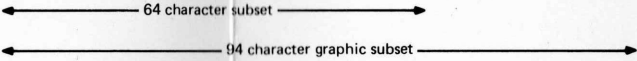


To obtain octal ASCII, decimal ASCII, or DECsystem-10 SIXBIT representation of a character, add the row value to the column value.

Column Value	000	008	016	024	032	040	048	056	064	072	080	088	096	104	112	120
Row Value	000	010	020	030	040	050	060	070	100	110	120	130	140	150	160	170
0	NUL	BS	DLE	CAN	space	(	0	8	@	H	P	X	grave	h	p	x
1	SOH	HT	DC1	EM	!	)	1	9	A	I	Q	Y	a	i	q	y
2	STX	LF	DC2	SUB	"	*	2	:	B	J	R	Z	b	j	r	z
3	EXT	VT	DC3	ESC	#	+	3	;	C	K	S	[	c	k	s	{
4	EOT	FF	DC4	FS	\$	,	4	<	D	L	T	\	d	l	t	
5	ENQ	CR	NAK	GS	%	-	5	=	E	M	U	]	e	m	u	}
6	ACK	SO	SYN	RS	&	.	6	>	F	N	V	( <u>^</u> )	f	n	v	(E <sub>~</sub> SC)
7	BEL	SI	ETB	US	'	/	7	?	G	O	W	( <u>+</u> )	g	o	w	DEL



Differences in the ASCII Standard

Octal	ASCII 1963	ASCII 1968
136	↑	^ (circumflex)
137	+	(underline)
176	ESC	~

NUL	NULL	DLE	DATA LINK ESCAPE (↑P)
SOH	START OF HEADING (↑A)	DC1	DEVICE CONTROL 1 (↑Q)
STX	START OF TEXT (↑B)	DC2	DEVICE CONTROL 2 (↑R)
ETX	END OF TEXT (↑C)	DC3	DEVICE CONTROL 3 (↑S)
EOT	END OF TRANSMISSION (↑D)	DC4	DEVICE CONTROL 4 (STOP) (↑T)
ENQ	ENQUIRY (↑E)	NAK	NEGATIVE ACKNOWLEDGE (↑U)
ACK	ACKNOWLEDGE (↑F)	SYN	SYNCHRONOUS IDLE (↑V)
BEL	BELL (↑G)	ETB	END OF TRANSMISSION BLOCK (↑W)
BS	BACKSPACE (↑H)	CAN	CANCEL (↑X)
HT	HORIZONTAL TABULATION (↑I)	EM	END OF MEDIUM (↑Y)
LF	LINE FEED (↑J)	SUB	SUBSTITUTE (↑Z)
VT	VERTICAL TABULATION (↑K)	ESC	ESCAPE (↑[)
FF	FORM FEED (↑L)	FS	FILE SEPARATOR (↑\)
CR	CARRIAGE RETURN (↑M)	GS	GROUP SEPARATOR (↑])
SO	SHIFT OUT (↑N)	RS	RECORD SEPARATOR (↑^)
SI	SHIFT IN (↑O)	US	UNIT SEPARATOR (↑+)
		DEL	DELETE (RUBOUT)

On most teleprinters, the ↑ x character is produced by depressing the CTRL key and at the same time depressing the x character key.

NOTES

- SIXBIT is not part of any ASCII standard. It is used by DECsystem-10 programs as a code compression technique for the 64 character graphic subset of ASCII.
- Teleprinters manufactured by Teletype Corporation, Skokie, Illinois, have used codes 175 (ALT) and 176 for ESC. Programs may forgo the use of } (175) and ~ (176) in order to use these codes as ESC on older teleprinters.
- ASCII is a seven bit character code with an optional odd parity bit (200) added for many devices. Programs normally use just seven bits internally; the 200 bit is either stripped or added so the program will operate with either parity or non-parity generating devices.
- ISO Recommendation R646 and CCITT Recommendation V.3 (International Alphabet No. 5) is identical to ASCII except that number sign (043) is represented as £ instead of # and certain characters are reserved for national use.

7-- INPUT-OUTPUT INSTRUCTIONS

70000	3BLKI	70204	6RDCSB
	1APRID		5RDTIME
70004	3DATAI	70210	6RDPUR
	4DATAI APR,		5WRPAE
	4RSW	70214	6RDCSTM
70010	3BLKO	70220	5RDTIM
	5WRFIL		5CONO TIM,
70014	4DATAO	70224	5RDINT
	4DATAO APR,		5CONI TIM,
70020	3CONO	70230	6RDHSB
	6WRAPR	70240	6WRSPB
	3CONO APR,		5RDMACT
70024	3CONI	70244	6WRCSB
	6RDAPR		5RDEACT
	3CONI APR,	70250	6WRPUR
70030	3CONSZ	70254	6WRCSTM
70034	3CONSO	70260	5WRTIM
70040	5RDERA		5CONO MTR,
70050	5SBDIAG	70264	5WRINT
70054	4DATAO PI,		5CONI MTR,
70060	5WRPI	70270	6WRHSB
	3CONO PI,	704	6WMOVE
70064	3CONI PI,	705	6WMOVEM
	6RDUBR	710	6TIOE
70104	1,3DATAI PAG,	71054	7DATAO PTR,
	1CLRPT	711	6TION
70110	6WRUBR	712	6RDIO
70114	1,3DATAO PAG,	713	6WRIO
	6WREBR	714	6BSIO
70120	1,3CONO PAG,	715	6BCIO
	6RDEBR	720	6TIOEB
70124	1,3CONI PAG,	721	6TIONB
	51SWPIA	722	6RDIOB
70144	51SWPVA	723	6WRIOB
70150	51SWPUA	724	6BSIOB
70154	51SWPIO	725	6BCIOB
70164	51SWPVO		
70170	51SWPUO		
70174	6RDSBP		
70200	5RDPFRF		

(x000x	3APR)
(x004x	3PI)
(x010x	1,3PAG)
(x014x	5CCA)
(x020x	5TIM)
(x024x	5MTR)

KEY

- Not available in KA10.
- No longer used in KS10 and future machines.
- Used only in KA10 and KI10.
- Used only in KL10.
- Used only in KS10.
- Used only in KI10.

↑ Indicates a NOW-standard instruction code that is available in the KL10 and KS10 (and can be expected to be available in all future processors) but is unassigned in the earlier processors.

MR 6495

# DECsystem-10 and DECSYSTEM-20

## KL SYSTEM REFERENCE CARD



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MR 6493

<b>PUSH</b> } { ~ and Jump <b>POP</b> }
<b>ADJ</b> ust Stack Pointer
use present pointer } and { <b>LoaD</b> Byte into AC Increment pointer } <b>DePosi</b> t Byte in memory Increment } Byte Pointer <b>ADJ</b> ust }
<b>MOVe</b> String { Left Justified Right Justified Offset Translated
<b>CoMP</b> are Strings and skip if { Less Equal Less or Equal Greater Greater or Equal Not equal
<b>ConVe</b> rt { Decimal to Binary } { Offset Binary to Decimal } Translated
<b>EDIT</b> string
<b>DATA</b> <b>BLocK</b> { In Out
<b>CON</b> ditions { in and Skip if { all masked bits Zero some masked bit One
Bit Set } In-Out Bit Clear } ReaD } WRite } { ~ Byte
Test In-Out { Equal Not equal }

MR-6499

<b>MOV</b> { E e Negative e Magnitude e Swapped
Half word { Right Left } to { Right Left } { no effect Ones Zeros Extend sign }
<b>BLocK</b> Transfer <b>EXCH</b> ange AC and memory
use present pointer } and { <b>LoaD</b> Byte into AC Increment pointer } <b>DePosi</b> t Byte in memory
Increment Byte Pointer
<b>PUSH</b> down } { ~ and Jump <b>POP</b> up }
<b>SET</b> to { Zeros Ones AC Memory Complement of AC Complement of Memory
<b>AND</b> inclusive OR { ~ with Complement of AC with Complement of Memory Complements of Both }
Inclusive OR eXclusive OR eQui Valence
<b>SKIP</b> if memory <b>JUMP</b> if AC
Add One to Subtract One from { memory and Skip AC and Jump } if { never Less Equal Less or Equal Always Greater Greater or Equal Not equal
Compare AC { Immediate with Memory } and skip if AC {
Add One to Both halves of AC and Jump if { Positive Negative
Arithmetic Shift Logical Shift ROTate { ~ Combined
Test AC { with Direct mask with Swapped mask Right with E Left with E } { No modification set masked bits to Zeros set masked bits to Ones Complement masked bits } and skip { never if all masked bits Equal 0 if Not all masked bits equal 0 Always
<b>ADD</b> <b>SUB</b> tract <b>MULTI</b> ply <b>Integer MULTI</b> ply <b>Divide</b> <b>Integer DiVide</b>
Floating Add Floating Sub Floating Multi Floating DiVide { and Round }
Floating Scale Double Floating Negate Unnormalized Floating Add FIX FIX and Round FLoat and Round
Double Floating Add Double Floating Sub Double Floating Multi Double Floating DiVide
Double MOV { E e Negative } { ~ to Memory
Jump, { to Sub Routine and Save Pc and Save Ac and Restore Ac if Find First One on Flag and CLear it on OVerflow (JFCL 10.) on CaRrY 0 (JFCL 4.) on CaRrY 1 (JFCL 2.) on CaRrY (JFCL 6.) on Floating OVerflow (JFCL 1.) and ReSTore and ReSTore Flags (JRST 2.) and ENable M channel (JRST 12.)
<b>HALT</b> (JRST 4.) <b>PORTAL</b> (JRST 1.) eXeCuTe
<b>DATA</b> <b>BLocK</b> { In Out
<b>CON</b> ditions { in and Skip if { all masked bits Zero some masked bit One

MR-6498

INSTRUCTION CODES									
	--0	--1	--2	--3	--4	--5	--6	--7	
00	ILLEGAL	CMPSL	CMPSE	CMPSL	EDIT	CMPSGE	CMPSN	CMPSG	
01	CVTDBO	CVTDBT	CVTDBO	CVTDBT	MOVSO	MOVST	MOVSLJ	MOVSRJ	
02									
03									
04	CALL	INIT	RESERVED MUO's					CALLI	
05	OPEN	TTCAL	GETSTS	STATZ	INBUF	RENAME	IN	OUT	
06	SETSTS	STATO	MTAPE	UGETF	USETI	OUTBUF	INPUT	OUTPUT	
07	CLOSE	RELEASE				USETO	LOOKUP	ENTER	
10	UJEN	DFAD	DFMP	DEDV	JSYS	ADJSP			
11	DFAD	DMOVI	DFSB	FIX	DMOVEM	DMOVNM	FIXR	FLTR	
12	DMOVI	DFN	FSC	IBP	ILDB	LDB	IDPB	DPB	
13	UFA								
14	FAD	-L	-M	-B	FADR	-I	-M	-B	
15	FSB	-L	-M	-B	FSBR	-I	-M	-B	
16	FMP	-L	-M	-B	FMPR	-I	-M	-B	
17	FDV	-L	-M	-B	FDVR	-I	-M	-B	
20	MOV	-I	-M	-S	MOVS	-I	-M	-S	
21	MOVN	-I	-M	-S	MOVNM	-I	-M	-S	
22	IMUL	-I	-M	-B	MUL	-I	-M	-B	
23	IDIV	-I	-M	-B	DIV	-I	-M	-B	
24	ASH	ROT	LSH	JFFO	ASHC	ROTC	LSHC	MAP	
25	EXCH	BLT	AOBJP	AOBJN	JRST	JFCL	XCT	JRA	
26	PUSHJ	PUSH	POP	POPJ	JSR	JSP	JSA	JRA	
27	ADD	-I	-M	-B	SUB	-I	-M	-B	
30	CAI	-L	-E	-LE	-A	-GE	-N	-G	
31	CAM	-L	-E	-LE	-A	-GE	-N	-G	
32	JUMP	-L	-E	-LE	-A	-GE	-N	-G	
33	SKIP	-L	-E	-LE	-A	-GE	-N	-G	
34	AOS	-L	-E	-LE	-A	-GE	-N	-G	
35	AOS	-L	-E	-LE	-A	-GE	-N	-G	
36	SOJ	-L	-E	-LE	-A	-GE	-N	-G	
37	SOS	-L	-E	-LE	-A	-GE	-N	-G	
40	SETZ	-I	-M	-B	AND	-I	-M	-B	
41	ANDCA	-I	-M	-B	SETM	-I	-M	-B	
42	ANDCM	-I	-M	-B	SETA	-I	-M	-B	
43	XOR	-I	-M	-B	IOR	-I	-M	-B	
44	ANDCB	-I	-M	-B	EOV	-I	-M	-B	
45	SETCA	-I	-M	-B	ORCA	-I	-M	-B	
46	SETCM	-I	-M	-B	ORCM	-I	-M	-B	
47	ORCB	-I	-M	-B	SETO	-I	-M	-B	
50	HLL	-I	-M	-S	HRL	-I	-M	-S	
51	HLLZ	-I	-M	-S	HRLZ	-I	-M	-S	
52	HLLO	-I	-M	-S	HLRO	-I	-M	-S	
53	HLLE	-I	-M	-S	HLRE	-I	-M	-S	
54	HRR	-I	-M	-S	HLR	-I	-M	-S	
55	HRRZ	-I	-M	-S	HLRZ	-I	-M	-S	
56	HRRO	-I	-M	-S	HLRO	-I	-M	-S	
57	HRRE	-I	-M	-S	HLRE	-I	-M	-S	
60	TRN	TLN	TRNE	TLNE	TRNA	TLNA	TRNN	TLNN	
61	TDN	TSN	TDNE	TSNE	TDNA	TSNA	TDNN	TSNN	
62	TRZ	TLZ	TRZE	TLZE	TRZA	TLZA	TRZN	TLZN	
63	TSZ	TSZ	TDZE	TSZE	TDZA	TSZA	TDZN	TSZN	
64	TRC	TLC	TRCE	TLCE	TRCA	TLCA	TRCN	TLCN	
65	TDC	TSC	TDCE	TSCC	TDCA	TSCA	TDON	TSN	
66	TRO	TLO	TROE	TLOE	TROA	TLOA	TRON	TLO	
67	TDO	TDO	TDOE	TDOE	TDOA	TDOA	TDON	TDO	

7 --- INPUT-OUTPUT INSTRUCTIONS

001-037 LUUO's, 001-020 codes under EXTEND, all others unassigned.

MR-6494

0	EIGHT CHANNEL LOGOUT AREAS
	EACH: 0 INITIAL CHANNEL COMMAND
	1 GETS CHANNEL STATUS WORD
	2 GETS LAST UPDATED COMMAND
	3 RESERVED
37	
40	RESERVED
41	
42	STANDARD PRIORITY INTERRUPT INSTRUCTIONS
57	
60	FOUR CHANNEL BLOCK FILL WORDS
63	
64	RESERVED
137	
140	FOUR DTE20 CONTROL BLOCKS
	EACH: 0 TO11 BYTE POINTER
	1 TO10 BYTE POINTER
	2 DTE INTERRUPT INSTRUCTION
	3 RESERVED
	4 EXAMINE PROTECT
	5 EXAMINE RELOCATION
	6 DEPOSIT PROTECT
	7 DEPOSIT RELOCATION
177	
200	RESERVED
420	
421	EXECUTIVE ARITHMETIC OVERFLOW TRAP INSTRUCTION
422	EXECUTIVE STACK OVERFLOW TRAP INSTRUCTION
423	EXECUTIVE TRAP 3 TRAP INSTRUCTION
424	
	RESERVED
507	
510	TIME BASE
511	
512	PERFORMANCE ANALYSIS COUNT
513	
514	INTERVAL COUNTER INTERRUPT INSTRUCTION
515	
	RESERVED
537	
540	EXECUTIVE SECTION 0 POINTER
577	EXECUTIVE SECTION 37 POINTER
600	
	RESERVED
777	

EXTENDED TOPS - 20 PROCESS TABLE  
CONFIGURATION

MR-3700

0	
	NOTE: ASTERISKS INDICATE LOCATIONS WHOSE USE DIFFERS FROM THOSE IN THE SINGLE SECTION PROCESS TABLE LISTED ON THE NEXT PAGE
	RESERVED
417	
420	ADDRESS OF LUUO BLOCK *
421	USER ARITHMETIC OVERFLOW TRAP INSTRUCTION
422	USER STACK OVERFLOW TRAP INSTRUCTION
423	USER TRAP 3 TRAP INSTRUCTION
424	MUO0 FLAGS MUO0 OP CODE, A *
425	MUO0 OLD PC *
426	E OF MUO0 *
427	MUO0 PROCESS CONTEXT WORD *
430	KERNEL NO TRAP MUO0 NEW PC *
431	KERNEL TRAP MUO0 NEW PC *
432	SUPERVISOR NO TRAP MUO0 NEW PC *
433	SUPERVISOR TRAP MUO0 NEW PC *
434	CONCEALED NO TRAP MUO0 NEW PC *
435	CONCEALED TRAP MUO0 NEW PC *
436	PUBLIC NO TRAP MUO0 NEW PC *
437	PUBLIC TRAP MUO0 NEW PC *
440	
	RESERVED
477	
500	PAGE FAIL WORD *
501	PAGE FAIL FLAGS *
502	PAGE FAIL OLD PC *
503	PAGE FAIL NEW PC *
504	
505	USER PROCESS EXECUTION TIME
506	
507	USER MEMORY REFERENCE COUNT
510	
	RESERVED
537	
540	USER SECTION 0 POINTER
577	USER SECTION 37 POINTER
600	
	RESERVED
777	

EXTENDED TOPS - 20 PROCESS TABLE  
CONFIGURATION (CONT)

MR-3701

0	EIGHT CHANNEL LOGOUT AREAS
	EACH: 0 INITIAL CHANNEL COMMAND
	1 GETS CHANNEL STATUS WORD
	2 GETS LAST UPDATED COMMAND
	3 RESERVED
37	
40	RESERVED
41	
42	STANDARD PRIORITY INTERRUPT INSTRUCTIONS
57	
60	FOUR CHANNEL BLOCK FILL WORDS
63	
64	RESERVED
137	
140	FOUR DTE20 CONTROL BLOCKS
	EACH: 0 TO11 BYTE POINTER
	1 TO10 BYTE POINTER
	2 DTE INTERRUPT INSTRUCTION
	3 RESERVED
	4 EXAMINE PROTECT
	5 EXAMINE RELOCATION
	6 DEPOSIT PROTECT
	7 DEPOSIT RELOCATION
177	
200	RESERVED
420	
421	EXECUTIVE ARITHMETIC OVERFLOW TRAP INSTRUCTION
422	EXECUTIVE STACK OVERFLOW TRAP INSTRUCTION
423	EXECUTIVE TRAP 3 TRAP INSTRUCTION
424	
	RESERVED
507	
510	TIME BASE
511	
512	PERFORMANCE ANALYSIS COUNT
513	
514	INTERVAL COUNTER INTERRUPT INSTRUCTION
515	
	RESERVED
537	
540	EXECUTIVE SECTION 0 POINTER
577	EXECUTIVE SECTION 37 POINTER
600	
	RESERVED
777	

SINGLE-SECTION TOPS-20 PROCESS  
TABLE CONFIGURATION

MR-3702

0	
	NOTE: ASTERISKS INDICATE LOCATIONS WHOSE USE DIFFERS FROM THOSE IN THE EXTENDED PROCESS TABLE LISTED ON THE PRECEDING PAGE.
	RESERVED
420	
421	USER ARITHMETIC OVERFLOW TRAP INSTRUCTION *
422	USER STACK OVERFLOW TRAP INSTRUCTION
423	USER TRAP 3 TRAP INSTRUCTION
424	RESERVED *
425	MUO0 STORED HERE *
426	MUO0 OLD PC WORD *
427	MUO0 PROCESS CONTEXT WORD *
430	KERNEL NO TRAP MUO0 NEW PC WORD *
431	KERNEL TRAP MUO0 NEW PC WORD *
432	SUPERVISOR NO TRAP MUO0 NEW PC WORD *
433	SUPERVISOR TRAP MUO0 NEW PC WORD *
434	CONCEALED NO TRAP MUO0 NEW PC WORD *
435	CONCEALED TRAP MUO0 NEW PC WORD *
436	PUBLIC NO TRAP MUO0 NEW PC WORD *
437	PUBLIC TRAP MUO0 NEW PC WORD *
440	
	RESERVED
477	
500	PAGE FAIL WORD *
501	PAGE FAIL FLAGS *
502	PAGE FAIL OLD PC WORD *
503	PAGE FAIL NEW PC WORD *
504	
505	USER PROCESS EXECUTION TIME
506	
507	USER MEMORY REFERENCE COUNT
510	
	RESERVED
537	
540	USER SECTION 0 POINTER
577	USER SECTION 37 POINTER
600	
	RESERVED
777	

SINGLE-SECTION TOPS-20 PROCESS  
TABLE CONFIGURATION (CONT)

MR-3703

(ADDRESSED FROM UBR)

0	USER PAGE 0	USER PAGE 1
377	USER PAGE 776	USER PAGE 777
400	EXECUTIVE PAGE 340	EXECUTIVE PAGE 341
417	EXECUTIVE PAGE 376	EXECUTIVE PAGE 377
420	RESERVED	
421	USER ARITHMETIC OVERFLOW TRAP INSTRUCTION	
422	USER STACK OVERFLOW TRAP INSTRUCTION	
423	USER TRAP 3 TRAP INSTRUCTION	
424	MUO STORED HERE	
425	MUO OLD PC WORD	
426	MUO PROCESS CONTEXT WORD	
427	RESERVED	
430	KERNEL NO TRAP MUO NEW PC WORD	
431	KERNEL TRAP MUO NEW PC WORD	
432	SUPERVISOR NO TRAP MUO NEW PC WORD	
433	SUPERVISOR TRAP MUO NEW PC WORD	
434	CONCEALED NO TRAP MUO NEW PC WORD	
435	CONCEALED TRAP MUO NEW PC WORD	
436	PUBLIC NO TRAP MUO NEW PC WORD	
437	PUBLIC TRAP MUO NEW PC WORD	
440	RESERVED	
477	PAGE FAIL WORD	
500	PAGE FAIL OLD PC WORD	
501	PAGE FAIL NEW PC WORD	
502	RESERVED	
504	USER PROCESS EXECUTION TIME	
505	USER MEMORY REFERENCE COUNT	
506	RESERVED	
510	RESERVED	
777		

TOPS - 10 PROCESS TABLE  
CONFIGURATION

MR-3698

(ADDRESSED FROM EBR)

0	EIGHT CHANNEL LOGOUT AREAS	
	EACH: 0 INITIAL CHANNEL COMMAND	
	1 GETS CHANNEL STATUS WORD	
	2 GETS LAST UPDATED COMMAND	
	3 RESERVED	
37	RESERVED	
40	RESERVED	
41	RESERVED	
42	STANDARD PRIORITY INTERRUPT INSTRUCTIONS	
57	RESERVED	
60	FOUR CHANNEL BLOCK FILL WORDS	
63	RESERVED	
64	RESERVED	
137	RESERVED	
140	FOUR DTE20 CONTROL BLOCKS	
	EACH: 0 TO11 BYTE POINTER	
	1 TO10 BYTE POINTER	
	2 DTE INTERRUPT INSTRUCTION	
	3 RESERVED	
	4 EXAMINE PROTECT	
	5 EXAMINE RELOCATION	
	6 DEPOSIT PROTECT	
	7 DEPOSIT RELOCATION	
177	EXECUTIVE PAGE 400	
200	EXECUTIVE PAGE 400	EXECUTIVE PAGE 401
377	EXECUTIVE PAGE 776	EXECUTIVE PAGE 777
400	RESERVED	
420	EXECUTIVE ARITHMETIC OVERFLOW TRAP INSTRUCTION	
421	EXECUTIVE STACK OVERFLOW TRAP INSTRUCTION	
422	EXECUTIVE TRAP 3 TRAP INSTRUCTION	
423	RESERVED	
424	RESERVED	
507	TIME BASE	
510	PERFORMANCE ANALYSIS COUNT	
511	INTERVAL COUNTER INTERRUPT INSTRUCTION	
512	RESERVED	
513	RESERVED	
514	EXECUTIVE PAGE 0	
515	EXECUTIVE PAGE 1	
577	EXECUTIVE PAGE 336	
600	EXECUTIVE PAGE 0	EXECUTIVE PAGE 1
757	EXECUTIVE PAGE 336	EXECUTIVE PAGE 337
760	RESERVED	
777	RESERVED	

TOPS - 10 PROCESS TABLE  
CONFIGURATION (CONT)

MR-3699



0	APR CPA CENTRAL PROCESSOR	PI PRIORITY INTERRUPT	PAG K110 PAGING	MCA20 CCA CACHE	TIM KL10 ACCOUNTING LOGIC	MTR	ADC2 ANALOG- DIGITAL CONVERTER	DX10 PDC3 MAGNETIC TAPE							DLB	DL10 DLC PDP-11 DATA LINK	DK10 CLK REAL TIME CLOCK	CLK2 REAL TIME CLOCK
1	PTP PAPER TAPE PUNCH	PTR PAPER TAPE READER	CDP CARD PUNCH	CP10	626 TTY CONSOLE TELETYPE	LP10 LPT LINE PRINTER	VP10 DIS DISPLAY	VP10 DIS2 DISPLAY	XY10 PLT PLOTTER	XY10 PLT2 PLOTTER	CR10 CR CARD READER	CR10 CR2 CARD READER			DLB2	DL10 DLC2	RC10 DSK DISK/DRUM	RC10 DSK2 DISK/DRUM
2	DTE20 10/11 INTERFACE	DTE20 DTE2 10/11 INTERFACE	DTE20 DTE3 10/11 INTERFACE	DTE20 DTE4 10/11 INTERFACE	DX10 PDC MAGNETIC TAPE	DX10 PDC2 MAGNETIC TAPE		LP10 LPT2 LINE PRINTER	DC10 DLS DATA LINE SCANNER	DC10 DLS2 DATA LINE SCANNER	RP10 DPC DISK PACK SYSTEM	RP10 DPC2 DISK PACK SYSTEM			RPH10 DPC3 DISK PACK SYSTEM	RPH10 DPC4 DISK PACK SYSTEM	RH10 RMC DATA CONTROL	RH10 RMC2 DATA CONTROL
3		DX10 PDC4 MAGNETIC TAPE			DTC	TD10 DTS	DTC2	TD10 DTS2	TMC	TM10 TMS	TMC2	TM10 TMS2			RH10 RMC3 DATA CONTROL	RH10 RMC4 DATA CONTROL	RH10 RMC5 DATA CONTROL	RH10 RMC6 DATA CONTROL
4															DSS	DS10 DSI SINGLE SYNCHRONOUS LINE UNIT	DSS2	DS10 DSI2 SINGLE SYNCHRONOUS LINE UNIT
5									RH20 MBC MASSBUS CONTROL	RH20 MBC2 MASSBUS CONTROL	RH20 MBC3 MASSBUS CONTROL	RH20 MBC4 MASSBUS CONTROL			RH20 MBC5 MASSBUS CONTROL	RH20 MBC6 MASSBUS CONTROL	RH20 MBC7 MASSBUS CONTROL	RH20 MBC8 MASSBUS CONTROL
6																		
7										K110 UNRESTRICTED CODES RESERVED FOR USERS					K110 UNRESTRICTED CODES RESERVED FOR DEC			

MR-2300

## BASIC INSTRUCTIONS

00 01 02 03 04 05 06 07 08 09 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

INSTRUCTION CODE (INCLUDING MODE)	A,F	I	X	Y
--------------------------------------	-----	---	---	---

## KL10 IN-OUT INSTRUCTIONS

00 01 02 03 04 05 06 07 08 09 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

1	1	1	DEVICE CODE	INSTR CODE	I	X	Y
---	---	---	-------------	------------	---	---	---

## INSTRUCTIONS EXECUTED UNDER EXTEND

00 01 02 03 04 05 06 07 08 09 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

[illegible]

## LOCAL INDIRECT WORD

00 01 02 03 04 05 06 07 08 09 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

1	0	RESERVED	I	X	Y
---	---	----------	---	---	---

## GLOBAL INDIRECT WORD

00 01 02 03 04 05 06 07 08 09 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

[illegible]

## LOCAL INDEX REGISTER

00 01 02 03 04 05 06 07 08 09 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

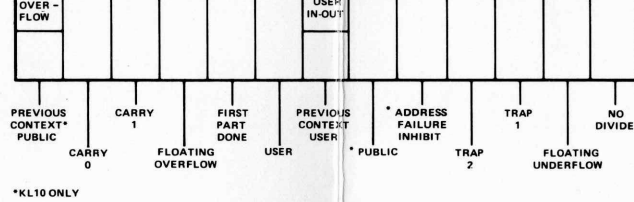
IN NONZERO SECTION MUST BE $\leq 0$ OR BITS 6-17 = 0																	LOCAL INDEX																
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

## GLOBAL INDEX REGISTER

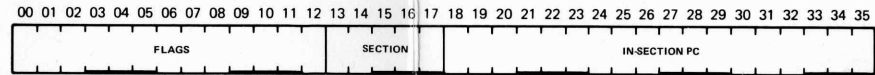
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

0	0	0	0	0	0	GLOBAL INDEX WITH NONZERO SECTION NUMBER																							
---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

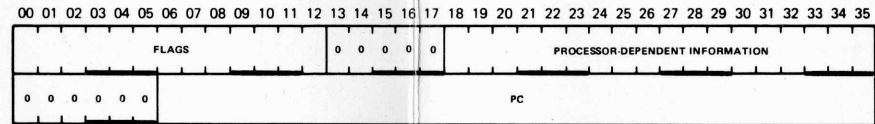
MR 6484



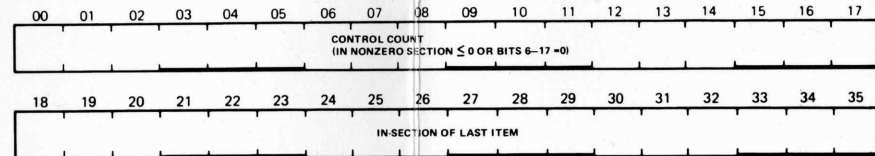
#### PC WORD



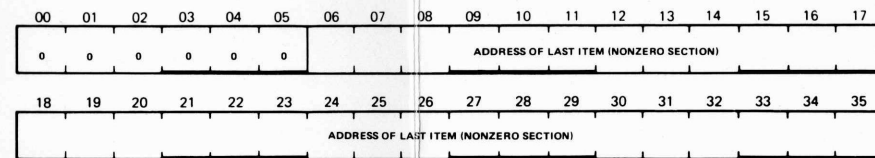
#### FLAG-PC DOUBLE WORD



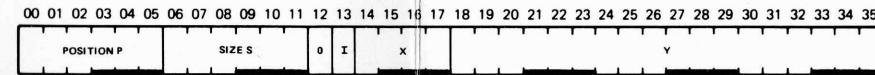
#### LOCAL STACK POINTER



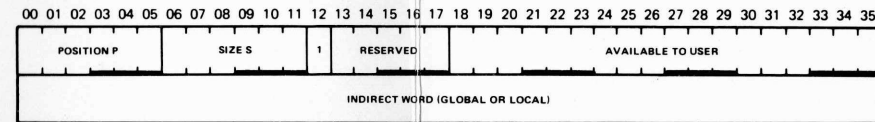
#### GLOBAL STACK POINTER



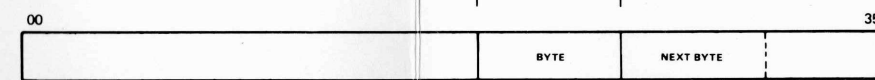
#### ONE-WORD BYTE POINTER



#### TWO-WORD BYTE POINTER

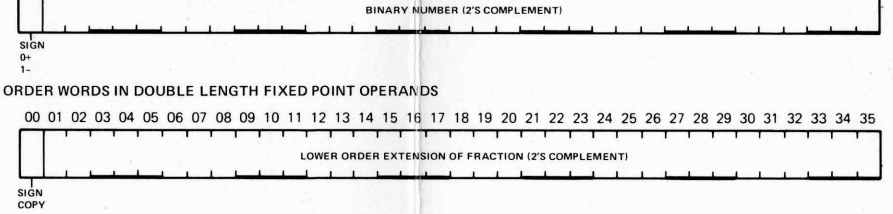


#### BYTE STORAGE

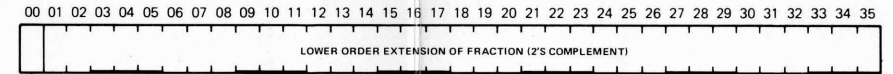


35-P-S+1 35-P 35-P+1

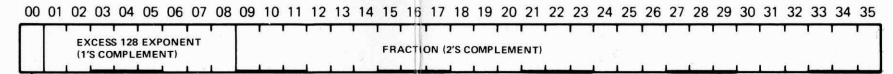
MR-6483



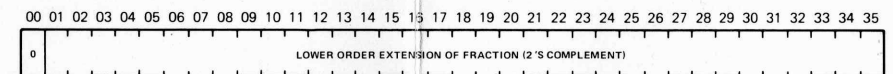
#### LOWER ORDER WORDS IN DOUBLE LENGTH FIXED POINT OPERANDS



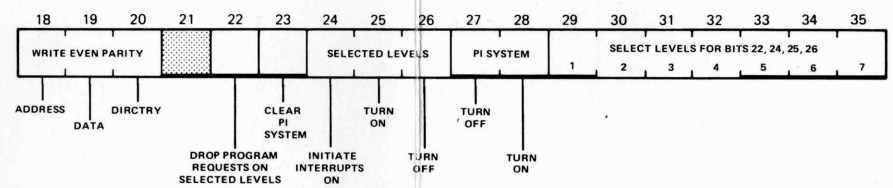
#### FLOATING POINT OPERANDS (SINGLE PRECISION OR HIGH ORDER WORD)



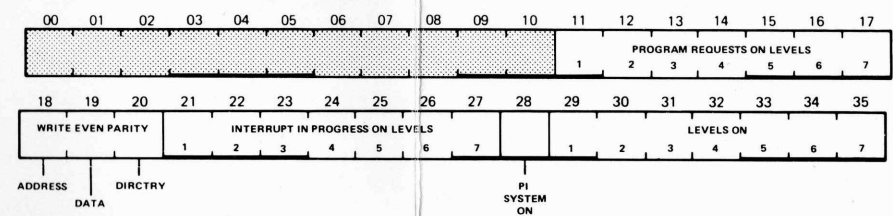
#### LOWER ORDER WORDS IN MULTIPLE LENGTH FLOATING POINT OPERANDS



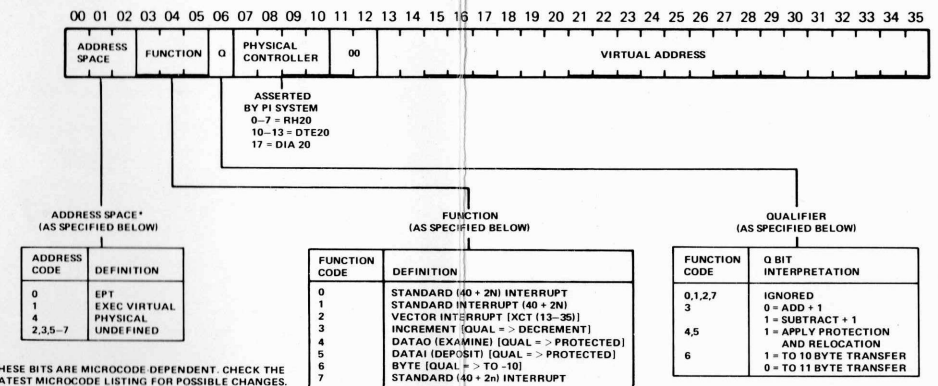
#### CONONO PI - Conditions Out, Priority Interrupt



#### CONONI PI - Conditions In, Priority Interrupt



#### API Word Format



\*THESE BITS ARE MICROCODE DEPENDENT. CHECK THE LATEST MICROCODE LISTING FOR POSSIBLE CHANGES.

MR-6500

MR-3827

MODE	0	ACC	MOD	WRT	REF TYPE	PUB	CACHE	VIRT	SECTION							
									13	14	15	16	17			

00 0 = EXEC MODE  
1 = USER MODE  
02 0 = REFILL REQUIRED TO DETERMINE PAGE ACCESSIBILITY  
1 = ACCESSIBLE  
03 0 = PAGE NOT MODIFIED  
1 = PAGE MODIFIED  
04 0 = WRITE-PROTECTED  
1 = WRITABLE

05 0 = READ-ONLY REFERENCE  
1 = REFERENCE INVOLVED A WRITE  
06 0 = PRIVATE  
1 = PUBLIC  
07 0 = CACHE-LOOK BUT DO NOT LOAD  
1 = CACHEABLE  
08 A 1 INDICATES A VIRTUAL ADDRESS WAS GIVEN FOR THE REFERENCE

MR-6497

#### Page Map Entry (TOPS-10 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
ACC	PUB	WRITE	SOFT	CACHE	14	15	16	PHYSICAL PAGE NUMBER (ODD VIRTUAL PAGE)								23	24
								17	18	19	20	21	22	23	24	25	26
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ACC	PUB	WRITE	SOFT	CACHE	14	15	16	PHYSICAL PAGE NUMBER (EVEN VIRTUAL PAGE)								23	24
								17	18	19	20	21	22	23	24	25	26

00 & 18 0 = NO ACCESS ALLOWED  
1 = ACCESS ALLOWED  
01 & 19 0 = PRIVATE  
1 = PUBLIC

02 & 20 0 = WRITE-PROTECTED  
1 = WRITABLE  
03 & 21 SOFTWARE (NOT INTERPRETED BY HARDWARE)  
04 & 22 0 = CACHE-LOOK BUT DO NOT LOAD  
1 = CACHEABLE

MR-2194

#### SECTION POINTER – No Access (TOPS-20 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	0	0														
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

MR-3832

#### SECTION POINTER – Immediate (TOPS-20 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	0	1	PUB	WRITE	CACHE		AVAILABLE TO SOFTWARE								STORAGE MEDIUM	
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
AVAILABLE TO SOFTWARE					14	15	16	17	PAGE NUMBER OF PAGE MAP								
									18	19	20	21	22	23	24	25	26

03 0 = PRIVATE  
1 = PUBLIC  
04 0 = WRITE-PROTECTED  
1 = WRITABLE

06 0 = CACHE-LOOK BUT DO NOT LOAD  
1 = CACHEABLE  
<12:17> NON-ZERO INDICATES PAGE MAP IS NOT IN MEMORY

MR-3833

#### SECTION POINTER – Shared (TOPS-20 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	1	0	PUB	WRITE	CACHE		AVAILABLE TO SOFTWARE									
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
INDEX TO SPT LOCATION CONTAINING PAGE ADDRESS OF PAGE MAP																	

NOTE: REFER TO IMMEDIATE POINTER FOR BIT DEFINITIONS.

MR-3835

#### SECTION POINTER – Indirect (TOPS-20 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	1	1	PUB	WRITE	CACHE	AVAIL TO SOFTWARE	SECTION TABLE INDEX									
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
INDEX TO SPT LOCATION CONTAINING PAGE ADDRESS OF ANOTHER SECTION TABLE																	

NOTE: REFER TO IMMEDIATE POINTER FOR BIT DEFINITIONS.

MR-3834

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	0	0														

18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

MR-3831

#### MAP POINTER – Immediate (TOPS-20 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	0	1	PUB	WRITE	CACHE		AVAILABLE TO SOFTWARE								STORAGE MEDIUM	
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
AVAILABLE TO SOFTWARE					14	15	16	17	18	PAGE NUMBER FOR MAPPING							
										19	20	21	22	23	24	25	26

03 0 = PRIVATE  
1 = PUBLIC  
04 0 = WRITE PROTECTED  
1 = WRITABLE

06 0 = CACHE-LOOK BUT DO NOT LOAD  
1 = CACHEABLE  
<12:17> NON-ZERO INDICATES PAGE NOT IN MEMORY

MR-2149

#### MAP POINTER – Shared (TOPS-20 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	1	0	PUB	WRITE	CACHE		AVAILABLE TO SOFTWARE									
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
INDEX TO SPT LOCATION CONTAINING PAGE ADDRESS FOR MAPPING																	

NOTE: REFER TO IMMEDIATE POINTER FOR BIT DEFINITIONS.

MR-2150

#### MAP POINTER – Indirect (TOPS-20 Only)

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
POINTER TYPE	0	1	1	PUB	WRITE	CACHE	AVAIL TO SOFTWARE	PAGE MAP INDEX									
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
INDEX TO SPT LOCATION CONTAINING PAGE ADDRESS OF ANOTHER PAGE MAP																	

NOTE: REFER TO IMMEDIATE POINTER FOR BIT DEFINITIONS.

MR-2151

#### CST ENTRY

00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
PAGE AGE								AVAILABLE TO SOFTWARE									
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
AVAILABLE TO SOFTWARE																	

NOTE: AGE TRAP OCCURS IF BITS <00:05> EQUAL ZERO.

MR-2152