IBM

FORTRAN for the IBM 1130

Illustrations

Programmed Instruction Course

IBM

FORTRAN for the IBM 1130

Illustrations

Programmed Instruction Course

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Form X28-7327-4
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FORTRAN CODING FORM

		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		IF (X) 40, 30, 30
40		X = -X
30		ROOT = X**0.5

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

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FORTRAN CODING FORM

Program		Punching Instructions		Page of
Programmer	Date	Graphic / Punch	Card Form # *	Identification 73–80

C FOR COMMENT

STATEMENT NUMBER (1–5) | Cont. (6) | FORTRAN STATEMENT (7–72)

```
      FACT=1.Ø
      Y=X
   1Ø FACT=FACT*Y
      Y=Y-1.Ø
      IF (Y) 2Ø,2Ø,1Ø
   2Ø (continue on in the program)
```

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

(10/65)

The complete FORTRAN programming operation can be described by the following typical steps:

1. Organize the problem, determining equations used, etc.
2. Determine which items should be read by the computer at execution time.
3. Write a first draft of the program statements on scratch paper (this permits easy corrections).
    a. Write Input statements.
    b. Write the statements to solve the particular problem.
    c. Determine the quantities to print and write the appropriate output statements.
    d. Add necessary specification statements and comments (C in column 1).
    e. Be sure that all subprograms are headed correctly and all programs have END statements.
4. Copy final draft on coding sheets.
5. Punch the program on cards (many computing centers offer this service if coding forms are used.)
6. Using the FORTRAN compiler program, translate your program to a computer-coded one.
7. Execute your computer-coded program, with any input data you are reading and obtain answers.
8. Examine the results and verify them, debugging if necessary (correct the FORTRAN statements and repeat at step No. 6).

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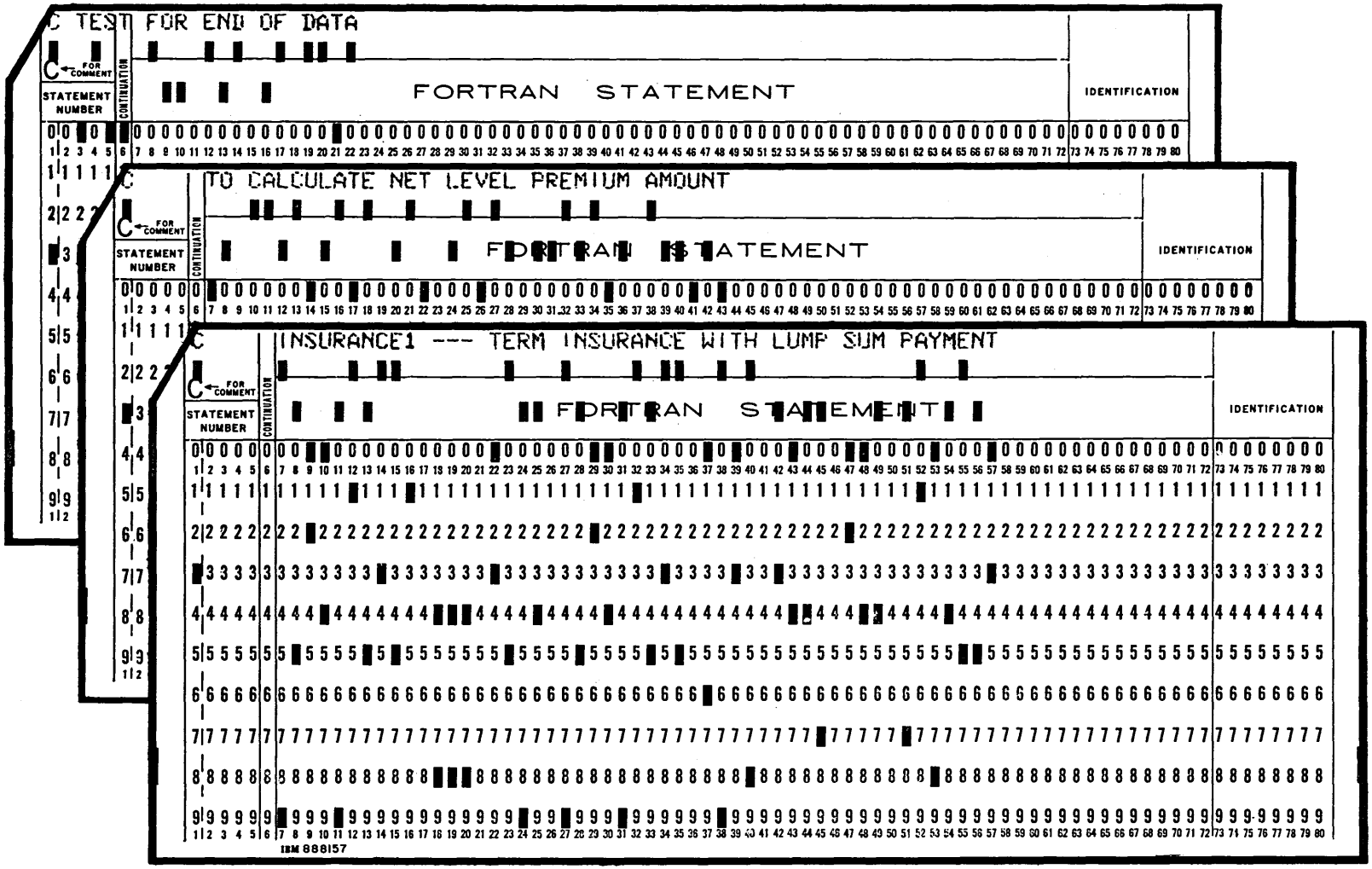
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		SUM=FIRST
		I = 1
10		FIRST= FIRST+DIF
		SUM=SUM+FIRST
		I = I+1
		IF (I-NUM) 10,20,20
20		(continue on in the program)

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

SAMPLE COMMENTS INTERSPERSED AT VARIOUS POINTS IN THE PROGRAM



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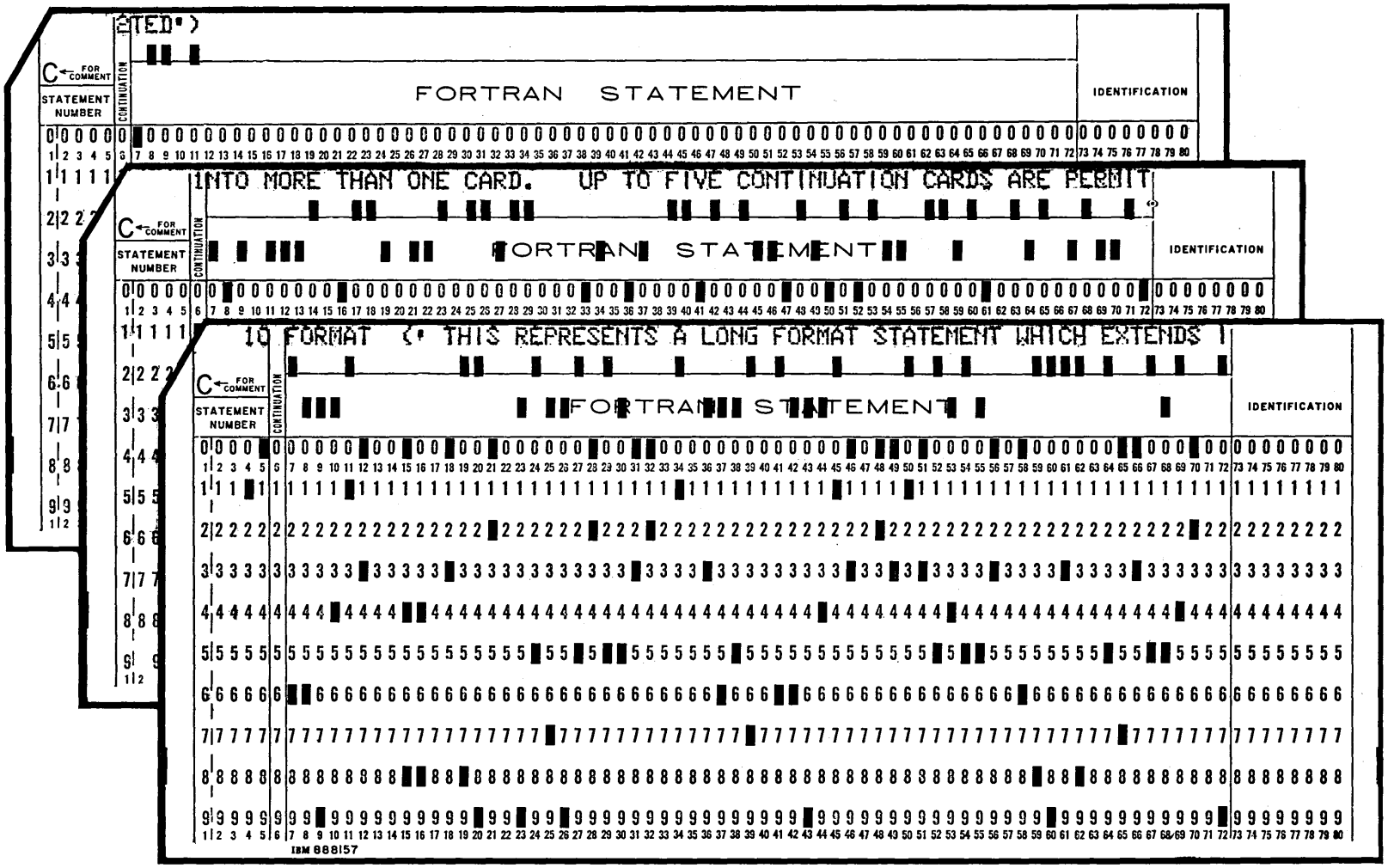
		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		IF (X-Y) 10, 20, 30
10		.
		(some statement or sequence of statements)
		.
		GO TO 40
20		.
		(some statement or sequence of statements)
		.
		GO TO 40
30		.
		(some statement or sequence of statements)
		.
40		(continue on in the program)
		.
		.

* A standard card form, IBM electro 888157, is available for punching source statements from this form.


TED*)
C ← FOR COMMENT
STATEMENT NUMBER
CONTINUATION
FORTRAN STATEMENT
IDENTIFICATION
INTO MORE THAN ONE CARD. UP TO FIVE CONTINUATION CARDS ARE PERMIT
10 FORMAT (* THIS REPRESENTS A LONG FORMAT STATEMENT WHICH EXTENDS
IBM 888157

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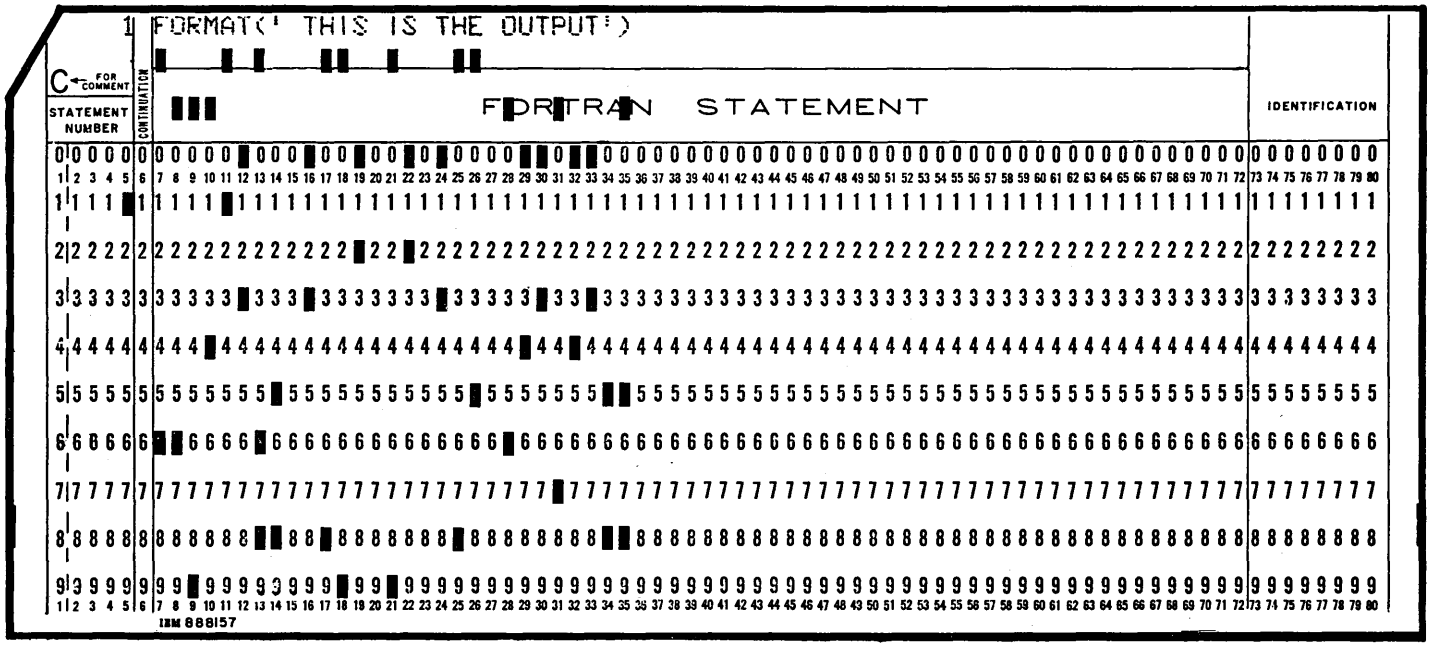
FORTRAN CODING FORM

		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		SUM=Ø.Ø
		DO 1Ø I=1,5Ø
1Ø		SUM=SUM+A(I)

* A standard card form, IBM electro 888157, is available for punching source statements from this form.


1 FORMAT(' THIS IS THE OUTPUT')
C ← FOR COMMENT
STATEMENT NUMBER
CONTINUATION
FORTRAN STATEMENT
IDENTIFICATION
IBM 888157

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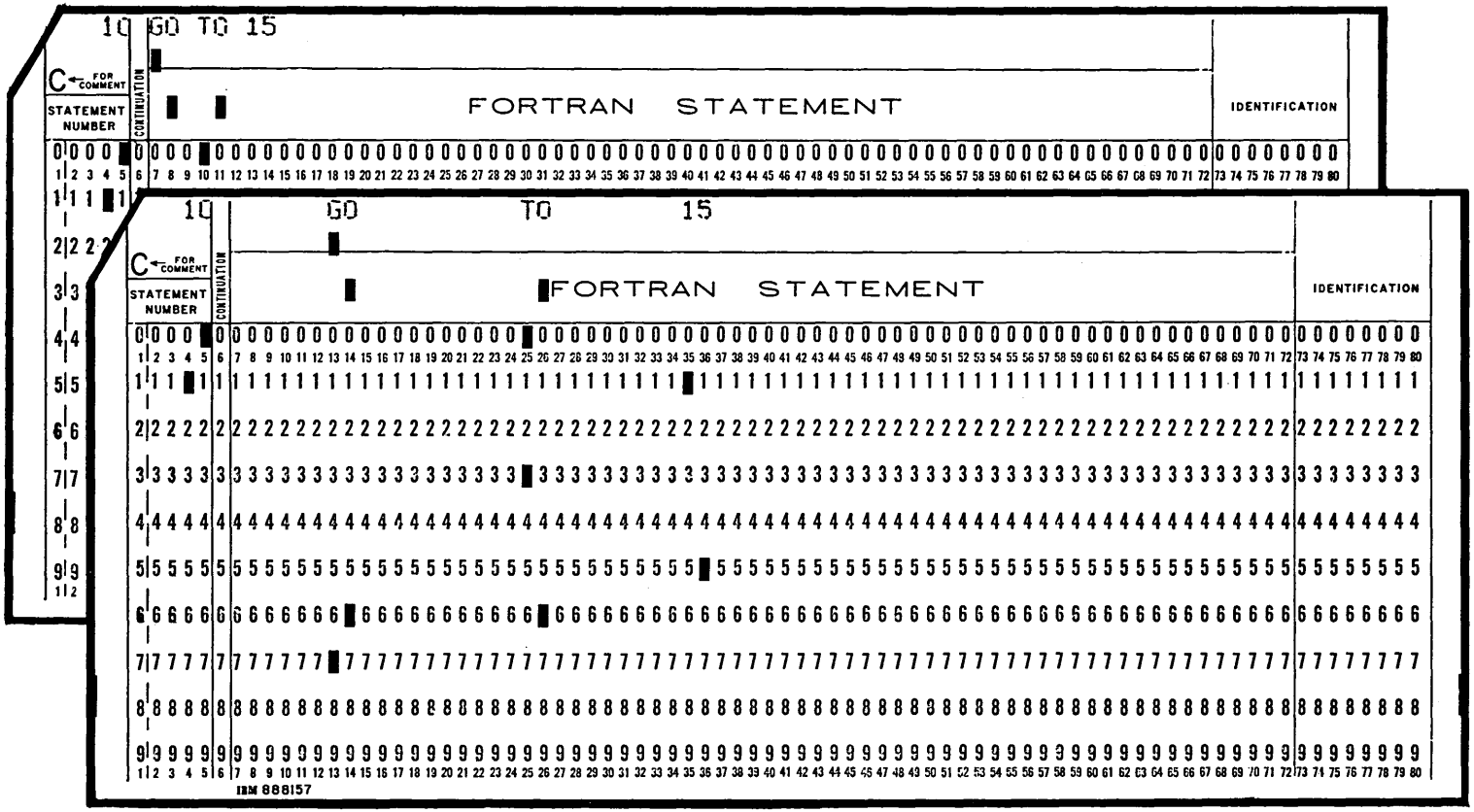
FORTRAN CODING FORM

	Punching Instructions		Page of
Program	Graphic	Card Form # *	Identification
Programmer / Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER (1–5)	Cont. (6)	FORTRAN STATEMENT (7–72)
		BIGA=A(1)
10		DO 50 I=2,1000
20		IF (A(I)-BIGA) 50,50,30
30		BIGA=A(I)
50		CONTINUE

* A standard card form, IBM electro 888157, is available for punching source statements from this form.


10 GO TO 15
C ← FOR COMMENT
STATEMENT NUMBER
CONTINUATION
FORTRAN STATEMENT
IDENTIFICATION
10 GO TO 15
C ← FOR COMMENT
STATEMENT NUMBER
CONTINUATION
FORTRAN STATEMENT
IDENTIFICATION
IBM 888157

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FORTRAN CODING FORM

		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		DO 10 I=1,2000
		IF (BLOCK(I)) 10,20,10
10		CONTINUE
11		LOC = 0
		GO TO 21
20		LOC = I
21		(continue in the program)

NOTE: Brackets will be used in future sample program segments to outline DO-loops, as done in this frame, for clarification purposes.

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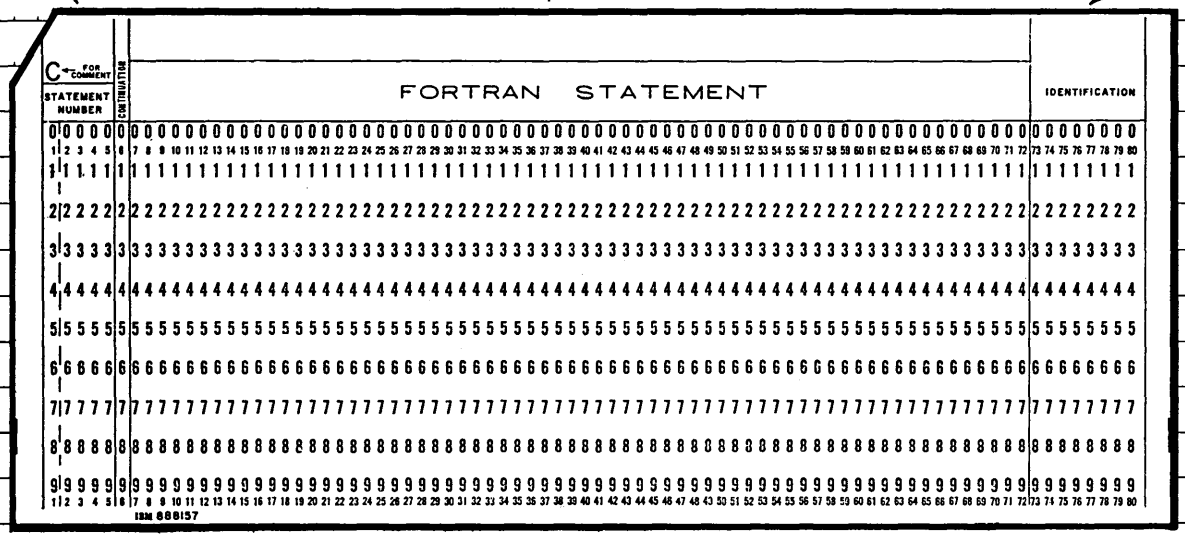
FORTRAN CODING FORM

		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72



* A standard card form, IBM electro 888157, is available for punching source statements from this form.

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FORTRAN CODING FORM

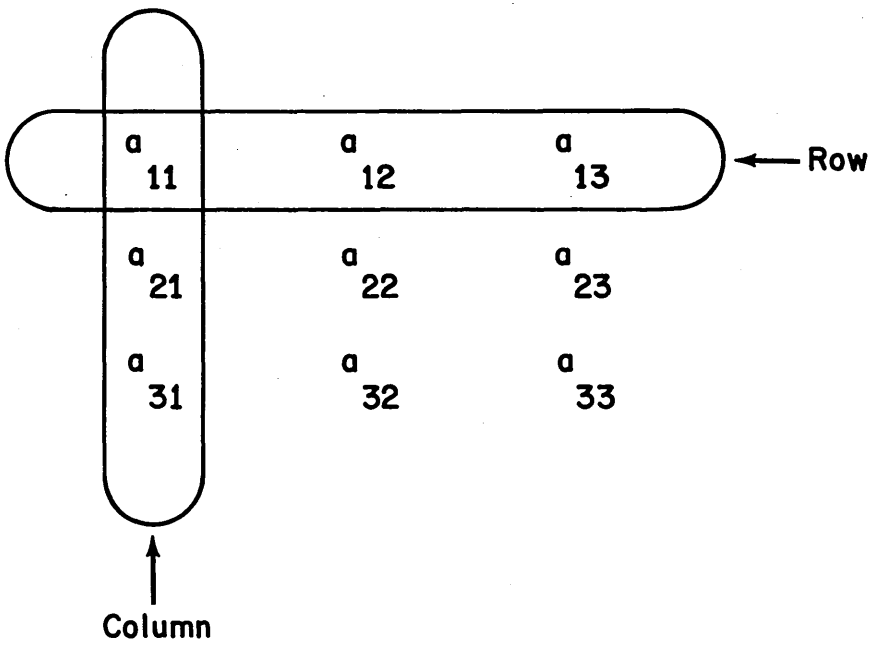
		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 72
		DO 10 I=1,10
		DO 10 J=1,10
		IF (A(I)-B(J)) 10,20,10
10		CONTINUE
		GO TO 30
20		LOC(1)=I
		LOC(2)=J
30		(continue on in the program)
		•
		•

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

SAMPLE 3X3 MATRIX



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FORTRAN CODING FORM

		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		DO 100 I=1,N
		K=N-I
		DO 100 J=1,K
		IF (ARRAY(J)-ARRAY(J+1)) 100,100,10
10		TEMP=ARRAY(J)
		ARRAY(J)=ARRAY(J+1)
		ARRAY(J+1)=TEMP
100		CONTINUE

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

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FORTRAN CODING FORM

		Punching Instructions		Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		PREVIOUS CALCULATION DETERMINES WHETHER TO TURN ON SENSE LIGHT 2
	OR	
		CALL SLITE(2)
		ADDITIONAL CALCULATIONS
		CALL SLITET(2,LINK)
		IF(LINK-1)10,20,10
20		ALPHA=SQRT(Y)
		GO TO 30
10		ALPHA=Y**3
30		continue program

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

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	Punching Instructions		Page of
Program	Graphic	Card Form # *	Identification
Programmer / Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 72
		K=X+1.Ø
		GO TO (1,2,3,4,5,6,7,8,9,1Ø,1Ø),K

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

SUBPROGRAMS

Subprogram Characteristics	Library or Built-In Functions	Arithmetic Statement Functions	FUNCTION Subprograms	SUBROUTINE Subprograms
How named	Pre-selected names	1-5 alphanumeric characters, first alph. (Same rules as variables)	Same rules as variables	Same rules as variables
Mode	Predefined by name (implicit)	Implicit in name or by Type statement	Implicit in name or by Type statement. Also INTEGER or REAL can precede FUNCTION name	Undefined-mode of results depends upon argument names
How many values returned to main program	One value returned	One value returned	One value returned	More than one value can be returned
How called	By name	By name	By name	By CALL statement. CALL supplies data for dummy variables in SUBROUTINE-may transmit constants, variables or expressions
How written or defined	Pre-written and stored in library	Single arithmetic statement defined within program in which it appears. Def. precedes 1st executable program statement	Independently written program contains many statements, has RETURN and END	Independently written program contains many statements, has RETURN and END
Arguments	Number and type predefined-depends upon routine	Non-subscripted variables	Has at least one. May be nonsubscripted variables, arrays or dummy names of SUBROUTINE or other FUNCTION programs	May have none. Or can be nonsubscripted variables, arrays or dummy names of FUNCTION subprograms or other SUBROUTINES

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FORTRAN CODING FORM

	Punching Instructions		
Program	Graphic	Card Form # *	Page of
Programmer / Date	Punch		Identification 73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		A=3.Ø
		B=2.5
		C=1.Ø
4Ø		Y=A*X**2+B*X+C

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

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FORTRAN CODING FORM

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	Punching Instructions		Page of
Program	Graphic	Card Form # *	Identification
Programmer / Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER (1–5)	Cont. (6)	FORTRAN STATEMENT (7–72)
		DIMENSION A(100)
1		FORMAT(I5/(6F12.4))
2		FORMAT(10F12.4)
		READ(2,1)N,(A(I),I=1,N)
		CALL ORDER(A,N)
		WRITE(3,2)(A(I),I=1,N)
		STOP
		END

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FORTRAN CODIN

Program		Graphic
Programmer	Date	Punch

C FOR COMMENT

STATEMENT NUMBER (1–5)	Cont. (6)	FORTRAN S (7–35)
		SUBROUTINE ORDER (A,N)
		DIMENSION A(100)
		K=N-1
		DO 10 I=1,K
		M=N-I
		DO 10 J=1,M
		IF (A(J+1)-A(J))5,10,10
5		TEMP=A(J)
		A(J)=A(J+1)
		A(J+1)=TEMP
10		CONTINUE
		RETURN
		END

* A standard card form, IBM electro 888157, is available for punching s ents from this

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FORTRAN CODING FORM

	Punching Instructions		Page of
Program	Graphic	Card Form # *	Identification 73–80
Programmer / Date	Punch		

C FOR COMMENT

STATEMENT NUMBER (1–5) | Cont. (6) | FORTRAN STATEMENT (7–72)

```
    4 DO 5 I=1,10
    5 READ(2,1)A(I)
```

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(10/65)

IBM FORTRAN CODING FORM

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Program	Punching Instructions	Page of
Programmer / Date	Graphic / Punch / Card Form # *	Identification 73–80

C FOR COMMENT — STATEMENT NUMBER (1–5), Cont. (6), FORTRAN STATEMENT (7–72)

```
      SUBROUTINE COPY (A,B,N)
      DIMENSION A(100),B(100)
      DO 10 I=1,N
   10 B(I)=A(I)
      RETURN
      END
```

IBM FORTRAN C…

Program / Programmer / Date

C FOR COMMENT — STATEMENT NUMBER (1–5), Cont. (6), (7–30)

```
      (some pertinent statements)
      CALL COPY (X,Y,K)
        (continue on)
      END
```

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

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FORTRAN CODING FORM

	Punching Instructions		
Program	Graphic	Card Form # *	Page of
Programmer / Date	Punch		Identification (73–80)

C FOR COMMENT

STATEMENT NUMBER (1–5)	Cont. (6)	FORTRAN STATEMENT (7–72)
		Example 1
		READ(2,1)K,(A(K))
		Example 2
		READ(2,1)A(I)

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IBM FORTRAN CODING FORM

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Program	Punching Instructions	Page of
Programmer / Date	Graphic / Punch / Card Form # *	Identification 73–80

C FOR COMMENT — STATEMENT NUMBER (1–5) | Cont. (6) | FORTRAN STATEMENT (7–72)

```
      FUNCTION SUM(A,N)
      DIMENSION A(1ØØ)
      SUM=A(1)
      DO 1Ø I=2,N
   1Ø SUM=SUM+A(I)
      RETURN
      END
```

IBM FOR…

Program

Programmer / Date

C FOR COMMENT — STATEMENT NUMBER | Cont.

```
      (some pertinent program statements)
      Y=SUM(BLOCK,KOUNT)
      (continuation of program)
      END
```

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FORTRAN CODING FORM

	Punching Instructions		Page of
Program	Graphic	Card Form # *	Identification
Programmer / Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		READ(2,1)N
		DO 5 I=1,N
5		READ(2,2)A(I)

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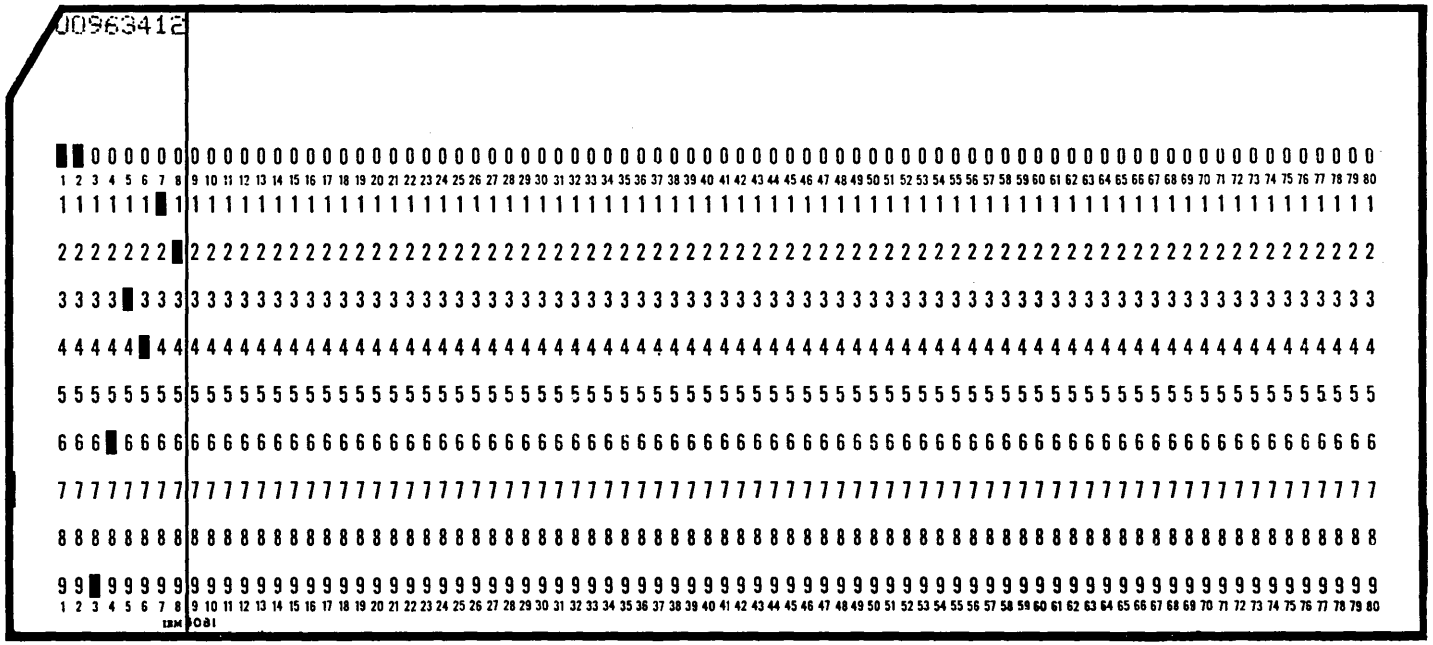
FORTRAN CODING FORM

		Punching Instructions	Page of
Program		Graphic	Card Form # *	Identification
Programmer	Date	Punch		73 80

C FOR COMMENT

STATEMENT NUMBER 1 5	Cont. 6	FORTRAN STATEMENT 7 10 15 20 25 30 35 40 45 50 55 60 65 70 72
		FUNCTION SUM(A,N)
		DIMENSION A(100)
		SUM=A(1)
		DO 10 I=2,N
10		SUM=SUM+A(I)
		RETURN
		END

* A standard card form, IBM electro 888157, is available for punching source statements from this form.


00963412
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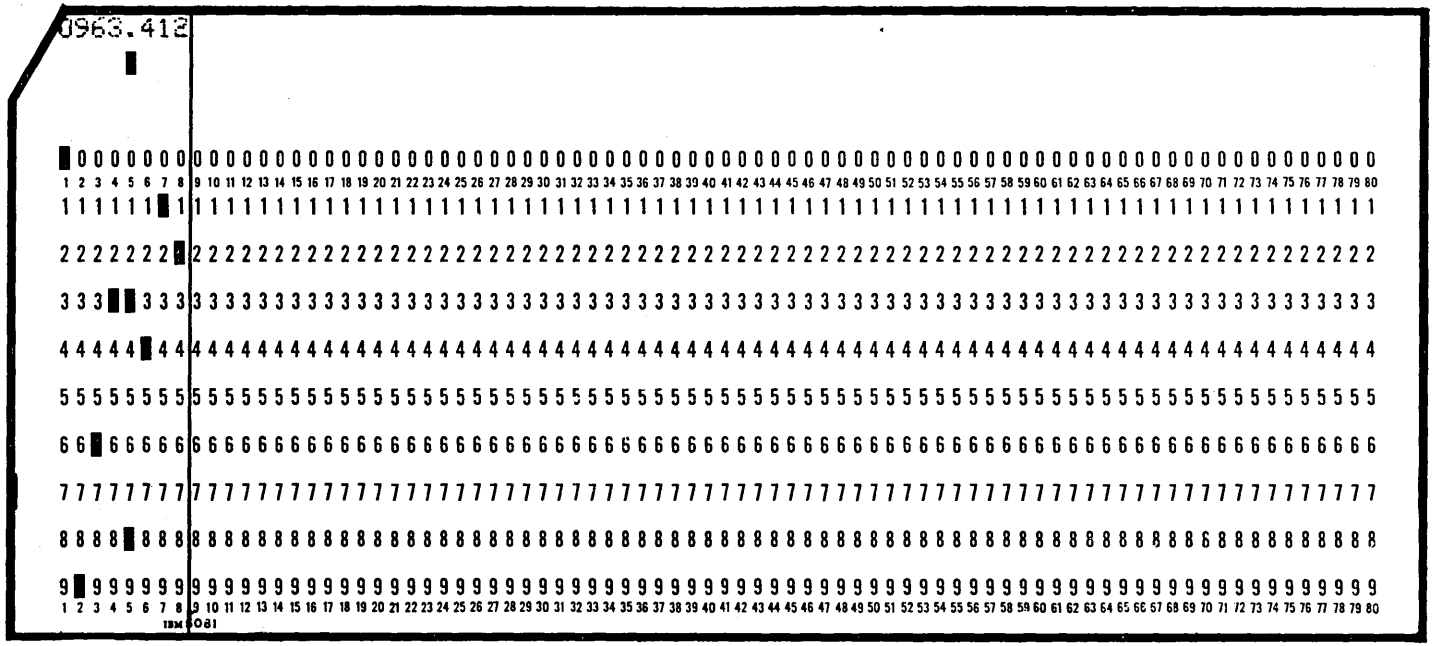
ADDITIONAL LIBRARY FUNCTIONS AVAILABLE WITH 1130 FORTRAN SYSTEMS

Name	Mode of Function	Mode of Arguments	No. of Arguments	Example
(Absolute value function)				
ABS	Real	Real	1	ABS(X**2-1.0)
IABS	Integer	Integer	1	IABS(I-L)
(Mode conversion and truncation functions)				
FLOAT	Real	Integer	1	FLOAT(INDEX)
IFIX	Integer	Real	1	IFIX(ALPHA)
(Diminishing Function)				
SIGN	Real	Real	2	SIGN(A,B)
ISIGN	Integer	Integer	2	ISIGN(L,M)


0963.412
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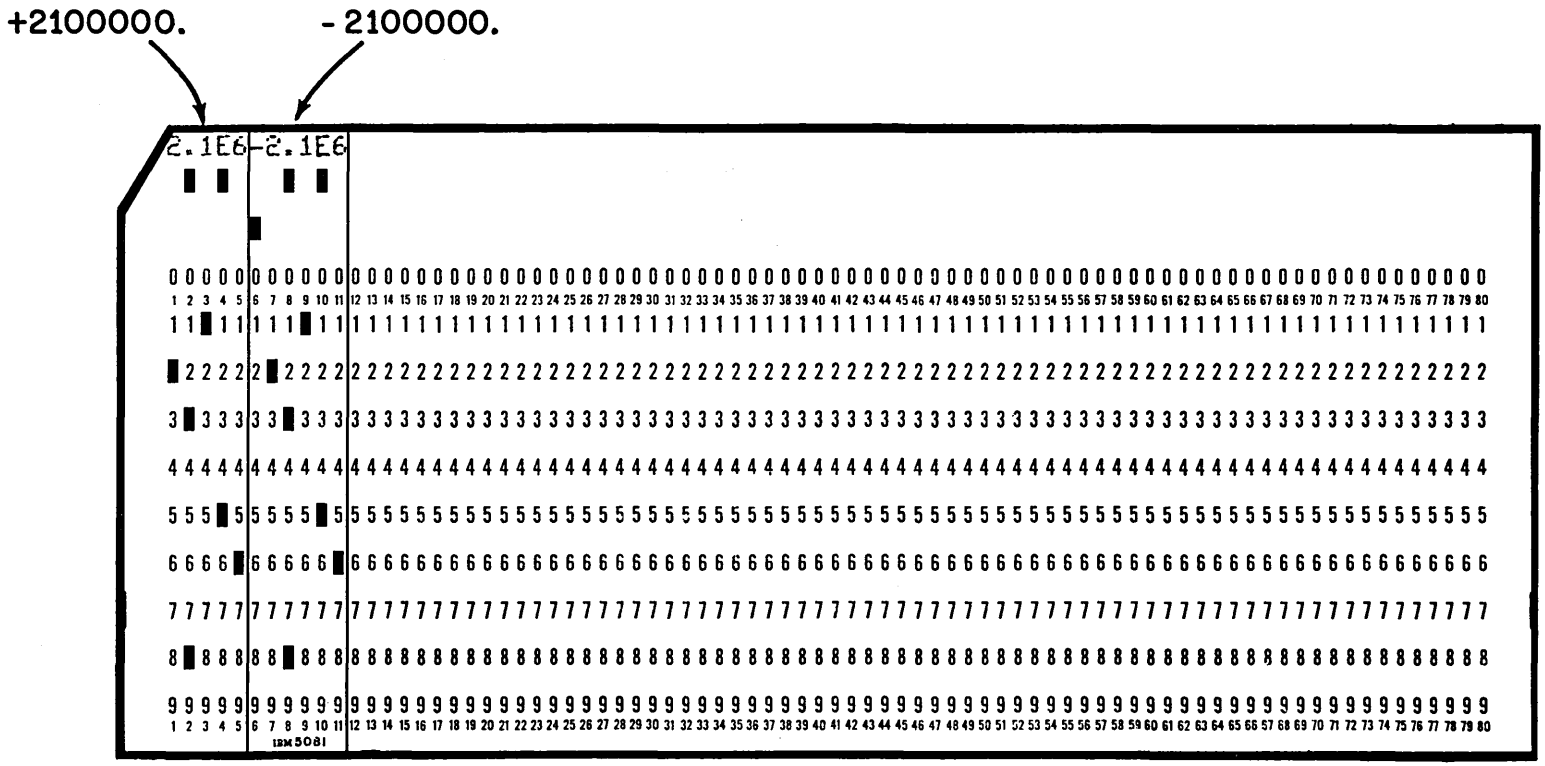
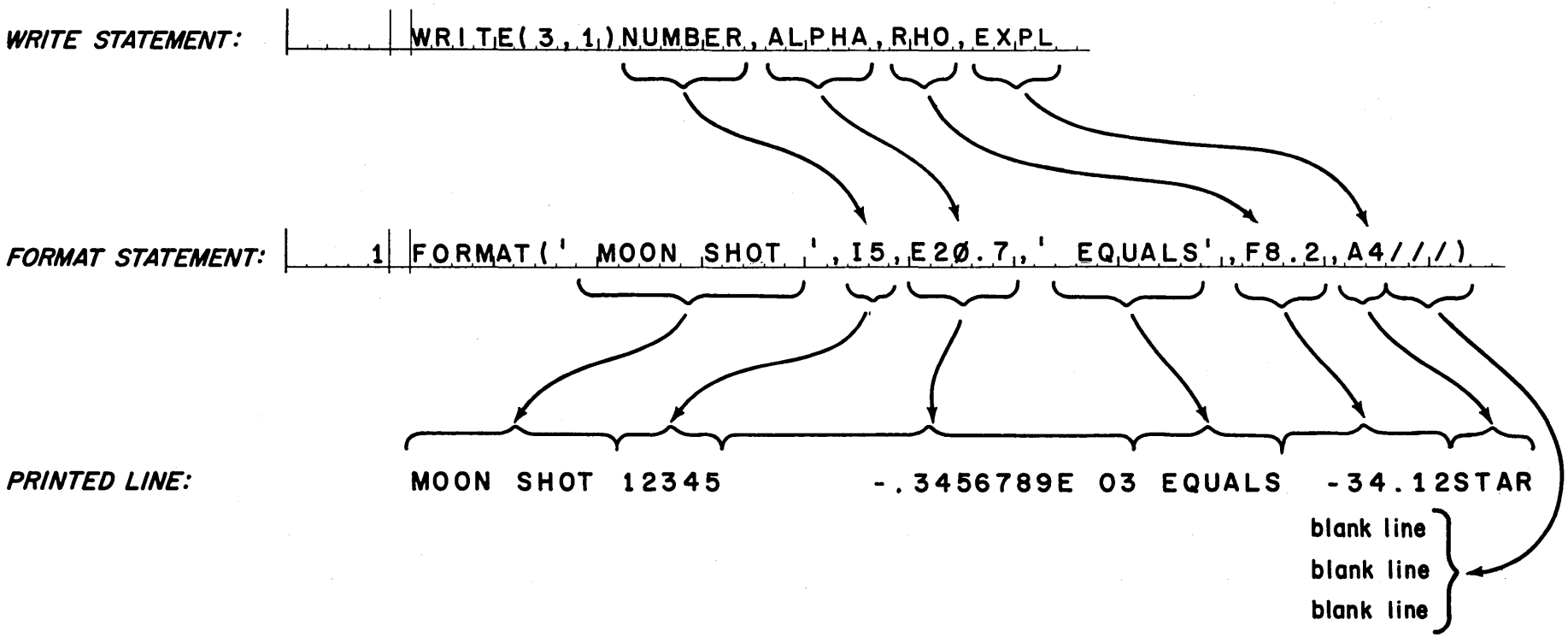
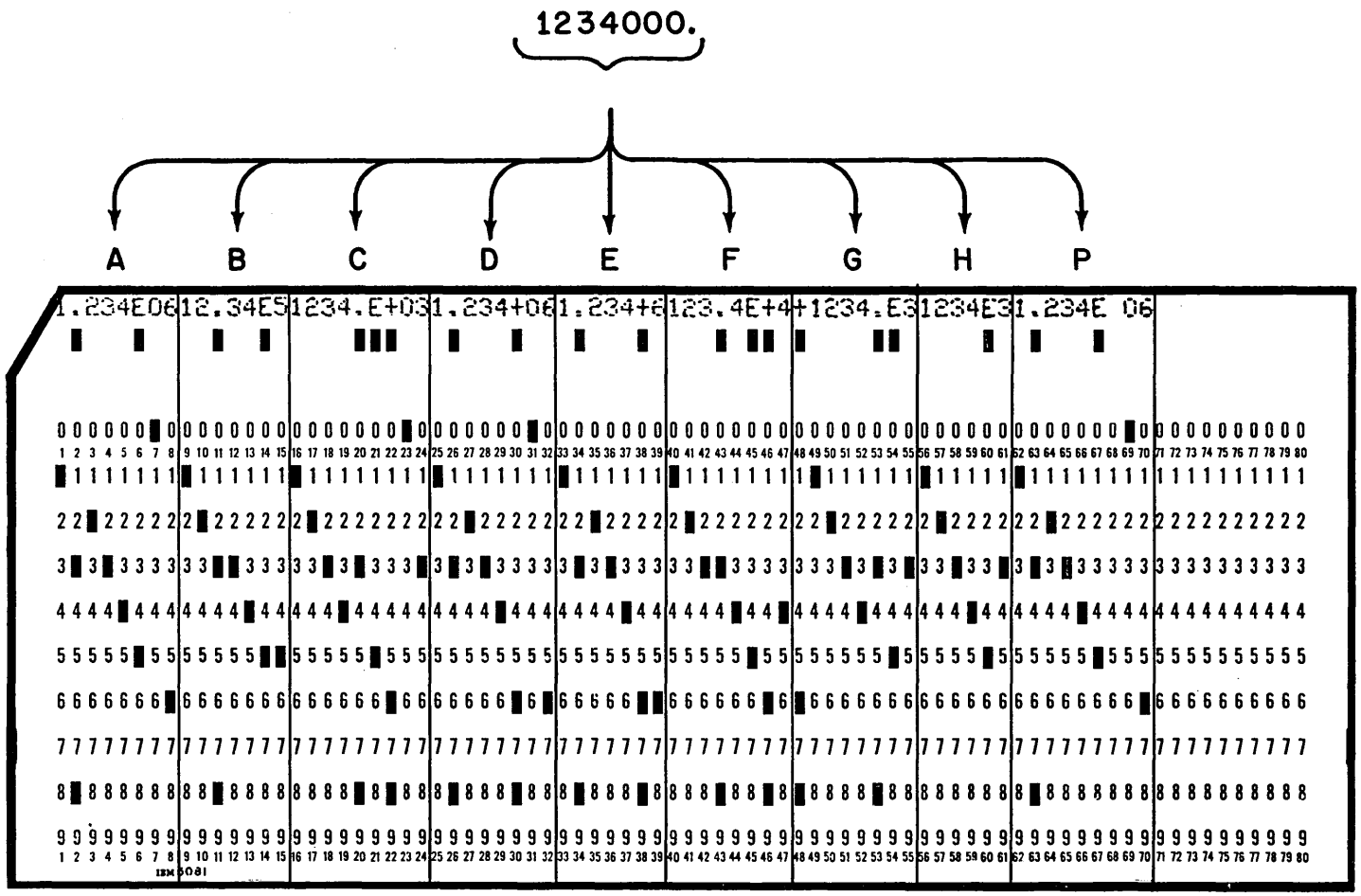
LIBRARY FUNCTIONS AVAILABLE WITH 1130 FORTRAN SYSTEMS

Name	Purpose		Comments	Mode of Function	Mode of Argument	Examples
SIN(A)	Trigonometric sine	(sinA)	arg. in radians	real	real	Y = SIN(A+B)
COS(A)	Trigonometric cosine	(cosA)	arg. in radians	real	real	X = A+COS(Z)
TANH(A)	Hyperbolic tangent	(tanhA)	arg. in radians	real	real	C = TANH(X**2)
ATAN(A)	Arc-tangent	($\tan^{-1}A$)		real	real	RIN = OMEGA-ATAN(BETA)
SQRT(A)	Square root	($\sqrt{A}$)	argument ≥ 0	real	real	HYPOT=SQRT (A**2+B**2)
EXP(A)	Exponential	(e^A)		real	real	GAMMA=EXP(Y)
ALOG(A)	Natural logarithm	($\log_e A$)	argument > 0	real	real	Q = SIN(F)+ ALOG(5.0)


+2100000.
-2100000.
2.1E6
-2.1E6
IBM 5081


WRITE STATEMENT:
WRITE(3,1)NUMBER,ALPHA,RHO,EXPL
FORMAT STATEMENT:
1 FORMAT(' MOON SHOT ',I5,E20.7,' EQUALS',F8.2,A4///)
PRINTED LINE:
MOON SHOT 12345 -.3456789E 03 EQUALS -34.12STAR
blank line
blank line
blank line


1234000.
A
B
C
D
E
F
G
H
P
1.234E06
12.34E5
1234.E+03
1.234+06
1.234+6
123.4E+4
+1234.E3
1234E3
1.234E 06

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FORTRAN CODING FORM

Program		Punching Instructions	Page of
Program		Graphic / Card Form # *	Identification
Programmer	Date	Punch	73 80

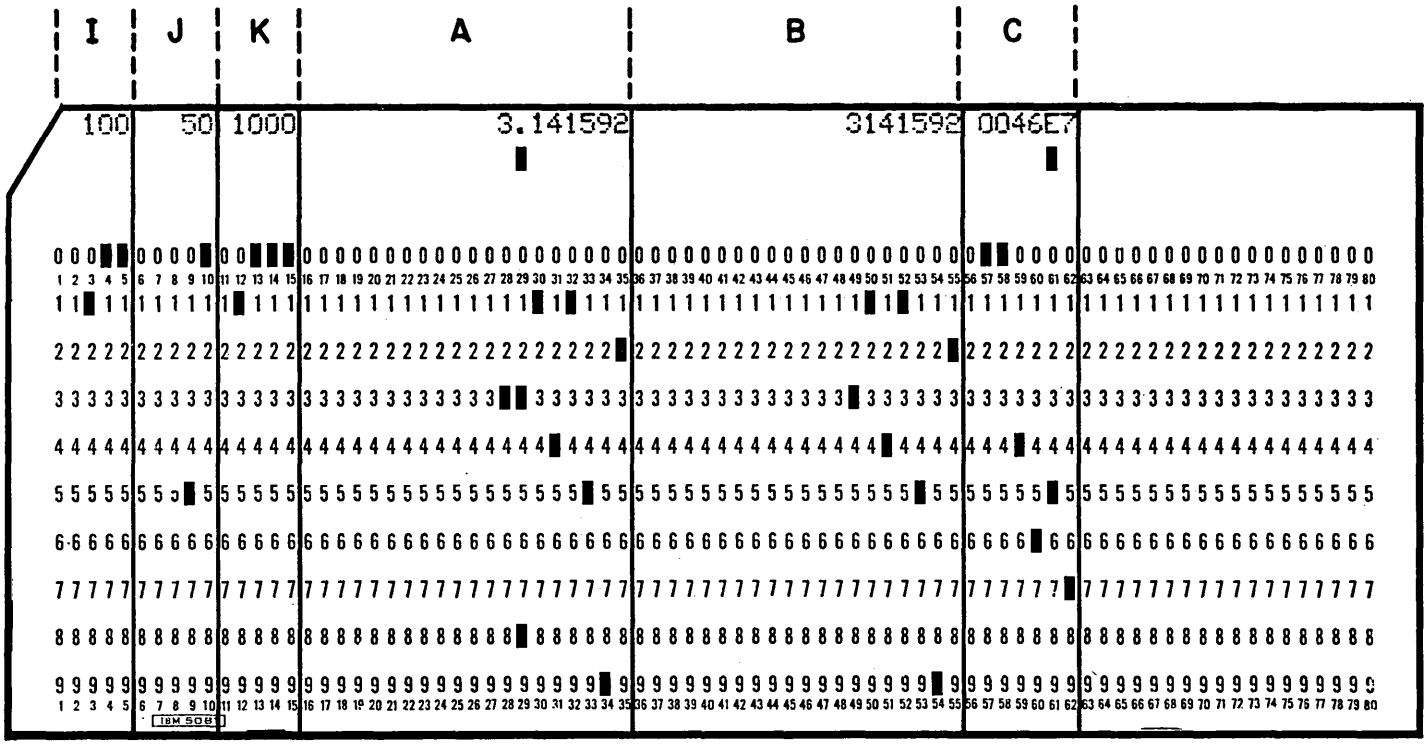
C FOR COMMENT

STATEMENT NUMBER 1–5 | Cont. 6 | FORTRAN STATEMENT 7–72

```
      WRITE(3,1)(A(I),I=1,1ØØØ)
    1 FORMAT(' A ARRAY'//(10F12.4))
```

* A standard card form, IBM electro 888157, is available for punching source statements from this form.

(10/65)


I
J
K
A
B
C
100
50
1000
3.141592
3141592
0046E7

E CONVERSION (using 3E20.7)

Printed (b = Blank)

	VALUES IN STORAGE
ALPHA(1)	968.2319
ALPHA(2)	-234.11
ALPHA(3)	.00000000004
ALPHA(4)	-.002
ALPHA(5)	1234567.
ALPHA(6)	-84566.12

bbbbbbb.9682319Eb03bbbbbb-.2341100Eb03bbbbbbb.4000000E-10

ALPHA(1) *ALPHA(2)* *ALPHA(3)*

bbbbbb-.2000000E-02bbbbbbb.1234567Eb07bbbbbb-.8456612Eb05

ALPHA(4) *ALPHA(5)* *ALPHA(6)*

F CONVERSION (using 4F10.4)

Printed (b = Blank)

	VALUES IN STORAGE
X(1)	968.2319
X(2)	45.62
X(3)	-234.11
X(4)	42.
X(5)	1.45678
X(6)	-123.9601
X(7)	1234567.
X(8)	-.2
X(9)	-84566.12
X(10)	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•
•	•
X(20)	•

X(1)	X(2)	X(3)	X(4)
bb968.2319	bbb45.6200	b-234.1100	bbb42.0000
bbbb1.4567	b-123.9601	**********	bbbb-.2000
**********	REMAINING NUMBERS PRINTED		

X(9)	X(10)	X(11)	X(12)

X(13)	X(14)	X(15)	X(16)

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