

# Motorola Semiconductor Engineering Bulletin

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## EB373

### Template for Initializing the Exception Vector Table of CPU32-Based Devices

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#### Introduction

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The assembly language program listed in this engineering bulletin is a template for initializing all of the exception and interrupt vectors in a CPU32-based device.

#### The Program

The program starts at \$00 0000 because the exception vector table always starts at that address from the release of RESET.

In the CPU-based devices, the exception vector table can be relocated by writing to the vector base address register (VBR). The instructions that write to the VBR are privileged instructions so that they can be used only in supervisor mode.

The first part of the program consists of two `dc.l` directives that specify the initial value for the stack pointer and program counter and 254 `dc.l` declarations that simply define a long word for labels `v2` through `v255`. The applications programmer must input initial stack pointer and initial program counter values.



The first long word value will be at address \$00 0000, the second word at \$00 0004, the third word at \$00 0008, and so on.

When the program is assembled, the assembler will find each label and assign an address to it. For instance, the assembler will find the label `v2`, which is the label for the bus error handler, and put the address of that label in location \$00 0008. This is the purpose of the

`dl v2 ;Bus Error` directive at line 9 of the listing file in this bulletin. Likewise, addresses will be assigned to each of the labels and those addresses will be appropriately substituted for the label names for all of the "dl label" directives at lines 9 through 262 in the listing file that follows.

The second part of the program simply puts an `rte` instruction at each label except for the initial stack pointer and initial program counter values.

The initial stack pointer and initial program counter values must be supplied by modifying the first two `dc.l` statements in the assembly listing. When the program is assembled, an absolute address for all the labels will be calculated. Then, these values are used in the `dc.l` statements. Thus, the address of `v2` will be placed at memory location \$00 0008, the address of `v3` at \$00 000c, the address of `v4` at \$00 0010 and so on. When a particular exception or interrupt occurs, the machine will fetch the associated vector number. The contents of the VBR are concatenated with the vector number which are concatenated with %00 to form a 32-bit address. The contents of this 32-bit address is the location of the exception handler.

In other words, when a BERR exception occurs, the machine will fetch vector 2. If the VBR contains \$0000 0000, the machine will go to memory location \$00 0008. The contents of this memory location is the address of the label `v2` which is where the BERR exception handler is located.

To use this template to initialize the exception vector table, follow these steps:

1. Cut and paste the assembly file into the first part of the user application.

2. Put in the appropriate values for the initial stack pointer and initial reset vector.
3. Put in exception handler code at each label for which an exception handler is needed. This code will replace the RTE instruction that is at the label now. For instance, a BERR exception handler starts at label `v2`. The spurious interrupt handler starts at label `v24`. User-defined vector 0 starts at label `v64`. Be sure to end the exception handler with an `rte` instruction.

**Exception Vector  
Initialization  
Program  
Listing File**

The following is the listing file for the exception vector initialization program. The assembly source code follows this listing file.

```

ASMVEC.ASM                               Assembled with IASM32 09/18/2000 15:45 PAGE 1

                                           1
                                           2
00000000                                3      org $0000
                                           4
                                           5
                                           6
00000000 00003FFC                        7      dl    $00003ffc    ;initial Stack Pointer
                                           8                          ;Modify this value
                                           9                          ;for your application
00000004 00000400                        10     dl    $00000400   ;initial Program Counter
                                           11                          ;Modify this value
                                           12                          ;for your application

00000008 00000408                        13     dl    v2         ;Bus Error
0000000C 0000040A                        14     dl    v3         ;Address Error
00000010 0000040C                        15     dl    v4         ;Illegal Instruction
00000014 0000040E                        16     dl    v5         ;Zero Division
00000018 00000410                        17     dl    v6         ;CHK, CHK2 Instructions
0000001C 00000412                        18     dl    v7         ;TRAPcc, TRAPV Instruction
00000020 00000414                        19     dl    v8         ;Privilege Violation
00000024 00000416                        20     dl    v9         ;Trace
00000028 00000418                        21     dl    v10        ;Line 1010 Emulation
0000002C 0000041A                        22     dl    v11        ;Line 1111 Emulation
00000030 0000041C                        23     dl    v12        ;Hardware Breakpoint
00000034 0000041E                        24     dl    v13        ;Reserved, Coprocessor Protocol
                                           ;Violation
00000038 00000420                        25     dl    v14        ;Format Error and Uninitialized
                                           ;Interrupt
0000003C 00000422                        26     dl    v15        ;Format Error and Uninitialized
                                           ;Interrupt

```

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00000040	00000424	27	dl	v16	;Unassigned
00000044	00000426	28	dl	v17	;Unassigned
00000048	00000428	29	dl	v18	;Unassigned
0000004C	0000042A	30	dl	v19	;Unassigned
00000050	0000042C	31	dl	v20	;Unassigned
00000054	0000042E	32	dl	v21	;Unassigned
00000058	00000430	33	dl	v22	;Unassigned
0000005C	00000432	34	dl	v23	;Unassigned
00000060	00000434	35	dl	v24	;Spurious Interrupt
00000064	00000436	36	dl	v25	;Level 1 Interrupt Autovector
00000068	00000438	37	dl	v26	;Level 2 Interrupt Autovector
0000006C	0000043A	38	dl	v27	;Level 3 Interrupt Autovector
00000070	0000043C	39	dl	v28	;Level 4 Interrupt Autovector
00000074	0000043E	40	dl	v29	;Level 5 Interrupt Autovector
00000078	00000440	41	dl	v30	;Level 6 Interrupt Autovector
0000007C	00000442	42	dl	v31	;Level 7 Interrupt Autovector
00000080	00000444	43	dl	v32	;Trap Instruction Vector 0
00000084	00000446	44	dl	v33	;Trap Instruction Vector 1
00000088	00000448	45	dl	v34	;Trap Instruction Vector 2
0000008C	0000044A	46	dl	v35	;Trap Instruction Vector 3
00000090	0000044C	47	dl	v36	;Trap Instruction Vector 4
00000094	0000044E	48	dl	v37	;Trap Instruction Vector 5
00000098	00000450	49	dl	v38	;Trap Instruction Vector 6
0000009C	00000452	50	dl	v39	;Trap Instruction Vector 7
000000A0	00000454	51	dl	v40	;Trap Instruction Vector 8

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000000A4	00000456	52	dl	v41	;Trap Instruction Vector 9
000000A8	00000458	53	dl	v42	;Trap Instruction Vector 10
000000AC	0000045A	54	dl	v43	;Trap Instruction Vector 11
000000B0	0000045C	55	dl	v44	;Trap Instruction Vector 12
000000B4	0000045E	56	dl	v45	;Trap Instruction Vector 13
000000B8	00000460	57	dl	v46	;Trap Instruction Vector 14
000000BC	00000462	58	dl	v47	;Trap Instruction Vector 15
000000C0	00000464	59	dl	v48	;Reserved, Coprocessor
000000C4	00000466	60	dl	v49	;Reserved, Coprocessor
000000C8	00000468	61	dl	v50	;Reserved, Coprocessor
000000CC	0000046A	62	dl	v51	;Reserved, Coprocessor
000000D0	0000046C	63	dl	v52	;Reserved, Coprocessor
000000D4	0000046E	64	dl	v53	;Reserved, Coprocessor
000000D8	00000470	65	dl	v54	;Reserved, Coprocessor
000000DC	00000472	66	dl	v55	;Reserved, Coprocessor
000000E0	00000474	67	dl	v56	;Reserved, Coprocessor
000000E4	00000476	68	dl	v57	;Reserved, Coprocessor
000000E8	00000478	69	dl	v58	;Reserved, Coprocessor
000000EC	0000047A	70	dl	v59	;Unassigned, Reserved
000000F0	0000047C	71	dl	v60	;Unassigned, Reserved
000000F4	0000047E	72	dl	v61	;Unassigned, Reserved
000000F8	00000480	73	dl	v62	;Unassigned, Reserved
000000FC	00000482	74	dl	v63	;Unassigned, Reserved
00000100	00000484	75	dl	v64	;User Defined Vector 0



00000104	00000486	76	dl	v65	;User Defined Vector 1
00000108	00000488	77	dl	v66	;User Defined Vector 2
0000010C	0000048A	78	dl	v67	;User Defined Vector 3
00000110	0000048C	79	dl	v68	;User Defined Vector 4
00000114	0000048E	80	dl	v69	;User Defined Vector 5
00000118	00000490	81	dl	v70	;User Defined Vector 6
0000011C	00000492	82	dl	v71	;User Defined Vector 7
00000120	00000494	83	dl	v72	;User Defined Vector 8
00000124	00000496	84	dl	v73	;User Defined Vector 9
00000128	00000498	85	dl	v74	;User Defined Vector 10
0000012C	0000049A	86	dl	v75	;User Defined Vector 11
00000130	0000049C	87	dl	v76	;User Defined Vector 12
00000134	0000049E	88	dl	v77	;User Defined Vector 13
00000138	000004A0	89	dl	v78	;User Defined Vector 14
0000013C	000004A2	90	dl	v79	;User Defined Vector 15
00000140	000004A4	91	dl	v80	;User Defined Vector 16
00000144	000004A6	92	dl	v81	;User Defined Vector 17
00000148	000004A8	93	dl	v82	;User Defined Vector 18
0000014C	000004AA	94	dl	v83	;User Defined Vector 19
00000150	000004AC	95	dl	v84	;User Defined Vector 20
00000154	000004AE	96	dl	v85	;User Defined Vector 21
00000158	000004B0	97	dl	v86	;User Defined Vector 22
0000015C	000004B2	98	dl	v87	;User Defined Vector 23
00000160	000004B4	99	dl	v88	;User Defined Vector 24
00000164	000004B6	100	dl	v89	;User Defined Vector 25
00000168	000004B8	101	dl	v90	;User Defined Vector 26
0000016C	000004BA	102	dl	v91	;User Defined Vector 27
00000170	000004BC	103	dl	v92	;User Defined Vector 28
00000174	000004BE	104	dl	v93	;User Defined Vector 29
00000178	000004C0	105	dl	v94	;User Defined Vector 30
0000017C	000004C2	106	dl	v95	;User Defined Vector 31
00000180	000004C4	107	dl	v96	;User Defined Vector 32
00000184	000004C6	108	dl	v97	;User Defined Vector 33
00000188	000004C8	109	dl	v98	;User Defined Vector 34

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0000018C	000004CA	110	dl	v99	;User Defined Vector 35
00000190	000004CC	111	dl	v100	;User Defined Vector 36
00000194	000004CE	112	dl	v101	;User Defined Vector 37
00000198	000004D0	113	dl	v102	;User Defined Vector 38
0000019C	000004D2	114	dl	v103	;User Defined Vector 39
000001A0	000004D4	115	dl	v104	;User Defined Vector 40
000001A4	000004D6	116	dl	v105	;User Defined Vector 41
000001A8	000004D8	117	dl	v106	;User Defined Vector 42
000001AC	000004DA	118	dl	v107	;User Defined Vector 43
000001B0	000004DC	119	dl	v108	;User Defined Vector 44
000001B4	000004DE	120	dl	v109	;User Defined Vector 45
000001B8	000004E0	121	dl	v110	;User Defined Vector 46
000001BC	000004E2	122	dl	v111	;User Defined Vector 47
000001C0	000004E4	123	dl	v112	;User Defined Vector 48
000001C4	000004E6	124	dl	v113	;User Defined Vector 49

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000001C8	000004E8	125	dl	v114	;User Defined Vector	50
000001CC	000004EA	126	dl	v115	;User Defined Vector	51
000001D0	000004EC	127	dl	v116	;User Defined Vector	52
000001D4	000004EE	128	dl	v117	;User Defined Vector	53
000001D8	000004F0	129	dl	v118	;User Defined Vector	54
000001DC	000004F2	130	dl	v119	;User Defined Vector	55
000001E0	000004F4	131	dl	v120	;User Defined Vector	56
000001E4	000004F6	132	dl	v121	;User Defined Vector	57
000001E8	000004F8	133	dl	v122	;User Defined Vector	58
000001EC	000004FA	134	dl	v123	;User Defined Vector	59
000001F0	000004FC	135	dl	v124	;User Defined Vector	60
000001F4	000004FE	136	dl	v125	;User Defined Vector	61
000001F8	00000500	137	dl	v126	;User Defined Vector	62
000001FC	00000502	138	dl	v127	;User Defined Vector	63
00000200	00000504	139	dl	v128	;User Defined Vector	64
00000204	00000506	140	dl	v129	;User Defined Vector	65
00000208	00000508	141	dl	v130	;User Defined Vector	66
0000020C	0000050A	142	dl	v131	;User Defined Vector	67
00000210	0000050C	143	dl	v132	;User Defined Vector	68
00000214	0000050E	144	dl	v133	;User Defined Vector	69
00000218	00000510	145	dl	v134	;User Defined Vector	70
0000021C	00000512	146	dl	v135	;User Defined Vector	71
00000220	00000514	147	dl	v136	;User Defined Vector	72
00000224	00000516	148	dl	v137	;User Defined Vector	73
00000228	00000518	149	dl	v138	;User Defined Vector	74
0000022C	0000051A	150	dl	v139	;User Defined Vector	75
00000230	0000051C	151	dl	v140	;User Defined Vector	76
00000234	0000051E	152	dl	v141	;User Defined Vector	77
00000238	00000520	153	dl	v142	;User Defined Vector	78
0000023C	00000522	154	dl	v143	;User Defined Vector	79
00000240	00000524	155	dl	v144	;User Defined Vector	80
00000244	00000526	156	dl	v145	;User Defined Vector	81
00000248	00000528	157	dl	v146	;User Defined Vector	82
0000024C	0000052A	158	dl	v147	;User Defined Vector	83
00000250	0000052C	159	dl	v148	;User Defined Vector	84
00000254	0000052E	160	dl	v149	;User Defined Vector	85
00000258	00000530	161	dl	v150	;User Defined Vector	86
0000025C	00000532	162	dl	v151	;User Defined Vector	87
00000260	00000534	163	dl	v152	;User Defined Vector	88
00000264	00000536	164	dl	v153	;User Defined Vector	89
00000268	00000538	165	dl	v154	;User Defined Vector	90
0000026C	0000053A	166	dl	v155	;User Defined Vector	91
00000270	0000053C	167	dl	v156	;User Defined Vector	92

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00000274	0000053E	168	dl	v157	;User Defined Vector	93
00000278	00000540	169	dl	v158	;User Defined Vector	94
0000027C	00000542	170	dl	v159	;User Defined Vector	95
00000280	00000544	171	dl	v160	;User Defined Vector	96
00000284	00000546	172	dl	v161	;User Defined Vector	97
00000288	00000548	173	dl	v162	;User Defined Vector	98

0000028C	0000054A	174	dl	v163	;User Defined Vector	99
00000290	0000054C	175	dl	v164	;User Defined Vector	100
00000294	0000054E	176	dl	v165	;User Defined Vector	101
00000298	00000550	177	dl	v166	;User Defined Vector	102
0000029C	00000552	178	dl	v167	;User Defined Vector	103
000002A0	00000554	179	dl	v168	;User Defined Vector	104
000002A4	00000556	180	dl	v169	;User Defined Vector	105
000002A8	00000558	181	dl	v170	;User Defined Vector	106
000002AC	0000055A	182	dl	v171	;User Defined Vector	107
000002B0	0000055C	183	dl	v172	;User Defined Vector	108
000002B4	0000055E	184	dl	v173	;User Defined Vector	109
000002B8	00000560	185	dl	v174	;User Defined Vector	110
000002BC	00000562	186	dl	v175	;User Defined Vector	111
000002C0	00000564	187	dl	v176	;User Defined Vector	112
000002C4	00000566	188	dl	v177	;User Defined Vector	113
000002C8	00000568	189	dl	v178	;User Defined Vector	114
000002CC	0000056A	190	dl	v179	;User Defined Vector	115
000002D0	0000056C	191	dl	v180	;User Defined Vector	116
000002D4	0000056E	192	dl	v181	;User Defined Vector	117
000002D8	00000570	193	dl	v182	;User Defined Vector	118
000002DC	00000572	194	dl	v183	;User Defined Vector	119
000002E0	00000574	195	dl	v184	;User Defined Vector	120
000002E4	00000576	196	dl	v185	;User Defined Vector	121
000002E8	00000578	197	dl	v186	;User Defined Vector	122
000002EC	0000057A	198	dl	v187	;User Defined Vector	123
000002F0	0000057C	199	dl	v188	;User Defined Vector	124
000002F4	0000057E	200	dl	v189	;User Defined Vector	125
000002F8	00000580	201	dl	v190	;User Defined Vector	126
000002FC	00000582	202	dl	v191	;User Defined Vector	127
00000300	00000584	203	dl	v192	;User Defined Vector	128
00000304	00000586	204	dl	v193	;User Defined Vector	129
00000308	00000588	205	dl	v194	;User Defined Vector	130
0000030C	0000058A	206	dl	v195	;User Defined Vector	131
00000310	0000058C	207	dl	v196	;User Defined Vector	132
00000314	0000058E	208	dl	v197	;User Defined Vector	133
00000318	00000590	209	dl	v198	;User Defined Vector	134
0000031C	00000592	210	dl	v199	;User Defined Vector	135
00000320	00000594	211	dl	v200	;User Defined Vector	136
00000324	00000596	212	dl	v201	;User Defined Vector	137
00000328	00000598	213	dl	v202	;User Defined Vector	138
0000032C	0000059A	214	dl	v203	;User Defined Vector	139
00000330	0000059C	215	dl	v204	;User Defined Vector	140
00000334	0000059E	216	dl	v205	;User Defined Vector	141
00000338	000005A0	217	dl	v206	;User Defined Vector	142
0000033C	000005A2	218	dl	v207	;User Defined Vector	143
00000340	000005A4	219	dl	v208	;User Defined Vector	144
00000344	000005A6	220	dl	v209	;User Defined Vector	145
00000348	000005A8	221	dl	v210	;User Defined Vector	146
0000034C	000005AA	222	dl	v211	;User Defined Vector	147
00000350	000005AC	223	dl	v212	;User Defined Vector	148
00000354	000005AE	224	dl	v213	;User Defined Vector	149
00000358	000005B0	225	dl	v214	;User Defined Vector	150

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```

0000035C 000005B2 226 dl v215 ;User Defined Vector 151
00000360 000005B4 227 dl v216 ;User Defined Vector 152
00000364 000005B6 228 dl v217 ;User Defined Vector 153
00000368 000005B8 229 dl v218 ;User Defined Vector 154
0000036C 000005BA 230 dl v219 ;User Defined Vector 155
00000370 000005BC 231 dl v220 ;User Defined Vector 156
00000374 000005BE 232 dl v221 ;User Defined Vector 157
00000378 000005C0 233 dl v222 ;User Defined Vector 158
0000037C 000005C2 234 dl v223 ;User Defined Vector 159
00000380 000005C4 235 dl v224 ;User Defined Vector 160
00000384 000005C6 236 dl v225 ;User Defined Vector 161
00000388 000005C8 237 dl v226 ;User Defined Vector 162
0000038C 000005CA 238 dl v227 ;User Defined Vector 163
00000390 000005CC 239 dl v228 ;User Defined Vector 164
00000394 000005CE 240 dl v229 ;User Defined Vector 165
00000398 000005D0 241 dl v230 ;User Defined Vector 166
0000039C 000005D2 242 dl v231 ;User Defined Vector 167
000003A0 000005D4 243 dl v232 ;User Defined Vector 168
000003A4 000005D6 244 dl v233 ;User Defined Vector 169
000003A8 000005D8 245 dl v234 ;User Defined Vector 170
000003AC 000005DA 246 dl v235 ;User Defined Vector 171
000003B0 000005DC 247 dl v236 ;User Defined Vector 172
000003B4 000005DE 248 dl v237 ;User Defined Vector 173
000003B8 000005E0 249 dl v238 ;User Defined Vector 174
000003BC 000005E2 250 dl v239 ;User Defined Vector 175
000003C0 000005E4 251 dl v240 ;User Defined Vector 176
000003C4 000005E6 252 dl v241 ;User Defined Vector 177
000003C8 000005E8 253 dl v242 ;User Defined Vector 178
000003CC 000005EA 254 dl v243 ;User Defined Vector 179
000003D0 000005EC 255 dl v244 ;User Defined Vector 180
000003D4 000005EE 256 dl v245 ;User Defined Vector 181
000003D8 000005F0 257 dl v246 ;User Defined Vector 182
000003DC 000005F2 258 dl v247 ;User Defined Vector 183
000003E0 000005F4 259 dl v248 ;User Defined Vector 184
000003E4 000005F6 260 dl v249 ;User Defined Vector 185
000003E8 000005F8 261 dl v250 ;User Defined Vector 186
000003EC 000005FA 262 dl v251 ;User Defined Vector 187
000003F0 000005FC 263 dl v252 ;User Defined Vector 188
000003F4 000005FE 264 dl v253 ;User Defined Vector 189
000003F8 00000600 265 dl v254 ;User Defined Vector 190
000003FC 00000602 266 dl v255 ;User Defined Vector 191
267
00000400 268 org $00000400 ;The first address after the
;vector
269 ;table is $400. The following
;labels
270 ;can be placed anywhere in
;memory.
271
272
00000400 00003FFC 273 v0 fcb $00,$00,$3f,$fc ;Reset: Initial Stack

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```

00000404 00000400 274 v1 fcb $00,$00,$04,$00 ;Pointer
;Reset: Initial Program
;Counter
275 ;These values will never
;be used, they
276 ;are simply serving as
;a place holder

```

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```

277 ;so that the label v2 will
;start at
278 ;the memory address $xxx8.
00000408 4E73 279 v2 rte ;Bus Error
0000040A 4E73 280 v3 rte ;Address Error
0000040C 4E73 281 v4 rte ;Illegal Instruction
0000040E 4E73 282 v5 rte ;Zero Division
00000410 4E73 283 v6 rte ;CHK, CHK2 Instruction
00000412 4E73 284 v7 rte ;TRAPcc, TRAPV Instructions
00000414 4E73 285 v8 rte ;Privilege Violation
00000416 4E73 286 v9 rte ;Trace
00000418 4E73 287 v10 rte ;Line 1010 Emulation
0000041A 4E73 288 v11 rte ;Line 1111 Emulation
0000041C 4E73 289 v12 rte ;Hardware Breakpoint
0000041E 4E73 290 v13 rte ;Reserved
00000420 4E73 291 v14 rte ;Format Error and Unitialized IRQ
00000422 4E73 292 v15 rte ;Format Error and Unitialized IRQ
00000424 4E73 293 v16 rte ;Unassigned
00000426 4E73 294 v17 rte ;Unassigned
00000428 4E73 295 v18 rte ;Unassigned
0000042A 4E73 296 v19 rte ;Unassigned
0000042C 4E73 297 v20 rte ;Unassigned
0000042E 4E73 298 v21 rte ;Unassigned
00000430 4E73 299 v22 rte ;Unassigned
00000432 4E73 300 v23 rte ;Unassigned
00000434 4E73 301 v24 rte ;Spurious Interrupt
00000436 4E73 302 v25 rte ;Level 1 Interrupt Autovector
00000438 4E73 303 v26 rte ;Level 2 Interrupt Autovector
0000043A 4E73 304 v27 rte ;Level 3 Interrupt Autovector
0000043C 4E73 305 v28 rte ;Level 4 Interrupt Autovector
0000043E 4E73 306 v29 rte ;Level 5 Interrupt Autovector
00000440 4E73 307 v30 rte ;Level 6 Interrupt Autovector
00000442 4E73 308 v31 rte ;Level 7 Interrupt Autovector
00000444 4E73 309 v32 rte ;Trap Instruction Vector 0
00000446 4E73 310 v33 rte ;Trap Instruction Vector 1
00000448 4E73 311 v34 rte ;Trap Instruction Vector 2
0000044A 4E73 312 v35 rte ;Trap Instruction Vector 3
0000044C 4E73 313 v36 rte ;Trap Instruction Vector 4
0000044E 4E73 314 v37 rte ;Trap Instruction Vector 5
00000450 4E73 315 v38 rte ;Trap Instruction Vector 6
00000452 4E73 316 v39 rte ;Trap Instruction Vector 7
00000454 4E73 317 v40 rte ;Trap Instruction Vector 8

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00000456	4E73	318	v41	rte	;Trap Instruction Vector 9
00000458	4E73	319	v42	rte	;Trap Instruction Vector 10
0000045A	4E73	320	v43	rte	;Trap Instruction Vector 11
0000045C	4E73	321	v44	rte	;Trap Instruction Vector 12
0000045E	4E73	322	v45	rte	;Trap Instruction Vector 13
00000460	4E73	323	v46	rte	;Trap Instruction Vector 14
00000462	4E73	324	v47	rte	;Trap Instruction Vector 15
00000464	4E73	325	v48	rte	;Reserved Coprocessor
00000466	4E73	326	v49	rte	;Reserved Coprocessor
00000468	4E73	327	v50	rte	;Reserved Coprocessor
0000046A	4E73	328	v51	rte	;Reserved Coprocessor
0000046C	4E73	329	v52	rte	;Reserved Coprocessor
0000046E	4E73	330	v53	rte	;Reserved Coprocessor

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00000470	4E73	331	v54	rte	;Reserved Coprocessor
00000472	4E73	332	v55	rte	;Reserved Coprocessor
00000474	4E73	333	v56	rte	;Reserved Coprocessor
00000476	4E73	334	v57	rte	;Reserved Coprocessor
00000478	4E73	335	v58	rte	;Reserved Coprocessor
0000047A	4E73	336	v59	rte	;Unassigned, Reserved
0000047C	4E73	337	v60	rte	;Unassigned, Reserved
0000047E	4E73	338	v61	rte	;Unassigned, Reserved
00000480	4E73	339	v62	rte	;Unassigned, Reserved
00000482	4E73	340	v63	rte	;Unassigned, Reserved
00000484	4E73	341	v64	rte	;User Vector 0
00000486	4E73	342	v65	rte	;User Vector 1
00000488	4E73	343	v66	rte	;User Vector 2
0000048A	4E73	344	v67	rte	;User Vector 3
0000048C	4E73	345	v68	rte	;User Vector 4
0000048E	4E73	346	v69	rte	;User Vector 5
00000490	4E73	347	v70	rte	;User Vector 6
00000492	4E73	348	v71	rte	;User Vector 7
00000494	4E73	349	v72	rte	;User Vector 8
00000496	4E73	350	v73	rte	;User Vector 9
00000498	4E73	351	v74	rte	;User Vector 10
0000049A	4E73	352	v75	rte	;User Vector 11
0000049C	4E73	353	v76	rte	;User Vector 12
0000049E	4E73	354	v77	rte	;User Vector 13
000004A0	4E73	355	v78	rte	;User Vector 14
000004A2	4E73	356	v79	rte	;User Vector 15
000004A4	4E73	357	v80	rte	;User Vector 16
000004A6	4E73	358	v81	rte	;User Vector 17
000004A8	4E73	359	v82	rte	;User Vector 18
000004AA	4E73	360	v83	rte	;User Vector 19
000004AC	4E73	361	v84	rte	;User Vector 20
000004AE	4E73	362	v85	rte	;User Vector 21
000004B0	4E73	363	v86	rte	;User Vector 22
000004B2	4E73	364	v87	rte	;User Vector 23
000004B4	4E73	365	v88	rte	;User Vector 24
000004B6	4E73	366	v89	rte	;User Vector 25

000004B8	4E73	367	v90	rte	;User Vector	26
000004BA	4E73	368	v91	rte	;User Vector	27
000004BC	4E73	369	v92	rte	;User Vector	28
000004BE	4E73	370	v93	rte	;User Vector	29
000004C0	4E73	371	v94	rte	;User Vector	30
000004C2	4E73	372	v95	rte	;User Vector	31
000004C4	4E73	373	v96	rte	;User Vector	32
000004C6	4E73	374	v97	rte	;User Vector	33
000004C8	4E73	375	v98	rte	;User Vector	34
000004CA	4E73	376	v99	rte	;User Vector	35
000004CC	4E73	377	v100	rte	;User Vector	36
000004CE	4E73	378	v101	rte	;User Vector	37
000004D0	4E73	379	v102	rte	;User Vector	38
000004D2	4E73	380	v103	rte	;User Vector	39
000004D4	4E73	381	v104	rte	;User Vector	40
000004D6	4E73	382	v105	rte	;User Vector	41
000004D8	4E73	383	v106	rte	;User Vector	42
000004DA	4E73	384	v107	rte	;User Vector	43
000004DC	4E73	385	v108	rte	;User Vector	44
000004DE	4E73	386	v109	rte	;User Vector	45
000004E0	4E73	387	v110	rte	;User Vector	46
000004E2	4E73	388	v111	rte	;User Vector	47

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000004E4	4E73	389	v112	rte	;User Vector	48
000004E6	4E73	390	v113	rte	;User Vector	49
000004E8	4E73	391	v114	rte	;User Vector	50
000004EA	4E73	392	v115	rte	;User Vector	51
000004EC	4E73	393	v116	rte	;User Vector	52
000004EE	4E73	394	v117	rte	;User Vector	53
000004F0	4E73	395	v118	rte	;User Vector	54
000004F2	4E73	396	v119	rte	;User Vector	55
000004F4	4E73	397	v120	rte	;User Vector	56
000004F6	4E73	398	v121	rte	;User Vector	57
000004F8	4E73	399	v122	rte	;User Vector	58
000004FA	4E73	400	v123	rte	;User Vector	59
000004FC	4E73	401	v124	rte	;User Vector	60
000004FE	4E73	402	v125	rte	;User Vector	61
00000500	4E73	403	v126	rte	;User Vector	62
00000502	4E73	404	v127	rte	;User Vector	63
00000504	4E73	405	v128	rte	;User Vector	64
00000506	4E73	406	v129	rte	;User Vector	65
00000508	4E73	407	v130	rte	;User Vector	66
0000050A	4E73	408	v131	rte	;User Vector	67
0000050C	4E73	409	v132	rte	;User Vector	68
0000050E	4E73	410	v133	rte	;User Vector	69
00000510	4E73	411	v134	rte	;User Vector	70
00000512	4E73	412	v135	rte	;User Vector	71
00000514	4E73	413	v136	rte	;User Vector	72
00000516	4E73	414	v137	rte	;User Vector	73
00000518	4E73	415	v138	rte	;User Vector	74

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0000051A 4E73      416  v139    rte                ;User Vector 75
0000051C 4E73      417  v140    rte                ;User Vector 76
0000051E 4E73      418  v141    rte                ;User Vector 77
00000520 4E73      419  v142    rte                ;User Vector 78
00000522 4E73      420  v143    rte                ;User Vector 79
00000524 4E73      421  v144    rte                ;User Vector 80
00000526 4E73      422  v145    rte                ;User Vector 81
00000528 4E73      423  v146    rte                ;User Vector 82
0000052A 4E73      424  v147    rte                ;User Vector 83
0000052C 4E73      425  v148    rte                ;User Vector 84
0000052E 4E73      426  v149    rte                ;User Vector 85
00000530 4E73      427  v150    rte                ;User Vector 86
00000532 4E73      428  v151    rte                ;User Vector 87
00000534 4E73      429  v152    rte                ;User Vector 88
00000536 4E73      430  v153    rte                ;User Vector 89
00000538 4E73      431  v154    rte                ;User Vector 90
0000053A 4E73      432  v155    rte                ;User Vector 91
0000053C 4E73      433  v156    rte                ;User Vector 92
0000053E 4E73      434  v157    rte                ;User Vector 93
00000540 4E73      435  v158    rte                ;User Vector 94
00000542 4E73      436  v159    rte                ;User Vector 95
00000544 4E73      437  v160    rte                ;User Vector 96
00000546 4E73      438  v161    rte                ;User Vector 97
00000548 4E73      439  v162    rte                ;User Vector 98
0000054A 4E73      440  v163    rte                ;User Vector 99
0000054C 4E73      441  v164    rte                ;User Vector 100
0000054E 4E73      442  v165    rte                ;User Vector 101
00000550 4E73      443  v166    rte                ;User Vector 102
00000552 4E73      444  v167    rte                ;User Vector 103
00000554 4E73      445  v168    rte                ;User Vector 104
00000556 4E73      446  v169    rte                ;User Vector 105

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00000558 4E73      447  v170    rte                ;User Vector 106
0000055A 4E73      448  v171    rte                ;User Vector 107
0000055C 4E73      449  v172    rte                ;User Vector 108
0000055E 4E73      450  v173    rte                ;User Vector 109
00000560 4E73      451  v174    rte                ;User Vector 110
00000562 4E73      452  v175    rte                ;User Vector 111
00000564 4E73      453  v176    rte                ;User Vector 112
00000566 4E73      454  v177    rte                ;User Vector 113
00000568 4E73      455  v178    rte                ;User Vector 114
0000056A 4E73      456  v179    rte                ;User Vector 115
0000056C 4E73      457  v180    rte                ;User Vector 116
0000056E 4E73      458  v181    rte                ;User Vector 117
00000570 4E73      459  v182    rte                ;User Vector 118
00000572 4E73      460  v183    rte                ;User Vector 119
00000574 4E73      461  v184    rte                ;User Vector 120
00000576 4E73      462  v185    rte                ;User Vector 121
00000578 4E73      463  v186    rte                ;User Vector 122
0000057A 4E73      464  v187    rte                ;User Vector 123

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0000057C	4E73	465	v188	rte	;User Vector	124
0000057E	4E73	466	v189	rte	;User Vector	125
00000580	4E73	467	v190	rte	;User Vector	126
00000582	4E73	468	v191	rte	;User Vector	127
00000584	4E73	469	v192	rte	;User Vector	128
00000586	4E73	470	v193	rte	;User Vector	129
00000588	4E73	471	v194	rte	;User Vector	130
0000058A	4E73	472	v195	rte	;User Vector	131
0000058C	4E73	473	v196	rte	;User Vector	132
0000058E	4E73	474	v197	rte	;User Vector	133
00000590	4E73	475	v198	rte	;User Vector	134
00000592	4E73	476	v199	rte	;User Vector	135
00000594	4E73	477	v200	rte	;User Vector	136
00000596	4E73	478	v201	rte	;User Vector	137
00000598	4E73	479	v202	rte	;User Vector	138
0000059A	4E73	480	v203	rte	;User Vector	139
0000059C	4E73	481	v204	rte	;User Vector	140
0000059E	4E73	482	v205	rte	;User Vector	141
000005A0	4E73	483	v206	rte	;User Vector	142
000005A2	4E73	484	v207	rte	;User Vector	143
000005A4	4E73	485	v208	rte	;User Vector	144
000005A6	4E73	486	v209	rte	;User Vector	145
000005A8	4E73	487	v210	rte	;User Vector	146
000005AA	4E73	488	v211	rte	;User Vector	147
000005AC	4E73	489	v212	rte	;User Vector	148
000005AE	4E73	490	v213	rte	;User Vector	149
000005B0	4E73	491	v214	rte	;User Vector	150
000005B2	4E73	492	v215	rte	;User Vector	151
000005B4	4E73	493	v216	rte	;User Vector	152
000005B6	4E73	494	v217	rte	;User Vector	153
000005B8	4E73	495	v218	rte	;User Vector	154
000005BA	4E73	496	v219	rte	;User Vector	155
000005BC	4E73	497	v220	rte	;User Vector	156
000005BE	4E73	498	v221	rte	;User Vector	157
000005C0	4E73	499	v222	rte	;User Vector	158
000005C2	4E73	500	v223	rte	;User Vector	159
000005C4	4E73	501	v224	rte	;User Vector	160
000005C6	4E73	502	v225	rte	;User Vector	161
000005C8	4E73	503	v226	rte	;User Vector	162
000005CA	4E73	504	v227	rte	;User Vector	163

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000005CC	4E73	505	v228	rte	;User Vector	164
000005CE	4E73	506	v229	rte	;User Vector	165
000005D0	4E73	507	v230	rte	;User Vector	166
000005D2	4E73	508	v231	rte	;User Vector	167
000005D4	4E73	509	v232	rte	;User Vector	168
000005D6	4E73	510	v233	rte	;User Vector	169
000005D8	4E73	511	v234	rte	;User Vector	170
000005DA	4E73	512	v235	rte	;User Vector	171
000005DC	4E73	513	v236	rte	;User Vector	172

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000005DE	4E73	514	v237	rte	;User Vector	173
000005E0	4E73	515	v238	rte	;User Vector	174
000005E2	4E73	516	v239	rte	;User Vector	175
000005E4	4E73	517	v240	rte	;User Vector	176
000005E6	4E73	518	v241	rte	;User Vector	177
000005E8	4E73	519	v242	rte	;User Vector	178
000005EA	4E73	520	v243	rte	;User Vector	179
000005EC	4E73	521	v244	rte	;User Vector	180
000005EE	4E73	522	v245	rte	;User Vector	181
000005F0	4E73	523	v246	rte	;User Vector	182
000005F2	4E73	524	v247	rte	;User Vector	183
000005F4	4E73	525	v248	rte	;User Vector	184
000005F6	4E73	526	v249	rte	;User Vector	185
000005F8	4E73	527	v250	rte	;User Vector	186
000005FA	4E73	528	v251	rte	;User Vector	187
000005FC	4E73	529	v252	rte	;User Vector	188
000005FE	4E73	530	v253	rte	;User Vector	189
00000600	4E73	531	v254	rte	;User Vector	190
00000602	4E73	532	v255	rte	;User Vector	191
		533				
		534				

**Assembly Listing**

The following is the assembly listing for the previous listing. This listing can be cut and pasted into an assembler for use with a user program.

```

org $0000

dl    $00003ffc    ;initial Stack Pointer
                    ;Modify this location with the
                    ;correct value for your application
dl    $00000400    ;initial Program Counter
                    ;Modify this location with the
                    ;correct value for your application

dl    v2           ;Bus Error
dl    v3           ;Address Error
dl    v4           ;Illegal Instruction
dl    v5           ;Zero Division
dl    v6           ;CHK, CHK2 Instructions
dl    v7           ;TRAPcc, TRAPV Instruction
dl    v8           ;Privilege Violation
dl    v9           ;Trace
dl    v10          ;Line 1010 Emulation
dl    v11          ;Line 1111 Emulation
dl    v12          ;Hardware Breakpoint
dl    v13          ;Reserved, Coprocessor Protocol Violation
dl    v14          ;Format Error and Uninitialized Interrupt
dl    v15          ;Format Error and Uninitialized Interrupt
dl    v16          ;Unassigned
dl    v17          ;Unassigned
dl    v18          ;Unassigned
dl    v19          ;Unassigned

```

```

d1    v20    ;Unassigned
d1    v21    ;Unassigned
d1    v22    ;Unassigned
d1    v23    ;Unassigned
d1    v24    ;Spurious Interrupt
d1    v25    ;Level 1 Interrupt Autovector
d1    v26    ;Level 2 Interrupt Autovector
d1    v27    ;Level 3 Interrupt Autovector
d1    v28    ;Level 4 Interrupt Autovector
d1    v29    ;Level 5 Interrupt Autovector
d1    v30    ;Level 6 Interrupt Autovector
d1    v31    ;Level 7 Interrupt Autovector
d1    v32    ;Trap Instruction Vector 0
d1    v33    ;Trap Instruction Vector 1
d1    v34    ;Trap Instruction Vector 2
d1    v35    ;Trap Instruction Vector 3
d1    v36    ;Trap Instruction Vector 4
d1    v37    ;Trap Instruction Vector 5
d1    v38    ;Trap Instruction Vector 6
d1    v39    ;Trap Instruction Vector 7
d1    v40    ;Trap Instruction Vector 8
d1    v41    ;Trap Instruction Vector 9
d1    v42    ;Trap Instruction Vector 10
d1    v43    ;Trap Instruction Vector 11
d1    v44    ;Trap Instruction Vector 12
d1    v45    ;Trap Instruction Vector 13
d1    v46    ;Trap Instruction Vector 14
d1    v47    ;Trap Instruction Vector 15
d1    v48    ;Reserved, Coprocessor
d1    v49    ;Reserved, Coprocessor
d1    v50    ;Reserved, Coprocessor
d1    v51    ;Reserved, Coprocessor
d1    v52    ;Reserved, Coprocessor
d1    v53    ;Reserved, Coprocessor
d1    v54    ;Reserved, Coprocessor
d1    v55    ;Reserved, Coprocessor
d1    v56    ;Reserved, Coprocessor
d1    v57    ;Reserved, Coprocessor
d1    v58    ;Reserved, Coprocessor
d1    v59    ;Unassigned, Reserved
d1    v60    ;Unassigned, Reserved
d1    v61    ;Unassigned, Reserved
d1    v62    ;Unassigned, Reserved
d1    v63    ;Unassigned, Reserved
d1    v64    ;User Defined Vector 0
d1    v65    ;User Defined Vector 1
d1    v66    ;User Defined Vector 2
d1    v67    ;User Defined Vector 3
d1    v68    ;User Defined Vector 4
d1    v69    ;User Defined Vector 5
d1    v70    ;User Defined Vector 6
d1    v71    ;User Defined Vector 7
d1    v72    ;User Defined Vector 8
d1    v73    ;User Defined Vector 9
d1    v74    ;User Defined Vector 10
d1    v75    ;User Defined Vector 11

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```

dl      v76      ;User Defined Vector 12
dl      v77      ;User Defined Vector 13
dl      v78      ;User Defined Vector 14
dl      v79      ;User Defined Vector 15
dl      v80      ;User Defined Vector 16
dl      v81      ;User Defined Vector 17
dl      v82      ;User Defined Vector 18
dl      v83      ;User Defined Vector 19
dl      v84      ;User Defined Vector 20
dl      v85      ;User Defined Vector 21
dl      v86      ;User Defined Vector 22
dl      v87      ;User Defined Vector 23
dl      v88      ;User Defined Vector 24
dl      v89      ;User Defined Vector 25
dl      v90      ;User Defined Vector 26
dl      v91      ;User Defined Vector 27
dl      v92      ;User Defined Vector 28
dl      v93      ;User Defined Vector 29
dl      v94      ;User Defined Vector 30
dl      v95      ;User Defined Vector 31
dl      v96      ;User Defined Vector 32
dl      v97      ;User Defined Vector 33
dl      v98      ;User Defined Vector 34
dl      v99      ;User Defined Vector 35
dl      v100     ;User Defined Vector 36
dl      v101     ;User Defined Vector 37
dl      v102     ;User Defined Vector 38
dl      v103     ;User Defined Vector 39
dl      v104     ;User Defined Vector 40
dl      v105     ;User Defined Vector 41
dl      v106     ;User Defined Vector 42
dl      v107     ;User Defined Vector 43
dl      v108     ;User Defined Vector 44
dl      v109     ;User Defined Vector 45
dl      v110     ;User Defined Vector 46
dl      v111     ;User Defined Vector 47
dl      v112     ;User Defined Vector 48
dl      v113     ;User Defined Vector 49
dl      v114     ;User Defined Vector 50
dl      v115     ;User Defined Vector 51
dl      v116     ;User Defined Vector 52
dl      v117     ;User Defined Vector 53
dl      v118     ;User Defined Vector 54
dl      v119     ;User Defined Vector 55
dl      v120     ;User Defined Vector 56
dl      v121     ;User Defined Vector 57
dl      v122     ;User Defined Vector 58
dl      v123     ;User Defined Vector 59
dl      v124     ;User Defined Vector 60
dl      v125     ;User Defined Vector 61
dl      v126     ;User Defined Vector 62
dl      v127     ;User Defined Vector 63
dl      v128     ;User Defined Vector 64
dl      v129     ;User Defined Vector 65
dl      v130     ;User Defined Vector 66
dl      v131     ;User Defined Vector 67

```



d1	v132	;User Defined Vector	68
d1	v133	;User Defined Vector	69
d1	v134	;User Defined Vector	70
d1	v135	;User Defined Vector	71
d1	v136	;User Defined Vector	72
d1	v137	;User Defined Vector	73
d1	v138	;User Defined Vector	74
d1	v139	;User Defined Vector	75
d1	v140	;User Defined Vector	76
d1	v141	;User Defined Vector	77
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d1	v174	;User Defined Vector	110
d1	v175	;User Defined Vector	111
d1	v176	;User Defined Vector	112
d1	v177	;User Defined Vector	113
d1	v178	;User Defined Vector	114
d1	v179	;User Defined Vector	115
d1	v180	;User Defined Vector	116
d1	v181	;User Defined Vector	117
d1	v182	;User Defined Vector	118
d1	v183	;User Defined Vector	119
d1	v184	;User Defined Vector	120
d1	v185	;User Defined Vector	121
d1	v186	;User Defined Vector	122
d1	v187	;User Defined Vector	123

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d1	v188	;User Defined Vector	124
d1	v189	;User Defined Vector	125
d1	v190	;User Defined Vector	126
d1	v191	;User Defined Vector	127
d1	v192	;User Defined Vector	128
d1	v193	;User Defined Vector	129
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d1	v237	;User Defined Vector	173
d1	v238	;User Defined Vector	174
d1	v239	;User Defined Vector	175
d1	v240	;User Defined Vector	176
d1	v241	;User Defined Vector	177
d1	v242	;User Defined Vector	178
d1	v243	;User Defined Vector	179

```

dl    v244    ;User Defined Vector 180
dl    v245    ;User Defined Vector 181
dl    v246    ;User Defined Vector 182
dl    v247    ;User Defined Vector 183
dl    v248    ;User Defined Vector 184
dl    v249    ;User Defined Vector 185
dl    v250    ;User Defined Vector 186
dl    v251    ;User Defined Vector 187
dl    v252    ;User Defined Vector 188
dl    v253    ;User Defined Vector 189
dl    v254    ;User Defined Vector 190
dl    v255    ;User Defined Vector 191

org $00000400 ;The first address after the vector
              ;table is $400. The following labels
              ;can be placed anywhere in memory.

v0    fcb $00,$00,$3f,$fc ;Reset: Initial Stack Pointer
v1    fcb $00,$00,$04,$00 ;Reset: Initial Program Counter
              ;The values will never be used, they
              ;are simply serving as a place holders
              ;so that the label v2 will start at
              ;the memory address $xxx8.

v2    rte                ;Bus Error
v3    rte                ;Address Error
v4    rte                ;Illegal Instruction
v5    rte                ;Zero Division
v6    rte                ;CHK, CHK2 Instruction
v7    rte                ;TRAPcc, TRAPV Instructions
v8    rte                ;Privilege Violation
v9    rte                ;Trace
v10   rte                ;Line 1010 Emulation
v11   rte                ;Line 1111 Emulation
v12   rte                ;Hardware Breakpoint
v13   rte                ;Reserved
v14   rte                ;Format Error and Unitialized IRQ
v15   rte                ;Format Error and Unitialized IRQ
v16   rte                ;Unassigned
v17   rte                ;Unassigned
v18   rte                ;Unassigned
v19   rte                ;Unassigned
v20   rte                ;Unassigned
v21   rte                ;Unassigned
v22   rte                ;Unassigned
v23   rte                ;Unassigned
v24   rte                ;Spurious Interrupt
v25   rte                ;Level 1 Interrupt Autovector
v26   rte                ;Level 2 Interrupt Autovector
v27   rte                ;Level 3 Interrupt Autovector
v28   rte                ;Level 4 Interrupt Autovector
v29   rte                ;Level 5 Interrupt Autovector
v30   rte                ;Level 6 Interrupt Autovector
v31   rte                ;Level 7 Interrupt Autovector
v32   rte                ;Trap Instruction Vector 0
v33   rte                ;Trap Instruction Vector 1

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v34    rte           ;Trap Instruction Vector 2
v35    rte           ;Trap Instruction Vector 3
v36    rte           ;Trap Instruction Vector 4
v37    rte           ;Trap Instruction Vector 5
v38    rte           ;Trap Instruction Vector 6
v39    rte           ;Trap Instruction Vector 7
v40    rte           ;Trap Instruction Vector 8
v41    rte           ;Trap Instruction Vector 9
v42    rte           ;Trap Instruction Vector 10
v43    rte           ;Trap Instruction Vector 11
v44    rte           ;Trap Instruction Vector 12
v45    rte           ;Trap Instruction Vector 13
v46    rte           ;Trap Instruction Vector 14
v47    rte           ;Trap Instruction Vector 15
v48    rte           ;Reserved Coprocessor
v49    rte           ;Reserved Coprocessor
v50    rte           ;Reserved Coprocessor
v51    rte           ;Reserved Coprocessor
v52    rte           ;Reserved Coprocessor
v53    rte           ;Reserved Coprocessor
v54    rte           ;Reserved Coprocessor
v55    rte           ;Reserved Coprocessor
v56    rte           ;Reserved Coprocessor
v57    rte           ;Reserved Coprocessor
v58    rte           ;Reserved Coprocessor
v59    rte           ;Unassigned, Reserved
v60    rte           ;Unassigned, Reserved
v61    rte           ;Unassigned, Reserved
v62    rte           ;Unassigned, Reserved
v63    rte           ;Unassigned, Reserved
v64    rte           ;User Vector 0
v65    rte           ;User Vector 1
v66    rte           ;User Vector 2
v67    rte           ;User Vector 3
v68    rte           ;User Vector 4
v69    rte           ;User Vector 5
v70    rte           ;User Vector 6
v71    rte           ;User Vector 7
v72    rte           ;User Vector 8
v73    rte           ;User Vector 9
v74    rte           ;User Vector 10
v75    rte           ;User Vector 11
v76    rte           ;User Vector 12
v77    rte           ;User Vector 13
v78    rte           ;User Vector 14
v79    rte           ;User Vector 15
v80    rte           ;User Vector 16
v81    rte           ;User Vector 17
v82    rte           ;User Vector 18
v83    rte           ;User Vector 19
v84    rte           ;User Vector 20
v85    rte           ;User Vector 21
v86    rte           ;User Vector 22
v87    rte           ;User Vector 23
v88    rte           ;User Vector 24
v89    rte           ;User Vector 25

```

v90	rte	;User Vector	26
v91	rte	;User Vector	27
v92	rte	;User Vector	28
v93	rte	;User Vector	29
v94	rte	;User Vector	30
v95	rte	;User Vector	31
v96	rte	;User Vector	32
v97	rte	;User Vector	33
v98	rte	;User Vector	34
v99	rte	;User Vector	35
v100	rte	;User Vector	36
v101	rte	;User Vector	37
v102	rte	;User Vector	38
v103	rte	;User Vector	39
v104	rte	;User Vector	40
v105	rte	;User Vector	41
v106	rte	;User Vector	42
v107	rte	;User Vector	43
v108	rte	;User Vector	44
v109	rte	;User Vector	45
v110	rte	;User Vector	46
v111	rte	;User Vector	47
v112	rte	;User Vector	48
v113	rte	;User Vector	49
v114	rte	;User Vector	50
v115	rte	;User Vector	51
v116	rte	;User Vector	52
v117	rte	;User Vector	53
v118	rte	;User Vector	54
v119	rte	;User Vector	55
v120	rte	;User Vector	56
v121	rte	;User Vector	57
v122	rte	;User Vector	58
v123	rte	;User Vector	59
v124	rte	;User Vector	60
v125	rte	;User Vector	61
v126	rte	;User Vector	62
v127	rte	;User Vector	63
v128	rte	;User Vector	64
v129	rte	;User Vector	65
v130	rte	;User Vector	66
v131	rte	;User Vector	67
v132	rte	;User Vector	68
v133	rte	;User Vector	69
v134	rte	;User Vector	70
v135	rte	;User Vector	71
v136	rte	;User Vector	72
v137	rte	;User Vector	73
v138	rte	;User Vector	74
v139	rte	;User Vector	75
v140	rte	;User Vector	76
v141	rte	;User Vector	77
v142	rte	;User Vector	78
v143	rte	;User Vector	79
v144	rte	;User Vector	80
v145	rte	;User Vector	81


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v146    rte           ;User Vector 82
v147    rte           ;User Vector 83
v148    rte           ;User Vector 84
v149    rte           ;User Vector 85
v150    rte           ;User Vector 86
v151    rte           ;User Vector 87
v152    rte           ;User Vector 88
v153    rte           ;User Vector 89
v154    rte           ;User Vector 90
v155    rte           ;User Vector 91
v156    rte           ;User Vector 92
v157    rte           ;User Vector 93
v158    rte           ;User Vector 94
v159    rte           ;User Vector 95
v160    rte           ;User Vector 96
v161    rte           ;User Vector 97
v162    rte           ;User Vector 98
v163    rte           ;User Vector 99
v164    rte           ;User Vector 100
v165    rte           ;User Vector 101
v166    rte           ;User Vector 102
v167    rte           ;User Vector 103
v168    rte           ;User Vector 104
v169    rte           ;User Vector 105
v170    rte           ;User Vector 106
v171    rte           ;User Vector 107
v172    rte           ;User Vector 108
v173    rte           ;User Vector 109
v174    rte           ;User Vector 110
v175    rte           ;User Vector 111
v176    rte           ;User Vector 112
v177    rte           ;User Vector 113
v178    rte           ;User Vector 114
v179    rte           ;User Vector 115
v180    rte           ;User Vector 116
v181    rte           ;User Vector 117
v182    rte           ;User Vector 118
v183    rte           ;User Vector 119
v184    rte           ;User Vector 120
v185    rte           ;User Vector 121
v186    rte           ;User Vector 122
v187    rte           ;User Vector 123
v188    rte           ;User Vector 124
v189    rte           ;User Vector 125
v190    rte           ;User Vector 126
v191    rte           ;User Vector 127
v192    rte           ;User Vector 128
v193    rte           ;User Vector 129
v194    rte           ;User Vector 130
v195    rte           ;User Vector 131
v196    rte           ;User Vector 132
v197    rte           ;User Vector 133
v198    rte           ;User Vector 134
v199    rte           ;User Vector 135
v200    rte           ;User Vector 136
v201    rte           ;User Vector 137

```

v202	rte	;User Vector	138
v203	rte	;User Vector	139
v204	rte	;User Vector	140
v205	rte	;User Vector	141
v206	rte	;User Vector	142
v207	rte	;User Vector	143
v208	rte	;User Vector	144
v209	rte	;User Vector	145
v210	rte	;User Vector	146
v211	rte	;User Vector	147
v212	rte	;User Vector	148
v213	rte	;User Vector	149
v214	rte	;User Vector	150
v215	rte	;User Vector	151
v216	rte	;User Vector	152
v217	rte	;User Vector	153
v218	rte	;User Vector	154
v219	rte	;User Vector	155
v220	rte	;User Vector	156
v221	rte	;User Vector	157
v222	rte	;User Vector	158
v223	rte	;User Vector	159
v224	rte	;User Vector	160
v225	rte	;User Vector	161
v226	rte	;User Vector	162
v227	rte	;User Vector	163
v228	rte	;User Vector	164
v229	rte	;User Vector	165
v230	rte	;User Vector	166
v231	rte	;User Vector	167
v232	rte	;User Vector	168
v233	rte	;User Vector	169
v234	rte	;User Vector	170
v235	rte	;User Vector	171
v236	rte	;User Vector	172
v237	rte	;User Vector	173
v238	rte	;User Vector	174
v239	rte	;User Vector	175
v240	rte	;User Vector	176
v241	rte	;User Vector	177
v242	rte	;User Vector	178
v243	rte	;User Vector	179
v244	rte	;User Vector	180
v245	rte	;User Vector	181
v246	rte	;User Vector	182
v247	rte	;User Vector	183
v248	rte	;User Vector	184
v249	rte	;User Vector	185
v250	rte	;User Vector	186
v251	rte	;User Vector	187
v252	rte	;User Vector	188
v253	rte	;User Vector	189
v254	rte	;User Vector	190
v255	rte	;User Vector	191

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