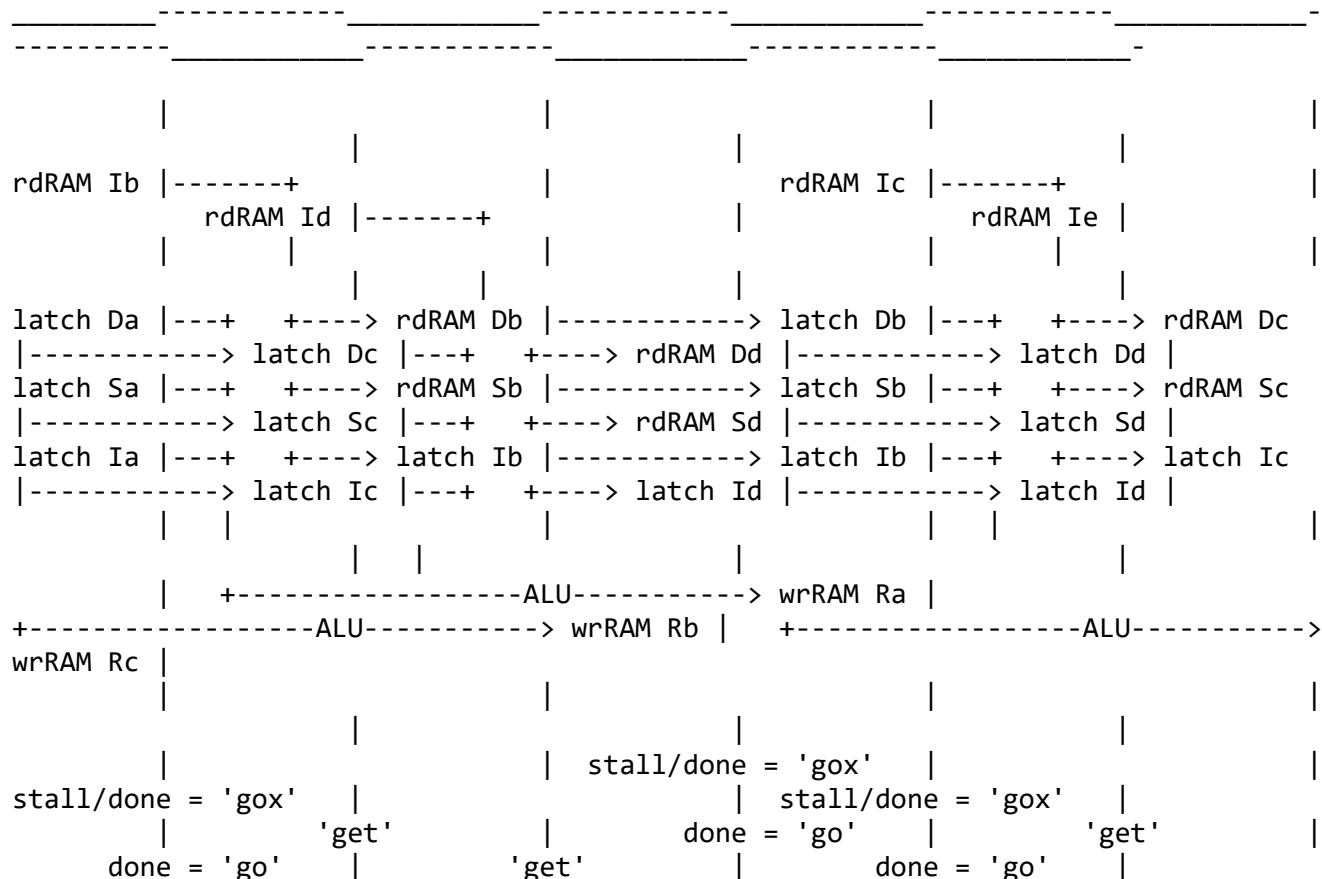


instructions\_v32.txt

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instruction timing  
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clk



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instructions  
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EEEE 0000000	CZI	DDDDDDDDDD	SSSSSSSSSS	ROR	D,S/#	{WC/WZ/WCZ}
EEEE 0000001	CZI	DDDDDDDDDD	SSSSSSSSSS	ROL	D,S/#	{WC/WZ/WCZ}
EEEE 0000010	CZI	DDDDDDDDDD	SSSSSSSSSS	SHR	D,S/#	{WC/WZ/WCZ}
EEEE 0000011	CZI	DDDDDDDDDD	SSSSSSSSSS	SHL	D,S/#	{WC/WZ/WCZ}
EEEE 0000100	CZI	DDDDDDDDDD	SSSSSSSSSS	RCR	D,S/#	{WC/WZ/WCZ}
EEEE 0000101	CZI	DDDDDDDDDD	SSSSSSSSSS	RCL	D,S/#	{WC/WZ/WCZ}
EEEE 0000110	CZI	DDDDDDDDDD	SSSSSSSSSS	SAR	D,S/#	{WC/WZ/WCZ}
EEEE 0000111	CZI	DDDDDDDDDD	SSSSSSSSSS	SAL	D,S/#	{WC/WZ/WCZ}
EEEE 0001000	CZI	DDDDDDDDDD	SSSSSSSSSS	ADD	D,S/#	{WC/WZ/WCZ}
EEEE 0001001	CZI	DDDDDDDDDD	SSSSSSSSSS	ADDX	D,S/#	{WC/WZ/WCZ}

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EEEE	0001010	CZI	DDDDDDDDDD	SSSSSSSSSS	ADDS	D,S/#	{WC/WZ/WCZ}
EEEE	0001011	CZI	DDDDDDDDDD	SSSSSSSSSS	ADDSX	D,S/#	{WC/WZ/WCZ}
EEEE	0001100	CZI	DDDDDDDDDD	SSSSSSSSSS	SUB	D,S/#	{WC/WZ/WCZ}
EEEE	0001101	CZI	DDDDDDDDDD	SSSSSSSSSS	SUBX	D,S/#	{WC/WZ/WCZ}
EEEE	0001110	CZI	DDDDDDDDDD	SSSSSSSSSS	SUBS	D,S/#	{WC/WZ/WCZ}
EEEE	0001111	CZI	DDDDDDDDDD	SSSSSSSSSS	SUBSX	D,S/#	{WC/WZ/WCZ}
EEEE	0010000	CZI	DDDDDDDDDD	SSSSSSSSSS	CMP	D,S/#	{WC/WZ/WCZ}
EEEE	0010001	CZI	DDDDDDDDDD	SSSSSSSSSS	CMPX	D,S/#	{WC/WZ/WCZ}
EEEE	0010010	CZI	DDDDDDDDDD	SSSSSSSSSS	CMP S	D,S/#	{WC/WZ/WCZ}
EEEE	0010011	CZI	DDDDDDDDDD	SSSSSSSSSS	CMP SX	D,S/#	{WC/WZ/WCZ}
EEEE	0010100	CZI	DDDDDDDDDD	SSSSSSSSSS	CMP R	D,S/#	{WC/WZ/WCZ}
EEEE	0010101	CZI	DDDDDDDDDD	SSSSSSSSSS	CMP M	D,S/#	{WC/WZ/WCZ}
EEEE	0010110	CZI	DDDDDDDDDD	SSSSSSSSSS	SUB R	D,S/#	{WC/WZ/WCZ}
EEEE	0010111	CZI	DDDDDDDDDD	SSSSSSSSSS	CMP SUB	D,S/#	{WC/WZ/WCZ}
EEEE	0011000	CZI	DDDDDDDDDD	SSSSSSSSSS	FGE	D,S/#	{WC/WZ/WCZ}
EEEE	0011001	CZI	DDDDDDDDDD	SSSSSSSSSS	FLE	D,S/#	{WC/WZ/WCZ}
EEEE	0011010	CZI	DDDDDDDDDD	SSSSSSSSSS	FGES	D,S/#	{WC/WZ/WCZ}
EEEE	0011011	CZI	DDDDDDDDDD	SSSSSSSSSS	FLES	D,S/#	{WC/WZ/WCZ}
EEEE	0011100	CZI	DDDDDDDDDD	SSSSSSSSSS	SUM C	D,S/#	{WC/WZ/WCZ}
EEEE	0011101	CZI	DDDDDDDDDD	SSSSSSSSSS	SUM NC	D,S/#	{WC/WZ/WCZ}
EEEE	0011110	CZI	DDDDDDDDDD	SSSSSSSSSS	SUM Z	D,S/#	{WC/WZ/WCZ}
EEEE	0011111	CZI	DDDDDDDDDD	SSSSSSSSSS	SUM NZ	D,S/#	{WC/WZ/WCZ}
EEEE	0100000	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST B	D,S/#	WC/WZ
EEEE	0100001	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST BN	D,S/#	WC/WZ
EEEE	0100010	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST B	D,S/#	ANDC/ANDZ
EEEE	0100011	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST BN	D,S/#	ANDC/ANDZ
EEEE	0100100	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST B	D,S/#	ORC/ORZ
EEEE	0100101	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST BN	D,S/#	ORC/ORZ
EEEE	0100110	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST B	D,S/#	XORC/XORZ
EEEE	0100111	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST BN	D,S/#	XORC/XORZ
EEEE	0100000	CZI	DDDDDDDDDD	SSSSSSSSSS	BIT L	D,S/#	{WCZ}
EEEE	0100001	CZI	DDDDDDDDDD	SSSSSSSSSS	BITH	D,S/#	{WCZ}
EEEE	0100010	CZI	DDDDDDDDDD	SSSSSSSSSS	BIT C	D,S/#	{WCZ}
EEEE	0100011	CZI	DDDDDDDDDD	SSSSSSSSSS	BIT NC	D,S/#	{WCZ}
EEEE	0100100	CZI	DDDDDDDDDD	SSSSSSSSSS	BIT Z	D,S/#	{WCZ}
EEEE	0100101	CZI	DDDDDDDDDD	SSSSSSSSSS	BIT NZ	D,S/#	{WCZ}
EEEE	0100110	CZI	DDDDDDDDDD	SSSSSSSSSS	BIT RND	D,S/#	{WCZ}
EEEE	0100111	CZI	DDDDDDDDDD	SSSSSSSSSS	BIT NOT	D,S/#	{WCZ}
EEEE	0101000	CZI	DDDDDDDDDD	SSSSSSSSSS	AND	D,S/#	{WC/WZ/WCZ}
EEEE	0101001	CZI	DDDDDDDDDD	SSSSSSSSSS	AND N	D,S/#	{WC/WZ/WCZ}

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EEEE	0101010	CZI	DDDDDDDDDD	SSSSSSSSSS	OR	D,S/#	{WC/WZ/WCZ}
EEEE	0101011	CZI	DDDDDDDDDD	SSSSSSSSSS	XOR	D,S/#	{WC/WZ/WCZ}
EEEE	0101100	CZI	DDDDDDDDDD	SSSSSSSSSS	MUXC	D,S/#	{WC/WZ/WCZ}
EEEE	0101101	CZI	DDDDDDDDDD	SSSSSSSSSS	MUXNC	D,S/#	{WC/WZ/WCZ}
EEEE	0101110	CZI	DDDDDDDDDD	SSSSSSSSSS	MUXZ	D,S/#	{WC/WZ/WCZ}
EEEE	0101111	CZI	DDDDDDDDDD	SSSSSSSSSS	MUXNZ	D,S/#	{WC/WZ/WCZ}
EEEE	0110000	CZI	DDDDDDDDDD	SSSSSSSSSS	MOV	D,S/#	{WC/WZ/WCZ}
EEEE	0110001	CZI	DDDDDDDDDD	SSSSSSSSSS	NOT	D,S/#	{WC/WZ/WCZ}
EEEE	0110010	CZI	DDDDDDDDDD	SSSSSSSSSS	ABS	D,S/#	{WC/WZ/WCZ}
EEEE	0110011	CZI	DDDDDDDDDD	SSSSSSSSSS	NEG	D,S/#	{WC/WZ/WCZ}
EEEE	0110100	CZI	DDDDDDDDDD	SSSSSSSSSS	NEGC	D,S/#	{WC/WZ/WCZ}
EEEE	0110101	CZI	DDDDDDDDDD	SSSSSSSSSS	NEGNC	D,S/#	{WC/WZ/WCZ}
EEEE	0110110	CZI	DDDDDDDDDD	SSSSSSSSSS	NEGZ	D,S/#	{WC/WZ/WCZ}
EEEE	0110111	CZI	DDDDDDDDDD	SSSSSSSSSS	NEGNZ	D,S/#	{WC/WZ/WCZ}
EEEE	0111000	CZI	DDDDDDDDDD	SSSSSSSSSS	INCMOD	D,S/#	{WC/WZ/WCZ}
EEEE	0111001	CZI	DDDDDDDDDD	SSSSSSSSSS	DECMOD	D,S/#	{WC/WZ/WCZ}
EEEE	0111010	CZI	DDDDDDDDDD	SSSSSSSSSS	ZEROX	D,S/#	{WC/WZ/WCZ}
EEEE	0111011	CZI	DDDDDDDDDD	SSSSSSSSSS	SIGNX	D,S/#	{WC/WZ/WCZ}
EEEE	0111100	CZI	DDDDDDDDDD	SSSSSSSSSS	ENCOD	D,S/#	{WC/WZ/WCZ}
EEEE	0111101	CZI	DDDDDDDDDD	SSSSSSSSSS	ONES	D,S/#	{WC/WZ/WCZ}
EEEE	0111110	CZI	DDDDDDDDDD	SSSSSSSSSS	TEST	D,S/#	{WC/WZ/WCZ}
EEEE	0111111	CZI	DDDDDDDDDD	SSSSSSSSSS	TESTN	D,S/#	{WC/WZ/WCZ}
EEEE	100000N	NNI	DDDDDDDDDD	SSSSSSSSSS	SETNIB	D,S/#,#N	
EEEE	100001N	NNI	DDDDDDDDDD	SSSSSSSSSS	GETNIB	D,S/#,#N	
EEEE	100010N	NNI	DDDDDDDDDD	SSSSSSSSSS	ROLNIB	D,S/#,#N	
EEEE	1000110	NNI	DDDDDDDDDD	SSSSSSSSSS	SETBYTE	D,S/#,#N	
EEEE	1000111	NNI	DDDDDDDDDD	SSSSSSSSSS	GETBYTE	D,S/#,#N	
EEEE	1001000	NNI	DDDDDDDDDD	SSSSSSSSSS	ROLBYTE	D,S/#,#N	
EEEE	1001001	0NI	DDDDDDDDDD	SSSSSSSSSS	SETWORD	D,S/#,#N	
EEEE	1001001	1NI	DDDDDDDDDD	SSSSSSSSSS	GETWORD	D,S/#,#N	
EEEE	1001010	0NI	DDDDDDDDDD	SSSSSSSSSS	ROLWORD	D,S/#,#N	
EEEE	1001010	10I	DDDDDDDDDD	SSSSSSSSSS	ALTSN	D,S/#	
EEEE	1001010	11I	DDDDDDDDDD	SSSSSSSSSS	ALTGN	D,S/#	
EEEE	1001011	00I	DDDDDDDDDD	SSSSSSSSSS	ALTSB	D,S/#	
EEEE	1001011	01I	DDDDDDDDDD	SSSSSSSSSS	ALTGB	D,S/#	
EEEE	1001011	10I	DDDDDDDDDD	SSSSSSSSSS	ALTSW	D,S/#	
EEEE	1001011	11I	DDDDDDDDDD	SSSSSSSSSS	ALTGW	D,S/#	
EEEE	1001100	00I	DDDDDDDDDD	SSSSSSSSSS	ALTR	D,S/#	
EEEE	1001100	01I	DDDDDDDDDD	SSSSSSSSSS	ALTD	D,S/#	
EEEE	1001100	10I	DDDDDDDDDD	SSSSSSSSSS	ALTS	D,S/#	
EEEE	1001100	11I	DDDDDDDDDD	SSSSSSSSSS	ALTB	D,S/#	
EEEE	1001101	00I	DDDDDDDDDD	SSSSSSSSSS	ALTI	D,S/#	

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EEEE	1001101	01I	DDDDDDDDDD	SSSSSSSSSS	SETR	D,S/#	
EEEE	1001101	10I	DDDDDDDDDD	SSSSSSSSSS	SETD	D,S/#	
EEEE	1001101	11I	DDDDDDDDDD	SSSSSSSSSS	SETS	D,S/#	
EEEE	1001110	00I	DDDDDDDDDD	SSSSSSSSSS	DECOD	D,S/#	
EEEE	1001110	01I	DDDDDDDDDD	SSSSSSSSSS	BMASK	D,S/#	
EEEE	1001110	10I	DDDDDDDDDD	SSSSSSSSSS	CRCBIT	D,S/#	
EEEE	1001110	11I	DDDDDDDDDD	SSSSSSSSSS	CRCNIB	D,S/#	
EEEE	1001111	00I	DDDDDDDDDD	SSSSSSSSSS	MUXNITS	D,S/#	
EEEE	1001111	01I	DDDDDDDDDD	SSSSSSSSSS	MUXNIBS	D,S/#	
EEEE	1001111	10I	DDDDDDDDDD	SSSSSSSSSS	MUXQ	D,S/#	
EEEE	1001111	11I	DDDDDDDDDD	SSSSSSSSSS	MOVBYTS	D,S/#	
EEEE	1010000	0ZI	DDDDDDDDDD	SSSSSSSSSS	MUL	D,S/#	{WZ}
EEEE	1010000	1ZI	DDDDDDDDDD	SSSSSSSSSS	MULS	D,S/#	{WZ}
EEEE	1010001	0ZI	DDDDDDDDDD	SSSSSSSSSS	SCA	D,S/#	{WZ}
EEEE	1010001	1ZI	DDDDDDDDDD	SSSSSSSSSS	SCAS	D,S/#	{WZ}
EEEE	1010010	00I	DDDDDDDDDD	SSSSSSSSSS	ADDPIX	D,S/#	
EEEE	1010010	01I	DDDDDDDDDD	SSSSSSSSSS	MULPIX	D,S/#	
EEEE	1010010	10I	DDDDDDDDDD	SSSSSSSSSS	BLNPIX	D,S/#	
EEEE	1010010	11I	DDDDDDDDDD	SSSSSSSSSS	MIXPIX	D,S/#	
EEEE	1010011	00I	DDDDDDDDDD	SSSSSSSSSS	ADDCT1	D,S/#	
EEEE	1010011	01I	DDDDDDDDDD	SSSSSSSSSS	ADDCT2	D,S/#	
EEEE	1010011	10I	DDDDDDDDDD	SSSSSSSSSS	ADDCT3	D,S/#	
EEEE	1010011	11I	DDDDDDDDDD	SSSSSSSSSS	WMLONG	D,S/#/PTRx	
EEEE	1010100	C0I	DDDDDDDDDD	SSSSSSSSSS	RQPIN	D,S/#	{WC}
EEEE	1010100	C1I	DDDDDDDDDD	SSSSSSSSSS	RDPIN	D,S/#	{WC}
EEEE	1010101	CZI	DDDDDDDDDD	SSSSSSSSSS	RDLUT	D,S/#	{WC/WZ/WCZ}
EEEE	1010110	CZI	DDDDDDDDDD	SSSSSSSSSS	RDBYTE	D,S/#/PTRx	{WC/WZ/WCZ}
EEEE	1010111	CZI	DDDDDDDDDD	SSSSSSSSSS	RDWORD	D,S/#/PTRx	{WC/WZ/WCZ}
EEEE	1011000	CZI	DDDDDDDDDD	SSSSSSSSSS	RDLONG	D,S/#/PTRx	{WC/WZ/WCZ}
EEEE	1011001	CZI	DDDDDDDDDD	SSSSSSSSSS	CALLD	D,S/#re19	{WC/WZ/WCZ}
EEEE	1011010	0LI	DDDDDDDDDD	SSSSSSSSSS	CALLPA	D/#,S/#re19	
EEEE	1011010	1LI	DDDDDDDDDD	SSSSSSSSSS	CALLPB	D/#,S/#re19	
EEEE	1011011	00I	DDDDDDDDDD	SSSSSSSSSS	DJZ	D,S/#re19	
EEEE	1011011	01I	DDDDDDDDDD	SSSSSSSSSS	DJNZ	D,S/#re19	
EEEE	1011011	10I	DDDDDDDDDD	SSSSSSSSSS	DJF	D,S/#re19	
EEEE	1011011	11I	DDDDDDDDDD	SSSSSSSSSS	DJNF	D,S/#re19	
EEEE	1011100	00I	DDDDDDDDDD	SSSSSSSSSS	IJZ	D,S/#re19	
EEEE	1011100	01I	DDDDDDDDDD	SSSSSSSSSS	IJNZ	D,S/#re19	

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EEEE	1011100	10I	DDDDDDDDDD	SSSSSSSSSS	TJZ	D,S/#rel9
EEEE	1011100	11I	DDDDDDDDDD	SSSSSSSSSS	TJNZ	D,S/#rel9
EEEE	1011101	00I	DDDDDDDDDD	SSSSSSSSSS	TJF	D,S/#rel9
EEEE	1011101	01I	DDDDDDDDDD	SSSSSSSSSS	TJNF	D,S/#rel9
EEEE	1011101	10I	DDDDDDDDDD	SSSSSSSSSS	TJS	D,S/#rel9
EEEE	1011101	11I	DDDDDDDDDD	SSSSSSSSSS	TJNS	D,S/#rel9
EEEE	1011110	00I	DDDDDDDDDD	SSSSSSSSSS	TJV	D,S/#rel9
EEEE	1011110	01I	000000000	SSSSSSSSSS	JINT	S/#rel9
EEEE	1011110	01I	000000001	SSSSSSSSSS	JCT1	S/#rel9
EEEE	1011110	01I	000000010	SSSSSSSSSS	JCT2	S/#rel9
EEEE	1011110	01I	000000011	SSSSSSSSSS	JCT3	S/#rel9
EEEE	1011110	01I	000000100	SSSSSSSSSS	JSE1	S/#rel9
EEEE	1011110	01I	000000101	SSSSSSSSSS	JSE2	S/#rel9
EEEE	1011110	01I	000000110	SSSSSSSSSS	JSE3	S/#rel9
EEEE	1011110	01I	000000111	SSSSSSSSSS	JSE4	S/#rel9
EEEE	1011110	01I	000001000	SSSSSSSSSS	JPAT	S/#rel9
EEEE	1011110	01I	000001001	SSSSSSSSSS	JFBW	S/#rel9
EEEE	1011110	01I	000001010	SSSSSSSSSS	JXMT	S/#rel9
EEEE	1011110	01I	000001011	SSSSSSSSSS	JXFI	S/#rel9
EEEE	1011110	01I	000001100	SSSSSSSSSS	JXRO	S/#rel9
EEEE	1011110	01I	000001101	SSSSSSSSSS	JXRL	S/#rel9
EEEE	1011110	01I	000001110	SSSSSSSSSS	JATN	S/#rel9
EEEE	1011110	01I	000001111	SSSSSSSSSS	JQMT	S/#rel9
EEEE	1011110	01I	000010000	SSSSSSSSSS	JNINT	S/#rel9
EEEE	1011110	01I	000010001	SSSSSSSSSS	JNCT1	S/#rel9
EEEE	1011110	01I	000010010	SSSSSSSSSS	JNCT2	S/#rel9
EEEE	1011110	01I	000010011	SSSSSSSSSS	JNCT3	S/#rel9
EEEE	1011110	01I	000010100	SSSSSSSSSS	JNSE1	S/#rel9
EEEE	1011110	01I	000010101	SSSSSSSSSS	JNSE2	S/#rel9
EEEE	1011110	01I	000010110	SSSSSSSSSS	JNSE3	S/#rel9
EEEE	1011110	01I	000010111	SSSSSSSSSS	JNSE4	S/#rel9
EEEE	1011110	01I	000011000	SSSSSSSSSS	JNPAT	S/#rel9
EEEE	1011110	01I	000011001	SSSSSSSSSS	JNFBW	S/#rel9
EEEE	1011110	01I	000011010	SSSSSSSSSS	JNXMT	S/#rel9
EEEE	1011110	01I	000011011	SSSSSSSSSS	JNXFI	S/#rel9
EEEE	1011110	01I	000011100	SSSSSSSSSS	JNXRO	S/#rel9
EEEE	1011110	01I	000011101	SSSSSSSSSS	JNXRL	S/#rel9
EEEE	1011110	01I	000011110	SSSSSSSSSS	JNATN	S/#rel9
EEEE	1011110	01I	000011111	SSSSSSSSSS	JNQMT	S/#rel9
EEEE	1011110	1LI	DDDDDDDDDD	SSSSSSSSSS	<empty>	D/#,S/#
EEEE	1011111	0LI	DDDDDDDDDD	SSSSSSSSSS	<empty>	D/#,S/#
EEEE	1011111	1LI	DDDDDDDDDD	SSSSSSSSSS	SETPAT	D/#,S/#
EEEE	1100000	0LI	DDDDDDDDDD	SSSSSSSSSS	WRPIN	D/#,S/#
EEEE	1100000	1LI	DDDDDDDDDD	SSSSSSSSSS	WXPIN	D/#,S/#

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EEEE	1100001	0LI	DDDDDDDDDD	SSSSSSSSSS	WYPIN	D/#,S/#	
EEEE	1100001	1LI	DDDDDDDDDD	SSSSSSSSSS	WRLUT	D/#,S/#	
EEEE	1100010	0LI	DDDDDDDDDD	SSSSSSSSSS	WRBYTE	D/#,S/#/PTRx	
EEEE	1100010	1LI	DDDDDDDDDD	SSSSSSSSSS	WRWORD	D/#,S/#/PTRx	
EEEE	1100011	0LI	DDDDDDDDDD	SSSSSSSSSS	WRLONG	D/#,S/#/PTRx	
EEEE	1100011	1LI	DDDDDDDDDD	SSSSSSSSSS	RDFAST	D/#,S/#	
EEEE	1100100	0LI	DDDDDDDDDD	SSSSSSSSSS	WRFAST	D/#,S/#	
EEEE	1100100	1LI	DDDDDDDDDD	SSSSSSSSSS	FBLOCK	D/#,S/#	
EEEE	1100101	0LI	DDDDDDDDDD	SSSSSSSSSS	XINIT	D/#,S/#	
EEEE	1100101	1LI	DDDDDDDDDD	SSSSSSSSSS	XZERO	D/#,S/#	
EEEE	1100110	0LI	DDDDDDDDDD	SSSSSSSSSS	XCONT	D/#,S/#	
EEEE	1100110	1LI	DDDDDDDDDD	SSSSSSSSSS	REP	D/#,S/#	
EEEE	1100111	CLI	DDDDDDDDDD	SSSSSSSSSS	COGINIT	D/#,S/#	{WC}
EEEE	1101000	0LI	DDDDDDDDDD	SSSSSSSSSS	QMUL	D/#,S/#	
EEEE	1101000	1LI	DDDDDDDDDD	SSSSSSSSSS	QDIV	D/#,S/#	
EEEE	1101001	0LI	DDDDDDDDDD	SSSSSSSSSS	QFRAC	D/#,S/#	
EEEE	1101001	1LI	DDDDDDDDDD	SSSSSSSSSS	QSQRT	D/#,S/#	
EEEE	1101010	0LI	DDDDDDDDDD	SSSSSSSSSS	QROTATE	D/#,S/#	
EEEE	1101010	1LI	DDDDDDDDDD	SSSSSSSSSS	QVECTOR	D/#,S/#	
EEEE	1101011	00L	DDDDDDDDDD	00000000	HUBSET	D/#	
EEEE	1101011	C0L	DDDDDDDDDD	00000001	COGID	D/#	{WC}
EEEE	1101011	00L	DDDDDDDDDD	00000011	COGSTOP	D/#	
EEEE	1101011	C00	DDDDDDDDDD	00000100	LOCKNEW	D	{WC}
EEEE	1101011	00L	DDDDDDDDDD	00000101	LOCKRET	D/#	
EEEE	1101011	C0L	DDDDDDDDDD	00000110	* LOCKTRY	D/#	{WC}
EEEE	1101011	00L	DDDDDDDDDD	00000111	* LOCKREL	D/#	{WC}
EEEE	1101011	00L	DDDDDDDDDD	00001110	QLOG	D/#	
EEEE	1101011	00L	DDDDDDDDDD	00001111	QEXP	D/#	
EEEE	1101011	CZ0	DDDDDDDDDD	00001000	RFBYTE	D	{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	00001001	RFWORD	D	{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	00001010	RFLONG	D	{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	00001011	RFVAR	D	{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	00001010	RFVARS	D	{WC/WZ/WCZ}
EEEE	1101011	00L	DDDDDDDDDD	000010101	WFBYTE	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000010110	WFWORD	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000010111	WFLONG	D/#	
EEEE	1101011	CZ0	DDDDDDDDDD	00001100	GETQX	D	{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	000011001	GETQY	D	{WC/WZ/WCZ}

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EEEE	1101011	000	DDDDDDDDDD	000011010	GETCT	D	
EEEE	1101011	CZL	DDDDDDDDDD	000011011	GETRND	{D}	{WC/WZ/WCZ}
EEEE	1101011	00L	DDDDDDDDDD	000011100	SETDACS	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000011101	SETXFRQ	D/#	
EEEE	1101011	000	DDDDDDDDDD	000011110	GETXACC	D	
EEEE	1101011	CZL	DDDDDDDDDD	000011111	* WAITX	D/#	{WC/WZ/WCZ}
EEEE	1101011	00L	DDDDDDDDDD	000100000	SETSE1	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000100001	SETSE2	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000100010	SETSE3	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000100011	SETSE4	D/#	
EEEE	1101011	CZ0	000000000	000100100	POLLINT		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000000001	000100100	POLLCT1		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000000010	000100100	POLLCT2		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000000011	000100100	POLLCT3		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000000100	000100100	POLLSE1		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000000101	000100100	POLLSE2		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000000110	000100100	POLLSE3		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000000111	000100100	POLLSE4		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001000	000100100	POLLPAT		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001001	000100100	POLLFBW		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001010	000100100	POLLXMT		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001011	000100100	POLLXFI		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001100	000100100	POLLXRO		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001101	000100100	POLLXRL		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001110	000100100	POLLATN		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000001111	000100100	POLLQMT		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010000	000100100	WAITINT		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010001	000100100	WAITCT1		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010010	000100100	WAITCT2		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010011	000100100	WAITCT3		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010100	000100100	WAITSE1		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010101	000100100	WAITSE2		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010110	000100100	WAITSE3		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000010111	000100100	WAITSE4		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000011000	000100100	WAITPAT		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000011001	000100100	WAITFBW		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000011010	000100100	WAITXMT		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000011011	000100100	WAITXFI		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000011100	000100100	WAITXRO		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000011101	000100100	WAITXRL		{WC/WZ/WCZ}
EEEE	1101011	CZ0	000011110	000100100	WAITATN		{WC/WZ/WCZ}
EEEE	1101011	000	000100000	000100100	ALLOWI		
EEEE	1101011	000	000100001	000100100	STALLI		

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EEEE	1101011	000	000100010	000100100	TRGINT1		
EEEE	1101011	000	000100011	000100100	TRGINT2		
EEEE	1101011	000	000100100	000100100	TRGINT3		
EEEE	1101011	000	000100101	000100100	NIXINT1		
EEEE	1101011	000	000100110	000100100	NIXINT2		
EEEE	1101011	000	000100111	000100100	NIXINT3		
EEEE	1101011	00L	DDDDDDDDDD	000100101	SETINT1	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000100110	SETINT2	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000100111	SETINT3	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000101000	SETQ	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000101001	SETQ2	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000101010	PUSH	D/#	
EEEE	1101011	CZ0	DDDDDDDDDD	000101011	POP	D	{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	000101100	JMP	D	{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	000101101	CALL	D	{WC/WZ/WCZ}
EEEE	1101011	CZ1	000000000	000101101	RET		{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	000101110	CALLA	D	{WC/WZ/WCZ}
EEEE	1101011	CZ1	000000000	000101110	RETA		{WC/WZ/WCZ}
EEEE	1101011	CZ0	DDDDDDDDDD	000101111	CALLB	D	{WC/WZ/WCZ}
EEEE	1101011	CZ1	000000000	000101111	RETB		{WC/WZ/WCZ}
EEEE	1101011	00L	DDDDDDDDDD	000110000	JMPREL	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000110001	SKIP	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000110010	SKIPF	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000110011	EXECF	D/#	
EEEE	1101011	000	DDDDDDDDDD	000110100	GETPTR	D	
EEEE	1101011	CZ0	DDDDDDDDDD	000110101	* GETBRK	D	{WC/WZ/WCZ}
EEEE	1101011	00L	DDDDDDDDDD	000110101	* COGBRK	D	
EEEE	1101011	00L	DDDDDDDDDD	000110110	* BRK	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000110111	SETLUTS	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111000	SETCY	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111001	SETCI	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111010	SETCQ	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111011	SETCFRQ	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111100	SETCMOD	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111101	SETPIV	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111110	SETPIX	D/#	
EEEE	1101011	00L	DDDDDDDDDD	000111111	COGATN	D/#	



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EEEE	1101011	CZL	DDDDDDDDDD	001000000	TESTP	D/#	WC/WZ
EEEE	1101011	CZL	DDDDDDDDDD	001000001	TESTPN	D/#	WC/WZ
EEEE	1101011	CZL	DDDDDDDDDD	001000010	TESTP	D/#	ANDC/ANDZ
EEEE	1101011	CZL	DDDDDDDDDD	001000011	TESTPN	D/#	ANDC/ANDZ
EEEE	1101011	CZL	DDDDDDDDDD	001000100	TESTP	D/#	ORC/ORZ
EEEE	1101011	CZL	DDDDDDDDDD	001000101	TESTPN	D/#	ORC/ORZ
EEEE	1101011	CZL	DDDDDDDDDD	001000110	TESTP	D/#	XORC/XORZ
EEEE	1101011	CZL	DDDDDDDDDD	001000111	TESTPN	D/#	XORC/XORZ
EEEE	1101011	CZL	DDDDDDDDDD	001000000	DIRL	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001000001	DIRH	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001000010	DIRC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001000011	DIRNC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001000100	DIRZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001000101	DIRNZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001000110	DIRRND	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001000111	DIRNOT	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001000	OUTL	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001001	OUTH	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001010	OUTC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001011	OUTNC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001100	OUTZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001101	OUTNZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001110	OUTRND	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001001111	OUTNOT	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010000	FLTL	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010001	FLTH	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010010	FLTC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010011	FLTNC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010100	FLTZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010101	FLTNZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010110	FLTRND	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001010111	FLTNOT	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011000	DRVL	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011001	DRVH	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011010	DRVC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011011	DRVNC	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011100	DRVZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011101	DRVNZ	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011110	DRVNRND	D/#	{WCZ}
EEEE	1101011	CZL	DDDDDDDDDD	001011111	DRVNOT	D/#	{WCZ}
EEEE	1101011	000	DDDDDDDDDD	001100000	SPLITB	D	
EEEE	1101011	000	DDDDDDDDDD	001100001	MERGE	D	

instructions\_v32.txt

```

EEEE 1101011 000 DDDDDDDDDD 001100010      SPLITW  D
EEEE 1101011 000 DDDDDDDDDD 001100011      MERGEW  D
EEEE 1101011 000 DDDDDDDDDD 001100100      SEUSSF  D
EEEE 1101011 000 DDDDDDDDDD 001100101      SEUSSR  D
EEEE 1101011 000 DDDDDDDDDD 001100110      RGBSQZ  D
EEEE 1101011 000 DDDDDDDDDD 001100111      RGBEXP  D
EEEE 1101011 000 DDDDDDDDDD 001101000      XOR032  D
EEEE 1101011 000 DDDDDDDDDD 001101001      REV     D
EEEE 1101011 CZ0 DDDDDDDDDD 001101010      RCZR    D      {WC/WZ/WCZ}
EEEE 1101011 CZ0 DDDDDDDDDD 001101011      RCZL    D      {WC/WZ/WCZ}
EEEE 1101011 000 DDDDDDDDDD 001101100      WRC     D
EEEE 1101011 000 DDDDDDDDDD 001101101      WRNC    D
EEEE 1101011 000 DDDDDDDDDD 001101110      WRZ     D
EEEE 1101011 000 DDDDDDDDDD 001101111      WRNZ    D
EEEE 1101011 CZ1 0cccczzzz 001101111      MODCZ   c,z      {WC/WZ/WCZ}

EEEE 1101100 RAA AAAAAAAAAA AAAAAAAAAA      JMP     #abs/#rel
EEEE 1101101 RAA AAAAAAAAAA AAAAAAAAAA      CALL   #abs/#rel
EEEE 1101110 RAA AAAAAAAAAA AAAAAAAAAA      CALLA  #abs/#rel
EEEE 1101111 RAA AAAAAAAAAA AAAAAAAAAA      CALLB  #abs/#rel

EEEE 11100WW RAA AAAAAAAAAA AAAAAAAAAA      CALLD  reg,#abs/#rel
EEEE 11101WW RAA AAAAAAAAAA AAAAAAAAAA      LOC    reg,#abs/#rel

EEEE 11110NN NNN NNNNNNNNNN NNNNNNNNNN      AUGS   #23bits
EEEE 11111NN NNN NNNNNNNNNN NNNNNNNNNN      AUGD   #23bits

```

\* changed recently

-----  
instruction aliases  
-----

```

NOP                =          $00000000

NOT    reg         =          NOT    reg,reg
ABS    reg         =          ABS    reg,reg
NEG    reg         =          NEG    reg,reg
NEGC   reg         =          NEGNC  reg,reg
NEGNC  reg         =          NEGZ   reg,reg
NEGZ   reg         =          NEGZ   reg,reg
NEGNZ  reg         =          ENCOD  reg,reg
ENCOD  reg         =          ONES   reg,reg
ONES   reg         =          TEST   reg,reg
TEST   reg         =          TEST   reg,reg

SETNIB  reg/#      =          SETNIB  0,reg/#,#0      (use after ALTSN)

```

```

instructions_v32.txt
GETNIB reg = GETNIB reg,0,#0 (use after ALTGN)
ROLNIB reg = ROLNIB reg,0,#0 (use after ALTGN)

SETBYTE reg/# = SETBYTE 0,reg/#,#0 (use after ALTSB)
GETBYTE reg = GETBYTE reg,0,#0 (use after ALTGB)
ROLBYTE reg = ROLBYTE reg,0,#0 (use after ALTGB)

SETWORD reg/# = SETWORD 0,reg/#,#0 (use after ALTSW)
GETWORD reg = GETWORD reg,0,#0 (use after ALTGW)
ROLWORD reg = ROLWORD reg,0,#0 (use after ALTGW)

ALTSN reg = ALTSN reg,#0
ALTGN reg = ALTGN reg,#0
ALTSB reg = ALTSB reg,#0
ALTGB reg = ALTGB reg,#0
ALTSW reg = ALTSW reg,#0
ALTGW reg = ALTGW reg,#0
ALTR reg = ALTR reg,#0
ALTD reg = ALTD reg,#0
ALTS reg = ALTS reg,#0
ALTB reg = ALTB reg,#0
ALTI reg = ALTI reg,#%101_100_100 (substitute reg for next
instruction)

DECOD reg = DECOD reg,reg
BMASK reg = BMASK reg,reg

POPA reg = RDLONG reg,--PTRA
POPB reg = RDLONG reg,--PTRB

RESI3 = CALLD $1F0,$1F1 WCZ
RESI2 = CALLD $1F2,$1F3 WCZ
RESI1 = CALLD $1F4,$1F5 WCZ
RESI0 = CALLD INA,INB WCZ

RETI3 = CALLD INB,$1F1 WCZ
RETI2 = CALLD INB,$1F3 WCZ
RETI1 = CALLD INB,$1F5 WCZ
RETI0 = CALLD INB,INB WCZ

AKPIN reg/# = WRPIN #1,reg/#

PUSHA reg/# = WRLONG reg/#,PTRA++
PUSHB reg/# = WRLONG reg/#,PTRB++

XSTOP = XINIT #0,#0

LUTSOFF = SETLUTS #0

```

```

LUTSON = instructions_v32.txt
        SETLUTS #1

MODC   c = MODCZ   c,0      {WC}
MODZ   z = MODCZ   0,z      {WZ}

```

-----  
MODCZ constants  
-----

```

_CLR           = %0000
_NC_AND_NZ    = %0001
_NZ_AND_NC    = %0001
_GT           = %0001
_NC_AND_Z     = %0010
_Z_AND_NC     = %0010
_NC           = %0011
_GE           = %0011
_C_AND_NZ     = %0100
_NZ_AND_C     = %0100
_NZ           = %0101
_NE           = %0101
_C_NE_Z       = %0110
_Z_NE_C       = %0110
_NC_OR_NZ     = %0111
_NZ_OR_NC     = %0111
_C_AND_Z      = %1000
_Z_AND_C      = %1000
_C_EQ_Z       = %1001
_Z_EQ_C       = %1001
_Z            = %1010
_E            = %1010
_NC_OR_Z      = %1011
_Z_OR_NC      = %1011
_C            = %1100
_LT           = %1100
_C_OR_NZ      = %1101
_NZ_OR_C      = %1101
_C_OR_Z       = %1110
_Z_OR_C       = %1110
_LE           = %1110
_SET          = %1111

```

Examples:

```

MODCZ  _CLR, _Z_OR_C  WCZ  'C = 0, Z |= C
MODCZ  _NZ,0         WC   'C = !Z

```

```

                                instructions_v32.txt
MODCZ  0,_SET           WZ      'Z = 1
MODC   _NZ_AND_C       WC      'C = !Z & C
MODZ   _Z_NE_C         WZ      'Z = Z ^ C

```

```

-----
notes
-----

```

A symbol declared under ORGH will return its hub address when referenced.

A symbol declared under ORG will return its cog address when referenced, but can return its hub address, instead, if preceded by '@':

```
COGINIT #0,#@newcode
```

For immediate-branch and LOC address operands, "#" is used before the address. In cases where there is an option between absolute and relative addressing, the assembler will choose absolute addressing when the branch crosses between cog and hub domains, or relative addressing when the branch stays in the same domain. Absolute addressing can be forced by following "#" with "\".

```

CALLPA/CALLPB/DJZ..JNXRL/JNATN/JNQMT  - rel_imm9/ind_reg20
JMP/CALL/CALLA/CALLB/CALLD           - abs_imm20/rel_imm20/ind_reg20
LOC                                   - abs_imm20/rel_imm20

```

If a constant larger than 9 bits is desired in an instruction, use "##", instead of "#" to invoke AUGS/AUGD:

```

AND      address,##$FFFFFF
DJNZ     reg,##far_away

```

The following assembler directives exist:

```
ORGH    {hub_address}
```

Set hub mode and an optional address to fill to with \$00 bytes.

```
ORG     {cog_address {,cog_address_limit}}
```

Set cog mode with optional cog address and limit. Defaults to \$000,\$200. If \$200..\$3FF used for cog address, LUT range selected. Doesn't generate

## instructions\_v32.txt

any data.

ORGF cog\_address

Fill to cog\_address with \$00 bytes. Must be in cog mode.

RES {cog\_registers}

Reserve cog registers. Defaults to 1. Doesn't generate any data. Must be in cog mode.

FIT {cog\_address}

Make sure cog code fits within cog address.

ALIGNW/ALIGNL

Align to next word/long in hub. Must be in hub mode.

BYTE data{[count]}{,data{[count]}...}

WORD data{[count]}{,data{[count]}...}

LONG data{[count]}{,data{[count]}...}

Generate byte/word/long data with optional repeat count.