

APPENDIX A FABRI-TEK MP12 INSTRUCTION SET

MEMORY REFERENCE INSTRUCTIONS

MNEMONIC SYMBOL	OPERATION CODE	EXECUTION TIME*	OPERATION DESCRIPTION
AND Y	0	Direct-3.0 Indirect-4.5	LOGICAL AND. This instruction generates the logical product of the contents of memory location Y and the contents of the accumulator. The result replaces the previous contents of the accumulator. The bit stored in the link register is not affected by the LOGICAL AND operation.
TAD Y	1	Direct-3.0 Indirect-4.5	TWO'S COMPLEMENT ADD. This instruction generates the arithmetic sum of the contents of memory location Y and the contents of the accumulator. The result replaces the previous contents of the accumulator. If the operation produces a carry from the most significant bit position, the link bit is complemented.
ISZ Y	2	Direct-3.0 Indirect-4.5	INCREMENT AND SKIP IF ZERO. This instruction adds one to the contents of memory location Y. If the result is zero the next instruction in sequence is skipped. The contents of the link register and accumulator are not affected by the INCREMENT AND SKIP IF ZERO operation.
DCA Y	3	Direct-3.0 Indirect-4.5	DEPOSIT AND CLEAR ACCUMULATOR. This instruction copies the contents of the accumulator into memory location Y and then clears the accumulator to zero. The bit stored in the link register is not affected by the DEPOSIT AND CLEAR ACCUMULATOR operation.
JMS Y	4	Direct-3.0 Indirect-4.5	JUMP TO SUBROUTINE. This instruction copies the address of the next instruction in sequence into memory location Y and transfers program control to location Y+1. The contents of the link register and accumulator are not affected by JUMP TO SUBROUTINE operation.
JMP Y	5	Direct-1.5 Indirect-3.0	JUMP. This instruction transfers program control to location Y. The contents of the link register and accumulator are not affected by the JUMP operation.

*Time referenced in microseconds.

GROUP I OPERATE MICROINSTRUCTIONS

MNEMONIC SYMBOL	OCTAL CODE	EXECUTION TIME*	OPERATION DESCRIPTION
NOP	7000	3.0	NO OPERATION. This instruction performs no operation.
IAC	7001	3.0	INCREMENT ACCUMULATOR. This instruction adds one to the contents of the accumulator and replaces the previous contents of the accumulator with the result. If the operation produces a carry from the most significant bit position, the link bit is complemented.
RAL	7004	3.0	ROTATE ACCUMULATOR AND LINK LEFT. This instruction shifts the contents of the accumulator left one bit position. The bit shifted out of bit position 00 is shifted into the link register and the previous content of the link register is shifted into bit position 11.
RAR	7010	3.0	ROTATE ACCUMULATOR AND LINK RIGHT. This instruction shifts the contents of the accumulator right one bit position. The bit shifted out of bit position 11 is shifted into the link register and the previous content of the link register is shifted into bit position 0.
RTL	7006	3.0	ROTATE ACCUMULATOR AND LINK TWICE LEFT. This instruction is equivalent to two sequential RAL instructions.
RTR	7012	3.0	ROTATE ACCUMULATOR AND LINK TWICE RIGHT. This instruction is equivalent to two sequential RAR instructions.
CML	7020	3.0	COMPLEMENT LINK. This instruction complements the bit stored in the link register. The contents of the accumulator are not affected by the COMPLEMENT LINK operation.
CMA	7040	3.0	COMPLEMENT ACCUMULATOR. This instruction generates the one's complement of the contents of the accumulator. The result replaces the previous contents of the accumulator. The bit stored in the link register is not affected by the COMPLEMENT ACCUMULATOR operation.
CLL	7100	3.0	CLEAR LINK. This instruction sets the content of the link register to zero. The contents of the accumulator are not affected by the CLEAR LINK operation.
CLA	7200	3.0	CLEAR ACCUMULATOR. This instruction sets the contents of the accumulator to zero. The bit stored in the link register is not affected by the CLEAR ACCUMULATOR operation.

*Time referenced in microseconds.

GROUP II OPERATE MICROINSTRUCTIONS

MNEMONIC SYMBOL	OCTAL CODE	EXECUTION TIME*	OPERATION DESCRIPTION
HLT	7402	3.0	HALT. This instruction stops instruction execution. If the HALT instruction is combined with other Group II microinstructions, the HALT instruction is the last operation to be performed.
OSR	7404	3.0	OR SWITCH REGISTER. This instruction generates the logical sum of the contents of the accumulator and the value set in the control panel switches. The result replaces the previous contents of the accumulator. The bit stored in the link register is not affected by the OR SWITCH REGISTER operation.
SKP	7410	3.0	Skip.
SNL	7420	3.0	Skip if $L \neq 0$.
SZL	7430	3.0	Skip if $L = 0$.
SZA	7440	3.0	Skip if $AC = 0$.
SNA	7450	3.0	Skip if $AC \neq 0$.
SZA SNL	7460	3.0	Skip if $AC = 0$, or $L = 1$, or both.
SNA SZL	7470	3.0	Skip if $AC \neq 0$ and $L = 0$.
SMA	7500	3.0	Skip if $AC < 0$.
SPA	7510	3.0	Skip if $AC \geq 0$.
SMA SNL	7520	3.0	Skip if $AC < 0$, or $L = 1$, or both.
SPA SZL	7530	3.0	Skip if $AC \geq 0$ and $L = 0$.
SMA SZA	7540	3.0	Skip if $AC \leq 0$.
SPA SNA	7550	3.0	Skip if $AC > 0$.
CLA	7600	3.0	Clear AC.
SZA CLA	7640	3.0	Skip if $AC = 0$, then clear AC.
SNA CLA	7650	3.0	Skip if $AC \neq 0$, then clear AC.
SMA CLA	7700	3.0	Skip if $AC < 0$, then clear AC.
SPA CLA	7710	3.0	Skip if $AC \geq 0$, then clear AC.

*Time referenced in microseconds.

INPUT-OUTPUT INSTRUCTIONS

MNEMONIC SYMBOL	OPER. CODE	EXECUTION TIME*	OPERATION DESCRIPTION
IOT Y	6	3.0	INPUT-OUTPUT TRANSFER. The input-output function specified by the least significant three bits of Y is performed with respect to the device addressed by the most significant 6 bits of Y ($000_8 \leq Y \leq 777_8$).

INTERRUPT INSTRUCTIONS

MNEMONIC SYMBOL	OCTAL CODE	EXECUTION TIME*	OPERATION DESCRIPTION
ION	6001	3.0	TURN INTERRUPTS ON. This instruction enables the interrupt system after a one instruction delay.
IOF	6002	3.0	TURN INTERRUPTS OFF. This instruction disables the interrupt system.
SPL	6004	3.0	SKIP IF POWER LOW. This instruction causes the next instruction in sequence to be skipped if the power low signal from the power supply is asserted.
CON	6774	3.0	TURN LINE FREQUENCY CLOCK ON. Enables the line frequency clock in the optional power supply module. When enabled, the clock will generate a processor interrupt each 16 2/3 milliseconds until disabled.
COF	6772	3.0	TURN LINE FREQUENCY CLOCK OFF. Disables the line frequency clock.
SCD	6771	3.0	SKIP ON CLOCK DONE AND CLEAR INTERRUPT. The next instruction in sequence is skipped if the line frequency clock has generated an interrupt request.

*Time referenced in microseconds.

APPENDIX B USASCII CHARACTER SET

OCTAL CODE	CHARACTER NAME	ASCII CHARACTER	TELETYPE CHARACTER	KEY OR KEY COMBINATIONS
220	Null/Idle	NULL	---	CTRL @
201	Start of Message	SOM	---	CTRL A
202	End of Address	EOA	---	CTRL B
203	End of Message	EOM	---	CTRL C
204	End of Transmission	EOT	---	CTRL D
205	Who Are You	WRU	---	CTRL E
206	Are You	RU	---	CTRL F
207	Audible Signal	BELL	---	CTRL G
210	Format Effector	FE	---	CTRL H
211	Horizontal Tabulation	H TAB	---	CTRL I
212	Line Feed	LF	---	CTRL J
213	Vertical Tabulation	V TAB	---	CTRL K
214	Form Feed	FF	---	CTRL L
215	Carriage Return	CR	---	CTRL M
216	Shift Out	SO	---	CTRL N
217	Shift In	SI	---	CTRL O
220	Device Control Reversed for Data Line Escape	DC0	---	CTRL P
221	Device Control ON	DC1	---	CTRL Q
222	Device Control (TAPE) ON	DC2	---	CTRL R
223	Device Control OFF	DC3	---	CTRL S
224	Device Control (TAPE) OFF	DC4	---	CTRL T
225	Error	ERR	---	CTRL U
226	Synchronous Idle	SYNC	---	CTRL V
227	Logical End of Media	LEM	---	CTRL W
230	Separator, Information	S0	---	CTRL X
231	Separator, Data Delimiters	S1	---	CTRL Y
232	Separator, Words	S2	---	CTRL Z
233	Separator, Groups	S3	---	SHIFT CTRL K
234	Separator, Records	S4	---	SHIFT CTRL L
235	Separator, Files	S5	---	SHIFT CTRL M
236	Separator, Misc.	S6	---	SHIFT CTRL N
237	Separator, Misc.	S7	---	SHIFT CTRL O
240	Space	SP	Space	Space Bar
241	Exclamation Point	!	!	SHIFT !
242	Quotation Marks	"	"	SHIFT "
243	Number Sign	#	#	SHIFT #
244	Dollar Sign	\$	\$	SHIFT \$

(CONTINUED)

OCTAL CODE	CHARACTER NAME	ASCII CHARACTER	TELETYPE CHARACTER	KEY OR KEY COMBINATIONS
245	Percent Sign	%	%	SHIFT %
246	Ampersand	&	&	SHIFT &
247	Apostrophe	'	'	SHIFT '
250	Parenthesis, Beginning	(	(	SHIFT (
251	Parenthesis, Ending	)	)	SHIFT)
252	Asterisk	*	*	SHIFT *
253	Plus Sign	+	+	SHIFT +
254	Comma	,	,	,
255	Hyphen	-	-	-
256	Period	.	.	.
257	Virgule	/	/	/
260	Numeral 0	0	0	0
261	Numeral 1	1	1	1
262	Numeral 2	2	2	2
263	Numeral 3	3	3	3
264	Numeral 4	4	4	4
265	Numeral 5	5	5	5
266	Numeral 6	6	6	6
267	Numeral 7	7	7	7
270	Numeral 8	8	8	8
271	Numeral 9	9	9	9
272	Colon	:	:	:
273	Semicolon	;	;	;
274	Less Than	<	<	SHIFT <
275	Equals	=	=	SHIFT =
276	Greater Than	>	>	SHIFT >
277	Interrogation Point	?	?	SHIFT ?
300	At	@	@	SHIFT @
301	Letter A	A	A	A
302	Letter B	B	B	B
303	Letter C	C	C	C
304	Letter D	D	D	D
305	Letter E	E	E	E
306	Letter F	F	F	F
307	Letter G	G	G	G
310	Letter H	H	H	H
311	Letter I	I	I	I
312	Letter J	J	J	J
313	Letter K	K	K	K
314	Letter L	L	L	L
315	Letter M	M	M	M
316	Letter N	N	N	N
317	Letter O	O	O	O

(CONTINUED)

OCTAL CODE	CHARACTER NAME	ASCII CHARACTER	TELETYPE CHARACTER	KEY OR KEY COMBINATIONS
320	Letter P	P	P	P
321	Letter Q	Q	Q	Q
322	Letter R	R	R	R
323	Letter S	S	S	S
324	Letter T	T	T	T
325	Letter U	U	U	U
326	Letter V	V	V	V
327	Letter W	W	W	W
330	Letter X	X	X	X
331	Letter Y	Y	Y	Y
332	Letter Z	Z	Z	Z
333	Bracket, Left	[	[	SHIFT K
334	Reverse Virgule	\	\	SHIFT L
335	Bracket, Right	]	]	SHIFT M
336	Up Arrow	↑	↑	SHIFT N
337	Left Arrow	←	←	SHIFT O
340 through 374 are not available				
375	Unassigned Control	1	---	ALT MODE
376	Not Available			
377	Rub Out	DEL	---	RUB OUT

APPENDIX C USASCII CHARACTER CODES

CHARACTER	8-BIT CODE (IN OCTAL)	CHARACTER	8-BIT CODE (IN OCTAL)
A	301	!	241
B	302	"	242
C	303	#	243
D	304	\$	244
E	305	%	245
F	306	&	246
G	307	'	247
H	310	(	250
I	311	)	251
J	312	*	252
K	313	+	253
L	314	,	254
M	315	-	255
N	316	.	256
O	317	/	257
P	320	:	272
Q	321	;	273
R	322	<	274
S	323	=	275
T	324	>	276
U	325	?	277
V	326	@	300
W	327	[	333
X	330	\	334
Y	331	]	335
Z	332	↑	336
		←	337
0	260		
1	261	Leader/Trailer	200
2	262	Line-Feed	212
3	263	Carriage-Return	215
4	264	Space	240
5	265	Rub-out	377
6	266	Null	000
7	267	alt-mode	375
8	270	escape	233
9	271		

APPENDIX D POWERS OF TWO

2 ⁿ	n	2 ⁻ⁿ
1	0	1 0
2	1	0 5
4	2	0 25
8	3	0 125
16	4	0 062 5
32	5	0 031 25
64	6	0 015 625
128	7	0 007 812 5
256	8	0 003 906 25
512	9	0 001 953 125
1 024	10	0 000 976 562 5
2 048	11	0 000 488 281 25
4 096	12	0 000 244 140 625
8 192	13	0 000 122 070 312 5
16 384	14	0 000 061 035 156 25
32 768	15	0 000 030 517 578 125
65 536	16	0 000 015 258 789 062 5
131 072	17	0 000 007 629 394 531 25
262 144	18	0 000 003 814 697 265 625
524 288	19	0 000 001 907 348 632 812 5
1 048 576	20	0 000 000 953 674 316 406 25
2 097 152	21	0 000 000 476 837 158 203 125
4 194 304	22	0 000 000 238 418 579 101 562 5
8 388 608	23	0 000 000 119 209 289 550 781 25
16 777 216	24	0 000 000 059 604 644 775 390 625
33 554 432	25	0 000 000 029 802 322 387 695 312 5
67 108 864	26	0 000 000 014 901 161 193 847 656 25
134 217 728	27	0 000 000 007 450 580 596 923 828 125
268 435 456	28	0 000 000 003 725 290 298 461 914 062 5
536 870 912	29	0 000 000 001 862 645 149 230 957 031 25
1 073 741 824	30	0 000 000 000 931 322 574 615 478 515 625
2 147 483 648	31	0 000 000 000 465 661 287 307 739 257 812 5
4 294 967 296	32	0 000 000 000 232 830 643 653 869 628 906 25
8 589 934 592	33	0 000 000 000 116 415 321 826 934 814 453 125
17 179 869 184	34	0 000 000 000 058 207 660 913 467 407 226 562 5
34 359 738 368	35	0 000 000 000 029 103 830 456 733 703 613 281 25
68 719 476 736	36	0 000 000 000 014 551 915 228 366 851 806 640 625
137 438 953 472	37	0 000 000 000 007 275 957 614 183 425 903 320 312 5
274 877 906 944	38	0 000 000 000 003 637 978 807 091 712 951 660 156 25
549 755 813 888	39	0 000 000 000 001 818 989 403 545 856 475 830 078 125
1 099 511 627 776	40	0 000 000 000 000 909 494 701 772 928 237 915 039 062 5
2 199 023 255 552	41	0 000 000 000 000 454 747 350 886 464 118 957 519 531 25
4 398 046 511 104	42	0 000 000 000 000 227 373 675 443 232 059 478 759 765 625
8 796 093 022 208	43	0 000 000 000 000 113 686 837 721 616 029 739 379 882 812 5
17 592 186 044 416	44	0 000 000 000 000 056 843 418 860 808 014 869 689 941 406 25
35 184 372 088 832	45	0 000 000 000 000 028 421 709 430 404 007 434 844 970 703 125
70 368 744 177 664	46	0 000 000 000 000 014 210 854 715 202 003 717 422 485 351 562 5
140 737 488 355 328	47	0 000 000 000 000 007 105 427 357 601 001 858 711 242 675 781 25
281 474 976 710 656	48	0 000 000 000 000 003 552 713 678 800 500 929 355 621 337 890 625
562 949 953 421 312	49	0 000 000 000 000 001 776 356 839 400 250 464 677 810 668 945 312 5
1 125 899 906 842 624	50	0 000 000 000 000 000 888 178 419 700 125 232 338 905 334 472 656 25
2 251 799 813 685 248	51	0 000 000 000 000 000 444 089 209 850 062 616 169 452 667 236 328 125
4 503 599 627 370 496	52	0 000 000 000 000 000 222 044 604 925 031 308 084 726 333 618 164 062 5
9 007 199 254 740 992	53	0 000 000 000 000 000 111 022 302 462 515 654 042 363 166 809 082 031 25
18 014 398 509 481 984	54	0 000 000 000 000 000 055 511 151 231 257 827 021 181 583 404 541 015 625
36 028 797 018 963 968	55	0 000 000 000 000 000 027 755 575 615 628 913 510 590 791 702 270 507 812 5

APPENDIX E OCTAL-DECIMAL CONVERSION TABLE

		0	1	2	3	4	5	6	7	
0000 to 0777 (Octal)	0000 to 0511 (Decimal)	0000	0000	0001	0002	0003	0004	0005	0006	0007
		0010	0008	0009	0010	0011	0012	0013	0014	0015
		0020	0016	0017	0018	0019	0020	0021	0022	0023
		0030	0024	0025	0026	0027	0028	0029	0030	0031
		0040	0032	0033	0034	0035	0036	0037	0038	0039
		0050	0040	0041	0042	0043	0044	0045	0046	0047
Octal	Decimal	0060	0048	0049	0050	0051	0052	0053	0054	0055
		0070	0056	0057	0058	0059	0060	0061	0062	0063
10000 - 4096										
20000 - 8192										
30000 - 12288		0100	0064	0065	0066	0067	0068	0069	0070	0071
40000 - 16384		0110	0072	0073	0074	0075	0076	0077	0078	0079
50000 - 20480		0120	0080	0081	0082	0083	0084	0085	0086	0087
60000 - 24576		0130	0088	0089	0090	0091	0092	0093	0094	0095
70000 - 28672		0140	0096	0097	0098	0099	0100	0101	0102	0103
		0150	0104	0105	0106	0107	0108	0109	0110	0111
		0160	0112	0113	0114	0115	0116	0117	0118	0119
		0170	0120	0121	0122	0123	0124	0125	0126	0127
		0200	0128	0129	0130	0131	0132	0133	0134	0135
		0210	0136	0137	0138	0139	0140	0141	0142	0143
		0220	0144	0145	0146	0147	0148	0149	0150	0151
		0230	0152	0153	0154	0155	0156	0157	0158	0159
		0240	0160	0161	0162	0163	0164	0165	0166	0167
		0250	0168	0169	0170	0171	0172	0173	0174	0175
		0260	0176	0177	0178	0179	0180	0181	0182	0183
		0270	0184	0185	0186	0187	0188	0189	0190	0191
		0300	0192	0193	0194	0195	0196	0197	0198	0199
		0310	0200	0201	0202	0203	0204	0205	0206	0207
		0320	0208	0209	0210	0211	0212	0213	0214	0215
		0330	0216	0217	0218	0219	0220	0221	0222	0223
		0340	0224	0225	0226	0227	0228	0229	0230	0231
		0350	0232	0233	0234	0235	0236	0237	0238	0239
		0360	0240	0241	0242	0243	0244	0245	0246	0247
		0370	0248	0249	0250	0251	0252	0253	0254	0255

		0	1	2	3	4	5	6	7	
1000 to 1777 (Octal)	0512 to 1023 (Decimal)	1000	0512	0513	0514	0515	0516	0517	0518	0519
		1010	0520	0521	0522	0523	0524	0525	0526	0527
		1020	0528	0529	0530	0531	0532	0533	0534	0535
		1030	0536	0537	0538	0539	0540	0541	0542	0543
		1040	0544	0545	0546	0547	0548	0549	0550	0551
		1050	0552	0553	0554	0555	0556	0557	0558	0559
		1060	0560	0561	0562	0563	0564	0565	0566	0567
		1070	0568	0569	0570	0571	0572	0573	0574	0575
		1100	0576	0577	0578	0579	0580	0581	0582	0583
		1110	0584	0585	0586	0587	0588	0589	0590	0591
		1120	0592	0593	0594	0595	0596	0597	0598	0599
		1130	0600	0601	0602	0603	0604	0605	0606	0607
		1140	0608	0609	0610	0611	0612	0613	0614	0615
		1150	0616	0617	0618	0619	0620	0621	0622	0623
		1160	0624	0625	0626	0627	0628	0629	0630	0631
		1170	0632	0633	0634	0635	0636	0637	0638	0639
1200	0640	0641	0642	0643	0644	0645	0646	0647		
1210	0648	0649	0650	0651	0652	0653	0654	0655		
1220	0656	0657	0658	0659	0660	0661	0662	0663		
1230	0664	0665	0666	0667	0668	0669	0670	0671		
1240	0672	0673	0674	0675	0676	0677	0678	0679		
1250	0680	0681	0682	0683	0684	0685	0686	0687		
1260	0688	0689	0690	0691	0692	0693	0694	0695		
1270	0696	0697	0698	0699	0700	0701	0702	0703		
1300	0704	0705	0706	0707	0708	0709	0710	0711		
1310	0712	0713	0714	0715	0716	0717	0718	0719		
1320	0720	0721	0722	0723	0724	0725	0726	0727		
1330	0728	0729	0730	0731	0732	0733	0734	0735		
1340	0736	0737	0738	0739	0740	0741	0742	0743		
1350	0744	0745	0746	0747	0748	0749	0750	0751		
1360	0752	0753	0754	0755	0756	0757	0758	0759		
1370	0760	0761	0762	0763	0764	0765	0766	0767		

	0	1	2	3	4	5	6	7
0400	0256	0257	0258	0259	0260	0261	0262	0263
0410	0264	0265	0266	0267	0268	0269	0270	0271
0420	0272	0273	0274	0275	0276	0277	0278	0279
0430	0280	0281	0282	0283	0284	0285	0286	0287
0440	0288	0289	0290	0291	0292	0293	0294	0295
0450	0296	0297	0298	0299	0300	0301	0302	0303
0460	0304	0305	0306	0307	0308	0309	0310	0311
0470	0312	0313	0314	0315	0316	0317	0318	0319
0500	0320	0321	0322	0323	0324	0325	0326	0327
0510	0328	0329	0330	0331	0332	0333	0334	0335
0520	0336	0337	0338	0339	0340	0341	0342	0343
0530	0344	0345	0346	0347	0348	0349	0350	0351
0540	0352	0353	0354	0355	0356	0357	0358	0359
0550	0360	0361	0362	0363	0364	0365	0366	0367
0560	0368	0369	0370	0371	0372	0373	0374	0375
0570	0376	0377	0378	0379	0380	0381	0382	0383
0600	0384	0385	0386	0387	0388	0389	0390	0391
0610	0392	0393	0394	0395	0396	0397	0398	0399
0620	0400	0401	0402	0403	0404	0405	0406	0407
0630	0408	0409	0410	0411	0412	0413	0414	0415
0640	0416	0417	0418	0419	0420	0421	0422	0423
0650	0424	0425	0426	0427	0428	0429	0430	0431
0660	0432	0433	0434	0435	0436	0437	0438	0439
0670	0440	0441	0442	0443	0444	0445	0446	0447
0700	0448	0449	0450	0451	0452	0453	0454	0455
0710	0456	0457	0458	0459	0460	0461	0462	0463
0720	0464	0465	0466	0467	0468	0469	0470	0471
0730	0472	0473	0474	0475	0476	0477	0478	0479
0740	0480	0481	0482	0483	0484	0485	0486	0487
0750	0488	0489	0490	0491	0492	0493	0494	0495
0760	0496	0497	0498	0499	0500	0501	0502	0503
0770	0504	0505	0506	0507	0508	0509	0510	0511

	0	1	2	3	4	5	6	7
1400	0768	0769	0770	0771	0772	0773	0774	0775
1410	0776	0777	0778	0779	0780	0781	0782	0783
1420	0784	0785	0786	0787	0788	0789	0790	0791
1430	0792	0793	0794	0795	0796	0797	0798	0799
1440	0800	0801	0802	0803	0804	0805	0806	0807
1450	0808	0809	0810	0811	0812	0813	0814	0815
1460	0816	0817	0818	0819	0820	0821	0822	0823
1470	0824	0825	0826	0827	0828	0829	0830	0831
1500	0832	0833	0834	0835	0836	0837	0838	0839
1510	0840	0841	0842	0843	0844	0845	0846	0847
1520	0848	0849	0850	0851	0852	0853	0854	0855
1530	0856	0857	0858	0859	0860	0861	0862	0863
1540	0864	0865	0866	0867	0868	0869	0870	0871
1550	0872	0873	0874	0875	0876	0877	0878	0879
1560	0880	0881	0882	0883	0884	0885	0886	0887
1570	0888	0889	0890	0891	0892	0893	0894	0895
1600	0896	0897	0898	0899	0900	0901	0902	0903
1610	0904	0905	0906	0907	0908	0909	0910	0911
1620	0912	0913	0914	0915	0916	0917	0918	0919
1630	0920	0921	0922	0923	0924	0925	0926	0927
1640	0928	0929	0930	0931	0932	0933	0934	0935
1650	0936	0937	0938	0939	0940	0941	0942	0943
1660	0944	0945	0946	0947	0948	0949	0950	0951
1670	0952	0953	0954	0955	0956	0957	0958	0959
1700	0960	0961	0962	0963	0964	0965	0966	0967
1710	0968	0969	0970	0971	0972	0973	0974	0975
1720	0976	0977	0978	0979	0980	0981	0982	0983
1730	0984	0985	0986	0987	0988	0989	0990	0991
1740	0992	0993	0994	0995	0996	0997	0998	0999
1750	1000	1001	1002	1003	1004	1005	1006	1007
1760	1008	1009	1010	1011	1012	1013	1014	1015
1770	1016	1017	1018	1019	1020	1021	1022	1023

1000 to 1777 (Octal)
1536 to 2047 (Decimal)

	0	1	2	3	4	5	6	7
2000	1024	1025	1026	1027	1028	1029	1030	1031
2010	1032	1033	1034	1035	1036	1037	1038	1039
2020	1040	1041	1042	1043	1044	1045	1046	1047
2030	1048	1049	1050	1051	1052	1053	1054	1055
2040	1056	1057	1058	1059	1060	1061	1062	1063
2050	1064	1065	1066	1067	1068	1069	1070	1071
2060	1072	1073	1074	1075	1076	1077	1078	1079
2070	1080	1081	1082	1083	1084	1085	1086	1087
2100	1088	1089	1090	1091	1092	1093	1094	1095
2110	1096	1097	1098	1099	1100	1101	1102	1103
2120	1104	1105	1106	1107	1108	1109	1110	1111
2130	1112	1113	1114	1115	1116	1117	1118	1119
2140	1120	1121	1122	1123	1124	1125	1126	1127
2150	1128	1129	1130	1131	1132	1133	1134	1135
2160	1136	1137	1138	1139	1140	1141	1142	1143
2170	1144	1145	1146	1147	1148	1149	1150	1151
2200	1152	1153	1154	1155	1156	1157	1158	1159
2210	1160	1161	1162	1163	1164	1165	1166	1167
2220	1168	1169	1170	1171	1172	1173	1174	1175
2230	1176	1177	1178	1179	1180	1181	1182	1183
2240	1184	1185	1186	1187	1188	1189	1190	1191
2250	1192	1193	1194	1195	1196	1197	1198	1199
2260	1200	1201	1202	1203	1204	1205	1206	1207
2270	1208	1209	1210	1211	1212	1213	1214	1215
2300	1216	1217	1218	1219	1220	1221	1222	1223
2310	1224	1225	1226	1227	1228	1229	1230	1231
2320	1232	1233	1234	1235	1236	1237	1238	1239
2330	1240	1241	1242	1243	1244	1245	1246	1247
2340	1248	1249	1250	1251	1252	1253	1254	1255
2350	1256	1257	1258	1259	1260	1261	1262	1263
2360	1264	1265	1266	1267	1268	1269	1270	1271
2370	1272	1273	1274	1275	1276	1277	1278	1279

4000 to 4777
(Octal) to 2559
(Decimal)

Octal Decimal
10000 - 4096
20000 - 8192
30000 - 12288
40000 - 16384
50000 - 20480
60000 - 24576
70000 - 28672

	0	1	2	3	4	5	6	7
4000	2048	2049	2050	2051	2052	2053	2054	2055
4010	2056	2057	2058	2059	2060	2061	2062	2063
4020	2064	2065	2066	2067	2068	2069	2070	2071
4030	2072	2073	2074	2075	2076	2077	2078	2079
4040	2080	2081	2082	2083	2084	2085	2086	2087
4050	2088	2089	2090	2091	2092	2093	2094	2095
4060	2096	2097	2098	2099	2100	2101	2102	2103
4070	2104	2105	2106	2107	2108	2109	2110	2111
4100	2112	2113	2114	2115	2116	2117	2118	2119
4110	2120	2121	2122	2123	2124	2125	2126	2127
4120	2128	2129	2130	2131	2132	2133	2134	2135
4130	2136	2137	2138	2139	2140	2141	2142	2143
4140	2144	2145	2146	2147	2148	2149	2150	2151
4150	2152	2153	2154	2155	2156	2157	2158	2159
4160	2160	2161	2162	2163	2164	2165	2166	2167
4170	2168	2169	2170	2171	2172	2173	2174	2175
4200	2176	2177	2178	2179	2180	2181	2182	2183
4210	2184	2185	2186	2187	2188	2189	2190	2191
4220	2192	2193	2194	2195	2196	2197	2198	2199
4230	2200	2201	2202	2203	2204	2205	2206	2207
4240	2208	2209	2210	2211	2212	2213	2214	2215
4250	2216	2217	2218	2219	2220	2221	2222	2223
4260	2224	2225	2226	2227	2228	2229	2230	2231
4270	2232	2233	2234	2235	2236	2237	2238	2239
4300	2240	2241	2242	2243	2244	2245	2246	2247
4310	2248	2249	2250	2251	2252	2253	2254	2255
4320	2256	2257	2258	2259	2260	2261	2262	2263
4330	2264	2265	2266	2267	2268	2269	2270	2271
4340	2272	2273	2274	2275	2276	2277	2278	2279
4350	2280	2281	2282	2283	2284	2285	2286	2287
4360	2288	2289	2290	2291	2292	2293	2294	2295
4370	2296	2297	2298	2299	2300	2301	2302	2303

	0	1	2	3	4	5	6	7
5000	2560	2561	2562	2563	2564	2565	2566	2567
5010	2568	2569	2570	2571	2572	2573	2574	2575
5020	2576	2577	2578	2579	2580	2581	2582	2583
5030	2584	2585	2586	2587	2588	2589	2590	2591
5040	2592	2593	2594	2595	2596	2597	2598	2599
5050	2600	2601	2602	2603	2604	2605	2606	2607
5060	2608	2609	2610	2611	2612	2613	2614	2615
5070	2616	2617	2618	2619	2620	2621	2622	2623
5100	2624	2625	2626	2627	2628	2629	2630	2631
5110	2632	2633	2634	2635	2636	2637	2638	2639
5120	2640	2641	2642	2643	2644	2645	2646	2647
5130	2648	2649	2650	2651	2652	2653	2654	2655
5140	2656	2657	2658	2659	2660	2661	2662	2663
5150	2664	2665	2666	2667	2668	2669	2670	2671
5160	2672	2673	2674	2675	2676	2677	2678	2679
5170	2680	2681	2682	2683	2684	2685	2686	2687
5200	2688	2689	2690	2691	2692	2693	2694	2695
5210	2696	2697	2698	2699	2700	2701	2702	2703
5220	2704	2705	2706	2707	2708	2709	2710	2711
5230	2712	2713	2714	2715	2716	2717	2718	2719
5240	2720	2721	2722	2723	2724	2725	2726	2727
5250	2728	2729	2730	2731	2732	2733	2734	2735
5260	2736	2737	2738	2739	2740	2741	2742	2743
5270	2744	2745	2746	2747	2748	2749	2750	2751
5300	2752	2753	2754	2755	2756	2757	2758	2759
5310	2760	2761	2762	2763	2764	2765	2766	2767
5320	2768	2769	2770	2771	2772	2773	2774	2775
5330	2776	2777	2778	2779	2780	2781	2782	2783
5340	2784	2785	2786	2787	2788	2789	2790	2791
5350	2792	2793	2794	2795	2796	2797	2798	2799
5360	2800	2801	2802	2803	2804	2805	2806	2807
5370	2808	2809	2810	2811	2812	2813	2814	2815

4000 to 4777
(Octal) to 2559
(Decimal)

Octal Decimal
10000 - 4096
20000 - 8192
30000 - 12288
40000 - 16384
50000 - 20480
60000 - 24576
70000 - 28672

	0	1	2	3	4	5	6	7
4400	2304	2305	2306	2307	2308	2309	2310	2311
4410	2312	2313	2314	2315	2316	2317	2318	2319
4420	2320	2321	2322	2323	2324	2325	2326	2327
4430	2328	2329	2330	2331	2332	2333	2334	2335
4440	2336	2337	2338	2339	2340	2341	2342	2343
4450	2344	2345	2346	2347	2348	2349	2350	2351
4460	2352	2353	2354	2355	2356	2357	2358	2359
4470	2360	2361	2362	2363	2364	2365	2366	2367
4500	2368	2369	2370	2371	2372	2373	2374	2375
4510	2376	2377	2378	2379	2380	2381	2382	2383
4520	2384	2385	2386	2387	2388	2389	2390	2391
4530	2392	2393	2394	2395	2396	2397	2398	2399
4540	2400	2401	2402	2403	2404	2405	2406	2407
4550	2408	2409	2410	2411	2412	2413	2414	2415
4560	2416	2417	2418	2419	2420	2421	2422	2423
4570	2424	2425	2426	2427	2428	2429	2430	2431
4600	2432	2433	2434	2435	2436	2437	2438	2439
4610	2440	2441	2442	2443	2444	2445	2446	2447
4620	2448	2449	2450	2451	2452	2453	2454	2455
4630	2456	2457	2458	2459	2460	2461	2462	2463
4640	2464	2465	2466	2467	2468	2469	2470	2471
4650	2472	2473	2474	2475	2476	2477	2478	2479
4660	2480	2481	2482	2483	2484	2485	2486	2487
4670	2488	2489	2490	2491	2492	2493	2494	2495
4700	2496	2497	2498	2499	2500	2501	2502	2503
4710	2504	2505	2506	2507	2508	2509	2510	2511
4720	2512	2513	2514	2515	2516	2517	2518	2519
4730	2520	2521	2522	2523	2524	2525	2526	2527
4740	2528	2529	2530	2531	2532	2533	2534	2535
4750	2536	2537	2538	2539	2540	2541	2542	2543
4760	2544	2545	2546	2547	2548	2549	2550	2551
4770	2552	2553	2554	2555	2556	2557	2558	2559

	0	1	2	3	4	5	6	7
5400	2816	2817	2818	2819	2820	2821	2822	2823
5410	2824	2825	2826	2827	2828	2829	2830	2831
5420	2832	2833	2834	2835	2836	2837	2838	2839
5430	2840	2841	2842	2843	2844	2845	2846	2847
5440	2848	2849	2850	2851	2852	2853	2854	2855
5450	2856	2857	2858	2859	2860	2861	2862	2863
5460	2864	2865	2866	2867	2868	2869	2870	2871
5470	2872	2873	2874	2875	2876	2877	2878	2879
5500	2880	2881	2882	2883	2884	2885	2886	2887
5510	2888	2889	2890	2891	2892	2893	2894	2895
5520	2896	2897	2898	2899	2900	2901	2902	2903
5530	2904	2905	2906	2907	2908	2909	2910	2911
5540	2912	2913	2914	2915	2916	2917	2918	2919
5550	2920	2921	2922	2923	2924	2925	2926	2927
5560	2928	2929	2930	2931	2932	2933	2934	2935
5570	2936	2937	2938	2939	2940	2941	2942	2943
5600	2944	2945	2946	2947	2948	2949	2950	2951
5610	2952	2953	2954	2955	2956	2957	2958	2959
5620	2960	2961	2962	2963	2964	2965	2966	2967
5630	2968	2969	2970	2971	2972	2973	2974	2975
5640	2976	2977	2978	2979	2980	2981	2982	2983
5650	2984	2985	2986	2987	2988	2989	2990	2991
5660	2992	2993	2994	2995	2996	2997	2998	2999
5670	3000	3001	3002	3003	3004	3005	3006	3007
5700	3008	3009	3010	3011	3012	3013	3014	3015
5710	3016	3017	3018	3019	3020	3021	3022	3023
5720	3024	3025	3026	3027	3028	3029	3030	3031
5730	3032	3033	3034	3035	3036	3037	3038	3039
5740	3040	3041	3042	3043	3044	3045	3046	3047
5750	3048	3049	3050	3051	3052	3053	3054	3055
5760	3056	3057	3058	3059	3060	3061	3062	3063
5770	3064	3065	3066	3067	3068	3069	3070	3071

6000 to 6777
(Octal) to 3583
(Decimal)

Octal Decimal
10000 - 4096
20000 - 8192
30000 - 12288
40000 - 16384
50000 - 20480
60000 - 24576
70000 - 28672

6200	3200	3201	3202	3203	3204	3205	3206	3207
6210	3208	3209	3210	3211	3212	3213	3214	3215
6220	3216	3217	3218	3219	3220	3221	3222	3223
6230	3224	3225	3226	3227	3228	3229	3230	3231
6240	3232	3233	3234	3235	3236	3237	3238	3239
6250	3240	3241	3242	3243	3244	3245	3246	3247
6260	3248	3249	3250	3251	3252	3253	3254	3255
6270	3256	3257	3258	3259	3260	3261	3262	3263
6300	3264	3265	3266	3267	3268	3269	3270	3271
6310	3272	3273	3274	3275	3276	3277	3278	3279
6320	3280	3281	3282	3283	3284	3285	3286	3287
6330	3288	3289	3290	3291	3292	3293	3294	3295
6340	3296	3297	3298	3299	3300	3301	3302	3303
6350	3304	3305	3306	3307	3308	3309	3310	3311
6360	3312	3313	3314	3315	3316	3317	3318	3319
6370	3320	3321	3322	3323	3324	3325	3326	3327

APPENDIX F
OCTAL-DECIMAL FRACTION CONVERSION TABLE

OCTAL	DEC.	OCTAL	DEC.	OCTAL	DEC.	OCTAL	DEC.
.000	.000000	.100	.125000	.200	.250000	.300	.375000
.001	.001953	.101	.126953	.201	.251953	.301	.376953
.002	.003906	.102	.128906	.202	.253906	.302	.378906
.003	.005859	.103	.130859	.203	.255859	.303	.380859
.004	.007812	.104	.132812	.204	.257812	.304	.382812
.005	.009765	.105	.134765	.205	.259765	.305	.384765
.006	.011718	.106	.136718	.206	.261718	.306	.386718
.007	.013671	.107	.138671	.207	.263671	.307	.388671
.010	.015625	.110	.140625	.210	.265625	.310	.390625
.011	.017578	.111	.142578	.211	.267578	.311	.392578
.012	.019531	.112	.144531	.212	.269531	.312	.394531
.013	.021484	.113	.146484	.213	.271484	.313	.396484
.014	.023437	.114	.148437	.214	.273437	.314	.398437
.015	.025390	.115	.150390	.215	.275390	.315	.400390
.016	.027343	.116	.152343	.216	.277343	.316	.402343
.017	.029296	.117	.154296	.217	.279296	.317	.404296
.020	.031250	.120	.156250	.220	.281250	.320	.406250
.021	.033203	.121	.158203	.221	.283203	.321	.408203
.022	.035156	.122	.160156	.222	.285156	.322	.410156
.023	.037109	.123	.162109	.223	.287109	.323	.412109
.024	.039062	.124	.164062	.224	.289062	.324	.414062
.025	.041015	.125	.166015	.225	.291015	.325	.416015
.026	.042968	.126	.167968	.226	.292968	.326	.417968
.027	.044921	.127	.169921	.227	.294921	.327	.419921
.030	.046875	.130	.171875	.230	.296875	.330	.421875
.031	.048828	.131	.173828	.231	.298828	.331	.423828
.032	.050781	.132	.175781	.232	.300781	.332	.425781
.033	.052734	.133	.177734	.233	.302734	.333	.427734
.034	.054687	.134	.179687	.234	.304687	.334	.429687
.035	.056640	.135	.181640	.235	.306640	.335	.431640
.036	.058593	.136	.183593	.236	.308593	.336	.433593
.037	.060546	.137	.185546	.237	.310546	.337	.435546
.040	.062500	.140	.187500	.240	.312500	.340	.437500
.041	.064453	.141	.189453	.241	.314453	.341	.439453
.042	.066406	.142	.191406	.242	.316406	.342	.441406
.043	.068359	.143	.193359	.243	.318359	.343	.443359
.044	.070312	.144	.195312	.244	.320312	.344	.445312
.045	.072265	.145	.197265	.245	.322265	.345	.447265
.046	.074218	.146	.199218	.246	.324218	.346	.449218
.047	.076171	.147	.201171	.247	.326171	.347	.451171
.050	.078125	.150	.203125	.250	.328125	.350	.453125
.051	.080078	.151	.205078	.251	.330078	.351	.455078
.052	.082031	.152	.207031	.252	.332031	.352	.457031
.053	.083984	.153	.208984	.253	.333984	.353	.458984
.054	.085937	.154	.210937	.254	.335937	.354	.460937
.055	.087890	.155	.212890	.255	.337890	.355	.462890
.056	.089843	.156	.214843	.256	.339843	.356	.464843
.057	.091796	.157	.216796	.257	.341796	.357	.466796
.060	.093750	.160	.218750	.260	.343750	.360	.468750
.061	.095703	.161	.220703	.261	.345703	.361	.470703
.062	.097656	.162	.222656	.262	.347656	.362	.472656
.063	.099609	.163	.224609	.263	.349609	.363	.474609
.064	.101562	.164	.226562	.264	.351562	.364	.476562
.065	.103515	.165	.228515	.265	.353515	.365	.478515
.066	.105468	.166	.230468	.266	.355468	.366	.480468
.067	.107421	.167	.232421	.267	.357421	.367	.482421
.070	.109375	.170	.234375	.270	.359375	.370	.484375
.071	.111328	.171	.236328	.271	.361328	.371	.486328
.072	.113281	.172	.238281	.272	.363281	.372	.488281
.073	.115234	.173	.240234	.273	.365234	.373	.490234
.074	.117187	.174	.242187	.274	.367187	.374	.492187
.075	.119140	.175	.244140	.275	.369140	.375	.494140
.076	.121093	.176	.246093	.276	.371093	.376	.496093
.077	.123046	.177	.248046	.277	.373046	.377	.498046

(CONTINUED)

OCTAL	DEC.	OCTAL	DEC.	OCTAL	DEC.	OCTAL	DEC.
.000000	.000000	.000100	.000244	.000200	.000488	.000300	.000732
.000001	.000003	.000101	.000247	.000201	.000492	.000301	.000736
.000002	.000007	.000102	.000251	.000202	.000495	.000302	.000740
.000003	.000011	.000103	.000255	.000203	.000499	.000303	.000744
.000004	.000015	.000104	.000259	.000204	.000503	.000304	.000747
.000005	.000019	.000105	.000263	.000205	.000507	.000305	.000751
.000006	.000022	.000106	.000267	.000206	.000511	.000306	.000755
.000007	.000026	.000107	.000270	.000207	.000514	.000307	.000759
.000010	.000030	.000110	.000274	.000210	.000518	.000310	.000762
.000011	.000034	.000111	.000278	.000211	.000522	.000311	.000766
.000012	.000038	.000112	.000282	.000212	.000526	.000312	.000770
.000013	.000041	.000113	.000286	.000213	.000530	.000313	.000774
.000014	.000045	.000114	.000289	.000214	.000534	.000314	.000778
.000015	.000049	.000115	.000293	.000215	.000537	.000315	.000782
.000016	.000053	.000116	.000297	.000216	.000541	.000316	.000785
.000017	.000057	.000117	.000301	.000217	.000545	.000317	.000789
.000020	.000061	.000120	.000305	.000220	.000549	.000320	.000793
.000021	.000064	.000121	.000308	.000221	.000553	.000321	.000797
.000022	.000068	.000122	.000312	.000222	.000556	.000322	.000801
.000023	.000072	.000123	.000316	.000223	.000560	.000323	.000805
.000024	.000076	.000124	.000320	.000224	.000564	.000324	.000808
.000025	.000080	.000125	.000324	.000225	.000568	.000325	.000812
.000026	.000083	.000126	.000328	.000226	.000572	.000326	.000816
.000027	.000087	.000127	.000331	.000227	.000576	.000327	.000820
.000030	.000091	.000130	.000335	.000230	.000579	.000330	.000823
.000031	.000095	.000131	.000339	.000231	.000583	.000331	.000827
.000032	.000099	.000132	.000343	.000232	.000587	.000332	.000831
.000033	.000102	.000133	.000347	.000233	.000591	.000333	.000835
.000034	.000106	.000134	.000350	.000234	.000595	.000334	.000839
.000035	.000110	.000135	.000354	.000235	.000598	.000335	.000843
.000036	.000114	.000136	.000358	.000236	.000602	.000336	.000846
.000037	.000118	.000137	.000362	.000237	.000606	.000337	.000850
.000040	.000122	.000140	.000366	.000240	.000610	.000340	.000854
.000041	.000125	.000141	.000370	.000241	.000614	.000341	.000858
.000042	.000129	.000142	.000373	.000242	.000617	.000342	.000862
.000043	.000133	.000143	.000377	.000243	.000621	.000343	.000865
.000044	.000137	.000144	.000381	.000244	.000625	.000344	.000869
.000045	.000141	.000145	.000385	.000245	.000629	.000345	.000873
.000046	.000144	.000146	.000389	.000246	.000633	.000346	.000877
.000047	.000148	.000147	.000392	.000247	.000637	.000347	.000881
.000050	.000152	.000150	.000396	.000250	.000640	.000350	.000885
.000051	.000156	.000151	.000400	.000251	.000644	.000351	.000888
.000052	.000160	.000152	.000404	.000252	.000648	.000352	.000892
.000053	.000164	.000153	.000408	.000253	.000652	.000353	.000896
.000054	.000167	.000154	.000411	.000254	.000656	.000354	.000900
.000055	.000171	.000155	.000415	.000255	.000659	.000355	.000904
.000056	.000175	.000156	.000419	.000256	.000663	.000356	.000907
.000057	.000179	.000157	.000423	.000257	.000667	.000357	.000911
.000060	.000183	.000160	.000427	.000260	.000671	.000360	.000915
.000061	.000186	.000161	.000431	.000261	.000675	.000361	.000919
.000062	.000190	.000162	.000434	.000262	.000679	.000362	.000923
.000063	.000194	.000163	.000438	.000263	.000682	.000363	.000926
.000064	.000198	.000164	.000442	.000264	.000686	.000364	.000930
.000065	.000202	.000165	.000446	.000265	.000690	.000365	.000934
.000066	.000205	.000166	.000450	.000266	.000694	.000366	.000938
.000067	.000209	.000167	.000453	.000267	.000698	.000367	.000942
.000070	.000213	.000170	.000457	.000270	.000701	.000370	.000946
.000071	.000217	.000171	.000461	.000271	.000705	.000371	.000949
.000072	.000221	.000172	.000465	.000272	.000709	.000372	.000953
.000073	.000225	.000173	.000469	.000273	.000713	.000373	.000957
.000074	.000228	.000174	.000473	.000274	.000717	.000374	.000961
.000075	.000232	.000175	.000476	.000275	.000720	.000375	.000965
.000076	.000236	.000176	.000480	.000276	.000724	.000376	.000968
.000077	.000240	.000177	.000484	.000277	.000728	.000377	.000972

(CONTINUED)

OCTAL	DEC.	OCTAL	DEC.	OCTAL	DEC.	OCTAL	DEC.
.000400	.000976	.000500	.001220	.000600	.001464	.000700	.001708
.000401	.000980	.000501	.001224	.000601	.001468	.000701	.001712
.000402	.000984	.000502	.001228	.000602	.001472	.000702	.001716
.000403	.000988	.000503	.001232	.000603	.001476	.000703	.001720
.000404	.000991	.000504	.001235	.000604	.001480	.000704	.001724
.000405	.000995	.000505	.001239	.000605	.001483	.000705	.001728
.000406	.000999	.000506	.001243	.000606	.001487	.000706	.001731
.000407	.001003	.000507	.001247	.000607	.001491	.000707	.001735
.000410	.001007	.000510	.001251	.000610	.001495	.000710	.001739
.000411	.001010	.000511	.001255	.000611	.001499	.000711	.001743
.000412	.001014	.000512	.001258	.000612	.001502	.000712	.001747
.000413	.001018	.000513	.001262	.000613	.001506	.000713	.001750
.000414	.001022	.000514	.001266	.000614	.001510	.000714	.001754
.000415	.001026	.000515	.001270	.000615	.001514	.000715	.001758
.000416	.001029	.000516	.001274	.000616	.001518	.000716	.001762
.000417	.001033	.000517	.001277	.000617	.001522	.000717	.001766
.000420	.001037	.000520	.001281	.000620	.001525	.000720	.001770
.000421	.001041	.000521	.001285	.000621	.001529	.000721	.001773
.000422	.001045	.000522	.001289	.000622	.001533	.000722	.001777
.000423	.001049	.000523	.001293	.000623	.001537	.000723	.001781
.000424	.001052	.000524	.001296	.000624	.001541	.000724	.001785
.000425	.001056	.000525	.001300	.000625	.001544	.000725	.001789
.000426	.001060	.000526	.001304	.000626	.001548	.000726	.001792
.000427	.001064	.000527	.001308	.000627	.001552	.000727	.001796
.000430	.001068	.000530	.001312	.000630	.001556	.000730	.001800
.000431	.001071	.000531	.001316	.000631	.001560	.000731	.001804
.000432	.001075	.000532	.001319	.000632	.001564	.000732	.001808
.000433	.001079	.000533	.001323	.000633	.001567	.000733	.001811
.000434	.001083	.000534	.001327	.000634	.001571	.000734	.001815
.000435	.001087	.000535	.001331	.000635	.001575	.000735	.001819
.000436	.001091	.000536	.001335	.000636	.001579	.000736	.001823
.000437	.001094	.000537	.001338	.000637	.001583	.000737	.001827
.000440	.001098	.000540	.001342	.000640	.001586	.000740	.001831
.000441	.001102	.000541	.001346	.000641	.001590	.000741	.001834
.000442	.001106	.000542	.001350	.000642	.001594	.000742	.001838
.000443	.001110	.000543	.001354	.000643	.001598	.000743	.001842
.000444	.001113	.000544	.001358	.000644	.001602	.000744	.001846
.000445	.001117	.000545	.001361	.000645	.001605	.000745	.001850
.000446	.001121	.000546	.001365	.000646	.001609	.000746	.001853
.000447	.001125	.000547	.001369	.000647	.001613	.000747	.001857
.000450	.001129	.000550	.001373	.000650	.001617	.000750	.001861
.000451	.001132	.000551	.001377	.000651	.001621	.000751	.001865
.000452	.001136	.000552	.001380	.000652	.001625	.000752	.001869
.000453	.001140	.000553	.001384	.000653	.001628	.000753	.001873
.000454	.001144	.000554	.001388	.000654	.001632	.000754	.001876
.000455	.001148	.000555	.001392	.000655	.001636	.000755	.001880
.000456	.001152	.000556	.001396	.000656	.001640	.000756	.001884
.000457	.001156	.000557	.001399	.000657	.001644	.000757	.001888
.000460	.001159	.000560	.001403	.000660	.001647	.000760	.001892
.000461	.001163	.000561	.001407	.000661	.001651	.000761	.001895
.000462	.001167	.000562	.001411	.000662	.001655	.000762	.001899
.000463	.001171	.000563	.001415	.000663	.001659	.000763	.001903
.000464	.001174	.000564	.001419	.000664	.001663	.000764	.001907
.000465	.001178	.000565	.001422	.000665	.001667	.000765	.001911
.000466	.001182	.000566	.001426	.000666	.001670	.000766	.001914
.000467	.001186	.000567	.001430	.000667	.001674	.000767	.001918
.000470	.001190	.000570	.001434	.000670	.001678	.000770	.001922
.000471	.001194	.000571	.001438	.000671	.001682	.000771	.001926
.000472	.001197	.000572	.001441	.000672	.001686	.000772	.001930
.000473	.001201	.000573	.001445	.000673	.001689	.000773	.001934
.000474	.001205	.000574	.001449	.000674	.001693	.000774	.001937
.000475	.001209	.000575	.001453	.000675	.001697	.000775	.001941
.000476	.001213	.000576	.001457	.000676	.001701	.000776	.001945
.000477	.001216	.000577	.001461	.000677	.001705	.000777	.001949

APPENDIX G

MP12 CPU CONNECTOR PIN ASSIGNMENT CHART

CONNECTOR PIN	ASSIGNMENT	CONNECTOR PIN	ASSIGNMENT
1	+5 Volts	51	Ground
2	+5 Volts	52	Reader On Loop (-)
3	+5 Volts	53	Ground
4	+5 Volts	54	/Dma Request
5	+5 Volts	55	Ground
6	+5 Volts	56	/DMA-Connect-Address
7	+5 Volts	57	Ground
8	+5 Volts	58	/DMA-Read-Write
9	Ground	59	Ground
10	Open	60	/DMA-Connect-Data
11	Ground	61	Ground
12	Open	62	/DMA-Load-Data
13	Ground	63	Ground
14	Open	64	/PIO-Interrupt
15	Ground	65	Ground
16	Open	66	/PIO-Select
17	Ground	67	Ground
18	Open	68	/PIO-Connect
19	Ground	69	Ground
20	Halt Indicator	70	/PIO-Load
21	Ground	71	Ground
22	Run Indicator	72	/PIO-Skip
23	Ground	73	Ground
24	Remote Load NC	74	/PIO-Disconnect AC
25	Ground	75	Ground
26	Remote Load NO	76	/PIO-Reset
27	Ground	77	Ground
28	Remote Run NC	78	/Data In Bus 00
29	Ground	79	Ground
30	Remote Run NO	80	/Data In Bus 01
31	Ground	81	Ground
32	Remote Halt NC	82	/Data In Bus 02
33	Ground	83	Ground
34	Remote Halt NO	84	/Data In Bus 03
35	Ground	85	Ground
36	Remote Reset NC	86	/Data In Bus 04
37	Ground	87	Ground
38	Remote Reset NO	88	/Data In Bus 05
39	Ground	89	Ground
40	/Power Fail	90	/Data In Bus 06
41	Ground	91	Ground
42	Rec. Loop (+)	92	/Data In Bus 07
43	Ground	93	Ground
44	Rec. Loop (-)	94	/Data In Bus 08
45	Ground	95	Ground
46	Trans. Loop (+)	96	/Data In Bus 09
47	Ground	97	Ground
48	Trans. Loop (-)	98	/Data In Bus 10
49	Ground	99	Ground
50	Reader On Loop (+)	100	/Data In Bus 11

MP12 I/O CONNECTOR PIN ASSIGNMENT CHART

CONNECTOR PIN	ASSIGNMENT	CONNECTOR PIN	ASSIGNMENT
1 Thru 4	+5 Volts	74	/PIO-Disconnect AC
		75	Ground
		76	/PIO-Reset
5 Thru 52	{ Peripheral	77	Ground
	{ Interface	78	/Data In Bus 00
	{ Signals	79	Ground
53	Ground	80	/Data In Bus 01
54	/DMA Request	81	Ground
55	Ground	82	/Data In Bus 02
56	/DMA Connect Address	83	Ground
57	Ground	84	/Data In Bus 03
58	/DMA Read-Write	85	Ground
59	Ground	86	/Data In Bus 04
60	/DMA Connect Data	87	Ground
61	Ground	88	/Data In Bus 05
62	/DMA Load-Data	89	Ground
63	Ground	90	/Data In Bus 06
64	/PIO-Interrupt	91	Ground
65	Ground	92	/Data In Bus 07
66	/PIO-Select	93	Ground
67	Ground	94	/Data In Bus 08
68	/PIO-Connect	95	Ground
69	Ground	96	/Data In Bus 09
70	/PIO-Load	97	Ground
71	Ground	98	/Data In Bus 10
72	/PIO-Skip	99	Ground
73	Ground	100	/Data In Bus 11

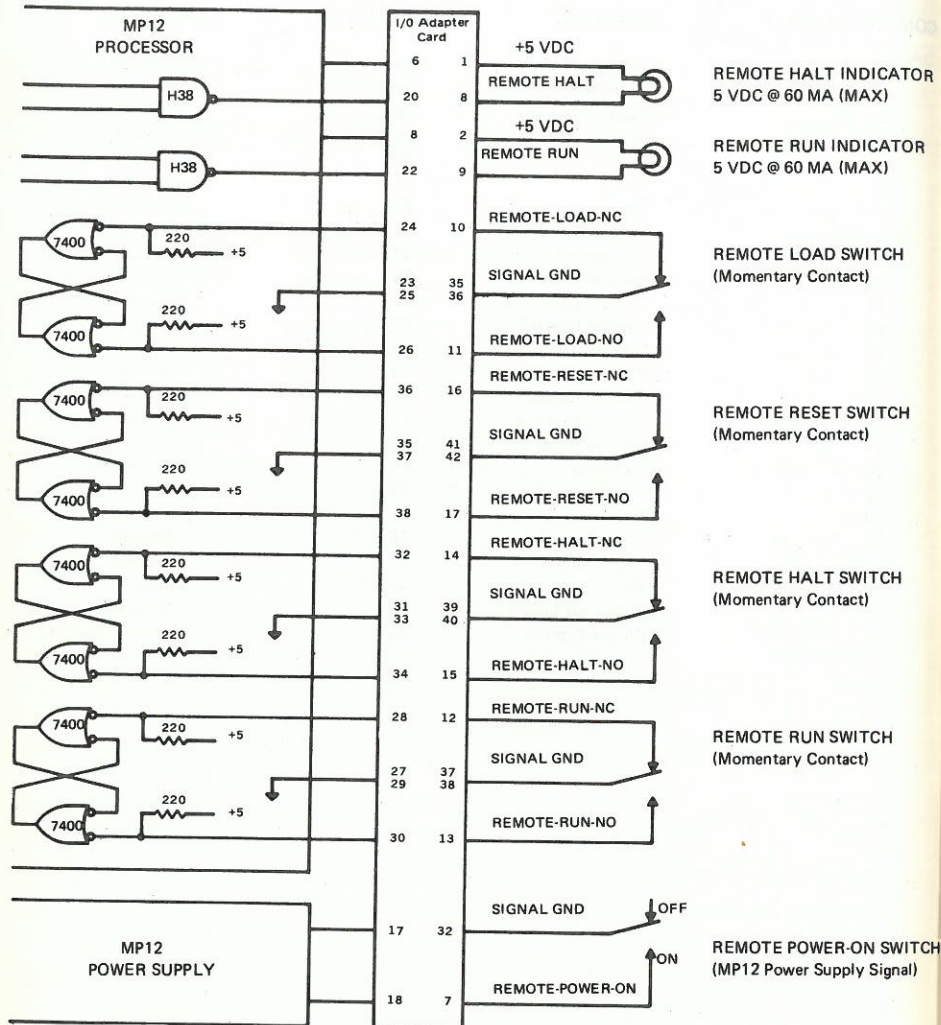
MP12 I/O ADAPTER PIN ASSIGNMENT CHART

CONNECTOR PIN	ASSIGNMENT
1 Thru 24	Peripheral Interface Signals
25	Chassis Ground
26 Thru 49	Peripheral Interface Signals
50	Chassis Ground

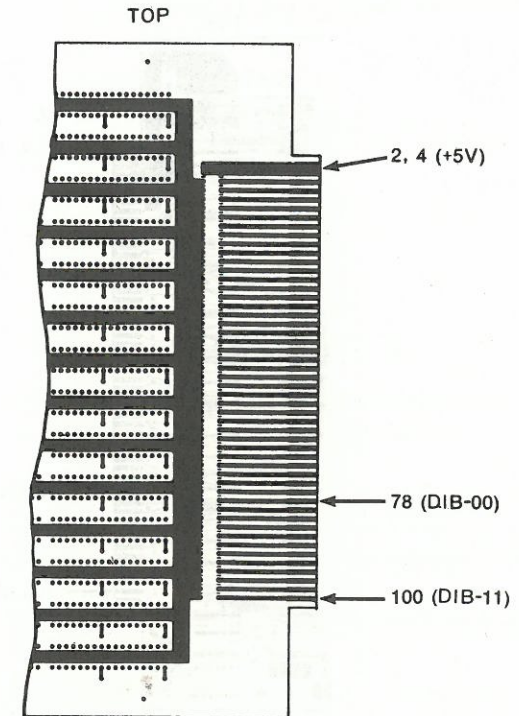
MP12 CPU I/O ADAPTER PIN ASSIGNMENT CHART

CONNECTOR PIN	ASSIGNMENT	CONNECTOR PIN	ASSIGNMENT
1	+5 Volts	26	+5 Volts
2	+5 Volts	27	+5 Volts
3	Open	28	Ground
4	Open	29	Ground
5	Open	30	Ground
6	Open	31	Ground
7	Open	32	Ground
8	Halt Indicator	33	Ground
9	Run Indicator	34	Ground
10	Remote Load-NC	35	Ground
11	Remote Load-NO	36	Ground
12	Remote Run-NC	37	Ground
13	Remote Run-NO	38	Ground
14	Remote Halt-NC	39	Ground
15	Remote Halt-NO	40	Ground
16	Remote Reset-NC	41	Ground
17	Remote Reset-NO	42	Ground
18	/Powerfail	43	Ground
19	Rec. Loop (+)	44	Ground
20	Rec. Loop (-)	45	Ground
21	Trans. Loop (+)	46	Ground
22	Trans. Loop (-)	47	Ground
23	Reader on Loop (+)	48	Ground
24	Reader on Loop (-)	49	Ground
25	Chassis Ground	50	Chassis Ground

MP12 REMOTE CONTROL SIGNAL PIN ASSIGNMENT CHART

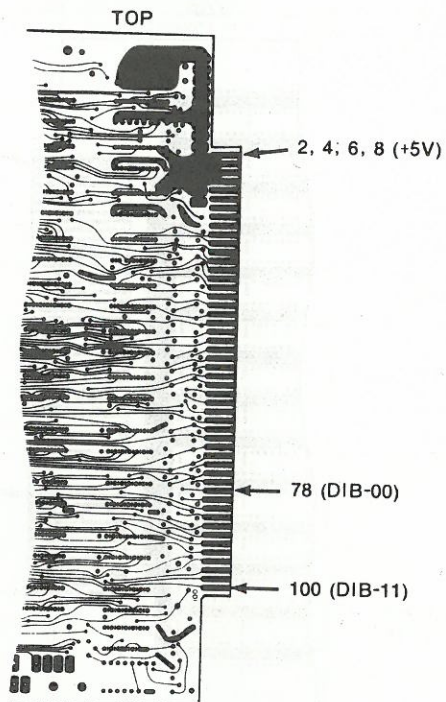


MP12 INPUT/OUTPUT CARD COMPONENT SIDE



NOTE: Even numbered pins on component side.
Odd numbered pins on circuit side.

MP12 CPU CARD COMPONENT SIDE



NOTE: Even numbered pins on component side.
Odd numbered pins on circuit side.

APPENDIX H STANDARD DEVICE ADDRESS ASSIGNMENTS

DEVICE ADDRESS	DEVICE
00 ₈	Reserved for CPU (IOF, ION, and SPL)
01 ₈	High Speed Paper Tape Reader
02 ₈	High Speed Paper Tape Punch
03 ₈	TTY Reader/Keyboard
04 ₈	TTY Punch/Printer
05 ₈ -76 ₈	Unassigned
77 ₈	Line Frequency Clock

APPENDIX I PROGRAMMING EXAMPLES

The following programming examples include utility subroutines for unsigned multiply (MPY), unsigned divide (DIV), binary-to-decimal conversion (BDC), decimal-to-binary conversion (DBC), binary-to-octal conversion (BOC), octal-to-binary conversion (OBC), and byte handling.

Each subroutine may be assembled relative to any page boundary, although the listings reflect a starting octal address of 200₈.

The binary-to-octal and binary-to-decimal subroutines produce strings of numeric ASCII characters from binary values. Each character is inserted into bits 4-11 of a 12-bit word.

The octal-to-binary and decimal-to-binary subroutines accept strings of 12-bit words as input and produce binary values as output. Bits 8-11 of each word are interpreted as a numeric digit as follows:

0000₂ - 0₁₀
 0001₂ - 1₁₀
 0010₂ - 2₁₀
 0011₂ - 3₁₀
 0100₂ - 4₁₀
 0101₂ - 5₁₀
 0110₂ - 6₁₀
 0111₂ - 7₁₀
 1000₂ - 8₁₀
 1001₂ - 9₁₀

The byte handling subroutines enable the manipulation of 6-bit bytes packed two per word.

```

1 /-----
2 /
3 /      UNSIGNED MULTIPLICATION SUBROUTINE
4 /
5 /      CALLING SEQUENCE:
6 /
7 /      TAD    ...      /AC = 12-BIT MULTIPLICAND
8 /      JMS    MPY      /CALL MULTIPLY SUBROUTINE
9 /      ...      /ADDRESS OF 12-BIT MULTIPLIER
10 /      ...      /ADDRESS OF 24-BIT RESULT
11 /      ...      /RETURN FROM MULTIPLY
12 /-----
13 /
14 MPY, 0
15 DCA T4      /STORE MULTIPLICAND
16 DCA T3
17 TAD I MPY    /FETCH MULTIPLIER
18 DCA T2
19 TAD I T2
20 DCA T2
21 DCA T0      /INITIALIZE PRODUCT
22 DCA T1
23 MPY1, TAD T2 /FETCH MULTIPLIER
24 SNA          /SKIP IF NOT ZERO
25 JMP MPY3     /IF ZERO, DONE
26 CLL RAR      /SHIFT MULTIPLIER RIGHT
27 DCA T2      /STORE
28 SNL          /SKIP ON LINK SET
29 JMP MPY2     /GO SHIFT MULTIPLICAND
30 TAD T4      /FORM PARTIAL PRODUCT
31 TAD T0
32 DCA T0
33 TAD T1
34 SNL
35 CLL IAC
36 TAD T3
37 DCA T1
38 MPY2, TAD T4 /SHIFT MULTIPLICAND
39 CLL RAL
40 DCA T4
41 TAD T3
42 RAL
43 DCA T3
44 JMP MPY1     /CONTINUE
45 MPY3, ISZ MPY /FETCH ADDRESS OF PRODUCT
46 TAD I MPY
47 DCA T2      /STORE
48 TAD T1      /FETCH BITS 00-11 OF PRODUCT
49 DCA I T2    /STORE
50 ISZ T2
51 TAD T0      /FETCH BITS 12-23 OF PRODUCT
52 DCA I T2    /STORE
53 ISZ MPY
  
```

0250 5600	54	JMP I MPY	/RETURN
0251 0000	55	-----	
0251 0000	56 T0,	0	/PRODUCT, BITS 12-23
0252 0000	57 T1,	0	/PRODUCT, BITS 00-11
0253 0000	58 T2,	0	/MULTIPLIER
0254 0000	59 T3,	0	/TEMP
0255 0000	60 T4,	0	/MULTIPLICAND

1 /	-----	
2 /		
3 /	UNSIGNED DIVISION SUBROUTINE	.
4 /		.
5 /	CALLING SEQUENCE:	.
6 /		.
7 /	TAD ...	/AC = 12-BIT DIVISOR
8 /	JMS DIV	/CALL DIVIDE SUBROUTINE
9 /	...	/ADDRESS OF 24-BIT DIVIDEND
10 /	...	/ADDRESS OF 24-BIT RESULT
11 /		/ BITS 0-11, QUOTIENT
12 /		/ BITS 12-23, REMAINDER
13 /	...	/RETURN FROM DIVIDE
14 /		/ LINK=0, DIVISION SUCCESSFUL
15 /		/ LINK=1, OVERFLOW
16 /		.
17 /	-----	

0200 0000	18 DIV,	0	
0201 3261	19	DCA T9	/STORE DIVISOR
0202 1600	20	TAD I DIV	/FETCH DIVIDEND
0203 3255	21	DCA T5	
0204 1655	22	TAD I T5	/BITS 0-11
0205 3257	23	DCA T7	/T7
0206 2255	24	ISZ T5	
0207 1655	25	TAD I T5	/BITS 12-23
0210 3260	26	DCA T8	/T8
0211 2200	27	ISZ DIV	
0212 1600	28	TAD I DIV	/FETCH ADDRESS OF RESULT
0213 3256	29	DCA T6	/STORE
0214 2200	30	ISZ DIV	
0215 1261	31	TAD T9	/CHECK FOR ZERO DIVISOR
0216 7141	32	CLL CMA IAC	
0217 3261	33	DCA T9	
0220 7430	34	SZL	
0221 5600	35	JMP I DIV	/IF SO, RETURN
0222 1257	36	TAD T7	/CHECK IF DIVIDEND < DIVISOR
0223 1261	37	TAD T9	
0224 7630	38	SZL CLA	
0225 5600	39	JMP I DIV	/IF NOT, RETURN
0226 1254	40	TAD C1	/INITIALIZE LOOP COUNT
0227 3255	41	DCA T5	
0230 1260	42 DIV2,	TAD T8	/SHIFT DIVIDEND
0231 7004	43	RAL	
0232 3260	44	DCA T8	
0233 1257	45	TAD T7	
0234 7004	46	RAL	
0235 3257	47	DCA T7	
0236 1257	48	TAD T7	/FETCH HIGH ORDER DIVIDEND
0237 1261	49	TAD T9	/SUBTRACT DIVISOR
0240 7430	50	SZL	/SKIP IF DIVIDEND < DIVISOR
0241 3257	51	DCA T7	/STORE DIVIDEND - DIVISOR
0242 7200	52	CLA	/CLEAR AC
0243 2255	53	ISZ T5	/INCREMENT COUNT, FINISHED

0244	5230	54	JMP	DIV2	/NO, CONTINUE
0245	1260	55	TAD	T8	/YES, FETCH QUOTIENT
0246	7004	56	RAL		
0247	3656	57	DCA	I T6	/STORE
0250	2256	58	ISZ	T6	
0251	1257	59	TAD	T7	/FETCH REMAINDER
0252	3656	60	DCA	I T6	/STORE
0253	5600	61	JMP	I DIV	/RETURN

0254	7764	63	C1,	-12	
0255	0000	64	T5,	0	/TEMP
0256	0000	65	T6,	0	/ADDRESS OF RESULT
0257	0000	66	T7,	0	/HIGH ORDER DIVIDEND
0260	0000	67	T8,	0	/LOW ORDER DIVIDEND
0261	0000	68	T9,	0	/DIVISOR

1	/	-----				
2	/					
3	/	BINARY TO DECIMAL CONVERSION SUBROUTINE		.		
4	/			.		
5	/	CALLING SEQUENCE:		.		
6	/			.		
7	/	TAD	...	/AC = NUMBER OF CHARACTERS		
8	/			/TO PRODUCE (MAXIMUM = 8)		
9	/	JMS	BDC	/CALL CONVERSION SUBROUTINE		
10	/			/ADDRESS OF 24-BIT NUMBER		
11	/			/TO BE CONVERTED		
12	/			/BEGINNING ADDRESS OF AREA		
13	/			/TO RECEIVE CHARACTERS		
14	/			/RETURN POINT		
15	/			.		
16	/	-----		.		
17	/					
18	BDC,	0				
0200	0000					
0201	3275	19	DCA	T17	/STORE DIGIT COUNT	
0202	1600	20	TAD	I BDC	/FETCH NUMBER TO CONVERT	
0203	3301	21	DCA	T21		
0204	1701	22	TAD	I T21	/BITS 00-11	
0205	3277	23	DCA	T19	/T19	
0206	2301	24	ISZ	T21		
0207	1701	25	TAD	I T21	/BITS 12-23	
0210	3300	26	DCA	T20	/T20	
0211	2200	27	ISZ	BDC		
0212	7040	28	CMA			
0213	1600	29	TAD	I BDC		
0214	2200	30	ISZ	BDC		
0215	1275	31	TAD	T17		
0216	3301	32	DCA	T21		
0217	1275	33	TAD	T17	/NEGATE COUNT	
0220	7450	34	SNA			
0221	5600	35	JMP	I BDC	/IF COUNT ZERO, RETURN	
0222	7041	36	CMA	IAC		
0223	3275	37	DCA	T17	/STORE COUNT	
0224	1272	38	TAD	C5		
0225	3303	39	DCA	T23		
0226	1274	40	BDC2,	TAD	C7	/DIVIDE NUMBER BY 10
0227	3302	41	DCA	T22		
0230	1300	42	TAD	T20		
0231	7104	43	CLL	RAL		
0232	3300	44	DCA	T20		
0233	1277	45	TAD	T19		
0234	7004	46	RAL			
0235	3277	47	DCA	T19		
0236	7004	48	BDC4,	RAL		
0237	3276	49	DCA	T18		
0240	1276	50	TAD	T18		
0241	1273	51	TAD	C6		
0242	7430	52	SZL			
0243	3276	53	DCA	T18		

0244	7200	54	CLA	
0245	1300	55	TAD	T20
0246	7004	56	RAL	
0247	3300	57	DCA	T20
0250	1277	58	TAD	T19
0251	7004	59	RAL	
0252	3277	60	DCA	T19
0253	1276	61	TAD	T18
0254	2302	62	ISZ	T22
0255	5236	63	JMP	BDC4
0256	1271	64	TAD	C4
		65		
0257	3701	66	DCA I	T21
0260	7040	67	CMA	
0261	1301	68	TAD	T21
0262	3301	69	DCA	T21
0263	2303	70	ISZ	T23
0264	7410	71	SKP	
0265	5600	72	JMP I	BDC
0266	2275	73	ISZ	T17
0267	5226	74	JMP	BDC2
0270	5600	75	JMP I	BDC
		76		
0271	0260	77	C4,	0260
0272	7770	78	C5,	-8
0273	7766	79	C6,	-10
0274	7750	80	C7,	-24
0275	0000	81	T17,	0
0276	0000	82	T18,	0
0277	0000	83	T19,	0
0300	0000	84	T20,	0
0301	0000	85	T21,	0
0302	0000	86	T22,	0
0303	0000	87	T23,	0

/CONVERT REMAINDER TO
 /ASCII CHARACTER
 /STORE CHARACTER
 /DECREMENT ADDRESS

 /EIGHT CHARACTERS PRODUCED

 /YES, RETURN
 /INCREMENT COUNT, FINISHED
 /NO, CONTINUE
 /YES, RETURN

/CHARACTER COUNT
 /TEMP
 /BITS 00-11 OF NUMBER
 /BITS 12-23 OF NUMBER
 /TEMP
 /TEMP
 /TEMP

1	/	-----	
2	/		
3	/	DECIMAL TO BINARY CONVERSION SUBROUTINE	.
4	/		.
5	/	CALLING SEQUENCE:	.
6	/		.
7	/	TAD ...	/AC = NUMBER OF CHARACTERS
8	/		/TO CONVERT (MAXIMUM = 8)
9	/	JMS DBC	/CALL CONVERSION SUBROUTINE
10	/	...	/BEGINNING ADDRESS OF
11	/		/DECIMAL CHARACTER STRING
12	/	...	/ADDRESS OF 24-BIT RESULT
13	/	...	/RETURN POINT
14	/		.
15	/	NOTE: CONVERSION IS PERFORMED MODULO	.
16	/	16,777,216	.
17	/		.
18	/		.
19	/	-----	
0200	0000	20	DBC, 0
0201	7141	21	CLL CMA IAC
0202	3302	22	DCA T14
0203	3276	23	DCA T10
0204	3277	24	DCA T11
0205	1600	25	TAD I DBC
0206	3303	26	DCA T15
0207	2200	27	ISZ D8C
0210	1600	28	TAD I DBC
0211	3304	29	DCA T16
0212	2200	30	ISZ D8C
0213	7430	31	SZL
0214	5266	32	JMP DBC4
0215	1703	33	DBC1, TAD I T15
0216	0274	34	AND C2
0217	1275	35	TAD C3
0220	7700	36	SMA CLA
0221	5266	37	JMP DBC4
0222	1276	38	TAD T10
0223	7104	39	CLL RAL
0224	3276	40	DCA T10
0225	1277	41	TAD T11
0226	7004	42	RAL
0227	3277	43	DCA T11
0230	1276	44	TAD T10
0231	7104	45	CLL RAL
0232	3300	46	DCA T12
0233	1277	47	TAD T11
0234	7004	48	RAL
0235	3301	49	DCA T13
0236	1300	50	TAD T12
0237	7104	51	CLL RAL
0240	3300	52	DCA T12
0241	1301	53	TAD T13

/NEGATE DIGIT COUNT
 /STORE
 /INITIALIZE RESULT

 /FETCH STRING ADDRESS
 /STORE

 /FETCH ADDRESS OF RESULT
 /STORE

 /IF ZERO DIGIT COUNT
 /FETCH CHARACTER
 /CHECK FOR DECIMAL DIGIT

 /IF NOT, GO RETURN
 /MULTIPLY RESULT BY 10

```

0242 7004 54 RAL
0243 3301 55 DCA T13
0244 1276 56 TAD T10
0245 1300 57 TAD T12
0246 3276 58 DCA T10
0247 1277 59 TAD T11
0250 7430 60 SZL
0251 7101 61 CLL IAC
0252 1301 62 TAD T13
0253 3277 63 DCA T11
0254 7100 64 CLL
0255 1703 65 TAD I T15 /FETCH CHARACTER
0256 0274 66 AND C2 /EXTRACT DIGIT
0257 1276 67 TAD T10 /ADD DIGIT TO RESULT
0260 3276 68 DCA T10
0261 7430 69 SZL
0262 2277 70 ISZ T11
0263 2303 71 ISZ T15 /INCREMENT POINTER
0264 2302 72 ISZ T14 /INCREMENT COUNT, FINISHED
0265 5215 73 JMP DBC1 /NO, CONTINUE
0266 1277 74 DBC4, TAD T11 /YES, STORE RESULT
0267 3704 75 DCA I T16 /BITS 00-11
0270 2304 76 ISZ T16
0271 1276 77 TAD T10
0272 3704 78 DCA I T16 /BITS 12-23
0273 5600 79 JMP I DBC /RETURN
80 /-----
0274 0017 81 C2, 0017
0275 7766 82 C3, -012
0276 0000 83 T10, 0 /RESULT, BITS 12-23
0277 0000 84 T11, 0 /RESULT, BITS 0-11
0300 0000 85 T12, 0 /TEMP
0301 0000 86 T13, 0 /TEMP
0302 0000 87 T14, 0 /TEMP
0303 0000 88 T15, 0 /TEMP
0304 0000 89 T16, 0 /TEMP

```

```

1 /-----
2 /
3 / BINARY TO OCTAL CONVERSION SUBROUTINE
4 /
5 / CALLING SEQUENCE:
6 /
7 / TAD ... /AC = NUMBER TO BE CONVERTED
8 / JMS BOC /CALL CONVERSION ROUTINE
9 / ... /ADDRESS OF STORAGE AREA TO
10 / /RECEIVE 4 OCTAL CHARACTERS
11 / ... /RETURN POINT
12 /
13 /-----
0200 0000 14 BOC, 0
0201 3231 15 DCA T24 /STORE VALUE
0202 1600 16 TAD I BCC /FETCH ADDRESS OF STORAGE AREA
0203 3232 17 DCA T25 /STORE
0204 2200 18 ISZ BOC
0205 1226 19 TAD C8 /INITIALIZE COUNT
0206 3233 20 DCA T26
0207 1231 21 BOC2, TAD T24 /FETCH VALUE
0210 7006 22 RTL /EXTRACT OCTAL DIGIT
0211 7006 23 RTL
0212 3234 24 DCA T27
0213 1234 25 TAD T27
0214 7010 26 RAR
0215 3231 27 DCA T24
0216 1234 28 TAD T27
0217 0227 29 AND C9
0220 1230 30 TAD C10 /CONVERT TO ASCII CHARACTER
0221 3632 31 DCA I T25 /STORE CHARACTER
0222 2232 32 ISZ T25 /INCREMENT ADDRESS
0223 2233 33 ISZ T26 /INCREMENT COUNT, FINISHED
0224 5207 34 JMP BOC2 /NO, CONTINUE
0225 5600 35 JMP I BOC /YES, RETURN
36 /-----
0226 7774 37 C8, -4
0227 0007 38 C9, 7
0230 0260 39 C10, 0260
0231 0000 40 T24, 0 /VALUE
0232 0000 41 T25, 0 /ADDRESS
0233 0000 42 T26, 0 /COUNT
0234 0000 43 T27, 0 /TEMP

```

```

1 /-----
2 /
3 /      OCTAL TO BINARY CONVERSION SUBROUTINE
4 /
5 /      CALLING SEQUENCE:
6 /
7 /      JMS    ...      /CALL CONVERSION SUBROUTINE
8 /      ...      /ADDRESS OF STORAGE AREA
9 /      ...      /CONTAINING 4 OCTAL CHARACTERS
10 /      ...      /RETURN POINT
11 /      ...      /AC = 12-BIT CONVERTED VALUE
12 /
13 /-----
0200 0000 14 OBC, 0
0201 7200 15      CLA      /CLEAR AC
0202 1600 16      TAD I OBC /FETCH ADDRESS OF STORAGE AREA
0203 3224 17      DCA T28  /STORE
0204 2200 18      ISZ OBC
0205 1223 19      TAD C12  /INITIALIZE COUNT
0206 3225 20      DCA T29
0207 7104 21 OBC2, CLL RAL /MULTIPLY VALUE BY 8
0210 7104 22      CLL RAL
0211 7104 23      CLL RAL
0212 3226 24      DCA T30
0213 1624 25      TAD I T28 /FETCH CHARACTER
0214 2224 26      ISZ T28  /INCREMENT ADDRESS
0215 0222 27      AND C11  /EXTRACT OCTAL DIGIT
0216 1226 28      TAD T30  /ADD TO VALUE
0217 2225 29      ISZ T29  /INCREMENT COUNT, FINISHED
0220 5207 30      JMP OBC2 /NO, CONTINUE
0221 5600 31      JMP I OBC  /YES, RETURN
32 /-----
0222 0007 33 C11, 7
0223 7774 34 C12, -4
0224 0000 35 T28, 0      /ADDRESS
0225 0000 36 T29, 0      /COUNT
0226 0000 37 T30, 0      /VALUE

```

```

1 /-----
2 /
3 /      BYTE HANDLING SUBROUTINES
4 /
5 /      THESE SUBROUTINES USE A COMMON BYTE ADDRESS
6 /      POINTER (BAP) TO MANIPULATE 6-BIT BYTES PACKED
7 /      TWO PER WORD. THE FOLLOWING FUNCTIONS MAY BE
8 /      PERFORMED:
9 /
10 /      SET:   SETS THE BYTE ADDRESS POINTER TO A
11 /             SPECIFIED VALUE
12 /
13 /      NOTE:  RETURNS THE VALUE OF THE BYTE ADDRESS
14 /             POINTER
15 /
16 /      INC:   INCREMENTS THE BYTE ADDRESS POINTER
17 /
18 /      GET:   GETS THE BYTE ADDRESSED BY THE CONTENTS
19 /             OF THE BYTE ADDRESS POINTER AND THEN
20 /             INCREMENTS THE BYTE ADDRESS POINTER
21 /
22 /      PUT:   STORES A BYTE AT THE ADDRESS CONTAINED
23 /             IN THE BYTE ADDRESS POINTER AND THEN
24 /             INCREMENTS THE BYTE ADDRESS POINTER
25 /
26 /      UPK:   CALLS GET TO OBTAIN A 6-BIT BYTE WHICH
27 /             IS THEN CONVERTED AND RETURNED AS AN
28 /             8-BIT ASCII CHARACTER IN THE RANGE
29 /             240 - 337
30 /
31 /      RET:   RETURNS THE ASCII CHARACTER LAST
32 /             OBTAINED VIA UPK
33 /
34 /-----
0200 0000 35      *020C      /LOAD ADDRESS
36 /-----
37 /
38 /      SET BYTE POINTER
39 /
40 /      CALLING SEQUENCE:
41 /
42 /      JMS    SET      /CALL SET
43 /      ...      / AC = WORD ADDRESS
44 /      ...      / LINK = 0, LEFT BYTE
45 /      ...      / LINK = 1, RIGHT BYTE
46 /      ...      /RETURN POINT
47 /
48 /-----
0200 0000 49 SET, 0
0201 3310 50      DCA BAP  /STORE AC IN BAP
0202 7004 51      RAL      /MOVE LINK TO AC BIT 11
0203 3311 52      DCA BAP+1 /STORE BYTE POSITION
0204 5600 53      JMP I SET /RETURN

```

```

54 /-----
55 /
56 /      NOTE BYTE POINTER
57 /
58 /      CALLING SEQUENCE:
59 /
60 /      JMS  NOTE      /CALL NCTE
61 /      ...           /RETURN POINT
62 /      / AC = WORD ADDRESS
63 /      / LINK = 0, LEFT BYTE
64 /      / LINK = 1, RIGHT BYTE
65 /
66 /-----
0205 0000 67 NOTE, 0
0206 7300 68 CLA CLL
0207 1311 69 TAD BAP+1 /FETCH BYTE POSITION
0210 7010 70 RAR /MOVE TO LINK
0211 1310 71 TAD BAP /FETCH WORD POINTER
0212 5605 72 JMP I NOTE /RETURN
73 /-----
74 /
75 /      INCREMENT BYTE POINTER
76 /
77 /      CALLING SEQUENCE:
78 /
79 /      JMS  INC      /CALL INC
80 /      ...           /RETURN POINT
81 /
82 /-----
0213 0000 83 INC, 0
0214 7200 84 CLA
0215 1311 85 TAD BAP+1 /FETCH BYTE POSITION
0216 7110 86 CLL RAR /MOVE TO LINK
0217 1310 87 TAD BAP /FETCH WORD ADDRESS
0220 7004 88 RAL /SHIFT LEFT TO OBTAIN BYTE ADDRESS
0221 7011 89 IAC RAR /INCREMENT AND SHIFT BACK
0222 3310 90 DCA BAP /STORE WORD ADDRESS
0223 7004 91 RAL /MOVE LINK TO AC BIT 11
0224 3311 92 DCA BAP+1 /STORE BYTE POSITION
0225 5613 93 JMP I INC /RETURN
94 /-----
95 /
96 /      GET BYTE
97 /
98 /      CALLING SEQUENCE:
99 /
100 /      JMS  GET      /CALL GET
101 /      ...           /RETURN POINT
102 /      / AC = 6-BIT BYTE
103 /
104 /-----
105
0226 0000 106 GET, 0

```

```

0227 7200 107 CLA
0230 1311 108 TAD BAP+1 /FETCH BYTE POSITION
0231 7110 109 CLL RAR /MOVE TO LINK
0232 1710 110 TAD I BAP /FETCH WORD
0233 7430 111 SZL /LEFT BYTE
0234 5240 112 JMP GET2 /NO, RIGHT BYTE
0235 7012 113 RTR /YES, RIGHT ADJUST BYTE
0236 7012 114 RTR
0237 7012 115 RTR
0240 0305 116 GET2, AND 077 /KILL BITS 0-5
0241 3312 117 DCA BYTE /SAVE BYTE
0242 4213 118 JMS INC /INCREMENT BYTE ADDRESS POINTER
0243 1312 119 TAD BYTE /FETCH BYTE
0244 5626 120 JMP I GET /RETURN
121 /-----
122 /
123 /      PUT BYTE
124 /
125 /      CALLING SEQUENCE:
126 /
127 /      JMS  PUT      /CALL PUT
128 /      /AC BITS 6-11 = BYTE TO STORE
129 /      ...           /RETURN POINT
130 /
131 /-----
0245 0000 132 PUT, 0
0246 0305 133 AND 077 /KILL AC BITS 0-5
0247 3312 134 DCA BYTE /SAVE BYTE
0250 1311 135 TAD BAP+1 /FETCH BYTE POSITION
0251 7640 136 SZA CLA /LEFT BYTE
0252 5263 137 JMP PUT2 /NO, RIGHT BYTE
0253 1312 138 TAD BYTE /YES, LEFT ADJUST BYTE
0254 7106 139 CLL RTL
0255 7006 140 RTL
0256 7006 141 RTL
0257 3312 142 DCA BYTE
0260 1710 143 TAD I BAP /FETCH WORD
0261 0305 144 AND 077 /KILL BITS 0-5
0262 5265 145 JMP PUT4 /GO MERGE AND STORE
0263 1710 146 PUT2, TAD I BAP /FETCH WORD
0264 0307 147 AND 07700 /KILL BITS 6-11
0265 1312 148 PUT4, TAD BYTE /MERGE WITH BYTE
0266 3710 149 DCA I BAP /STORE WORD
0267 4213 150 JMS INC /INCREMENT BYTE ADDRESS POINTER
0270 5645 151 JMP I PUT /RETURN
152 /-----
153 /
154 /      UNPACK CHARACTER
155 /
156 /      CALLING SEQUENCE:
157 /
158 /      JMS  UPK      /CALL UPK
159 /      ...           /RETURN POINT

```

NOTES

```

160 /          / AC = 8-BIT ASCII CHARACTER .
161 /          .
162 /.....
0271 0000 163 UPK, 0
0272 4226 164 JMS GET /GET BYTE
0273 1306 165 TAD 0240 /CONVERT TO ASCII CHARACTER
0274 0305 166 AND 077
0275 1306 167 TAD 0240
0276 3313 168 DCA CHAR /SAVE CHARACTER
0277 1313 169 TAD CHAR /FETCH CHARACTER
0300 5671 170 JMP I UPK /RETURN
171 /-----
172 /
173 / RETURN CHARACTER .
174 / .
175 / CALLING SEQUENCE: .
176 / .
177 / JMS RET /CALL RET .
178 / ... /RETURN POINT .
179 / / AC = LAST CHARACTER .
180 / / OBTAINED VIA UPK .
181 / .
182 /.....
0301 0000 183 RET, 0
0302 7200 184 CLA
0303 1313 185 TAD CHAR /FETCH CHARACTER
0304 5701 186 JMP I RET /RETURN
187 /-----
0305 0077 188 077, 077
0306 0240 189 0240, 0240
0307 7700 190 07700, 07700
0310 0000 191 BAP, 0;0 /BYTE ADDRESS POINTER
0311 0000
0312 0000 192 BYTE, 0 /BYTE STORAGE
0313 0000 193 CHAR, 0 /CHARACTER STORAGE

```

MP 12

MP 12

MP 12

MP 12

MP 12

MP 12

MP 12

MP 12

 **FABRI-TEK** INC.
COMPUTER SYSTEMS

MP 12

MP 12

MP 12

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