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CLEAR STORAGE 1      ,008015,022026,030037,044,049,053053N000000N00001026      1
CLEAR STORAGE 2      L068116,105106,110117B101/I9I#071029C029056B026/B001/0991,001/001117I0?  2
BOOTSTRAP            ,008015,022029,036040,047054,061068,072/061039      ,0010011040      3
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SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
101				JOB							
102				CTL	6611						
103				ORG	87				0087		
104	89	X1		DCW	000	3		0089			4
105	91			DC	00	2		0091			4
106	94	X2		DCW	000	3		0094			4
107	96			DC	00	2		0096			4
108	99	X3		DCW	000	3		0099			4
109	100			DC	0	1		0100			4
110				*							
111				*	ARITHMETIC INTERPRETER						
112				*							
113				*	GENERAL FORM OF INTERPRETED STRING IS						
114				*	OPERAND [ OPERATOR OPERAND ... ],						
115				*	HOWEVER, IF OPERAND HAS A WORD MARK, IT'S AN OPERATOR,						
116				*	USUALLY A FUNCTION CALL. OPERANDS ARE MACHINE ADDRESSES,						
117				*	WITH A TAG IN THE TENS DIGIT TO INDICATE TYPE: A- OR B-						
118				*	ZONE ALONE INDICATES INTEGER. OPERATORS ARE ONE CHARACTER.						
119				*							
120				*	TWO ACCUMULATORS IN THE PRINT AREA ARE USED. THE LOW-ORDER						
121				*	DIGIT OF AN OPERAND IS LOADED INTO ACCUMULATOR 1 AT 250; IT						
122				*	EXTENDS LEFTWARD BY THE LENGTH OF THE OPERAND, AND RIGHTWARD						
123				*	FROM THE LEFT END BY THE MANTISSA WIDTH. ACCUMULATOR 2 HAS ITS						
124				*	HIGH-ORDER DIGIT AT 280; IT EXTENDS RIGHTWARD BY THE MANTISSA						
125				*	WIDTH.						
126				*							
127				*	MOSTLY, INDEX REGISTER USAGE IS						
128				*	X1 = OPERAND ADDRESS						
129				*	X2 = INTERPRETER'S COUNTER, LOW-ORDER DIGIT OF ACCUM 1						
130				*	X3 = OPERAND WIDTH						
131				*							
132				ORG	700				0700		
133	700	ARITF		SBR	X2	4		0700	H 094		5
134	704			SBR	X1-3	4		0704	H 086		5
135	708			SBR	ERMSI&6	4		0708	H V06		5
136	712	NXTOP		MCW	2&X2,X1	7		0712	M 0!2 089		5
137	719			SAR	SX2A&6	4		0719	Q 765		5
138	723	NXTOPO		SBR	SX2B&6	4		0723	H S27		5
139	727			BCE	1206,0&X2,\$	8		0727	B S06 0!0 \$		5
140	735			SBR	RES&6,0&X1	7		0735	H T75 0'0		6
141	742			CS	303	4		0742	/ 303		6
142	746			CS		1		0746	/		6
143	747			CS		1		0747	/		6
144	748			LCA	KZ1,280	7		0748	L W85 280		6
145	755	NXTOP1		S	X1&2	4		0755	S 091		6
146	759	SX2A		SBR	X2,0-0	7		0759	H 094 000		6
147	766			C	4&X2,ASGOP	7		0766	C 0!4 W86		7

SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
148		773		MCW	4&X2,SAVOP			7 0773	M 0!4 924		7
149		780		SW	201			4 0780	, 201		7
150		784		BL	FUNC			5 0784	B T05 T		7
151				*							
152				*	ASSIGNMENT OP GREATER OR EQUAL TO OPERATOR, I.E., OPERATOR IS						
153				*	BLANK, ., ) LOZENGE, } GROUP MARK, &, \$, *, -, /, COMMA, %, #						
154				*							
155		789		SBR	NXTOP2&6,4&X2			7 0789	H 874 0!4		7
156		796		BCE	1199,5&X2,\$			8 0796	B /99 0!5 \$		7
157		804		MCW	7&X2,X1			7 0804	M 0!7 089		8
158		811		SAR	SX2A&6			4 0811	Q 765		8
159		815	TSTZON	BWZ	ARITI,X1-1,K			8 0815	V V30 088 K		8
160		823		BWZ	ARITI,X1-1,S			8 0823	V V30 088 S		8
161		831		SBR	X3,0			7 0831	H 099 000		8
162		838		CW	IFLAG			4 0838	) W87		8
163		842		MCW	0&X1,EXP1-1			7 0842	M 0!0 W82		9
164		849		SAR	X1			4 0849	Q 089		9
165		853		MCW	0&X1,250			7 0853	M 0!0 250		9
166				*	FROM HERE, X2 INDEXES						
167		860		SBR	X2			4 0860	H 094		9
168		864		LCA	KZ1			4 0864	L W85		9
169		868	NXTOP2	BW	NOSIGN,0-0			8 0868	V 883 000 1		9
170		876		MZ	250,ZAS			7 0876	Y 250 '87		10
171		883	NOSIGN	S	KZ1,252&X3			7 0883	S W85 2E2		10
172		890		C	1&X2,KZ1			7 0890	C 0!1 W85		10
173		897		A	X3,X2			7 0897	A 099 094		10
174		904		BCE	FDIV,SAVOP,/			8 0904	B S33 924 /		10
175		912		BCE	FMPY,SAVOP,*			8 0912	B S62 924 *		11
176		920		S	SAVOP			4 0920	S 924		11
177		924	SAVOP	ZA	ZAS			4 0924	? '87		11
178		928		BCE	NMLZ1,280,0			8 0928	B '17 280 0		11
179		936		BE	CLRWK			5 0936	B /34 S		11
180		941		S	EXP1-1,EXP2-1			7 0941	S W82 W79		11
181		948		ZA	EXP2,X1&1			7 0948	? W80 090		12
182		955		C	X3,X1			7 0955	C 099 089		12
183		962		BM	E1GTE2,EXP2-1			8 0962	V /65 W79 K		12
184		970		BH	EXDGMW			5 0970	B /88 U		12
185		975		A	EXP2-1,EXP1-1			7 0975	A W79 W82		12
186		982		ZA	250,250&X1			7 0982	? 250 2V0		13
187		989		ZA	X3&1,X1&1			7 0989	? 100 090		13
188		996	ADDSUB	MZ	ZAS,0&X2			7 0996	Y '87 0!0		13
189	1	003		A	279&X1,0&X2			7 1003	A 2X9 0!0		13
190				*							
191				*	RELOCATABLE FUNCTIONS RETURN HERE TOO						
192				*							
193	1	010	FRET	MZ	0&X2,ZAS			7 1010	Y 0!0 '87		13
194				*							
195				*	NORMALIZE FLOATING-POINT RESULT OF A SINGLE ARITHMETIC						
196				*	OPERATION; PLACE THE NORMALIZED RESULT IN THE WORKING						
197				*	ACCUMULATOR. IF EXPONENT OVERFLOW IS DETECTED, GO TO ERMSG TO						

SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
198					* PRINT MESSAGE (NOF); THEN GO TO STR99. IF EXPONENT UNDERFLOW						
199					* IS DETECTED, GO TO STRZE. HERE, THE LOW-ORDER DIGIT OF THE						
200					* RESULT IS INDEXED BY X2.						
201					*						
202					* THE NORMALIZED RESULT IS LEFT IN ACCUM 2.						
203					*						
204	1	017	NMLZ1	ZA	EXP1-1,EXP2-1	7		1017	? W82 W79		14
205	1	024	NMLZ2	MCW	RM,1&X2 INSERT RM AFTER LOW-ORDER DIGIT	7		1024	M W75 0!1		14
206	1	031		MZ	CHAIN	1		1031	Y		14
207	1	032		MZ	TWO ZEROS	1		1032	Y		14
208	1	033		A	AND ADD ANOTHER ONE	1		1033	A		14
209	1	034		MN	DECR A AND B (COPIES JUNK TO UNUSED)	1		1034	D		14
210	1	035		SBR	X1	4		1035	H 089		14
211	1	039		S	281&X3 CLEAR ACCUM 2	4		1039	S 2H1		15
212	1	043	NMLZL	BCE	STRZE,2&X1,' RECORD MARK INDICATES ZERO RESULT	8		1043	B /42 0'2 '		15
213	1	051		SBR	X1 BUMP X1	4		1051	H 089		15
214	1	055		BCE	NMLZL,1&X1,0 ZERO MEANS MORE NORMALIZATION NEEDED	8		1055	B '43 0'1 0		15
215	1	063		MCM	1&X1,280 NORMALIZE	7		1063	P 0'1 280		15
216	1	070		S	X3,X2	7		1070	S 099 094		15
217	1	077		CW	DECREASE AS AND BS TO	1		1077	)		15
218	1	078		CW	REFER TO X2 AND X1	1		1078	)		16
219	1	079		S	X2,X1	1		1079	S		16
220	1	080		S	X1,EXP2-1 STORE NORMALIZED EXPONENT	7		1080	S 089 W79		16
221	1	087	ZAS	ZA	279&X3 ZS IF ACCUM 1 NEGATIVE	4		1087	? 2G9		16
222	1	091		SW		1		1091	,		16
223	1	092		BCE	CLRWK,EXP2-3,0	8		1092	B /34 W77 0		16
224	1	100		BM	STRZE,EXP2-1 EXPONENT UNDERFLOW	8		1100	V /42 W79 K		16
225	1	108		B	ERMSG EXPONENT OVERFLOW	4		1108	B U71		17
226	1	114		DCW	@NOF@	3		1114			17
227					*						
228					* EXPONENT OVERFLOW; SET RESULT MAGNITUDE EQUAL TO LARGEST						
229					* VALUE POSSIBLE IN FLOATING-POINT NOTATION; SET RESULT SIGN						
230					* AS APPROPRIATE.						
231					*						
232	1	115	STR99	ZA	KM99,EXP2-1 -99 TO EXP2	7		1115	? W89 W79		17
233	1	122		MN	KM99,279&X3 ALL 9'S	7		1122	D W89 2G9		17
234	1	129		MCW	TO MANTISSA	1		1129	M		17
235	1	130		MCW	278&X3 IN ACCUM2	4		1130	M 2G8		17
236					*						
237					* CLEAR ACCUM 1 AFTER AN INDIVIDUAL ARITHMETIC OPERATION						
238					*						
239	1	134	CLRWK	CS	278	4		1134	/ 278		17
240	1	138		B	NXTOP1	4		1138	B 755		18
241					*						
242					* EXPONENT UNDERFLOW, OR RESULT IS ZERO. SET FLOATING-POINT						
243					* RESULT TO ZERO						
244					*						
245	1	142	STRZE	S	EXP2-1 EXP2 = 0	4		1142	S W79		18
246	1	146		S	279&X3 ACCUM 2 MANTISSA = 0	4		1146	S 2G9		18
247	1	150		B	CLRWK	4		1150	B /34		18



SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
298					* ASSIGNMENT OPERATOR IS LESS THAN CURRENT OPERATOR, I.E.,						
299					* CURRENT OPERATOR IS ONE OF @, ?, A-I, !, J-R, ', S-Z, 0-9.						
300					* IF NOT RECORD MARK, IT'S THE FIRST CHARACTER OF WHAT WOULD						
301					* OTHERWISE BE AN OPERAND, SO BUMP THE OPERAND ADDRESS.						
302					*						
303	1	305	FUNC	BCE	DONE,4&X2,'			8 1305	B T31 0!4 '		23
304	1	313		SBR	SX2A&6,1&X2			7 1313	H 765 0!1		23
305	1	320		C	280,KZ1			7 1320	C 280 W85		23
306					* THE LOADER PLUGS THE RELOCATABLE FUNCTION SELECTOR ADDRESS HERE						
307	1	327	QFUNCT	B	0			4 1327	B 000		24
308	1	331	DONE	BCE	RES,280,0			8 1331	B T69 280 0		24
309	1	339		BW	RES,IFLAG			8 1339	V T69 W87 1		24
310	1	347		BW	FPRES,4&X2			8 1347	V T92 0!4 1		24
311	1	355		SBR	X3,2&X3			7 1355	H 099 0?2		24
312	1	362	SEXP2	MCM	EXP2-2,278&X3			7 1362	P W78 2G8		25
313	1	369	RES	LCA	279&X3,0			7 1369	L 2G9 000		25
314	1	376		BW	5&X2,4&X2			8 1376	V 0!5 0!4 1		25
315	1	384		SAR	X2			4 1384	Q 094		25
316	1	388		B	NXTOP			4 1388	B 712		25
317					*						
318					* ROUND NONZERO FLOATING-POINT RESULT						
319					*						
320	1	392	FPRES	A	KP5,278&X3			7 1392	A W91 2G8		25
321	1	399		BWZ	CARRY,280,S			8 1399	V U18 280 S		26
322	1	407	CPZONE	MZ	279&X3,277&X3			7 1407	Y 2G9 2G7		26
323	1	414		B	SEXP2			4 1414	B T62		26
324	1	418	CARRY	A	KP1,EXP2-1			7 1418	A W92 W79		26
325	1	425		BCE	FOVFL,EXP2-3,1			8 1425	B U48 W77 1		26
326	1	433		S	279&X3			4 1433	S 2G9		26
327	1	437		LCA	K1B-1,280			7 1437	L W93 280		27
328	1	444		B	CPZONE			4 1444	B U07		27
329					*						
330					* FLOATING-POINT OVERFLOW -- HIGH-ORDER DIGIT OF EXP2 IS 1						
331					*						
332	1	448	FOVFL	MN	KM99,279&X3			7 1448	D W89 2G9		27
333	1	455		MCW				1 1455	M		27
334	1	456		MCW	278&X3			4 1456	M 2G8		27
335	1	460		S	KP1,EXP2-1			7 1460	S W92 W79		27
336	1	467		B	CPZONE			4 1467	B U07		27
337					*						
338					* PRINT APPROPRIATE ERROR MESSAGES, WHICH INCLUDES A MNEMONIC						
339					* THREE-CHARACTER CODE AND THE DISPLAY ADDRESS IN THE GENERATED						
340					* PROCEDURE OF THE SOURCE PROGRAM STATEMENT BEING EXECUTED. THIS						
341					* SUBROUTINE IS USED TO RECORD CIRCUMSTANCES, OCCURRING DURING						
342					* ARITHMETIC OPERATIONS, WHICH MAY AFFECT THE CALCULATION						
343					* ADVERSELY.						
344					*						
345	1	471	ERMSG	SBR	ERSVX&6			4 1471	H U92		28
346	1	475		CS	202&X3			4 1475	/ 2?2		28
347	1	479		SBR	ERSX3&6,0&X3			7 1479	H V25 0?0		28

SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
348	1	486	ERSVX	SBR	X3,0	7		1486	H 099 000		28
349	1	493	MCW		2&X3,212	7		1493	M 0?2 212		28
350	1	500	ERMSI	SBR	217,0	7		1500	H 217 000		28
351	1	507		W		1		1507	2		28
352	1	508		SW	201	4		1508	, 201		29
353	1	512		SBR	ERMSGX&3,3&X3	7		1512	H V29 0?3		29
354	1	519	ERSX3	SBR	X3,0	7		1519	H 099 000		29
355	1	526	ERMSGX	B	0	4		1526	B 000		29
356			*								
357			*		* OPERAND TENS DIGIT HAS A OR B BUT NOT AB ZONE (INTEGER ARITH.)						
358			*								
359	1	530	ARITI	SBR	X3,0	7		1530	H 099 000		29
360	1	537		SW	IFLAG	4		1537	, W87		29
361	1	541		MCS	0&X1,250	7		1541	Z 0'0 250		30
362	1	548		BCE	XDIV,SAVOP,/	8		1548	B W23 924 /		30
363	1	556		BCE	XMPY,SAVOP,*	8		1556	B V98 924 *		30
364	1	564		BM	XSUB,SAVOP	8		1564	V V87 924 K		30
365	1	572		A	0&X1,279&X3	7		1572	A 0'0 2G9		30
366	1	579	XSIGN	ZA	279&X3	4		1579	? 2G9		31
367	1	583		B	CLRWK	4		1583	B /34		31
368	1	587	XSUB	S	0&X1,279&X3	7		1587	S 0'0 2G9		31
369	1	594		B	XSIGN	4		1594	B V79		31
370	1	598	XMPY	LCA	0&X1,250	7		1598	L 0'0 250		31
371	1	605		M	279&X3,251&X3	7		1605	@ 2G9 2E1		31
372	1	612		MCW	251&X3,279&X3	7		1612	M 2E1 2G9		32
373	1	619		B	CLRWK	4		1619	B /34		32
374	1	623	XDIV	BCE	DVERR,250,	8		1623	B /54 250		32
375	1	631		MCW	0&X1,250&X3	7		1631	M 0'0 2E0		32
376	1	638		MN		1		1638	D		32
377	1	639		SBR	MOVEQ&3	4		1639	H W64		32
378	1	643		LCA	279&X3	4		1643	L 2G9		32
379	1	647		ZA	279&X3,250&X3	7		1647	? 2G9 2E0		33
380	1	654		D	0&X1,251	7		1654	% 0'0 251		33
381	1	661	MOVEQ	MCW	249,279&X3	7		1661	M 249 2G9		33
382	1	668		B	CLRWK	4		1668	B /34		33
383			*								
384			*		* DATA						
385			*								
386	1	674		DCW	000	3		1674			33
387	1	675	RM	DCW	@'@	1		1675			33
388	1	676		DCW	0	1		1676			33
389	1	680	EXP2	DCW	@000'@	4		1680	EXPONENT OF ACCUM 2, AND ZERO AND RM		34
390	1	683	EXP1	DCW	000	3		1683	EXPONENT OF ACCUM 1, AND ZERO		34
391	1	684		DCW	8	1		1684			34
392	1	685	KZ1	DCW	0	1		1685			34
393	1	686	ASGOP	DCW	@##	1		1686	ASSIGNMENT OPERATOR		34
394	1	687	IFLAG	DCW	#1	1		1687	WORD MARK INDICATES INTEGER		34
395	1	689	KM99	DCW	-99	2		1689	USED FOR OVERFLOW		34
396	1	690	KP2	DCW	&2	1		1690			35
397	1	691	KP5	DCW	&5	1		1691			35

SEQ	PG	LIN	LABEL	OP	OPERANDS	SFX	CT	LOCN	INSTRUCTION	TYPE	CARD
398	1	692	KP1	DCW	&1	1		1692			35
399	1	694	K1B	DCW	@1 @	2		1694			35
400	1	695		DCW	0	1		1695			35
401	1	696		DC	@"@	1		1696		GMARK	35
402				END	GROUP MARK				/ 000 080		

