. INSTRUCTION — NO. OF COMPOUNDING PERIODS/YR.?
8. Key NO. OF COMPOUNDING PERIODS/YR [CR/LF] — 8. Key 4 [CR/LF]
9. INSTRUCTION — NO. OF YRS. INVESTED?
10. Key NO. OF YRS. INVESTED [CR/LF] — 10. Key 1 7 [CR/LF]
11. Read: — SUM = $8056.80
12. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)?
13. Key 0 [CR/LF] or Key 1 [CR/LF] — 13. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 14.

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

PERIODIC INVESTMENT

TITLE

PF.06-2200.01A-00FI-7-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Finds the periodic investment R required to yield sum S.

BLOCK	SAVE "NAME"	BYTES REQUIRED
17		393

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PROGRAM DESCRIPTION

Finds the periodic investment R required to yield sum S if R is invested at interest rate I, M times/year for N years.

$$R = S \left[\frac{i/M}{(1 + i/M)^{NM} - 1} \right]$$

where:

R = end of period investment

S = sum after N years

i = nominal annual interest rate

M = no. of investments/year

N = no. of years

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

How much would you need to invest monthly at 5.5% to yield $12,000 after 17 years?

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — SUM AFTER N YEARS?
4. Key SUM AFTER N YRS. [CR/LF] — 4. Key 1 2 0 0 0 [CR/LF]
5. INSTRUCTION — ANNUAL INTEREST RATE IN FORM X.XX?
6. Key A.I.R. (%) [CR/LF] — 6. Key 5 . 5 [CR/LF]
7. INSTRUCTION — NO. OF INVESTMENTS/YR.?
8. Key NO. OF INVESTMENTS/YR. [CR/LF] — 8. Key 1 2 [CR/LF]
9. INSTRUCTIONS — NO. OF YRS.?
10. Key NO. OF YRS. [CR/LF] — 10. Key 1 7 [CR/LF]
11. Read: — PERIODIC INVESTMENT = $35.67
12. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)?
13. Key 0 [CR/LF] or Key 1 [CR/LF] — 13. Key 0 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 14.

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

SUM FROM PERIODIC INVESTMENT

TITLE

PF.06-2200.01A-00FI-8-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Finds the sum resulting from an amount invested at a given interest rate, m times/year for N years.

BLOCK	SAVE "NAME"	BYTES REQUIRED
18		393

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PROGRAM DESCRIPTION

Finds the sum resulting from an amount invested at a given interest rate, M times/year for N years.

$$S = R \left[\frac{(1 + i/M)^{NM} - 1}{i/M} \right]$$

where:

S = sum after N years

R = end of period investment

i = nominal annual interest rate

M = no. of investments/year

N = no. of years

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

If you invested $23.95 monthly at 5.5%, how much would you have after 17 years?

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — AMOUNT OF PERIODIC INVESTMENT?
4. Key AMT OF PERIODIC INVESTMENT [CR/LF] — 4. Key 2 3 . 9 5 [CR/LF]
5. INSTRUCTION — ANNUAL INTEREST RATE IN THE FORM X.XX?
6. Key A.I.R. (%) [CR/LF] — 6. Key 5 . 5 [CR/LF]
7. INSTRUCTION — NO. OF INVESTMENTS/YR?
8. Key NO. OF INVESTMENTS/YR. [CR/LF] — 8. Key 1 2 [CR/LF]
9. INSTRUCTION — NO. OF YRS.
10. Key NO. OF YRS. [CR/LF] — 10. Key 1 7 [CR/LF]
11. Read: — SUM = $8056.49
12. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)?
13. Key 0 [CR/LF] — 13. Key 0 [CR/LF]

    or

    Key 1 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 14.

14. END PROGRAM

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WANG 2200 SERIES PROGRAM

DEPRECIATION CHARGE (DECLINING BALANCE)
TITLE

PF.05-2200.01A-00FI-2-0 6/1/73
NUMBER DATE

2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Finds the depreciation charge in a given year for a given declining balance depreciation rate.

BLOCK	SAVE "NAME"	BYTES REQUIRED
19		346

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PROGRAM DESCRIPTION

Finds the depreciation charge in a given year for a given declining balance depreciation rate.

$$C = Pf\,(1 - f)^{Y-1}$$

where:

C = depreciation charge

P = price or first cost

f = declining balance depreciation rate

Y = age in years at the end of year to be considered

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

What is the depreciation write off in the 9th year for a $25,000 computer if the declining balance depreciation rate is 15.497%?

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — PRICE?
4. Key PRICE [CR/LF] — Key 2 5 0 0 0 [CR/LF]
5. INSTRUCTION — DEPRECIATION RATE (%)?
6. Key DEPRECIATION RATE (%) [CR/LF] — 6. Key 1 5 . 4 9 7 [CR/LF]
7. INSTRUCTION — AGE AT END OF YEAR TO BE CONSIDERED?
8. Key YEAR [CR/LF] — 8. Key 9 [CR/LF]
9. Read — DEPRECIATION CHARGE = $1007.31
10. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)?
11. Key 0 [CR/LF] — 11. Key 0 [CR/LF]
    or
    Key 1 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 12.

12. END PROGRAM

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WANG 2200 SERIES PROGRAM

DECLINING BALANCE DEPRECIATION RATE
TITLE

PF.05-2200.01A-00FI-3-0 6/1/73
NUMBER DATE

2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Finds the declining balance depreciation rate.

BLOCK	SAVE "NAME"	BYTES REQUIRED
20		308

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PROGRAM DESCRIPTION

Finds the declining balance depreciation rate such that the book (listed) value of an item equals the estimated salvage value at the end of an N year life.

$$f = 1 - (L/P)^{1/N}$$

where:

f = declining balance depreciation rate

N = life of study period (years)

L = prospective net salvage value after N years

P = price or first cost

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

What declining balance depreciation rate would make the book value of a $25,000 computer exactly equal to the prospective salvage value ($2,000) at end of 15 years?

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — PRICE?
4. Key PRICE [CR/LF] — 4. Key 2 5 0 0 0 [CR/LF]
5. INSTRUCTION — NET SALVAGE VALUE AFTER N YEARS?
6. Key SALVAGE VALUE [CR/LF] — 6. Key 2 0 0 0 [CR/LF]
7. INSTRUCTION — LIFE OF STUDY PERIOD (YRS.)?
8. Key LIFE (YRS) [CR/LF] — 8. Key 1 5 [CR/LF]
9. Read: — DEPRECIATION RATE = 15.496895244
10. INSTRUCTION — MORE INPUT (1 = YES, 0 = NO)
11. Key 0 [CR/LF] — 11. Key 0 [CR/LF]
    or
    Key 1 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 12.

12. END PROGRAM

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WANG 2200 SERIES PROGRAM

SALVAGE VALUE

TITLE

PF.05-2200.01A-00FI-4-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Finds the book salvage value at the end of N years given the declining balance depreciation rate.

BLOCK	SAVE "NAME"	BYTES REQUIRED
21		278

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PROGRAM DESCRIPTION

Finds the book salvage value at the end of N years given the declining balance depreciation rate.

$$L = P (1 - f)^N$$

where:

L = book salvage value

P = price or first cost

f = declining balance depreciation rate

N = age of item (years)

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION
4. Key PRICE [CR/LF]
5. INSTRUCTION
6. Key DEPRECIATION RATE (%) [CR/LF]
7. INSTRUCTION
8. Key AGE (YRS.) [CR/LF]
9. Read
10. INSTRUCTION
11. Key 0 [CR/LF]
    or
    Key 1 [CR/LF]

If you have more input, go to Step 3. Otherwise, go to Step 12.

12.

EXAMPLE

What is the salvage value of a 9 year old $25,000 computer if the declining balance depreciation rate is 15.497%.

PRICE?

4. Key 2 5 0 0 0 [CR/LF]

DEPRECIATION RATE (90)?

6. Key 1 5 . 4 9 7 [CR/LF]

AGE (YRS)?

8. Key 9 [CR/LF]

SALVAGE VALUE = $5492.74

MORE INPUT (1 = YES, 0 = NO)?

11. Key 0 [CR/LF]

END PROGRAM

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WANG 2200 SERIES PROGRAM

AVERAGE GROWTH RATE & PROJECTED SALES

TITLE

PS.05-2200.01A-00FI-5-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Computes the "average" growth rate in sales, earnings, etc. of a company over N years.

BLOCK	SAVE "NAME"	BYTES REQUIRED
22		1101

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PROGRAM DESCRIPTION

Computes the "average" growth rate in sales, earnings, etc. of a company over N years. Given the total sales S_o, S_1, . . ., S_n of a company for each year over a period of N years, we perform a linear regression to determine the "average" growth rate, G. Using G we can project what the sales of the company should be in the mth year by:

$$S_n = S_o (1 + G)^m$$

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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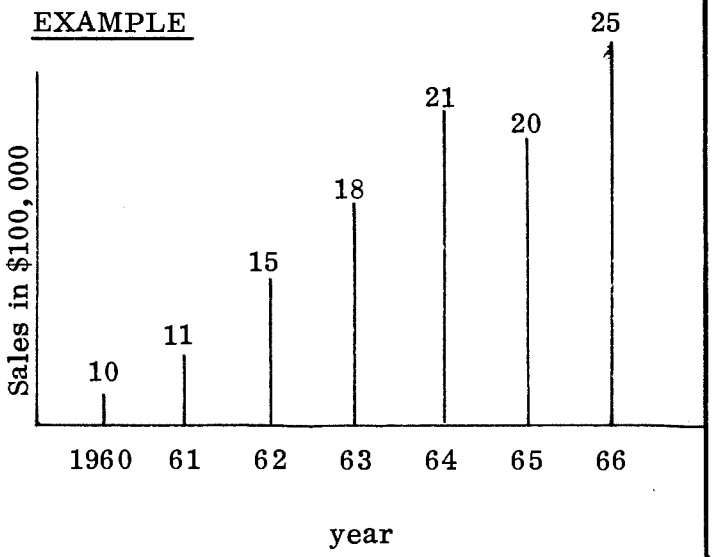
OPERATING INSTRUCTIONS

EXAMPLE



For the above data, compute the average growth rate, and projected sales for years 1968, 1970 and 1972.

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION — FIRST YEAR FOR WHICH FIGURES ARE KNOWN?

4. Key FIRST YEAR [CR/LF] — 4. Key 1 9 6 0 [CR/LF]

5. INSTRUCTION — LAST YEAR FOR WHICH FIGURES ARE KNOWN?

6. Key LAST YEAR [CR/LF] — 6. Key 1 9 6 6 [CR/LF]

7. INSTRUCTION — SALES FOR PERIOD (YEAR)

8. Key 1st YEAR'S SALES [CR/LF] — 8. Key 1 0 [CR/LF]

The program will ask for all sales figures in the same manner as Step 7, 8. After all figures have been entered, go to Step 9.

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OPERATING INSTRUCTIONS (Cont)

9.	Read	'AVE.' GROWTH RATE = 16.5200896494 PERCENT
10.	INSTRUCTION	YEAR OF INTEREST (FOR PROJECTED SALES)
11.	Key YEAR [CR/LF]	11. Key 1 9 6 8 [CR/LF]
12.	Read	PROJECTED SALES FOR YEAR 1968 = 35.10952

If you wish to calculate more projected sales, go to Step 10. Otherwise, Key 0 [CR/LF] .

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PLOT ROUTINES

BLOCK	PROGRAM TITLE
23	PLOT
24	MULTI-PLOT
25	POLAR PLOT
26	T-PLOT
27	HISTOGRAM

UTILITY SUBROUTINES

28	UTILITY

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WANG 2200 SERIES PROGRAM

PLOT

TITLE

PMi.07-2200.01A-00FI-1-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Plots a function of X, f(x) on a set of coordinate axes.

BLOCK	SAVE "NAME"	BYTES REQUIRED
23		1061

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PROGRAM DESCRIPTION

Plots a function of X, f(x), on a set of coordinate axes. The user must supply the following information:

1. Function to be plotted.
2. Lower limit of X (X_1).
3. Upper limit of X (X_2).
4. Increment by which X is to be increased between each plotted point.
5. Lower limit of Y (Y_1).
6. Upper limit of Y (Y_2).
7. Increment by which Y is to be increased.

The X-axis runs vertically. If Y = 0 is in the specified range of Y and is actually attained when incrementing from Y_1 to Y_2, then the true X-axis is printed. Otherwise, the X-axis is the line Y = Y_1. The Y-axis runs horizontally. The true Y-axis is printed if X= 0 is in the range of X and is actually attained. Otherwise, the Y-axis is the line X = X.

For typewriter output, insert the following two statements in program:

```
 47 SELECT PRINT 211
900 SELECT PRINT 005
```

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

Plot Y = sin(2X)

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

Enter the function in line 1 of the program as follows:

1 DEF FNC(X) = function of X.

For example, the function $f(x) = X^2 \cos(X)$ would be entered as follows:

1 DEF FNC(X) = X 2*cos(X)

2. Key 1 [DEFFN] C (X) = f(x) [CR/LF]

2. Key 1 [DEFFN] C (X) = SIN(2 * X) [CR/LF]

3. Key [RUN] [CR/LF]

4. INSTRUCTION

LEFT X-ENDPOINT, RIGHT X-ENDPOINT, X-INCREMENT?

5. Key LEFT X-END POINT ,
   RIGHT X-END POINT ,
   X-INCREMENT, [CR/LF]

5. Key - 2 , 2 , . 2 [CR/LF]

6. INSTRUCTION

LOWER Y-END POINT, UPPER Y-END POINT, Y-INCREMENT?

7. Key LOWER Y-END POINT ,
   UPPER Y-END POINT ,
   Y-INCREMENT [CR/LF]

7. Key - 2 , 2 , . 1 [CR/LF]

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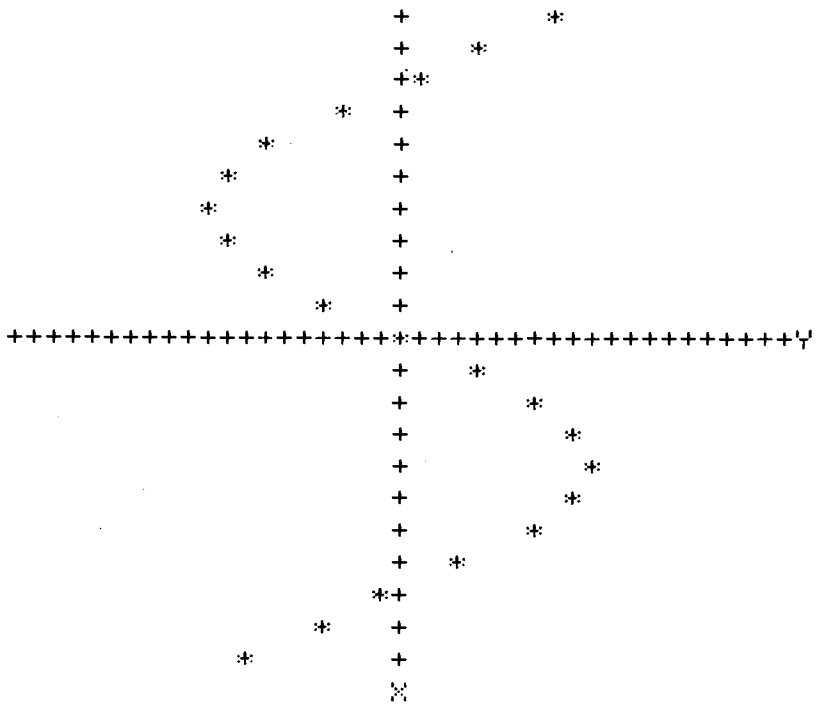
OPERATING INSTRUCTIONS (Cont)

8. Read Output

X-AXIS IS THE LINE: Y = 0
Y-AXIS IS THE LINE: X = 0



END PROGRAM

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WANG 2200 SERIES PROGRAM

MULTI-PLOT

TITLE

PMi. 07-2200. 01A-00FI-2-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Plots from 1 to 9 functions of X on the same set of coordinate axes.

BLOCK	SAVE "NAME"	BYTES REQUIRED
24		1392

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PROGRAM DESCRIPTION

Plots from 1 to 9 functions of X on the same set of coordinate axes. The user must supply the following information:

1. Number of functions being plotted.
2. Each function to be plotted.
3. Lower limit of $X(X_1)$.
4. Upper limit of $X(X_2)$.
5. Increment by which X is to be increased between each plotted point.
6. Lower limit of $Y(Y_1)$.
7. Upper limit of $Y(Y_2)$.
8. Increment by which Y is to be increased.

The X-axis will run vertically and be the line $Y = Y_1$. The Y-axis will run horizontally and be the line $X = X_1$; the number of steps in the Y-axis must be ≤ 70.

The first function will be represented by the character "1", the second by "2", etc. If more than 1 function is to be plotted at the same location, an asterisk is printed. Values of the function outside the specified range of Y are ignored.

For typewriter output, insert the following two statements in the program:

```
205 SELECT PRINT 211
555 SELECT PRINT 005
```

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

Plot: $Y = \frac{1}{4}X^2 - X$

$Y = e^{-x}$

$Y = \sin(2X)$

$Y = \cos(2X)$

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

Enter the number of functions to be plotted (n) in line 10 of the program as follows:

10 DATA n

Enter the functions to be plotted on lines 15-90 of the program as follows:

15 Y(1) = first function of X.
20 Y(2) = second function of X.
.
.
.

2. Key 1 0 [DATA] n [CR/LF]
3. Key 1 5 Y (1) = ... [CR/LF]
   Key 2 0 Y (2) = ... [CR/LF]
   .
   .
   .
4. Key [RUN] [CR/LF]

2. Key 1 0 [DATA] 4 [CR/LF]
3. Key 1 5 Y (1) = X * X / 4 - X, [CR/LF]

   Key 2 0 Y (2) = 1 / EXP(X) [CR/LF]

   Key 2 5 Y (3) = SIN(2 * X) [CR/LF]

   Key 3 0 Y (4) = cos(2 * X) [CR/LF]

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OPERATING INSTRUCTIONS (Cont)

5. INSTRUCTION

LEFT X-ENDPOINT, RIGHT X-ENDPOINT,
X-INCREMENT?
?

6. Key LEFT X-ENDPOINT ,
RIGHT X-ENDPOINT ,
X-INCREMENT CR/LF

6. Key 0 , 4 , . 1 CR/LF

7. INSTRUCTION

LOWER Y-ENDPOINT, UPPER Y-ENDPOINT,
Y-INCREMENT?

8. Key LOWER Y-ENDPOINT ,
UPPER Y-ENDPOINT ,
Y-INCREMENT CR/LF

8. Key - 1 , 1 , . 0 5 CR/LF

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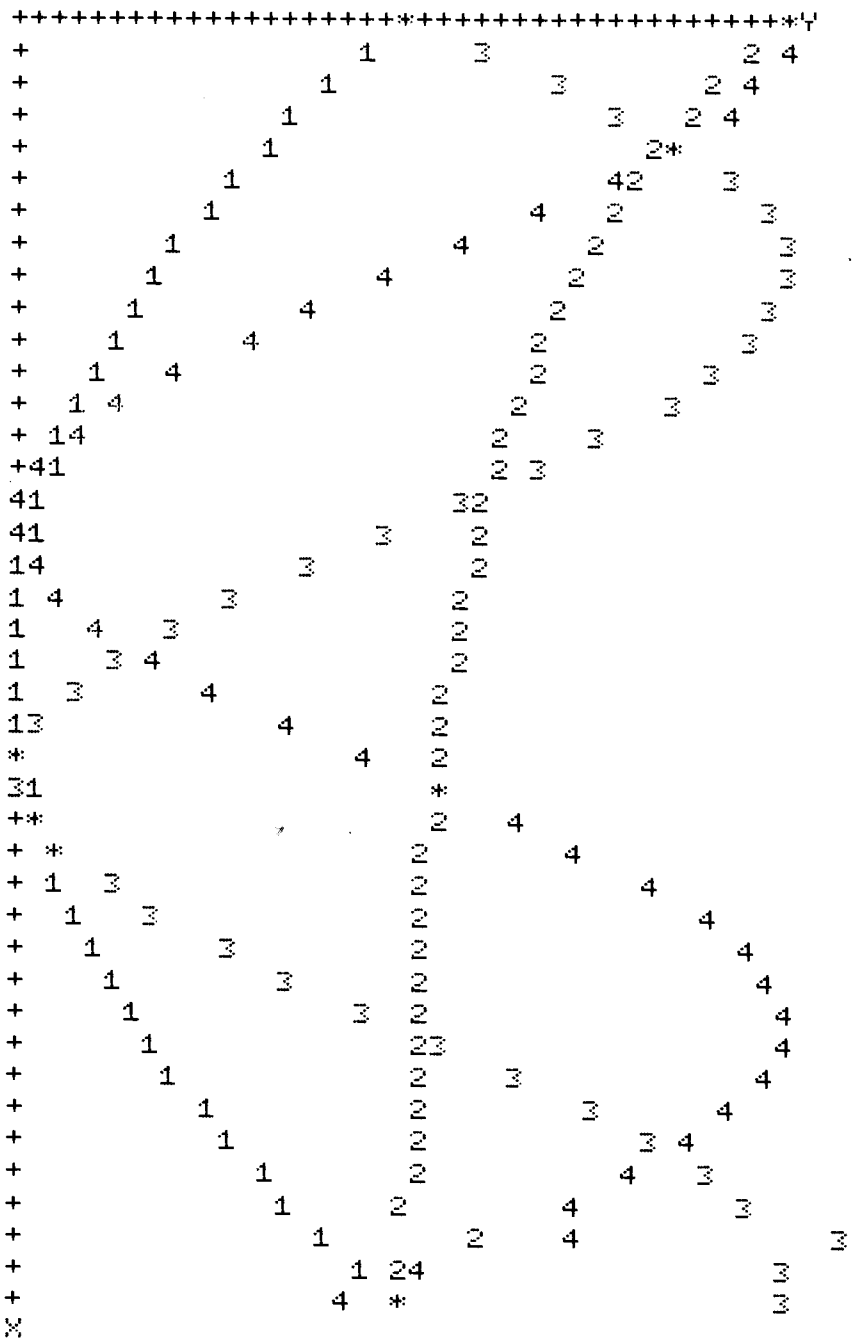
9. Read Output

X-AXIS IS THE LINE: Y = -1
Y-AXIS IS THE LINE: X = 0



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WANG 2200 SERIES PROGRAM

POLAR PLOT

TITLE

PMi. 07-2200. 01A-00FI-3-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Plots a function f(θ) in polar coordinates.

BLOCK	SAVE "NAME"	BYTES REQUIRED
25		2636

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PROGRAM DESCRIPTION

Plots a function f(θ) in polar coordinates. The X-axis (0 = zero degrees) runs horizontally; the Y-axis runs vertically. Each axis is 6 inches long. The user must specify the value of the positive end of the X-axis.

For typewriter output, insert the following two statements in the program:

```
  2 SELECT PRINT 211
205 SELECT PRINT 005
```

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

Enter the function, f(θ), in line 5 of the program as follows:

5 DEF FNC(T) = "function"

For example, the function f(θ) = 4 sin (2θ) would be entered as follows:

5 DEF FNC(T) = 4 * sin (2 * T)

NOTE: The letter T replaces θ.

2. Key 5 [DEFFN] C (T) = f(T)

3. Key [RUN] [CR/LF]

4. INSTRUCTION

5. Key POS. ENDPOINT OF X-AXIS

EXAMPLE

Plot f(x) = 2 * (1 - 2 * sin((X)))

max. value of positive X-axis is 7.

2. Key 5 [DEFFN] C (T) = 2 * (1 - 2 * sin(T)) [CR/LF]

POS. ENDPOINT OF X-AXIS

5. Key 7 [CR/LF]

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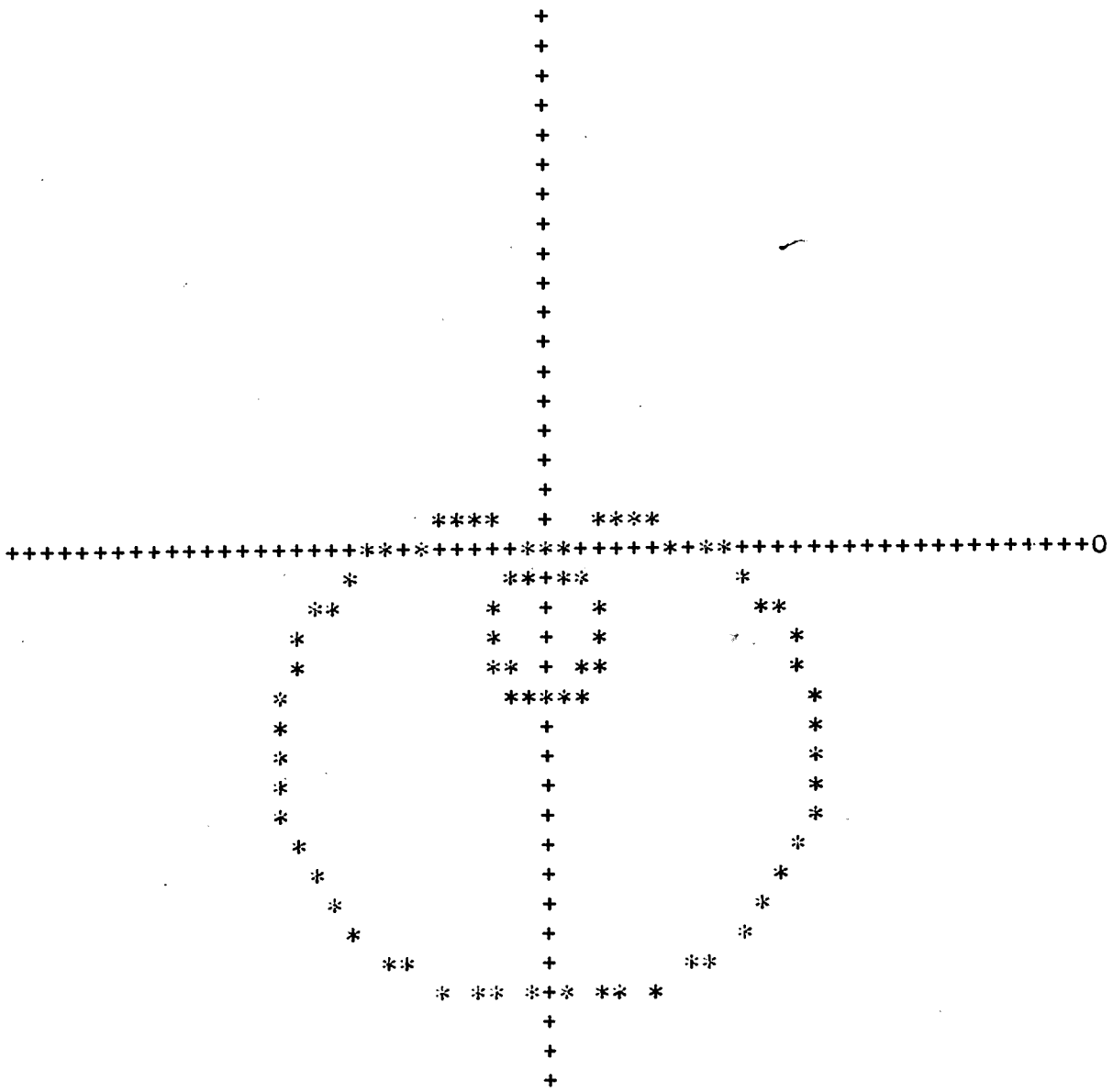
6. Read

```
INCREMENT IN X IS: .23333333
INCREMENT IN Y IS: .38888889
```



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WANG 2200 SERIES PROGRAM

T-PLOT

TITLE

PMi.07-2200.01A-00FI-4-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Plots a set of (X, Y) data points on a set of coordinate axes.

BLOCK	SAVE "NAME"	BYTES REQUIRED
26		3188

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PROGRAM DESCRIPTION

Plots a set of (X,Y) data points on a set of coordinate axes. The user must supply the following information:

X1 - the lower X-endpoint

X2 - the upper X-endpoint

ΔX - the X-increment

Y1 - the lower Y-endpoint

Y2 - the upper Y-endpoint

ΔY - the Y-increment

N - the number of data points to be plotted

$(X_1, Y_1),\ldots,(X_N, Y_N)$ - the data points

The X-axis runs vertically. The Y-axis runs horizontally and may have no more than 60 steps in it.

For typewriter output, insert the following two statements in program.

```
125 SELECT PRINT 211 (150): Print Hex (0E)
465 SELECT PRINT 005(64)
```

NOTE

Many operating instructions are presented via the CRT (display) or one of the output devices. When such instructions occur the word INSTRUCTION will appear on the left hand side of the operating instructions and what is displayed or typed will appear on the right hand side.

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OPERATING INSTRUCTIONS

EXAMPLE

Plot the following points:

X	Y
18	9
3	1
7	2.3
15	7.8
15	8.1
5.5	2.9
10	4.1
10	7.3
9	3.5
10	5.6
14	7.5
13	6.8
13	4.5
11	2.4
7	4.1
8	3.8
12	4

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION

LOWER X-ENDPOINT, UPPER X-ENDPOINT, X-INCREMENT
?

4. Key LOWER X-ENDPOINT ,
UPPER X-ENDPOINT ,
X-INCREMENT, [CR/LF]

4. Key 1 , 2 0 , 1 [CR/LF]

5. INSTRUCTION

LOWER Y-ENDPOINT, UPPER Y-ENDPOINT, Y-INCREMENT
?

6. Key LOWER Y-ENDPOINT ,
UPPER Y-ENDPOINT ,
Y-INCREMENT [CR/LF]

6. Key 1 , 1 0 , . 2 [CR/LF]

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OPERATING INSTRUCTIONS (Cont)

7. INSTRUCTION

8. Key # of Points [CR/LF]

9. INSTRUCTION

10. Key X_1 , Y_1 [CR/LF]

    Key X_2 , Y_2 [CR/LF]

    .
    .
    .

    Key X_N , Y_N [CR/LF]

11. Read Output

NO. OF POINTS TO BE PLOTTED?
?

8. Key 1 7 [CR/LF]

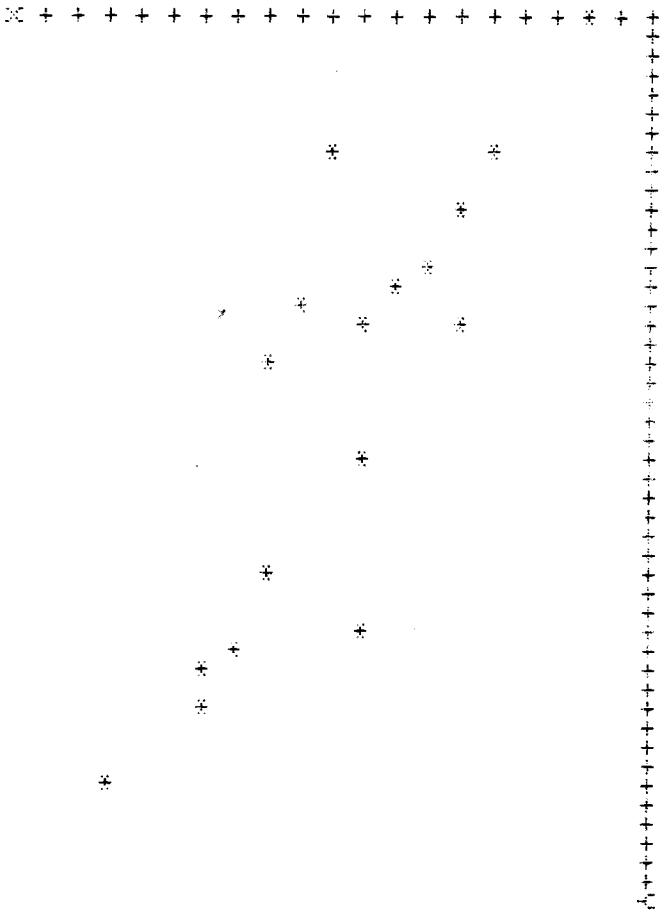
ENTER POINTS

10. Key 1 8 , 9 [CR/LF]

    Key 3 , 1 [CR/LF]

    .
    .
    .

    Key 1 2 , 4 [CR/LF]



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WANG 2200 SERIES PROGRAM

HISTOGRAM

TITLE

PMi.07-2200.01A-00FI-5-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Prints a histogram of a set of numbers.

BLOCK	SAVE "NAME"	BYTES REQUIRED
27		2764

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PROGRAM DESCRIPTION

Prints a histogram of a set of numbers. Allows up to 255 data points.

The interval size is inputed by the user. For the complete histogram to be displayed in its entirety, the user should input the interval in such a manner that the distance between the lowest and highest data point can be handled by 12 intervals.

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

Create a histogram of the following (20) test results:

Scores

0, 1, 5, 4, 7, 8
5, 3, 12.67, 8, 4
13, 18.9, 6, 20, 12
16, 1, 2, 3

Interval size = 3

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — ENTER THE INTERVAL SIZE?
4. Key INTERVAL SIZE [CR/LF] — 4. Key 3 [CR/LF]
5. INSTRUCTION — ENTER THE TOTAL NUMBER OF ENTRIES
6. Key NO. OF ENTRIES [CR/LF] — 6. Key 2 0 [CR/LF]
7. INSTRUCTION — A(1)?

Program will ask for entries, one at a time.

8. Key ENTRY [CR/LF] — 8. Key 0 [CR/LF]
9. Continue as above until all entries have been made.

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10. Read

```
ENTRIES          HISTOGRAM
 0               ****
 3               *******
 6               ****
 9               *
 12              ***
 15              *
 18              **
```

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WANG 2200 SERIES PROGRAM

UTILITY

TITLE

PMi.07-2200.01A-00FI-6-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Program contains 6 subroutines for the user.

BLOCK	SAVE "NAME"	BYTES REQUIRED
28		1467

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PROGRAM DESCRIPTION

This program is made up of 6 subroutines to do:

Sort numeric arrays
Sort alpha-numeric arrays
Pack numeric arrays
Unpack numeric arrays

These subroutines must be used as a part of a main program written by the user. All numeric arrays are X( ) and the alpha array is A$( ), N is the number of items in the array, and C is a value 1 or 0 denoting Hi to Lo or Lo to Hi.

There are two sets of pack and unpack subroutines. The first set will handle positive integers of 6 digits. The second set uses the natural log and exponentiation. Accuracy is lost when you use the last set.

To use these subroutines, the user must "call" them by using the GOSUB' verb.

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GAMES

BLOCK	PROGRAM TITLE
29	ARTILLERY
30	CRAPS
31	TIC-TAC-TOE
32	ONE ARMED BANDIT
33	BLACKJACK

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WANG 2200 SERIES PROGRAM

ARTILLERY

TITLE

PMi.04-2200.01A-00FI-1-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Game to determine your rank in the army artillery.

BLOCK	SAVE "NAME"	BYTES REQUIRED
29		1653

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PROGRAM DESCRIPTION

Pretend you are in the artillery branch of the army and are about to take a test to determine your rank. This rank will be based on how many times you must fire your gun to zero in on and destroy a one foot target which has been placed at any distance in miles that you specify. You will be asked to enter the following information:

D = distance in miles that you want the target placed

A = angle in degrees of your gun barrel

V = velocity in ft/sec. of the projectile

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

Determine your rank in the army artillery.

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION — ENTER DISTANCE, ANGLE, VELOCITY

4. Key DISTANCE , ANGLE ,
   VELOCITY [CR/LF]

5. Read

   Various remarks will be displayed, depending upon your accuracy of firing. The over or under shot distance will be displayed.

6. INSTRUCTION — YOUR NEW ANGLE AND VELOCITY ARE?

7. Key ANGLE , VELOCITY [CR/LF]

   The cycle will repeat itself until you either blow yourself up or destroy the target. Afterwords go to Step 8.

8. INSTRUCTION — DO YOU WISH TO PLAY AGAIN?
   1 = YES, 0 = NO

9. Key 1 or 0 [CR/LF]

10. If you keyed 1, go to Step 3.
    Otherwise, program ends.

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WANG 2200 SERIES PROGRAM

CRAPS

TITLE

PMi.04-2200.01A-00FI-2-0 6/1/73

NUMBER DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Simulates the game of craps.

BLOCK	SAVE "NAME"	BYTES REQUIRED
30		941

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PROGRAM DESCRIPTION

Simulates the game of craps.

NOTE

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OPERATING INSTRUCTIONS

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION

CRAPS

RULES:
1. IF 7 OR 11 ROLLED ON FIRST ROLL, YOU WIN.
2. IF 2, 3, or 12 ROLLED ON FIRST ROLL, YOU LOSE.
3. IF ANOTHER NUMBER ROLLED, THIS NUMBER IS YOUR 'POINT'. KEEP ROLLING UNTIL YOUR 'POINT' TURNS UP (YOU WIN) OR A 7 IS ROLLED (YOU LOSE).
4. HOUSE LIMIT: $1000.

4. INSTRUCTION

YOUR BET IS?

5. Key BET [CR/LF]

6. Read

The program will go to Step 4. If you do not wish to play any more, key [RESET] and go to the next program of interest.

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WANG 2200 SERIES PROGRAM

TIC-TAC-TOE

TITLE

PMi.04-2200.01A-00FI-3-0 6/1/73

NUMBER **DATE**

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Plays Tic-Tac-Toe with user.

BLOCK	SAVE "NAME"	BYTES REQUIRED
31		1141

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PROGRAM DESCRIPTION

Plays Tic-Tac-Toe with user.

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION

TIC-TAC-TOE

MACHINE MOVES DESIGNATED BY '0', YOUR MOVES DESIGNATED BY '11', AVAILABLE SPACES DESIGNATED BY A DIGIT FROM 1-9. THE MACHINE MOVES FIRST. TO ENTER YOUR MOVE, TYPE THE DIGIT OF THE SPACE YOU WISH TO OCCUPY FOLLOWED BY A CARRIAGE RETURN.

```
1  2  3
8  0  4
7  6  5
```

4. INSTRUCTION

YOUR MOVE?

5. Key YOUR MOVE [CR/LF]

> "Computer" will make his move and display the board. It will then go to Step 4. Game continues until there is a winner or a draw. Then proceed with Step 6.

6. INSTRUCTION

KEY '1' TO PLAY AGAIN, KEY '0' TO END PROGRAM

7. TO PLAY AGAIN

   Key 1 [CR/LF]

   Go to Step 4

   Otherwise

   Key 0 [CR/LF]

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WANG 2200 SERIES PROGRAM

ONE ARMED BANDIT

TITLE

PMi.04-2200.01A-00FI-4-0 — 6/1/73

NUMBER — DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Simulates a "one-armed-bandit" machine.

BLOCK	SAVE "NAME"	BYTES REQUIRED
32		2404

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PROGRAM DESCRIPTION

Simulates a "One-Armed-Bandit" machine.

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

Try your luck with the "One-Armed Bandid"

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION

ONE-ARMED BANDID

EACH PLAY YOU CAN PUT ANY AMOUNT OF SILVER DOLLARS INTO THE MACHINE UP TO THE BALANCE YOU HAVE BY TYPING IN THE QUANTITY OF DOLLARS.

YOU 'PULL DOWN THE HANDLE' BY DEPRESSING THE RETURN KEY.

WHEN YOUR BALANCE REACHES ZERO, THE GAME IS OVER...OR ENTER '0' TO QUIT ANY TIME. GOOD LUCK...
YOUR STARTING BALANCE IS $37.
HOW MANY DOLLARS DO YOU WANT TO PUT IN ON YOUR 1ST PLAY?

Your beginning balance is randomly determined.

4. Key DOLLARS YOU WISH TO PLAY
   [CR/LF]

CRT will display, the arrangement (final) of the "fruit", your winning or loss, and balance.

5. Read

6. INSTRUCTION

AMOUNT?

7. Go to Step 4.

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WANG 2200 SERIES PROGRAM

BLACK JACK

TITLE

PMi.04-2200.01A-00FI-5-0 — 6/1/73

NUMBER — DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

Simulates the game of "blackjack".

BLOCK	SAVE "NAME"	BYTES REQUIRED
33		1867

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PROGRAM DESCRIPTION

Program will simulate the game of "Black Jack". The calculator is the dealer.

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

1. Key [RESET] [CLEAR] [CR/LF]
   [LOAD] [CR/LF]

2. Key [RUN] [CR/LF]

3. INSTRUCTION — ***BLACKJACK***

4. INSTRUCTION — YOUR BET IS?

5. Key BET [CR/LF]

6. INSTRUCTION — YOUR CARDS ARE: DEALER SHOWS:

> If one of your cards is an ACE, you will be asked if it is one or eleven. Otherwise, go to Step 9.

7. INSTRUCTION — IS YOUR ACE 1 OR 11?

8. Key 1 or 1 1 [CR/LF]

9. INSTRUCTION — YOU NOW HAVE
   DO YOU WANT A HIT (1=YES, 2=NO)?

10. Key 1 or 2 [CR/LF]

    If you keyed 2 go to Step 4.

11. INSTRUCTION — YOUR CARD IS
    YOU NOW HAVE

> Program will continue until you "bust" or answer no to a "hit". Then the results will be displayed and continue with Step 4.

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GENERAL SCIENCE

BLOCK	PROGRAM TITLE
34	MASS OF NITROGEN IN CONTAINMENT SYSTEM
35	PERCENT ABSORPTION TO CONCENTRATION

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WANG 2200 SERIES PROGRAM

MASS OF NITROGEN IN CONTAINMENT SYSTEM

TITLE

PS.05-2200.01A-00FI-1-0	6/1/73
NUMBER	DATE

2200A-01, 2215, 2216/2217

EQUIPMENT

PROGRAM ABSTRACT

This program calculates the mass of nitrogen in the reactor containment system on a periodic basis to provide a measure of the leakage rate.

BLOCK	SAVE "NAME"	BYTES REQUIRED
34		616

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PROGRAM DESCRIPTION

This program (adapted from a program written by W. Wold, District Manager, San Rafael) calculates the mass of nitrogen (used as an inert fill gas) in the reactor containment system on a periodic basis to provide a measure of the leakage rate. There are 4 drybulb temp. sensors, 2 dewpoint sensors, a manometer for gauge pressure, and a barometer for atmospheric pressure. Mass of nitrogen is calculated by the perfect gas law.

P_1	= Barometric Pressure (In. Hg)
P_2	= Containment Pressure (In. Water)
T_1, T_2	= Dewpt. Sensors (Deg. F)
S_1, S_2, S_3, S_4	= Drybulb Sensors (Deg. F)
M	= Mass of Nitrogen (Lb)
PW	= Partial pressure of water vapor in containment based on TA
TA	= Average dewpoint
PN	= Partial pressure of N in containment
SA	= Average Abs. drybulb temperature
PT	= Containment pressure (PSIA)
PT	= .49116*P1 + .036127*P2
PN	= PT - PW
SA	= $459.6 + (S_1 + S_2 + S_3 + S_4)/4$
M	= 32637*PN/SA

NOTE

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OPERATING INSTRUCTIONS

EXAMPLE

Find the mass of Nitrogen given:

Barometric pressure (In. Hg) = 29.87

Containment pressure (In. $H_2 0$) = 24.19

Dewpoint (Deg F)

Sensor T1 = 85.2

Sensor T2 = 89.3

Drybulb Sensors (Deg F)

Sensor S1 = 139

Sensor S2 = 85

Sensor S3 = 124.5

Sensor S4 = 89.5

Partial pressure of water vapor based on dewpoint of 87.25°F = .64.

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]	
2. Key [RUN] [CR/LF]	
3. INSTRUCTION	BAROMETRIC PRESSURE (IN. HG)?
4. Key BAROMETRIC PRESSURE [CR/LF]	4. Key 2 9 . 8 7 [CR/LF]
5. INSTRUCTION	CONTAINMENT PRESSURE (IN. WATER)?
6. Key CONTAINMENT PRESSURE [CR/LF]	6. Key 2 4 . 1 9 [CR/LF]
7. INSTRUCTION	DEWPOINT SENSORS T1, T2 (DEG F)?
8. Key T1 , T2 [CR/LF]	8. Key 8 5 . 2 , 8 9 . 3 [CR/LF]
9. INSTRUCTION	DRYBULB SENSORS S1, S2, S3, S4 (DEG. F)?

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OPERATING INSTRUCTIONS Cont)

10. Key S1 , S2 , S3 , S4 CR/LF

10. Key 1 3 9 , 8 5 , 1 2 4 . 5 , 8 9 . 5 CR/LF

11. INSTRUCTION

PARTIAL PRESSURE OF WATER VAPOR BASED ON DEWPOINT OF 87.25* DEG. F?

The value of 87.25 is a calculated value and will change with different T1 and T2 values.

12. Key PARTIAL PRESSURE CR/LF

12. Key . 6 4 CR/LF

13. Read

MASS OF N = 854.7706189197 LB.

END PROGRAM

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WANG 2200 SERIES PROGRAM

PERCENT ABSORPTION TO CONCENTRATION
TITLE

PS.05-2200.01A-00FI-2-0 6/1/73
NUMBER DATE
2200A-01, 2215, 2216/2217
EQUIPMENT

PROGRAM ABSTRACT

Computes the concentration of unknowns given the percent absorption read from an atomic absorption spectrophotometer.

BLOCK	SAVE "NAME"	BYTES REQUIRED
35		502

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PROGRAM DESCRIPTION

Computes the concentration of unknowns given the percent absorption read from an atomic absorption spectrophotometer. Two known samples (standards) are to use only one standard, the second standard may arbitrarily be assigned coordinates of 0 concentration, 0 percent absorption.

NOTE: adapted from a program written by E.R. McGough, Kermac Potash Co.

$$C = (C_2 - C_1)\left(\frac{\text{LOG}\,\frac{(100 - A_1)}{(100 - A)}}{\text{LOG}\,\frac{(100 - A_1)}{(100 - A_2)}}\right) + C_1$$

where:

C = concentration (unknown)

C_1 = concentration (low standard)

C_2 = concentration (high standard)

A_1 = percentage (low standard)

A_2 = percentage (high standard)

A = percentage (unknown)

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OPERATING INSTRUCTIONS

EXAMPLE

Determine the concentration, given the following data:

	LOW STD.	HIGH STD.
CONCENTRATION	4.46	8
PERCENTAGE	40	60

Percentage (unknown) = 6.051797415

1. Key [RESET] [CLEAR] [CR/LF] [LOAD] [CR/LF]
2. Key [RUN] [CR/LF]
3. INSTRUCTION — CONCENTRATION (LOW STANDARD) ?
4. Key CONCENTRATION (LOW) [CR/LF] — 4. Key 4 . 4 6 [CR/LF]
5. INSTRUCTION — CONCENTRATION (HIGH STANDARD) ?
6. Key CONCENTRATION (HIGH) [CR/LF] — 6. Key 8 [CR/LF]
7. INSTRUCTION — PERCENTAGE (LOW STANDARD) ?
8. Key PERCENTAGE (LOW) [CR/LF] — 8. Key 4 0 [CR/LF]
9. INSTRUCTION — PERCENTAGE (HIGH STANDARD) ?
10. Key PERCENTAGE (HIGH) [CR/LF] — 10. Key 6 0 [CR/LF]
11. INSTRUCTION — PERCENTAGE (UNKNOWN) ? TO END PROGRAM INPUT 0
12. Key PERCENTAGE (UNKNOWN) [CR/LF] — 12. Key 6 . 0 5 1 7 9 7 4 1 5 [CR/LF]
13. Read: — CONCENTRATION = .545156179958
14. INSTRUCTION — PERCENTAGE (UNKNOWN) ?

If you have more unknowns, go to Step 12. Otherwise Key 0 [CR/LF] . Program ends.

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