DATE: June 13

SUBJECT:

PDP-11 EAE

DP-1

TD: D. Savins Lists A, C and FROM: Roger Cady Design Rev. Comm.

> Proposed first pass at EAE instructions for PDP-11 are attached. This indicates the way in which these would be added within the frame- . work of the basic instruction set.

Summary of Mnemonics:

Summary	of Mnemon	ics:	Source	(6bit)	Dest	ination
MUL		А,В				(6D1t)
DIV		А,В	Ť			
*ROT+N		R,A				
*ROTB+N		R,A			nder fange All 252 af de se	
*LSH+N	철상동이 성수가 있었다. - 1911년 1월 11년 - 1911년 - 1911년 1월 11년 1월 12년 - 1911년	R,A				
*LSHD+N		R,A				
*ASH+N		R,A				
*ASHD+N		R,A				
NOR		R,A.				
NORD		R,A				1

*R field optional. If blank, no index.

JUN 18 1969

DIGITAL EQUIPMENT CORPORATION . MAYNARD, MASSACHUSETTS

DATE: June 13

SUBJECT:

PDP-11 EAE

DP-II

TO:

Lists A, C and FROM: Roger Cady Design Rev. Comm.

Proposed first pass at EAE instructions for PDP-11 are attached. This indicates the way in which these would be added within the framework of the basic instruction set.

Source, (6bit) Destination

Summary	of	Mnemonics:
MUL		А,В
DIV		A, B
*ROT <u>+</u> N		R,A
*ROTB+N		R,A
*LSH <u>+</u> N		R,A
*LSHD <u>+</u> N		R,A
*ASH+N		R,A
*ASHD <u>+</u> N		R,A
NOR		R,A
NORD		R,A

*R field optional. If blank, no index.

JUN 1 8 1969

PROPOSED EAE INSTRUCTIONS FOR PDP-11

EAE will add the arithmetic power of multiply, divide, and a powerful multiple rotate, shift, and normalize group.

The adopted data structure is as follows:

Single Precision

S	MAGNITUDE		(m.			
15	14		(1%	0'S	000	n+

Double Precision

Shigh $\frac{1}{2}$ magnitudeØlow $\frac{1}{2}$ magnitude1514015140

All double word operands are assumed to be in this form, all double word results are stored in this form.

and a subscription of the second s		a - the the standard gas	Anna an	والأروافية والإكرام والمراجع أراجع والمراجع	content of the second second	and the second	
	М	IUL		A		B	
MODITATI	0	1 1	1	SOUI	RCE	DESTINATI	ON
	15		12	11	6	5	٤0
			or le If qu nc or	(SE)*(I (PC)+n berands 5 point 5 both c antitie 5 take 1 result	$DE) \longrightarrow (1)$ $are consistent constraints of the con$	DE), (DE+2) nsidered to quantities s are maximu >V and opera Otherwise tion.	be um negative ation will N, Z set
			If pr re (C	destir coduct w gister CAUTION:	nation vill be and the MUL 2	is a registe stored in e next regis A, %R5 will	er, the that ster. alter LP)
DIVIDE	1 15	DIV 1 1	1 12	A SOUF 11	A , RCE 6	B DESTINATIO 5	ОМ 0
		<u>(DE</u>	<u>;), (</u> (SE) +n	<u>DE+2)</u>	(DE), Remainde:	r

If both divisor and dividend are maximum negative quantities or if divisor is smaller than upper half of dividend $1 \longrightarrow V$ otherwise $1 \longrightarrow N$ if quotient negative $1 \longrightarrow Z$ if quotient zero.

Register destination note same as in MUL

ROTATE/SHIFT GROUP

Two	wor	d (iı	nsti	ucti	Lon	•		and the second	
В	C	00	1	10		11	OI	?	DESTIN	ATION
15	14			· · · · · · · · · · · · · · · · · · ·	9	8	7	6	5	0
				x	REC	3	S		COUNI	
15			12	11	10	8	7	6		0

BITS

В	OP	OPERATION	MNEMONIC
15	76		
0	0 0	Rotate with carry (word)	ROT
1	0 0	Rotate with carry (byte) In rotates, V gets comple- mented for every l shifted thru carry.	ROTB
0	01	Logical Shift (word)	LSH
1	01	Logical Shift (double word)	LSHD
0	10	Arithmetic Shift (word)	ASH
1	10	Arithmetic Shift (double word)	ASHD
0	111	Normalize (word)	NOR
1	111	Normalize (double word)	NORD

The second word determines direction and count for multiple Rotate/Shifts. The sign of the Count is the direction (+ = right, - = left). This is a Two's Complement 8 bit quantity.

ROT, ROTB, LSH, LSHD, ASH, ASHD:

If the X bit in the second word is set, the count is indexed by the contents of the register specified in the REG field.

NOR, NORD

The count and X bits are ignored if the instruction is normalize. The REG field determines where the normalize count is left after the operation. Previous contents of REG are destroyed.

Comments:

- 1. ROTB used to generate parity of byte data
- Double word operations use the destination location and destination location +2.
- 3. Max effective count is 32. The effective count if indexed, after indexing) is determined by the least significant 5 bits.