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VAX Maintenance Handbook

VAX-11/750

digital



VAX Maintenance Handbook

VAX Systems

1983 Edition

Prepared by Educational Services
of
Digital Equipment Corporation

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MISCELLANEOUS



CHAPTER 1
INTRODUCTION



INTRODUCTION

The purpose of the VAX Maintenance Handbook series is to provide a complete, quick-reference source of troubleshooting, maintenance, operating, and programming information that is frequently referenced by DIGITAL field service, manufacturing, training, and engineering personnel.

This first volume of the VAX Maintenance Handbook provides a useful summary of system information that applies to all VAX systems. Each of the other volumes picking up this series is processor specific; that is, it provides a highly compressed compendium of processor facts that encompasses hardware and software information available from such sources as manuals, printouts, microcode lists, and program labelations.



CHAPTER 2
INSTRUCTION SET



DATA TYPE REPRESENTATIONS

WORD



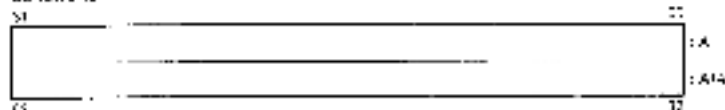
BYTES



LONGWORD



QUADWORD



OCTAWORD



DATA TYPE REPRESENTATIONS (CONT)

EXPONENT

15	00 25	00
5	EXPONENT	FRACTION
FRACTION		

31

18

EXPONENT

15	00 25	00
5	EXPONENT	FRACTION
FRACTION		
FRACTION		
FRACTION		

31

31

31

PACKED DECIMAL (PDC) (12)

15	00 25	00
5	0	1
5	0	1

1A

1A1

CHARACTER STRING (CST)

15	00 25	00
5	0	1
5	0	1
5	0	1

1A

1A1

1A12

VARIABLE-LENGTH BIT FIELD

15	00 25	00
5	0	1
5	0	1
5	0	1

1A12-1A15

EXPONENT

15	00 25	00
5	EXPONENT	FRACTION
FRACTION		
FRACTION		
FRACTION		

31

31

EXPONENT

15	00 25	00
5	EXPONENT	FRACTION
FRACTION		
FRACTION		
FRACTION		
FRACTION		
FRACTION		
FRACTION		

1A

1A2

1A3

1A4

1A5

1A10

1A11

1A12

SUMMARY OF VAX-11 ADDRESSING MODES

[illegible]

2025-01-01 10:00:00

	Dec	Hex	Assembler	Address	PC	SP	Instruction
1	PC	0	Initial	00000000	-	-	
2	PC	9	compute	00000009	-	-	
3	PC	0	byte relative	00000000	-	-	
4	PC	1	byte relative				
			deferred	00000000	-	-	
5	PC	12	word relative	0000000C	-	-	
6	PC	13	word relative				
			deferred	00000000	-	-	
7	PC	14	longword relative	0000000E	-	-	
8	PC	15	longword relative				
			deferred	00000000	-	-	

```

- 1: displacement
- 2: 8-bit addressable mode
- 3: register addressing
- 4: 16-bit addressable mode from
- 5: register
- 6: register
- 7: 8-bit addressable mode from
- 8: register
- 9: 16-bit addressable mode from
- 10: register
- 11: 8-bit addressable mode from
- 12: register
- 13: 16-bit addressable mode from
- 14: register
- 15: 8-bit addressable mode from
- 16: register
- 17: 16-bit addressable mode from
- 18: register
- 19: 8-bit addressable mode from
- 20: register
- 21: 16-bit addressable mode from
- 22: register
- 23: 8-bit addressable mode from
- 24: register
- 25: 16-bit addressable mode from
- 26: register
- 27: 8-bit addressable mode from
- 28: register
- 29: 16-bit addressable mode from
- 30: register
- 31: 8-bit addressable mode from
- 32: register

```

VAX-11 SPECIAL REGISTER USAGE

Register	Hardware Use	Conventional Software Use
R0	Results of R0R0, C0C0; length counter in character and decimal instructions	Results of functions, status of processor (not saved or restored on procedure call)
R1	Results of R0R0, address counter in character and decimal instructions	Results of functions (not saved or restored on procedure call)
R2, R4	Length counter in character and decimal instructions	Any
R3, R5	Address counter in character and decimal instructions	Any
R6-R11	None	Any
AP (R17)	Argument pointer; saved and loaded by CALL, restored by RET	Argument pointer (base address of argument list)
FP (R13)	Frame pointer; saved and loaded by C0C0, used and restored by RET	Frame pointer; condition signaling
SP (R14)	Stack pointer	Stack pointer
PC (R15)	Program counter	Program counter

TABLE B276 (Contd)

OP	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	HALT	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
1	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
2	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
3	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
4	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
5	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
6	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
7	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
8	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
9	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
A	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
B	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
C	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
D	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
E	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV
F	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV	MOV

VAX-11 INSTRUCTION SET BY OPCCODE (CONT)

INSTRUCTION NAME CODE

INSTR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	00000	00001	00002	00003	00004	00005	00006	00007	00008	00009	00010	00011	00012	00013	00014	00015	00016	00017	00018	00019	00020	00021	00022	00023	00024	00025	00026	00027	00028	00029	00030
1	00031	00032	00033	00034	00035	00036	00037	00038	00039	00040	00041	00042	00043	00044	00045	00046	00047	00048	00049	00050	00051	00052	00053	00054	00055	00056	00057	00058	00059	00060	00061
2	00062	00063	00064	00065	00066	00067	00068	00069	00070	00071	00072	00073	00074	00075	00076	00077	00078	00079	00080	00081	00082	00083	00084	00085	00086	00087	00088	00089	00090	00091	00092
3	00093	00094	00095	00096	00097	00098	00099	00100	00101	00102	00103	00104	00105	00106	00107	00108	00109	00110	00111	00112	00113	00114	00115	00116	00117	00118	00119	00120	00121	00122	00123
4	00124	00125	00126	00127	00128	00129	00130	00131	00132	00133	00134	00135	00136	00137	00138	00139	00140	00141	00142	00143	00144	00145	00146	00147	00148	00149	00150	00151	00152	00153	00154
5	00155	00156	00157	00158	00159	00160	00161	00162	00163	00164	00165	00166	00167	00168	00169	00170	00171	00172	00173	00174	00175	00176	00177	00178	00179	00180	00181	00182	00183	00184	00185
6	00186	00187	00188	00189	00190	00191	00192	00193	00194	00195	00196	00197	00198	00199	00200	00201	00202	00203	00204	00205	00206	00207	00208	00209	00210	00211	00212	00213	00214	00215	00216
7	00217	00218	00219	00220	00221	00222	00223	00224	00225	00226	00227	00228	00229	00230	00231	00232	00233	00234	00235	00236	00237	00238	00239	00240	00241	00242	00243	00244	00245	00246	00247
8	00248	00249	00250	00251	00252	00253	00254	00255	00256	00257	00258	00259	00260	00261	00262	00263	00264	00265	00266	00267	00268	00269	00270	00271	00272	00273	00274	00275	00276	00277	00278
9	00279	00280	00281	00282	00283	00284	00285	00286	00287	00288	00289	00290	00291	00292	00293	00294	00295	00296	00297	00298	00299	00300	00301	00302	00303	00304	00305	00306	00307	00308	00309
10	00310	00311	00312	00313	00314	00315	00316	00317	00318	00319	00320	00321	00322	00323	00324	00325	00326	00327	00328	00329	00330	00331	00332	00333	00334	00335	00336	00337	00338	00339	00340
11	00341	00342	00343	00344	00345	00346	00347	00348	00349	00350	00351	00352	00353	00354	00355	00356	00357	00358	00359	00360	00361	00362	00363	00364	00365	00366	00367	00368	00369	00370	00371
12	00372	00373	00374	00375	00376	00377	00378	00379	00380	00381	00382	00383	00384	00385	00386	00387	00388	00389	00390	00391	00392	00393	00394	00395	00396	00397	00398	00399	00400	00401	00402
13	00403	00404	00405	00406	00407	00408	00409	00410	00411	00412	00413	00414	00415	00416	00417	00418	00419	00420	00421	00422	00423	00424	00425	00426	00427	00428	00429	00430	00431	00432	00433
14	00434	00435	00436	00437	00438	00439	00440	00441	00442	00443	00444	00445	00446	00447	00448	00449	00450	00451	00452	00453	00454	00455	00456	00457	00458	00459	00460	00461	00462	00463	00464
15	00465	00466	00467	00468	00469	00470	00471	00472	00473	00474	00475	00476	00477	00478	00479	00480	00481	00482	00483	00484	00485	00486	00487	00488	00489	00490	00491	00492	00493	00494	00495
16	00496	00497	00498	00499	00500	00501	00502	00503	00504	00505	00506	00507	00508	00509	00510	00511	00512	00513	00514	00515	00516	00517	00518	00519	00520	00521	00522	00523	00524	00525	00526
17	00527	00528	00529	00530	00531	00532	00533	00534	00535	00536	00537	00538	00539	00540	00541	00542	00543	00544	00545	00546	00547	00548	00549	00550	00551	00552	00553	00554	00555	00556	00557
18	00558	00559	00560	00561	00562	00563	00564	00565	00566	00567	00568	00569	00570	00571	00572	00573	00574	00575	00576	00577	00578	00579	00580	00581	00582	00583	00584	00585	00586	00587	00588
19	00589	00590	00591	00592	00593	00594	00595	00596	00597	00598	00599	00600	00601	00602	00603	00604	00605	00606	00607	00608	00609	00610	00611	00612	00613	00614	00615	00616	00617	00618	00619
20	00620	00621	00622	00623	00624	00625	00626	00627	00628	00629	00630	00631	00632	00633	00634	00635	00636	00637	00638	00639	00640	00641	00642	00643	00644	00645	00646	00647	00648	00649	00650
21	00651	00652	00653	00654	00655	00656	00657	00658	00659	00660	00661	00662	00663	00664	00665	00666	00667	00668	00669	00670	00671	00672	00673	00674	00675	00676	00677	00678	00679	00680	00681
22	00682	00683	00684	00685	00686	00687	00688	00689	00690	00691	00692	00693	00694	00695	00696	00697	00698	00699	00700	00701	00702	00703	00704	00705	00706	00707	00708	00709	00710	00711	00712
23	00713	00714	00715	00716	00717	00718	00719	00720	00721	00722	00723	00724	00725	00726	00727	00728	00729	00730	00731	00732	00733	00734	00735	00736	00737	00738	00739	00740	00741	00742	00743
24	00744	00745	00746	00747	00748	00749	00750	00751	00752	00753	00754	00755	00756	00757	00758	00759	00760	00761	00762	00763	00764	00765	00766	00767	00768	00769	00770	00771	00772	00773	00774
25	00775	00776	00777	00778	00779	00780	00781	00782	00783	00784	00785	00786	00787	00788	00789	00790	00791	00792	00793	00794	00795	00796	00797	00798	00799	00800	00801	00802	00803	00804	00805
26	00806	00807	00808	00809	00810	00811	00812	00813	00814	00815	00816	00817	00818	00819	00820	00821	00822	00823	00824	00825	00826	00827	00828	00829	00830	00831	00832	00833	00834	00835	00836
27	00837	00838	00839	00840	00841	00842	00843	00844	00845	00846	00847	00848	00849	00850	00851	00852	00853	00854	00855	00856	00857	00858	00859	00860	00861	00862	00863	00864	00865	00866	00867
28	00868	00869	00870	00871	00872	00873	00874	00875	00876	00877	00878	00879	00880	00881	00882	00883	00884	00885	00886	00887	00888	00889	00890	00891	00892	00893	00894	00895	00896	00897	00898
29	00899	00900	00901	00902	00903	00904	00905	00906	00907	00908	00909	00910	00911	00912	00913	00914	00915	00916	00917	00918	00919	00920	00921	00922	00923	00924	00925	00926	00927	00928	00929
30	00930	00931	00932	00933	00934	00935	00936	00937	00938	00939	00940	00941	00942	00943	00944	00945	00946	00947	00948	00949	00950	00951	00952	00953	00954	00955	00956	00957	00958	00959	00960
31	00961	00962	00963	00964	00965	00966	00967	00968	00969	00970	00971	00972	00973	00974	00975	00976	00977	00978	00979	00980	00981	00982	00983	00984	00985	00986	00987	00988	00989	00990	00991
32	00992	00993	00994	00995	00996	00997	00998	00999	01000	01001	01002	01003	01004	01005	01006	01007	01008	01009	01010	01011	01012	01013	01014	01015	01016	01017	01018	01019	01020	01021	01022
33	01023	01024	01025	01026	01027	01028	01029	01030	01031	01032	01033	01034	01035	01036	01037	01038	01039	01040	01041	01042	01043	01044	01045	01046	01047	01048	01049	01050	01051	01052	01053
34	01054	01055	01056	01057	01058	01059	01060	01061	01062	01063	01064	01065	01066	01067	01068	01069	01070	01071	01072	01073	01074	01075	01076	01077	01078	01079	01080	01081	01082	01083	01084
35	01085	01086	01087	01088	01089	01090	01091	01092	01093	01094	01095	01096	01097	01098	01099	01100	01101	01102	01103	01104	01105	01106	01107	01108	01109	01110	01111	01112	01113	01114	01115
36	01116	01117	01118	01119	01120	01121	01122	01123	01124	01125	01126	01127	01128	01129	01130	01131	01132	01133	01134	01135	01136	01137	01138	01139	01140	01141	01142	01143	01144	01145	01146
37	01147	01148	01149	01150	01151	01152	01153	01154	01155																						

VAX-11 INSTRUCTION SET BY OPCODE (CONT)

DECIMAL INSTRUCTION SET

OPCODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0																															
1																															
2																															
3																															
4																															
5																															
6																															
7																															
8																															
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26																															
27																															
28																															
29																															
30																															
31																															

VAX-11 INSTRUCTION SET OPERAND SPECIFIER NOTATION

Operand specifiers are specified in the following manner:

NAME[.DATA] IS TYPE[DATA TYPE]

1. Name - Suggestive name for operand in the context of the instruction.
2. Access type - Letter denoting operand specifier access type:
 - A - Calculate the effective address of the specified operand. Address is returned in a longword which is the actual instruction operand. Context of address calculation is given by DATA TYPE.
 - D - No operand reference. Operand specifier is a branch displacement. Size of branch displacement is given by DATA TYPE.
 - R - Operand is read, possibly by register, and written. This is not an indivisible memory operation.
 - W - Operand is read only.
 - M - Operand is write only.
3. Data type - Letter denoting the data type of the operand:
 - B - Byte
 - F - 16-bit floating
 - F - Floating
 - S - S floating
 - H - H floating
 - L - Longword
 - O - Octaword
 - Q - Quadword
 - W - Word

Spécialiser votre

[illegible]

REF ID: A60172

C	A	R	P	INSTRUCTION	
				OPERATION	SYMBOLIC
0	MOVEMV R0,R0	0	000000	MOVEMV R0,R0	000000
1	MOVEMV R1,R1	000001	000001	MOVEMV R1,R1	000001
2	MOVEMV R2,R2	000002	000002	MOVEMV R2,R2	000002
3	MOVEMV R3,R3	000003	000003	MOVEMV R3,R3	000003
4	MOVEMV R4,R4	000004	000004	MOVEMV R4,R4	000004
5	MOVEMV R5,R5	000005	000005	MOVEMV R5,R5	000005
6	MOVEMV R6,R6	000006	000006	MOVEMV R6,R6	000006
7	MOVEMV R7,R7	000007	000007	MOVEMV R7,R7	000007
8	MOVEMV R8,R8	000008	000008	MOVEMV R8,R8	000008
9	MOVEMV R9,R9	000009	000009	MOVEMV R9,R9	000009
10	MOVEMV R10,R10	000010	000010	MOVEMV R10,R10	000010
11	MOVEMV R11,R11	000011	000011	MOVEMV R11,R11	000011
12	MOVEMV R12,R12	000012	000012	MOVEMV R12,R12	000012
13	MOVEMV R13,R13	000013	000013	MOVEMV R13,R13	000013
14	MOVEMV R14,R14	000014	000014	MOVEMV R14,R14	000014
15	MOVEMV R15,R15	000015	000015	MOVEMV R15,R15	000015
16	MOVEMV R16,R16	000016	000016	MOVEMV R16,R16	000016
17	MOVEMV R17,R17	000017	000017	MOVEMV R17,R17	000017
18	MOVEMV R18,R18	000018	000018	MOVEMV R18,R18	000018
19	MOVEMV R19,R19	000019	000019	MOVEMV R19,R19	000019
20	MOVEMV R20,R20	000020	000020	MOVEMV R20,R20	000020
21	MOVEMV R21,R21	000021	000021	MOVEMV R21,R21	000021
22	MOVEMV R22,R22	000022	000022	MOVEMV R22,R22	000022
23	MOVEMV R23,R23	000023	000023	MOVEMV R23,R23	000023
24	MOVEMV R24,R24	000024	000024	MOVEMV R24,R24	000024
25	MOVEMV R25,R25	000025	000025	MOVEMV R25,R25	000025
26	MOVEMV R26,R26	000026	000026	MOVEMV R26,R26	000026
27	MOVEMV R27,R27	000027	000027	MOVEMV R27,R27	000027
28	MOVEMV R28,R28	000028	000028	MOVEMV R28,R28	000028
29	MOVEMV R29,R29	000029	000029	MOVEMV R29,R29	000029
30	MOVEMV R30,R30	000030	000030	MOVEMV R30,R30	000030
31	MOVEMV R31,R31	000031	000031	MOVEMV R31,R31	000031

[illegible]

VAX-11 INSTRUCTION SET (CONT)

Instruction	Condition Code			C
	N	Z	O	
14 ADDI, ADDRESS OF LOCAL ORIGIN + IMMEDIATE	1	2		0
16 ADDI, ADDRESS OF LOCAL ORIGIN + LOCAL	1	2		0
18 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
20 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
22 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
24 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
26 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
28 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
30 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
32 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
34 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
36 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
38 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
40 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
42 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
44 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
46 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
48 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
50 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
52 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
54 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
56 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
58 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
60 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
62 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
64 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
66 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
68 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
70 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
72 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
74 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
76 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
78 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
80 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
82 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
84 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
86 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
88 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
90 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
92 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
94 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
96 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
98 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0
100 ADDI, ADDRESS OF ORIGIN + LOCAL	1	2		0

[illegible]

VAX-11 INSTRUCTION SET (CONTI

Line	Amount	Description	Debit	Credit	Balance
1	100.00	Initial deposit		100.00	100.00
2	50.00	Withdrawal	50.00		50.00
3	25.00	Interest income		25.00	75.00
4	75.00	Transfer from savings		75.00	150.00
5	150.00	Final balance			150.00

INSTRUC. CODE	OPERATION	Operand Address			
		R	D	V	C
4P	UNARY TEST COUNT TESTCOUNT, R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0000 0000 0000	TEST COUNT COUNT	0	TEST COUNT COUNT
4R	UNARY TEST COUNT TESTCOUNT, R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0000 0000 0000	TEST COUNT COUNT	0	TEST COUNT COUNT
5P	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
5R	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
6P	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
6R	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
7P	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
7R	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
8P	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
8R	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
9P	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
9R	CMR CHANGE WORD TO R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15	0	0	0	0
AP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
AR	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
BP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
BR	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
CP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
CR	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
DP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
EP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
FP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
GP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
HP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
IP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
JP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
KP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
LP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
MP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
NP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
OP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
PP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
QP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
RP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
SP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
TP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
UP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
VP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
WP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
XP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
YP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0
ZP	TEST CLEAR 1 DELAYED TESTING	0	0	0	0

VAX-11 INSTRUCTION SET (CONT.)

[illegible]

VAX-11 INSTRUCTION SET CONTI

DATE	DESCRIPTION	AMOUNT	BALANCE
1970-01-01	OPENING BALANCE	100.00	100.00
1970-01-15	PAYROLL	25.00	75.00
1970-02-01	RENT	15.00	60.00
1970-02-15	UTILITIES	10.00	50.00
1970-03-01	SALES	30.00	80.00
1970-03-15	PAYROLL	25.00	55.00
1970-04-01	RENT	15.00	40.00
1970-04-15	UTILITIES	10.00	30.00
1970-05-01	SALES	30.00	60.00
1970-05-15	PAYROLL	25.00	35.00
1970-06-01	RENT	15.00	20.00
1970-06-15	UTILITIES	10.00	10.00
1970-07-01	SALES	30.00	40.00
1970-07-15	PAYROLL	25.00	15.00
1970-08-01	RENT	15.00	0.00
1970-08-15	UTILITIES	10.00	(10.00)
1970-09-01	SALES	30.00	20.00
1970-09-15	PAYROLL	25.00	(5.00)
1970-10-01	RENT	15.00	(20.00)
1970-10-15	UTILITIES	10.00	(30.00)
1970-11-01	SALES	30.00	(0.00)
1970-11-15	PAYROLL	25.00	(25.00)
1970-12-01	RENT	15.00	(40.00)
1970-12-15	UTILITIES	10.00	(50.00)
1971-01-01	SALES	30.00	(20.00)
1971-01-15	PAYROLL	25.00	(45.00)
1971-02-01	RENT	15.00	(60.00)
1971-02-15	UTILITIES	10.00	(70.00)
1971-03-01	SALES	30.00	(40.00)
1971-03-15	PAYROLL	25.00	(65.00)
1971-04-01	RENT	15.00	(80.00)
1971-04-15	UTILITIES	10.00	(90.00)
1971-05-01	SALES	30.00	(60.00)
1971-05-15	PAYROLL	25.00	(85.00)
1971-06-01	RENT	15.00	(100.00)
1971-06-15	UTILITIES	10.00	(110.00)
1971-07-01	SALES	30.00	(80.00)
1971-07-15	PAYROLL	25.00	(105.00)
1971-08-01	RENT	15.00	(120.00)
1971-08-15	UTILITIES	10.00	(130.00)
1971-09-01	SALES	30.00	(100.00)
1971-09-15	PAYROLL	25.00	(125.00)
1971-10-01	RENT	15.00	(140.00)
1971-10-15	UTILITIES	10.00	(150.00)
1971-11-01	SALES	30.00	(120.00)
1971-11-15	PAYROLL	25.00	(145.00)
1971-12-01	RENT	15.00	(160.00)
1971-12-15	UTILITIES	10.00	(170.00)
1972-01-01	SALES	30.00	(140.00)
1972-01-15	PAYROLL	25.00	(165.00)
1972-02-01	RENT	15.00	(180.00)
1972-02-15	UTILITIES	10.00	(190.00)
1972-03-01	SALES	30.00	(160.00)
1972-03-15	PAYROLL	25.00	(185.00)
1972-04-01	RENT	15.00	(200.00)
1972-04-15	UTILITIES	10.00	(210.00)
1972-05-01	SALES	30.00	(180.00)
1972-05-15	PAYROLL	25.00	(205.00)
1972-06-01	RENT	15.00	(220.00)
1972-06-15	UTILITIES	10.00	(230.00)
1972-07-01	SALES	30.00	(200.00)
1972-07-15	PAYROLL	25.00	(225.00)
1972-08-01	RENT	15.00	(240.00)
1972-08-15	UTILITIES	10.00	(250.00)
1972-09-01	SALES	30.00	(220.00)
1972-09-15	PAYROLL	25.00	(245.00)
1972-10-01	RENT	15.00	(260.00)
1972-10-15	UTILITIES	10.00	(270.00)
1972-11-01	SALES	30.00	(240.00)
1972-11-15	PAYROLL	25.00	(265.00)
1972-12-01	RENT	15.00	(280.00)
1972-12-15	UTILITIES	10.00	(290.00)
1973-01-01	SALES	30.00	(260.00)
1973-01-15	PAYROLL	25.00	(285.00)
1973-02-01	RENT	15.00	(300.00)
1973-02-15	UTILITIES		

[illegible]

VAX-11 INSTRUCTION SET (CONT)

INSTRUC. NAME	Operational Fields			OPERATION	AFFECTED REGISTER	AFFECTED REGISTER
	1	2	3			
40 COPY IMMEDIATE TO REGISTER R0, R1, R2	DEST 2					DEST 2 R0, R1, R2 REGISTER TO DEST
41 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3	DEST 2					DEST 2 R0, R1, R2, R3 REGISTER TO DEST
42 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3, R4	DEST 2					DEST 2 R0, R1, R2, R3, R4 REGISTER TO DEST
43 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3, R4, R5	DEST 2					DEST 2 R0, R1, R2, R3, R4, R5 REGISTER TO DEST
44 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3, R4, R5, R6	DEST 2					DEST 2 R0, R1, R2, R3, R4, R5, R6 REGISTER TO DEST
45 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3, R4, R5, R6, R7	DEST 2					DEST 2 R0, R1, R2, R3, R4, R5, R6, R7 REGISTER TO DEST
46 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3, R4, R5, R6, R7, R8	DEST 2					DEST 2 R0, R1, R2, R3, R4, R5, R6, R7, R8 REGISTER TO DEST
47 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3, R4, R5, R6, R7, R8, R9	DEST 2					DEST 2 R0, R1, R2, R3, R4, R5, R6, R7, R8, R9 REGISTER TO DEST
48 COPY REGISTER IMMEDIATE TO REGISTER R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10	DEST 2					DEST 2 R0, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10 REGISTER TO DEST

[illegible]

		Classification Codes			
DESCRIPTION	1	2	3	4	
22 OTHER DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
23 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
24 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
25 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
26 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
27 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
28 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
29 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
30 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
31 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
32 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
33 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
34 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
35 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
36 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
37 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
38 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
39 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
40 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
41 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
42 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
43 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
44 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
45 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
46 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
47 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
48 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
49 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	
50 DELETED DELETED RECORDS (2000-2004)	00000	00000	00000	00000	

VAX-11 INSTRUCTION SET (CONT)

[illegible]

Instruction		Condition Codes			
		0	1	2	3
1000	PSHRT STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHRT0	PSHRT 1	PSHRT0 OVERFLOW	0
1001	PSHRT STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHRT0	PSHRT 1	PSHRT0 OVERFLOW	0
1010	PSHL STORED REGISTER ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1011	PSHL ROUNDOFF TO FRACTION				
1100	PSHL ROUNDOFF TO FRACTION				
1101	PSHL ROUNDOFF TO FRACTION				
1110	PSHL ROUNDOFF TO FRACTION				
1111	PSHL ROUNDOFF TO FRACTION				
1200	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1201	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1210	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1211	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1300	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1301	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1310	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1311	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1400	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1401	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1410	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1411	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1500	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1501	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1510	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0
1511	PSHL STORED REGISTER R, ROUNDOFF ROUNDING, ROUND UP, ROUN DOWN, STAY, FRACTION	PSHL0	PSHL 1	PSHL 0	0

		OPERANDS			
INSTRUCTION		M	D	Y	Z
22	ENTER INDEX REGISTER ADDRESSING: BASE, INDEX, DISPLACEMENT OPERANDS: IMMEDIATE, IMMEDIATE	IMMEDIATE	DISPLACEMENT	0	0
42	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE OPERANDS: IMMEDIATE, IMMEDIATE	0	INDEX REGISTER	0	0
50	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE OPERANDS: IMMEDIATE, IMMEDIATE	0	INDEX REGISTER	0	0
60	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE, IMMEDIATE	0	0	0	0
62	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	DISPLACEMENT	DISPLACEMENT	0	DISPLACEMENT
42	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE	0	0	0	0
14	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE	0	0	0	0
62	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE	0	0	0	0
24	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
26	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
28	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
30	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
32	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
34	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
36	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
38	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0
40	ENTER INDEX INTO INDEX REGISTER ADDRESSING: IMMEDIATE, IMMEDIATE	0	INDEX	0	0

VAX-11 INSTRUCTION SET (CONT)

[illegible]

Instruction Code	M	Condition Codes		C
		Z	V	
14 BLAND MOVE DESTREG CC src DESTREG, DESTREG	100-00	100-00	0	0
15 BLAND MOVE ALLREGS src DESTREG, DESTREG	100-00	100-00	0	0
16 BLAND MOVE src DESTREG, DESTREG	100-00	100-00	0	0
18 BLAND MOVE DESTREGISTER src DESTREG, DESTREGISTER, 16 DESTREGISTER DESTREGISTER=DESTREGISTER	0	1	0	0
19 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
20 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
21 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
22 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
23 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
24 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
25 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
26 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
27 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
28 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
29 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
30 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
31 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
32 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
33 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0
34 BLAND MOVE DESTREGISTER src DESTREGISTER, 16 DESTREGISTER, 16 DESTREGISTER=DESTREGISTER	100-00	100-00	0	0

Q	ANSWER	Q	ANSWER	Q	ANSWER	Q	ANSWER
1	NO ANSWER TO QUESTION	2	NO ANSWER TO QUESTION	3	NO ANSWER TO QUESTION	4	NO ANSWER TO QUESTION
5	NO ANSWER TO QUESTION	6	NO ANSWER TO QUESTION	7	NO ANSWER TO QUESTION	8	NO ANSWER TO QUESTION
9	NO ANSWER TO QUESTION	10	NO ANSWER TO QUESTION	11	NO ANSWER TO QUESTION	12	NO ANSWER TO QUESTION
13	NO ANSWER TO QUESTION	14	NO ANSWER TO QUESTION	15	NO ANSWER TO QUESTION	16	NO ANSWER TO QUESTION
17	NO ANSWER TO QUESTION	18	NO ANSWER TO QUESTION	19	NO ANSWER TO QUESTION	20	NO ANSWER TO QUESTION
21	NO ANSWER TO QUESTION	22	NO ANSWER TO QUESTION	23	NO ANSWER TO QUESTION	24	NO ANSWER TO QUESTION
25	NO ANSWER TO QUESTION	26	NO ANSWER TO QUESTION	27	NO ANSWER TO QUESTION	28	NO ANSWER TO QUESTION
29	NO ANSWER TO QUESTION	30	NO ANSWER TO QUESTION	31	NO ANSWER TO QUESTION	32	NO ANSWER TO QUESTION
33	NO ANSWER TO QUESTION	34	NO ANSWER TO QUESTION	35	NO ANSWER TO QUESTION	36	NO ANSWER TO QUESTION
37	NO ANSWER TO QUESTION	38	NO ANSWER TO QUESTION	39	NO ANSWER TO QUESTION	40	NO ANSWER TO QUESTION
41	NO ANSWER TO QUESTION	42	NO ANSWER TO QUESTION	43	NO ANSWER TO QUESTION	44	NO ANSWER TO QUESTION
45	NO ANSWER TO QUESTION	46	NO ANSWER TO QUESTION	47	NO ANSWER TO QUESTION	48	NO ANSWER TO QUESTION
49	NO ANSWER TO QUESTION	50	NO ANSWER TO QUESTION	51	NO ANSWER TO QUESTION	52	NO ANSWER TO QUESTION
53	NO ANSWER TO QUESTION	54	NO ANSWER TO QUESTION	55	NO ANSWER TO QUESTION	56	NO ANSWER TO QUESTION
57	NO ANSWER TO QUESTION	58	NO ANSWER TO QUESTION	59	NO ANSWER TO QUESTION	60	NO ANSWER TO QUESTION
61	NO ANSWER TO QUESTION	62	NO ANSWER TO QUESTION	63	NO ANSWER TO QUESTION	64	NO ANSWER TO QUESTION
65	NO ANSWER TO QUESTION	66	NO ANSWER TO QUESTION	67	NO ANSWER TO QUESTION	68	NO ANSWER TO QUESTION
69	NO ANSWER TO QUESTION	70	NO ANSWER TO QUESTION	71	NO ANSWER TO QUESTION	72	NO ANSWER TO QUESTION
73	NO ANSWER TO QUESTION	74	NO ANSWER TO QUESTION	75	NO ANSWER TO QUESTION	76	NO ANSWER TO QUESTION
77	NO ANSWER TO QUESTION	78	NO ANSWER TO QUESTION	79	NO ANSWER TO QUESTION	80	NO ANSWER TO QUESTION
81	NO ANSWER TO QUESTION	82	NO ANSWER TO QUESTION	83	NO ANSWER TO QUESTION	84	NO ANSWER TO QUESTION
85	NO ANSWER TO QUESTION	86	NO ANSWER TO QUESTION	87	NO ANSWER TO QUESTION	88	NO ANSWER TO QUESTION
89	NO ANSWER TO QUESTION	90	NO ANSWER TO QUESTION	91	NO ANSWER TO QUESTION	92	NO ANSWER TO QUESTION
93	NO ANSWER TO QUESTION	94	NO ANSWER TO QUESTION	95	NO ANSWER TO QUESTION	96	NO ANSWER TO QUESTION
97	NO ANSWER TO QUESTION	98	NO ANSWER TO QUESTION	99	NO ANSWER TO QUESTION	100	NO ANSWER TO QUESTION

[illegible]

VAX-11 INSTRUCTION SET (CONT)

[illegible]

Instruction	Description	Condition Codes			
		Z	N	V	C
14	TRANSFER PAGE ADDRESS OF NAME AND, 42	INTERRUPT	ADDRESS	0	0
15	CALL PAGE LONG AND, 42	ERROR	ADDRESS	0	0
16	CALL PAGE LONG AND, 42	0	0	0	0
17	CALL PAGE LONG AND, 42	0	0	0	0
18	CALL PAGE LONG AND, 42	0	0	0	0
19	CALL PAGE LONG AND, 42	0	0	0	0
20	CALL PAGE LONG AND, 42	0	0	0	0
21	CALL PAGE LONG AND, 42	0	0	0	0
22	CALL PAGE LONG AND, 42	0	0	0	0
23	CALL PAGE LONG AND, 42	0	0	0	0
24	CALL PAGE LONG AND, 42	0	0	0	0
25	CALL PAGE LONG AND, 42	0	0	0	0
26	CALL PAGE LONG AND, 42	0	0	0	0
27	CALL PAGE LONG AND, 42	0	0	0	0
28	CALL PAGE LONG AND, 42	0	0	0	0
29	CALL PAGE LONG AND, 42	0	0	0	0
30	CALL PAGE LONG AND, 42	0	0	0	0
31	CALL PAGE LONG AND, 42	0	0	0	0
32	CALL PAGE LONG AND, 42	0	0	0	0
33	CALL PAGE LONG AND, 42	0	0	0	0
34	CALL PAGE LONG AND, 42	0	0	0	0
35	CALL PAGE LONG AND, 42	0	0	0	0
36	CALL PAGE LONG AND, 42	0	0	0	0
37	CALL PAGE LONG AND, 42	0	0	0	0
38	CALL PAGE LONG AND, 42	0	0	0	0
39	CALL PAGE LONG AND, 42	0	0	0	0
40	CALL PAGE LONG AND, 42	0	0	0	0
41	CALL PAGE LONG AND, 42	0	0	0	0
42	CALL PAGE LONG AND, 42	0	0	0	0
43	CALL PAGE LONG AND, 42	0	0	0	0
44	CALL PAGE LONG AND, 42	0	0	0	0
45	CALL PAGE LONG AND, 42	0	0	0	0
46	CALL PAGE LONG AND, 42	0	0	0	0
47	CALL PAGE LONG AND, 42	0	0	0	0
48	CALL PAGE LONG AND, 42	0	0	0	0
49	CALL PAGE LONG AND, 42	0	0	0	0
50	CALL PAGE LONG AND, 42	0	0	0	0
51	CALL PAGE LONG AND, 42	0	0	0	0
52	CALL PAGE LONG AND, 42	0	0	0	0
53	CALL PAGE LONG AND, 42	0	0	0	0
54	CALL PAGE LONG AND, 42	0	0	0	0
55	CALL PAGE LONG AND, 42	0	0	0	0
56	CALL PAGE LONG AND, 42	0	0	0	0
57	CALL PAGE LONG AND, 42	0	0	0	0
58	CALL PAGE LONG AND, 42	0	0	0	0
59	CALL PAGE LONG AND, 42	0	0	0	0
60	CALL PAGE LONG AND, 42	0	0	0	0
61	CALL PAGE LONG AND, 42	0	0	0	0
62	CALL PAGE LONG AND, 42	0	0	0	0
63	CALL PAGE LONG AND, 42	0	0	0	0
64	CALL PAGE LONG AND, 42	0	0	0	0
65	CALL PAGE LONG AND, 42	0	0	0	0
66	CALL PAGE LONG AND, 42	0	0	0	0
67	CALL PAGE LONG AND, 42	0	0	0	0
68	CALL PAGE LONG AND, 42	0	0	0	0
69	CALL PAGE LONG AND, 42	0	0	0	0
70	CALL PAGE LONG AND, 42	0	0	0	0
71	CALL PAGE LONG AND, 42	0	0	0	0
72	CALL PAGE LONG AND, 42	0	0	0	0
73	CALL PAGE LONG AND, 42	0	0	0	0
74	CALL PAGE LONG AND, 42	0	0	0	0
75	CALL PAGE LONG AND, 42	0	0	0	0
76	CALL PAGE LONG AND, 42	0	0	0	0
77	CALL PAGE LONG AND, 42	0	0	0	0
78	CALL PAGE LONG AND, 42	0	0	0	0
79	CALL PAGE LONG AND, 42	0	0	0	0
80	CALL PAGE LONG AND, 42	0	0	0	0
81	CALL PAGE LONG AND, 42	0	0	0	0
82	CALL PAGE LONG AND, 42	0	0	0	0
83	CALL PAGE LONG AND, 42	0	0	0	0
84	CALL PAGE LONG AND, 42	0	0	0	0
85	CALL PAGE LONG AND, 42	0	0	0	0
86	CALL PAGE LONG AND, 42	0	0	0	0
87	CALL PAGE LONG AND, 42	0	0	0	0
88	CALL PAGE LONG AND, 42	0	0	0	0
89	CALL PAGE LONG AND, 42	0	0	0	0
90	CALL PAGE LONG AND, 42	0	0	0	0
91	CALL PAGE LONG AND, 42	0	0	0	0
92	CALL PAGE LONG AND, 42	0	0	0	0
93	CALL PAGE LONG AND, 42	0	0	0	0
94	CALL PAGE LONG AND, 42	0	0	0	0
95	CALL PAGE LONG AND, 42	0	0	0	0
96	CALL PAGE LONG AND, 42	0	0	0	0
97	CALL PAGE LONG AND, 42	0	0	0	0
98	CALL PAGE LONG AND, 42	0	0	0	0
99	CALL PAGE LONG AND, 42	0	0	0	0

INSTR. CODE	Condition Codes			
	5	2	1	0
1201 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
1202 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
71 GTE: COMPARE LONG & LONGER [R], [R2], [R3]	DIFF	DIFF	DIFF	UNKN. FROM 101
72 GTE: COMPARE LONG & LONGER [R], [R2], [R3]	DIFF	DIFF	DIFF	UNKN. FROM 101
81 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
82 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
83 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
84 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
85 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
86 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
87 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
88 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
89 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
90 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
91 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
92 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
93 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
94 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
95 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
96 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
97 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
98 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0
99 XNOR: XNOR WITH R, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [PC]	DIFF	DIFF	PARITY OVERFLOW	0

VAX-11 INSTRUCTION SET (CONT)

[illegible]

VAX-11 INSTRUCTION SET (CONT)

Instruction		Condition codes	
		2	4
0000	ADDI	+	NO CONDITIONAL
0001	ADDI	+	NO CONDITIONAL
0002	ADDI	+	NO CONDITIONAL
0003	ADDI	+	NO CONDITIONAL
0004	ADDI	+	NO CONDITIONAL
0005	ADDI	+	NO CONDITIONAL
0006	ADDI	+	NO CONDITIONAL
0007	ADDI	+	NO CONDITIONAL
0008	ADDI	+	NO CONDITIONAL
0009	ADDI	+	NO CONDITIONAL
0010	ADDI	+	NO CONDITIONAL
0011	ADDI	+	NO CONDITIONAL
0012	ADDI	+	NO CONDITIONAL
0013	ADDI	+	NO CONDITIONAL
0014	ADDI	+	NO CONDITIONAL
0015	ADDI	+	NO CONDITIONAL
0016	ADDI	+	NO CONDITIONAL
0017	ADDI	+	NO CONDITIONAL
0018	ADDI	+	NO CONDITIONAL
0019	ADDI	+	NO CONDITIONAL
0020	ADDI	+	NO CONDITIONAL
0021	ADDI	+	NO CONDITIONAL
0022	ADDI	+	NO CONDITIONAL
0023	ADDI	+	NO CONDITIONAL
0024	ADDI	+	NO CONDITIONAL
0025	ADDI	+	NO CONDITIONAL
0026	ADDI	+	NO CONDITIONAL
0027	ADDI	+	NO CONDITIONAL
0028	ADDI	+	NO CONDITIONAL
0029	ADDI	+	NO CONDITIONAL
0030	ADDI	+	NO CONDITIONAL
0031	ADDI	+	NO CONDITIONAL

Instruction		Condition Codes			
		N	Z	V	C
WSTP	W STOPPED TO INTERNAL				
WSPB	W STOPPED TO INTERNAL				
WSPC	W STOPPED TO INTERNAL				
WSPB	W STOPPED TO ALL WE-B				

BRANCH CONDITIONS

Operator	Condition
LTBR	$N \text{ or } Z = 0$
GTBR	$N \text{ or } Z = 1$
BEQ	$S = 0$
BEQHI	$S = 0$
BTST	$Z = 1$
BEQLE	$Z = 1$
BCEQ	$K = 0$
BKLE	$K = 1$
BSTR	$C \text{ or } Z = 0$
BSTR	$C \text{ or } Z = 1$
BVC	$V = 0$
BVS	$V = 1$
BUSQLE	$C = 0$
BCL	$C = 0$
BCLL	$C = 1$
BCR	

CHAPTER 3
EXCEPTIONS
AND INTERRUPTS



INTERRUPT AND EXCEPTION DEFINITIONS

Interrupt	An event other than an exception, branch, jump, call, or call instruction that changes the normal flow of instruction execution. Interrupts are generally external to the processor execution when the interrupt occurs.
Exception	An event detected by hardware other than an interrupt, jump, branch, call, or call instruction that changes the normal flow of instruction execution. An exception is always caused by the execution of an instruction or set of instructions. There are three types of exceptions.
• Trap	An exception condition that occurs at the end of the instruction that causes the exception. The PC saved on the stack is the address of the next instruction that would normally have been executed.
• Fault	A condition that occurs in the middle of an instruction and leaves the registers and memory in a consistent state that allows the instruction to restart and give correct results once the fault has been cleared or eliminated.
• Abort	An exception that occurs in the middle of an instruction and leaves the registers and memory in an indeterminate state that also prohibits an instruction restart.

SYSTEM CONTROL BLOCK

ADDRESS (HEX) (DEC)

79 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
71 ADDRESS IN INTERRUPT STATE
72 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
73 MISC

ADDRESS (HEX) (DEC)

1 ISSUED, 48-60000
2 48-100000
3 48-100000
4 48-100000
5 48-100000
6 48-100000
7 48-100000
8 48-100000
9 48-100000
10 48-100000
11 48-100000
12 48-100000
13 48-100000
14 48-100000
15 48-100000
16 48-100000
17 48-100000
18 48-100000
19 48-100000
20 48-100000
21 48-100000
22 48-100000
23 48-100000
24 48-100000
25 48-100000
26 48-100000
27 48-100000
28 48-100000
29 48-100000
30 48-100000
31 48-100000
32 48-100000
33 48-100000
34 48-100000
35 48-100000
36 48-100000
37 48-100000
38 48-100000
39 48-100000
40 48-100000
41 48-100000
42 48-100000
43 48-100000
44 48-100000
45 48-100000
46 48-100000
47 48-100000
48 48-100000
49 48-100000
50 48-100000
51 48-100000
52 48-100000
53 48-100000
54 48-100000
55 48-100000
56 48-100000
57 48-100000
58 48-100000
59 48-100000
60 48-100000
61 48-100000
62 48-100000
63 48-100000
64 48-100000
65 48-100000
66 48-100000
67 48-100000
68 48-100000
69 48-100000
70 48-100000
71 48-100000
72 48-100000
73 48-100000
74 48-100000
75 48-100000
76 48-100000
77 48-100000
78 48-100000
79 48-100000
80 48-100000
81 48-100000
82 48-100000
83 48-100000
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85 48-100000
86 48-100000
87 48-100000
88 48-100000
89 48-100000
90 48-100000
91 48-100000
92 48-100000
93 48-100000
94 48-100000
95 48-100000
96 48-100000
97 48-100000
98 48-100000
99 48-100000
100 48-100000

4. The address 48-100000 is reserved for the system.

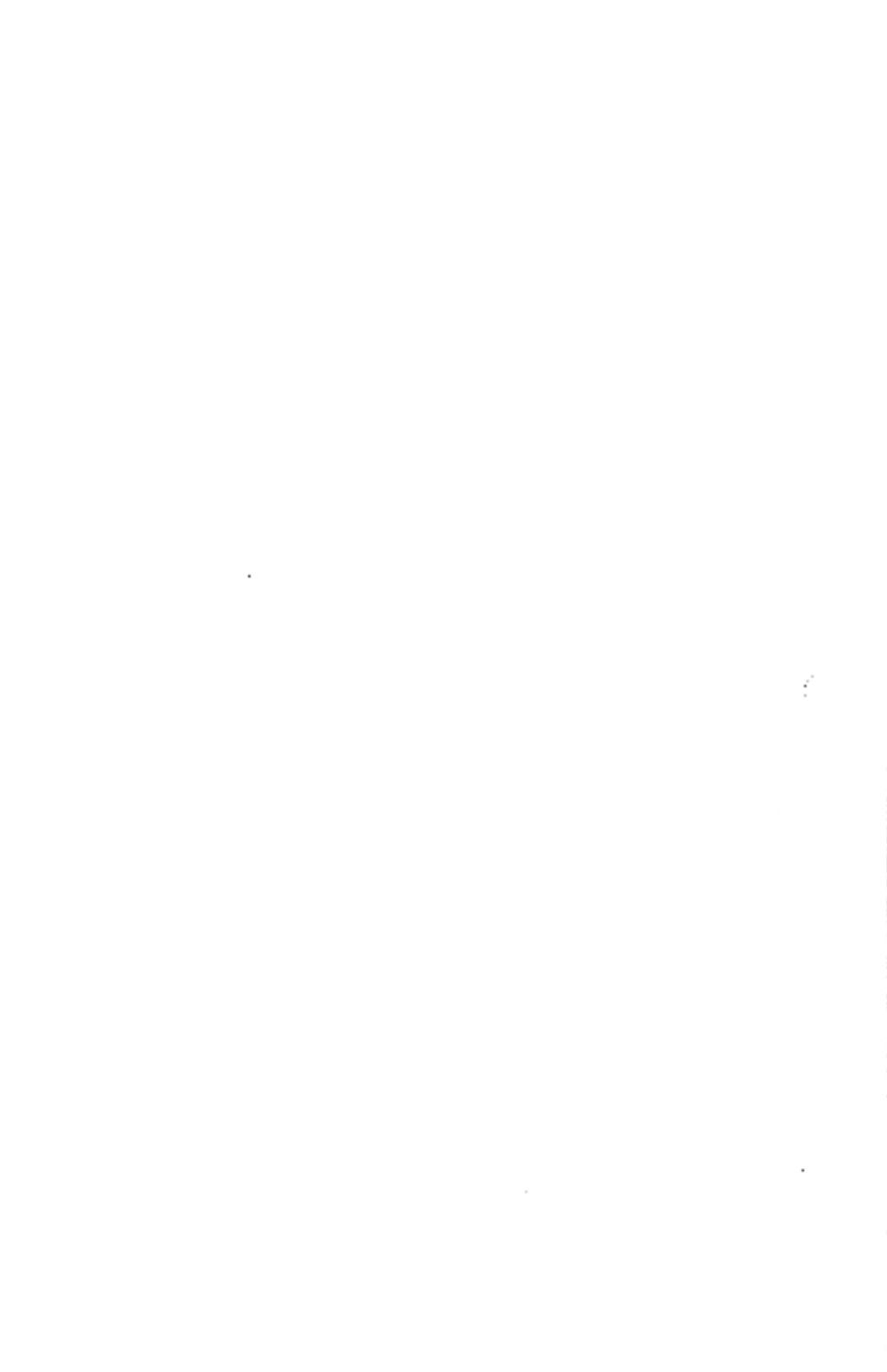
5. The address 48-100000 is reserved for the system.

ADDRESS (HEX) (DEC)

1 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
2 ADDRESS IN INTERRUPT STATE
3 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
4 MISC
5 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
6 ADDRESS IN INTERRUPT STATE
7 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
8 MISC
9 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
10 ADDRESS IN INTERRUPT STATE
11 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
12 MISC
13 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
14 ADDRESS IN INTERRUPT STATE
15 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
16 MISC
17 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
18 ADDRESS IN INTERRUPT STATE
19 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
20 MISC
21 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
22 ADDRESS IN INTERRUPT STATE
23 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
24 MISC
25 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
26 ADDRESS IN INTERRUPT STATE
27 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
28 MISC
29 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
30 ADDRESS IN INTERRUPT STATE
31 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
32 MISC
33 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
34 ADDRESS IN INTERRUPT STATE
35 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
36 MISC
37 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
38 ADDRESS IN INTERRUPT STATE
39 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
40 MISC
41 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
42 ADDRESS IN INTERRUPT STATE
43 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
44 MISC
45 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
46 ADDRESS IN INTERRUPT STATE
47 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
48 MISC
49 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
50 ADDRESS IN INTERRUPT STATE
51 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
52 MISC
53 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
54 ADDRESS IN INTERRUPT STATE
55 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
56 MISC
57 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
58 ADDRESS IN INTERRUPT STATE
59 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
60 MISC
61 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
62 ADDRESS IN INTERRUPT STATE
63 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
64 MISC
65 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
66 ADDRESS IN INTERRUPT STATE
67 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
68 MISC
69 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
70 ADDRESS IN INTERRUPT STATE
71 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
72 MISC
73 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
74 ADDRESS IN INTERRUPT STATE
75 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
76 MISC
77 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
78 ADDRESS IN INTERRUPT STATE
79 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
80 MISC
81 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
82 ADDRESS IN INTERRUPT STATE
83 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
84 MISC
85 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
86 ADDRESS IN INTERRUPT STATE
87 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
88 MISC
89 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
90 ADDRESS IN INTERRUPT STATE
91 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
92 MISC
93 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
94 ADDRESS IN INTERRUPT STATE
95 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
96 MISC
97 ADDRESS IN OPER. TRACK ADDRESS RUNNING ON EXTERNAL DEVICE
98 ADDRESS IN INTERRUPT STATE
99 ADDRESS IN RES. PAGE DING 12.2 TO MISC DC
100 MISC

EXCEPTION CONDITIONS

Condition	Vector
Machine check	34
Kernel stack not valid	38
Reserved EBC operands and privileged instructions	40
Reserved instruction operands	42
Reserved operands	46
Reserved addressing modes	48
Address control violation	50
Translation not valid	54
Frame trap	58
DBT operand	60
Compatibility mode trap	62
Arithmetic trap	64
ITPR operand	68
DPNE operand	70
CHMS operand	72
CHMS operand	74



CHAPTER 4

MEMORY MANAGEMENT





VIRTUAL AND PHYSICAL ADDRESS SPACE

VIRTUAL ADDRESS SPACE

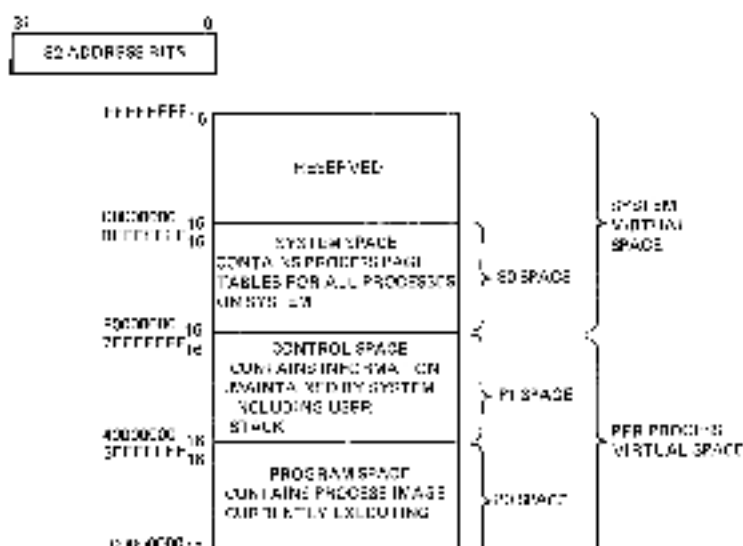


FIG. 2-1

PHYSICAL ADDRESS SPACE

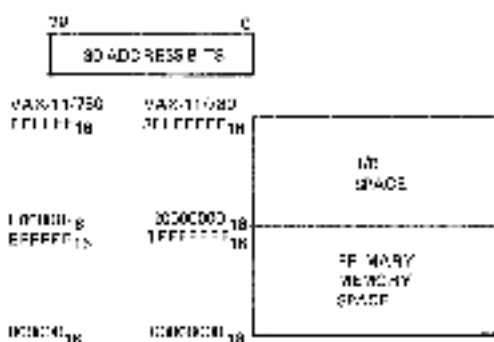


FIG. 2-2

PAGE TABLE FORMATS AND PAGE TABLE ENTRY FORMAT

PAGE TABLE FORMATS

SYSTEM BASE REGISTER

RECORDS THE PHYSICAL ADDRESS OF THE FIRST ENTRY OF THE PAGE TABLE.

SYSTEM LENGTH REGISTER

RECORDS THE NUMBER OF PAGE TABLE ENTRIES IN

SYSTEM REGION PAGE TABLE

Page Table Entry for Virtual Page #1 (First Entry)
Page Table Entry
Page Table Entry
Page Table Entry for Virtual Page #1 (Last Entry)

PER-PROCESS PAGE TABLES

SYSTEM REGION PAGE TABLE

Page Table Entry for Virtual Page #1 (First Entry)
Page Table Entry
Page Table Entry
Page Table Entry for Virtual Page #1 (Last Entry)

CONTROL REGION BASE REGISTER

RECORDS THE VIRTUAL ADDRESS OF BASE OF THE PAGE TABLE.

CONTROL REGION LENGTH REGISTER

RECORDS THE VIRTUAL ADDRESS OF THE FIRST ENTRY IN THE PAGE TABLE FOR VIRTUAL PAGE NUMBER 2¹² (2048), WHICH IS THE NUMBER OF PAGE TABLE ENTRIES.

SYSTEM REGION PAGE TABLE

Page Table Entry for Virtual Page #1 (First Entry)
Page Table Entry
Page Table Entry
Page Table Entry for Virtual Page #1 (Last Entry)

PROGRAM REGION BASE REGISTER

RECORDS THE VIRTUAL ADDRESS OF THE FIRST ENTRY IN THE PAGE TABLE.

PROGRAM REGION LENGTH REGISTER

RECORDS THE NUMBER OF PAGE TABLE ENTRIES IN

PAGE TABLE ENTRY FORMAT

31 30	27 26 25	21 20	00
V	PROT	V	MBZ
PFN			

TC-0014

PAGE TABLE ENTRY PROTECTION CODES

Code	Meaning			
	K	R	S	U
0 0 0 0	X	X	X	X
0 0 0 1	unpredictable			
0 0 1 0	R/W	*	*	*
0 0 1 1	RO	*	*	*
0 1 0 0	R/W	R/W	R/W	R/W
0 1 0 1	R/W	R/W	*	*
0 1 1 0	R/W	RO	*	*
0 1 1 1	RO	RO	*	*
1 0 0 0	R/W	R/W	R/W	*
1 0 0 1	R/W	R/W	RO	*
1 0 1 0	R/W	RO	RO	*
1 0 1 1	RO	RO	RO	*
1 1 0 0	R/W	R/W	R/W	RO
1 1 0 1	R/W	R/W	RO	RO
1 1 1 0	R/W	RO	RO	RO
1 1 1 1	RO	RO	RO	RO

K Kernel

R Executed

S Supervisor

U User

* No access

RO Read only

R/W Read write

Mode

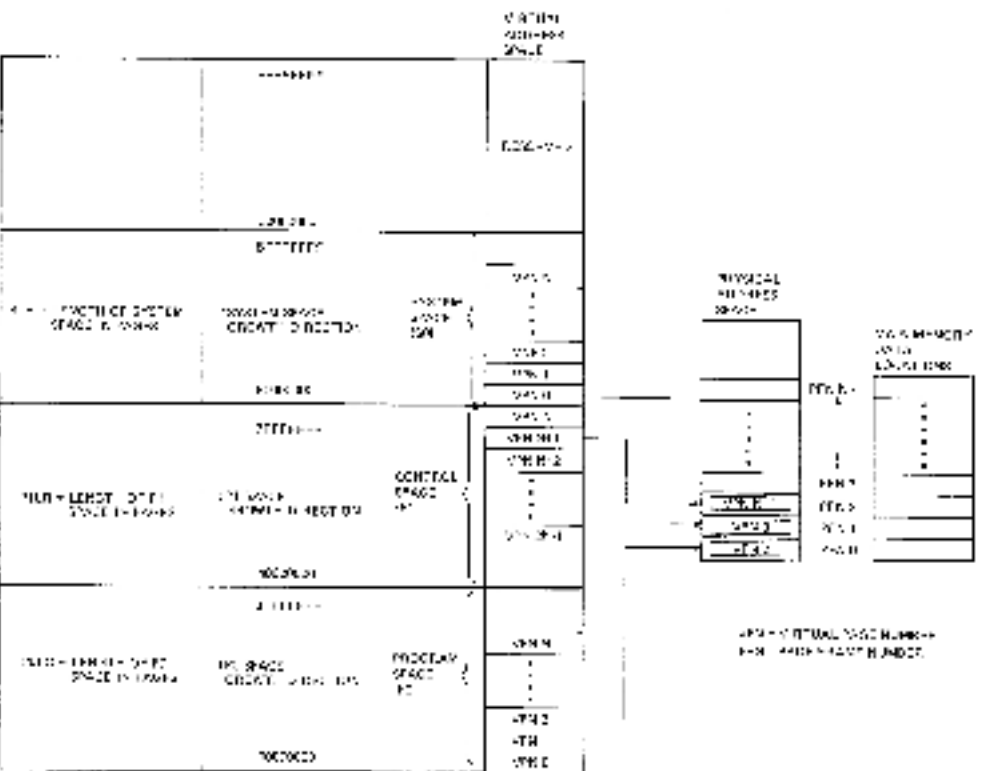
0 (00) Kernel

1 (01) Executed

2 (10) Supervisor

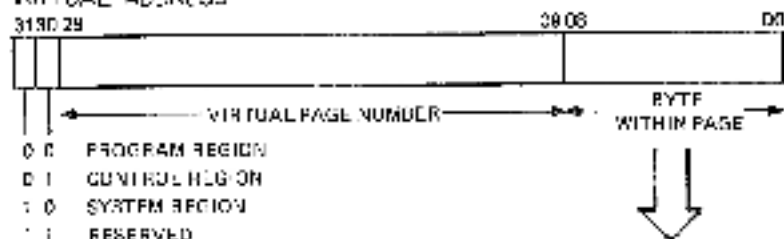
3 (11) User

EXAMPLE OF PAGE FRAME ALLOCATION (RELOCATION)

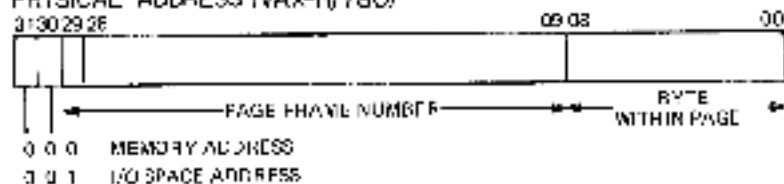


VIRTUAL AND PHYSICAL ADDRESS FORMATS

VIRTUAL ADDRESS

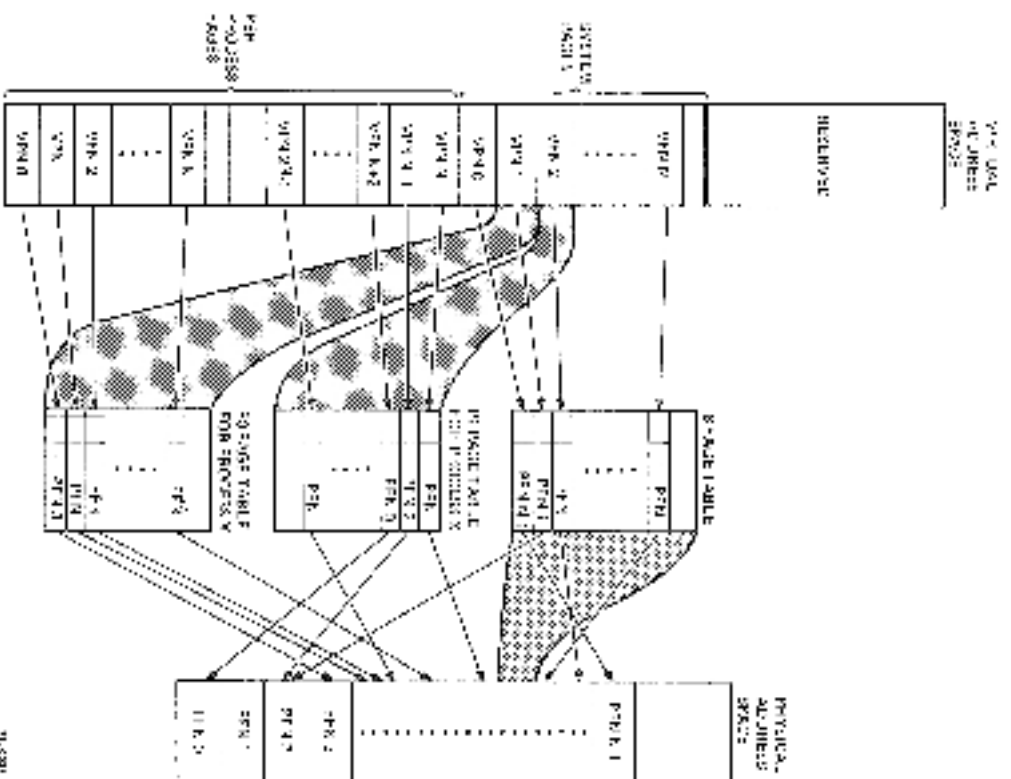


PHYSICAL ADDRESS (VAX-11/780)

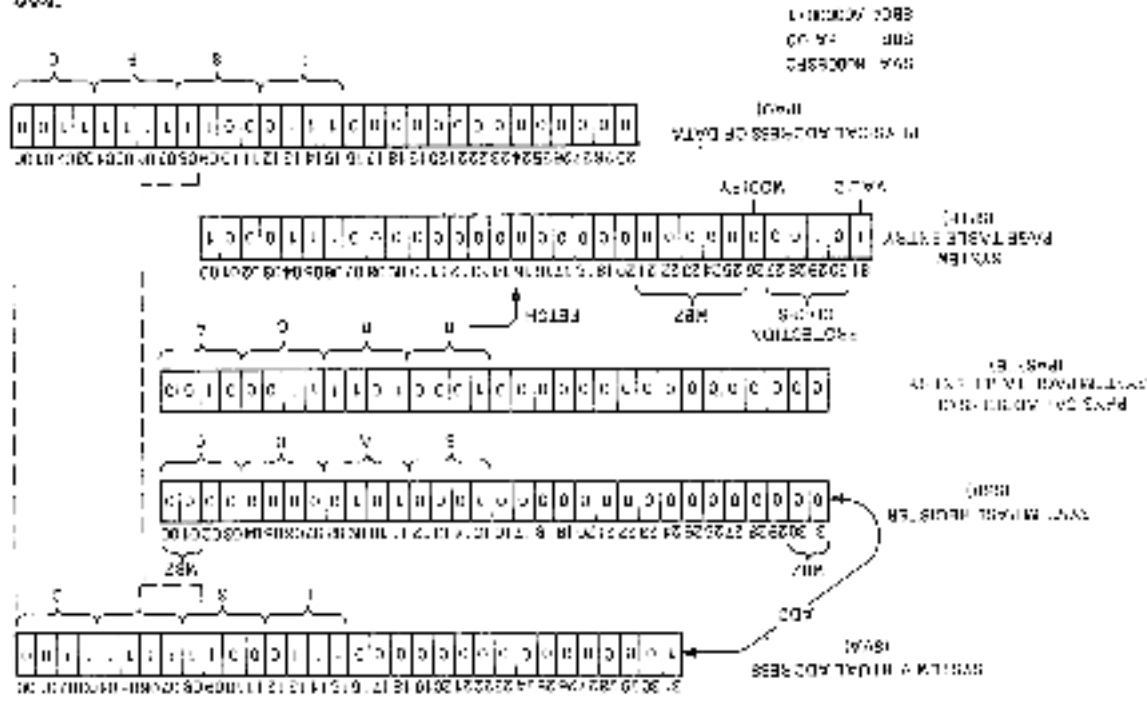


K-1024

VIRTUAL PAGES MAPPED TO PHYSICAL SPACE



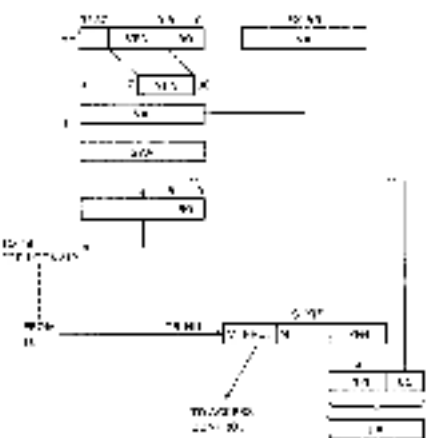
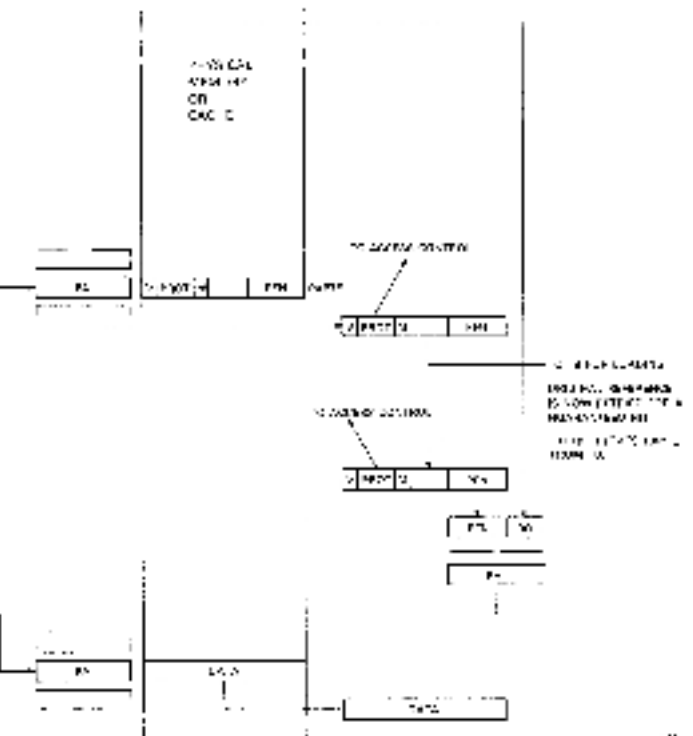
SYSTEM VIRTUAL TO-PHYSICAL ADDRESS TRANSLATION, EXAMPLE



PROCESS VIRTUAL-TO-PHYSICAL ADDRESS TRANSLATION, EXAMPLE



ADDRESS CALCULATION FOR A TB HIT DURING A MISS





CHAPTER 5
OPERATING SYSTEM





VMS BOOT PROCEDURE

VMS is loaded into physical memory and gains control via a JMP instruction from CONSOLE, boot block 3 of the boot device, or ROMROM in the routine \$SYSTEM_BOOT.

VMS begins by creating and initializing an RPB. If the software bootstrap control flags specified a bootstrap breakpoint, VMS then executed a RET instruction that transfers control to XDBTAP.

After the XDBTAP breakpoint, VMS initializes a system data structure, that is, a context parameter block (CPB) that allows a system reboot after a power fail or crash. The RPB holds the bootstrap input registers, the boot device's IIR and bus configuration register (CBR), the address of the RPB, and pointers to a primitive device driver.

VMS, the primary bootstrap, also identifies all physical memory in the configuration by creating a bit map in which each bit represents one page of physical memory. In the process of locating all memory, VMS determines which memory on the system bus are attached to adapters. For every memory segment, VMS records the adapter type in the RPB.

Finally, VMS checks a secondary bootstrap image - either by default, the boot flag settings, or by utilizing a file specification from the user. VMS uses a minimal driver for the bootstrap device to load the secondary image into memory and transfers control to that bootstrap.

The secondary bootstrap - usually \$SYSTEM2.BXX - uses the minimal driver from VMS to read and write to and from the bootstrap device. Thus, \$SYSTEM2 is device independent.

VMS has CPU dependencies when its system bus addresses, memory controller registers, and bus adapter register locations. Therefore, VMS consists of common code that applies to all VAX implementations, and CPU-specific code that applies to one hardware implementation only. The current version supports the following CPUs:

- VAX-11/780
- VAX-11/750
- VAX-11/730

Inputs:

```
03      CH140 MBZ
      CH180 boot device type code
          0      VAXBUS device (BX12/1, BPH4/5/6/7)
          1      RM26/7
          2      RM21/2
          10     BUS on CI
          64     Compaq's alpha storage device
04      Boot device's bus address
          11750  CH140 MBZ
          CH180 08 number of adapter
```

VMS BOOT PROCEDURE (CONT)

11:58 <31:24> HEX
 (31:24) Address of the I/O page for
 the host owner's adapter

22 INITIUS:

<31:18> HEX
 <17:8> UNIFORM address of the console's CPU

MASSBUS:

<11:4> MBS
 <1:3> Adapter's control and/status number

61:

<11:8> MBS
 <7:8> host boot manager station address

73 Boot device unit number

85 Software boot control flags

bit Meaning

0 BOOTV_CONV.
 Conventional boot. At various points
 in the system boot procedure, the
 bootstrap code solicits parameters and
 other input from the console terminal.

1 BOOTV_ISSUE.
 Debug. If this flag is set, VMS save the
 code for the BOOTV debugger into the
 system page table of the running system.

2 BOOTV_INTERRUPT.
 Inhibit breakpoint. If BOOTV_INTERRUPT is
 set, VMS executes a BPC instruction
 immediately after setting bootstrap.

3 BOOTV_BLOCK.
 Secondary boot from boot block.
 Secondary bootstrap is a single 512-byte
 block, whose LBN is specified in B1.

4 BOOTV_DISK.
 Single-shot boot. Secondary bootstrap is
 loaded called [SYSTEMATIC/BOOT/BOOT.DISK].

5 BOOTV_ABORT.
 Bootstrap breakpoint. Stops the primary
 and secondary bootstraps with a
 breakpoint instruction before loading
 memory.

VMS BOOT PROCEDURE (CONT)

- 54- **Rebooting**
- 5 **REBOOT HEADER.**
Image header. Takes the transfer address of the secondary bootstrapping image from the first image header. Transfer address is not set, transferring control to the first byte of the secondary boot file.
- 7 **REBOOT SYSTEM.**
Verify load info. Sets a bit in the PBN bit map for each page of memory present. Does not touch the bitmap.
- 9 **REBOOT SELECT.**
File name. VMS prompts for the name of a secondary bootstrapping file.
- 9 **REBOOT HALL.**
PA - before transfer. Executes a PAH instruction before transferring control to the secondary bootstrapping.
- 10 **REBOOT KERNEL.**
No PEB deletion (not implemented). Intender to call VMS not to read a file from the boot device that identifies hard or reserved memory pages. As that VMS does not mark these pages as valid in the PBN bitmap).
- 11 **REBOOT KPX.**
Specifies that multiprocess memory is to be used for the kernel, unswapped memory requirement. No local memory is to be used. This is for tightly coupled multiprocessing.
- 12 **REBOOT USEMEM.**
Specifies that multiprocess memory should be used in addition to local memory. As much as each word one single page of pages.
- 13 **REBOOT METHOD.**
Specifies that a more extensive algorithm be used when looking for a memory for hardware uncorrectable (PES) errors.
- (31:28) **REBOOT TOPMEM.**
Specifies the top level directory number for system files with multiple systems.

VMS BOOT PROCEDURE (CONT)

The hardware of the CONSOLE program loads up the next three registers after a system crash or power failure:

```

R12      - halt PC
R11      - halt PSL
R0       - halt code
R0       - <base_address + "x200" of 64KB of good memory

```

Implicit inputs:

When VMB gains control, physical memory looks like the following diagram:

SP="x200;	Restart Parameter Block (RPB)
SP:	Primary Bootstrap (VMB)

Outputs:

```

R12      - base address of region containing secondary
          bootstrap
R11      - address of restart parameter block
R0       - current stack pointer
R0R0_S00B - system control block address

```

Implicit outputs:

When VMB assumes control to the secondary bootstrap, physical memory is laid out as in the following diagram:

REBOOT_BASE:	Restart Parameter Block (RPB)
base+"x210:	Primary Bootstrap (VMB)
R0R0_S00B:	System Control Block (SCB)
	PER bitrap
PERMAP("X000:	Blank
SP:	Secondary Bootstrap (SYSBOOT)

The design for the PER bitrap has been extended to handle more than four pages of bitrap equal to eight megabytes of memory. Bitraps that do not fit in the four-page reserved area are now allocated contiguous good pages in higher memory. Assuming that the pages are actually good, the bitrap is placed at the RPB address plus one megabyte. If a page in that area is bad, the next contiguous run of pages that is big enough is where the bitrap will be placed. For backward compatibility, the RPB0 PERMAP descriptor in the RPB points at the preallocated four-page bitrap, which is correct for the low eight megabytes of memory. The real descriptor for the bitrap is passed in the sequenced list.

SUMMARY OF EXCEPTION CONDITIONS

THE 25 ARE NOT NEARLY IDENTIFIED IN THE TOTAL AREA AND THEREFORE ARE NOT INCLUDED IN THIS SUMMARY TABLE. THE

Page/Section	Revision	Additional Remarks
Page 1 of 1	1.0	
Page 2 of 1	1.0	
Page 3 of 1	1.0	
Page 4 of 1	1.0	
Page 5 of 1	1.0	
Page 6 of 1	1.0	
Page 7 of 1	1.0	
Page 8 of 1	1.0	
Page 9 of 1	1.0	
Page 10 of 1	1.0	
Page 11 of 1	1.0	
Page 12 of 1	1.0	
Page 13 of 1	1.0	
Page 14 of 1	1.0	
Page 15 of 1	1.0	
Page 16 of 1	1.0	
Page 17 of 1	1.0	
Page 18 of 1	1.0	
Page 19 of 1	1.0	
Page 20 of 1	1.0	
Page 21 of 1	1.0	
Page 22 of 1	1.0	
Page 23 of 1	1.0	
Page 24 of 1	1.0	
Page 25 of 1	1.0	
Page 26 of 1	1.0	
Page 27 of 1	1.0	
Page 28 of 1	1.0	
Page 29 of 1	1.0	
Page 30 of 1	1.0	
Page 31 of 1	1.0	
Page 32 of 1	1.0	
Page 33 of 1	1.0	
Page 34 of 1	1.0	
Page 35 of 1	1.0	
Page 36 of 1	1.0	
Page 37 of 1	1.0	
Page 38 of 1	1.0	
Page 39 of 1	1.0	
Page 40 of 1	1.0	
Page 41 of 1	1.0	
Page 42 of 1	1.0	
Page 43 of 1	1.0	
Page 44 of 1	1.0	
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Page 47 of 1	1.0	
Page 48 of 1	1.0	
Page 49 of 1	1.0	
Page 50 of 1	1.0	
Page 51 of 1	1.0	
Page 52 of 1	1.0	
Page 53 of 1	1.0	
Page 54 of 1	1.0	
Page 55 of 1	1.0	
Page 56 of 1	1.0	
Page 57 of 1	1.0	
Page 58 of 1	1.0	
Page 59 of 1	1.0	
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Page 69 of 1	1.0	
Page 70 of 1	1.0	
Page 71 of 1	1.0	
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Page 76 of 1	1.0	
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Page 78 of 1	1.0	
Page 79 of 1	1.0	
Page 80 of 1	1.0	
Page 81 of 1	1.0	
Page 82 of 1	1.0	
Page 83 of 1	1.0	
Page 84 of 1	1.0	
Page 85 of 1	1.0	
Page 86 of 1	1.0	
Page 87 of 1	1.0	
Page 88 of 1	1.0	
Page 89 of 1	1.0	
Page 90 of 1	1.0	
Page 91 of 1	1.0	
Page 92 of 1	1.0	
Page 93 of 1	1.0	
Page 94 of 1	1.0	
Page 95 of 1	1.0	
Page 96 of 1	1.0	
Page 97 of 1	1.0	
Page 98 of 1	1.0	
Page 99 of 1	1.0	
Page 100 of 1	1.0	

Condition Name/Type	Explanation	Additional Remarks
324 CHNGRD (Trap)	Change mode to supervisor instruction encountered +	Change mode code. The possible values are -32768 through 32767.
325 CHNGRD (Trap)	Change mode to user instruction encountered +	Change mode code. The possible values are -32768 through 32767.
326 COMPAB (Fault)	Compatibility mode exception. This exception condition can only occur when executing in compatibility mode.	Type of compatibility exception. The possible values are: 0 = Invalid instruction to float 1 = User instruction executed 2 = User trap instruction 3 = RMT instruction executed 4 = TRAP instruction executed 5 = Floating-point exception executed 6 = SSI instruction fault 7 = TRAP trap
328 DZOVW (Trap)	Decimal overflow	None
329 FLAUF (Trap)	Floating/decimal divide by zero	None
330 FLAUF_F (Fault)	Floating overflow	None
332 FLAUF_F (Fault)	Floating overflow fault	None
334 FLAUF (Trap)	Floating overflow	None
336 FLAUF_F (Fault)	Floating underflow fault	None

+ If a change mode handler has been declared for user or supervisor modes with the `CHNGRD` change mode or compatibility mode handler (325/324), system service, task routine receives control when the associated trap occurs.

** If a compatibility mode handler has been declared with the `CHNGRD` or `COMPAB` compatibility mode handler (325/326), system service, task routine receives control when this fault occurs.

PROCESS PRIVILEGES

Privilege	Definition
CHGRNT	May change mode to kernel.
EXECUTE	May change mode to executive.
INSRGP	May insert in system logical name table.
GRNMAN	May insert in group logical name table.
ALLSPOL	May allocate spooled device.
DETACH	May create detached processes.
DIAGNOSR	May diagnose devices.
LOG IO	May do logical I/O.
GRNHP	May attach other processes to own group.
ACCT	May suppress accounting message.
RENCH	May create permanent message event cluster.
PRMNR	May create permanent mailbox.
PRMNRN	May change process swap mode.
ALPHR	May set any priority value.
PRPR	May set any privilege bit.
TRMNR	May create temporary mailbox.
WORLD	May affect other processes in the world.
OPR	May perform operator functions.
EXGRNT	May exceed quota.
NETKRN	May create network device.
CLMPO	May override volume protection.
PHZ IO	May do physical I/O.
BUCCRN	May make bus check log entries.
RENCR	May create permanent global sections.
LNCR	May create system-wide global sections.
ROUNT	May execute mount MVS functions.
LEKRN	May map in specific physical pages.
RMRF	May remove global sections and mailboxes in multiport memory.
EXGRN	May access objects via system protection.
SYSTEM	May allow user's process to lock system-wide resources.

SYSTEM ERROR LOG FORMATTER (SYE) UTILITY

The SYE utility is a system management tool that automatically reports the contents of an error log file. The VAX/VMS system automatically writes messages to the latest version of an error log file named `$$$SERVLOG:ERRLOG.SYS` whenever one of the following events is detected:

- **Error** - Device errors, scratch checks, bus errors, soft error correcting code (ECC) errors, asynchronous write errors, or hard disk errors
- **Configuration changes** - Volume mounts and dismounts
- **System events** - Cold startup, warm startup, crash startup, message received from the send message to error logger (SMKERR) system service, or a time alarm

All SYE reports are 72 columns wide, so they can be displayed on the terminal. SYE reports are primarily intended to assist DIGITAL field service personnel. In some cases, however, they can assist in system management by identifying recurrent problems that indicate outside attention is required.

Additional details about error logging can be found in the VAX/VMS System Management and Operations Guide.

INVOKING AND TERMINATING SYE

The following command invokes the SYE utility:

```
$ RUN $$$SERVLOG:SYE
```

Only users with the `SYSPRV` privilege or a system RUC can access the error log file.

SYE normally runs to completion and issues a successful completion message on the device `SYE$OUTPUT`. To request additional SYE reports, you must reinvoke the utility. You can interrupt SYE at any time with `CTRL/C`.

SYE PROMPTS

SYE displays a series of prompts to which you respond with a value or take the default by pressing `CTRL/C` or the `ENTER` key. The prompt ends with a question mark and indicates the default within square brackets. A list of prompts and types of valid responses follows. The responses are described in later sections.

Prompt	Valid Response
_INPUT FILE [\$\$\$SERVLOG:ERRLOG.SYS]	Input-file-name
_OUTPUT FILE [SYE\$OUTPUT]	Output-file-name
_OPTIONS [PRT=OFF]	Report-option
_DEVICE NAME [CDS]	Category-type
_FROM DATE [FIRST ENTRY]	After-date-spec
_REPORT DATE [LAST ENTRY]	Before-date-spec

SYSTEM ERROR LOG FORMATTER (SYE) UTILITY (CONT)

VALID RESPONSES TO SYE PROMPTS

This section describes the responses you can enter to each of the SYE prompts in the proper order.

Input-file-spec

This is a specification for the input log file. If you do not specify a file, but simply respond by pressing RETURN, SYE uses the highest version of SYS\$COMMON:ERROR.LOG by default.

The file specification may be any valid VAX/VMS file specification. Wild-card characters and logical names are allowed. You may also use the special file specification MAILBOX, which reports error log entries as they occur on the system, at the time you request. However, use of the MAILBOX feature of SYE requires the user privilege DISCROSS. The fields you enter default to those for VAX-11 PORTEN unit 1, that is, the highest version of SYS\$SYSROOT:[default-directory]PUSHB.LAY (xxx is written in PORTEN).

Output-file-spec

The file specification for the output report file; the default is SYS\$OUTPUT, which is usually your terminal.

If you want to direct the output to a specific file, simply identify it with any valid file specification. Logical names are allowed. Omitted fields default to those for VAX-11 PORTEN unit 2, that is, the highest version of SYS\$SYSROOT:[default-directory]PUSHB.LAY.

Report-option

Any one of the following single-character abbreviations to request the type of report you want, or RETURN its absence (the default option, which is the rolling report).

B (Brief) - A brief report of each error, configuration change, and system event being reported.

C (Compact) - A report of the contents of the device registers at the time a particular device error occurred. The values are represented in hexadecimal with no explanations. This report is only meaningful when errors on a single device are requested.

R (Rollup) - A report providing details for each category of error report requested (either a single category or all categories can be requested). This is the default.

S (Standard) - A full report of each error, configuration change, and system event being reported.

SYSTEM ERROR LOG FORMATTER (SYE) UTILITY (CONT)

Category-type

Either the name of a device whose device errors you want reported or some a qualifier that requests partition or subpartition of errors that you want to review. Refer to the manual to specify these. If you respond by pressing F4/F5/F6, you involve a report of a series that covers category and every device.

Device name - Valid VAX/VMS supported device names appear in the device name table - the VAX/VMS Local Language User's Guide. The asterisk (*) wildcard character is allowed. For example, if you specify the device name `DIS*`, you obtain a report of errors incurred on all the devices; if you specify `DISA*`, you obtain a report of errors on controller A of your DR device; a complete specification of bus/ controller errors only for the particular DR device in unit 0 of controller A.

This is a change from earlier versions of SYE. Previously you could request reports on all DR devices by specifying DR. Now you must specify DR to obtain the same report. You should not specify an underscore (_) with the device name; however, you can specify a colon (:).

In addition, you can specify errors on LSI/LAS supported devices that may or may not be in your system that were not provided with the VAX/VMS system.

DR example - a valid disk (:) as a prefix for a device name. That is, if you specify `-DR_`, the SYE request covers all devices except the DR disk.

Category-type qualifiers - You can specify any one of the following category-type qualifiers. Note that several of these qualifiers accept a device-name specification. For these qualifiers, you can specify any or some device names, as just described. Specify multiple device-names in parentheses, separated by commas. Use a single asterisk (*) with each character of the device-name specification to request a report of all the errors of that category on all the devices. (You can also use the asterisk wildcard character in the device specification, as already described.)

- | | |
|-------------------------------------|--|
| <code>/SD[=MC_0RE]</code> | 5.1 oncheck utility. You can request that the operator-requested subpartition be updated by specifying <code>/SD MC_0RE</code> . |
| <code>/CM[device name[,...]]</code> | Configuration changes due to volume mounts and volume dismounts. |
| <code>/DB</code> | Machine checks, applications bus errors, application interrupts, and uninitialized bus vector interrupts (on a VAX- 1/318 only). |

SYSTEM ERROR LOG FORMATTER (SYE) UTILITY (CONT)

/BA=(device-name[,...]) Device attention notices. These device errors can occur even when there is no I/O request outstanding on the device. For example, such errors can occur when diagnostics are run on a TMSB.

/BE=(device-name[,...]) Device error bit(s) set entries.

/BI=(device-name[,...]) Device I/O timeouts.

/BK Busy errors detected by the spanning code and interrupts and fatal runtime errors loaded by the machine check code.

/SY System errors, such as system startup, system power fail, new error log file creation, system power fail restart, time stamp, operator messages, network messages, and receipt of messages from the SMDSDM system service.

/UN Unknown device errors. This qualifier requests a report of errors found on all non-DIGITAL devices and all drivers not supported by DIGITAL. It also covers DIGITAL-supported devices that may have been removed since the last release of SYE. When you request information on the unknown devices, the report is developed on a "best try" basis, because SYE cannot fully interpret errors on these devices.

You can also specify a minus sign (-) as a prefix for any or the qualifiers to indicate you want all the errors in every category except this one. However, you cannot combine the minus sign on the qualifier with a minus sign on one or more of the device names.

Afterdate spec

line on error log after which reporting begins, in the following format:

```
dd-mm-yyyy hh:mm:ss
```

SYSTEM ERROR LOG FORMATTER (SYE) UTILITY (CONT)

this is almost the format given in the VAX/VMS Command Language User's Guide for the absolute time format. The only difference is you cannot specify a colon (:) between the year field (yyyy) and the hour field (hh). If you wish the unified time specification by pressing RETURN, SYE starts over the entries at the beginning of the log. You can edit portions of the time specification and obtain certain details. Refer to the description of the STRIK system service in the VAX/VMS System Service Reference Manual for the rules and examples of the details.

Beforedata=spec

Time on error log before which reporting ends, in the following format:

```
dd-mm-yyyy hh:mm:ss.ss
```

this is almost the format given in the VAX/VMS Command Language User's Guide for the absolute time format. The only difference is you cannot specify a colon (:) between the year field (yyyy) and the hour field (hh). If you wish the unified time specification by pressing RETURN, SYE continues all entries until the end of the log is reached. You can edit portions of the time specification and obtain certain details. Refer to the description of the STRIK system service in the VAX/VMS System Service Reference Manual for the rules and examples of the details.

ERROR MESSAGES

SYE rarely issues error messages on incorrect input; most often it simply reprompts. A few error messages originated by SYE have a facility code of SYE or some other system component such as RMS or STRIP. The VAX/VMS System Message and Recovery Procedures Manual lists these messages and provides explanations and suggested user actions. If any other type of error message appears in the report, you should return to the error message. Most SYE error messages are reported as VAX-11 console messages. If you receive a recurring error message that does not disappear when you rerun SYE, you should submit a Software Defect Report (SDR) to DECIMAL. SDRs are described in the VAX/VMS System Management and Operations Guide.

TYPICAL SYE UTILITY ENTRY

```

$ SET DEPENDS SYSTEMROOT
$ REMOVE BRADLEY.SZC.MILLER.CLOUTIER VERSION
$ RUC SYSTEM-ROOT-ENV

```

2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818 2819 2820 2821 2822 2823 2824 2825 2826

```

NAME: PUFF [SYS:EPROMLOC:BRLOC.CWD] PUFF
OUTPUT FILE: SYSDICTION SPREADSHEET
OPTIONS: INT-IMP 00
DEVICE NAME: (CIR) PUFF
MASTER NAME: (FIRST ENTRY) PUFF
MASTER DATE: (LAST ENTRY) PUFF
SOURCE: PUFF.CWD

```

RUNNING THE SYSTEM DUMP ANALYZER (SDA)

When the operating system crashes, the kernel routine writes the contents of the kernel log file, the processor registers, and physical memory to a non-volatile file called SYSDUMP.DMP. With the help of the SDA command, you can analyze and display parts of the formatted system dump file as a video dump or hex dump. Or, you can create hardcopy printouts.

Any user can run SDA by typing the SDA command:

```
> RUN SYSDUMPANALYZER
```

When you issue this command, SDA will prompt for the name of the system dump file you want to examine.

```
Enter name of dump file >
```

To examine the most recent system dump, press RETURN at the prompt:

```
Enter name of dump file >
```

SDA will search the system directory (SYSTEM) (logical name SYSDIR) for the SYSDUMP.DMP file. To examine an older system dump, enter the file specification.

```
Enter name of dump file NAME[SYSTEM\SYSDUMP.DMP]
```

SAVING THE SYSTEM DUMP FILE

When the kernel routine writes data into SYSDUMP.DMP, it destroys the previous contents of the file. Therefore, to save or make a copy of the file under another name, use the VMS copy command or the SDA copy command to save the file.

```
> COPY SYSDUMP.DMP SAV.DUMPLUMP
```

```
OK
```

```
> STASCOPY SYSDUMP.DMP;SYSDUMP.DMP
```

SDA COMMANDS

Command	Function
REPEAT <i>cmd</i> <i>times</i>	Repeat <i>cmd</i> <i>times</i>
COPY	Copy data file
ENTER	Define symbols and their values
EVALUATE	Perform calculations
EXAMINE	Examine memory locations
EXIT	Exit from display or utility
FORMAT	Format data blocks
READ	Copy object module symbols
SET OBJECT	Set output to device or file specification
SET PROCTER	Set to the current process context
SHOW CORE	Display core information
SHOW DEVICE	Display I/O data structures
SHOW PAGE TABLE	Display system page table
SHOW PPM DATA	Display PPM data base
SHOW PROC	Display system memory
SHOW PROCTER	Display specific process information
SHOW STACK	Display process/thread stacks
SHOW MEMORY	Display process memory
SHOW SYMBOL	Display symbol table

Three help files within SDA will provide explanations.

- * `HELPCommand-help` Briefly explains a command
- * `HELP SDA` Briefly explains command format
- * `HELP` Briefly explains the SDA utility

FILE TRANSFER UTILITY (FLX) HELP FILE

FLX Extensions

Qualifier	File type
/IM (Image Mode)	1EK, 0EK, 5YS, 8NL, 0LD, XKL
/SS (Formatted binary)	OSL, SLE, PTC, LCA
/XA (Formatted ASCII)	All others
/CN (Contiguous)	For making a file copied to a disk contiguous.

Before knowing the File Utility (FLX) you must mount the floppy:

```
$ MOUNT/For CTR:
```

To enter FLX running under XMS type:

```
> MCR FLX (Note: The > on line prompts for XMS.)
```

The proper response to MCR FLX should be:

```
FLX>
```

If the floppy has never been used and needs to be initialized to RC-11 format:

```
FLX>CS1/RT/SE
```

To copy from disk (filed in format CS1) to floppy (RC-11 format) (RM):

```
FLX>CS1/RC=CS1/FT=NAME.EX/RT/IM or PB or PA
```

To copy from floppy to disk:

```
FLX>CS CS1/FT=NAME.EX/RT/IM or PB or PA
```

To copy from floppy to disk and make the file on disk contiguous:

```
FLX>CS/CS=CS1/FT=NAME.EX/RT/IM or PB or PA
```

To delete one file on floppy:

```
FLX>CS1/FT=NAME.EX/RC/IR
```

To obtain a directory of the floppy:

```
FLX>CS1/IM/LI
```

To copy CRMSO.CMD from floppy to disk:

```
FLX>RC=CS1/CS3POO.CMD/IM/PA
```

To copy CRMSO.LYS from floppy to disk:

```
FLX>/RS-CS1/CRMSO.LYS/RD/IM
```

FILE TRANSFER UTILITY (FLX) HELP FILE (CONT)

To copy D3B00.000 from disk to floppy:

```
FLX>DISK:/NO=D3B00.000/FS/FS
```

To copy B3B00.000 from disk to floppy:

```
FLX>DISK:/IN=B3B00.000/FS/FS
```

To delete a file from the floppy:

```
FLX>DEL/D3B00.000/FS/FS
```

To copy A3B00.000 from floppy to disk continue:

```
FLX>FS/TO=DISK:B3B00.000/FS/FS
```

To make a file bootable, you must use the utility RTB. Before using RTB, enter the following assignment using DEL:

```
% A3B00.000:RTB
```

Then invoke RTB by:

```
% RTB
```

The correct response should be:

```
RTB>
```

Then perform the following:

```
RTB>DISK:DEL MARK.EXT
```

Temp to

```
RTB>DISK:COBOL.EXT
```

To exit either RTB> or RTB>, type CTRL/Z (CZ).

TERMINAL FUNCTION KEYS

RETURN	(usually RETURN) Transfers the machine from the system for processing. (On most terminals, the RETURN key is labeled CR.) Begins a terminal session, initiates login sequence.
Control characters	Define functions to be performed when the CTRL key and another key are pressed simultaneously. All CTRL's are sequenced and entered on the terminal as ^X.
CTRL/C	During command entry, cancels command processing. Begins a terminal session, initiates login sequence.
CTRL/I	Has the same function as the TAB key.
CTRL/J	Resumes the current line to the next vertical tab stop.
CTRL/L	Line feed.
CTRL/O	Alternately suppressed and continues display of output to the screen.
CTRL/S	Resumes terminal output that was suspended by CTRL/Z.
CTRL/R	Retypes the current input line and leaves the cursor positioned at the end of the line.
CTRL/T	Suspends terminal output until CTRL/O is pressed.
CTRL/U	Cancels the current line and discards it.
CTRL/V	Interrupts command or program execution and returns control to the command interpreter.
CTRL/Z	Signals end-of-file for data entered from the terminal.
DELETE	Deletes the last character entered at the terminal and backspaces over it. (On some terminals, the DELETE key is labeled RUBOUT.)
ESCAPE	Has special uses in particular commands or programs, but generally performs the same function as RETURN. (On some terminals, the ESCAPE key is labeled ALT/CR.)
Tab	Moves the printing element or cursor on the terminal to the next tab stop on the terminal. Most terminals have tab stops at every eight character positions on a line.

EDT VERSION 2 VT100 KEYPAD

GOLO	HELP	FIND/XT FIND	DEL L UND L
PAGE COMMAND	SECT FILL	APPEND REPLACE	DEL W UND W
ADVANCE BOTTOM	BACKUP TOP	CJT PASTE	DEL C UND C
WORD CHNGCASE	EOI DEL EOI	CHAR SPECINS	ENTER SUBS
LINE OPEN LINE		SELECT RESET	

BACKSPACE	GO TO BEGINNING OF LINE
DELETE	DELETE CHARACTER
LINEFEED	DELETE TO START OF WORD
CTRL/A	COMPUTE TAB LEVEL
CTRL/D	DECREASE TAB LEVEL
CTRL/E	INCREASE TAB LEVEL
CTRL/K	DEFINE KEY
CTRL/T	ADJUST TABS
CTRL/U	DELETE TO START OF LINE
CTRL/W	REFRESH SCREEN
CTRL/Z	RETURN TO LINE MODE

TK-0075

EDT VERSION 2 VT52 KEYPAD

GOLD	HELP	DEL L UND L	LF REPLACE
PAGE COMMAND	ENDNXT FIND	DEL W UND W	DOWN SECT
ADVANCE BOTTOM	BACKUP TOP	DEL C UND C	RIGHT SPECINS
WORD CHNGCASE	FOI DEL FOI	CUT PASTE	LEFT APPEND
LINE OPEN LINE		SELECT RESET	ENTER SUBS

BACKSPACE
 DELETE
 LINEFEED
 CTRL/A
 CTRL/D
 CTRL/E
 CTRL/F
 CTRL/K
 CTRL/T
 CTRL/U
 CTRL/W
 CTRL/Z

GO TO BEGINNING OF LINE
 DELETE CHARACTER
 DELETE TO START OF WORD
 COMPUTE TAB LEVEL
 DECREASE TAB LEVEL
 INCREASE TAB LEVEL
 FILL TEXT
 DEFINE KEY
 ADJUST TABS
 DELETE TO START OF LINE
 REFRESH SCREEN
 RETURN TO LINE MODE

TR 8007



CHAPTER 6

DIAGNOSTICS





[illegible]

[illegible]

Diagnosis	Level	Title	Priority
EXN00	2	MAX 0000 Functional Diagnostic	EXN00, EXN00
EXN01	3	MAX 0001 Functional Diagnostic	EXN01
EXN02	3	MAX 0002 Functional Diagnostic	EXN02
EXN03	3	MAX 0003 Functional Diagnostic	EXN03
EXN04	3	MAX 0004 Functional Diagnostic	EXN04
EXN05	3	MAX 0005 Functional Diagnostic	EXN05
EXN06	3	MAX 0006 Functional Diagnostic	EXN06
EXN07	3	MAX 0007 Functional Diagnostic	EXN07
EXN08	3	MAX 0008 Functional Diagnostic	EXN08
EXN09	3	MAX 0009 Functional Diagnostic	EXN09
EXN10	3	MAX 0010 Functional Diagnostic	EXN10
EXN11	3	MAX 0011 Functional Diagnostic	EXN11
EXN12	3	MAX 0012 Functional Diagnostic	EXN12
EXN13	3	MAX 0013 Functional Diagnostic	EXN13
EXN14	3	MAX 0014 Functional Diagnostic	EXN14
EXN15	3	MAX 0015 Functional Diagnostic	EXN15
EXN16	3	MAX 0016 Functional Diagnostic	EXN16
EXN17	3	MAX 0017 Functional Diagnostic	EXN17
EXN18	3	MAX 0018 Functional Diagnostic	EXN18
EXN19	3	MAX 0019 Functional Diagnostic	EXN19
EXN20	3	MAX 0020 Functional Diagnostic	EXN20
EXN21	3	MAX 0021 Functional Diagnostic	EXN21
EXN22	3	MAX 0022 Functional Diagnostic	EXN22
EXN23	3	MAX 0023 Functional Diagnostic	EXN23
EXN24	3	MAX 0024 Functional Diagnostic	EXN24
EXN25	3	MAX 0025 Functional Diagnostic	EXN25
EXN26	3	MAX 0026 Functional Diagnostic	EXN26
EXN27	3	MAX 0027 Functional Diagnostic	EXN27
EXN28	3	MAX 0028 Functional Diagnostic	EXN28
EXN29	3	MAX 0029 Functional Diagnostic	EXN29
EXN30	3	MAX 0030 Functional Diagnostic	EXN30
EXN31	3	MAX 0031 Functional Diagnostic	EXN31
EXN32	3	MAX 0032 Functional Diagnostic	EXN32
EXN33	3	MAX 0033 Functional Diagnostic	EXN33
EXN34	3	MAX 0034 Functional Diagnostic	EXN34
EXN35	3	MAX 0035 Functional Diagnostic	EXN35
EXN36	3	MAX 0036 Functional Diagnostic	EXN36
EXN37	3	MAX 0037 Functional Diagnostic	EXN37
EXN38	3	MAX 0038 Functional Diagnostic	EXN38
EXN39	3	MAX 0039 Functional Diagnostic	EXN39
EXN40	3	MAX 0040 Functional Diagnostic	EXN40
EXN41	3	MAX 0041 Functional Diagnostic	EXN41
EXN42	3	MAX 0042 Functional Diagnostic	EXN42
EXN43	3	MAX 0043 Functional Diagnostic	EXN43
EXN44	3	MAX 0044 Functional Diagnostic	EXN44
EXN45	3	MAX 0045 Functional Diagnostic	EXN45
EXN46	3	MAX 0046 Functional Diagnostic	EXN46
EXN47	3	MAX 0047 Functional Diagnostic	EXN47
EXN48	3	MAX 0048 Functional Diagnostic	EXN48
EXN49	3	MAX 0049 Functional Diagnostic	EXN49
EXN50	3	MAX 0050 Functional Diagnostic	EXN50
EXN51	3	MAX 0051 Functional Diagnostic	EXN51
EXN52	3	MAX 0052 Functional Diagnostic	EXN52
EXN53	3	MAX 0053 Functional Diagnostic	EXN53
EXN54	3	MAX 0054 Functional Diagnostic	EXN54
EXN55	3	MAX 0055 Functional Diagnostic	EXN55
EXN56	3	MAX 0056 Functional Diagnostic	EXN56
EXN57	3	MAX 0057 Functional Diagnostic	EXN57
EXN58	3	MAX 0058 Functional Diagnostic	EXN58
EXN59	3	MAX 0059 Functional Diagnostic	EXN59
EXN60	3	MAX 0060 Functional Diagnostic	EXN60
EXN61	3	MAX 0061 Functional Diagnostic	EXN61
EXN62	3	MAX 0062 Functional Diagnostic	EXN62
EXN63	3	MAX 0063 Functional Diagnostic	EXN63
EXN64	3	MAX 0064 Functional Diagnostic	EXN64
EXN65	3	MAX 0065 Functional Diagnostic	EXN65
EXN66	3	MAX 0066 Functional Diagnostic	EXN66
EXN67	3	MAX 0067 Functional Diagnostic	EXN67
EXN68	3	MAX 0068 Functional Diagnostic	EXN68
EXN69	3	MAX 0069 Functional Diagnostic	EXN69
EXN70	3	MAX 0070 Functional Diagnostic	EXN70
EXN71	3	MAX 0071 Functional Diagnostic	EXN71
EXN72	3	MAX 0072 Functional Diagnostic	EXN72
EXN73	3	MAX 0073 Functional Diagnostic	EXN73
EXN74	3	MAX 0074 Functional Diagnostic	EXN74
EXN75	3	MAX 0075 Functional Diagnostic	EXN75
EXN76	3	MAX 0076 Functional Diagnostic	EXN76
EXN77	3	MAX 0077 Functional Diagnostic	EXN77
EXN78	3	MAX 0078 Functional Diagnostic	EXN78
EXN79	3	MAX 0079 Functional Diagnostic	EXN79
EXN80	3	MAX 0080 Functional Diagnostic	EXN80
EXN81	3	MAX 0081 Functional Diagnostic	EXN81
EXN82	3	MAX 0082 Functional Diagnostic	EXN82
EXN83	3	MAX 0083 Functional Diagnostic	EXN83
EXN84	3	MAX 0084 Functional Diagnostic	EXN84
EXN85	3	MAX 0085 Functional Diagnostic	EXN85
EXN86	3	MAX 0086 Functional Diagnostic	EXN86
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EXN89	3	MAX 0089 Functional Diagnostic	EXN89
EXN90	3	MAX 0090 Functional Diagnostic	EXN90
EXN91	3	MAX 0091 Functional Diagnostic	EXN91
EXN92	3	MAX 0092 Functional Diagnostic	EXN92
EXN93	3	MAX 0093 Functional Diagnostic	EXN93
EXN94	3	MAX 0094 Functional Diagnostic	EXN94
EXN95	3	MAX 0095 Functional Diagnostic	EXN95
EXN96	3	MAX 0096 Functional Diagnostic	EXN96
EXN97	3	MAX 0097 Functional Diagnostic	EXN97
EXN98	3	MAX 0098 Functional Diagnostic	EXN98
EXN99	3	MAX 0099 Functional Diagnostic	EXN99
EXN100	3	MAX 0100 Functional Diagnostic	EXN100

VAX DIAGNOSTIC PROGRAM CODES (CONT)

Program Code	Program Name	Program Type	Program Description
00000	VAX/0000/0000/0000	0	VAX/0000/0000/0000/0000
00001	VAX/0001/0001/0001	1	VAX/0001/0001/0001/0001
00002	VAX/0002/0002/0002	2	VAX/0002/0002/0002/0002
00003	VAX/0003/0003/0003	3	VAX/0003/0003/0003/0003
00004	VAX/0004/0004/0004	4	VAX/0004/0004/0004/0004
00005	VAX/0005/0005/0005	5	VAX/0005/0005/0005/0005
00006	VAX/0006/0006/0006	6	VAX/0006/0006/0006/0006
00007	VAX/0007/0007/0007	7	VAX/0007/0007/0007/0007
00008	VAX/0008/0008/0008	8	VAX/0008/0008/0008/0008
00009	VAX/0009/0009/0009	9	VAX/0009/0009/0009/0009
00010	VAX/0010/0010/0010	10	VAX/0010/0010/0010/0010
00011	VAX/0011/0011/0011	11	VAX/0011/0011/0011/0011
00012	VAX/0012/0012/0012	12	VAX/0012/0012/0012/0012
00013	VAX/0013/0013/0013	13	VAX/0013/0013/0013/0013
00014	VAX/0014/0014/0014	14	VAX/0014/0014/0014/0014
00015	VAX/0015/0015/0015	15	VAX/0015/0015/0015/0015
00016	VAX/0016/0016/0016	16	VAX/0016/0016/0016/0016
00017	VAX/0017/0017/0017	17	VAX/0017/0017/0017/0017
00018	VAX/0018/0018/0018	18	VAX/0018/0018/0018/0018
00019	VAX/0019/0019/0019	19	VAX/0019/0019/0019/0019
00020	VAX/0020/0020/0020	20	VAX/0020/0020/0020/0020
00021	VAX/0021/0021/0021	21	VAX/0021/0021/0021/0021
00022	VAX/0022/0022/0022	22	VAX/0022/0022/0022/0022
00023	VAX/0023/0023/0023	23	VAX/0023/0023/0023/0023
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00051	VAX/0051/0051/0051	51	VAX/0051/0051/0051/0051
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00054	VAX/0054/0054/0054	54	VAX/0054/0054/0054/0054
00055	VAX/0055/0055/0055	55	VAX/0055/0055/0055/0055
00056	VAX/0056/0056/0056	56	VAX/0056/0056/0056/0056
00057	VAX/0057/0057/0057	57	VAX/0057/0057/0057/0057
00058	VAX/0058/0058/0058	58	VAX/0058/0058/0058/0058
00059	VAX/0059/0059/0059	59	VAX/0059/0059/0059/0059
00060	VAX/0060/0060/0060	60	VAX/0060/0060/0060/0060
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00064	VAX/0064/0064/0064	64	VAX/0064/0064/0064/0064
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00066	VAX/0066/0066/0066	66	VAX/0066/0066/0066/0066
00067	VAX/0067/0067/0067	67	VAX/0067/0067/0067/0067
00068	VAX/0068/0068/0068	68	VAX/0068/0068/0068/0068
00069	VAX/0069/0069/0069	69	VAX/0069/0069/0069/0069
00070	VAX/0070/0070/0070	70	VAX/0070/0070/0070/0070
00071	VAX/0071/0071/0071	71	VAX/0071/0071/0071/0071
00072	VAX/0072/0072/0072	72	VAX/0072/0072/0072/0072
00073	VAX/0073/0073/0073	73	VAX/0073/0073/0073/0073
00074	VAX/0074/0074/0074	74	VAX/0074/0074/0074/0074
00075	VAX/0075/0075/0075	75	VAX/0075/0075/0075/0075
00076	VAX/0076/0076/0076	76	VAX/0076/0076/0076/0076
00077	VAX/0077/0077/0077	77	VAX/0077/0077/0077/0077
00078	VAX/0078/0078/0078	78	VAX/0078/0078/0078/0078
00079	VAX/0079/0079/0079	79	VAX/0079/0079/0079/0079
00080	VAX/0080/0080/0080	80	VAX/0080/0080/0080/0080
00081	VAX/0081/0081/0081	81	VAX/0081/0081/0081/0081
00082	VAX/0082/0082/0082	82	VAX/0082/0082/0082/0082
00083	VAX/0083/0083/0083	83	VAX/0083/0083/0083/0083
00084	VAX/0084/0084/0084	84	VAX/0084/0084/0084/0084
00085	VAX/0085/0085/0085	85	VAX/0085/0085/0085/0085
00086	VAX/0086/0086/0086	86	VAX/0086/0086/0086/0086
00087	VAX/0087/0087/0087	87	VAX/0087/0087/0087/0087
00088	VAX/0088/0088/0088	88	VAX/0088/0088/0088/0088
00089	VAX/0089/0089/0089	89	VAX/0089/0089/0089/0089
00090	VAX/0090/0090/0090	90	VAX/0090/0090/0090/0090
00091	VAX/0091/0091/0091	91	VAX/0091/0091/0091/0091
00092	VAX/0092/0092/0092	92	VAX/0092/0092/0092/0092
00093	VAX/0093/0093/0093	93	VAX/0093/0093/0093/0093
00094	VAX/0094/0094/0094	94	VAX/0094/0094/0094/0094
00095	VAX/0095/0095/0095	95	VAX/0095/0095/0095/0095
00096	VAX/0096/0096/0096	96	VAX/0096/0096/0096/0096
00097	VAX/0097/0097/0097	97	VAX/0097/0097/0097/0097
00098	VAX/0098/0098/0098	98	VAX/0098/0098/0098/0098
00099	VAX/0099/0099/0099	99	VAX/0099/0099/0099/0099

PRIVILEGES AND QUOTAS NEEDED TO RUN DIAGNOSTICS ON LINE

Privilege	Quota
ABRACAD	GET.POL
ALLENORL	ASILEN: 1000
DETACH	TOTLEN: 1000
DIAGNOST	MSDF.FAULT: 256
DOS_0	PORCLK: 100
GROUP	PCOLN: 1000
PRNCT	XTLEN: 100
RENNBA	MSQUOTA: 512
USMALK	JRI
TKPNDR	TOTLEN: 1020
WORLD	REPLECOTA: 40
WRS_00	

DIAGNOSTIC SUPERVISOR COMMANDS

SET LOAD COMMAND

```
SET LOAD <device>[:directory]<code>
```

The SET LOAD command establishes the storage device from which the supervisor will load diagnostic programs. The default load device is the device from which the supervisor was booted. Use SET LOAD when you wish to load diagnostic programs from a different device. Use the SET LOAD command in conjunction with the LOAD command of the JCB command.

```
DD> SET LOAD DMA0[:SYSTEMATN]  
DD> LOAD KBDA0  
  
DD> SET LOAD DMA0[:SYSTEMATN]  
DD> JCB BSDB
```

SET LOAD Command Example

NOTE

The directory name, and the source bracketed around it, are necessary in the SET LOAD command.

SHOW LOAD COMMAND

```
SHOW LOADCODES
```

The SHOW LOAD command causes the supervisor to display the storage device from which diagnostic programs are to be loaded when the LOAD command is given.

```
DD> SHOW LOAD  
DMA0[:SYSTEMATN]  
DD>
```

SHOW LOAD Command Example

LOAD COMMAND

```
LOAD <file-name><code>
```

This command loads the specified file into main memory from the default load device. The default file extension is LEAB. The storage device from which the program is loaded is the device established on the previous SET LOAD command. Note that you need supply only the file-loader name that identifies each diagnostic program for the command file argument <file-name>.

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

LOAD DEVICE : Load the local terminal
diagnostic program.

LOAD Diagnostic Program

ATTACH COMMAND

ATTACH <CPU-type><line-name><generic-device-name>...<ID>

The operator must use several ATTACH commands, before starting a diagnostic program, to define each unit under test (UNIT), and the devices that are it to the test, for the supervisor. If you are testing several units at once, repeat the ATTACH commands for each device. Every unit under test is uniquely defined by a hardware designation and a line.

The first parameter, <CPU-type>, is the hardware designation of the unit under test. For example, RM735, CM81, VM16, and RM1 are hardware designations.

The second parameter, <line-name>, is the name of the piece of hardware that runs the unit under test. In most cases through intermediate links, to the main computer bus. For example, an RM735 is linked to the bus; a CM81 is linked to an RM2; and a VM16 is linked to a RM1. You must attach each piece of hardware with the exception of the RM1 before you can use it as a link in an ATTACH command.

The third parameter is the generic device name, which identifies to the supervisor the parameter unit to be tested. Use the term given for the device name. ID is a two character generic device name (alphabetic); A is an alphabetic character, specifying the device control line; B is a decimal number in the range of 0-999, specifying the number of the unit with respect to the controller.

Use A or B only if it is applicable to the device. You may supply additional information for some types of hardware to enable the diagnostic program to address the device. For example, you must supply ID and RM numbers for an RM735, the controller number for a CM81, and the Q&A, vector, and SP for a VM16 device. If you do not include additional information, but the information is necessary, the supervisor will prompt you for it.

in the generic name:

- * is a letter from A to Z
- A is a decimal number in the range 0-999
- B is a generic device name that may be any two letters

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

```
DS> ATTACH ENTER BIT 708 1 4      | Attach the ENTER.  
DS> ATTACH DEL LOW OTA                | Attach the DEL via.  
DEL? ENTER                             | The supervisor example  
VBCOR? 128                             | For information not  
PR? 4                                   | supplied in the command  
| line.  
END
```

ATTACH Command Example

SELECT COMMAND

```
SELECT <generic-device-name>[:<CH0>  
[<channel>-<device-name>[:...]]<ALLCH0>
```

The operator must re-attach each unit to be tested with the SELECT command, after attaching it. For each unit, supply the appropriate generic device name. SELECT adds the specified device to the list of units to be tested. The command takes effect the next time the diagnostic program is started.

```
DS> SEL KEY 2100  
END
```

SELECT Command Example

DESELECT COMMAND

```
DESELECT <device>[:<device>[:...]]<ALL>
```

Use the Deselect command to remove the name of one or more devices from the list of units to be tested.

```
DS> DESELECT 770  
DS> DESELECT ALL  
END
```

DESELECT Command Example

SHOW DEVICE COMMAND

```
SHOW DEVICE <device>[:<device>[:...]]<CH0>
```

The SHOW DEVICE command causes the supervisor to display the characteristics of the specified devices on the operator's terminal. If you omit the device name, the supervisor will list the characteristics of all attached devices (see the following example).

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

SHOW SELECTED COMMAND

BACK SELECTKEY<CR>

The SHOW SELECTED command causes the display of information in the same format as the SHOW DEVICE command. However, the information is shown only for the device that have been previously selected.

```

FOR EACH DEVICE
  FOR I=1 TO 10
    GETDEV DEV SELECTED=NO
    GETDEV DEV SELECTED=NO
    GETDEV DEV SELECTED=NO
  END FOR
END FOR
FOR EACH DEVICE
  FOR I=1 TO 10
    GETDEV DEV SELECTED=NO
  END FOR
END FOR
END FOR
END FOR
```

SHOW DEVICE and SHOW SELECTED COMMANDS EXAMPLE

START COMMAND

```

START [SECTION:section name] <CR>
[TEST:ch1ch2ch3] <CR> [SUBTEST:ch4ch5] <CR>
[PARAMS:ch6ch7ch8] <CR>
```

The START command causes the diagnostic supervisor to pass control to the initialize routine in the diagnostic program L library, thus beginning program execution.

Each diagnostic program is organized in discrete tests. The tests are grouped in sections, according to their functions, execution times, and whether or not there is a need for operator intervention.

If the START command is given without switches, the program will run the tests in the default section. In other words, the initial setting for SECTION is DEFAULT. The supervisor calls only those tests that have been designed by the diagnostic engineer to run in the default section. Certain section tests do not require operator intervention. When a section is requested in conjunction with the START command, only the tests that it contains will be executed.

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

The TEST switch is used in two distinctly different ways. To the first and with arguments are specified, the supervisor sequentially passes control to tests first through LAST, inclusively. If the first argument is combined with the SUSPEND switch, program execution begins at the beginning of the first test and terminates at the end of the last test. If the SUBTEST switch is used in conjunction with the PASSES switch, the operator is provided with a loop on subtest capability. In this case, only the subtest named in the command line is executed, once looping begins.

If the TEST switch is not specified, all tests within the named section of the program are executed. In other words, the default for TEST is TEST * through LAST *, where TEST * is the highest numbered test in the section. If only the first argument is specified with the TEST switch, the last argument is assumed to default to be the highest numbered test within the selected section of the program.

Tests are run only if they are included in the section named. To the PASSES switch is not used, the default value is 1. Test and pass numbers are decimal. The minimum value for passes is 1. The maximum value is 9, which means infinity in this context.

For example:

TEST 4 AND	! First execution of the ! diagnostic section is away.
TEST 4 AND/NO/TEST	! First execution of the section ! section of the program.
ALL TESTS/NO/NO/TEST/TEST/TEST	! Run tests 1 through 10 if they are ! in the program section. Tests ! tests may not be run if tests ! are not in the program.
ALL 4 AND/TEST/TEST	! Run tests 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
ALL 4 AND/TEST/TEST/TEST	! Run tests 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
ALL 4 AND/TEST	! Run tests 1 through 10, which is ! the last test in the default ! section.
TEST 4 AND/TEST	! Run 4 passes of the default ! section.
ALL 4 AND/TEST/TEST/TEST/TEST	! Execute 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, ! 1, 2, 3, and then loop on subtest ! 4 until failure.

START COMMAND EXAMPLES

DIAGNOSTIC SUPERVISOR DEMANDS (CONT)

RUN COMMAND

```
RUN <file spec> [/SECTION, <action name>] -<CR>
  [/TESTS, <file spec>] [/CLASS, <SUBTESTS class>] [-<CR>]
  [/SUBSET, <subset>] <CR>
```

RUN is equivalent to a LOAD and START command sequence. The RUN command switches are identical to those in the START command.

For example:

```
770 RUN MAIN                                : Load and run the local
                                           : normal diagnostic.

780 RUN MAIN/NO/NO/NO/NO/NO                 : Load the local normal
                                           : diagnostic and run the
                                           : normal section.

790 RUN TESTS/NO/NO/NO/NO/NO/NO/NO/NO       : Load the local normal
                                           : diagnostic and run tests
                                           : 12 and 13 in the normal
                                           : section.

800 RUN TESTS/NO/NO/NO/NO/NO/NO/NO/NO       : Load the local normal
                                           : diagnostic and run tests
                                           : 12, 13, 14, 15, 16, 17, 18, 19, 20.

810 RUN TESTS/NO/NO/NO/NO/NO/NO/NO/NO       : Load the local normal
                                           : diagnostic and run tests 1,
                                           : 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.

820 RUN TESTS/NO/NO/NO                     : Load the local normal
                                           : diagnostic and run tests 1,
                                           : 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.

830 RUN TESTS/NO/NO/NO                     : Load the local normal
                                           : diagnostic and run tests
                                           : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.

840 RUN TESTS/NO/NO/NO/NO/NO/NO/NO/NO       : Load the local normal
                                           : diagnostic and run tests 1,
                                           : 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.
```

RUN Command Example

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

SUMMARY COMMAND

SUMMARY <CR>

This command causes the execution of the program's summary report code section, which prints statistical reports. Note that this command is generally used only after running a pair of a diagnostic program. However, the summary command can be used at any time, and could be useful, for example, when the time reliability program is run. Type CTRL/C first to return control to the command line interpreter (CLI). Then type SUMMARY to obtain a statistics report on the program. CONTINUE may be typed at this point, if the operator wishes to resume program execution.

CTRL/C

Transfers CTRL/C causes control from a diagnostic program to the command line interpreter in the diagnostic supervisor. The supervisor then enters a command wait state and displays the I&O prompt on the operator's terminal. The operator may then issue any valid command. CTRL/C is the only diagnostic supervisor command that may be issued while a program is running. When a diagnostic program is running in conversation mode, CTRL/C returns control to a command interpreter within the program for the conversation mode.

CONTINUE COMMAND

CONTINUE <CR>

This command resumes program execution to resume at the point at which the program was suspended. This command is used to proceed from a breakpoint, error halt, sorry, or CTRL/C situation.

The following example shows how CTRL/C, SUMMARY, and CONTINUE can be used together to obtain statistics on the program run and to then resume execution.

...Program is running...

TS		
TS> SUMMARY		Operator types CTRL/C.
		Supervisor prompt.
		Operator requests
		statistical report.

Statistical
Report

TS> CONTINUE		Supervisor prompt.
		Operator requests
		resumption of execution.

...Program is running...

Example of use of CTRL/C, SUMMARY, and CONTINUE commands

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

ABORT COMMAND

ABORT [CDB]

This command passes control to the program's cleanup code and then returns control to the supervisor, which enters a normal wait state and displays the supervisor prompt, DSD. At this point the operator may issue any command except COMMAND. The following example shows how the ABORT command can be used together with CDB/C and SUMMARY.

```
...Program is running...

DSD
DSD CDB/C          ! Operator types CDB/C.
DSD SUMMARY        ! Supervisor prompt.
DSD                ! Operator requests
DSD                ! Statistical report.

Statistical
Summary

DSD ABORT          ! Supervisor prompt.
DSD                ! Operator requests program
DSD                ! cleanup and termination.

DSD                ! Supervisor prompt.
```

Example of use of CDB/C, SUMMARY, and ABORT commands

SET FLAGS COMMAND

SET [FLAGS]any flags on

This command results in the setting of the execution control flags specified by any-flags. No other flags are affected. Any-flags is a string of flag numbers from the following table, separated by commas.

TIME	Time or error detection. When the program detects a failure and this flag is set, the supervisor enters a command wait state after all error messages associated with the failure have been output. The operator may then continue, restart, or abort the program. This flag takes precedence over the LOOP flag.
LOOP	Loop on error. When set, this flag causes the program to enter a predetermined escape loop on a task or segment that detects a failure. Set the TIME flag if you want to inhibit error messages. Looping will continue until the operator returns control to the supervisor by using the CDB/C command. The operator may then continue, clear the flag and messages, or abort the program.

ANY-FLAG Set any of the following flags

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

RELL	RELL on error. When set, this flag causes the supervisor to send a call to the operator whenever the program detects a failure.
TEL	Enable error messages at level 1. When set, this flag suppresses all error messages, except those that are forced by the program or supervisor.
TEL	Enable error messages at level 2. When set, this flag suppresses basic and extended information concerning the failure. Only the header information message (first three lines) is output for each failure.
TEL	Enable error messages at level 3. When set, this flag suppresses extended information concerning the failure. The header and basic information messages are output for each failure.
REN	Enable summary report. When set, this flag suppresses statistical report messages.
QUICK	quick verify. When set, this flag indicates to the program that the operator wants a quick verify mode of operation. The interpretation of this flag is program dependent.
CEASE	Report the execution of each task. When set, this flag causes the supervisor to report the execution of each individual task within the program to the supervisor dispatched control task task.
OPERATOR (operator)	operator present. When set, this flag indicates to the supervisor that operator information is possible. When cleared, the supervisor takes appropriate action to ensure that the test session continues without an operator.
PROGRAM (program)	Display task dialogue. When set, this flag indicates to the supervisor that the operator wants to see the limits and defaults for all questions printed by the program.
ALL	All flags in this list.

CLEAR FLAGS COMMAND

CLEAR [PLACE] <arg-list> CMD

This command results in the clearing of the flags specified by arg-list. No other flags are affected. Arg-list is a string of flag encodings separated by commas. See the SET command for supported arguments.

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

SET FLAGS DEFAULT COMMAND

SET FLAGS DEFAULT COMMAND

This command returns all flags to their initial default status. The default flag settings are DEFAULSON and PROMP77.

SHOW FLAGS COMMAND

SHOW FLAGS COMMAND

This command displays all the execution control flags and their current status. The flags are displayed as two hexadecimal flags, and flag is for those flags that are set, the other for those that are clear.

The following example shows how the SET FLAGS, CLEAR FLAGS, and SHOW FLAGS commands can be coordinated.

```
SET SET FLAGS TRACE           ! Set the TRACE flag.
SET CLEAR FLAGS QUICK         ! Clear the QUICK flag.
DO SHOW FLAGS
CURRENT TRACE SET: PROMP7, DEBR, TRACE
CURRENT FLAG CLEAR: QUICK, TTS, ITS, ITS, DEL, RBLL, LOOP, EACT
JOB
```

Example of the Use of the FLAG CONTROL Commands

SET EVENT FLAGS COMMAND

SET EVENT (FLAG) (arg-list) COMMAND

This command results in the setting of the event flag specified by arg-list. No other event flags are affected. Arg-list is a string of flag numbers in the range of 1-23, separated by commas. ALL may be specified instead of arg-list.

Event flags are status marking bits maintained by VMS and the Supervisor. Diagnostic programs can use event flags to perform a variety of signaling functions, including communication with the operator.

CLEAR EVENT FLAGS COMMAND

CLEAR EVENT (FLAG) (arg-list) COMMAND

This command results in the clearing of the event flag specified by arg-list. No other event flags are affected. Arg-list is a string of flag numbers in the range of 1-23, separated by commas. An optional ALL may be specified instead of arg-list.

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

SHOW EVENT FLAGS COMMAND

SHOW EVENT [FLAGS]<CR>

This command causes the supervisor to display a list of the event flags that are currently set.

The following example shows how the SET EVENT FLAGS, CLEAR EVENT FLAGS, and SHOW EVENT FLAGS commands can be coordinated.

```
DS> SET EVENT FLAGS 1, 9, 15
DS> CLEAR EVENT FLAGS 2, 5
DS> SHOW EVENT FLAGS
EVENT FLAG SET: 15, 9, 1
END
```

Example of EVENT FLAG CONTROL Commands

SET BASE COMMAND

SET BASE <address><CR>

This command loads the address specified into a software register. This number is then used as a base to which the address specified in the SET BREAKPOINT, CLEAR BREAKPOINT, FIXING, and DEBUG commands is added. The SET BASE command is useful when referencing code in the diagnostic program listings. The base should be set to the base address (see the program fix map) of the program section referenced. Then the PC numbers provided in the fixings can be used directly in referencing locations in the program listings.

For example:

```
DS> SET BASE 588          ! Set the base
                          ! address to the
                          ! beginning of the object of
                          ! the routine under
                          ! examination.
END
```

SET BASE Command Example

NOTE
Virtual address = physical address
(normally) when memory management is
turned off.

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

SET BREAKPOINT COMMAND

SET BREAKPOINT (address) (offset)

This command causes control to pass to the supervisor when the program counter points to the (address) previously specified by this command. A maximum of 15 simultaneous breakpoints can be set within the diagnostic program.

For example:

```
DS> SET BREAKPOINT 38      | Set a breakpoint  
                           | at an offset of  
                           | 38 from the  
                           | base address.
```

SET BREAKPOINT Command Example

CLEAR BREAKPOINT COMMAND

CLEAR BREAKPOINT (address) (offset)

This command clears the previously set breakpoint at the memory location specified by (address). If no breakpoint existed at the specified address, an error message is given. An optional argument of ALL clears all previously defined breakpoints.

For example:

```
DS> CLEAR BREAKPOINT 38  | Clear the breakpoint  
                           | at the location which  
                           | is offset 38 from  
                           | the base address.
```

DS>

CLEAR BREAKPOINT Command Example

SHOW BREAKPOINTS COMMAND

SHOW BREAKPOINTS (offset)

This command displays all currently defined breakpoints.

For example:

```
DS> SHOW BREAKPOINTS      | Display breakpoints  
                           | currently set.  
CURRENT BREAKPOINTS:  
00100230(A)  
DS>
```

SHOW BREAKPOINTS Command Example

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

SET DEFAULT COMMAND

SET DEFAULT [arguments] [ADDRESS]

This command causes setting of default qualifiers for the pending and default commands. The [arguments] argument consists of data length default, address radix default, qualifiers. If both qualifiers are present, they are separated by a comma. If only one default qualifier is specified, the other one is not affected. The default qualifiers are BTY and DECIMAL. Default qualifiers are:

Data Length: Byte, word, long
Radix: hexadecimal, decimal, octal

For example:

```
BTY SET DEFAULT BTY, DECIMAL 1 SET the default data  
length qualifier as  
byte and the default  
radix qualifier as  
decimal.  
BTY
```

SET DEFAULT Command Example

EXAMINE COMMAND (online - optional, default = optional)

EXAMINE [qualifiers] [addresses] [data]

The EXAMINE command displays the contents of memory in the format described by the qualifiers. If no qualifiers are specified, the default qualifiers set by a previous default command are used. The optional *n* qualifiers are described in the following table.

Examine Command Qualifier Descriptions

Qualifier	Description
/B	Address points to a byte
/W	Address points to a word
/L	Address points to a longword
/H	Display in hexadecimal radix
/D	Display in decimal radix
/O	Display in octal radix
/S	Display in ASCII bytes

When specified, the [addresses] argument is accepted in hexadecimal format unless some other radix has been set with the SET DEFAULT command. Option *y*, [addresses] may be specified as decimal, octal, or hexadecimal by immediately preceding the address argument with *WD*, *WO*, or *WY*, respectively. *y*, [addresses] may also be one of the following: BR-11, AR, ER, SR, PR, BRN.

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

For example:

```
DS> EXAMINE 10      ! Display the contents
                   ! of the longword which
                   ! is offset 30 from
                   ! the base address of RRR.
ADDRESS10: 00000001
DS>
```

EXAMINE Command Example

DEPOSIT COMMAND

DEPOSIT [qualifier] <address><data>

This command accepts data and writes it into the memory location specified by <address> in the format described by the qualifier. If no qualifiers are specified, the default qualifiers are used. The applicable qualifiers are identical to those of the EXAMINE command described in the previous table.

The <address> argument is accepted in hexadecimal format unless some other radix has been set with the SET RADIX command. Optionally, <address> may be specified as decimal, octal or hexadecimal by inserting y preceded by <address> with 10, 80, or 16, respectively.

For example:

```
DS> DEPOSIT/16 10 RRR ! Deposit 1081 (hex)
                   ! in the word
                   ! offset 10 from
                   ! the base address.
00000030: 1081
DS>
```

DEPOSIT Command Example

DIAGNOSTIC SUPERVISOR COMMANDS (CONT)

NEXT COMMAND

NEXT [address-of-instruction]<CR>

This command causes the supervisor to execute one more instruction. If you specify a number (address) after NEXT, the supervisor will execute that number of instructions. The supervisor displays the PC of the next instruction and the contents of the next four bytes, after execution of each instruction.

Use this command to step through a line of a program where you suspect a problem. Do not use the NEXT command unless you have stopped the program at a breakpoint.

For example:

```
END NEXT          ! Execute the next instruction.  
AC388R31: 0051D81  
000
```

NEXT Command Example

```
0000 000000 (0000 0000 0000)  
0000 000001 (0000 0000 0000)  
0010 000002 (0000 0000 0000)
```

DEVICE NAMING CONVENTIONS

Device Type	Pin	Package	Pinout	Typical
7411	14	14	14	14
7412	14	14	14	14
7413	14	14	14	14
7414	14	14	14	14
7415	14	14	14	14
7416	14	14	14	14
7417	14	14	14	14
7418	14	14	14	14
7419	14	14	14	14
7420	14	14	14	14
7421	14	14	14	14
7422	14	14	14	14
7423	14	14	14	14
7424	14	14	14	14
7425	14	14	14	14
7426	14	14	14	14
7427	14	14	14	14
7428	14	14	14	14
7429	14	14	14	14
7430	14	14	14	14
7431	14	14	14	14
7432	14	14	14	14
7433	14	14	14	14
7434	14	14	14	14
7435	14	14	14	14
7436	14	14	14	14
7437	14	14	14	14
7438	14	14	14	14
7439	14	14	14	14
7440	14	14	14	14
7441	14	14	14	14
7442	14	14	14	14
7443	14	14	14	14
7444	14	14	14	14
7445	14	14	14	14
7446	14	14	14	14
7447	14	14	14	14
7448	14	14	14	14
7449	14	14	14	14
7450	14	14	14	14
7451	14	14	14	14
7452	14	14	14	14
7453	14	14	14	14
7454	14	14	14	14
7455	14	14	14	14
7456	14	14	14	14
7457	14	14	14	14
7458	14	14	14	14
7459	14	14	14	14
7460	14	14	14	14
7461	14	14	14	14
7462	14	14	14	14
7463	14	14	14	14
7464	14	14	14	14
7465	14	14	14	14
7466	14	14	14	14
7467	14	14	14	14
7468	14	14	14	14
7469	14	14	14	14
7470	14	14	14	14
7471	14	14	14	14
7472	14	14	14	14
7473	14	14	14	14
7474	14	14	14	14
7475	14	14	14	14
7476	14	14	14	14
7477	14	14	14	14
7478	14	14	14	14
7479	14	14	14	14
7480	14	14	14	14
7481	14	14	14	14
7482	14	14	14	14
7483	14	14	14	14
7484	14	14	14	14
7485	14	14	14	14
7486	14	14	14	14
7487	14	14	14	14
7488	14	14	14	14
7489	14	14	14	14
7490	14	14	14	14
7491	14	14	14	14
7492	14	14	14	14
7493	14	14	14	14
7494	14	14	14	14
7495	14	14	14	14
7496	14	14	14	14
7497	14	14	14	14
7498	14	14	14	14
7499	14	14	14	14
7500	14	14	14	14

DEVICE NAMING CONVENTIONS (CONT)

Category	Line	Genetic	Parameters	Typical
TYPE	40	NEC	REF. #	
1911	506	PLC	CRS VOT 1A	776567 144 9
TH15	509	STAN		
TU16	40	DOU	CRS VOT 0L	776568 144 8
1917	510	STAN		
1918	504	SPIC		
1919	44	DDAN	CRS VOT 0H	
1920	704	1100		
1921	714	1100		
1922	724	1100		
1923	734	1100		

Notes: The typical season is only a portion of the duration of the year number of months mentioned.

3. Alpha particles:

11. $\text{C}_2\text{H}_5\text{OH}$ is 100% pure.

$$m_{\text{eff}} = m_{\text{eff}}^{\text{eff}} - m_{\text{eff}}^{\text{eff}} \langle \text{eff} \rangle$$

PAULO SANTI CASAS 1928-1998 GARDNER, Mass.

1. DATE _____
 2. TO _____
 3. FROM _____
 4. SUBJECT _____
 5. REMARKS _____
 6. INITIALS _____
 7. SIGNATURE _____
 8. DATE _____
 9. TO _____
 10. FROM _____
 11. SUBJECT _____
 12. REMARKS _____
 13. INITIALS _____
 14. SIGNATURE _____
 15. DATE _____
 16. TO _____
 17. FROM _____
 18. SUBJECT _____
 19. REMARKS _____
 20. INITIALS _____
 21. SIGNATURE _____
 22. DATE _____
 23. TO _____
 24. FROM _____
 25. SUBJECT _____
 26. REMARKS _____
 27. INITIALS _____
 28. SIGNATURE _____
 29. DATE _____
 30. TO _____
 31. FROM _____
 32. SUBJECT _____
 33. REMARKS _____
 34. INITIALS _____
 35. SIGNATURE _____
 36. DATE _____
 37. TO _____
 38. FROM _____
 39. SUBJECT _____
 40. REMARKS _____
 41. INITIALS _____
 42. SIGNATURE _____
 43. DATE _____
 44. TO _____
 45. FROM _____
 46. SUBJECT _____
 47. REMARKS _____
 48. INITIALS _____
 49. SIGNATURE _____
 50. DATE _____
 51. TO _____
 52. FROM _____
 53. SUBJECT _____
 54. REMARKS _____
 55. INITIALS _____
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 57. DATE _____
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 60. SUBJECT _____
 61. REMARKS _____
 62. INITIALS _____
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 64. DATE _____
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 67. SUBJECT _____
 68. REMARKS _____
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 71. DATE _____
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 89. REMARKS _____
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 95. SUBJECT _____
 96. REMARKS _____
 97. INITIALS _____
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 111. INITIALS _____
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 117. REMARKS _____
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 123. SUBJECT _____
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 130. SUBJECT _____
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 132. INITIALS _____
 133. SIGNATURE _____
 134. DATE _____
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 136. FROM _____
 137. SUBJECT _____
 138. REMARKS _____
 139. INITIALS _____
 140. SIGNATURE _____
 141. DATE _____
 142. TO _____
 143. FROM _____
 144. SUBJECT _____
 145. REMARKS _____
 146. INITIALS _____
 147. SIGNATURE _____
 148. DATE _____
 149. TO _____
 150. FROM _____
 151. SUBJECT _____
 152. REMARKS _____
 153. INITIALS _____
 154. SIGNATURE _____
 155. DATE _____
 156. TO _____
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 158. SUBJECT _____
 159. REMARKS _____
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 162. DATE _____
 163. TO _____
 164. FROM _____
 165. SUBJECT _____
 166. REMARKS _____
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 172. SUBJECT _____
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 180. REMARKS _____
 181. INITIALS _____
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 187. REMARKS _____
 188. INITIALS _____
 189. SIGNATURE _____
 190. DATE _____
 191. TO _____
 192. FROM _____
 193. SUBJECT _____
 194. REMARKS _____
 195. INITIALS _____
 196. SIGNATURE _____
 197. DATE _____
 198. TO _____
 199. FROM _____
 200. SUBJECT _____
 201. REMARKS _____
 202. INITIALS _____
 203. SIGNATURE _____
 204. DATE _____
 205. TO _____
 206. FROM _____
 207. SUBJECT _____
 208. REMARKS _____
 209. INITIALS _____
 210. SIGNATURE _____
 211. DATE _____
 212. TO _____
 213. FROM _____
 214. SUBJECT _____
 215. REMARKS _____
 216. INITIALS _____
 217. SIGNATURE _____
 218. DATE _____
 219. TO _____
 220. FROM _____
 221. SUBJECT _____
 222. REMARKS _____
 223. INITIALS _____

2007 年 7 月



CHAPTER 7

I/O OPTIONS





FKB11/RK711 REGISTERS BIT CONFIGURATION

[illegible]

RK611/RK711 REGISTERS BIT CONFIGURATION (CONT)

INSTR. AND STATUS REGISTER INSTR															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT	ACC	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD
INSTR. AND STATUS REGISTER STATUS															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT	ACC	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD
INSTR. AND STATUS REGISTER STATUS															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT	ACC	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD
INSTR. AND STATUS REGISTER STATUS															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT	ACC	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD
INSTR. AND STATUS REGISTER STATUS															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT	ACC	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD
INSTR. AND STATUS REGISTER STATUS															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT	ACC	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD	LD	RD

RK611/RK711 REGISTERS BIT CONFIGURATION (CONT)

REGISTER OF ADDRESS REGISTER

ADDRESS																NAME				ADDRESS	VALUE	INITIAL
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

DATA REGISTER																NAME				ADDRESS	VALUE	INITIAL
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

REGISTER OF ADDRESS REGISTER																NAME				ADDRESS	VALUE	INITIAL
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

REGISTER OF ADDRESS REGISTER																NAME				ADDRESS	VALUE	INITIAL
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

REGISTER OF ADDRESS REGISTER																NAME				ADDRESS	VALUE	INITIAL
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

REGISTER OF ADDRESS REGISTER																NAME				ADDRESS	VALUE	INITIAL
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

REGISTER OF ADDRESS REGISTER																NAME				ADDRESS	VALUE	INITIAL
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	14	13	12	11	10	9

MASSBUS DISK DRIVE REGISTER ADDRESS CALCULATION CHART

Register Number			L200C Number										
Dev	Offset	Drive Type	RP (Disk)	RA (Disk)	TS (Tape)	0	1	2	3	4	5	6	7
0	0	CS1	RPT1	RE	RE	0	00	100	100	200	200	300	300
1	1	PG	RPT2	RE	RE	4	04	104	104	204	204	304	304
2	2	RI1	RPT3	RE	RE	8	08	108	108	208	208	308	308
3	3	RI2	RPT4	RE	RE	C	0C	10C	10C	20C	20C	30C	30C
4	4	AS	RPT5	AS	AS	10	00	110	110	210	210	310	310
5	5	AS	RPT6	AS	AS	14	04	114	114	214	214	314	314
6	6	TS	RPT7	TS	TS	18	08	118	118	218	218	318	318
7	7	TS	RPT8	TS	TS	1C	0C	11C	11C	21C	21C	31C	31C
8	8	LS	RPT9	LS	LS	20	00	120	120	220	220	320	320
9	9	LS	RPT10	LS	LS	24	04	124	124	224	224	324	324
10	10	CP	RPT11	CP	CP	28	08	128	128	228	228	328	328
11	11	CP	RPT12	CP	CP	2C	0C	12C	12C	22C	22C	32C	32C
12	12	DC	RPT13	DC	DC	30	00	130	130	230	230	330	330
13	13	DC	RPT14	DC	DC	34	04	134	134	234	234	334	334
14	14	RS	RPT15	RS	RS	38	08	138	138	238	238	338	338
15	15	RS	RPT16	RS	RS	3C	0C	13C	13C	23C	23C	33C	33C
16	16	KMP1	RPT17	KMP1	KMP1	40	00	140	140	240	240	340	340
17	17	KMP2	RPT18	KMP2	KMP2	44	04	144	144	244	244	344	344
18	18					48	08	148	148	248	248	348	348

RP05/RP06 REGISTER CONTENTS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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RF07 REGISTER SUMMARY

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TM03 REGISTER CONTENTS

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TM03 REGISTER CONTENTS (CONT)

REGISTER
ADDRESS

REGISTER
CONTENT

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
01	055	141	000	734	000	000										
	NOT SET						FORMERLY TRANSFER FROM 000									

07
INSTR
FORMAT

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
						000	000	000	000	000	000	000	000	000	000
NOT SET						000	000	000	000	000	000	000	000	000	000

08 INSTRUCTION

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
						000	000	000	000	000	000	000	000	000	000
NOT SET						000	000	000	000	000	000	000	000	000	000

09

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
0000				0000				0000				0000			
0000				0000				0000				0000			

10

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
0000				0000				0000				0000			
0000				0000				0000				0000			

TM78 REGISTER CONTENTS

LINE	DATE	DESCRIPTION	AMOUNT	CHECK	DEBIT	CREDIT	BALANCE
1	12/15/00	OPENING BALANCE					100.00
2	12/15/00	SALES	100.00			100.00	200.00
3	12/15/00	SALES TAX	10.00			10.00	210.00
4	12/15/00	EXPENSES			10.00		200.00
5	12/15/00	CLOSING BALANCE					200.00

YOUNG & RUBIN

[illegible]

100

TWI72 REGISTER CONTENTS (CONT.)

Byte	Description
1	Command code being executed on last error
2	Interrupt code from last error
3	Field no. 000 from last code
4	Hardware register 8; read path write path bits
5	Hardware register 15; read path diagnostic bits
6	Hardware register 17; read path status
7	Hardware register 3; read path summary comp
8	Hardware register 70; AMTIS
9	Hardware register 21; RC DONE
10	Hardware register 22; illegal channel
11	Hardware register 23; kick x
12	Hardware register 24; end kick
13	Hardware register 25; SC LAR bits
14	Hardware register 26; readable ctrl
15	Hardware register 29; data
16	Hardware register 33; ORR
17	Hardware register 35; corrected data
18	Hardware register 32; ECC status
19	Hardware register 40; channel 0 TIS bus
20	Hardware register 41; channel 1 TIS bus
21	Hardware register 42; channel 2 TIS bus
22	Hardware register 43; channel 3 TIS bus
23	Hardware register 44; channel 4 TIS bus
24	Hardware register 45; channel 5 TIS bus
25	Hardware register 46; channel 6 TIS bus
26	Hardware register 47; channel 7 TIS bus
27	Hardware register 48; channel 8 TIS bus
28	Hardware register 49; TIS bus
29	Hardware register 126; SMPIC

TM78 REGISTER CONTENTS (CONT.)

Byte	Description
56	Entry control bits (ENCTRL). This byte is used by the microcode to control error recovery. It is meaningful only when the entry number (byte 55) is not zero. Bit 5 - Set when initial command moved in the reverse direction. Bit 4 - Set when initial command was a read. Bit 3 - Set when last entry requested was in opposite direction of initial command.
57	IO hardware status (IHW). This byte contains information about the tape drive. Bit 8 - Set when a DATA EQUALLYIZE ADDRESS command is in progress. Bit 1 - Set when a BEMTER command is in progress. Bit 2 - Set when tape units online and power is on. Bit 3 - Set when a ROLDATA COMMANDER command loaded from a PASSBUS port is in progress. Bit 4 - Set when tape was not moved in the reverse direction. Bit 5 - Set when last tape operation involved writing on tape. Bit 6 - Set when last record read was a tape mark. Bit 7 - Set when last PASSBUS command came from port B.
58	Transfer control word (XTRCWL). This byte contains control information used by DATA TRANSFER commands. Bits 3-7 - Write & not select Bits 3-5 - Read clock select Bits 7 - PIO bypass Bits 7 - Low read threshold
59	Relay suppress and format control (XRBTRC). This byte contains the contents of the left half of the XASBJ9 register, which contains the relay suppress bit, format, and skip codes.
60	Keypad enable flag (PKAKE). This byte is not zero when the keypad is enabled.

CHAPTER 8
MISCELLANEOUS





CONVERSION TABLES

HEX ADDER

A	L	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
K	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10
D	2	3	4	5	6	7	8	9	A	B	C	D	E	F	10	11
U	3	4	5	6	7	8	9	A	B	C	D	E	F	10	11	12
B	4	5	6	7	8	9	A	B	C	D	E	F	10	11	12	13
V	5	6	7	8	9	A	B	C	D	E	F	10	11	12	13	14
S	6	7	8	9	A	B	C	D	E	F	10	11	12	13	14	15
H	7	8	9	A	B	C	D	E	F	10	11	12	13	14	15	16
T	8	9	A	B	C	D	E	F	10	11	12	13	14	15	16	17
Q	9	A	B	C	D	E	F	10	11	12	13	14	15	16	17	18
F	A	B	C	D	E	F	10	11	12	13	14	15	16	17	18	19
M	B	C	D	E	F	10	11	12	13	14	15	16	17	18	19	20
N	C	D	E	F	10	11	12	13	14	15	16	17	18	19	20	21
J	D	E	F	10	11	12	13	14	15	16	17	18	19	20	21	22
P	E	F	10	11	12	13	14	15	16	17	18	19	20	21	22	23
R	F	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Z	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
I	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
G	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

CONVERSION TABLES (CONT.)

HEX SUBTRACTOR

[illegible]

CONVERSION TABLES (CONT)

HEX/DECIMAL CONVERSION

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
20	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
30	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
40	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
50	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
60	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
70	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
80	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
90	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A0	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B0	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C0	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D0	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E0	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F0	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

CONVERSION TABLES (CONT)

HEX/Octal CONVERSION

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	1	2	3	4	5	6	7	10	11	12	13	14	15	16	17
10	20	21	22	23	24	25	26	27	30	31	32	33	34	35	36	37
20	40	41	42	43	44	45	46	47	50	51	52	53	54	55	56	57
30	60	61	62	63	64	65	66	67	70	71	72	73	74	75	76	77
40	100	101	102	103	104	105	106	107	110	111	112	113	114	115	116	117
50	120	121	122	123	124	125	126	127	130	131	132	133	134	135	136	137
60	140	141	142	143	144	145	146	147	150	151	152	153	154	155	156	157
70	160	161	162	163	164	165	166	167	170	171	172	173	174	175	176	177
80	200	201	202	203	204	205	206	207	210	211	212	213	214	215	216	217
90	220	221	222	223	224	225	226	227	230	231	232	233	234	235	236	237
A0	240	241	242	243	244	245	246	247	250	251	252	253	254	255	256	257
B0	260	261	262	263	264	265	266	267	270	271	272	273	274	275	276	277
C0	300	301	302	303	304	305	306	307	310	311	312	313	314	315	316	317
D0	320	321	322	323	324	325	326	327	330	331	332	333	334	335	336	337
E0	340	341	342	343	344	345	346	347	350	351	352	353	354	355	356	357
F0	360	361	362	363	364	365	366	367	370	371	372	373	374	375	376	377

CONVERSION TABLES (CONT)

OCTAL/DECIMAL CONVERSION

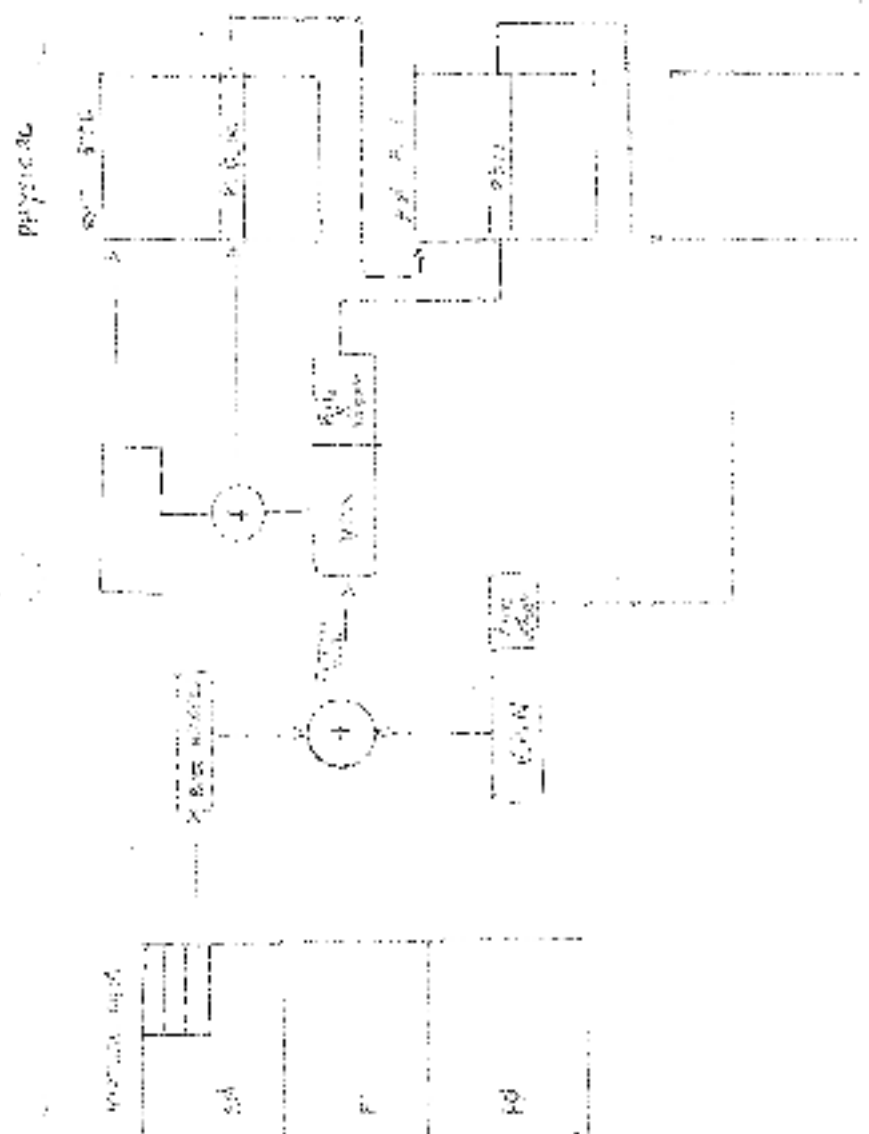
	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
10	12	13	14	15	16	17	20	21	22	23
20	24	25	26	27	30	31	32	33	34	35
30	36	37	40	41	42	43	44	45	46	47
40	50	51	52	53	54	55	56	57	60	61
50	62	63	64	65	66	67	70	71	72	73
60	74	75	76	77	100	101	102	103	124	105
70	106	107	110	111	112	113	114	115	116	117
80	120	121	122	123	124	125	126	127	130	131
90	132	133	134	135	136	137	140	141	142	143
100	144	145	146	147	150	151	152	153	154	155
110	156	157	160	161	162	163	164	165	166	167
120	170	171	172	173	174	175	176	177	200	201
130	202	203	204	205	206	207	210	211	212	213
140	214	215	216	217	220	221	222	223	224	225
150	226	227	230	231	232	233	234	235	236	237
160	240	241	242	243	244	245	246	247	250	251
170	252	253	254	255	256	257	260	261	262	263
180	264	265	266	267	270	271	272	273	274	275
190	276	277	300	301	302	303	304	305	306	307
200	310	311	312	313	314	315	316	317	320	321
210	322	323	324	325	326	327	330	331	332	333
220	334	335	336	337	340	341	342	343	344	345
230	346	347	350	351	352	353	354	355	356	357
240	360	361	362	363	364	365	366	367	370	371
250	372	373	374	375	376	377				

CONVERSION TABLES (CONT)

HEX/ASCII CONVERSION

HEX Code	ASCII Char	HEX Code	ASCII Char	HEX Code	ASCII Char	HEX Code	ASCII Char
10	00	20	SP	40	@	60	`
11	01	21	!	41	A	61	a
12	02	22	"	42	B	62	b
13	03	23	#	43	C	63	c
14	04	24	\$	44	D	64	d
15	05	25	%	45	E	65	e
16	06	26	&	46	F	66	f
17	07	27	'	47	G	67	g
18	08	28	(	48	H	68	h
19	09	29	)	49	I	69	i
1A	0A	2A	*	4A	J	6A	j
1B	0B	2B	+	4B	K	6B	k
1C	0C	2C	,	4C	L	6C	l
1D	0D	2D	-	4D	M	6D	m
1E	0E	2E	.	4E	N	6E	n
1F	0F	2F	/	4F	O	6F	o
20	10	30	0	50	P	70	p
21	11	31	1	51	Q	71	q
22	12	32	2	52	R	72	r
23	13	33	3	53	S	73	s
24	14	34	4	54	T	74	t
25	15	35	5	55	U	75	u
26	16	36	6	56	V	76	v
27	17	37	7	57	W	77	w
28	18	38	8	58	X	78	x
29	19	39	9	59	Y	79	y
2A	1A	3A	:	5A	Z	7A	z
2B	1B	3B	;	5B	[	7B	{
2C	1C	3C	<	5C	\	7C	
2D	1D	3D	=	5D	]	7D	}
2E	1E	3E	>	5E	^	7E	~
2F	1F	3F	?	5F		7F	DEL

NOTES



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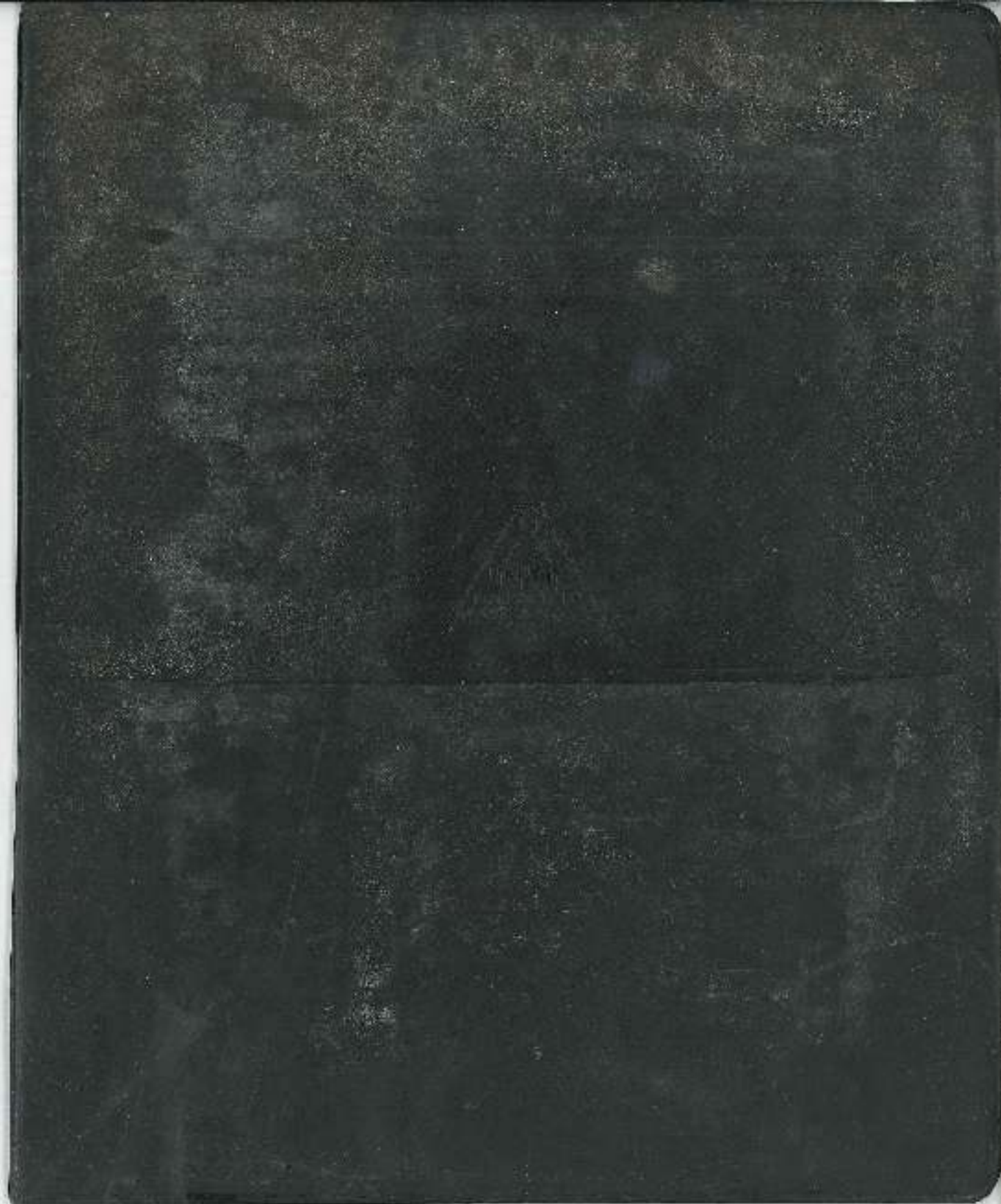
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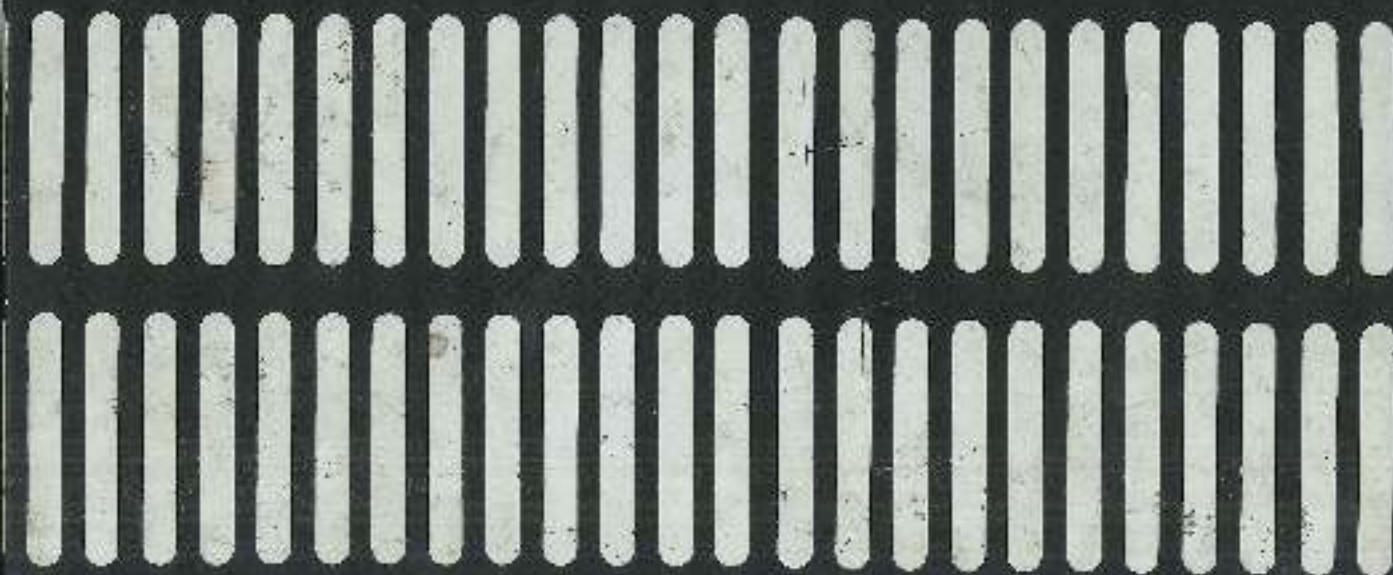
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