

GENERAL ELECTRIC COMPANY
COMPUTER DEPARTMENT
PHOENIX, ARIZONA

FORTRAN IV COMPARISONS

Attached is a FORTRAN IV Comparison for the 200, 400, and 600 lines which was prepared in July, 1964. A brief glance will show clearly that the 400 is a subset of the other four. While both the 200 and 600 versions have limited extensions, the block name in the 200 line is the only restriction that prevents 600, I.B.M., and A.S.A. from being a subset. It appears only the G conversion prevents the 200, I.B.M., and A.S.A. from being a subset of the 600, excluding the 200 line extensions.

(Prepared by Applied Programming Sub-section, July 22, 1964)

A. E. Training
H. L. Berkey/les
February 15, 1965

FEATURE	200	400	600	I.B.M.* 5/64	A.S.A. 4/64	REMARKS
✓ CHARACTER SET	26 Letters 10 Digits 11 Special	26 Letters 10 Digits 11 Special	26 Letters ^{BCD} 10 Digits ^{BCD} 12 Special	26 Letters ^{BCD} 10 Digits ^{BCD} 12 Special ¹⁰ (*)	26 Letters 10 Digits 11 Special	
✓ COMMENTS	C in Column 1	C in Column 1	C in Column 1 or *	C in Column 1	C in Column 1	
✓ END OF PROGRAM	END in Columns 7-72	END in Columns 7-72	END in Columns 7-72	END in Columns 7-72	END in Columns 7-72	
✓ CONTINUATION LINE	Non-Zero Non Blank in Column 6	Non-Zero Non Blank in Column 6	Non-Zero ? Non Blank in Column 6 (1/1 max)	Non-Zero Non Blank in Column 6 (1/1 max)	Non-Zero Non Blank in Column 6	
✓ STATEMENTS	In Columns 7-72	In Columns 7-72	In Columns 7-72	In Columns 7-72	In Columns 7-72	
✓ SYMBOLIC NAMES	1-12 Alphanumeric Characters, First is Alpha	1-6 Alphanumeric Characters, First is Alpha	1-6 Alphanumeric Characters, First is Alpha	1-6 Alphanumeric Characters, First is Alpha	1-6 Alphanumeric Characters, First is Alpha	
DATA TYPES	Specified by TYPE Statement	No Double Preci- sion or Complex or Logical	Specified by TYPE Statement	Specified by TYPE Statement (5)	Specified by TYPE Statement	
✓ INTEGER DATA	Integers +,-,0 $\pm 2^{19}$ and 0	Integers +,-,0 23 Bits + Sign	Integers +,-,0 $\pm 2^{35}$ and 0	Integers +,-,0	Integers +,-,0	
✓ REAL DATA	$\pm 10^{\pm 76}$ and 0 9 Decimal Digits	$10^{\pm 127}$ 8 Decimal Digits	$\pm 2^{-127}$ to $\pm 2^{+128}$ 9 Decimal Digits	+, -, 0	+, -, 0	
✓ DOUBLE PRECISION DATA	$\pm 10^{76}$, $\pm 10^{-67}$ and 0 18 Decimal Digits	Not Allowed	$\pm 2^{+127}$ to $\pm 2^{-128}$ $10^{\pm 38}$ 18 Decimal Digits	+, -, 0 with less error than Real Conversion	+, -, 0 with greater Accuracy than Real Conversion	

* I.B.M. FORTRAN IV manual for Implementors and Product test.

A. E. Training
HLB:les-2/15/65

(*) & and/or can only
appear in following
list

FORTRAN IV

COMPARATIVE ANALYSIS

FEATURE	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
COMPLEX DATA	A Real Pair	Not Allowed	A Real Pair	A Real Pair	A Real Pair	
LOGICAL DATA	True or False	Not Allowed	True or False	True or False ?	True or False	
HOLLERITH DATA	Any Valid Alpha Symbol String	Allowed	Any Valid Alpha Symbol String	Any Valid Alpha Symbol String	Any Valid Alpha Symbol String	
INTEGER CONSTANT	Non Empty String of Digits Sign, 1-6 Digits	Non Empty String of Digits	Non Empty String of Digits 1-11 Digits	Non Empty String of Digits	Non Empty String of Digits	
REAL CONSTANT	Integer + Decimal Point + Fraction + E + Exponent 1-9 Digits Sign	Integer + Decimal Point + Fraction + E + Exponent	Integer + Decimal Point + Fraction + E + Exponent	Integer + Decimal Point + Fraction + E + Exponent	Integer + Decimal Point + Fraction + E + Exponent	
DOUBLE PRECISION CONSTANT	Contains letter D instead of E Sign, 1-18 Digits Exponent	Not Allowed	Contains letter D instead of E	Contains letter D instead of E	Contains letter D instead of E	
COMPLEX CONSTANT	A Real Pair (a,b)	Not Allowed	A Real Pair (a,b)	A Real Pair (a,b)	A Real Pair (a,b)	
LOGICAL CONSTANT	.TRUE. or .FALSE.	Not Allowed	.TRUE. or .FALSE.	.TRUE. or .FALSE.	.TRUE. or .FALSE.	
HOLLERITH CONSTANT	nH..... Only in Data Statement	nH.....	nH..... ✓	nH..... ✓	nH..... ✓	
VARIABLE	Single Element with Symbolic Name	Single Element with Symbolic Name	Single Element with Symbolic Name	Single Element with Symbolic Name	Single Element with Symbolic Name	

FORTRAN IV

COMPARATIVE ANALYSIS

FEATURE	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
ARRAY	Ordered Set of 1-64 Dimensions	Ordered Set of 1, 2, or 3 Dimensions	Ordered Set of 1, 2, or 3 to 7 Dimensions	Ordered Set of 1, 2, or 3 Dimensions	Ordered Set of 1, 2, or 3 Dimensions	
ARRAY ELEMENT	Member of Array Referenced by Subscripts	Member of Array Referenced by Subscripts	Member of Array Referenced by Subscripts	Member of Array Referenced by Subscripts	Member of Array Referenced by Subscripts	
SUBSCRIPT	(i,j,k)	(i,j,k)	(i,j,k)	(i,j,k)	(i,j,k)	
SUBSCRIPT EXPRESSIONS	Any Legitimate Expression	C*V [†] K : V C*V : K V [†] K :	C*V [†] K : V C*V : K V [†] K :	C*V [†] K : V C*V : K V [†] K :	C*V [†] K : V C*V : K V [†] K :	C, K are Integer Constant V is Integer Variable
ARITHMETIC EXPRESSIONS	Allows any Mixed Mode Except CPX/DP	Does not Allow Real + DP = DP Real + CPX = CPX	Allows Real + DP = DP Real + CPX = CPX	Allows Real + DP = DP Real + CPX = CPX	Allows Real + DP = DP Real + CPX = CPX	
RELATIONAL EXPRESSIONS	Allows any Mixed Mode Except any that Use CPX	Not Allowed	Allows I op I DP op R R op R DP op DP R op DP	Allows I op I DP op R R op R DP op DP R op DP	Allows R op DP I op I R op R DP op R DP op DP	
LOGICAL EXPRESSIONS	.OR., .AND., .NOT.	Not Allowed	.OR., .AND., .NOT.	.OR., .AND., .NOT.	.OR., .AND., .NOT.	
ASSIGNMENT STATEMENT	Allows any Mix of Arithmetic Data	CPX and DP Not Available	Does not Allow Mix between CPX and Others	Does not Allow Mix between CPX and Others	Does not Allow Mix between CPX and Others	A = B

FEATURE	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
ASSIGN STATEMENT	Assign K to I K is Statement Label I is Integer Variable	Assign K to I K is Statement Label I is Integer Variable	Assign K to I K is Statement Label I is Integer Variable	Assign K to I K is Statement Label I is Integer Variable	Assign K to I K is Statement Label I is Integer Variable	
GO TO STATEMENT	Unconditional, Assigned, Computed	Unconditional, Assigned, Computed	Unconditional, Assigned, Computed	Unconditional, Assigned, Computed	Unconditional, Assigned, Computed	
ARITHMETIC IF STATEMENT	IF (e) K_1, K_2, K_3 or IF (e) K_1, K_2	IF (e) K_1, K_2, K_3 e Cannot be a DP or Logical	IF (e) K_1, K_2, K_3	IF (e) K_1, K_2, K_3	IF (e) K_1, K_2, K_3	
LOGICAL IF STATEMENT	IF (e) S	Not Allowed	IF (e) S	IF (e) S	IF (e) S	
CALL STATEMENT	CALL S (a,b,...) CALL S Arguments may by Expressions	CALL S (a,b,...) CALL S	CALL S (a,b,...) CALL S	CALL S (a,b,...) CALL S	CALL S (a,b,...) CALL S	
RETURN STATEMENT	RETURN	RETURN	RETURN	RETURN	RETURN	
CONTINUE STATEMENT	CONTINUE	CONTINUE	CONTINUE	CONTINUE	CONTINUE	
STOP STATEMENT	STOP N STOP $N < 2^{19}$	STOP N STOP $N < 2^{15}$	STOP	STOP N STOP N is 1-5 Octal Digits	STOP N STOP N is 1-5 Octal Digits	

FORTRAN IV

COMPARATIVE ANALYSIS

FEATURE	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
PAUSE STATEMENT	PAUSE N PAUSE $N < 2^{19}$	PAUSE N PAUSE $N < 2^{15}$	PAUSE	PAUSE N PAUSE N is 1-5 Octal Digits	PAUSE N PAUSE N is 1-5 Octal Digits	
DO STATEMENT	DO N i = m ₁ m ₂ m ₃ DO N i = m ₁ m ₂	DO N i = m ₁ m ₂ m ₃ DO N i = m ₁ m ₂	DO N i = m ₁ m ₂ m ₃ DO N i = m ₁ m ₂	DO N i = m ₁ m ₂ m ₃ DO N i = m ₁ m ₂	DO N i = m ₁ m ₂ m ₃ DO N i = m ₁ m ₂	
	N cannot be GO TO, Arith. IF, RETURN, STOP, PAUSE, or DO	N cannot be GO TO, Arith. IF, RETURN, STOP, PAUSE, or DO	N cannot be GO TO, Arith. IF, RETURN, STOP, PAUSE, or DO	N cannot be GO TO, Arith. IF, RETURN, STOP, PAUSE, or DO	N cannot be GO TO, Arith. IF, RETURN, STOP, PAUSE, or DO	
	DO in DO must be Subset of the Larger DO	DO in DO must be Subset of the Larger DO	DO in DO must be Subset of the Larger DO	DO in DO must be Subset of the Larger DO	DO in DO must be Subset of the Larger DO	
FORMATTED READ (BCD)	READ (U,F) K READ (U,F)	READ (U,F) K READ (U,F)	READ (U,F) K	READ (U,F) K	READ (U,F) K READ (U,F)	
FORMATTED WRITE	WRITE (U,F) K WRITE (U,F)	WRITE (U,F) K WRITE (U,F)	WRITE (U,F) K	WRITE (U,F) K	WRITE (U,F) K WRITE (U,F)	
UNFORMATTED READ (many)	READ (U) K READ (U)	READ (U) K READ (U)	READ (U) K	READ (U) K	READ (U) K READ (U)	
UNFORMATTED WRITE	WRITE (U) K WRITE (U)	WRITE (U) K WRITE (U)	WRITE (U) K	WRITE (U) K	WRITE (U) K WRITE (U)	
REWIND	REWIND U	REWIND U	REWIND U	REWIND U	REWIND U	
BACKSPACE	BACKSPACE U	BACKSPACE U	BACKSPACE U	BACKSPACE U	BACKSPACE U	

FEATURE	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
ENDFILE	ENDFILE U	ENDFILE U	ENDFILE U	ENDFILE U	ENDFILE U	
CARRIAGE CONTROL CONVENTIONS	BLANK - One Line 0 - Two Lines 1 Next Page + No Advance	Blank - One Line 0 - Two Lines 1 Next Page (136 Characters)	Blank - One Line 0 - Two Lines 1 Next Page <i>+ No Advance</i>	Blank - One Line 0 - Two Lines 1 Next Page + No Advance	Blank - One Line 0 - Two Lines 1 Next Page + No Advance	
DIMENSION	Max. 64	Max. 3	Max. X 7	Max. 3	Max. 3	
COMMON	Dimension Info. No Block Names	Dimension Info. No Block Names	Dimension Info. Block Names	Dimension Info. Block Names	Dimension Info. Block Names	
EQUIVALENCE	Storage Sharing All CDE must be First in Program	Storage Sharing	Storage Sharing All CDE must be First in Program	Storage Sharing	Storage Sharing	
EXTERNAL	External V_1, V_2, \dots	External V_1, V_2, \dots	External V_1, V_2, \dots	External V_1, V_2, \dots	External V_1, V_2, \dots	
TYPE STATEMENTS	Integer Real Double Precision Complex Logical	Integer Real	Integer Real Double Precision Complex Logical	Integer Real Double Precision Complex Logical	Integer Real Double Precision Complex Logical	
DATA STATEMENT	DATA $K_1/D_1/\dots$	Not Allowed	DATA $K_1/D_1/\dots$	DATA $K_1/D_1/\dots$	DATA $K_1/D_1/\dots$	
FORMAT STATEMENT	Format (....	Format (....	Format (....	Format (....	Format (....	
FORMAT FIELD DESCRIPTORS	F, E, D, I, L, A, H, X, G	F, E, I, A, H, X	D, E, F, I, O, A, L, H, X	D, E, F, I, G, ϕ , A, L, H, X	F, E, G, D, I, L, A, H, X	

*real
datum
G.w.d
d specifies # significant digits*

FEATURE	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
FORMAT FIELD SEPARATORS	, and /	, and /	, and /	, and /	, and /	
FORMAT REPEAT	Integer Count before Descriptor	Integer Count before Descriptor	Integer Count before Descriptor	Integer Count before Descriptor	OMITTED PRESUMES Integer Count (1) before Descriptor	
FORMAT -- I/O INTERACTION	I/O on Format Control or Length of Record	I/O on Format Control	I/O on Format Control	I/O on Format Control	I/O on Format Control	
SCALE FACTOR	Applies to All F, E, G, D Conversion	Applies to All F, E Conversion	Applies to All F, E, D Conversion	Applies to All F, E, G, D Conversion	Applies to All F, E, G, D Conversion	
STATEMENT FUNCTION	Before Executables not External $f(a...b) = e$	Not External $f(a...b) = e$ is Integer or Real	Before Executables Statement $f(a...b) = e$	Before Executables $f(a...b) = e$	Not External $f(a...b) = e$	
INTRINSIC FUNCTIONS	See Appendix A	See Appendix A	See Appendix A	See Appendix A	See Appendix A	
FUNCTION STATEMENT	T Function F(... Integer, Real, Double Precision, Complex & Logical	T Function F(... Integer, Real	Function F(... TYPE Function F(...	T Function F(... Integer, Real, Double Precision, Complex & Logical	T Function F(... Integer, Real, Double Precision, Complex & Logical	
BASIC EXTERNAL FUNCTIONS	See Appendix B	See Appendix B	See Appendix B	See Appendix B	See Appendix B	
SUBROUTINE STATEMENT	Subroutine S (...	Subroutine S (...	Subroutine S (...	Subroutine S (...	Subroutine S (...	

FEATURE	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
BLOCK DATA SUBPROGRAM	Not Available	Not Available	Block Data only Specification & Data Statements	Block Data only Type, Data Statements etc.	Block Data only Type, Data Statements etc.	
FORMATTED CARD READ	READ F, K	READ F, K	READ F, K	READ F, K	READ F, K	
FORMATTED CARD PUNCH	PUNCH F, K	PUNCH F, K	PUNCH F, K	PUNCH F, K	PUNCH F, K	
FORMATTED PRINTER OUTPUT	PRINT F, K or WRITE F, K	PRINT F, K or WRITE F, K	PRINT F, K or WRITE F, K	PRINT F, K or WRITE F, K	PRINT F, K or WRITE F, K	
FORMAT READABLE AT OBJECT TIME	Format Name is an Array	Format Name is an Array	Format Name is an Array	Format Name is an Array	Format Name is an Array	
DEFINE FILE STATEMENT	Not Available	Not Available	Not Available	Define File F (....	Not Available	Disc File
FIND STATEMENT	Not Available	Not Available	Not Available	Find $i_1 i_2$	Not Available	Disc File

FUNCTION	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
ABS	R → R	R → R	R → R	R → R	R → R	
IABS	LABS I → I	I → I	I → I	LABS I → I	I → I	
DABS	D → D	Not Allowed	D → D	D → D	D → D	
ASIN	R → R	R → R	R → R	R → R	R → R	
INT	R → I	R → I	R → I	R → I	R → I	
IDINT	D → I	Not Allowed	D → I	D → I	D → I	
AMOD	R → R	R → R	R → R	R → R	R → R	
MOD	I → I	I → I	I → I	I → I	I → I	
AMAX 0 + 1	I → R, R → R	I → R, R → R	I → R, R → R	I → R, R → R	I → R, R → R	
MAX 0 + 1	I → I, R → I	I → I, R → I	I → I, R → I	I → I, R → I	I → I, R → I	
DMAX 1	D → D	Not Allowed	D → D	D → D	D → D	
AMIN 0 + 1	I → R, R → R	I → R, R → R	I → R, R → R	I → R, R → R	I → R, R → R	
MIN 0 + 1	I → I, R → I	I → I, R → I	I → I, R → I	I → I, R → I	I → I, R → I	
DMIN 1	D → D	Not Allowed	D → D	D → D	D → D	
FLOAT	I → R	I → R	I → R	I → R	I → R	
IFIX	R → I	R → I	R → I	R → I	R → I	
SIGN	R → R	R → R	R → R	R → R	R → R	
ISIGN	I → I	I → I	I → I	I → I	I → I	
DSIGN	D → D	Not Allowed	D → D	D → D	D → D	

FUNCTION	200	400	600	I. B. M. 5/64	A. S. A. 4/64	REMARKS
DIM	R → R	R → R	R → R	R → R	R → R	
IDIM	I → I	I → I	I → I	I → I	I → I	
SNGL	D → R	Not Allowed	D → R	D → R	D → R	
REAL	CPX → R	Not Allowed	CPX → R	CPX → R	CPX → R	
AIMAG	CPX → R	Not Allowed	CPX → R	CPX → R	CPX → R	
DBLE	R → D	Not Allowed	R → D	R → D	R → D	
CMPLX	R → CPX	Not Allowed	R → CPX	R → CPX	R → CPX	
CONJG	CPX → CPX	Not Allowed	CPX → CPX	CPX → CPX	CPX → CPX	

FUNCTION	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
EXP	R	R	R	R	R	
DEXP	D	Not Allowed	D	D	D	
CEXP	CPX	Not Allowed	CPX	CPX	CPX	
ALOG	R	R	R	R	R	
DLOG	D	Not Allowed	D	D	D	
CLOG	CPX	Not Allowed	CPX	CPX	CPX	
ALOGIO	R	R	R	R	R	
DLOGIO	D	Not Allowed	D	D	D	
SIN	R	R	R	R	R	
DSIN	D	Not Allowed	D	D	D	
CSIN	CPX	Not Allowed	CPX	CPX	CPX	
COS	R	R	R	R	R	
DCOS	D	Not Allowed	D	D	D	
CCOS	CPX	Not Allowed	CPX	CPX	CPX	
TANH	R	R	R	R	R	
SQRT	R	R	R	R	R	
DSQRT	D	Not Allowed	D	D	D	
CSQRT	CPX	Not Allowed	CPX	CPX	CPX	
ATAN	R	R	R	R	R	

FUNCTION	200	400	600	I.B.M. 5/64	A.S.A. 4/64	REMARKS
DATAN	D	Not Allowed	D	D	D	
ATAN2	R	R	R	R	R	
DATAN2	D	Not Allowed	D	D	D	
DMOD	D	Not Allowed	D	D	D	
GABS	CPX \rightarrow R	Not Allowed	CPX \rightarrow CPX	CPX \rightarrow CPX	CPX \rightarrow R	