

```

SSSSSSSSSSSS 00000000 RRRRRRRRRR TTTTTTTTTT 33333333 22222222
SSSSSSSSSSSS 00000000 RRRRRRRRRR TTTTTTTTTT 33333333 22222222
SSSSSSSSSSSS 00000000 RRRRRRRRRR TTTTTTTTTT 33333333 22222222
SSS          000      000  RRR      RRR  TTT      333      222
SSS          000      000  RRR      RRR  TTT      333      222
SSS          000      000  RRR      RRR  TTT      333      222
SSS          000      000  RRR      RRR  TTT      333      222
SSS          000      000  RRR      RRR  TTT      333      222
SSS          000      000  RRR      RRR  TTT      333      222
SSSSSSSSSS 000      000  RRRRRRRRRR TTT      333      222
SSSSSSSSSS 000      000  RRRRRRRRRR TTT      333      222
SSSSSSSSSS 000      000  RRRRRRRRRR TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSS          000      000  RRR  RRR  TTT      333      222
SSSSSSSSSSSS 00000000 RRR      RRR  TTT      33333333 22222222222222
SSSSSSSSSSSS 00000000 RRR      RRR  TTT      33333333 22222222222222
SSSSSSSSSSSS 00000000 RRR      RRR  TTT      33333333 22222222222222

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T
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000000  PPPPPPPP  CCCCCCCC  000000  DDDDDDDD  EEEEEEEEE  SSSSSSSS
000000  PPPPPPPP  CCCCCCCC  000000  DDDDDDDD  EEEEEEEEE  SSSSSSSS
00      00  PP      PP  CC      CC      00      00  DD      DD  EE      SS
00      00  PP      PP  CC      CC      00      00  DD      DD  EE      SS
00      00  PP      PP  CC      CC      00      00  DD      DD  EE      SS
00      00  PP      PP  CC      CC      00      00  DD      DD  EE      SS
00      00  PPPPPPPP  CC      CC      00      00  DD      DD  EEEEEEEE  SSSSSS
00      00  PPPPPPPP  CC      CC      00      00  DD      DD  EEEEEEEE  SSSSSS
00      00  PP      CC      CC      00      00  DD      DD  EE      SS
00      00  PP      CC      CC      00      00  DD      DD  EE      SS
00      00  PP      CC      CC      00      00  DD      DD  EE      SS
00      00  PP      CC      CC      00      00  DD      DD  EE      SS
000000  PP      CCCCCCCC  000000  DDDDDDDD  EEEEEEEEE  SSSSSSSS
000000  PP      CCCCCCCC  000000  DDDDDDDD  EEEEEEEEE  SSSSSSSS

```

```

RRRRRRR  EEEEEEEEE  QQQQQQ
RRRRRRR  EEEEEEEEE  QQQQQQ
RR      RR  EE      QQ      QQ
RR      RR  EE      QQ      QQ
RR      RR  EE      QQ      QQ
RRRRRRR  EEEEEEEE  QQ      QQ
RRRRRRR  EEEEEEEE  QQ      QQ
RR  RR  EE      QQ  QQ  QQ
RR  RR  EE      QQ  QQ  QQ
RR      RR  EE      QQ      QQ
RR      RR  EE      QQ      QQ
RR      RR  EEEEEEEEE  QQQQ  QQ
RR      RR  EEEEEEEEE  QQQQ  QQ

```

....
....
....
....

File: OPCODES.REQ IDENT = 'V04-000' ! File: OPCODES.REQ Edit: PDG1001

```

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```

**
FACILITY:      VAX-11 SORT / MERGE
ABSTRACT:
      This module defines numeric values of opcodes and operand specifiers.
ENVIRONMENT:  VAX/VMS user mode
AUTHOR: P. Gilbert, CREATION DATE: 07-Dec-1981
MODIFIED BY:
      V01-000      Original
      V01-001 Change values of two-byte opcodes to conform with definitions
              in STARLET. PDG 4-Apr-1983
--

```

MACRO OPCODES	=								
'HALT'	0.	00	.	.	.	.	.	.	.
'NOP'	0.	01	.	.	.	.	.	.	.
'REI'	0.	02	.	.	.	.	.	.	.
'BPT'	0.	03	.	.	.	.	.	.	.
'RET'	0.	04	.	.	.	.	.	.	.
'RSB'	0.	05	.	.	.	.	.	.	.
'LDPCTX'	0.	06	.	.	.	.	.	.	.
'SVPCTX'	0.	07	.	.	.	.	.	.	.
'CVTPS'	4.	08	rw	ab	rw	ab	.	.	.
'CVTSP'	4.	09	rw	ab	rw	ab	.	.	.
'INDEX'	6.	0A	rl	rl	rl	rl	rl	wl	.
'CRC'	4.	0B	ab	rl	rw	ab	.	.	.
'PROBER'	3.	0C	rb	rw	ab	.	.	.	.
'PROBEW'	3.	0D	rb	rw	ab	.	.	.	.
'INSQUE'	2.	0E	ab	ab	.	.	.	.	.
'REMQUE'	2.	0F	ab	wl	.	.	.	.	.
'BSBB'	1.	10	bb	.	.	.	.	.	.
'BRB'	1.	11	bb	.	.	.	.	.	.
'BNEQ'	1.	12	bb	.	.	.	.	.	.
'BEQL'	1.	13	bb	.	.	.	.	.	.
'BGTR'	1.	14	bb	.	.	.	.	.	.
'BLEQ'	1.	15	bb	.	.	.	.	.	.
'JSB'	1.	16	ab	.	.	.	.	.	.
'JMP'	1.	17	ab	.	.	.	.	.	.
'BGEQ'	1.	18	bb	.	.	.	.	.	.
'BLSS'	1.	19	bb	.	.	.	.	.	.
'BGTRU'	1.	1A	bb	.	.	.	.	.	.
'BLEQU'	1.	1B	bb	.	.	.	.	.	.
'BVC'	1.	1C	bb	.	.	.	.	.	.
'BVS'	1.	1D	bb	.	.	.	.	.	.
'BGEQU'	1.	1E	bb	.	.	.	.	.	.
'BLSSU'	1.	1F	bb	.	.	.	.	.	.
'ADDP4'	4.	20	rw	ab	rw	ab	.	.	.
'ADDP6'	6.	21	rw	ab	rw	ab	rw	ab	.
'SUBP4'	4.	22	rw	ab	rw	ab	.	.	.
'SUBP6'	6.	23	rw	ab	rw	ab	rw	ab	.
'CVTPT'	5.	24	rw	ab	ab	rw	ab	.	.
'MULP'	6.	25	rw	ab	rw	ab	rw	ab	.
'CVTTP'	5.	26	rw	ab	ab	rw	ab	.	.
'DIVP'	6.	27	rw	ab	rw	ab	rw	ab	.
'MOVC3'	3.	28	rw	ab	ab	.	.	.	.
'CMPC3'	3.	29	rw	ab	ab	.	.	.	.
'SCANC'	4.	2A	rw	ab	ab	rb	.	.	.
'SPANC'	4.	2B	rw	ab	ab	rb	.	.	.
'MOVC5'	5.	2C	rw	ab	rb	rw	ab	.	.
'CMPC5'	5.	2D	rw	ab	rb	rw	ab	.	.
'MOVTC'	6.	2E	rw	ab	rb	ab	rw	ab	.
'MOVTUC'	6.	2F	rw	ab	rb	ab	rw	ab	.
'BSBW'	1.	30	bw	.	.	.	.	.	.
'BRW'	1.	31	bw	.	.	.	.	.	.
'CVTWL'	2.	32	rw	wl	.	.	.	.	.
'CVTWB'	2.	33	rw	wb	.	.	.	.	.
'MOVP'	3.	34	rw	ab	ab	.	.	.	.
'CMPP3'	3.	35	rw	ab	ab	.	.	.	.
'CVTPL'	3.	36	rw	ab	wl	.	.	.	.

'CMPP4'	4	'37'	r	ab	r	ab	.	.
'EDITPC'	4	'38'	r	ab	ab	ab	.	.
'MATCHC'	4	'39'	r	ab	ab	ab	.	.
'LOCC'	4	'3A'	r	ab	ab	ab	.	.
'SKPC'	4	'3B'	r	ab	ab	ab	.	.
'MOVZWL'	4	'3C'	r	ab	ab	ab	.	.
'ACBW'	4	'3D'	r	ab	ab	ab	.	.
'MOVAV'	4	'3E'	r	ab	ab	ab	.	.
'PUSHAW'	4	'3F'	r	ab	ab	ab	.	.
'ADDF2'	4	'40'	r	ab	ab	ab	.	.
'ADDF3'	4	'41'	r	ab	ab	ab	.	.
'SUBF2'	4	'42'	r	ab	ab	ab	.	.
'SUBF3'	4	'43'	r	ab	ab	ab	.	.
'MULF2'	4	'44'	r	ab	ab	ab	.	.
'MULF3'	4	'45'	r	ab	ab	ab	.	.
'DIVF2'	4	'46'	r	ab	ab	ab	.	.
'DIVF3'	4	'47'	r	ab	ab	ab	.	.
'CVTFB'	4	'48'	r	ab	ab	ab	.	.
'CVTFW'	4	'49'	r	ab	ab	ab	.	.
'CVTFL'	4	'4A'	r	ab	ab	ab	.	.
'CVTRFL'	4	'4B'	r	ab	ab	ab	.	.
'CVTBF'	4	'4C'	r	ab	ab	ab	.	.
'CVTWF'	4	'4D'	r	ab	ab	ab	.	.
'CVTLF'	4	'4E'	r	ab	ab	ab	.	.
'ACBF'	4	'4F'	r	ab	ab	ab	.	.
'MOVF'	4	'50'	r	ab	ab	ab	.	.
'CMPF'	4	'51'	r	ab	ab	ab	.	.
'MNEGF'	4	'52'	r	ab	ab	ab	.	.
'TSTF'	4	'53'	r	ab	ab	ab	.	.
'EMODF'	4	'54'	r	ab	ab	ab	.	.
'POLYF'	4	'55'	r	ab	ab	ab	.	.
'CVTFD'	4	'56'	r	ab	ab	ab	.	.
'X57'	4	'57'	r	ab	ab	ab	.	.
'ADAWI'	4	'58'	r	ab	ab	ab	.	.
'X59'	4	'59'	r	ab	ab	ab	.	.
'X5A'	4	'5A'	r	ab	ab	ab	.	.
'X5B'	4	'5B'	r	ab	ab	ab	.	.
'INSQH1'	4	'5C'	r	ab	ab	ab	.	.
'INSQT1'	4	'5D'	r	ab	ab	ab	.	.
'REMQH1'	4	'5E'	r	ab	ab	ab	.	.
'REMQT1'	4	'5F'	r	ab	ab	ab	.	.
'ADDD2'	4	'60'	r	ab	ab	ab	.	.
'ADDD3'	4	'61'	r	ab	ab	ab	.	.
'SUBD2'	4	'62'	r	ab	ab	ab	.	.
'SUBD3'	4	'63'	r	ab	ab	ab	.	.
'MULD2'	4	'64'	r	ab	ab	ab	.	.
'MULD3'	4	'65'	r	ab	ab	ab	.	.
'DIVD2'	4	'66'	r	ab	ab	ab	.	.
'DIVD3'	4	'67'	r	ab	ab	ab	.	.
'CVTDB'	4	'68'	r	ab	ab	ab	.	.
'CVTDW'	4	'69'	r	ab	ab	ab	.	.
'CVTDL'	4	'6A'	r	ab	ab	ab	.	.
'CVTRDL'	4	'6B'	r	ab	ab	ab	.	.
'CVTBD'	4	'6C'	r	ab	ab	ab	.	.
'CVTWD'	4	'6D'	r	ab	ab	ab	.	.
'CVTLD'	4	'6E'	r	ab	ab	ab	.	.

'DIVW3'	3	'A7'	rw	rw	ww	.	.	.
'BISW2'	.	'A8'	rw	rw	ww	.	.	.
'BISW3'	.	'A9'	rw	rw	ww	.	.	.
'BICW2'	.	'AA'	rw	rw	ww	.	.	.
'BICW3'	.	'AB'	rw	rw	ww	.	.	.
'XORW2'	.	'AC'	rw	rw	ww	.	.	.
'XORW3'	.	'AD'	rw	rw	ww	.	.	.
'MNEGW'	.	'AE'	rw	rw	ww	.	.	.
'CASEW'	.	'AF'	rw	rw	rw	.	.	.
'MOVW'	.	'B0'	rw	rw	ww	.	.	.
'CMPW'	.	'B1'	rw	rw	ww	.	.	.
'MCOMW'	.	'B2'	rw	rw	ww	.	.	.
'BITW'	.	'B3'	rw	rw	ww	.	.	.
'CLRW'	1	'B4'	rw	rw	ww	.	.	.
'TSTW'	1	'B5'	rw	rw	ww	.	.	.
'INCW'	1	'B6'	rw	rw	ww	.	.	.
'DECW'	1	'B7'	rw	rw	ww	.	.	.
'BISPSW'	1	'B8'	rw	rw	ww	.	.	.
'BICPSW'	1	'B9'	rw	rw	ww	.	.	.
'POPR'	1	'BA'	rw	rw	ww	.	.	.
'PUSHR'	1	'BB'	rw	rw	ww	.	.	.
'CHMK'	1	'BC'	rw	rw	ww	.	.	.
'CHME'	1	'BD'	rw	rw	ww	.	.	.
'CHMS'	1	'BE'	rw	rw	ww	.	.	.
'CHMU'	1	'BF'	rw	rw	ww	.	.	.
'ADDL2'	2	'C0'	rw	rw	ww	.	.	.
'ADDL3'	3	'C1'	rw	rw	ww	.	.	.
'SUBL2'	2	'C2'	rw	rw	ww	.	.	.
'SUBL3'	3	'C3'	rw	rw	ww	.	.	.
'MULL2'	2	'C4'	rw	rw	ww	.	.	.
'MULL3'	3	'C5'	rw	rw	ww	.	.	.
'DIVL2'	2	'C6'	rw	rw	ww	.	.	.
'DIVL3'	3	'C7'	rw	rw	ww	.	.	.
'BISL2'	2	'C8'	rw	rw	ww	.	.	.
'BISL3'	3	'C9'	rw	rw	ww	.	.	.
'BICL2'	2	'CA'	rw	rw	ww	.	.	.
'BICL3'	3	'CB'	rw	rw	ww	.	.	.
'XORL2'	2	'CC'	rw	rw	ww	.	.	.
'XORL3'	3	'CD'	rw	rw	ww	.	.	.
'MNEGL'	.	'CE'	rw	rw	ww	.	.	.
'CASEL'	.	'CF'	rw	rw	ww	.	.	.
'MOVL'	2	'D0'	rw	rw	ww	.	.	.
'CMPL'	2	'D1'	rw	rw	ww	.	.	.
'MCOML'	2	'D2'	rw	rw	ww	.	.	.
'BITL'	2	'D3'	rw	rw	ww	.	.	.
'CLRL'	1	'D4'	rw	rw	ww	.	.	.
'TSTL'	1	'D5'	rw	rw	ww	.	.	.
'INCL'	1	'D6'	rw	rw	ww	.	.	.
'DECL'	1	'D7'	rw	rw	ww	.	.	.
'ADWC'	2	'D8'	rw	rw	ww	.	.	.
'SBWC'	2	'D9'	rw	rw	ww	.	.	.
'MTPR'	2	'DA'	rw	rw	ww	.	.	.
'MFPR'	2	'DB'	rw	rw	ww	.	.	.
'MOVPSL'	1	'DC'	rw	rw	ww	.	.	.
'PUSHL'	1	'DD'	rw	rw	ww	.	.	.
'MOVAL'	2	'DE'	rw	rw	ww	.	.	.

'PUSHAL'	1	'DF'	al	.	.	.	.	.	.
'BBS'	1	'FO'	al	v	sb	.	.	.	.
'BBC'	1	'F1'	al	v	sb	.	.	.	.
'BBSS'	1	'F2'	al	v	sb	.	.	.	.
'BBCS'	1	'F3'	al	v	sb	.	.	.	.
'BBSC'	1	'F4'	al	v	sb	.	.	.	.
'BBCC'	1	'F5'	al	v	sb	.	.	.	.
'BBSSI'	1	'F6'	al	v	sb	.	.	.	.
'BBCCI'	1	'F7'	al	v	sb	.	.	.	.
'BLBS'	2	'F8'	al	v	sb	.	.	.	.
'BLBC'	2	'F9'	al	v	sb	.	.	.	.
'FFS'	4	'FA'	al	v	sb	w	.	.	.
'FFC'	4	'FB'	al	v	sb	w	.	.	.
'CMPV'	4	'FC'	al	v	sb	w	.	.	.
'CMPZV'	4	'FD'	al	v	sb	w	.	.	.
'EXTV'	4	'FE'	al	v	sb	w	.	.	.
'EXTZV'	4	'FF'	al	v	sb	w	.	.	.
'INSV'	4	'F0'	al	v	sb	w	.	.	.
'ACBL'	4	'F1'	al	v	sb	w	.	.	.
'AOBLSS'	3	'F2'	al	m	bb	.	.	.	.
'AOBLEQ'	3	'F3'	al	m	bb	.	.	.	.
'SOBGEQ'	2	'F4'	al	m	sb	.	.	.	.
'SOBGTR'	2	'F5'	al	m	sb	.	.	.	.
'CVTLB'	2	'F6'	al	v	sb	.	.	.	.
'CVTLW'	2	'F7'	al	v	sb	.	.	.	.
'ASHP'	6	'F8'	al	v	sb	ab	rb	rw	ab
'CVTLP'	3	'F9'	al	v	sb	ab	.	.	.
'CALLG'	2	'FA'	al	v	sb
'CALLS'	2	'FB'	al	v	sb
'XFC'	0	'FC'
'ESCD'	0	'FD'
'ESCE'	0	'FE'
'ESCF'	0	'FF'	z:

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MACRO	FDCODES								
'CVTDH'	32FD	rd							
'CVTGF'	33FD	rd							
'ADDG2'	40FD	rd							
'ADDG3'	41FD	rd							
'SUBG2'	42FD	rd							
'SUBG3'	43FD	rd							
'MULG2'	44FD	rd							
'MULG3'	45FD	rd							
'DIVG2'	46FD	rd							
'DIVG3'	47FD	rd							
'CVTGB'	48FD	rd							
'CVTGW'	49FD	rd							
'CVTGL'	4AFD	rd							
'CVTRGL'	4BFD	rd							
'CVTBG'	4CFD	rd							
'CVTWG'	4DFD	rd							
'CVTLG'	4EFD	rd							
'ACBG'	4FFD	rd							
'MOVG'	50FD	rd							
'CMPG'	51FD	rd							
'MNEGG'	52FD	rd							
'TSTG'	53FD	rd							
'EMODG'	54FD	rd							
'POLYG'	55FD	rd							
'CVTGH'	56FD	rd							
'ADDH2'	60FD	rd							
'ADDH3'	61FD	rd							
'SUBH2'	62FD	rd							
'SUBH3'	63FD	rd							
'MULH2'	64FD	rd							
'MULH3'	65FD	rd							
'DIVH2'	66FD	rd							
'DIVH3'	67FD	rd							
'CVTHB'	68FD	rd							
'CVTHW'	69FD	rd							
'CVTHL'	6AFD	rd							
'CVTRHL'	6BFD	rd							
'CVTBH'	6CFD	rd							
'CVTWH'	6DFD	rd							
'CVTLH'	6EFD	rd							
'ACBH'	6FFD	rd							
'MOVH'	70FD	rd							
'CMPH'	71FD	rd							
'MNEGH'	72FD	rd							
'TSTH'	73FD	rd							
'EMODH'	74FD	rd							
'POLYH'	75FD	rd							
'CVTHG'	76FD	rd							
'CLRO'	7CFD	rd							
'MOV0'	7DFD	rd							
'MOVAD'	7EFD	rd							
'PUSHAD'	7FFD	rd							
'CVTFH'	98FD	rd							
'CVTFG'	99FD	rd							
'CVTFH'	F6FD	rd							

'CVTHD'	:	2.	'F7FD'	:	rh.wd.	:	:	:	:	:
'BUGL'	:	0.	'FDFD'	:	il.	:	:	:	:	:
'BUGW'	:	0.	'FEFD'	:	iw.	:	:	:	:	z:

SOR

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MAC

OPCODES.REQ;1

```
MACRO
  DEF_OPCODES[A,B,C,D,E,F,G,H,I] =
  %NAME('OPC_',A) = %X(' ');
LITERAL
  DEF_OPCODES(OPCODES,FDCODES);
UNDECLARE
  %QUOTE OPCODES,
  %QUOTE FDCODES;
```

SOR

MAC

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MAC

```
! Define literals for the registers
```

```
LITERAL
R_0 = 0.      ! Register 0
R_1 = 1.
R_2 = 2.
R_3 = 3.
R_4 = 4.
R_5 = 5.
R_6 = 6.
R_7 = 7.
R_8 = 8.
R_9 = 9.
R_10 = 10.
R_11 = 11.
R_AP = 12.    ! Argument Pointer
R_FP = 13.    ! Frame pointer
R_SP = 14.    ! Stack pointer
R_PC = 15.    ! Program Counter
```

```
! Define literals for addressing modes
```

```
LITERAL
M_I = ZX'40' : Indexed mode
M_R = ZX'50' : Register
M_RD = ZX'60' : Register deferred
M_AD = ZX'70' : Autodecrement
M_AI = ZX'80' : Autoincrement
M_AID = ZX'90' : Autoincrement deferred
M_BD = ZX'A0' : Byte displacement
M_BDD = ZX'B0' : Byte displacement deferred
M_WD = ZX'C0' : Word displacement
M_WDD = ZX'D0' : Word displacement deferred
M_LD = ZX'E0' : Longword displacement
M_LDD = ZX'F0' : Longword displacement deferred
```

