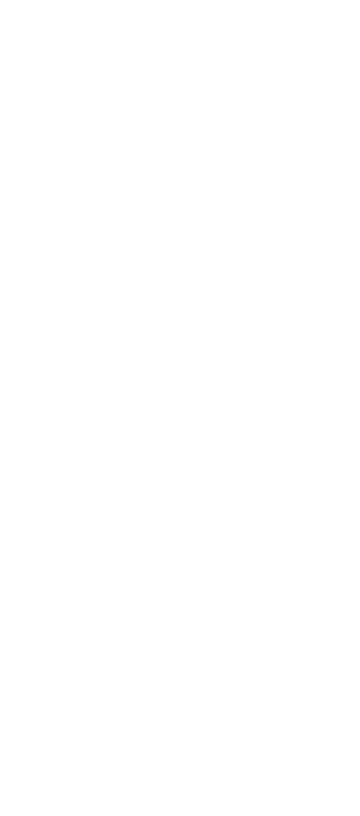


# Reference Summary





# Reference Summary

### Tenth Edition (September, 2017)

This revision differs from the previous edition by containing instructions related to the facilities marked by a bar under "Facility" in "Preface" and minor corrections and clarifications. Changes are indicated by a bar in the margin.

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#### **Preface**

This publication is intended primarily for use by z/Architecture™ assembler-language application programmers. It contains basic machine information summarized from the IBM z/Architecture Principles of Operation (SA22-7832), about the IBM z Systems™ processors. It also contains frequently used information from IBM ESA/390 Common I/O-Device Commands and Self Description (SA22-7204), IBM System/370 Extended Architecture Interpretive Execution (SA22-7095), The Load-Program-Parameter and the CPU-Measurement Facilities (SC23-2260), and IBM High Level Assembler for z/OS, z/VM & z/VSE Language Reference (SC26-4940). This publication will be updated from time to time. However, the above publications and others cited in this publication are the authoritative reference sources and will be first to reflect changes.

The following instructions may be uninstalled or not available on a particular model:

Facility	Instruction
ASN-and-LX-reuse	EPAIR, ESAIR, PTI, SSAIR
Compare-and-swap-and-store	CSST
Configuration-topology	PTF
Constrained-transactional-execution	TBEGINC
DAT-enhancement 1	CSPG, IDTE
DAT-enhancement 2	LPTEA

Decimal-floating-point

ADTR, AXTR, CDGTR, CDSTR, CDTR, CDUTR, CEDTR, CEXTR, CGDTR, CGXTR, CSDTR, CSXTR, CUDTR, CUXTR, CXGTR, CXGTR, CXSTR, CXTR, CUDTR, CUXTR, CXGTR, CXSTR, CXTR, CXTR, DTR, EEDTR, EEXTR, ESDTR, ESXTR, FIDTR, FIXTR, IEDTR, IEXTR, KDTR, KXTR, LDETR, LDXTR, LEDTR, LTDTR, LTXTR, LXDTR, MDTR, MXTR, QADTR, QAXTR, RRDTR, RRXTR, SDTR, SLDT, SLXT, SRDT, SRXT, RRDTR, RRXTR, SDTR, SLDT, SLXT, SRDT, SRXT,

RRDTR, RRXTR, SDTR, SLDT, SLXT, SRDT, SRXT, SXTR, TDCDT, TDCET, TDCXT, TDGDT, TDGET, TDGXT SRNMT

DFP-rounding SRNMT

DFP-nacked-conversion CDPT CPDT CF

DFP-packed-conversion CDPT, CPDT, CPXT, CXPT
DFP-zoned-conversion CDZT, CXZT, CZDT, CZXT

Distinct-operands AGHIK, AGRK, AHIK, ALGHSIK, ALGRK, ALHSIK, ALRK,

ARK, NGRK, NRK, OGRK, ORK, SGRK, SLAK, SLGRK, SLLK, SLRK, SRAK, SRK, SRLK, XGRK, XRK

 Enhanced-DAT 1
 PFMF

 Enhanced-DAT 2
 CRDTE

 Execute-extensions
 EXRL

 Execution-hint
 BPP, BPRP, NIAI

Execution-nint BPP, BPHP, NIAI

Expanded-storage PGIN, PGOUT

Extended-immediate AFI, AGFI, ALFI, ALGFI, CFI, CGFI, CLFI, CLGFI,

FLOGR, IİHF, IILF, LBR, LGBR, LGHR, LGFI, LHR, LLC, LLCR, LLGCR, LLGHR, LLH, LLHR, LLIHF, LLILF, LT, LTG, NIHF, NILF, OIHF, OILF, SLFI, SLGFI, XIHF, XILF

CLCLU, MVCLU, PKA, PKU, TP, TROO, TROT, TRTO,

TRTT, UNPKA, UNPKU

Extended-translation 3 CU14, CU24, CU41, CU42, SRSTU, TRTR

Extract-CPU-time ECTG

Extended-translation 2

Floating-point-extension ADTRA, AXTRA, CDFBRA, CDFTR, CDGBRA, CDG-

TRA, CDLFBR, CDLFTR, CDLGBR, CDLGTR, CEFBRA, CEGBRA, CELFBR, CELGBR, CFDBRA, CFDTR, CFEBRA, CFXBRA, CFXBRA, CFXTR, CGDBRA, CGDTRA, CGEBRA, CGXBRA, CGXTRA, CLFDBR, CLFDTR, CLFEBR, CLFXBR, CLFXTR, CLGDBR, CLGDTR, CLGEBR, CLGXBR, CLGXTR, CXFBRA, CXFTR, CXGBRA, CXGTRA, CXLFTR, CXLGBR, CXLGTR, DDTRA, DXTRA, FIDBRA, FIEBRA, FIXBRA, LDXBRA, LEDBRA, LEXBRA, MDTRA, MTRA, SDTRA, SRNMB, SXTRA

Floating-point-support-sign-handling CPSDR, LCDFR, LNDFR, LPDFR

FPR-GR-transfer LDGR, LGDR

Facility Instruction

General-instructions-extension ASI, AGSI, ALSI, ALGSI, CRB, CGRB, CRJ, CGRJ, CRT, CGRT, CGH, CHHSI, CHSI, CGHSI, CHRL, CGHRL, CIB,

CGIB, CIJ, CGIJ, CIT, CGIT, CLRB, CLGRB, CLRJ, CLGRJ, CLRT, CLGRT, CLHHSI, CLFHSI, CLGHSI, CLIB, CLGIB, CLIJ, CLGIJ, CLFIT, CLGIT, CLRL, CLHRL, CLGRL, CLGHRL, CLGFRL, CRL, CGRL, CGFRL, ECAG, LAEY, LTGF, LHRL, LGHRL, LLHRL, LLGHRL LLGFRL, LRL, LGRL, LGFRL, MVHHI, MVHI, MVGHI, MFY, MHY, MSFI, MSGFI, PFD, PFDRL, RNSBG, RXSBG, RISBG, ROSBG, STHRL, STRL, STGRL

Guarded storage LGG, LGSC, LLGFSG, STGSC

MAD, MADR, MAE, MAER, MSD, MSDR, MSE, MSER HFP-multiply-and-add/subtract MAY, MAYR, MAYH, MAYHR, MAYL, MAYLR, MY, MYH, HFP-unnormalized extensions

MYL, MYR, MYHR, MYLR

AHHHR, AHHLR, AIH, ALHHHR, ALHHLR, ALSIH, High-word

ALSIHN, BRCTH, CHF, CHHR, CHLR, CIH, CLHF, CLHHR, CLHLR, CLIH, LBH, LHH, LFH, LLCH, LLHH, RISBHG, RISBLG, SHHHR, SHHLR, SLHHHR, SLHHLR, STCH, STHH, STFH

LEAS SEASE IEEE-exception-simulation

Insert-reference-bits-multiple facility IRRM

LAA, LAAG, LAAL, LAALG, LAN, LANG, LAO, LAOG, Interlocked-access

LAX, LAXG, LPD, LPDG

LAT, LFHAT, LGAT, LLGFAT, LLGTAT Load-and-trap

Load-and-zero-rightmost-byte LLZRGF, LZRF, LZRG

LOC, LOCG, LOCGR, LOCR, STOC, STOCG Load/store-on-condition facility 1

LOCFH, LOCFHR, LOCGHI, LOCHHI, LOCHI, STOCFH Load/store-on-condition facility 2 Long displacement

AHY, ALY, AY, CDSY, CHY, CLIY, CLMY, CLY, CSY, CVBY, CVDY, CY, ICMY, ICY, LAMY, LAY, LB, LDY, LEY, LGB, LHY, LMY, LRAY, LY, MSY, MVIY, NIY, NY, OIY, OY, SHY SLY, STAMY, STCMY, STCY, STDY, STEY, STHY, STMY,

STY, SY, TMY, XIY, XY

Message-security-assist KM, KMC, KIMD, KLMD, KMAC

Message-security-assist extension 3 **PCKMO** 

KMCTR, KMF, KMO, PCC Message-security-assist extension 4

PRNO Message-security-assist extension 5 ΚΜΔ Message-security-assist extension 8

Miscellaneous-instruction-extensions 1 CLT CLGT RISBGN

AGH, BIC, MG, MGH, MGRK, MSC, MSGC, MSGRKC, Miscellaneous-instruction-extensions 2

MSRKC, SGH

MVCOS Move-with-optional-specifications TRTE, TRTRE Parsing-enhancement

Perform-floating-point-operation PFPO POPCNT Population-count PPA Processor-assist Reset-reference-bits-multiple RRBM Store-clock fast STCKF Store-facility-list extended STFLE

PTFF Transactional-execution ETND, NTSTG, TABORT, TBEGIN, TEND

TPFI Test-pending-external-interruption

TOD-clock steering

structio

П

Vector-facility-for-z/Architecture LCBB, VA, VAC, VACC, VACC, VAVG, VAVGL, VCDG, VCDLG, VCEQ, VCGD, VCH, VCHL, VCKSM, VCLGD,

VCLZ, VCTZ, VEC, VECI, VERIM, VERILL, VERILV, VESIL, VESILV, VESARA, VESRAV, VESRIL, VERILV, VFA, VFAE, VFGE, VFCH, VFCHE, VFD, VFEE, VFENE, VFI, VFLL, VFLR, VFM, VFMS, VFPSO, VFS, VFSO, VFTCI, VGBM, VGFMA, VGM, VGFMA, VGM, VISTR, VL, VLBB, VLCF, VGEG, VGFM, VGFMA, VGM, VISTR, VL, VLBG, VLCH, VLEF, VLEG, VLCH, VLLEZ, VLM, VLP, VLR, VLREP, VLVG, VLVGP, VMAE, VMAH, VMAL, VMALD, VMAO, VME, VMH, VML, VMM, VMML, VMO, VMRH, VMM, VMXL, VN, VNC, VNO, VO, VPDI, VPERM, VPK, VPKLS, VPSO, VPOPCT, VREP, VREPI, VS, VSBCBI, VSBI, VSCBI, VSCB, VSTEP, VSTEP, VSTEP, VSTEP, VSTEP, VSTEP, VSTEP, VSTEM, VSTM, VSTMC, VSUMG, VSTM, VUPL, VUPLH, VUPL, VUPLH,

VUPLL, VX, WFC, WFK

Vector-extensions facility 1 VBPERM, VFMAX, VFMMA, VFNMS, VMSL,

VNN, VNX, VOC

Vector-packed-decimal VAP, VCP, VCVB, VCVBG, VCVD, VCVDG, VDP, VLIP,
VMP, VMSP, VPKZ, VPSOP, VRP, VSDP, VSPP, VSP, VTP.

VUPKZ, VLRLR, VLRL, VSTRLR, VSTRL

For information about Enterprise Systems Architecture/390<sup>®</sup> (ESA/390™) architecture, refer to *IBM Enterprise Systems Architecture/390 Principles of Operation*, SA22-7201, and *IBM Enterprise Systems Architecture/390 Reference Summary*, SA22-7209.

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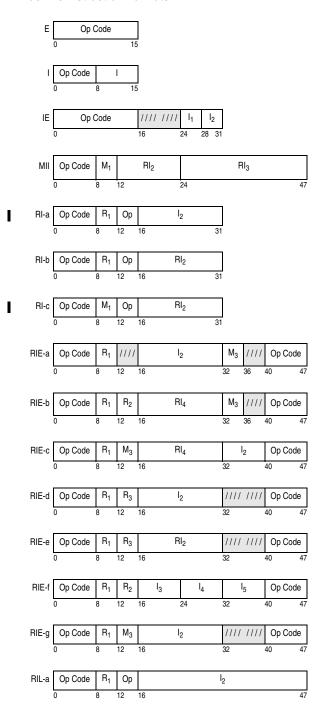
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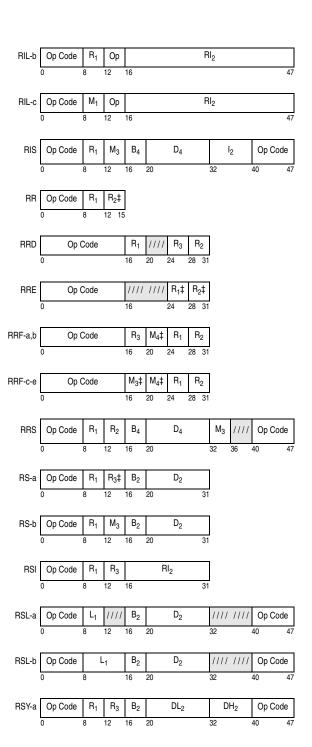
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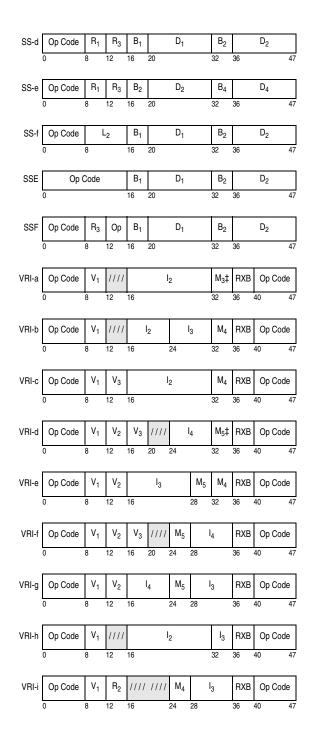
#### **Machine Instruction Formats**





RSY-b	Op Code	R <sub>1</sub>	M <sub>3</sub>	B <sub>2</sub>		DL <sub>2</sub>	32	H <sub>2</sub>	Op Co	de
	0	8	12	16	20		32		40	47
RX-a	Op Code	R <sub>1</sub>	$X_2$	B <sub>2</sub>		$D_2$				
	0	8	12	16	20		31			
					,					
RX-b	Op Code	M <sub>1</sub>	X <sub>2</sub>	B <sub>2</sub>		$D_2$				
	0	8	12	16	20		31			
		1	1		1		-		ı	
RXE	Op Code	R <sub>1</sub>	X <sub>2</sub>	B <sub>2</sub>		$D_2$	M <sub>3</sub> ‡	////	Op Co	de
	0	8	12	16	20		32	36	40	47
RXF	Op Code	$R_3$	X <sub>2</sub>	B <sub>2</sub>		D <sub>2</sub>	R <sub>1</sub>	////	Op Co	de
	0	8	12	16	20		32	36	40	47
<b>5</b> ).0.4			Lv	_	1	DI	1 -			. 1
нх ү-а	Op Code	Н1	λ <sub>2</sub>	В2		DL <sub>2</sub>		т2	Op Co	de
	0	8	12	16	20		32		40	47
DVVh	On Codo	М.	Υ.	R.	1	DI.	Г	H.	On Co	do
חאוים	Op Code	0 1111	10	16	20	DL <sub>2</sub>	20	'1'2	Op Co	47
	U	0	12	10	20		32		40	47
s	Op	Code		B <sub>2</sub> ‡	I	Do‡				
	Op 0			16	20	21	31			
SI	Op Code	ŀ	2‡	B <sub>1</sub>		D <sub>1</sub>				
	0	8		16	20		31			
SIL	Op 0	Code		B <sub>1</sub>		D <sub>1</sub>			l <sub>2</sub>	
	0			16	20		32			47
									1	
SIY	Op Code		l <sub>2</sub>	B <sub>1</sub>		DL <sub>1</sub>		H <sub>1</sub>	Op Co	de
	0	8		16	20		32		40	47
		ı			1					_
SMI	Op Code	M <sub>1</sub>	////	B <sub>3</sub>		$D_3$		F	RI <sub>2</sub>	
	0	8	12	16	20		32			47
	Г						-1-			
SS-a	Op Code	Lo	or L <sub>1</sub>	В <sub>1</sub>		D <sub>1</sub>	B <sub>2</sub>		D <sub>2</sub>	
	0	8	_	16	20		32	36		47
00 '	0-0-1	1.	1 ,	В	1		I P	1		
SS-b	Op Code	L1	L <sub>2</sub>	В1		D <sub>1</sub>	B <sub>2</sub>		D <sub>2</sub>	
	U	8	12	16	20		32	36		47
99.	On Codo	1.	l.	R.		D <sub>1</sub>	R.		D <sub>2</sub>	
35-C	Op Code	<u> </u>	13	16	20	۲1	22	26	D <sub>2</sub>	17
	U	O	12	10	20		32	30		4/

I



VRR-a	Op Code	V <sub>1</sub>	V <sub>2</sub>	////	////	M <sub>5</sub> ‡	M <sub>4</sub> ‡	M <sub>3</sub> ‡	RXB	Ор	Code
	0	8	12	16		24	28	32	36	40	47
VRR-b	Op Code	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	////	M <sub>5</sub> ‡	////	M <sub>4</sub> ‡	RXB	Ор	Code
	0	8	12	16	20	24	28	32	36	40	47
VRR-c	Op Code	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	////	M <sub>6</sub> ‡	M <sub>5</sub> ‡	M <sub>4</sub> ‡	RXB	Ор	Code
	0	8	12	16	20	24	28	32	36	40	47
VRR-d	Op Code	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	M <sub>5</sub> ‡	M <sub>6</sub> ‡	////	V <sub>4</sub>	RXB	Ор	Code
VRR-e	Op Code	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	M <sub>6</sub> ‡	////	M <sub>5</sub> ‡	V <sub>4</sub>	RXB	Ор	Code
VRR-f	Op Code	V <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	20	////	////	////	RXB 36	Op (	Code 47
VRR-g	Op Code	8	V <sub>1</sub>	16	////	////	////	////	RXB	Op (	Code
•	•	•							00		
		1	l		i	l			1		
VRR-h	Op Code	////	V <sub>1</sub>	V <sub>2</sub>	////	M <sub>3</sub>	////	////	RXB	Op (	Code 47
	Op Code										
	Op Code Op Code 0										
VRR-i	Op Code	R <sub>1</sub>	V <sub>2</sub>	1///	////	M <sub>3</sub>	//// 28	////	RXB 36	Op (	Code 47
VRR-i		R <sub>1</sub>	V <sub>2</sub>	//// 16 B <sub>2</sub>	////	M <sub>3</sub>	28	////	RXB 36 RXB	Op (	Code 47
VRR-i VRS-a	Op Code Op Code	8 V <sub>1</sub> 8	V <sub>2</sub> 12 V <sub>3</sub> 12	//// 16 B <sub>2</sub>	20	M <sub>3</sub>	28	//// M <sub>4</sub> ‡	RXB 36 RXB 36	Op (	Code 47 Code 47
VRR-i VRS-a VRS-b	Op Code	8 V <sub>1</sub> 8	V <sub>2</sub> 12 V <sub>3</sub> 12	16 B <sub>2</sub> 16 B <sub>2</sub>	20	M <sub>3</sub>	28	//// M <sub>4</sub> ‡	RXB 36 RXB 36	Op (	Code 47 Code 47
VRR-i VRS-a VRS-b	Op Code  Op Code  Op Code  Op Code	8 V <sub>1</sub> 8	V <sub>2</sub> 12 V <sub>3</sub> 12 R <sub>3</sub>	16 B <sub>2</sub> 16 B <sub>2</sub> 16	20 20	M <sub>3</sub> 24 D <sub>2</sub>	28	//// M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡ 32	RXB 36 RXB 36 RXB 36	Op ( 40  Op ( 40  Op ( 40)  40	Code 47 Code 47
VRR-i VRS-a VRS-b	Op Code  Op Code  Op Code  Op Code	8 V <sub>1</sub> 8	V <sub>2</sub> 12 V <sub>3</sub> 12 R <sub>3</sub> 12 V <sub>3</sub>	16 B <sub>2</sub> 16 B <sub>2</sub> 16	20 20	M <sub>3</sub>	228	//// M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡ 32	RXB 36 RXB 36 RXB RXB	Op (  Op (  Op (  40)  Op (  40)  Op (  Op	Code  47  Code  47  Code
VRR-i VRS-a VRS-b VRS-c	Op Code  Op Code  Op Code  Op Code	R <sub>1</sub> 8 V <sub>1</sub> 8 R <sub>1</sub> 8	V <sub>2</sub> 12 V <sub>3</sub> 12 R <sub>3</sub> 12 V <sub>3</sub> 12	16 B <sub>2</sub> 16 B <sub>2</sub> 16	20 20	M <sub>3</sub> 24 D <sub>2</sub>	228	M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡	RXB 36 RXB 36 RXB RXB	Op (  Op (  40  Op (  40  Op (  40  Op (  40)	Code 47 Code 47 Code 47 Code 47
VRS-a VRS-b VRS-c	Op Code  Op Code  Op Code  Op Code  Op Code  Op Code	R <sub>1</sub> 8 V <sub>1</sub> 8 R <sub>1</sub> 8	V <sub>2</sub> 12 V <sub>3</sub> 12 R <sub>3</sub> 12 V <sub>3</sub> 12	////   16   B <sub>2</sub>   B <sub>2</sub>	20 20	M <sub>3</sub> 224 D <sub>2</sub> D <sub>2</sub>	228	M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡ 32	RXB 36  RXB 36  RXB 36  RXB RXB	Op (  Op (  40  Op (  40  Op (  40  Op (  40)	Code 47 Code 47 Code 47 Code 47
VRS-a VRS-b VRS-c	Op Code  Op Code  Op Code  Op Code  Op Code  Op Code	R <sub>1</sub> 8 V <sub>1</sub> 8 V <sub>1</sub> 8 V <sub>1</sub> 8	V <sub>2</sub> 112 V <sub>3</sub> 112 R <sub>3</sub> 112 R <sub>3</sub> 112	////   16   B <sub>2</sub>   B <sub>2</sub>	220	M <sub>3</sub> 224 D <sub>2</sub> D <sub>2</sub>	228	M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡ 32 M <sub>4</sub> ‡ 32 V <sub>1</sub> 32	RXB 36  RXB 36  RXB 36  RXB RXB	Op ( 40	Code 47 Code 47 Code 47 Code 47 Code 47 47

VRX	Op Code	V <sub>1</sub>	X <sub>2</sub>	B <sub>2</sub>	D <sub>2</sub>	M <sub>3</sub> ‡	RXB	Op Code
	0	8	12	16	20	32	36	40 47

VSI	Op Code	l <sub>3</sub>	B <sub>2</sub>	D <sub>2</sub>	V <sub>1</sub>	RXB	Op Code	
	0	8	16	20	32	36	40	47

1, 2, 3, 4, 5, 6 Denotes association with first, second, third, fourth, fifth, or sixth operand

a, b, c, d, e, f Distinguishes among instances of the same basic instruction format

B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> Base register designation field

D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub>, D<sub>4</sub> Displacement field (including DH and DL for long-displacement

forms)

 $\mathsf{I},\,\mathsf{I}_2,\,\mathsf{I}_3,\,\mathsf{I}_4,\,\mathsf{I}_5 \qquad \qquad \mathsf{Immediate operand field}$ 

 $L, L_1, L_2$  Length field  $M_1, M_3, M_4, M_5, M_6$  Mask field

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> Register designation field
RI<sub>2</sub>, RI<sub>3</sub>, RI<sub>4</sub> Relative-immediate operand field

RXB Most significant bits of vector registers designated by the  $V_1, V_2,$ 

V<sub>3</sub>, V<sub>4</sub> fields, respectively Index register designation field

X<sub>2</sub> Index register designation field ‡ For certain instructions, this operand is not defined

## **Machine Instructions by Mnemonic**

Mne- monic	Onorande	Name	For- mat	Op- code	Clas & Note
A	Operands	Add (32)	RX-a	5A	C
AD	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Add Normalized (LH)	RX-a	6A	пc
ADB	$R_1, D_2(X_2, B_2)$	Add (LB)	RXE	ED1A	
ADBR	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Add (LB)	RRE	B31A	
ADBR	R <sub>1</sub> ,R <sub>2</sub>	Add Normalized (LH)	RR	2A	пc
ADTR	R <sub>1</sub> ,R <sub>2</sub>	, ,		B3D2	
ADTRA	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Add (LD) Add (LD)		B3D2	
AD I NA AE	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> ,M <sub>4</sub>	Add Normalized (SH)	RX-a		D C
AEB	$R_1, D_2(X_2, B_2)$	Add (SB)	RXE	ED0A	
AEBR	$R_1, D_2(X_2, B_2)$	• •	RRE	B30A	
	R <sub>1</sub> ,R <sub>2</sub>	Add (SB)	RR	3A	
AER	R <sub>1</sub> ,R <sub>2</sub>	Add Normalized (SH)	RIL-a		¤ C
AFI AG	R <sub>1</sub> ,l <sub>2</sub>	Add Immediate (32)			c El
	$R_1, D_2(X_2, B_2)$	Add (64)		E308	
AGF	$R_1, D_2(X_2, B_2)$	Add (64←32)		E318	
AGFI	R <sub>1</sub> ,l <sub>2</sub>	Add Immediate (64←32)	RIL-a		c El
AGFR	R <sub>1</sub> ,R <sub>2</sub>	Add (64←32)	RRE	B918	
AGH	$R_1,D_2(X_2,B_2)$	Add Halfword (64←16)		E338	
AGHI	R <sub>1</sub> ,l <sub>2</sub>	Add Halfword Immediate (64←16)	RI-a	A7B	c N
AGHIK	R <sub>1</sub> ,R <sub>3</sub> ,I <sub>2</sub>	Add Immediate (64←16)		ECD9	
AGR	R <sub>1</sub> ,R <sub>2</sub>	Add (64)	RRE	B908	
AGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Add (64)		B9E8	
AGSI	$D_1(B_1), I_2$	Add Immediate (64←8)	SIY	EB7A	
AH	$R_1, D_2(X_2, B_2)$	Add Halfword (32←16)	RX-a	4A	С
AHHHR	$R_1,R_2,R_3$	Add High (32)		B9C8	
AHHLR	$R_1,R_2,R_3$	Add High (32)		B9D8	c HW
AHI	$R_1,I_2$	Add Halfword Immediate (32←16)	RI-a	A7A	С
AHIK	$R_1,R_3,I_2$	Add Immediate (32←16)		ECD8	
AHY	$R_1, D_2(X_2, B_2)$	Add Halfword (32←16)		E37A	c LD
AIH	$R_1,I_2$	Add Immediate High (32)	RIL-a		c HW
AL	$R_1,D_2(X_2,B_2)$	Add Logical (32)	RX-a	5E	С
ALC	$R_1,D_2(X_2,B_2)$	Add Logical with Carry (32)	RXY-a	E398	c N3
ALCG	$R_1,D_2(X_2,B_2)$	Add Logical with Carry (64)	RXY-a	E388	сN
ALCGR	R <sub>1</sub> ,R <sub>2</sub>	Add Logical with Carry (64)	RRE	B988	сN
ALCR	R <sub>1</sub> ,R <sub>2</sub>	Add Logical with Carry (32)	RRE	B998	c N3
ALFI	$R_1,I_2$	Add Logical Immediate (32)	RIL-a	C2B	c El
ALG	$R_1,D_2(X_2,B_2)$	Add Logical (64)	RXY-a	E30A	сN
ALGF	$R_1,D_2(X_2,B_2)$	Add Logical (64←32)	RXY-a	E31A	сN
ALGFI	$R_1,I_2$	Add Logical Immediate (64←32)	RIL-a	C2A	c El
ALGFR	R <sub>1</sub> ,R <sub>2</sub>	Add Logical (64←32)	RRE	B91A	сN
ALGHSIK	$R_1,R_3,I_2$	Add Logical with Signed Immediate (64←16)	RIE-d	ECDB	c DO
ALGR	R <sub>1</sub> ,R <sub>2</sub>	Add Logical (64)	RRE	B90A	сN
ALGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Add Logical (64)	RRF-a	B9EA	c DO
ALGSI	$D_1(B_1), I_2$	Add Logical with Signed Immediate (64←8)	SIY	EB7E	c GE
ALHHHR		Add Logical High (32)		B9CA	c HV
ALHHLR		Add Logical High (32)	RRF-a	B9DA	c HV
ALHSIK	R <sub>1</sub> ,R <sub>3</sub> ,I <sub>2</sub>	Add Logical with Signed Immediate (32←16)	RIE-d	ECDA	c DC
ALR	R <sub>1</sub> ,R <sub>2</sub>	Add Logical (32)	RR	1E	С
ALRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Add Logical (32)	RRF-a	B9FA	c DO
ALSI	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Add Logical with Signed Immediate (32←8)		EB6E	
ALSIH	R <sub>1</sub> ,I <sub>2</sub>	Add Logical with Signed Immediate High (32)	RIL-a	CCA	c HW
ALSIHN	$R_1,I_2$	Add Logical with Signed Immediate High (32)	RIL-a	ССВ	HW
ALY	$R_1,D_2(X_2,B_2)$	Add Logical (32)	RXY-a	E35E	c LD
AP	$D_1(L_1,B_1),D_2(L_2,B_2)$		SS-b	FA	пc
AR	R <sub>1</sub> ,R <sub>2</sub>	Add (32)	RR	1A	С
ARK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Add (32)		B9F8	c DO

Mne-			For-	Ор-	Clas &
monic	Operands	Name	mat	code	Note
ASI	$D_1(B_1),I_2$	Add Immediate (32←8)	SIY	EB6A	c GE
AU	$R_1,D_2(X_2,B_2)$	Add Unnormalized (SH)	RX-a	7E	¤С
AUR	R <sub>1</sub> ,R <sub>2</sub>	Add Unnormalized (SH)	RR	3E	¤ C
AW	$R_1,D_2(X_2,B_2)$	Add Unnormalized (LH)	RX-a	6E	Ω C
AWR	R <sub>1</sub> ,R <sub>2</sub>	Add Unnormalized (LH)	RR	2E	ΩC
AXBR	R <sub>1</sub> ,R <sub>2</sub>	Add (EB)	RRE	B34A	
AXR	R <sub>1</sub> ,R <sub>2</sub>	Add Normalized (EH)	RR	36	¤ C
AXTR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Add (ED)	RRF-a		
AXTRA	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> ,M <sub>4</sub>	ADD (ED)	RRF-a		
AY	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Add (32)	RXY-a		
BAKR	R <sub>1</sub> ,R <sub>2</sub>	Branch and Stack	RRE	B240	a a
BAL	$R_1,D_2(X_2,B_2)$	Branch and Link	RX-a	45	Ω D
BALR	R <sub>1</sub> ,R <sub>2</sub>	Branch and Link	RR	05 4D	
BAS	$R_1,D_2(X_2,B_2)$	Branch and Save	RX-a	4D	0
BASR	R <sub>1</sub> ,R <sub>2</sub>	Branch and Save	RR	0D	0
BASSM	R <sub>1</sub> ,R <sub>2</sub>	Branch and Save and Set Mode	RR	0C	0
BC BCB	M <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Branch on Condition	RX-b	47 07	a a
BCR BCT	M <sub>1</sub> ,R <sub>2</sub>	Branch on Count (32)	RR RX-a	07 46	Ω Ω
	$R_1,D_2(X_2,B_2)$	Branch on Count (32)			
BCTG	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Branch on Count (64)	RXY-a RRE		пN
BCTGR BCTR	R <sub>1</sub> ,R <sub>2</sub>	Branch on Count (64)	RR	B946	
BIC	R <sub>1</sub> ,R <sub>2</sub>	Branch on Count (32)	RXY-b	06 E247	D n M
BPP	M <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Branch Indirect on Condition Branch Prediction Preload	SMI	C7	¤ MI
	M <sub>1</sub> ,Rl <sub>2</sub> ,D <sub>3</sub> (B <sub>3</sub> )				
BPRP	M <sub>1</sub> ,Rl <sub>2</sub> ,Rl <sub>3</sub>	Branch Prediction Relative Preload	MII	C5	¤ EH
BRAS	R <sub>1</sub> ,Rl <sub>2</sub>	Branch Relative and Save	RI-b RIL-b	A75	¤ N3
BRASL BRC	R <sub>1</sub> ,RI <sub>2</sub>	Branch Relative and Save Long Branch Relative on Condition	RI-c	A74	n M3
BRCL	M <sub>1</sub> ,Rl <sub>2</sub> M <sub>1</sub> ,Rl <sub>2</sub>	Branch Relative on Condition Long	RIL-c	C04	¤ N3
BRCT		Branch Relative on Count (32)	RI-b	A76	α α
BRCTG	R <sub>1</sub> ,Rl <sub>2</sub> R <sub>1</sub> ,Rl <sub>2</sub>	Branch Relative on Count (64)	RI-b	A77	¤Ν
BRCTH	R <sub>1</sub> ,RI <sub>2</sub>	Branch Relative on Count High (32)	RIL-b	CC6	¤ HV
BRXH	R <sub>1</sub> ,R <sub>3</sub> ,Rl <sub>2</sub>	Branch Relative on Index High (32)	RSI	84	מ
BRXHG	R <sub>1</sub> ,R <sub>3</sub> ,Rl <sub>2</sub>	Branch Relative on Index High (64)	RIE-e		
BRXLE	R <sub>1</sub> ,R <sub>3</sub> ,Rl <sub>2</sub>	Branch Relative on Index Low or Equal (32)		85	D IN
BRXLG	R <sub>1</sub> ,R <sub>3</sub> ,Rl <sub>2</sub>	Branch Relative on Index Low or Equal (64)			
BSA	R <sub>1</sub> ,R <sub>2</sub>	Branch and Set Authority	RRE	B25A	q
BSG	R <sub>1</sub> ,R <sub>2</sub>	Branch in Subspace Group	RRE	B258	ч D
BSM	R <sub>1</sub> ,R <sub>2</sub>	Branch and Set Mode	RR	0B	D D
BXH	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Branch on Index High (32)	RS-a	86	¤
BXHG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Branch on Index High (64)	RSY-a		
BXLE	$R_1, R_3, D_2(B_2)$ $R_1, R_3, D_2(B_2)$	Branch on Index Low or Equal (32)	RS-a	87	מ
BXLEG	$R_1, R_3, D_2(B_2)$ $R_1, R_3, D_2(B_2)$	Branch on Index Low or Equal (64)	RSY-a		
C	$R_1, D_2(X_2, B_2)$	Compare (32)	RX-a	59	C
CD	$R_1,D_2(X_2,B_2),M_3$	Compare (LH)	RX-a	69	С
CDB	$R_1,D_2(X_2,B_2)$	Compare (LB)	RXE	ED19	
CDBR	R <sub>1</sub> ,R <sub>2</sub>	Compare (LB)	RRE	B319	пc
CDFBR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (LB←32)	RRE	B395	D C
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Fixed (LB←32)	RRF-e		¤Ε
CDFR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (LH←32)	RRE	B3B5	
CDFTR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Fixed (LD←32)	RRE	B951	
CDGBR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (LB←64)	RRE	B3A5	
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Fixed (LB←64)	RRF-e		
CDGR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (LH←64)	RRE	B3C5	
CDGTR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (LD←64)	RRE	B3F1	
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Fixed (LD ← 64)	RRF-e		
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Logical (LB←32)	RRF-e		¤F
	R <sub>1</sub> ,W <sub>3</sub> ,R <sub>2</sub> ,W <sub>4</sub>	Convert from Logical (LD←32)	RRF-e		
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub> R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Logical (LB←64)		B3A1	
	R <sub>1</sub> ,W <sub>3</sub> ,R <sub>2</sub> ,W <sub>4</sub>	Convert from Logical (LD←64)	RRF-e		
OPPOIN	1 17,1413,1 12,1414	Convert Horri Logical (LD v 04)	e	عرون	~ 1

CDR         R₁-R₂         Compare (LH)         RR           CDS         R₁-R₃,D₂(B₂)         Compare Double and Swap (32)         RS-a           CDSG         R₁-R₃,D₂(B₂)         Compare Double and Swap (64)         RSY-i           CDSTR         R₁-R₂         Convert from Signed Packed (LD←64)         RSY-i           CDSY         R₁-R₃,D₂(B₂)         Compare Double and Swap (32)         RSY-i           CDTR         R₁-R₂         Compare Double and Swap (32)         RSY-i           CDTR         R₁-R₂         Compare (LD)         RRE           CDUTR         R₁-R₂         Convert from Unsigned Packed (LD←64)         RRE           CDZT         R₁-D₂(L₂-B₂),M₃         Convert from Daved (to long DFP)         RSL-i           CE         R₁-D₂(L₂-B₂)         Compare (SH)         RX-a           CEB         R₁-D₂(L₂-B₂)         Compare (SH)         RX-a           CEB         R₁-D₂(X₂-B₂)         Compare (SH)         RX-a           CEB         R₁-D₂(X₂-B₂)         Compare (SH)         RX-a           CEB         R₁-R₂         Compare (SH)         RRE           CEDTR         R₁-R₂         Compare Biased Exponent (LD)         RRE           CEFBR         R₁-R₂         Convert from Fixed (SH←32)	B3F2 D EDAA 79 ED09 B309 B3F4 B394 B384 B384 B3A4 B3A4 B3C4 B390 B3FC B21A	0 C 0 C C C C C C C C C C C C C C C C C
CDPT         R <sub>1</sub> ,D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub> Convert from Packed (To Long DFP)         RSL-I           CDR         R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )         Compare (LH)         RR           CDS         R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )         Compare Double and Swap (32)         RS-a           CDSG         R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )         Compare Double and Swap (64)         RSY-G           CDSTR         R <sub>1</sub> ,R <sub>2</sub> Convert from Signed Packed (LD-64)         RRE           CDSY         R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )         Compare Double and Swap (32)         RSY-G           CDTR         R <sub>1</sub> ,R <sub>2</sub> Compare Double and Swap (32)         RSY-G           CDTR         R <sub>1</sub> ,R <sub>2</sub> Compare Double and Swap (32)         RSY-G           CDTR         R <sub>1</sub> ,R <sub>2</sub> Compare Double and Swap (32)         RSY-G           CDTR         R <sub>1</sub> ,R <sub>2</sub> Compare Double and Swap (32)         RSY-G           CDTR         R <sub>1</sub> ,R <sub>2</sub> Compare Glath         RSY-G           CDTR         R <sub>1</sub> ,R <sub>2</sub> Compare (LD)         RRE           CDTR         R <sub>1</sub> ,R <sub>2</sub> Convert from Unsigned Packed (LD-64)         RRE           CEB         R <sub>1</sub> ,D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub> Convert (SB)         RXE           CEB         R <sub>1</sub> ,D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub> Compare (SB)	DEDAE  29  BB  1 EB3E  B3F3  1 B3E4  B3F2  DEDAE  79  ED09  B309  B3F4  B394   PC  CC  CC  CC  CC  CC  CC  CC  CC  CC	
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	29 BB BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB	0 C 0 C C C C C C C C C C C C C C C C C
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	BB	OCNOTE OCN
$\begin{array}{llll} \text{CDSG} & R_1, R_3, D_2(D_2) & \text{Compare Double and Swap } (64) & \text{RSY-CDSTR} \\ R_1, R_2 & \text{Convert from Signed Packed } (LD \leftarrow 64) & \text{RRE} \\ \text{CDSY} & R_1, R_3, D_2(B_2) & \text{Compare Double and Swap } (32) & \text{RSY-CDTR} \\ R_1, R_2 & \text{Compare } (LD) & \text{RRE} \\ \text{CDUTR} & R_1, R_2 & \text{Convert from Unsigned Packed } (LD \leftarrow 64) & \text{RRE} \\ \text{CDUTR} & R_1, D_2(L_2, B_2), M_3 & \text{Convert from Zoned (to long DFP)} & \text{RSL-IDSTR} \\ \text{CE} & R_1, D_2(X_2, B_2) & \text{Compare } (SH) & \text{RX-RE} \\ \text{CEBR} & R_1, R_2 & \text{Compare } (SH) & \text{RX-RE} \\ \text{CEDTR} & R_1, R_2 & \text{Compare } (SH) & \text{RRE} \\ \text{CEDTR} & R_1, R_2 & \text{Compare } (SH) & \text{RRE} \\ \text{CEDTR} & R_1, R_2 & \text{Compare } (SH) & \text{RRE} \\ \text{CEFBR} & R_1, R_2 & \text{Compare } (SH) & \text{RRE} \\ \text{CEFBR} & R_1, R_2 & \text{Convert from Fixed } (SH \leftarrow 32) & \text{RRE} \\ \text{CEFBRA} & R_1, M_3, R_2, M_4 & \text{Convert from Fixed } (SH \leftarrow 32) & \text{RRE} \\ \text{CEGBR} & R_1, R_2 & \text{Convert from Fixed } (SH \leftarrow 32) & \text{RRE} \\ \text{CEGBRA} & R_1, M_3, R_2, M_4 & \text{Convert from Fixed } (SH \leftarrow 64) & \text{RRE} \\ \text{CEGBRA} & R_1, R_2 & \text{Convert from Fixed } (SH \leftarrow 64) & \text{RRE} \\ \text{CEGBRA} & R_1, M_3, R_2, M_4 & \text{Convert from Logical } (SH \leftarrow 64) & \text{RRE} \\ \text{CELGBR} & R_1, R_2 & \text{Convert from Logical } (SH \leftarrow 64) & \text{RRE} \\ \text{CELGBR} & R_1, R_2 & \text{Convert from Logical } (SH \leftarrow 64) & \text{RRE} \\ \text{CELGBR} & R_1, R_2 & \text{Convert from Logical } (SH \leftarrow 64) & \text{RRE} \\ \text{CELGBR} & R_1, R_2 & \text{Convert from Logical } (SH \leftarrow 64) & \text{RRE} \\ \text{CELGBR} & R_1, R_2 & \text{Convert from Logical } (SH \leftarrow 64) & \text{RRE} \\ \text{CECTATR} & R_1, R_2 & \text{Compare } SH & \text{Convert from Logical } (SH \leftarrow 64) & \text{RRE} \\ \text{CFDR} & R_1, R_2 & \text{Compare } SH & \text{Convert } SH \\ \text{CFDR} & R_1, R_2 & \text{Compare } SH & \text{Convert } SH \\ \text{CFDR} & R_1, R_2 & \text{Compare } SH & \text{Convert } SH \\ \text{CFDBR} & R_1, M_3, R_2 & \text{Convert } SH & \text{Convert } SH \\ \text{CFDBR} & R_1, R_2 & \text{Compare } SH & \text{Convert } SH \\ \text{CFDBR} & R_1, R_3, R_2 & \text{Convert } SH & \text{CONVERT } SH \\ \text{CFDBR} & R_1, R_3, R_2 & \text{Convert } SH & \text{CONVERT } SH \\ \text{CFDBR} & R_1, R_3, R_2 & $	B3F3 B3F4 B3F4 B3F4 B3F4 B3F4 B3F4 B3F4	a c N a TF a c LD a c TF a ZF a c a c a c a c a c a c a F a N a F a F a N a F a F a C a C a C a C TF a C TF
CDSTR $R_1,R_2$ Convert from Signed Packed (LD←64) RRE CDSY $R_1,R_3,D_2(B_2)$ Compare Double and Swap (32) RSY-CDTR $R_1,R_2$ Compare (LD) RRE CDUTR $R_1,R_2$ Convert from Unsigned Packed (LD←64) RRE CDZT $R_1,D_2(L_2,B_2)$ M3 Convert from Zoned (to long DFP) RSL-CE $R_1,D_2(X_2,B_2)$ Compare (SH) RX-a CDZT $R_1,D_2(L_2,B_2)$ Compare (SH) RX-a CDZT $R_1,D_2(X_2,B_2)$ Compare (SB) RXE CEBR $R_1,R_2$ Compare (SB) RXE CEBR $R_1,R_2$ Compare (SB) RRE CEDTR $R_1,R_2$ Compare (SB) RRE CEFBR $R_1,R_2$ Convert from Fixed (SB←32) RRE CEFBR $R_1,R_2$ Convert from Fixed (SH←32) RRE CEGBR $R_1,R_2$ Convert from Fixed (SH←64) RRE CEGBR $R_1,R_2$ Convert from Fixed (SH←64) RRE CELFBR $R_1,R_2$ Convert from Fixed (SH←64) RRE CELFBR $R_1,R_2$ Convert from Logical (SH←64) RRE CEXTR $R_1,R_2$ Compare SIAD RAPE CEXTR $R_1,R_2$ Compare Biased Exponent (ED) RRE CEXTR $R_1,R_2$ Compare Biased Exponent (ED) RRE CFDBR $R_1,M_3,R_2$ Convert to Fixed (32←LB) RFF-CFDBRA $R_1,M_3,R_2,M_4$ Convert to Fixed (32←LB) RRF-CFDBRA $R_1,M_3,R_2,M_4$ Convert to Fixed (32←LB) RRF-CFDBRA $R_1,M_3,R_2,M_4$ Convert to Fixed (32←LB) RRF-	B3F3 B3E4 B3F2 D EDAA 79 ED09 B309 B3F4 B394 B394 B394 B384 B384 B384 B384 B384 B384 B384 B38	o TF o c LD o c TF o TF o ZF o c o c o c o c TF o o N o F o F o c o c TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B314 B352 B364 B364 B364 B364 B364 B364 B364 B364	a c LD a c TF a TF a ZF a c a c a c a c a c TF a B B B B B B B B B B B B B B B B B B
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B3E4 B3F2 D EDAA 79 ED09 B309 B3F4 B394 B384 B3A4 B3A4 B3A4 B3C4 B390 B3FC B21A	acTF TF TF CZF CC
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B3F2 D EDAA 79 ED09 B309 B3F4 B394 B384 B384 B3A4 B3A4 B3C4 B390 B3FC B21A	a TF a ZF a c a c a c a c a c b c TF a b F a N a F a F a F a F a C a c TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	D EDAA 79 ED09 B309 B3F4 B394 B394 B384 B3A4 B3A4 B3C4 B390 B3FC B21A	a ZF a c a c a c TF a F a N a F a N a F a N a F a C a C TF
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	79 ED09 B309 B3F4 B394 B384 B3A4 B3C4 B3C4 B390 B3A0 39 B3FC B21A	a c a c TF a a F a N a F a F a C a C TF a c TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B309 B374 B394 B394 B384 B3A4 B3A4 B3C4 B390 B3A0 39 B3FC B21A	a c a c TF a a F a N a F a F a C a c TF
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	B309 B3F4 B394 B394 B3B4 B3A4 B3C4 B390 B3A0 39 B3FC B21A	ac ac TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B3F4 B394 B394 B3B4 B3A4 B3C4 B390 B3A0 39 B3FC B21A	a c TF a a F a a N a F a N a F a C a C TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B394 B384 B3A4 B3A4 B3C4 B390 B3A0 39 B3FC B21A	a F a N a F a F a C a C TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B394 B3B4 B3A4 B3A4 B3C4 B390 B3A0 39 B3FC B21A	a F a N a F a N a F a F a C
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B3B4 B3A4 B3C4 B3C9 B3A0 B3A0 B3FC B21A	a N a F a F a C a c TF
DEGBR $R_1, R_2$ Convert from Fixed (SB $\leftarrow$ 64)       RRE         DEGBRA $R_1, M_3, R_2, M_4$ Convert from Fixed (SB $\leftarrow$ 64)       RRF         DEGR $R_1, R_2$ Convert from Fixed (SH $\leftarrow$ 64)       RRE         DELFBR $R_1, M_3, R_2, M_4$ Convert from Logical (SB $\leftarrow$ 32)       RRF         DELGBR $R_1, M_3, R_2, M_4$ Convert from Logical (SB $\leftarrow$ 64)       RRF         DECR $R_1, R_2$ Compare (SH)       RR         DEXTR $R_1, R_2$ Compare Biased Exponent (ED)       RRE         DECTC $D_2$ (B2)       Compare and Form Codeword       S         DEFDBR $R_1, M_3, R_2$ Convert to Fixed (32 $\leftarrow$ LB)       RRF         DEFDBRA $R_1, M_3, R_2, M_4$ Convert to Fixed (32 $\leftarrow$ LB)       RRF	B3A4 B3C4 B390 B3A0 39 B3FC B21A	a N a F a N a F a F a c a c TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B3A4 B3C4 B390 B3A0 39 B3FC B21A	¤ F ¤ N ¤ F ¤ F ¤ c ¤ c TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B3C4 B390 B3A0 39 B3FC B21A	¤ N ¤ F ¤ F ¤ c ¤ c TF
$ \begin{array}{llll} \text{CELFBR} & R_1 M_3 R_2 M_4 & \text{Convert from Logical (SB} \leftarrow 32) & \text{RRF-} \\ \text{CELGBR} & R_1 M_3 R_2 M_4 & \text{Convert from Logical (SB} \leftarrow 64) & \text{RRF-} \\ \text{CER} & R_1 R_2 & \text{Compare (SH)} & \text{RR} \\ \text{CEXTR} & R_1 R_2 & \text{Compare Biased Exponent (ED)} & \text{RRE} \\ \text{CFC} & D_2 (B_2) & \text{Compare and Form Codeword} & S \\ \text{CFDBR} & R_1 M_3 R_2 & \text{Convert to Fixed (32} \leftarrow \text{LB)} & \text{RRF-} \\ \text{CFDBRA} & R_1 M_3 R_2 M_4 & \text{Convert to Fixed (32} \leftarrow \text{LB)} & \text{RRF-} \\ \end{array} $	B390 B3A0 39 B3FC B21A	¤F ¤F ¤c ¤cTF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B3A0 39 B3FC B21A	¤F ¤c ¤cTF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	39 B3FC B21A	¤c ¤cTF
	B3FC B21A	¤ c TF
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	B21A	
CFDBR $R_1$ , $M_3$ , $R_2$ Convert to Fixed (32 $\leftarrow$ LB) RRF-CFDBRA $R_1$ , $M_3$ , $R_2$ , $M_4$ Convert to Fixed (32 $\leftarrow$ LB) RRF-		
CFDBRA R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub> Convert to Fixed (32←LB) RRF-		
1. 0. 2. 4		
FDR R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> Convert to Fixed (32←LH) RRF-	B399	
1. 0. 2. 4	B941	
17 07 2	B398	
1. 0. 2. 4	B398	
1, 3, 2	B3B8	
1/2	C2D	c El
	B39A	
1, 0, 5, 4	B39A	
	B3BA	
1. 0. 2. 4	B949	
1. 2. 2. 2	E320	
· · · · ·	B3A9	
	B3A9	
1, 0, 5	B3C9	
. 0 2	B3E1	
17 07 27 4	B3E1	
1. 0. 2	B3A8	
1, 3, 2, 4	B3A8	
1, 0, 5	B3C8	
1, 2, 2, 2,,	E330	
	C2C	c El
CGFR R <sub>1</sub> ,R <sub>2</sub> Compare (64←32) RRE	B930	
1, 5	C6C	c GE
	E334	
CGHI R <sub>1</sub> ,I <sub>2</sub> Compare Halfword Immediate (64←16) RI-a	A7F	c N
CGHRL R <sub>1</sub> ,RI <sub>2</sub> Compare Halfword Relative Long (64←16) RIL-b		c GE
CGHSI D <sub>1</sub> (B <sub>1</sub> ),I <sub>2</sub> Compare Halfword Immediate (64←16) SIL	E558	
CGIB R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub> ,D <sub>4</sub> (B <sub>4</sub> ) Compare Immediate and Branch (64←8) RIS		¤ GE
CGIJ R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub> ,RI <sub>4</sub> Compare Immediate and Branch Relative RIE-c (64←8)	EC7C	¤ GE
, ,	EC70	GE
CGR R <sub>1</sub> ,R <sub>2</sub> Compare (64) RRE	B920	
CGRB R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub> ,D <sub>4</sub> (B <sub>4</sub> ) Compare and Branch (64) RRS	ECE4	
CGRJ R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub> ,RI <sub>4</sub> Compare and Branch Relative (64) RIE-b		

Mno			Fo-	٥٣	Class
Mne- monic	Operands	Name	For- mat	Op- code	& Notes
CGRL	R <sub>1</sub> ,RI <sub>2</sub>	Compare Relative Long (64)	RIL-b	C68	c GE
CGRT	$R_1,R_2,M_3$	Compare and Trap (64)	RRF-c	B960	GE
CGXBR	$R_1, M_3, R_2$	Convert to Fixed (64←EB)	RRF-e	B3AA	¤сN
CGXBRA	$R_1,M_3,R_2,M_4$	Convert to Fixed (64←EB)	RRF-e	ВЗАА	¤сF
CGXR	$R_1, M_3, R_2$	Convert to Fixed (64←EH)	RRF-e	B3CA	¤сN
CGXTR	$R_1, M_3, R_2$	Convert to Fixed (64←ED)	RRF-e	B3E9	¤ c TF
CGXTRA	$R_1, M_3, R_2, M_4$	Convert to Fixed (64←ED)	RRF-e	B3E9	¤сF
CH	$R_1,D_2(X_2,B_2)$	Compare Halfword (32←16)	RX-a	49	С
CHF	$R_1,D_2(X_2,B_2)$	Compare High (32)	RXY-a	E3CD	
CHHR	R <sub>1</sub> ,R <sub>2</sub>	Compare High (32)	RRE	B9CD	
CHHSI	$D_1(B_1),I_2$	Compare Halfword Immediate (16←16)	SIL	E554	c GE
CHI	$R_1,I_2$	Compare Halfword Immediate (32←16)	RI-a	A7E	С
CHLR	R <sub>1</sub> ,R <sub>2</sub>	Compare High (32)	RRE	B9DD	c HW
CHRL	R <sub>1</sub> ,RI <sub>2</sub>	Compare Halfword Relative Long (32←16)		C65	c GE
CHSI	$D_1(B_1),I_2$	Compare Halfword Immediate (32←16)	SIL	E55C	
CHY	$R_1,D_2(X_2,B_2)$	Compare Halfword (32←16)	RXY-a	E379	c LD
CIB	$R_1, I_2, M_3, D_4(B_4)$	Compare Immediate and Branch (32←8)	RIS	ECFE	¤ GE
CIH	$R_1,I_2$	Compare Immediate High (32)	RIL-a		
CIJ	R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub> ,RI <sub>4</sub>	Compare Immediate and Branch Relative (32←8)		EC7E	
CIT	$R_1,I_2,M_3$	Compare Immediate and Trap (32←16)		EC72	GE
CKSM	R <sub>1</sub> ,R <sub>2</sub>	Checksum	RRE	B241	шС
CL	$R_1,D_2(X_2,B_2)$	Compare Logical (32)	RX-a	55	С
CLC	$D_1(L,B_1),D_2(B_2)$	Compare Logical (character)	SS-a	D5	пc
CLCL	R <sub>1</sub> ,R <sub>2</sub>	Compare Logical Long	RR	0F	ic
CLCLE	$R_1, R_3, D_2(B_2)$	Compare Logical Long Extended	RS-a	A9	шС
CLCLU	$R_1, R_3, D_2(B_2)$	Compare Logical Long Unicode	RSY-a	EB8F	□ c E2
CLFDBR	$R_1,M_3,R_2,M_4$	Convert to Logical (32←LB)	RRF-e	B39D	¤сF
CLFDTR	$R_1, M_3, R_2, M_4$	Convert to Logical (32←LD)	RRF-e		
CLFEBR	$R_1, M_3, R_2, M_4$	Convert to Logical (32←SB)	RRF-e	B39C	¤cF
CLFHSI	$D_1(B_1), I_2$	Compare Logical Immediate (32←16)	SIL	E55D	c GE
CLFI	$R_1,I_2$	Compare Logical Immediate (32)	RIL-a	C2F	c El
CLFIT	R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub>	Compare Logical Immediate and Trap (32←16)		EC73	
	$R_1, M_3, R_2, M_4$	Convert to Logical (32←EB)	RRF-e		
CLFXTR	$R_1, M_3, R_2, M_4$	Convert to Logical (32←ED)	RRF-e	B94B	¤сF
CLG	$R_1,D_2(X_2,B_2)$	Compare Logical (64)	RXY-a	E321	сN
CLGDBR	$R_1, M_3, R_2, M_4$	Convert to Logical (64←LB)	RRF-e	B3AD	¤cF
CLGDTR	$R_1, M_3, R_2, M_4$	Convert to Logical (64←LD)	RRF-e	B942	¤cF
CLGEBR	$R_1, M_3, R_2, M_4$	Convert to Logical (64←SB)	RRF-e	B3AC	¤cF
CLGF	$R_1,D_2(X_2,B_2)$	Compare Logical (64←32)	RXY-a	E331	сN
CLGFI	$R_1,I_2$	Compare Logical Immediate (64←32)	RIL-a	C2E	c El
CLGFR	R <sub>1</sub> ,R <sub>2</sub>	Compare Logical (64←32)	RRE	B931	сN
CLGFRL	R <sub>1</sub> ,RI <sub>2</sub>	Compare Logical Relative Long (64←32)	RIL-b	C6E	c GE
CLGHRL	R <sub>1</sub> ,RI <sub>2</sub>	Compare Logical Relative Long (64←16)	RIL-b	C66	c GE
CLGHSI	$D_1(B_1), I_2$	Compare Logical Immediate (64←16)	SIL	E559	c GE
CLGIB	$R_1, I_2, M_3, D_4(B_4)$	Compare Logical Immediate and Branch (64←8)	RIS	ECFD	¤ GE
CLGIJ	R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub> ,RI <sub>4</sub>	Compare Logical Immediate and Branch Relative (64←8)		EC7D	
CLGIT	R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub>	Compare Logical Immediate and Trap (64←16)		EC71	
CLGR	R <sub>1</sub> ,R <sub>2</sub>	Compare Logical (64)	RRE	B921	
CLGRB	$R_1, R_2, M_3, D_4(B_4)$	Compare Logical and Branch (64)	RRS	ECE5	
CLGRJ	$R_1,R_2,M_3,RI_4$	Compare Logical and Branch Relative (64)	RIE-b		
CLGRL	R <sub>1</sub> ,RI <sub>2</sub>	Compare Logical Relative Long (64)	RIL-b		c GE
CLGRT	$R_1,R_2,M_3$	Compare Logical and Trap (64)	RRF-c		GE
CLGT	$R_1,M_3,D_2(B_2)$	Compare Logical and Trap (64)		EB2B	
	$R_1,M_3,R_2,M_4$	Convert to Logical (64←EB)		B3AE	
	$R_1,M_3,R_2,M_4$	Convert to Logical (64←ED)		B94A	
CLHF	$R_1,D_2(X_2,B_2)$	Compare Logical High (32)	RXY-a	E3CF	c HW

Mne- monic	Operands	Name	For- mat	Op- code	Class & Notes
CLHHR	R <sub>1</sub> ,R <sub>2</sub>	Compare Logical High (32)	RRE	B9CF	c HW
CLHHSI	$D_1(B_1),I_2$	Compare Logical Immediate (16←16)	SIL	E555	c GE
CLHLR	R <sub>1</sub> ,R <sub>2</sub>	Compare Logical High (32)	RRE	B9DF	c HW
CLHRL	R <sub>1</sub> ,RI <sub>2</sub>	Compare Logical Relative Long (32←16)	RIL-b	C67	c GE
CLI	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Compare Logical Immediate	SI	95	С
CLIB	$R_1, I_2, M_3, D_4(B_4)$	Compare Logical Immediate and Branch (32←8)	RIS	ECFF	¤ GE
CLIH	$R_1, I_2$	Compare Logical Immediate High (32)	RIL-a	CCF	c HW
CLIJ	R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub> ,RI <sub>4</sub>	Compare Logical Immediate and Branch Relative (32←8)	RIE-c	EC7F	¤ GE
CLIY	$D_1(B_1), I_2$	Compare Logical Immediate	SIY	EB55	c LD
CLM	$R_1, M_3, D_2(B_2)$	Compare Logical Char. under Mask (low)	RS-b	BD	С
CLMH	R <sub>1</sub> ,M <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Compare Logical Char. under Mask (high)	RSY-b	EB20	сN
CLMY	$R_1, M_3, D_2(B_2)$	Compare Logical Char. under Mask (low)	RSY-b	EB21	c LD
CLR	R <sub>1</sub> ,R <sub>2</sub>	Compare Logical (32)	RR	15	С
CLRB	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub> ,D <sub>4</sub> (B <sub>4</sub> )	Compare Logical and Branch (32)	RRS	ECF7	
CLRJ	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub> ,RI <sub>4</sub>	Compare Logical and Branch Relative (32)	RIE-b		
CLRL		Compare Logical Relative Long (32)	RIL-b		c GE
	R <sub>1</sub> ,RI <sub>2</sub>				
CLRT	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub>	Compare Logical and Trap (32)	RRF-c		GE
CLST	R <sub>1</sub> ,R <sub>2</sub>	Compare Logical String	RRE	B25D	
CLT	R <sub>1</sub> ,M <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Compare Logical and Trap (32)	RSY-b		
CLY	$R_1,D_2(X_2,B_2)$	Compare Logical (32)	RXY-a		c LD
CMPSC	$R_1,R_2$	Compression Call	RRE	B263	Ι¤С
CP	$D_1(L_1,B_1),D_2(L_2,B_2)$	Compare Decimal	SS-b	F9	шС
CPDT	$R_1,D_2(L_2,B_2),M_3$	Convert to Packed (From Long DFP)	RSL-b	EDAC	c PC
CPSDR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Copy Sign (L)	RRF-b	B372	¤ FS
CPXT	R <sub>1</sub> ,D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Convert to Packed (From Extended DFP)	RSL-b	EDAD	c PC
CPYA	R <sub>1</sub> ,R <sub>2</sub>	Copy Access	RRE	B24D	
CR	R <sub>1</sub> ,R <sub>2</sub>	Compare (32)	RR	19	С
CRB	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub> ,D <sub>4</sub> (B <sub>4</sub> )	Compare and Branch (32)	RRS	ECF6	
CRDTE	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub> [,M <sub>4</sub> ]	Compare and Replace DAT Table Entry	RRF-b		
CRJ	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub> ,RI <sub>4</sub>	Compare and Branch Relative (32)	RIE-b	EC76	
CRL	R <sub>1</sub> ,RI <sub>2</sub>	Compare Relative Long (32)	RIL-b		c GE
CRT	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub>	Compare and Trap (32)	RRF-c		GE
CS		Compare and Swap (32)	RS-a	BA	¤ C
CSCH	$R_1, R_3, D_2(B_2)$				
CSDTR	R. R. M.	Clear Subchannel Convert to Signed Packed (64←LD)	S RRF-d	B230	p C
CSG	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>4</sub>		RSY-a		
CSP	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Compare and Swap (64)			
	R <sub>1</sub> ,R <sub>2</sub>	Compare and Swap and Purge (32)	RRE	B250	p c
CSPG	R <sub>1</sub> ,R <sub>2</sub>	Compare and Swap and Purge (64)	RRE		p c DE
CSST	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> ),R <sub>3</sub>	Compare and Swap and Store	SSF	C82	Ω C
CSXTR	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert to Signed Packed (128←ED)	RRF-d		
CSY	$R_1, R_3, D_2(B_2)$	Compare and Swap (32)			¤ c LD
CU12	$R_1, R_2[, M_3]$	Convert UTF-8 to UTF-16	RRF-c		
CU14	$R_1, R_2[, M_3]$	Convert UTF-8 to UTF-32	RRF-c	B9B0	¤cE3
CU21	$R_1,R_2[,M_3]$	Convert UTF-16 to UTF-8	RRF-c	B2A6	пc
CU24	$R_1, R_2[, M_3]$	Convert UTF-16 to UTF-32	RRF-c	B9B1	¤cE3
CU41	R <sub>1</sub> ,R <sub>2</sub>	Convert UTF-32 to UTF-8	RRE	B9B2	¤ c E3
CU42	R <sub>1</sub> ,R <sub>2</sub>	Convert UTF-32 to UTF-16	RRE	B9B3	¤ c E3
CUDTR	R <sub>1</sub> ,R <sub>2</sub>	Convert to Unsigned Packed (64←LD)	RRE	B3E2	¤ TF
CUSE	R <sub>1</sub> ,R <sub>2</sub>	Compare until Substring Equal	RRE		
CUTFU	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]	Convert UTF-8 to Unicode	RRF-c		
		Convert Unicode to UTF-8			
CUUTF	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]		RRF-c		
CUXTR	R <sub>1</sub> ,R <sub>2</sub>	Convert to Unsigned Packed (128←ED)	RRE	B3EA	
CVB	$R_1, D_2(X_2, B_2)$	Convert to Binary (32)	RX-a	4F	σ
CVBG	$R_1, D_2(X_2, B_2)$	Convert to Binary (64)	RXY-a		
CVBY	$R_1, D_2(X_2, B_2)$	Convert to Binary (32)	RXY-a		
CVD	$R_1,D_2(X_2,B_2)$	Convert to Decimal (32)	RX-a	4E	۵
OVD					
CVDG	$R_1, D_2(X_2, B_2)$	Convert to Decimal (64)	RXY-a	E32E	¤Ν

Mne-			For-	Ор-	Clas &
monic	Operands	Name	mat	code	Note
CXBR	R <sub>1</sub> ,R <sub>2</sub>	Compare (EB)	RRE	B349	αс
CXFBR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (EB←32)	RRE	B396	۵
CXFBRA	$R_1, M_3, R_2, M_4$	Convert from Fixed (EB←32)	RRF-e	B396	¤F
CXFR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (EH←32)	RRE	B3B6	۵
CXFTR	$R_1,M_3,R_2,M_4$	Convert from Fixed (ED←32)	RRE	B959	¤F
CXGBR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (EB←64)	RRE	B3A6	
	$R_1, M_3, R_2, M_4$	Convert from Fixed (EB←64)		B3A6	
CXGR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (EH←64)	RRE	B3C6	
CXGTR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Fixed (ED←64)	RRE	B3F9	
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Fixed (ED←64)		B3F9	
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Logical (EB←32)	RRF-e		
CXLFTR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Logical (ED←32)		B95B	
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Logical (EB←64)		B3A2	
	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Convert from Logical (ED←64)		B95A	
CXPT	$R_1,D_2(L_2,B_2),M_3$	Convert from Packed (To Extended DFP)		EDAF	
CXR	R <sub>1</sub> ,R <sub>2</sub>	Compare (EH)	RRE	B369	
CXSTR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Signed Packed (ED←128)	RRE	B3FB	
CXTR	R <sub>1</sub> ,R <sub>2</sub>	Compare (ED)	RRE	B3EC	
CXUTR	R <sub>1</sub> ,R <sub>2</sub>	Convert from Unsigned Packed (ED←128)		B3FA	
CXZT	$R_1,D_2(L_2,B_2),M_3$	Convert from Zoned (to extended DFP)		EDAB	
CY	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Compare (32)		E359	
CZDT	R <sub>1</sub> ,D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Convert to Zoned (from long DFP)  Convert to Zoned (from extended DFP)		EDA8 EDA9	
CZXT D	$R_1,D_2(L_2,B_2),M_3$	,	RX-a	5D	u ZF
DD	$R_1, D_2(X_2, B_2)$	Divide (32←64) Divide (LH)	RX-a	6D	۵
DDB	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Divide (LB)	RXE	ED1D	
DDBR	R <sub>1</sub> ,R <sub>2</sub>	Divide (LB)	RRE	B31D	
DDR	R <sub>1</sub> ,R <sub>2</sub>	Divide (LH)	RR	2D	۵
DDTR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Divide (LD)	RRF-a		
DDTRA	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> ,M <sub>4</sub>	Divide (LD)		B3D1	
DE	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Divide (SH)	RX-a	7D	۵
DEB	$R_1,D_2(X_2,B_2)$	Divide (SB)	RXE	ED0D	
DEBR	R <sub>1</sub> ,R <sub>2</sub>	Divide (SB)	RRE	B30D	
DER	R <sub>1</sub> ,R <sub>2</sub>	Divide (SH)	RR	3D	۵
DIDBR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Divide to Integer (LB)		B35B	
DIEBR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Divide to Integer (SB)		B353	
DL	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Divide Logical (32←64)		E397	
DLG	$R_1, D_2(X_2, B_2)$	Divide Logical (64←128)	RXY-a	E387	¤Ν
DLGR	R <sub>1</sub> ,R <sub>2</sub>	Divide Logical (64←128)	RRE	B987	¤Ν
DLR	R <sub>1</sub> ,R <sub>2</sub>	Divide Logical (32←64)	RRE	B997	¤ N3
DP	D <sub>1</sub> (L <sub>1</sub> ,B <sub>1</sub> ),D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> )		SS-b	FD	۵
DR	R <sub>1</sub> ,R <sub>2</sub>	Divide (32←64)	RR	1D	۵
DSG	$R_1, D_2(X_2, B_2)$	Divide Single (64)	RXY-a	E30D	¤Ν
DSGF	$R_1,D_2(X_2,B_2)$	Divide Single (64←32)	RXY-a	E31D	пN
DSGFR	$R_1,R_2$	Divide Single (64←32)	RRE	B91D	пN
DSGR	R <sub>1</sub> ,R <sub>2</sub>	Divide Single (64)	RRE	B90D	¤Ν
DXBR	$R_1,R_2$	Divide (EB)	RRE	B34D	۵
DXR	$R_1,R_2$	Divide (EH)	RRE	B22D	۵
DXTR	$R_1,R_2,R_3$	Divide (ED)	RRF-a	B3D9	¤ TF
DXTRA	$R_1, R_2, R_3, M_4$	Divide (ED)		B3D9	۵F
EAR	$R_1,R_2$	Extract Access	RRE	B24F	
ECAG	$R_1, R_3, D_2(B_2)$	Extract CPU Attribute		EB4C	
ECTG	$D_1(B_1), D_2(B_2), R_3$	Extract CPU Time	SSF	C81	¤ ET
ED	$D_1(L,B_1),D_2(B_2)$	Edit	SS-a	DE	ΩС
EDMK	$D_1(L,B_1),D_2(B_2)$	Edit and Mark	SS-a	DF	αс
EEDTR	$R_1,R_2$	Extract Biased Exponent (64←LD)	RRE	B3E5	
EEXTR	$R_1,R_2$	Extract Biased Exponent (64←ED)	RRE	B3ED	
EFPC	R <sub>1</sub>	Extract FPC	RRE	B38C	۵
EPAIR	R <sub>1</sub>	Extract Primary ASN and Instance	RRE	B99A	q RA
EPAR	R <sub>1</sub>	Extract Primary ASN	RRE	B226	q

Mne- monic	Operands	Name	For- mat	Op- code	CI:
EPSW	R <sub>1</sub> ,R <sub>2</sub>	Extract PSW	RRE	B98D	¤Ν
EREG	R <sub>1</sub> ,R <sub>2</sub>	Extract Stacked Registers (32)	RRE		¤
EREGG	R <sub>1</sub> ,R <sub>2</sub>	Extract Stacked Registers (64)	RRE	B90E	۵N
ESAIR	R <sub>1</sub>	Extract Secondary ASN and Instance	RRE	B99B	
ESAR	R <sub>1</sub>	Extract Secondary ASN	RRE	B227	
ESDTR	R <sub>1</sub> ,R <sub>2</sub>	Extract Significance (64←LD)	RRE	B3E7	
ESEA	R <sub>1</sub> ,R <sub>2</sub>	Extract and Set Extended Authority	RRE	B99D	
ESTA	R <sub>1</sub> ,R <sub>2</sub>	Extract Stacked State	RRE	B24A	
ESXTR	R <sub>1</sub> ,R <sub>2</sub>	Extract Significance (64←ED)	RRE	B3EF	
ETND	R <sub>1</sub>	Extract Transaction Nesting Depth	RRE	B2EC	-
EX	$R_1,D_2(X_2,B_2)$	Execute	RX-a	44	σ,
EXRL	R <sub>1</sub> ,RI <sub>2</sub>	Execute Relative Long	RIL-b		۵)
FIDBR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub>	Load FP Integer (LB)	RRF-e		
FIDBRA			RRF-e		
FIDR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load FP Integer (LB)	RRE	B37F	
	R <sub>1</sub> ,R <sub>2</sub>	Load FP Integer (LH)			
FIDTR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load FP Integer (LD)	RRF-e		
FIEBR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub>	Load FP Integer (SB)	RRF-e		
FIEBRA	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load FP Integer (SB)	RRF-e		
FIER	R <sub>1</sub> ,R <sub>2</sub>	Load FP Integer (SH)	RRE	B377	
FIXBR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub>	Load FP Integer (EB)	RRF-e		0
FIXBRA	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load FP Integer (EB)	RRF-e		
FIXR	R <sub>1</sub> ,R <sub>2</sub>	Load FP Integer (EH)	RRE	B367	
FIXTR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load FP Integer (ED)	RRF-e		
FLOGR	R <sub>1</sub> ,R <sub>2</sub>	Find Leftmost One	RRE	B983	
HDR	R <sub>1</sub> ,R <sub>2</sub>	Halve (LH)	RR	24	۵
HER	$R_1,R_2$	Halve (SH)	RR	34	۵
HSCH	_	Halt Subchannel	S	B231	ро
IAC	R <sub>1</sub>	Insert Address Space Control	RRE	B224	qc
IC	$R_1,D_2(X_2,B_2)$	Insert Character	RX-a	43	
ICM	$R_1, M_3, D_2(B_2)$	Insert Characters under Mask (low)	RS-b	BF	С
ICMH	$R_1, M_3, D_2(B_2)$	Insert Characters under Mask (high)	RSY-b	EB80	сN
ICMY	$R_1, M_3, D_2(B_2)$	Insert Characters under Mask (low)	RSY-b	EB81	сL
ICY	$R_1,D_2(X_2,B_2)$	Insert Character	RXY-a		LD
IDTE	$R_1, R_3, R_2$	Invalidate DAT Table Entry	RRF-b	B98E	pι
IEDTR	$R_1, R_3, R_2$	Insert Biased Exponent (LD←64&LD)	RRF-b	B3F6	٦α
IEXTR	$R_1, R_3, R_2$	Insert Biased Exponent (ED←64&ED)	RRF-b	B3FE	٦α
IIHF	$R_1,I_2$	Insert Immediate (high)	RIL-a	C08	ΕI
IIHH	$R_1,I_2$	Insert Immediate (high high)	RI-a	A50	Ν
IIHL	$R_1, I_2$	Insert Immediate (high low)	RI-a	A51	Ν
IILF	$R_1,I_2$	Insert Immediate (low)	RIL-a	C09	El
IILH	$R_1,I_2$	Insert Immediate (low high)	RI-a	A52	Ν
IILL	$R_1,I_2$	Insert Immediate (low low)	RI-a	A53	Ν
IPK		Insert PSW Key	S	B20B	q
IPM	R <sub>1</sub>	Insert Program Mask	RRE	B222	
IPTE	R <sub>1</sub> ,R <sub>2</sub>	Invalidate Page Table Entry	RRF-a	B221	р
IRBM	R <sub>1</sub> ,R <sub>2</sub>	Insert Reference Bits Multiple	RRE	B2AC	pΙ
ISKE	$R_1,R_2$	Insert Storage Key Extended	RRE	B229	р
IVSK	$R_1,R_2$	Insert Virtual Storage Key	RRE	B223	q
KDB	$R_1,D_2(X_2,B_2)$	Compare and Signal (LB)	RXE	ED18	۵۵
KDBR	R <sub>1</sub> ,R <sub>2</sub>	Compare and Signal (LB)	RRE	B318	۵۵
KDTR	R <sub>1</sub> ,R <sub>2</sub>	Compare and Signal (LD)	RRE	B3E0	
KEB	$R_1,D_2(X_2,B_2)$	Compare and Signal (SB)	RXE	ED08	۵۵
KEBR	R <sub>1</sub> ,R <sub>2</sub>	Compare and Signal (SB)	RRE	B308	۵۵
KIMD	R <sub>1</sub> ,R <sub>2</sub>	Compute Intermediate Message Digest	RRE	B93E	
KLMD	R <sub>1</sub> ,R <sub>2</sub>	Compute Last Message Digest	RRE	B93F	
KM	R <sub>1</sub> ,R <sub>2</sub>	Cipher Message	RRE	B92E	
KMA	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Cipher Message with Authentication	RRF-b		
KMAC	R <sub>1</sub> ,R <sub>2</sub>	Compute Message Authentication Code	RRE	B91E	
		•			
KMC	$R_1,R_2$	Cipher Message with Chaining	RRE	B92F	D C

					Class
Mne- monic	Operands	Name	For- mat	Op- code	& Notes
KMF	R <sub>1</sub> ,R <sub>2</sub>	Cipher Message with Cipher Feedback	RRE	B92A	¤ c M4
KMO	R <sub>1</sub> ,R <sub>2</sub>	Cipher Message with Output Feedback	RRE		¤ c M4
KXBR	R <sub>1</sub> ,R <sub>2</sub>	Compare and Signal (EB)	RRE	B348	
KXTR L	R <sub>1</sub> ,R <sub>2</sub>	Compare and Signal (ED)	RRE	B3E8 58	¤ cTF
LA	$R_1, D_2(X_2, B_2)$	Load (32) Load Address	RX-a RX-a	56 41	
LAA	$R_1,D_2(X_2,B_2)$ $R_1,R_3,D_2(B_2)$	Load and Add (32)		EBF8	ποIΔ
LAAG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load and Add (64)		EBE8	
LAAL	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load and Add Logical (32)		EBFA	
LAALG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load and Add Logical (64)	RSY-a	EBEA	¤сIА
LAE	$R_1,D_2(X_2,B_2)$	Load Address Extended	RX-a	51	۵
LAEY	$R_1,D_2(X_2,B_2)$	Load Address Extended	RXY-a	E375	¤ GE
LAM	$R_1, R_3, D_2(B_2)$	Load Access Multiple	RS-a	9A	۵
LAMY	$R_1, R_3, D_2(B_2)$	Load Access Multiple	RSY-a	EB9A	¤LD
LAN	$R_1, R_3, D_2(B_2)$	Load and AND (32)		EBF4	
LANG	$R_1, R_3, D_2(B_2)$	Load and AND (64)		EBE4	
LAO	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load and OR (32)		EBF6	
LAOG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load and OR (64)		EBE6	
LARL	R <sub>1</sub> ,Rl <sub>2</sub>	Load Address Relative Long	RIL-b		N3
LASP	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Load Address Space Parameters	SSE	E500	
LAT LAX	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load and Trap (32)		E39F	
LAXG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load and Exclusive OR (32) Load and Exclusive OR (64)		EBF7 EBE7	
LAXG	$R_1, R_3, D_2(B_2)$ $R_1, D_2(X_2, B_2)$	Load Address		E371	
LB	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Load Byte (32←8)	RXY-a		LD
LBH	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Load Byte High (32←8)		E3C0	
LBR	R <sub>1</sub> ,R <sub>2</sub>	Load Byte (32←8)	RRE	B926	
LCBB	$R_1, D_2(X_2, B_2), M_3$	Load Count to Block Boundary	RXE	E727	
LCDBR	R <sub>1</sub> ,R <sub>2</sub>	Load Complement (LB)	RRE	B313	
LCDFR	R <sub>1</sub> ,R <sub>2</sub>	Load Complement (L)	RRE	B373	¤ FS
LCDR	R <sub>1</sub> ,R <sub>2</sub>	Load Complement (LH)	RR	23	ΩС
LCEBR	$R_1,R_2$	Load Complement (SB)	RRE	B303	пс
LCER	$R_1,R_2$	Load Complement (SH)	RR	33	пС
LCGFR	$R_1,R_2$	Load Complement (64←32)	RRE	B913	
LCGR	R <sub>1</sub> ,R <sub>2</sub>	Load Complement (64)	RRE	B903	c N
LCR	R <sub>1</sub> ,R <sub>2</sub>	Load Complement (32)	RR	13	С
LCTL	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load Control (32)	RS-a	B7	p
LCTLG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Load Control (64)		EB2F	
LCXBR	R <sub>1</sub> ,R <sub>2</sub>	Load Complement (EB)	RRE	B343	пС
LCXR LD	R <sub>1</sub> ,R <sub>2</sub>	Load Complement (EH) Load (L)	RRE RX-a	B363 68	a C
LDE	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Load (L)  Load Lengthened (LH←SH)	RXE	ED24	
LDEB	$R_1,D_2(X_2,B_2)$	Load Lengthened (LB←SB)	RXE	ED04	
LDEBR	R <sub>1</sub> ,R <sub>2</sub>	Load Lengthened (LB←SB)	RRE	B304	D
LDER	R <sub>1</sub> ,R <sub>2</sub>	Load Lengthened (LH←SH)	RRE	B324	
LDETR	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load Lengthened (LD←SD)	RRF-d	B3D4	¤ TF
LDGR	R <sub>1</sub> ,R <sub>2</sub>	Load FPR from GR (L←64)	RRE	B3C1	¤ FG
LDR	R <sub>1</sub> ,R <sub>2</sub>	Load (L)	RR	28	۵
LDXBR	R <sub>1</sub> ,R <sub>2</sub>	Load Rounded (LB←EB)	RRE	B345	۵
LDXBRA	$R_1,M_3,R_2,M_4$	Load Rounded (LB←EB)	RRF-e	B345	۵F
LDXR	$R_1,R_2$	Load Rounded (LH←EH)	RR	25	۵
LDXTR	$R_1, M_3, R_2, M_4$	Load Rounded (LD←ED)		B3DD	
LDY	$R_1, D_2(X_2, B_2)$	Load (L)		ED65	
LE	$R_1,D_2(X_2,B_2)$	Load (S)	RX-a	78	۵
LEDBR	R <sub>1</sub> ,R <sub>2</sub>	Load Rounded (SB←LB)	RRE	B344	σ_
LEDBRA	17 U7 E7 T	Load Rounded (SB←LB)		B344	
LEDR	R <sub>1</sub> ,R <sub>2</sub>	Load Rounded (SH←LH)	RR	35	¤ ~ TF
LEDTR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load Rounded (SD←LD)		B3D5	
LER	R <sub>1</sub> ,R <sub>2</sub>	Load (S)	RR	38	0
LEXBR	R <sub>1</sub> ,R <sub>2</sub>	Load Rounded (SB←EB)	RRE	B346	۵

Mne- monic	Operande	Name	For- mat	Op-	Class & Notes
LEXBRA	Operands	Load Rounded (SB←EB)	RRF-e	Code	¤ F
LEXR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>		RRE	B366	0
LEY	$R_1, R_2$ $R_1, D_2(X_2, B_2)$	Load Rounded (SH←EH) Load (S)		ED64	
LFAS	$D_2(B_2)$	Load FPC and Signal	S	B2BD	
LFH	$R_1, D_2(X_2, B_2)$	Load High (32)		E3CA	
LFHAT	$R_1,D_2(X_2,B_2)$	Load and Trap (32H←32)		E3C8	
LFPC	$D_2(B_2)$	Load FPC	S	B29D	
LG	$R_1, D_2(X_2, B_2)$	Load (64)		E304	
LGAT	$R_1,D_2(X_2,B_2)$	Load and Trap (64)	RXY-a		LT
LGB	$R_1,D_2(X_2,B_2)$	Load Byte (64←8)		E377	
LGBR	R <sub>1</sub> ,R <sub>2</sub>	Load Byte (64←8)	RRE	B906	
LGDR	R <sub>1</sub> ,R <sub>2</sub>	Load GR from FPR (64←L)	RRE	B3CD	
LGF	$R_1, D_2(X_2, B_2)$	Load (64←32)	RXY-a		N.
LGFI	R <sub>1</sub> ,l <sub>2</sub>	Load Immediate (64←32)	RIL-a		El
LGFR	R <sub>1</sub> ,R <sub>2</sub>	Load (64←32)	RRE	B914	
LGFRL	R <sub>1</sub> ,Rl <sub>2</sub>	Load Relative Long (64←32)	RIL-b		GE
LGG	$R_1, D_2(X_2, B_2)$	Load guarded (64)		E34C	
LGH	$R_1,D_2(X_2,B_2)$	Load Halfword (64←16)		E315	
LGHI	R <sub>1</sub> ,I <sub>2</sub>	Load Halfword Immediate (64←16)	RI-a	A79	N
LGHR	R <sub>1</sub> ,R <sub>2</sub>	Load Halfword (64←16)	RRE	B907	
LGHRL	R <sub>1</sub> ,Rl <sub>2</sub>	Load Halfword Relative Long (64←16)	RIL-b		GE
LGR	R <sub>1</sub> ,R <sub>2</sub>	Load (64)	RRE	B904	N
LGRL	R <sub>1</sub> ,Rl <sub>2</sub>	Load Relative Long (64)	RIL-b		GE
LGSC	$R_1, D_2(X_2, B_2)$	Load guarded storage controls		E34D	
LH	$R_1, D_2(X_2, B_2)$	Load Halfword (32←16)	RX-a	48	٠.
LHH	$R_1,D_2(X_2,B_2)$	Load Halfword High (32←16)		E3C4	HW
LHI	R <sub>1</sub> ,l <sub>2</sub>	Load Halfword Immediate (32←16)	RI-a	A78	
LHR	R <sub>1</sub> ,R <sub>2</sub>	Load Halfword (32←16)	RRE	B927	ΕI
LHRL	R <sub>1</sub> ,Rl <sub>2</sub>	Load Halfword Relative Long (32←16)	RIL-b		GE
LHY	$R_1, D_2(X_2, B_2)$	Load Halfword (32←16)		E378	LD
LLC	$R_1,D_2(X_2,B_2)$	Load Logical Character (32←8)		E394	
LLCH	$R_1,D_2(X_2,B_2)$	Load Logical Character High (32←8)		E3C2	
LLCR	R <sub>1</sub> ,R <sub>2</sub>	Load Logical Character (32←8)	RRE	B994	El
LLGC	$R_1, D_2(X_2, B_2)$	Load Logical Character (64←8)	RXY-a		N.
LLGCR	R <sub>1</sub> ,R <sub>2</sub>	Load Logical Character (64←8)	RRE	B984	El
LLGF	$R_1, D_2(X_2, B_2)$	Load Logical (64←32)	RXY-a		N.
LLGFAT	$R_1,D_2(X_2,B_2)$	Load and Trap (64←32)		E39D	
LLGFR	R <sub>1</sub> ,R <sub>2</sub>	Load Logical (64←32)	RRE	B916	
LLGFRL	R <sub>1</sub> ,Rl <sub>2</sub>	Load Logical Relative Long (64←32)	RIL-b		GE
	$R_1, D_2(X_2, B_2)$	Load logical and shift guarded (64←32)		E348	
LLGH	$R_1,D_2(X_2,B_2)$	Load Logical Halfword (64←16)	RXY-a		N
LLGHR	R <sub>1</sub> ,R <sub>2</sub>	Load Logical Halfword (64←16)	RRE	B985	El
LLGHRL		Load Logical Halfword Relative Long	RIL-b		GE
LEGITILE	11,1112	(64←16)		040	۵L
LLGT	$R_1,D_2(X_2,B_2)$	Load Logical Thirty One Bits (64←31)	RXY-a	E317	N
LLGTAT	$R_1,D_2(X_2,B_2)$	Load Logical Thirty One Bits and Trap	RXY-a	E39C	LT
		(64←31)			
LLGTR	R <sub>1</sub> ,R <sub>2</sub>	Load Logical Thirty One Bits (64←31)	RRE	B917	N
LLH	$R_1,D_2(X_2,B_2)$	Load Logical Halfword (32←16)	RXY-a		El
LLHH	$R_1,D_2(X_2,B_2)$	Load Logical Halfword High (32←16)		E3C6	
LLHR	$R_1,R_2$	Load Logical Halfword (32←16)	RRE	B995	El
LLHRL	R <sub>1</sub> ,Rl <sub>2</sub>	Load Logical Halfword Relative Long (32←16)	RIL-b	C42	GE
LLIHF	R <sub>1</sub> ,l <sub>2</sub>	Load Logical Immediate (high)	RIL-a	C0E	EI
LLIHH	R <sub>1</sub> ,l <sub>2</sub>	Load Logical Immediate (high high)	RI-a	A5C	N
LLIHL	R <sub>1</sub> ,l <sub>2</sub>	Load Logical Immediate (high low)	RI-a	A5D	N
LLILF	R <sub>1</sub> ,l <sub>2</sub>	Load Logical Immediate (low)	RIL-a	C0F	EI
LLILH	R <sub>1</sub> ,l <sub>2</sub>	Load Logical Immediate (low high)	RI-a	A5E	N
LLILL	R <sub>1</sub> ,l <sub>2</sub>	Load Logical Immediate (low low)	RI-a	A5F	N
LLZRGF	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load Logical and Zero Rightmost Byte (32)			LZ
LM	$R_1, R_3, D_2(B_2)$	Load Multiple (32)	RS-a	98	

					Class
Mne- monic	Operands	Name	For- mat	Op- code	& Notes
LMD	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> ),D <sub>4</sub> (B <sub>4</sub> )	Load Multiple Disjoint (64←32&32)	SS-e	EF	¤Ν
LMG	$R_1, R_3, D_2(B_2)$	Load Multiple (64)	RSY-a	EB04	N
LMH	$R_1, R_3, D_2(B_2)$	Load Multiple High	RSY-a	EB96	N
LMY	$R_1, R_3, D_2(B_2)$	Load Multiple (32)	RSY-a	EB98	LD
LNDBR	$R_1,R_2$	Load Negative (LB)	RRE	B311	αС
LNDFR	$R_1,R_2$	Load Negative (L)	RRE	B371	¤ FS
LNDR	$R_1,R_2$	Load Negative (LH)	RR	21	ΩС
LNEBR	$R_1,R_2$	Load Negative (SB)	RRE	B301	αС
LNER	$R_1,R_2$	Load Negative (SH)	RR	31	ΩС
LNGFR	$R_1,R_2$	Load Negative (64←32)	RRE	B911	c N
LNGR	R <sub>1</sub> ,R <sub>2</sub>	Load Negative (64)	RRE	B901	c N
LNR	$R_1,R_2$	Load Negative (32)	RR	11	С
LNXBR	$R_1,R_2$	Load Negative (EB)	RRE	B341	шC
LNXR	R <sub>1</sub> ,R <sub>2</sub>	Load Negative (EH)	RRE	B361	αС
LOC	$R_1,D_2(B_2),M_3$	Load on Condition (32)	RSY-b	EBF2	L1
LOCFH	$R_1,D_2(B_2),M_3$	Load High on Condition (32)	RSY-b	EBE0	L2
LOCFHR	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub>	Load High on Condition (32)	RRF-c	B9E0	L2
LOCG	$R_1, D_2(B_2), M_3$	Load on Condition (64)	RSY-b	EBE2	L1
LOCGHI	$R_1,I_2,M_3$	Load Halfword Immediate on Condition (64←16)	RIE-g	EC46	L2
LOCGR	$R_1, R_2, M_3$	Load on Condition (64)	RRF-c	B9E2	L1
LOCHHI	R <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub>	Load Halfword High Immediate on Condition (32←16)	RIE-g	EC4E	L2
LOCHI	$R_1, I_2, M_3$	Load Halfword Immediate on Condition (32←16)	RIE-g	EC42	L2
LOCR	$R_1, R_2, M_3$	Load on Condition (32)	RRF-c	B9F2	L1
LPD	$R_3, D_1(B_1), D_2(B_2)$	Load Pair Disjoint (32)	SSF	C84	c IA
LPDBR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (LB)	RRE	B310	αс
LPDFR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (L)	RRE	B370	¤ FS
LPDG	R <sub>3</sub> ,D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Load Pair Disjoint (64)	SSF	C85	c IA
LPDR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (LH)	RR	20	αс
LPEBR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (SB)	RRE	B300	αс
LPER	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (SH)	RR	30	αс
LPGFR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (64←32)	RRE	B910	c N
LPGR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (64)	RRE	B900	c N
LPQ	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load Pair from Quadword (64&64←128)	RXY-a	E38F	¤Ν
LPR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (32)	RR	10	С
LPSW	D <sub>2</sub> (B <sub>2</sub> )	Load PSW	SI	82	p n
LPSWE	D <sub>2</sub> (B <sub>2</sub> )	Load PSW Extended	S	B2B2	p n N
LPTEA	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Load Page-Table-Entry Address	RRF-b	B9AA	p c D2
LPXBR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (EB)	RRE	B340	
LPXR	R <sub>1</sub> ,R <sub>2</sub>	Load Positive (EH)	RRE	B360	αс
LR	R <sub>1</sub> ,R <sub>2</sub>	Load (32)	RR	18	
LRA	$R_1, D_2(X_2, B_2)$	Load Real Address (32)	RX-a	B1	рс
LRAG	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load Real Address (64)	RXY-a	E303	pcN
LRAY	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load Real Address (32)	RXY-a		pcLD
LRDR	R <sub>1</sub> ,R <sub>2</sub>	Load Rounded (LH←EH)	RR	25	D D
LRER	R <sub>1</sub> ,R <sub>2</sub>	Load Rounded (SH←LH)	RR	35	a
LRL	R <sub>1</sub> ,RI <sub>2</sub>	Load Relative Long (32)	RIL-b	C4D	GE
LRV	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load Reversed (32)		E31E	
LRVG	$R_1,D_2(X_2,B_2)$	Load Reversed (64)		E30F	
LRVGR	R <sub>1</sub> ,R <sub>2</sub>	Load Reversed (64)	RRE	B90F	
LRVH	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load Reversed (04)		E31F	
LRVR		Load Reversed (32)	RRE	B91F	
	R <sub>1</sub> ,R <sub>2</sub>	. ,			
LTDRD	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load and Test (32)	RRE	E312	
LTDBR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (LB)		B312	
LTDTD	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (LH)	RR	22	¤ C
LTDTR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (CD)	RRE		¤ c TF
LTEBR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (SB)	RRE	B302	
LTER	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (SH)	RR	32	α C
LTG	$R_1,D_2(X_2,B_2)$	Load and Test (64)	RXY-a	E302	c El

					Class
Mne- monic	Operands	Name	For- mat	Op- code	& Notes
LTGF	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Load And Test (64←32)	RXY-a		c GE
LTGFR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (64←32)	RRE	B912	c N
LTGR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (64)	RRE	B902	c N
LTR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (32)	RR	12	С
LTXBR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (EB)	RRE	B342	
LTXR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (EH)	RRE	B362	αс
LTXTR	R <sub>1</sub> ,R <sub>2</sub>	Load and Test (ED)	RRE	B3DE	¤ c TF
LURA	R <sub>1</sub> ,R <sub>2</sub>	Load Using Real Address (32)	RRE	B24B	p
LURAG	R <sub>1</sub> ,R <sub>2</sub>	Load Using Real Address (64)	RRE	B905	pΝ
LXD	$R_1, D_2(X_2, B_2)$	Load Lengthened (EH←LH)	RXE	ED25	۵
LXDB	$R_1,D_2(X_2,B_2)$	Load Lengthened (EB←LB)	RXE	ED05	۵
LXDBR	R <sub>1</sub> ,R <sub>2</sub>	Load Lengthened (EB←LB)	RRE	B305	۵
LXDR	R <sub>1</sub> ,R <sub>2</sub>	Load Lengthened (EH←LH)	RRE	B325	۵
LXDTR	$R_1, R_2, M_4$	Load Lengthened (ED←LD)	RRF-d	B3DC	¤ TF
LXE	$R_1,D_2(X_2,B_2)$	Load Lengthened (EH←SH)	RXE	ED26	۵
LXEB	$R_1,D_2(X_2,B_2)$	Load Lengthened (EB←SB)	RXE	ED06	۵
LXEBR	R <sub>1</sub> ,R <sub>2</sub>	Load Lengthened (EB←SB)	RRE	B306	۵
LXER	R <sub>1</sub> ,R <sub>2</sub>	Load Lengthened (EH←SH)	RRE	B326	۵
LXR	R <sub>1</sub> ,R <sub>2</sub>	Load (E)	RRE	B365	۵
LY	$R_1,D_2(X_2,B_2)$	Load (32)	RXY-a	E358	LD
LZDR	R <sub>1</sub>	Load Zero (L)	RRE	B375	۵
LZER	R <sub>1</sub>	Load Zero (S)	RRE	B374	۵
LZRF	$R_1,D_2(X_2,B_2)$	Load and Zero Rightmost Byte (32)	RXY-a	E33B	LZ
LZRG	$R_1,D_2(X_2,B_2)$	Load and Zero Rightmost Byte (64)	RXY-a	E32A	LZ
LZXR	R <sub>1</sub>	Load Zero (E)	RRE	B376	۵
M	$R_1,D_2(X_2,B_2)$	Multiply (64←32)	RX-a	5C	
MAD	$R_1, R_3, D_2(X_2, B_2)$	Multiply and Add (LH)	RXF	ED3E	¤ HM
MADB	$R_1, R_3, D_2(X_2, B_2)$	Multiply and Add (LB)	RXF	ED1E	۵
MADBR	$R_1,R_3,R_2$	Multiply and Add (LB)	RRD	B31E	۵
MADR	$R_1,R_3,R_2$	Multiply and Add (LH)	RRD	B33E	¤ HM
MAE	$R_1, R_3, D_2(X_2, B_2)$	Multiply and Add (SH)	RXF	ED2E	¤ HM
MAEB	$R_1, R_3, D_2(X_2, B_2)$	Multiply and Add (SB)	RXF	ED0E	
MAEBR	$R_1,R_3,R_2$	Multiply and Add (SB)	RRD	B30E	
MAER	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply and Add (SH)	RRD	B32E	
MAY	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply and Add Unnormalized (EH←LH)	RXF	ED3A	
MAYH	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply and Add Unnormalized (EH <sub>H</sub> ←LH)		ED3C	
MAYHR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply and Add Unnormalized (EH <sub>H</sub> ←LH)		B33C	
MAYL	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply and Add Unnormalized (EH <sub>L</sub> ←LH)		ED38	
MAYLR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply and Add Unnormalized (EH <sub>L</sub> ←LH)		B338	¤ UE
MAYR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply and Add Unnormalized (EH←LH)	RRD	B33A	
MC	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Monitor Call	SI	AF	0
MD	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply (LH)	RX-a	6C	0
MDB	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply (LB)	RXE	ED1C	
MDBR	R <sub>1</sub> ,R <sub>2</sub>	Multiply (LB)	RRE	B31C	0
MDE	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply (LH←SH)	RX-a	7C	0
MDEB	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply (LB←SB)	RXE	ED0C B30C	
MDEBR MDER	R <sub>1</sub> ,R <sub>2</sub>	Multiply (LB←SB)	RRE RR	3C	<u>а</u>
MDR	R <sub>1</sub> ,R <sub>2</sub>	Multiply (LH←SH) Multiply (LH)	RR	2C	D D
	R <sub>1</sub> ,R <sub>2</sub>	1, 1, 1	RRF-a		
MDTR MDTRA	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> ,M <sub>4</sub>	Multiply (LD) Multiply (LD)	RRF-a		
ME	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply (LH←SH)	RX-a	7C	۵
MEE		Multiply (SH)	RXE	ED37	
MEEB	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Multiply (SB)	RXE	ED37	
MEEBR	$R_1, R_2$	Multiply (SB)	RRE	B317	۵
MEER	R <sub>1</sub> ,R <sub>2</sub>	Multiply (SH)	RRE	B337	۵
MER	R <sub>1</sub> ,R <sub>2</sub>	Multiply (LH←SH)	RR	3C	۵
MFY	$R_1, D_2(X_2, B_2)$	Multiply (64←32)		E35C	
MG	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Multiply (128←64)	RXY-a		MI2
MGH	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Multiply Halfword(64←16)	RXY-a		MI2
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Mne- monic	Operands	Name	For- mat	Op- code	Class & Notes
MGHI	R <sub>1</sub> ,l <sub>2</sub>	Multiply Halfword Immediate (64←16)	RI-a	A7D	N
MGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Multiply (128←64)	RRF-a	B9EC	MI2
MH	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply Halfword (32←16)	RX-a	4C	
MHI	R <sub>1</sub> ,l <sub>2</sub>	Multiply Halfword Immediate (32←16)	RI-a	A7C	
MHY	$R_1,D_2(X_2,B_2)$	Multiply Halfword (64←16)	RXY-a		GE
ML	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply Logical (64←32)	RXY-a	E396	N3
MLG	$R_1, D_2(X_2, B_2)$	Multiply Logical (128←64)	RXY-a		N
MLGR	R <sub>1</sub> ,R <sub>2</sub>	Multiply Logical (128←64)	RRE	B986	N
MLR	R <sub>1</sub> ,R <sub>2</sub>	Multiply Logical (64←32)	RRE	B996	N3
MP	$D_1(L_1,B_1),D_2(L_2,B_2)$		SS-b	FC	а
MR	R <sub>1</sub> ,R <sub>2</sub>	Multiply (64←32)	RR	1C	
MS	$R_1, D_2(X_2, B_2)$	Multiply Single (32)	RX-a	71	
MSC	$R_1,D_2(X_2,B_2)$	Multiply Single (32)	RXY-a		c MI2
MSCH	D <sub>2</sub> (B <sub>2</sub> )	Modify Subchannel	S	B232	рс
MSD	$R_1, R_3, D_2(X_2, B_2)$	Multiply and Subtract (LH)	RXF	ED3F	
MSDB	$R_1, R_3, D_2(X_2, B_2)$	Multiply and Subtract (LB)	RXF	ED1F	
MSDBR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply and Subtract (LB)	RRD	B31F	
MSDR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply and Subtract (LH)	RRD	B33F	
MSE	$R_1, R_3, R_2$ $R_1, R_3, D_2(X_2, B_2)$	Multiply and Subtract (SH)	RXF	ED2F	
MSEB	$R_1, R_3, D_2(X_2, B_2)$ $R_1, R_3, D_2(X_2, B_2)$	Multiply and Subtract (SB)	RXF	ED0F	
MSEBR		Multiply and Subtract (SB)	RRD	B30F	
MSER	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub> R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply and Subtract (SH)	RRD	B32F	
MSFI	n <sub>1</sub> ,n <sub>3</sub> ,n <sub>2</sub> R <sub>1</sub> ,l <sub>2</sub>	Multiply Single Immediate (32)	RIL-a		GE
MSG	1. 2		RXY-a		
	$R_1, D_2(X_2, B_2)$	Multiply Single (64)	RXY-a		
MSGC	$R_1, D_2(X_2, B_2)$	Multiply Single (64)			
MSGF	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply Single (64←32)	RXY-a		
MSGFI MSGFR	R <sub>1</sub> ,l <sub>2</sub>	Multiply Single Immediate (64←32)	RIL-a		GE
	R <sub>1</sub> ,R <sub>2</sub>	Multiply Single (64←32)	RRE	B91C	
MSGR	R <sub>1</sub> ,R <sub>2</sub>	Multiply Single (64)	RRE	B90C	
MSGRKC		Multiply Single (64)	RRF-a		C IVII2
MSR	R <sub>1</sub> ,R <sub>2</sub>	Multiply Single (32)	RRE	B252	- 1410
MSRKC	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Multiply Single (32)	RRF-a RRE	B247	C IVII2
MSTA	R <sub>1</sub>	Modify Stacked State			
MSY	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Multiply Single (32)	RXY-a SS-a	E351	LD ¤
MVCDK	D <sub>1</sub> (L,B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Move (character)			
MVCDK	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Move with Destination Key	SSE	E50F	q
MVCIN	D <sub>1</sub> (L,B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Move Inverse	SS-a	E8	۵
MVCK	$D_1(R_1,B_1),D_2(B_2),R_3$		SS-d	D9	q c
MVCL	R <sub>1</sub> ,R <sub>2</sub>	Move Long	RR	0E	i¤c
MVCLE	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Move Long Extended	RS-a	A8	¤ C
MVCLU	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Move Long Unicode	RSY-a		
MVCOS	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> ),R <sub>3</sub>	Move with Optional Specifications	SSF	C80	q c M
MVCP	D <sub>1</sub> (R <sub>1</sub> ,B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> ),R <sub>3</sub>		SS-d	DA	q c
MVCS		Move to Secondary	SS-d	DB	q c
MVCSK	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Move with Source Key	SSE	E50E	
MVGHI	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Move (64←16)	SIL	E548	GE
MVHHI	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Move (16←16)	SIL	E544	GE
MVHI	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Move (32←16)	SIL	E54C	GE
MVI	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Move Immediate	SI	92	
MVIY	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Move Immediate	SIY	EB52	
MVN	D <sub>1</sub> (L,B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Move Numerics	SS-a	D1	۵
MVO	$D_1(L_1,B_1),D_2(L_2,B_2)$		SS-b	F1	۵
MVPG	R <sub>1</sub> ,R <sub>2</sub>	Move Page	RRE	B254	q c
MVST	R <sub>1</sub> ,R <sub>2</sub>	Move String	RRE	B255	шС
MVZ	$D_1(L,B_1),D_2(B_2)$	Move Zones	SS-a	D3	۵
MXBR	$R_1,R_2$	Multiply (EB)	RRE	B34C	
MXD	$R_1, D_2(X_2, B_2)$	Multiply (EH←LH)	RX-a	67	۵
MXDB	$R_1, D_2(X_2, B_2)$	Multiply (EB←LB)	RXE	ED07	۵
MXDBR	R <sub>1</sub> ,R <sub>2</sub>	Multiply (EB←LB)	RRE	B307	۵
MXDR	$R_1,R_2$	Multiply (EH←LH)	RR	27	ø

Mne- monic	Operands	Name	For- mat	Op- code	Class & Notes
MXR	R <sub>1</sub> ,R <sub>2</sub>	Multiply (EH)	RR	26	۵
MXTR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Multiply (ED)	RRF-a	B3D8	¤ TF
MXTRA	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> ,M <sub>4</sub>	Multiply (ED)	RRF-a		
MY	$R_1, R_3, D_2(X_2, B_2)$	Multiply Unnormalized (EH←LH)	RXF	ED3B	
MYH	$R_1, R_3, D_2(X_2, B_2)$	Multiply Unnormalized (EH <sub>H</sub> ←LH)	RXF	ED3D	
MYHR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply Unnormalized (EH <sub>H</sub> ←LH)	RRD	B33D	
MYL		Multiply Unnormalized (EH <sub>I</sub> ←LH)	RXF	ED39	
MYLR	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )		RRD	B339	
MYR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply Unnormalized (EH <sub>L</sub> ←LH)			
	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub>	Multiply Unnormalized (EH←LH)	RRD	B33B	
N	$R_1,D_2(X_2,B_2)$	AND (32)	RX-a	54	С
NC	$D_1(L,B_1),D_2(B_2)$	AND (character)	SS-a	D4	шС
NG	$R_1, D_2(X_2, B_2)$	AND (64)	RXY-a		c N
NGR	R <sub>1</sub> ,R <sub>2</sub>	AND (64)	RRE	B980	сN
NGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	AND (64)	RRF-a	B9E4	c DO
NI	$D_1(B_1),I_2$	AND Immediate	SI	94	С
NIAI	l <sub>1</sub> ,l <sub>2</sub>	Next Instruction Access Intent	ΙE	B2FA	EH
NIHF	R <sub>1</sub> ,I <sub>2</sub>	AND Immediate (high)	RIL-a	C0A	c El
NIHH	R <sub>1</sub> ,I <sub>2</sub>	AND Immediate (high high)	RI-a	A54	сN
NIHL	R <sub>1</sub> ,l <sub>2</sub>	AND Immediate (high low)	RI-a	A55	сN
NILF	R <sub>1</sub> ,l <sub>2</sub>	AND Immediate (low)	RIL-a		c El
NILH	R <sub>1</sub> ,l <sub>2</sub>	AND Immediate (low high)	RI-a	A56	сN
NILL	R <sub>1</sub> ,l <sub>2</sub>	AND Immediate (low low)	RI-a	A57	c N
NIY	D <sub>1</sub> (B <sub>1</sub> ),I <sub>2</sub>	AND Immediate	SIY	EB54	
NR			RR	14	
	R <sub>1</sub> ,R <sub>2</sub>	AND (32)			C . DO
NRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	AND (32)	RRF-a		
NTSTG	$R_1,D_2(X_2,B_2)$	Nontransactional Store (64)	RXY-a		
NY	$R_1, D_2(X_2, B_2)$	AND (32)	RXY-a		c LD
0	$R_1,D_2(X_2,B_2)$	OR (32)	RX-a	56	С
OC	$D_1(L,B_1),D_2(B_2)$	OR (character)	SS-a	D6	ΩC
OG	$R_1,D_2(X_2,B_2)$	OR (64)	RXY-a	E381	сN
OGR	R <sub>1</sub> ,R <sub>2</sub>	OR (64)	RRE	B981	сN
OGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	OR (64)	RRF-a	B9E6	c DO
OI	$D_1(B_1),I_2$	OR Immediate	SI	96	С
OIHF	$R_1, I_2$	OR Immediate (high)	RIL-a	COC	c El
OIHH	R <sub>1</sub> ,l <sub>2</sub>	OR Immediate (high high)	RI-a	A58	сN
OIHL	R <sub>1</sub> ,l <sub>2</sub>	OR Immediate (high low)	RI-a	A59	сN
OILF	R <sub>1</sub> ,l <sub>2</sub>	OR Immediate (low)	RIL-a		c El
OILH	R <sub>1</sub> ,I <sub>2</sub>	OR Immediate (low high)	RI-a	A5A	c N
OILL		OR Immediate (low low)	RI-a	A5B	c N
OILL	R <sub>1</sub> ,l <sub>2</sub>	, ,	SIY	EB56	
	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	OR Immediate			
OR	R <sub>1</sub> ,R <sub>2</sub>	OR (32)	RR	16	C
ORK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	OR (32)	RRF-a		
OY	$R_1, D_2(X_2, B_2)$	OR (32)	RXY-a		c LD
PACK	$D_1(L_1,B_1),D_2(L_2,B_2)$		SS-b	F2	۵
PALB		Purge ALB	RRE	B248	p
PC	$D_2(B_2)$	Program Call	S	B218	q
PCC		Perform Cryptographic Computation	RRE	B92C	
PCKMO		Perform Crypto. Key Mgmt. Operations	RRE	B928	M3
PFD	$M_1,D_2(X_2,B_2)$	Prefetch Data	RXY-b	E336	¤ GE
PFDRL	M <sub>1</sub> ,RI <sub>2</sub>	Prefetch Data Relative Long	RIL-c	C62	
PFMF	R <sub>1</sub> ,R <sub>2</sub>	Perform Frame Management Function	RRE	B9AF	p ED1
PFPO		Perform Floating-Point Operation	E	010A	¤PF
PGIN	R <sub>1</sub> ,R <sub>2</sub>	Page In	RRE	B22E	p c ES
PGOUT	R <sub>1</sub> ,R <sub>2</sub>	Page Out	RRE	B22F	p c ES
PKA	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> )	Pack ASCII	SS-f	E9	¤ E2
PKU	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> )	Pack Unicode	SS-f	E1	¤ E2
PLO		Perform Locked Operation	SS-e	EE	пС
POPCNT		Population Count	RRE	B9E1	
		· operation count	100		0111
PPA	R <sub>1</sub> ,R <sub>2</sub> ,M <sub>3</sub>	Perform Processor Assist	RRF-c	R2E9	PA

Mne-			For-	Op-	Clas &
monic	Operands	Name	mat	code	Note
PRNO	R <sub>1</sub> ,R <sub>2</sub>	Perform Random Number Operation	RRE	B93C	M5
PT	R <sub>1</sub> ,R <sub>2</sub>	Program Transfer	RRE	B228	q
PTF	R <sub>1</sub>	Perform Topology Function	RRE	B9A2	c p C
PTFF		Perform Timing-Facility Function	Е	0104	q c
PTI	R <sub>1</sub> ,R <sub>2</sub>	Program Transfer with Instance	RRE	B99E	
PTLB		Purge TLB	S	B20D	
QADTR	$R_1, R_3, R_2, M_4$	Quantize (LD)	RRF-b		
QAXTR	$R_1, R_3, R_2, M_4$	Quantize (ED)	RRF-b	B3FD	¤ TF
RCHP		Reset Channel Path	S	B23B	
RISBG	$R_1, R_2, I_3, I_4[, I_5]$	Rotate then Insert Selected Bits (64)	RIE-f		
RISBGN	$R_1, R_2, I_3, I_4[, I_5]$	Rotate then Insert Selected Bits (64)	RIE-f	EC59	MI1
RISBHG	$R_1,I_2,I_3,I_4[,I_5]$	Rotate then Insert Selected Bits High (32)	RIE-f	EC5D	HW
RISBLG	$R_1, I_2, I_3, I_4[, I_5]$	Rotate then Insert Selected Bits Low (32)	RIE-f	EC51	HW
RLL	$R_1, R_3, D_2(B_2)$	Rotate Left Single Logical (32)	RSY-a	EB1D	N3
RLLG	$R_1, R_3, D_2(B_2)$	Rotate Left Single Logical (64)	RSY-a	EB1C	N
RNSBG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> [,I <sub>5</sub> ]	Rotate then AND Selected Bits (64)	RIE-f	EC54	c GE
ROSBG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> [,I <sub>5</sub> ]	Rotate then OR Selected Bits (64)	RIE-f		
RP	D <sub>2</sub> (B <sub>2</sub> )	Resume Program	S	B277	
RRBE	R <sub>1</sub> ,R <sub>2</sub>	Reset Reference Bit Extended	RRE	B22A	
RRBM	R <sub>1</sub> ,R <sub>2</sub>	Reset Reference Bits Multiple	RRE	B9AE	
RRDTR	R <sub>1</sub> ,R <sub>3</sub> ,R <sub>2</sub> ,M <sub>4</sub>	Reround (LD)	RRF-b		
RRXTR		Reround (ED)		B3FF	
RSCH	$R_1,R_3,R_2,M_4$	Resume Subchannel	S		
RXSBG	$R_1, R_2, I_3, I_4[, I_5]$	Rotate then Exclusive OR Selected Bits (64)	RIE-f	B238 EC57	
S	$R_1,D_2(X_2,B_2)$	Subtract (32)	RX-a	5B	С
SAC	D <sub>2</sub> (B <sub>2</sub> )	Set Address Space Control	S	B219	q
SACF	D <sub>2</sub> (B <sub>2</sub> )	Set Address Space Control Fast	S	B279	q
SAL	2( 2)	Set Address Limit	S	B237	p
SAM24		Set Addressing Mode (24)	Ē	010C	
SAM31		Set Addressing Mode (31)	Е	010D	
SAM64		Set Addressing Mode (64)	Е	010E	¤Ν
SAR	$R_1,R_2$	Set Access	RRE	B24E	۵
SCHM		Set Channel Monitor	S	B23C	р
SCK	$D_2(B_2)$	Set Clock	S	B204	рс
SCKC	D <sub>2</sub> (B <sub>2</sub> )	Set Clock Comparator	S	B206	p
SCKPF		Set Clock Programmable Field	Е	0107	p
SD	$R_1,D_2(X_2,B_2)$	Subtract Normalized (LH)	RX-a	6B	пc
SDB	$R_1,D_2(X_2,B_2)$	Subtract (LB)	RXE	ED1B	αс
SDBR	R <sub>1</sub> ,R <sub>2</sub>	Subtract (LB)	RRE	B31B	αс
SDR	R <sub>1</sub> ,R <sub>2</sub>	Subtract Normalized (LH)	RR	2B	αс
SDTR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract (LD)	RRF-a	B3D3	¤ c T
SDTRA	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> ,M <sub>4</sub>	Subtract (LD)	RRF-a		
SE	$R_1, D_2(X_2, B_2)$	Subtract Normalized (SH)	RX-a		пς
SEB	$R_1,D_2(X_2,B_2)$	Subtract (SB)	RXE	ED0B	
SEBR		, ,	RRE	B30B	
	R <sub>1</sub> ,R <sub>2</sub>	Subtract Normalized (SU)			
SER	R <sub>1</sub> ,R <sub>2</sub>	Subtract Normalized (SH)	RR	3B	¤ C
SFASR	R <sub>1</sub>	Set FPC and Signal	RRE	B385	
SFPC	R <sub>1</sub>	Set FPC	RRE	B384	α
SG	$R_1, D_2(X_2, B_2)$	Subtract (64)	RXY-a		
SGF	$R_1, D_2(X_2, B_2)$	Subtract (64←32)	RXY-a	E319	сN
SGFR	R <sub>1</sub> ,R <sub>2</sub>	Subtract (64←32)	RRE		
SGH	$R_1, D_2(X_2, B_2)$	Subtract Halfword (64←16)	RXY-a	E339	c MI2
SGR	R <sub>1</sub> ,R <sub>2</sub>	Subtract (64)	RRE	B909	сN
SGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract (64)	RRF-a	B9E9	c DO
SH	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Subtract Halfword (32←16)	RX-a		С
SHHHR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract High (32)		B9C9	
SHHLR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract High (32)		B9D9	
SHY	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Subtract Halfword (32←16)		E37B	
SIE	$D_2(B_2)$	Start Interpretive Execution	S	B214	
	-21-21	Signal Processor	RS-a	AE	٠,٢

Mne-			For-	Op-	Class &
monic	Operands	Name	mat	code	Notes
SL	$R_1,D_2(X_2,B_2)$	Subtract Logical (32)	RX-a	5F	С
SLA	R <sub>1</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Shift Left Single (32)	RS-a	8B	C
SLAG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Shift Left Single (64)	RSY-a		
SLAK	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Shift Left Single (32)	RSY-a		
SLB	$R_1, D_2(X_2, B_2)$	Subtract Logical with Borrow (32)	RXY-a		
SLBG SLBGR	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Subtract Logical with Borrow (64)	RXY-a RRE		c N c N
SLBR	R <sub>1</sub> ,R <sub>2</sub> R <sub>1</sub> ,R <sub>2</sub>	Subtract Logical with Borrow (64) Subtract Logical with Borrow (32)	RRE	B989 B999	c N3
SLDA	R <sub>1</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Shift Left Double (64)	RS-a	8F	C
SLDL	R <sub>1</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Shift Left Double Logical (64)	RS-a	8D	•
SLDT	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Shift Significand Left (LD)	RXF	ED40	¤ TF
SLFI	R <sub>1</sub> ,I <sub>2</sub>	Subtract Logical Immediate (32)	RIL-a		c El
SLG	$R_1, D_2(X_2, B_2)$	Subtract Logical (64)	RXY-a	E30B	
SLGF	$R_1, D_2(X_2, B_2)$	Subtract Logical (64←32)	RXY-a	E31B	c N
SLGFI	R <sub>1</sub> ,l <sub>2</sub>	Subtract Logical Immediate (64←32)	RIL-a	C24	c El
SLGFR	R <sub>1</sub> ,R <sub>2</sub>	Subtract Logical (64←32)	RRE	B91B	c N
SLGR	R <sub>1</sub> ,R <sub>2</sub>	Subtract Logical (64)	RRE	B90B	c N
SLGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract Logical (64)	RRF-a	B9EB	c DO
SLHHHR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract Logical High (32)	RRF-a	B9CB	c HW
SLHHLR	$R_1,R_2,R_3$	Subtract Logical High (32)	RRF-a	B9DB	c HW
SLL	$R_1,D_2(B_2)$	Shift Left Single Logical (32)	RS-a	89	
SLLG	$R_1, R_3, D_2(B_2)$	Shift Left Single Logical (64)	RSY-a	EB0D	N
SLLK	$R_1, R_3, D_2(B_2)$	Shift Left Single Logical (32)	RSY-a		DO
SLR	R <sub>1</sub> ,R <sub>2</sub>	Subtract Logical (32)	RR	1F	C
SLRK	$R_1, R_2, R_3$	Subtract Logical (32)	RRF-a		
SLXT	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Shift Significand Left (ED)	RXF	ED48	
SLY	$R_1,D_2(X_2,B_2)$	Subtract Logical (32)	RXY-a		c LD
SP	$D_1(L_1,B_1),D_2(L_2,B_2)$		SS-b	FB	шС
SPKA	D <sub>2</sub> (B <sub>2</sub> )	Set PSW Key from Address	S	B20A	
SPM	R <sub>1</sub>	Set Program Mask	RR	04	n
SPT SPX	D <sub>2</sub> (B <sub>2</sub> )	Set CPU Timer Set Prefix	S S	B208 B210	p
SQD	$D_2(B_2)$ $R_1, D_2(X_2, B_2)$	Square Root (LH)	RXE		p ¤
SQDB	$R_1,D_2(X_2,B_2)$ $R_1,D_2(X_2,B_2)$	Square Root (LB)	RXE	ED15	
SQDBR	R <sub>1</sub> ,R <sub>2</sub>	Square Root (LB)	RRE	B315	۵
SQDR	R <sub>1</sub> ,R <sub>2</sub>	Square Root (LH)	RRE	B244	۵
SQE	$R_1, D_2(X_2, B_2)$	Square Root (SH)	RXE	ED34	
SQEB	$R_1, D_2(X_2, B_2)$	Square Root (SB)	RXE	ED14	
SQEBR	R <sub>1</sub> ,R <sub>2</sub>	Square Root (SB)	RRE	B314	۵
SQER	R <sub>1</sub> ,R <sub>2</sub>	Square Root (SH)	RRE	B245	۵
SQXBR	R <sub>1</sub> ,R <sub>2</sub>	Square Root (EB)	RRE	B316	۵
SQXR	R <sub>1</sub> ,R <sub>2</sub>	Square Root (EH)	RRE	B336	۵
SR	$R_1,R_2$	Subtract (32)	RR	1B	С
SRA	$R_1,D_2(B_2)$	Shift Right Single (32)	RS-a	8A	С
SRAG	$R_1, R_3, D_2(B_2)$	Shift Right Single (64)	RSY-a	EB0A	c N
SRAK	$R_1, R_3, D_2(B_2)$	Shift Right Single (32)	RSY-a	EBDC	c DO
SRDA	$R_1,D_2(B_2)$	Shift Right Double (64)	RS-a	8E	С
SRDL	$R_1,D_2(B_2)$	Shift Right Double Logical (64)	RS-a	8C	
SRDT	$R_1, R_3, D_2(X_2, B_2)$	Shift Significand Right (LD)	RXF	ED41	¤ TF
SRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract (32)		B9F9	c DO
SRL	$R_1, D_2(B_2)$	Shift Right Single Logical (32)	RS-a		
SRLG	$R_1, R_3, D_2(B_2)$	Shift Right Single Logical (64)		EB0C	
SRLK	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Shift Right Single Logical (32)		EBDE	
SRNM	D <sub>2</sub> (B <sub>2</sub> )	Set BFP Rounding Mode (2 bit)	S	B299	
SRNMB	D <sub>2</sub> (B <sub>2</sub> )	Set BFP Rounding Mode (3 bit)	S	B2B8	
SRNMT	D <sub>2</sub> (B <sub>2</sub> )	Set DFP Rounding Mode	S	B2B9	
SRP		Shift and Round Decimal	SS-c	F0	шС
SRST	R <sub>1</sub> ,R <sub>2</sub>	Search String	RRE	B25E	
SRSTU	R <sub>1</sub> ,R <sub>2</sub>	Search String Unicode	RRE		¤ c E3
SRXT	$R_1, R_3, D_2(X_2, B_2)$	Shift Significand Right (ED)	RXF	ED49	u IF

Mne-			For-	Ор-	Class &	
monic	Operands	Name	mat	code	Note	
SSAIR	R <sub>1</sub>	Set Secondary ASN with Instance	RRE	B99F	¤ RA	
SSAR	R <sub>1</sub>	Set Secondary ASN	RRE	B225	۵	
SSCH	D <sub>2</sub> (B <sub>2</sub> )	Start Subchannel	S	B233	рс	
SSKE	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]	Set Storage Key Extended	RRF-d	B22B	рс	
SSM	D <sub>2</sub> (B <sub>2</sub> )	Set System Mask	SI	80	p	
ST	$R_1,D_2(X_2,B_2)$	Store (32)	RX-a	50		
STAM	$R_1, R_3, D_2(B_2)$	Store Access Multiple	RS-a	9B		
STAMY	$R_1, R_3, D_2(B_2)$	Store Access Multiple	RSY-a	EB9B	LD	
STAP	D <sub>2</sub> (B <sub>2</sub> )	Store CPU Address	S	B212	p	
STC	$R_1,D_2(X_2,B_2)$	Store Character	RX-a	42		
STCH	$R_1, D_2(X_2, B_2)$	Store Character High (8)	RXY-a	E3C3	HW	
STCK	D <sub>2</sub> (B <sub>2</sub> )	Store Clock	S	B205	αс	
STCKC	D <sub>2</sub> (B <sub>2</sub> )	Store Clock Comparator	S	B207	p	
STCKE	D <sub>2</sub> (B <sub>2</sub> )	Store Clock Extended	S	B278	пc	
STCKF	D <sub>2</sub> (B <sub>2</sub> )	Store Clock Fast	S	B27C	¤ c S	
STCM	$R_1,M_3,D_2(B_2)$	Store Characters under Mask (low)	RS-b	BE		
STCMH	$R_1,M_3,D_2(B_2)$	Store Characters under Mask (high)	RSY-b	EB2C	пΝ	
STCMY	$R_1,M_3,D_2(B_2)$	Store Characters under Mask (low)	RSY-b	EB2D	LD	
STCPS	D <sub>2</sub> (B <sub>2</sub> )	Store Channel Path Status	S	B23A	p	
STCRW	D <sub>2</sub> (B <sub>2</sub> )	Store Channel Report Word	S	B239	рс	
STCTG	$R_1, R_3, D_2(B_2)$	Store Control (64)	RSY-a	EB25	pΝ	
STCTL	$R_1, R_3, D_2(B_2)$	Store Control (32)	RS-a	B6	p	
STCY	$R_1,D_2(X_2,B_2)$	Store Character	RXY-a	E372	LD	
STD	$R_1,D_2(X_2,B_2)$	Store (L)	RX-a	60	۵	
STDY	$R_1,D_2(X_2,B_2)$	Store (L)	RXY-a	ED67	¤ LD	
STE	$R_1,D_2(X_2,B_2)$	Store (S)	RX-a	70	۵	
STEY	$R_1,D_2(X_2,B_2)$	Store (S)	RXY-a	ED66	¤ LD	
STFH	$R_1,D_2(X_2,B_2)$	Store High (32)	RXY-a	E3CB	HW	
STFL	D <sub>2</sub> (B <sub>2</sub> )	Store Facility List	S	B2B1	pN3	
STFLE	D <sub>2</sub> (B <sub>2</sub> )	Store Facility List Extended	S	B2B0	¤сF	
STFPC	D <sub>2</sub> (B <sub>2</sub> )	Store FPC	S	B29C	۵	
STG	$R_1,D_2(X_2,B_2)$	Store (64)	RXY-a	E324	N	
STGRL	R <sub>1</sub> ,RI <sub>2</sub>	Store Relative Long (64)	RIL-b	C4B	GE	
STGSC	$R_1,D_2(X_2,B_2)$	Store guarded storage controls	RXY-a	E349	¤ GF	
STH	$R_1,D_2(X_2,B_2)$	Store Halfword (16)	RX-a	40		
STHH	$R_1,D_2(X_2,B_2)$	Store Halfword High (16)	RXY-a	E3C7	HW	
STHRL	R <sub>1</sub> ,RI <sub>2</sub>	Store Halfword Relative Long (16)	RIL-b	C47	GE	
STHY	$R_1, D_2(X_2, B_2)$	Store Halfword (16)	RXY-a	E370	LD	
STIDP	D <sub>2</sub> (B <sub>2</sub> )	Store CPU ID	S	B202	p	
STM	$R_1, R_3, D_2(B_2)$	Store Multiple (32)	RS-a	90		
STMG	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Store Multiple (64)	RSY-a	EB24	N	
STMH	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Store Multiple High (32)	RSY-a	EB26	N	
STMY	R <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Store Multiple (32)	RSY-a	EB90	LD	
STNSM	D <sub>1</sub> (B <sub>1</sub> ),I <sub>2</sub>	Store Then And System Mask	SI	AC	р	
STOC	$R_1,D_2(B_2),M_3$	Store on Condition (32)	RSY-b	EBF3	L1	
STOCFH	$R_1,D_2(B_2),M_3$	Store High on Condition (32)	RSY-b	EBE1	L2	
STOCG	$R_1,D_2(B_2),M_3$	Store on Condition (64)	RSY-b	EBE3	L1	
STOSM	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Store Then Or System Mask	SI	AD	р	
STPQ	$R_1,D_2(X_2,B_2)$	Store Pair to Quadword (64,64→128)	RXY-a	E38E	¤Ν	
STPT	D <sub>2</sub> (B <sub>2</sub> )	Store CPU Timer	S	B209	p	
STPX	D <sub>2</sub> (B <sub>2</sub> )	Store Prefix	S	B211	p	
STRAG	D <sub>1</sub> (B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Store Real Address (64)	SSE	E502	pΝ	
STRL	R <sub>1</sub> ,RI <sub>2</sub>	Store Relative Long (32)	RIL-b		GE	
STRV	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Store Reversed (32)	RXY-a			
STRVG	$R_1,D_2(X_2,B_2)$	Store Reversed (64)	RXY-a		N	
STRVH	$R_1,D_2(X_2,B_2)$	Store Reversed (16)	RXY-a			
STSCH	$D_2(B_2)$	Store Subchannel	S	B234	рс	
STSI	$D_2(B_2)$ $D_2(B_2)$	Store System Information	S	B27D		
STURA	R <sub>1</sub> ,R <sub>2</sub>	Store Using Real Address (32)	RRE	B246	р	
STURG	R <sub>1</sub> ,R <sub>2</sub>	Store Using Real Address (64)	RRE	B925	рN	

Mne- monic	Operands	Name	For- mat	Op- code	Cla & Not
STY	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Store (32)	RXY-a	E350	LD
SU	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Subtract Unnormalized (SH)	RX-a	7F	αс
SUR	R <sub>1</sub> ,R <sub>2</sub>	Subtract Unnormalized (SH)	RR	3F	αс
SVC	1, 2	Supervisor Call	1	0A	D .
SW	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Subtract Unnormalized (LH)	RX-a	6F	αс
SWR	R <sub>1</sub> ,R <sub>2</sub>	Subtract Unnormalized (LH)	RR	2F	αс
SXBR	R <sub>1</sub> ,D <sub>2</sub>	Subtract (EB)	RRE	B34B	пc
SXR	R <sub>1</sub> ,D <sub>2</sub>	Subtract Normalized (EH)	RR	37	пс
SXTR	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Subtract (ED)	RRF-a		
SXTRA	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub> ,M <sub>4</sub>	Subtract (ED)	RRF-a		
SY	$R_1, D_2(X_2, B_2)$	Subtract (32)	RXY-a		
TABORT		Transaction Abort	S	B2FC	
TAM	D <sub>2</sub> (B <sub>2</sub> )		E	010B	
TAR	R <sub>1</sub> ,R <sub>2</sub>	Test Addressing Mode Test Access	RRE	B24C	
TB	R <sub>1</sub> ,R <sub>2</sub>	Test Block	RRE	B22C	
TBDR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub>	Convert HFP to BFP (LB←LH)	RRF-e		шC
TBEDR	R <sub>1</sub> ,M <sub>3</sub> ,R <sub>2</sub>	Convert HFP to BFP (SB←LH)		B350	
TBEGIN	$D_1(B_1), I_2$	Transaction Begin (nonconstrained)	SIL	E560	
TBEGINC		Transaction Begin (constrained)	SIL	E561	
TCDB	$R_1,D_2(X_2,B_2)$	Test Data Class (LB)	RXE	ED11	
TCEB	$R_1,D_2(X_2,B_2)$	Test Data Class (SB)	RXE	ED10	αС
TCXB	$R_1,D_2(X_2,B_2)$	Test Data Class (EB)	RXE	ED12	αС
TDCDT	$R_1,D_2(X_2,B_2)$	Test Data Class (LD)	RXE	ED54	¤ TI
TDCET	$R_1,D_2(X_2,B_2)$	Test Data Class (SD)	RXE	ED50	¤ TI
TDCXT	$R_1,D_2(X_2,B_2)$	Test Data Class (ED)	RXE	ED58	¤Τ
TDGDT	$R_1,D_2(X_2,B_2)$	Test Data Group (LD)	RXE	ED55	¤ TI
TDGET	$R_1,D_2(X_2,B_2)$	Test Data Group (SD)	RXE	ED51	¤ TI
TDGXT	R <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Test Data Group (ED)	RXE	ED59	¤ TI
TEND	1, 2( 2, 2)	Transaction End	S	B2F8	
THDER	R <sub>1</sub> ,R <sub>2</sub>	Convert BFP to HFP (LH←SB)	RRE	B358	
THDR	R <sub>1</sub> ,R <sub>2</sub>	Convert BFP to HFP (LH←LB)	RRE	B359	αс
TM	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Test under Mask	SI	91	С
TMH	R <sub>1</sub> ,I <sub>2</sub>	Test under Mask High	RI-a	A70	С
TMHH	R <sub>1</sub> ,l <sub>2</sub>	Test under Mask (high high)	RI-a	A72	c N
TMHL		Test under Mask (high low)	RI-a	A73	c N
TML	R <sub>1</sub> ,I <sub>2</sub>	Test under Mask (nightiow)	RI-a	A73	
	R <sub>1</sub> ,I <sub>2</sub>				C
TMLH	R <sub>1</sub> ,l <sub>2</sub>	Test under Mask (low high)	RI-a	A70	c N
TMLL	R <sub>1</sub> ,l <sub>2</sub>	Test under Mask (low low)	RI-a	A71	c N
TMY	D <sub>1</sub> (B <sub>1</sub> ),l <sub>2</sub>	Test under Mask	SIY	EB51	
TP	$D_1(L_1,B_1)$	Test Decimal	RSL	EBC0	
TPEI	R <sub>1</sub> ,R <sub>2</sub>	Test Pending External Interruption	RRE	B9A1	рс
TPI	$D_2(B_2)$	Test Pending Interruption	S	B236	рс
TPROT	$D_1(B_1), D_2(B_2)$	Test Protection	SSE	E501	рс
TR	$D_1(L,B_1),D_2(B_2)$	Translate	SS-a	DC	۵
TRACE	$R_1,R_3,D_2(B_2)$	Trace (32)	RS-a	99	p
TRACG	$R_1,R_3,D_2(B_2)$	Trace (64)	RSY-a	EB0F	pΝ
TRAP2		Trap	E	01FF	۵
TRAP4	D <sub>2</sub> (B <sub>2</sub> )	Trap	S	B2FF	۵
TRE	R <sub>1</sub> ,R <sub>2</sub>	Translate Extended	RRE	B2A5	αс
TROO	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]	Translate One to One	RRF-c	B993	αс
TROT	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]	Translate One to Two	RRF-c		
TRT	D <sub>1</sub> (L,B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Translate and Test	SS-a		αс
TRTE	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]	Translate and Test Extended		B9BF	
TRTO	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]	Translate Two to One	RRF-c		
TRTR	D <sub>1</sub> (L,B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Translate and Test Reverse	SS-a	D0	пC
TRTRE		Translate and Test Reverse Extended	RRF	B9BD	
	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]		RRF-c		
TRTT	R <sub>1</sub> ,R <sub>2</sub> [,M <sub>3</sub> ]	Translate Two to Two			
TS	D <sub>2</sub> (B <sub>2</sub> )	Test and Set	SI	93	пC
TSCH	D <sub>2</sub> (B <sub>2</sub> )	Test Subchannel	S	B235	рс
UNPK	$D_1(L_1,B_1),D_2(L_2,B_2)$	Unnack	SS-b	F3	Ø

Mne-			For-	Op-	Class &	
monic	Operands	Name	mat	code	Note	
UNPKA	D <sub>1</sub> (L <sub>1</sub> ,B <sub>1</sub> ),D <sub>2</sub> (B <sub>2</sub> )	Unpack ASCII	SS-a	EA	¤сЕ	
UNPKU	$D_1(L_1,B_1),D_2(B_2)$	Unpack Unicode	SS-a	E2	¤сЕ	
JPT		Update Tree	E	0102	i¤c	
/A	$V_1, V_2, V_3, M_4$	Vector Add	VRR-c	E7F3	¤ VF	
/AC	$V_1, V_2, V_3, V_4, M_5$	Vector Add With Carry	VRR-d	E7BB	¤ VF	
/ACC	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Add Compute Carry	VRR-c	E7F1	¤ VF	
/ACCC	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Add With Carry Compute Carry	VRR-d	E7B9	¤ VF	
/AP	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,I <sub>4</sub> ,M <sub>5</sub>	Vector Add Decimal	VRI-f	E671	¤ c* \	
VAVG	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Average	VRR-c			
/AVGL	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Average Logical	VRR-c			
/BPERM		Vector Bit Permute	VRR-c			
VCDG	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector FP Convert from Fixed 64-bit	VRR-a			
VCDLG	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector FP Convert from Logical 64-bit	VRR-a			
VCEQ		Vector Compare Equal	VRR-b			
VCEQ	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>		VRR-a			
	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector FP Convert to Fixed 64-bit				
VCH	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector Compare High	VRR-b			
VCHL	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector Compare High Logical	VRR-b			
VCKSM	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector Checksum	VRR-c			
VCLGD	$V_1, V_2, M_3, M_4, M_5$	Vector FP Convert to Logical 64-bit	VRR-a			
VCLZ	$V_1, V_2, M_3$	Vector Count Leading Zeros	VRR-a			
VCP	$V_1, V_2, M_3$	Vector Compare Decimal	VRR-h			
VCTZ	$V_1, V_2, M_3$	Vector Count Trailing Zeros	VRR-a	E752	¤ VF	
VCVB	$R_1,V_2,M_3$	Vector Convert to Binary	VRR-i	E650	¤ C* /	
VCVBG	$R_1, V_2, M_3$	Vector Convert to Binary	VRR-i	E652	¤ C* \	
VCVD	$V_1,R_2,I_3,M_4$	Vector Convert to Decimal	VRI-i	E658	¤ C* \	
VCVDG	$V_1,R_2,I_3,M_4$	Vector Convert to Decimal	VRI-i	E65A	¤ c* \	
VDP	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,I <sub>4</sub> ,M <sub>5</sub>	Vector Divide Decimal	VRI-f	E67A	¤ c* \	
VEC	$V_1, V_2, M_3$	Vector Element Compare	VRR-a	E7DB	¤сV	
VECL	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub>	Vector Element Compare Logical	VRR-a	E7D9	псV	
VERIM	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,I <sub>4</sub> ,M <sub>5</sub>	Vector Element Rotate and Insert Under Mask	VRI-d	E772	¤ VF	
VERLL	$V_1, V_3, D_2(B_2), M_4$	Vector Element Rotate Left Logical	VRS-a	E733	¤ VF	
VERLLV	$V_1, V_2, V_3, M_4$	Vector Element Rotate Left Logical	VRR-c	E773	¤ VF	
VESL	$V_1, V_3, D_2(B_2), M_4$	Vector Element Shift Left	VRS-a	E730	¤ VF	
VESLV	$V_1, V_2, V_3, M_4$	Vector Element Shift Left	VRR-c	E770	¤ VF	
VESRA	V <sub>1</sub> ,V <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> ),M <sub>4</sub>	Vector Element Shift Right Arithmetic	VRS-a	E73A	¤ VF	
VESRAV	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Element Shift Right Arithmetic	VRR-c	E77A	¤ VF	
VESRL	V <sub>1</sub> ,V <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> ),M <sub>4</sub>	Vector Element Shift Right Logical	VRS-a	E738	¤ VF	
VESRLV	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Element Shift Right Logical	VRR-c			
VFA	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector FP Add	VRR-c			
VFAE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> [,M <sub>5</sub> ]	Vector Find Any Element Equal	VRR-b			
VFCE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub> ,M <sub>6</sub>	Vector FP Compare Equal	VRR-c			
VFCH		Vector FP Compare High	VRR-c			
VFCHE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub> ,M <sub>6</sub> V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub> ,M <sub>6</sub>	, ,	VRR-c			
VFORE		Vector FP Compare High or Equal  Vector FP Divide	VRR-c			
VFEE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>		VRR-b			
	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> [,M <sub>5</sub> ]	Vector Find Element Equal				
VFENE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> [,M <sub>5</sub> ]	Vector Find Element Not Equal	VRR-b			
VFI	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector Load FP Integer	VRR-a			
VFLL	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub> ,M <sub>4</sub>	Vector FP Load Lengthened	VRR-a			
VFLR	$V_1, V_2, M_3, M_4, M_5$	Vector FP Load Rounded	VRR-a			
VFM	$V_1, V_2, V_3, M_4, M_5$	Vector FP Multiply	VRR-c			
VFMA	$V_1, V_2, V_3, V_4, M_5, M_6$		VRR-e			
VFMAX	$V_1, V_2, V_3, M_4, M_5, M_6$	Vector FP Maximum	VRR-c			
VFMIN	$V_1, V_2, V_3, M_4, M_5, M_6$	Vector FP Minimum	VRR-c	E7EE	¤ V1	
VFMS	$V_1, V_2, V_3, V_4, M_5, M_6$	Vector FP Multiply and Subtract	VRR-e	E78E	¤۷F	
VFNMA		Vector FP Negative Multiply and Add	VRR-e	E79F	¤V1	
VFNMS		Vector FP Negative Multiply and Subtract	VRR-e			
VFPSO	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector FP Perform Sign Operation	VRR-a			
VFS	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector FP Subtract		E7E2		

Mne-			For-	Ор-	Class &
monic	Operands	Name	mat	code	Notes
VFTCI	V <sub>1</sub> ,V <sub>2</sub> ,I <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector FP Test Data Class Immediate	VRI-e	E74A	¤ VF
VGBM	V <sub>1</sub> ,I <sub>2</sub>	Vector Generate Byte Mask	VRI-a		
VGEF	V <sub>1</sub> ,D <sub>2</sub> (V <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Gather Element (32)	VRV	E713	
VGEG	V <sub>1</sub> ,D <sub>2</sub> (V <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Gather Element (64)	VRV	E712	
VGFM	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Galois Field Multiply Sum	VRR-c		
VGFMA	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,W <sub>4</sub> ,M <sub>5</sub>	Vector Galois Field Multiply Sum and Accu-			
· OI IVII (	*1,*2,*3,*4,**5	mulate	VIIII	2,00	- • • •
VGM	$V_1, I_2, I_3, V_4$	Vector Generate Mask	VRI-b	E746	¤VF
VISTR	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub> [,M <sub>5</sub> ]	Vector Isolate String	VRR-a	E75C	□ c* VF
VL	$V_1,D_2(X_2,B_2)$	Vector Load	VRX	E706	¤VF
VLBB	V <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Load to Block Boundary	VRX	E707	
VLC	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub>	Vector Load Complement	VRR-a	E7DE	¤ VF
VLEB	V <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Load Element (8)	VRX	E700	
VLEF	$V_1,D_2(X_2,B_2),M_3$	Vector Load Element (32)	VRX	E703	
VLEG	$V_1,D_2(X_2,B_2),M_3$ $V_1,D_2(X_2,B_2),M_3$	Vector Load Element (64)	VRX	E702	
VLEH		Vector Load Element (16)	VRX	E701	
VLEIB	V <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Load Element Immediate (8)	VRI-a		
	V <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub>	* *			
VLEIF	V <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub>	Vector Load Element Immediate (32)	VRI-a		
/LEIG	V <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub>	Vector Load Element Immediate (64)	VRI-a		
VLEIH	V <sub>1</sub> ,I <sub>2</sub> ,M <sub>3</sub>	Vector Load Element Immediate (16)	VRI-a		
VLGV	$R_1, V_3, D_2(B_2), M_4$	Vector Load GR from VR Element	VRS-c		
VLIP	$V_{1},I_{2},I_{3}$	Vector Load Immediate Decimal	VRI-h		
VLL	$V_1,R_3,D_2(B_2)$	Vector Load With Length	VRS-b	E737	¤ VF
VLLEZ	$V_1,D_2(X_2,B_2),M_3$	Vector Load Logical Element and Zero	VRX	E704	¤ VF
VLM	$V_1, V_3, D_2(B_2)$	Vector Load Multiple	VRS-a	E736	¤VF
VLP	$V_1, V_2, M_3$	Vector Load Positive	VRR-a	E7DF	¤ VF
VLR	$V_1, V_2$	Vector Load	VRR-a	E756	¤VF
VLREP	$V_1,D_2(X_2,B_2),M_3$	Vector Load and Replicate	VRX	E705	¤VF
VLRL	$V_1,D_2(B_2),I_3$	Vector Load Rightmost with Length	VSI	E635	¤ VD
VLRLR	$V_1, R_3, D_2(B_2)$	Vector Load Rightmost with Length	VRS-d	E637	¤ VD
VLVG	V <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> ),M <sub>4</sub>	Vector Load VR Element from GR	VRS-b	E722	¤ VF
VLVGP	V <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Vector Load VR from GRs Disjoint	VRR-f	E762	¤ VF
VMAE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Multiply and Add Even	VRR-d	E7AE	¤VF
VMAH	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Multiply and Add High	VRR-d	E7AB	¤VF
VMAL	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Multiply and Add Low	VRR-d		
VMALE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Multiply and Add Logical Even	VRR-d		
VMALH	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Multiply and Add Logical High	VRR-d		
VMALO		Vector Multiply and Add Logical Odd	VRR-d		
VMAO	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Multiply and Add Odd	VRR-d		
VIVIAO	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	• •	VRR-c		
VMH	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Multiply Even			
	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Multiply High	VRR-c		
VML	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Multiply Low	VRR-c		
VMLE	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Multiply Logical Even	VRR-c		
VMLH	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Multiply Logical High	VRR-c		
VMLO	$V_1, V_2, V_3, M_4$	Vector Multiply Logical Odd	VRR-c		
VMN	$V_1, V_2, V_3, M_4$	Vector Minimum	VRR-c		
VMNL	$V_1, V_2, V_3, M_4$	Vector Minimum Logical	VRR-c	E7FC	¤ VF
VMO	$V_1, V_2, V_3, M_4$	Vector Multiply Odd	VRR-c		
VMP	$V_1, V_2, V_3, I_4, M_5$	Vector Multiply Decimal	VRI-f	E678	a C <sub>*</sub> AE
VMRH	$V_1, V_2, V_3, M_4$	Vector Merge High	VRR-c	E761	¤ VF
VMRL	$V_1, V_2, V_3, M_4$	Vector Merge Low	VRR-c	E760	¤VF
VMSL	$V_1, V_2, V_3, V_4, M_5, M_6$	Vector Multiply Sum Logical	VRR-d	E6B8	¤ V1
VMSP	$V_1, V_2, V_3, I_4, M_5$	Vector Multiply and Shift Decimal	VRI-f	E679	¤c* VD
VMX	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Maximum	VRR-c		
VMXL	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Maximum Logical	VRR-c		
VN	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector AND	VRR-c		
VNC	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector AND with Complement	VRR-c		
VNN	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector NAND	VRR-c		
VNO	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector NOR	VRR-c		
	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector Not Exclusive OR	VRR-c		
VNX					

Mne-			For-	Op-	Class &
monic	Operands	Name	mat	code	Notes
VO	$V_1, V_2, V_3$	Vector OR	VRR-c		¤ VF
VOC	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector OR with Complement	VRR-c		
VPDI	$V_1, V_2, V_3, M_4$	Vector Permute Doubleword Immediate	VRR-c		
VPERM	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub>	Vector Permute	VRR-e		
VPK	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Pack	VRR-c		
VPKLS	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector Pack Logical Saturate			¤ c* VF
VPKS VPKZ	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub> ,M <sub>5</sub>	Vector Pack Saturate			¤ c* VF
	V <sub>1</sub> ,D <sub>2</sub> (B <sub>2</sub> ),I <sub>3</sub>	Vector Pack Zoned	VSI	E634	
VPSOP	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub>	Vector Population Count Vector Perform Sign Operation Decimal	VRR-a		¤c*VD
VREP	V <sub>1</sub> ,V <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> ,M <sub>5</sub> V <sub>1</sub> ,V <sub>3</sub> ,I <sub>2</sub> ,M <sub>4</sub>	Vector Replicate	VRI-c		
VREPI	V <sub>1</sub> , V <sub>3</sub> , I <sub>2</sub> , IVI <sub>4</sub> V <sub>1</sub> , I <sub>2</sub> , M <sub>3</sub>	Vector Replicate Immediate	VRI-a		
VRP	V <sub>1</sub> , I <sub>2</sub> , IVI <sub>3</sub> V <sub>1</sub> , V <sub>2</sub> , V <sub>3</sub> , I <sub>4</sub> , M <sub>5</sub>	Vector Remainder Decimal			¤c* VD
VS	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,I <sub>4</sub> ,IVI <sub>5</sub> V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Subtract	VRR-c		
VSBCBI	V <sub>1</sub> , V <sub>2</sub> , V <sub>3</sub> , W <sub>4</sub> V <sub>1</sub> , V <sub>2</sub> , V <sub>3</sub> , V <sub>4</sub> , M <sub>5</sub>	Vector Subtract With Borrow Compute	VRR-d		
		Borrow Indication			
VSBI	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub> ,M <sub>5</sub>	Vector Subtract With Borrow Indication	VRR-d		
VSCBI	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,M <sub>4</sub>	Vector Subtract Compute Borrow Indication			
VSCEF	V <sub>1</sub> ,D <sub>2</sub> (V <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Scatter Element (32)	VRV	E71B	
VSCEG	V <sub>1</sub> ,D <sub>2</sub> (V <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Scatter Element (64)	VRV	E71A	
VSDP	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,I <sub>4</sub> ,M <sub>5</sub>	Vector Shift and Divide Decimal	VRI-f		¤c* VD
VSEG	V <sub>1</sub> ,V <sub>2</sub> ,M <sub>3</sub>	Vector Sign Extend to Doubleword	VRR-a		
VSEL	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,V <sub>4</sub>	Vector Select	VRR-e		
VSL	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector Shift Left	VRR-c		
VSLB VSLDB	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector Shift Left By Byte	VRR-c		
	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,I <sub>4</sub>	Vector Shift Left Double By Byte	VRI-d		¤c*VD
VSP VSRA	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub> ,I <sub>4</sub> ,M <sub>5</sub>	Vector Subtract Decimal	VRI-I		
VSRAB	V <sub>1</sub> ,V <sub>2</sub> ,V <sub>3</sub>	Vector Shift Right Arithmetic Vector Shift Right Arithmetic By Byte	VRR-c		
VSRL	$V_1, V_2, V_3$ $V_1, V_2, V_3$	Vector Shift Right Logical	VRR-c		
VSRLB	V <sub>1</sub> , V <sub>2</sub> , V <sub>3</sub> V <sub>1</sub> , V <sub>2</sub> , V <sub>3</sub>	Vector Shift Right Logical By Byte	VRR-c		
VSRP	V <sub>1</sub> , V <sub>2</sub> , I <sub>3</sub> , I <sub>4</sub> , M <sub>5</sub>	Vector Shift and Round Decimal			¤c* VD
VST	V <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> )	Vector Store	VRX	E70E	
VSTEB	$V_1,D_2(X_2,B_2),M_3$	Vector Store Element (8)	VRX	E708	
VSTEF	$V_1,D_2(X_2,B_2),M_3$	Vector Store Element (32)	VRX	E70B	
VSTEG	V <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Store Element (64)	VRX	E70A	¤ VF
VSTEH	V <sub>1</sub> ,D <sub>2</sub> (X <sub>2</sub> ,B <sub>2</sub> ),M <sub>3</sub>	Vector Store Element (16)	VRX	E709	۵VF
VSTL	V <sub>1</sub> ,R <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Vector Store With Length	VRS-b	E73F	¤ VF
VSTM	V <sub>1</sub> ,V <sub>3</sub> ,D <sub>2</sub> (B <sub>2</sub> )	Vector Store Multiple	VRS-a	E73E	۵VF
VSTRC		Vector String Range Compare	VRR-d	E78A	¤ c* VF
VSTRL	V <sub>1</sub> ,D <sub>2</sub> (B <sub>2</sub> ),I <sub>3</sub>	Vector Store Rightmost with Length	VSI	E63D	αVD
VSTRLR	$V_1,R_3,D_2(B_2)$	Vector Store Rightmost with Length	VRS-d	E63F	αVD
VSUM	$V_1, V_2, V_3, M_4$	Vector Sum Across Word	VRR-c	E764	۵VF
VSUMG	$V_1, V_2, V_3, M_4$	Vector Sum Across Doubleword	VRR-c	E765	۵VF
VSUMQ	$V_1, V_2, V_3, M_4$	Vector Sum Across Quadword	VRR-c	E767	¤VF
VTM	$V_1,V_2$	Vector Test Under Mask	VRR-a	E7D8	¤ VF
VTP	V <sub>1</sub>	Vector Test Decimal	VRR-g	E65F	¤c* VD
VUPH	$V_1, V_2, M_3$	Vector Unpack High	VRR-a	E7D7	¤ VF
VUPKZ	$V_1,D_2(B_2),I_3$	Vector Unpack Zoned	VSI	E63C	¤VD
VUPL	$V_1, V_2, M_3$	Vector Unpack Low	VRR-a	E7D6	۵VF
VUPLH	$V_1, V_2, M_3$	Vector Unpack Logical High	VRR-a	E7D5	۵VF
VUPLL	$V_1, V_2, M_3$	Vector Unpack Logical Low	VRR-a	E7D4	¤ VF
VX	$V_1, V_2, V_3$	Vector Exclusive OR	VRR-c		
WFC	$V_1, V_2, M_3, M_4$	Vector FP Compare Scalar	VRR-a		
WFK	$V_1, V_2, M_3, M_4$	Vector FP Compare and Signal Scalar	VRR-a	E7CA	۵VF
Χ	$R_1, D_2(X_2, B_2)$	Exclusive OR (32)	RX-a	57	С
XC	$D_1(L,B_1), D_2(B_2)$	Exclusive OR (character)	SS-a	D7	пС
XG	$R_1, D_2(X_2, B_2)$	Exclusive OR (64)	RXY-a		
XGR	$R_1,R_2$	Exclusive OR (64)	RRE	B982	
XGRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Exclusive OR (64)	RRF-a	B9E7	c DO

Mne- monic	Operands	Name	For- mat	Op- code	Class & Notes
XI	$D_1(B_1), I_2$	Exclusive OR Immediate	SI	97	С
XIHF	$R_1,I_2$	Exclusive OR Immediate (high)	RIL-a	C06	c El
XILF	$R_1,I_2$	Exclusive OR Immediate (low)	RIL-a	C07	c El
XIY	$D_1(B_1), I_2$	Exclusive OR Immediate	SIY	EB57	c LD
XR	$R_1,R_2$	Exclusive OR (32)	RR	17	С
XRK	R <sub>1</sub> ,R <sub>2</sub> ,R <sub>3</sub>	Exclusive OR (32)	RRF-a	B9F7	c DO
XSCH		Cancel Subchannel	S	B276	рс
XY	$R_1,D_2(X_2,B_2)$	Exclusive Or (32)	RXY-a	E357	c LD
ZAP	D <sub>1</sub> (L <sub>1</sub> ,B <sub>1</sub> ),D <sub>2</sub> (L <sub>2</sub> ,B <sub>2</sub> )	Zero and Add	SS-b	F8	пС

Floating-Point Operand Lengths	and	Types:	
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Point Operand Lengths and Types:		
Extended (binary, decimal or hex)	LB	Long binary
Extended binary	LD	Long decimal
Extended decimal	LH	Long hex
Extended hex	S	Short (binary, decimal or hex)
Extended hex (low-order part)	SB	Short binary
Extended hex (high-order part)	SD	Short decimal
Long (binary, decimal or hex)	SH	Short hex
	Extended (binary, decimal or hex) Extended binary Extended decimal Extended hex Extended hex Extended hex (low-order part) Extended hex (high-order part)	Extended (binary, decimal or hex)  Extended binary  Extended decimal  Extended hex  S  Extended hex (low-order part)  SB  Extended hex (high-order part)

No	tes:			
	&	Combination of fields	L1	Load/store-on-condition facility 1
	Ø	One or more restrictions apply in the	L2	Load/store-on-condition facility 2
		transactional-execution mode	LD	Long-displacement facility
	С	Condition code set	LT	Load-and-trap facility
	C*	Condition code may be set based on	LZ	Load-and-zero-rightmost-byte facility
		control in the instruction	M3	Message-security assist extension 3
	i	Interruptible instruction	M4	Message-security assist extension 4
	n	New condition code loaded	M5	Message-security assist extension 5
	р	Privileged instruction; restricted in the	M8	Message-security assist extension 8
		transactional-execution mode	MI1	Miscellaneous-instructions facility 1
	q	Semiprivileged instruction; restricted in	MI2	Miscellaneous-instructions facility 2
		the transactional-execution mode	MO	Move-with-optional-specifications
	u	Condition code is unpredictable		facility
	CS	Compare-and-swap-and-store facility	MS	Message-security assist
	CT	Configuration topology facility	N	New in z/Architecture
	CX	Constrained-transactional-execution	N3	New in z/Architecture and added to
		facility		ESA/390
	D2	DAT-enhancement facility 2	PA	Processor-assist facility
	DE	DAT-enhancement facility	PC	DFP-packed-conversion facility
	DO	Distinct-operands facility	PE	Parsing-enhancement facility
	E2	Extended-translation facility 2	PF	PFPO facility
	E3	Extended-translation facility 3	PK	Population-count facility
	ED1	Enhanced-DAT facility 1	RA	ASN-and-LX-reuse facility
	ED2		RB	Reset-reference-bits multiple facility
	EH	Execution-hint facility	SC	Store-clock-fast facility
	El	Extended-immediate facility	TE	Test-pending-external-interruption
	ES	Expanded-storage facility		facility
	ET	Extract-CPU-time facility	TF	Decimal-floating-point facility
	F	Floating-point-extension facility	TR	Decimal-floating-point-rounding facility
	FG	FPR-GPR-transfer facility	TS	TOD-clock-steering facility
	FL	Store-facility-list-extended facility	TX	Transactional-execution facility
	FS	Floating-point-support-sign-handling	UE	HFP unnormalized-extension facility
		facility	VD	Vector-packed-decimal facility
_	GE	General-instructions-extension facility	VF	Vector facility for z/Architecture
	GF	Guarded-storage facility	V1	Vector-enhancements facility 1
	HM	HFP multiply-and-add/subtract facility	XF	IEEE-exception-support facility
	HW	High-word facility	XX	Execute-extension facility
	IA	Interlocked-access facility	ZF	DFP zoned-conversion facility
ı	IM	Insert-reference-bits-multiple facility		

# **Machine Instructions by Operation Code**

OpCode	Mnemonic
0101	PR
0102	UPT
0104	PTFF
0107 010A	SCKPF PFPO
010A 010B	TAM
010C	SAM24
010D	SAM31
010E	SAM64
01FF	TRAP2 SPM
04 05	BALR
06	BCTR
07	BCTR BCR
0A	SVC
0B	BSM BASSM
0C 0D	BASR
0E	MVCL
0F	CLCL
10	LPR
11 12	LNR
13	LTR LCR
14	NR
15	CLR
16	OR
17	XR
18 19	LR CR
1A	AR
1B	SR
1C	MR
1D 1E	DR ALR
1F	SLR
20	LPDR
21	LNDR
22	LTDR LCDR
23 24	HDR
25	LDXR
25	LRDR
26	MXR
27	MXDR
28 29	LDR CDR
29 2A	ADR
2B	SDR
2C	MDR
2D	DDR
2E 2F	AWR SWR
30	LPER
31	LNER
32	LTER
33	LCER
34 35	HER LEDR
35	LRER
36	AXR
37	SXR
38	LER
39 3A	CER AER
3B	SER
3C	MDER
3C	MER
3D	DER
3E 3F	AUR SUR
40	STH

OpCode	Mnemonic
41 42	LA STC
43	IC
44	EX
45 46	BAL BCT
47	BC
48	LH
49 4A	CH AH
4B	SH
4C 4D	MH BAS
4E	CVD
4F 50	CVB ST
51	LAE
54	N
55 56	CL O
57	Χ
58 59	L C
5A	A
5B	S
5C 5D	M D
5E	AL
5F 60	SL STD
67	MXD
68	LD
69 6A	CD AD
6B	SD
6C 6D	MD DD
6E	AW
6F 70	SW STE
71	MS
78 79	LE CE
79 7A	AE
7B	SE
7C 7C	MDE ME
7D	DE
7E 7F	AU SU
80	SSM
82 83	LPSW Diagnose
84	BRXH
85 86	BRXLE BXH
87	BXLE
88	SRL SLL
89 8A	SRA
8B	SLA
8C 8D	SRDL SLDL
8E	SRDA
8F 90	SLDA STM
91	TM
92	MVI
93 94	TS NI
95	CLI
96	Ol

OpCode         Mnemonic         OpCode         Mnemonic           B22A         RRBE         B307         MXDBR         B370         LPDFR           B22B         SSKE         B308         KEBR         B371         LINDFR           B22D         DXR         B308         KEBR         B372         CPSDR           B22D         PGNI         B30B         SEBR         B373         LCDFR           B22F         PGOUT         B30C         MDEBR         B375         LZDR           B231         HSCH         B30D         DEBR         B376         LZXR           B231         HSCH         B30D         DEBR         B376         LZXR           B232         MSCH         B30F         MSEBR         B377         FIER           B232         MSCH         B311         LVDBR         B384         SFPC           B234         STSCH         B311         LVDBR         B385         SFASR           B235         TSCH         B312         LTDBR         B386         EFPC           B236         TSCH         B311         LVDBR         B389         CELFBR           B233         STCHW         B315         SQDBR
B22B         SSKE         B308         KEBR         B371         LNDFR           B22C         TB         B309         CEBR         B372         CPSDR           B22E         PGIN         B30A         AEBR         B373         LOFR           B22F         PGOUT         B30C         MDEBR         B375         LZDR           B230         CSCH         B30D         DEBR         B376         LZXR           B231         HSCH         B30E         MAEBR         B377         FIER           B232         MSCH         B30F         MSEBR         B377         FIER           B233         SSCH         B310         LPDBR         B384         SFPC           B234         STSCH         B311         LNDBR         B385         SFASR           B235         TSCH         B312         LCDBR         B390         CELFBR           B236         TSCH         B312         LCDBR         B390         CELFBR           B237         SAL         B314         SQEBR         B391         CDLFBR           B237         SAL         B315         SQUBR         B392         CXLFBR           B238         RSCH <t< th=""></t<>
B22C         TB         B309         CEBR         B372         CPSDR           B22D         DXR         B30A         AEBR         B373         LCDFR           B22E         PGOUT         B30C         MDEBR         B375         LZDR           B230         CSCH         B30D         DEBR         B376         LZXR           B231         HSCH         B30E         MAEBR         B377         FIER           B232         MSCH         B30F         MSEBR         B377         FIER           B233         SSCH         B310         LPDBR         B384         SFPC           B234         STSCH         B311         LNDBR         B385         SFASR           B235         TSCH         B312         LTDBR         B386         EFPC           B236         TPI         B313         LODBR         B390         CELFBR           B237         SAL         B314         SOEBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B238         RCHP <t< td=""></t<>
B22D         DXR         B30A         AEBR         B373         LCDFR           B22E         PGIN         B30B         SEBR         B374         LZER           B22F         PGOUT         B30C         MDEBR         B375         LZDR           B231         HSCH         B30E         MAEBR         B377         FIER           B231         HSCH         B30E         MAEBR         B377         FIER           B232         MSCH         B301         LPDBR         B384         SFPC           B233         SSCH         B310         LPDBR         B384         SFPC           B233         SSCH         B311         LNDBR         B385         SFASR           B234         STSCH         B311         LNDBR         B385         SFASR           B235         TSCH         B312         LTDBR         B386         SFPC           B236         TSCH         B311         LNDBR         B385         SFASR           B237         SAL         B314         SOEBR         B391         CDLFBR           B238         STCFW         B316         SQXBR         B394         CEFBRA           B239         STCFW
B22E         PGIN         B30B         SEBR         B374         LZER           B22F         PGOUT         B30C         MDEBR         B375         LZDR           B230         CSCH         B30D         DEBR         B377         FIER           B231         HSCH         B30E         MAEBR         B377         FIER           B232         MSCH         B30F         MSEBR         B377         FIER           B233         SSCH         B310         LPDBR         B384         SFPC           B234         STSCH         B311         LNDBR         B385         SFASR           B235         TSCH         B312         LCDBR         B390         CELFBR           B236         TSCH         B313         LCDBR         B390         CELFBR           B237         SAL         B314         SQEBR         B391         CDLFBR           B238         RSCH         B315         SQWBR         B394         CEFBRA           B238         STCPS         B317         MEEBR         B394         CEFBRA           B238         STCPS         B317         MEEBR         B394         CEFBRA           B230         SCHM
B22F         PGOUT         B30C         MDEBR         B375         LZDR           B230         CSCH         B30D         DEBR         B376         LZXR           B231         HSCH         B30E         MAEBR         B377         FIER           B232         MSCH         B30F         MSEBR         B377         FIDR           B233         SSCH         B310         LPDBR         B384         SFPC           B234         STSCH         B311         LNDBR         B385         SFASR           B235         TSCH         B312         LTDBR         B380         CEFPC           B236         TPI         B313         LODBR         B390         CELFBR           B236         TPI         B314         SOEBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B238         TSCRW         B316         SOXBR         B394         CEFBR           B238         RCHP         B318         KDBR         B395         CDFBR           B230         SCHM         B319         CDBR         B395         CDFBR           B231         CKSM
B30E   MAEBR   B377   FIER   B232   MSCH   B30F   MSEBR   B377   FIDR   B323   SSCH   B310   LPDBR   B384   SFPC   B234   STSCH   B311   LNDBR   B385   SFASR   B235   TSCH   B312   LTDBR   B380C   EFPC   B236   TSCH   B313   LCDBR   B390   CELFBR   B237   SAL   B314   SQEBR   B391   CDLFBR   B237   SAL   B314   SQEBR   B391   CDLFBR   B238   STCRW   B316   SQWBR   B392   CXLFBR   B239   STCRW   B316   SQWBR   B394   CEFBR   B230   STCRW   B316   SQWBR   B394   CEFBR   B230   CELFBR   B317   MEEBR   B394   CEFBR   B230   CEFBR   B318   KDBR   B395   CDFBR   B230   CXFBR   B314   ADBR   B395   CDFBR   B240   BAKR   B314   ADBR   B395   CDFBR   B241   CKSM   B318   SDBR   B396   CXFBR   B244   SQLF   B310   DDBR   B398   CFEBR   B245   SQLF   B310   DDBR   B398   CFEBR   B246   STURA   B315   MADBR   B399   CFDBR   B246   STURA   B315   MADBR   B399   CFDBR   B248   PALB   B324   LDER   B394   CFEBR   B249   EREG   B325   LXDR   B394   CFEBR   B249   CFEBR   B326   LXER   B390   CLFDBR   B246   CFEBR   B326   LXER   B390   CLFDBR   B247   B348   CEFBR   B341   CDLFDBR   B248   LIPA   B325   MAER   B330   CLFDBR   B246   CAFBR   B346   CLFDBR   B247   CAFBR   B336   CAFBR   B346   CLFDBR   B250   CSP   B330   MYIR   B344   CEGBR   B250   CSP   B330   MYIR   B345   CDGBR   B255   MSST   B331   LNXBR   B346   CXGBR   B255   SRST   B341   LNXBR   B346   CXGBR   B256   SRST   B341   LNXBR   B348   CGEBR   B257   CUSE   B330   MYIR   B346   CXGBR   B257   CUSE   B331   LNXBR   B348   CGEBR   B257   CUSE   B331   LNXBR   B346   CXGBR   B257   CUSE   B331   MADR   B346   CXGBR   B257   CUSE   B345   LDXBR   B340   CGBBR   B257   CUSE   B345   LDXBR   B346   CXGBR   B257   STCKF   B344   LEDBR   B346   CXGBR   B257   STCKF   B345   LDXBR   B346   CXGBR   B345   LDXBR   B346   CAGBR   B346   CXGBR   B346   CXGB
B232         MSCH         B30F         MSEBR         B37F         FIDR           B233         SSCH         B310         LPDBR         B384         SFPC           B234         STSCH         B311         LINDBR         B385         SFASR           B235         TSCH         B312         LTDBR         B386         EFPC           B236         TPI         B313         LODBR         B390         CELFBR           B238         RSCH         B315         SQDBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B239         STCRW         B316         SQXBR         B392         CXLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B238         RCHP         B318         KDBR         B394         CEFBRA           B238         RCHP         B318         KDBR         B395         CDFBRA           B230         SCHMM         B319         CDBR         B395         CDFBRA           B241         CKSM         B318         SDBR         B396         CXFBRA           B241         CKSM
B233         SSCH         B310         LPDBR         B384         SFPC           B234         STSCH         B311         LNDBR         B385         SFASR           B235         TSCH         B312         LTDBR         B38C         EFPC           B236         TPI         B313         LCDBR         B390         CELFBR           B237         SAL         B314         SOEBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B238         STCPS         B316         SQXBR         B394         CEFBR           B238         STCPS         B317         MEEBR         B394         CEFBR           B238         STCPS         B317         MEEBR         B394         CEFBR           B238         STCPS         B317         MEEBR         B394         CEFBR           B230         SCHM         B318         KDBR         B395         CDFBRA           B240         BAKR         B31A         ADBR         B395         CDFBRA           B241         CKSM         B31B         SDBR         B396         CXFBRA           B244         SQER
B234         STSCH         B311         LNDBR         B385         SFASR           B235         TSCH         B312         LITDBR         B38C         EFPC           B236         TPI         B313         LCDBR         B390         CELFBR           B237         SAL         B314         SQEBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B239         STCPS         B317         MEEBR         B394         CEFBRA           B230         SCCHM         B318         KOBR         B395         CDFBR           B230         SCHM         B319         CDBR         B395         CDFBR           B230         SCHM         B319         CDBR         B396         CXFBR           B241         CKSM         B318         SDBR         B396         CXFBR           B241         CKSM         B318         SDBR         B396         CXFBR           B244         SQER         B310         DDBR         B398         CFEBRA           B245         SQER         B31D         DDBR         B398         CFEBRA           B246         STURA
B235         TSCH         B312         LTDBR         B38C         EFPC           B236         TPI         B313         LCDBR         B390         CELFBR           B237         SAL         B314         SOEBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B239         STCRW         B316         SQXBR         B394         CEFBRA           B238         RCHP         B318         KDBR         B395         CDFBRA           B230         SCHM         B319         CDBR         B395         CDFBRA           B230         SCHM         B318         ADBR         B395         CDFBRA           B240         BAKR         B314         ADBR         B395         CDFBRA           B241         CKSM         B318         SDBR         B396         CXFBRA           B241         CKSM         B318         SDBR         B396         CXFBRA           B244         SODR         B31C         MDBR         B399         CFDBR           B245         SQER
B236         TPI         B313         LCDBR         B390         CELFBR           B237         SAL         B314         SQEBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B239         STCRW         B316         SQXBR         B394         CEFBR           B23A         STCPS         B317         MEEBR         B394         CEFBR           B23B         RCHP         B318         KDBR         B395         CDFBR           B23B         SCHM         B319         CDBR         B395         CDFBRA           B240         BAKR         B31A         ADBR         B396         CXFBRA           B241         CKSM         B31B         SDBR         B396         CXFBRA           B244         SQDR         B31C         MDBR         B398         CFEBR           B244         SQDR         B31D         DDBR         B398         CFEBR           B245         SQER         B31D         DDBR         B398         CFEBR           B245         SQER         B31F         MSDBR         B399         CFDBR           B248         PALB
B237         SAL         B314         SQEBR         B391         CDLFBR           B238         RSCH         B315         SQDBR         B392         CXLFBR           B239         STCRW         B316         SQXBR         B394         CEFBRA           B230         STCPS         B317         MEEBR         B394         CEFBRA           B230         SCHM         B318         KDBR         B395         CDFBRA           B240         BAKR         B318         CDBR         B396         CXFBR           B241         CKSM         B318         SDBR         B396         CXFBR           B241         CKSM         B318         SDBR         B396         CXFBR           B244         SQDR         B310         MDBR         B398         CFEBRA           B245         SQER         B31D         DDBR         B398         CFEBRA           B246         STURA         B31E         MADBR         B399         CFDBRA           B247         MSTA         B31E         MADBR         B399         CFDBRA           B248         PALB         B324         LDER         B398         CFEBRA           B248         BABA
B238         RSCH         B315         SQDBR         B392         CXLFBR           B239         STCRW         B316         SQXBR         B394         CEFBRA           B23A         STCPS         B317         MEEBR         B394         CEFBRA           B23B         RCHP         B318         KDBR         B395         CDFBRA           B23C         SCHM         B319         CDBR         B395         CDFBRA           B240         BAKR         B31A         ADBR         B396         CXFBRA           B241         CKSM         B31B         SDBR         B396         CXFBRA           B241         CKSM         B31B         SDBR         B396         CXFBRA           B244         SQDR         B31C         MDBR         B396         CXFBRA           B244         SQDR         B31D         DDBR         B398         CFBBRA           B245         SQER         B31B         MDBR         B399         CFDBR           B246         STURA         B31E         MADBR         B399         CFDBR           B246         STURA         B31F         MSDBR         B399         CFDBR           B249         EREG </td
B239         STCRW         B316         SQXBR         B394         CEFBRA           B23A         STCPS         B317         MEEBR         B394         CEFBRA           B23B         RCHP         B318         KDBR         B395         CDFBRA           B23C         SCHM         B319         CDBR         B395         CDFBRA           B240         BAKR         B31A         ADBR         B396         CXFBRA           B241         CKSM         B31B         SDBR         B396         CXFBRA           B244         SQDR         B31C         MDBR         B398         CFEBRA           B245         SQER         B31D         DDBR         B398         CFEBRA           B244         STURA         B31E         MADBR         B399         CFDBRA           B246         STURA         B31F         MSDBR         B399         CFDBRA           B248         PALB         B324         LDER         B399         CFDBRA           B248         PALB         B325         LXDR         B399         CFDBRA           B249         EREG         B325         LXDR         B399         CFDBRA           B24B         LURA
B23B         RCHP         B318         KDBR         B395         CDFBR           B23C         SCHM         B319         CDBR         B395         CDFBRA           B240         BAKR         B31A         ADBR         B396         CXFBR           B241         CKSM         B31B         SDBR         B396         CXFBRA           B244         SODR         B31C         MDBR         B398         CFEBRA           B245         SQER         B31D         DDBR         B398         CFEBRA           B246         STURA         B31E         MADBR         B399         CFDBR           B247         MSTA         B31E         MADBR         B399         CFDBR           B248         PALB         B324         LDER         B399         CFDBR           B249         EREG         B325         LXDR         B39A         CFXBR           B249         EREG         B325         LXDR         B39A         CFXBR           B249         EREG         B32E         MAER         B39C         CLFEBR           B249         EREG         B32E         MAER         B39A         CFXBRA           B24B         LUFA
B23C         SCHM         B319         CDBR         B395         CDFBR           B240         BAKR         B31A         ADBR         B396         CXFBR           B241         SQDR         B31B         SDBR         B396         CXFBRA           B244         SQDR         B31C         MDBR         B398         CFEBR           B245         SQER         B31D         DDBR         B398         CFEBR           B246         STURA         B31E         MADBR         B399         CFDBRA           B247         MSTA         B31F         MSDBR         B399         CFDBRA           B248         PALB         B324         LDER         B39A         CFXBRA           B249         EREG         B325         LXDR         B39A         CFXBRA           B24A         ESTA         B326         LXER         B39C         CLFBBR           B24B         LURA         B32E         MAER         B39C         CLFBBR           B24B         LURA         B32F         MSER         B39E         CLFSBR           B24B         SAR         B337         MSER         B341         CDLGBR           B24E         SAR
B240         BAKR         B31A         ADBR         B396         CXFBRA           B241         CKSM         B31B         SDBR         B396         CXFBRA           B244         SQDR         B31C         MDBR         B398         CFEBRA           B245         SQER         B31D         DDBR         B398         CFEBRA           B246         STURA         B31F         MSDBR         B399         CFDBRA           B247         MSTA         B31F         MSDBR         B399         CFDBRA           B248         PALB         B324         LDER         B39A         CFXBRA           B249         EREG         B325         LXDR         B39A         CFXBRA           B249         EREG         B325         LXDR         B39A         CFXBRA           B249         EREG         B325         LXER         B39C         CLFBBR           B249         EREG         B325         LXER         B39C         CLFBBR           B240         LIRA         B32E         MAER         B39D         CLFBBR           B240         CPYA         B336         SQXR         B34O         CLFBBR           B241         CPYA
B241         CKSM         B31B         SDBR         B396         CXFBRA           B244         SQDR         B31C         MDBR         B398         CFEBRA           B245         SQER         B31D         DDBR         B398         CFEBRA           B246         STURA         B31E         MADBR         B399         CFDBRA           B248         PALB         B324         LDER         B399         CFDBRA           B248         PALB         B324         LDER         B39A         CFXBRA           B249         EREG         B325         LXDR         B39A         CFXBRA           B248         LURA         B32E         MAER         B39C         CLFBR           B24B         LURA         B32E         MAER         B39D         CLFDBR           B24C         TAR         B32F         MSER         B39E         CLFSBR           B24C         TAR         B32F         MSER         B39E         CLFSBR           B24D         CPYA         B336         SQXR         B3AO         CELGBR           B24F         EAR         B337         MEER         B3A1         CDLGBR           B250         CSP
B244         SQDR         B31C         MDBR         B398         CFEBRA           B245         SQER         B31D         DDBR         B398         CFEBRA           B246         STURA         B31E         MADBR         B399         CFDBRA           B247         MSTA         B31F         MSDBR         B399         CFDBRA           B248         PALB         B324         LDER         B39A         CFXBRA           B249         EREG         B325         LXDR         B39A         CFXBRA           B24A         ESTA         B326         LXER         B39C         CLFBBR           B24B         LURA         B32E         MAER         B39D         CLFBBR           B24B         LURA         B32E         MAER         B39C         CLFBBR           B24D         CPYA         B336         SQXR         B34A         CPLFBR           B24D         CPYA         B336         SQXR         B34A         CPLGBR           B24E         SAR         B337         MEER         B34A         CDLGBR           B24F         EAR         B338         MYLR         B3A4         CEGBR           B252         MSR
B245         SQER         B31D         DDBR         B398         CFEBRA           B246         STURA         B31E         MADBR         B399         CFDBRA           B247         MSTA         B31F         MSDDR         B399         CFDBRA           B248         PALB         B324         LDER         B39A         CFXBRA           B249         EREG         B325         LXDR         B39A         CFXBRA           B24A         ESTA         B326         LXER         B39C         CLFEBR           B24B         LURA         B32E         MAER         B39D         CLFDBR           B24C         TAR         B32F         MSER         B39D         CLFDBR           B24D         CPYA         B336         SQXR         B34D         CLFBBR           B24D         CPYA         B336         SQXR         B34O         CLGBR           B24E         SAR         B337         MEER         B3A1         CDLGBR           B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBRA           B254         MVPG
B246         STURA         B31E         MADBR         B399         CFDBR           B247         MSTA         B31F         MSDBR         B399         CFDBRA           B248         PALB         B324         LDER         B399         CFDBRA           B249         EREG         B325         LXDR         B39A         CFXBRA           B24B         LURA         B32E         LXER         B39C         CLFBBR           B24B         LURA         B32E         MAER         B39D         CLFDBR           B24C         TAR         B32F         MSER         B39E         CLFSBR           B24C         TAR         B32F         MSER         B39E         CLFSBR           B24D         CPYA         B336         SQXR         B3AO         CELGBR           B24F         EAR         B337         MEER         B3A1         CDLGBR           B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYR         B3A4         CEGBR           B254         MVPG         B338         MYR         B3A5         CDGBR           B255         MST         <
B248         PÅLB         B324         LDER         B39A         CFXBR           B249         EREG         B325         LXDR         B39A         CFXBRA           B24A         ESTA         B326         LXER         B39C         CLFEBR           B24B         LURA         B32E         MAER         B39D         CLFDBR           B24C         TAR         B32F         MSER         B39E         CLFDBR           B24D         CPYA         B336         SQXR         B3A0         CELGBR           B24E         SAR         B337         MEER         B3A1         CDLGBR           B24E         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBRA           B252         MSR         B33A         MAYR         B3A4         CEGBRA           B254         MVPG         B33B         MYR         B3A5         CDGBR           B255         MVST         B33C         MAYHR         B3A5         CDGBR           B255         MVST         B33D         MYHR         B3A6         CXGBR           B257         CUSE <t< td=""></t<>
B249         EREG         B325         LXDR         B39A         CFXBRA           B24A         ESTA         B326         LXER         B39C         CLFEBR           B24B         LURA         B32E         MAER         B39D         CLFDBR           B24C         TAR         B32F         MSER         B39E         CLFDBR           B24C         TAR         B33F         MSER         B39E         CLFBR           B24D         CPYA         B336         SOXR         B3A0         CELGBR           B24F         EAR         B337         MEER         B3A1         CDLGBR           B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBR           B255         MSR         B33A         MAYR         B3A4         CEGBR           B254         MVPG         B33B         MYR         B3A5         CDGBR           B255         MVST         B33D         MYHR         B3A6         CXGBR           B255         MSA         B33F         MSDR         B3A6         CXGBR           B258         BSA         B33F
B24A         ESTA         B326         LXER         B39C         CLFEBR           B24B         LURA         B32E         MAER         B39D         CLFDBR           B24C         TAR         B32F         MSER         B39E         CLFDBR           B24D         CPYA         B336         SOXR         B3A0         CELGBR           B24E         SAR         B337         MEER         B3A1         CDLGBR           B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBR           B252         MSR         B33A         MAYR         B3A4         CEGBR           B255         MVST         B33C         MYHR         B3A5         CDGBR           B255         MVST         B33C         MYHR         B3A6         CXGBR           B257         CUSE         B33D         MYHR         B3A6         CXGBR           B258         BSG         B33E         MSDR         B3A8         CGEBR           B250         CLST         B340         LPXBR         B3A8         CGEBR           B250         CLST         B
B24B         LURA         B32E         MAER         B39D         CLFDBR           B24C         TAR         B32F         MSER         B39E         CLFDBR           B24D         CPYA         B336         SQXR         B3A0         CELGBR           B24E         SAR         B337         MEER         B3A1         CDLGBR           B24F         EAR         B338         MYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBRA           B252         MSR         B33A         MAYR         B3A4         CEGBRA           B254         MVPG         B33B         MYR         B3A5         CDGBR           B255         MVST         B33C         MAYHR         B3A5         CDGBR           B257         CUSE         B33D         MYHR         B3A6         CXGBR           B258         BSG         B33E         MADR         B3A6         CXGBR           B255         ABA         B33F         MSDR         B3A8         CGEBR           B250         CLST         B340         LPXBR         B3A8         CGEBRA           B25E         SRST         B
B24C         TAR         B32F         MSER         B39E         CLFXBR           B24D         CPYA         B336         SQXR         B3A0         CELGBR           B24F         SAR         B337         MEER         B3A1         CDLGBR           B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B338         MYR         B3A4         CEGBR           B252         MSR         B33A         MAYR         B3A4         CEGBR           B254         MVPG         B33B         MYR         B3A5         CDGBR           B255         MVST         B33C         MAYHR         B3A5         CDGBR           B255         MVST         B33D         MYHR         B3A6         CXGBR           B258         BSG         B33F         MADR         B3A6         CXGBR           B258         BSA         B33F         MSDR         B3A6         CXGBR           B250         CLST         B340         LPXBR         B3A8         CGEBR           B25E         SRST         B341         LNXBR         B3A9         CGDBR           B263         CMPSC         B34
B24D         CPYA         B336         SQXR         B3A0         CELGBR           B24E         SAR         B337         MEER         B3A1         CDLGBR           B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBR           B252         MSR         B3A3         MAYR         B3A4         CEGBRA           B254         MVPG         B338         MYR         B3A5         CDGBRA           B255         MVST         B33C         MAYHR         B3A5         CDGBRA           B257         CUSE         B33D         MYHR         B3A6         CXGBRA           B258         BSG         B33E         MADR         B3A6         CXGBRA           B258         BSG         B33F         MSDR         B3A8         CGEBR           B250         CLST         B340         LPXBR         B3A8         CGEBRA           B251         CLST         B340         LPXBR         B3A9         CGDBRA           B252         SRST         B341         LIXBR         B3A9         CGDBRA           B276         XSCH
B24E         SAR         B337         MEER         B341         CDLGBR           B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBR           B252         MSR         B33A         MAYR         B3A4         CEGBRA           B255         MVST         B33C         MAYHR         B3A5         CDGBR           B255         MVST         B33C         MAYHR         B3A5         CDGBRA           B257         CUSE         B33D         MYHR         B3A6         CXGBRA           B258         BSG         B33E         MADR         B3A6         CXGBRA           B25A         BSA         B33F         MSDR         B3A8         CGEBRA           B25D         CLST         B340         LPXBR         B3A8         CGEBRA           B25E         SRST         B341         LIXBR         B3A9         CGDBRA           B263         CMPSC         B342         LIXBR         B3A9         CGDBRA           B276         XSCH         B343         LOXBR         B3AA         CGXBR           B277         RP
B24F         EAR         B338         MAYLR         B3A2         CXLGBR           B250         CSP         B339         MYLR         B3A4         CEGBR           B252         MSR         B33A         MAYR         B3A4         CEGBRA           B254         MVPG         B33B         MYR         B3A5         CDGBRA           B255         MVST         B33C         MAYHR         B3A5         CDGBRA           B257         CUSE         B33D         MYHR         B3A6         CXGBRA           B258         BSG         B33F         MADR         B3A6         CXGBRA           B25A         BSA         B33F         MSDR         B3A6         CXGBRA           B25D         CLST         B340         LPXBR         B3A8         CGEBRA           B25E         SRST         B341         LNXBR         B3A9         CGDBRA           B263         CMPSC         B342         LCXBR         B3AA         CGXBR           B265         SRST         B341         LNXBR         B3A9         CGDBRA           B276         XSCH         B343         LCXBR         B3AA         CGXBR           B277         RP
B252         MSR         B33A         MAYR         B3A4         CEGBRA           B254         MVPG         B33B         MYR         B3A5         CDGBR           B255         MVST         B33C         MAYHR         B3A5         CDGBR           B257         CUSE         B33D         MYHR         B3A6         CXGBR           B258         BSG         B33E         MADR         B3A6         CXGBR           B25A         BSA         B33F         MSDR         B3A8         CGEBR           B25D         CLST         B340         LPXBR         B3A8         CGEBRA           B25E         SRST         B341         LIXBR         B3A9         CGDBR           B263         CMPSC         B342         LTXBR         B3A9         CGDBR           B276         XSCH         B343         LOXBR         B3AA         CGXBR           B277         RP         B344         LEDBR         B3AA         CGXBR           B278         SACF         B344         LEDBRA         B3AC         CLGBR           B279         SACF         B345         LDXBR         B3AE         CLGDSR           B27C         STCKF
B254         MVPG         B33B         MYR         B3A5         CDGBR           B255         MVST         B33C         MAYHR         B3A5         CDGBRA           B257         CUSE         B33D         MYHR         B3A6         CXGBR           B258         BSG         B33E         MADR         B3A6         CXGBRA           B25A         B3A         B33F         MSDR         B3A8         CGEBRA           B25D         CLST         B340         LPXBR         B3A8         CGEBRA           B25E         SRST         B341         LNXBR         B3A9         CGDBRA           B263         CMPSC         B342         LCXBR         B3AA         CGXBR           B276         XSCH         B343         LCXBR         B3AA         CGXBR           B277         RP         B344         LEDBR         B3AA         CGXBR           B279         SACF         B345         LDXBR         B3AD         CLGEBR           B270         STCKE         B345         LDXBR         B3AD         CLGEBR           B270         STCKF         B345         LDXBRA         B3AE         CLGEBR           B270         STSI
B255 MVST   B33C MAYHR   B3A5 CDGBRA
B257         CUSE         B33D         MYHR         B3A6         CXGBRA           B258         BSG         B33E         MADR         B3A6         CXGBRA           B25A         BSA         B33F         MSDR         B3A8         CGEBR           B25D         CLST         B340         LPXBR         B3A8         CGEBRA           B26S         SRST         B341         LIXBR         B3A9         CGDBRA           B263         CMPSC         B342         LTXBR         B3A9         CGDBRA           B276         XSCH         B343         LCXBR         B3AA         CGXBRA           B277         RP         B344         LEDBR         B3AA         CGXBRA           B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGSBR           B27D         STSI         B346         LEXBRA         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B290         STFP
B258         BSG         B33E         MADR         B3A6         CXGBRA           B25A         BSA         B33F         MSDR         B3A8         CGEBRA           B25D         CLST         B340         LPXBR         B3A8         CGEBRA           B25E         SRST         B341         LNXBR         B3A9         CGDBRA           B263         CMPSC         B342         LCXBR         B3A9         CGDBRA           B276         XSCH         B343         LCXBR         B3AA         CGXBR           B277         RP         B344         LEDBR         B3AA         CGXBRA           B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGSBR           B27D         STSI         B346         LEXBRA         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B290         STFPC         B347         FIXBR         B3B6         CXFR
B25A         BSA         B33F         MSDR         B3A8         CGEBR           B25D         CLST         B340         LPXBR         B3A8         CGEBRA           B25E         SRST         B341         LNXBR         B3A9         CGDBRA           B263         CMPSC         B342         LTXBR         B3A9         CGDBRA           B276         XSCH         B343         LCXBR         B3AA         CGXBRA           B277         RP         B344         LEDBRA         B3AA         CGXBRA           B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBR         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B25D         CLST         B340         LPXBR         B348         CGEBRA           B25E         SRST         B341         LIXBR         B3A9         CGDBRA           B263         CMPSC         B342         LTXBR         B3A9         CGDBRA           B276         XSCH         B343         LCXBR         B3AA         CGXBRA           B277         RP         B344         LEDBR         B3AA         CGXBRA           B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBRA         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B290         STFPC         B347         FIXBR         B3B6         CXFR
B263         CMPSC         B342         LTXBR         B3A9         CGDBRA           B276         XSCH         B343         LCXBR         B3AA         CGXBR           B277         RP         B344         LEDBR         B3AA         CGXBRA           B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBR         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B276         XSCH         B343         LCXBR         B3AA         CGXBR           B277         RP         B344         LEDBR         B3AA         CGXBRA           B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBR         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B277         RP         B344         LEDBR         B3AA         CGXBRA           B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBRA         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B278         STCKE         B344         LEDBRA         B3AC         CLGEBR           B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBR         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B279         SACF         B345         LDXBR         B3AD         CLGDBR           B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBR         B3B4         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B27C         STCKF         B345         LDXBRA         B3AE         CLGXBR           B27D         STSI         B346         LEXBR         B384         CEFR           B299         SRNM         B346         LEXBRA         B3B5         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B27D         STSI         B346         LEXBR         B384         CEFR           B299         SRNM         B346         LEXBRA         B385         CDFR           B29C         STFPC         B347         FIXBR         B3B6         CXFR
B29C STFPC B347 FIXBR B3B6 CXFR
B29D LFPC B347 FIXBRA B3B8 CFER
B2A5         TRE         B348         KXBR         B3B9         CFDR           B2A6         CU21         B349         CXBR         B3BA         CFXR
B2A6 CUUTF B34A AXBR B3C1 LDGR
B2A7 CU12 B34B SXBR B3C4 CEGR
B2A7 CUTFU B34C MXBR B3C5 CDGR
B2B0 STFLE B34D DXBR B3C6 CXGR
B2B1 STFL B350 TBEDR B3C8 CGER
B2B2         LPSWE         B351         TBDR         B3C9         CGDR           B2B8         SRNMB         B353         DIEBR         B3CA         CGXR
B2B8         SRNMB         B353         DIEBR         B3CA         CGXR           B2B9         SRNMT         B357         FIEBR         B3CD         LGDR
B2BD LFAS B357 FIEBRA B3D0 MDTR
B2E8 PPA B358 THDER B3D0 MDTRA
B2EC ETND B359 THDR B3D1 DDTR
B2F8 TEND B35B DIDBR B3D1 DDTRA
B2FA NIAI B35F FIDBR B3D2 ADTR
B2FC         TABORT         B35F         FIDBRA         B3D2         ADTRA           B2FF         TRAP4         B360         LPXR         B3D3         SDTR
B2FF         TRAP4         B360         LPXR         B3D3         SDTR           B300         LPEBR         B361         LNXR         B3D3         SDTRA
B301 LNEBR B362 LTXR B3D4 LDETR
B302 LTEBR B363 LCXR B3D5 LEDTR
B303 LCEBR B365 LXR B3D6 LTDTR
B304 LDEBR B366 LEXR B3D7 FIDTR
B305 LXDBR B367 FIXR B3D8 MXTR
B306 LXEBR B369 CXR B3D8 MXTRA

B309	OpCode	Mnemonic		OpCode	Mnemonic		OpCode	Mnemonic
B3DA   AXTR   B3DA   AXTRA   B3DB   SXTR   B3DD   LDXTR   B3DD   LDXTR   B3DB   B3D2   KMG   B3DD   CLHR   B3DD   LDXTR   B3DD   LDXTR   B3DD   KMGTR   B3DD   SHHLR   B3DB   SAHHLR	B3D9	DXTR		B921	CLGR		B9C8	AHHHR
B30B	B3D9	DXTRA		B925	STURG		B9C9	SHHHR
B30B	B3DA	AXTR		B926	LBR		B9CA	ALHHHR
B30B	B3DA	AXTRA		B927	LHR		B9CB	SLHHHR
B3DD	B3DB						B9CD	
B3DD								
B3DD         LDXTR         B82B         KMO         B8909         SHHLR         B87D         SHHLR         B89D         ALHHLR         B87D         ALHHLR         B89D         CHR         B87D         FIXTR         B82E         KMCTR         B89D         ALHHLR         B89D         CHR         B87D         CHLR         B87D         CCHLR         B87D         CCHR         B87D         CCGR         B87D         CCGTR         B87D         CCGTR			•					
B3DE								
B35D	B3DE							
B35E1	-				KMCTB			
B35E1   CGDTRA   B35E   CGDTRA   B35E2   CUDTR   B35E3   CDTR   B35E3   CDTR   B35E4   CDTR   B35E5   EEDTR   B35E5   EEDTR   B35E6   CGXTR   B35E9   CGXTR   B34E1   CFDTR   B35E9   CGXTR   B35E9   CGXTR   B35E9   CGXTRA   B35E0   CGXTRA   B35E1   CDFTRA   B35E1   CDFTRA   B35E2   CDFTRA   B35E2   CDFTRA   B35E3   CDFTRA   B35E4   CDFTRA   B35E5   CDFTRA   B35E1   CDFTRA   B35E1   CDFTRA   B35E1   CDFTRA   B35E3   CDFTA   CDFTA   CDFT								
B35E1								
B3E2								
B3E3								
B354   CDTR   B935   KIMD   B946   OGRK   B357   ESDTR   B941   CFDTR   B956   OGRK   B957   CGNTR   B942   CLGDTR   B958   AGRK   B959   CGNTR   B949   CFNTR   B958   AGRK   B958   AGRK   B359   CGNTR   B949   CFNTR   B958   AGRK   B958   AGRK   B359   CGNTR   B949   CFNTR   B958   AGRK   B958   AGRK   B958   AGRK   B356   CONTR   B949   CFNTR   B958   AGRK   B958   AGRK   B958   AGRK   B958   AGRK   B958   AGRK   B958   AGRK   B959   CFNTR   B958   AGRK   B958   AGRK   B958   AGRK   B958   AGRK   B958   AGRK   B959   AGRK   B959   AGRK   B959   AGRK   B959   AGRK   B959   AGRK   AGRK   AGRK   B959   AGRK								
B35E   EEDTR   B94F   KLMD   B96F   CGRK   B36E   KXTR   B941   CFDTR   B967   XGRK   B36E   KXTR   B943   CLFDTR   B968   AGRK   B968   AGRK   B369   CGXTR   B949   CFXTR   B968   ALGRK   B969   ALGRK   B960   AL			•					
B3E7								
B3E8								
B3E9								-
B3E9								
B3EA   CUXTR   B949   CFXTR   B3EB   CSXTR   B3EC   CXTR   B394A   CLGXTR   B3EC   MGRK   B3EC   CXTR   B3ED   EEXTR   B3E5   CDFTR   B3EF   EXTR   B3E5   CDFTR   B3E7   CDGTR   B953   CDLFTR   B9F6   ORK   B3F1   CDGTR   B953   CDLFTR   B9F6   ORK   B3F1   CDGTR   B953   CXFTR   B9F7   XFK   B3F2   CDUTR   B954   CXLGTR   B9F8   ARK   B3F3   CDSTR   B958   CXLFTR   B9F8   ARK   B3F3   CDSTR   B959   CXFTR   B9F8   ARK   B3F3   CDSTR   B960   CGRT   B9F8   ARK   B3F6   EDTR   B9F7   CLRT   B9F8   SLFK   B3F7   RRDTR   B973   CLRT   B9F8   SLFK   B3F9   CXGTR   B9F8   CXGTR   B9F8   CXGTR   B9F8   CXGTR   B9F8   CXGTR   B9F8   CXGTR   B9F9   CXGTR								
B3EB								
B3EC						١.		
B3ED								
BBSEF   ESXTR   B952   CDLGTR   B956   ORK   B3F1   CDGTR   B959   CXFTR   B9F6   ORK   B3F1   CDGTRA   B959   CXFTR   B9F6   CRK   B3F2   CDUTR   B950   CXLGTR   B9F8   ARK   B3F2   CDSTR   B958   CXLFTR   B9F9   SRK   B3F3   CDSTR   B960   CGRT   B9F8   ALRK   B3F5   QADTR   B961   CLGRT   B9FB   SLRK   B3F5   QADTR   B961   CLGRT   B9FB   SLRK   B3F7   RADTR   B973   CLRT   B3FD   MSRKC   B3F9   CXGTR   B980   NGR   BB   CDS   B3F9   CXGTR   B980   NGR   BB   CDS   B3F9   CXGTR   B981   OGR   BD   CLM   B3FB   CXSTR   B982   XGR   BE   STCM   B3FB   CXSTR   B983   FLOGR   BF   ICM   EARLY   COL   LGF   CAL   LGF   CAL						•		
B3F1								
B3F1   CDGTRA   B959   CXFTR   B958   ARK   B3F2   CDUTR   B958   CXLGTR   B958   ARK   B3F3   CDSTR   B958   CXLGTR   B958   ARK   B3F3   ARK   B3F5   ARK   B								
B3F2								
B3F3								
B3F4								
B3F5								
B3F6								
B3F7								
B3F9						•		
B3F9								
B3FA   CXUTR   B982   XGR   BF   CM   B3FB   CXSTR   B983   FLOGR   BF   CM   B3FC   CEXTR   B984   LLGCR   C00   LARL   C01   LGFI   C02   BRASL   C06   XIHF   C01   LGFI   C02   MIHF   C02   XIHF								
B3FB   CXSTR   B983								-
B3FC   CEXTR   B984								
B3FD								
BBFE   EXTR   B986   MLGR   C04   BRCL   BBFF   RRXTR   B987   DLGR   C05   BRASL   B6   STCTL   B988   ALCGR   C06   XIHF   B990   LCTL   B989   SLBGR   C07   XILF   B990   LTGR   B980   EPSW   C09   IILF   B992   LTGR   B98E   IDTE   C0A   MIHF   B902   LTGR   B98F   CDTE   C0B   MILF   B995   LURAG   B991   TRTO   C0D   OILF   B905   LURAG   B991   TRTO   C0D   OILF   B905   LURAG   B991   TRTO   C0D   OILF   B906   LGBR   B992   TROT   C0E   LLIHF   B908   AGR   B994   LLCR   C20   MSGFI   B908   AGR   B994   LLCR   C20   MSGFI   B909   SGR   B995   LLHR   C21   MSFI   B908   AGR   B995   LLHR   C21   MSFI   B908   AGR   B996   MIRR   C24   SLGFI   B908   SLGR   B997   DLR   C25   SLFI   B908   SLGR   B997   DLR   C25   SLFI   B908   B998   ALCR   C28   AGFI   B909   B909   BSAR   B999   ESAR   C29   AFI   B906   EREGG   B990   ESAR   C29   AFI   B901   LNGFR   B991   ESAR   C22   CGFI   B911   LNGFR   B992   FTF   C22   CLFI   B914   LGFR   B994   ESAR   C25   CLFI   B915   LLGFR   B994   ESAR   C25   CLFI   B991   SGFR   B994   ERBM   C45   LHRL   C46   LLGHRL   B916   LLGFR   B946   RRBM   C45   LHRL   B916   LLGFR   B946   RRBM   C46   LLGHRL   B916   SGFR   B946   CU14   C48   LGRL   STGRL   B916   SGFR   B946   STGRL   C46   LLGFRL   B916   SGFR   B958   CU24   C48   STGRL   C46   LLGFRL   B916   SGFR   B996   SRSTU   C47   STRL   C47   STRL   C46   LGFRL   C47   STRL   C47								
B3FF   RRXTR   B997   DLGR   C05   BRASL   B6   STCTL   B989   SLBGR   C06   XIHF   B7   LCTL   B999   SLBGR   C07   XILF   B991   LNGR   B991   ENW   C09   IILF   B992   LTGR   B998   EDTE   C08   IIHF   B902   LTGR   B998   EDTE   C08   IIHF   B903   LCGR   B996   EDTE   C08   NILF   B903   LCGR   B996   TRTT   C0C   C0HF   B995   LURAG   B991   TRTO   C0D   C0HF   B906   LGBR   B992   TROT   C0E   LLIHF   B907   LGHR   B993   TROO   C0F   LILIF   B908   AGR   B994   LLCR   C20   MSGF   B998   LLHR   C21   MSGF   B909   SGR   B995   LLHR   C21   MSGF   B909   SGR   B995   LLHR   C24   SLGF   B900   SGR   B996   MLR   C24   SLGF   B900   DSGR   B997   DLR   C25   SLF   B906   B996   MLR   C24   SLGF   B906   B996   B998   ALCR   C28   AGF   B906   B997   DLR   C25   SLF   B906   B998   ESAIR   C29   AF   B906   B996   B998   ESAIR   C29   AF   B906   B996   B998   ESAIR   C28   ALF   B906   B996   B998   ESAIR   C28   ALF   B906   B991   ESA   C20   CGF   B913   LCGFR   B995   B996   PT   C2D   CF   B912   LTGFR   B996   B997   DLR   C25   CLF   B914   LGFR   B996   B996   PT   C2D   CF   B915   LURGR   B996   PT   C2D   CF   B916   LLGFR   B996   RB996   RB996   C44   LGHRL   B916   LLGFR   B996   RB996   RB996   RB996   C45   LHRL   B916   LLGFR   B996   RB996   C46   LLGHRL   B916   C46   LGHRL   B916   C47   STHRL   B916   C48   LGFR   B996   C44   C48   LGFR   B916   C46   LGFR   B996   C47   C48   LGFR   B916   C47   STHRL   C48   LGFR   B916   C47   C48   LGFR   B916   C47   C48   LGFR   B916   C47   STHRL   C48   LGFR   B916   C47   C48   LGF								
B7	B3FF	RRXTR						BRASL
B900         LPGR         B98A         CSPG         C08         IIHF           B901         LNGR         B98D         EPSW         C09         IILF           B902         LTGR         B98E         IDTE         C0A         NIHF           B903         LCGR         B98F         CRDTE         C0B         NILF           B904         LGR         B991         TRTO         C0C         OIHF           B906         LGBR         B991         TRTO         C0D         OILF           B906         LGBR         B992         TROT         C0E         LLIHF           B907         LGHR         B993         TROO         C0F         LLILF           B908         AGR         B994         LLCR         C20         MSGFI           B909         SGR         B995         LLHR         C21         MSGFI           B909         SGR         B995         LLHR         C24         SLGFI           B900         SGR         B995         LLHR         C24         SLGFI           B900         MSGR         B996         MLR         C22         SSEFI           B900         MSGR         B998         ALCR	B6	STCTL		B988	ALCGR		C06	XIHF
B901	B7	LCTL		B989	SLBGR		C07	XILF
B902	B900	LPGR		B98A	CSPG		C08	IIHF
B903         LCGR         B98F         CRDTE         COB         NILF           B904         LGR         B990         TRTT         COC         OIHF           B905         LURAG         B991         TRTO         COD         OILF           B906         LGBR         B992         TROT         COE         LLIHF           B906         LGHR         B993         TROO         COF         LLILF           B908         AGR         B994         LLCR         C20         MSGFI           B909         SGR         B995         LLHR         C21         MSGFI           B900         SGR         B996         MLR         C24         SLGFI           B900         MSGR         B996         MLR         C25         SLFI           B900         MSGR         B998         ALCR         C28         AGFI           B900         DSGR         B999         SLBR         C29         AFI           B90F         LRVGR         B998         ESAIR         C2A         ALGFI           B910         LPGFR         B990         ESEA         C2C         CGFI           B912         LTGFR         B991         T	B901	LNGR		B98D	EPSW		C09	IILF
B904	B902	LTGR		B98E	IDTE		C0A	NIHF
B905								
B906         LGBR         B992         TROT         COE         LLIHF           B907         LGHR         B993         TROO         COF         LLILF           B908         AGR         B994         LLCR         C20         MSGFI           B909         SGR         B995         LLHR         C21         MSFI           B908         ALGR         B996         MLR         C24         SLGFI           B900         MSGR         B998         ALCR         C28         AGFI           B900         DSGR         B999         SLBR         C29         AFI           B90F         LRVGR         B998         ESAIR         C28         ALFI           B90F         LRVGR         B99B         ESAIR         C2B         ALFI           B910         LPGFR         B99B         ESAIR         C2C         CGFI           B911         LNGFR         B99B         PTI         C2D         CFI           B912         LTGFR         B99F         SSAIR         C2E         CLGFI           B914         LGFR         B941         TPEI         C2F         CLFI           B916         LLGFR         B9AE         <								
B907         LGHR         B993         TROO         COF         LLILF           B908         AGR         B994         LLCR         C20         MSGFI           B909         SGR         B995         LLHR         C21         MSFI           B90A         ALGR         B996         MLR         C24         SLGFI           B90C         MSGR         B997         DLR         C25         SLFI           B90D         DSGR         B998         ALCR         C28         AGFI           B90F         LRVGR         B998         SLBR         C29         AFI           B90F         LRVGR         B998         SEAIR         C28         ALFI           B90F         LPGFR         B99B         ESAIR         C28         ALFI           B911         LNGFR         B99B         ESEA         C2C         CGFI           B911         LNGFR         B99F         PTI         C2D         CFI           B914         LGFR         B99A         PTF         C42         LLHRL           B916         LLGFR         B9AA         LPTEA         C44         LGHRL           B917         LLGTR         B9AE <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>								
B908								
B909         SGR         B995         LLHR         C21         MSFI           B90A         ALGR         B996         MLR         C24         SLGFI           B90C         MSGR         B997         DLR         C25         SLFI           B90C         MSGR         B998         ALCR         C28         AGFI           B90D         DSGR         B999         SLBR         C29         AFI           B90F         LRVGR         B998         EPAIR         C2A         ALGFI           B90F         LRVGR         B99B         ESAIR         C2B         ALFI           B910         LPGFR         B99B         ESAIR         C2C         CGFI           B911         LNGFR         B99B         PTI         C2D         CFI           B912         LTGFR         B99F         SSAIR         C2E         CLGFI           B914         LGFR         B941         TPEI         C2F         CLFI           B916         LLGFR         B9AA         LPTEA         C44         LGHRL           B917         LLGTR         B9AC         RBM         C45         LHRL           B919         SGFR         B9AF         <								
B90A         ALGR         B996         MLR         C24         SLGFI           B90B         SLGR         B997         DLR         C25         SLFI           B90C         MSGR         B998         ALCR         C28         AGFI           B90D         DSGR         B999         SLBR         C29         AFI           B90F         LRVGR         B998         ESAIR         C2A         ALGFI           B910         LPGFR         B99B         ESAIR         C2C         CGFI           B911         LNGFR         B99B         ESAIR         C2C         CGFI           B911         LNGFR         B99F         PTI         C2D         CFI           B913         LCGFR         B99F         SSAIR         C2E         CLGFI           B914         LGFR         B9A1         TPEI         C2F         CLFI           B914         LGFR         B9A2         PTF         C42         LLHRL           B917         LLGTR         B9A2         RRBM         C45         LHRL           B918         AGFR         B9AF         PRMF         C47         STHRL           B918         AGFR         B9AF         <								
B90B         SLGR         B997         DLR         C25         SLFI           B90C         MSGR         B998         B999         SLBR         C28         AGFI           B90E         EREGG         B999         SLBR         C29         AFI           B90E         EREGG         B99A         EPAIR         C2A         ALGFI           B90F         ESAIR         C2B         ALFI         B991         LCB         C2B         ALFI           B910         LPGFR         B99B         ESAIR         C2C         CGFI         CGFI         B991         ESEA         C2C         CGFI         CGFI         B99F         SSAIR         C2E         CLGFI         C2E         CLGFI         C2E         CLGFI         C2E         CLGFI         C2F         CLFI         C2F         CLFI         C2F         CLFI         C2F         CLFI         C2F         CLFI         C2F         CLFI         C2E         CLGFI         C2F         CLFI								
B90C         MSGR         B998         ALCR         C28         AGFI           B90D         DSGR         B999         SLBR         C29         AFI           B90F         EREGG         B99A         EPAIR         C2A         ALGFI           B90F         LRVGR         B99B         ESAIR         C2B         ALFI           B910         LPGFR         B99B         ESAIR         C2C         CGFI           B911         LNGFR         B99E         PTI         C2D         CFI           B912         LTGFR         B99F         SSAIR         C2E         CLGFI           B913         LCGFR         B99A         PTF         C42         CLHR           B914         LGFR         B9A2         PTF         C42         LLHRL           B916         LLGFR         B9A2         PTF         C42         LLHRL           B917         LLGTR         B9AC         IBBM         C45         LHRL           B918         AGFR         B9AC         IBBM         C46         LLGHRL           B919         SGFR         B9BF         CV14         C48         LGRL           B910         CV24         C4B								
B90D         DSGR         B999         SLBR         C29         AFI           B90E         EREGG         B99A         EPAIR         C2A         ALGFI           B90F         LRVGR         B99B         ESAIR         C2B         ALFI           B910         LPGFR         B99D         ESEA         C2C         CGFI           B911         LNGFR         B99E         PTI         C2D         CFI           B912         LTGFR         B99F         SSAIR         C2E         CLGFI           B913         LCGFR         B99F         SSAIR         C2E         CLGFI           B914         LGFR         B9A2         PTF         C42         LLHRL           B916         LLGFR         B9A2         PTF         C42         LLHRL           B918         AGFR         B9AC         IBBM         C45         LHRL           B918         AGFR         B9AF         PFMF         C47         STHRL           B91A         ALGFR         B9B0         CU14         C48         LGRL           B91B         BLGFR         B9B1         CU24         C4B         STGRL           B91C         MSGFR         B9B2								
B90E         EREGG         B99A         EPAIR         C2A         ALGFI           B90F         LRVGR         B99B         ESAIR         C2B         ALFI           B910         LPGFR         B99B         ESAIR         C2C         CGFI           B911         LNGFR         B99E         PTI         C2D         CFI           B913         LCGFR         B99F         SSAIR         C2E         CLGFI           B913         LCGFR         B9A1         TPEI         C2F         CLFI           B914         LGFR         B9A2         PTF         C42         LLHRL           B917         LLGTR         B9A2         LPTEA         C44         LGHRL           B917         LLGTR         B9AC         IRBM         C45         LHRL           B918         AGFR         B9AF         RRBM         C46         LIGHRL           B918         BJGFR         B9B0         CU14         C48         LGRL           B910         MSGFR         B9B1         CU24         C4B         STGRL           B910         DSGFR         B9B2         CU41         C4C         LGFRL           B91F         KMAC         B9BD <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td>					-			
B90F         LRVGR         B99B         ESAIR         C2B         ALFI           B910         LPGFR         B99D         ESEA         C2C         CGFI           B911         LNGFR         B99E         PTI         C2D         CFI           B912         LTGFR         B99F         SSAIR         C2E         CLGFI           B913         LGFR         B9A1         TPEI         C2F         CLFI           B916         LLGFR         B9A2         PTF         C42         LLHRL           B916         LLGFR         B9A2         RTBM         C45         LHRL           B917         LLGTR         B9AE         RRBM         C45         LHRL           B918         SGFR         B9AE         RRBM         C46         LLGHRL           B919         SGFR         B9B0         CU14         C48         LGRL           B916         LU24         C4B         STGRL         B9BC         CU41         C4C         LGFRL           B910         DSGFR         B9B2         CU41         C4C         LGFRL         B9BC         CU41         C4C         LGFRL           B91F         KMAC         B9BD         TTTRE								
B910         LPGFR         B99D         ESEA         C2C         CGFI           B911         LNGFR         B99E         PTI         C2D         CFI           B912         LTGFR         B99F         SSAIR         C2E         CLGFI           B913         LCGFR         B99F         SSAIR         C2E         CLFI           B914         LGFR         B9A2         PTF         C42         LLHRL           B916         LLGFR         B9AC         IBBM         C45         LHRL           B918         AGFR         B9AC         IBBM         C45         LHRL           B918         AGFR         B9AF         PFMF         C47         STHRL           B91A         ALGFR         B9BO         CU14         C48         LGRL           B91A         ALGFR         B9BO         CU14         C48         LGRL           B91C         MSGFR         B9B1         CU24         C4B         STGRL           B91C         MSGFR         B9B2         CU41         C4C         LGFRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE								
B911					-			
B912								
B913	D040	LTOED		D00F	00410		005	
B914								
B916         LLGFR         B9AA         LPTEA         C44         LGHRL           B917         LLGTR         B9AC         IRBM         C45         LHRL           B918         AGFR         B9AE         RRBM         C46         LLGHRL           B919         SGFR         B9AF         PFMF         C47         STHRL           B918         SLGFR         B9B0         CU14         C48         LGRL           B91C         MSGFR         B9B1         CU24         C4B         STGRL           B91C         MSGFR         B9B2         CU41         C4C         LGFRL           B91D         DSGFR         B9B3         CU42         C4D         LRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL			•					
B917         LLGTR         ■         B9AC         IRBM         C45         LHRL           B918         AGFR         B9AE         RRBM         C46         LLGHRL           B919         SGFR         B9AF         PFMF         C47         STHRL           B91A         ALGFR         B9B0         CU14         C48         LGRL           B91B         SLGFR         B9B1         CU24         C4B         STGRL           B91D         DSGFR         B9B2         CU41         C4C         LGFRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL								
B918         AGFR         B9AE         RRBM         C46         LLGHRL           B919         SGFR         B9AF         PFMF         C47         STHRL           B91A         ALGFR         B9B0         CU14         C48         LGRL           B91B         SLGFR         B9B1         CU24         C4B         STGRL           B91C         MSGFR         B9B2         CU41         C4C         LGFRL           B91D         DSGFR         B9B3         CU42         C4D         LRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL							-	
B919         SGFR         B9AF         PFMF         C47         STHRL           B91A         ALGFR         B9B0         CU14         C48         LGRL           B91B         SLGFR         B9B1         CU24         C4B         STGRL           B91C         MSGFR         B9B2         CU41         C4C         LGFRL           B91D         DSGFR         B983         CU42         C4D         LRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL			•					
B91A         ALGFR         B9B0         CU14         C48         LGRL           B91B         SLGFR         B9B1         CU24         C4B         STGRL           B91C         MSGFR         B9B2         CU41         C4C         LGFRL           B91D         DSGFR         B9B3         CU42         C4D         LRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL								
B91B         SLGFR         B9B1         CU24         C4B         STGRL           B91C         MSGFR         B9B2         CU41         C4C         LGFRL           B91D         DSGFR         B9B3         CU42         C4D         LRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL								
B91C         MSGFR         B9B2         CU41         C4C         LGFRL           B91D         DSGFR         B9B3         CU42         C4D         LRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL								
B91D         DSGFR         B9B3         CU42         C4D         LRL           B91E         KMAC         B9BD         TRTRE         C4E         LLGFRL           B91F         LRVR         B9BE         SRSTU         C4F         STRL				B9B2				
B91F LRVR B9BE SRSTU C4F STRL	B91D			B9B3				
B920 CGR B9BF TRTE C5 BPRP				-			-	-
	B920	CGR		B9BF	TRTE		C5	BPRP

OpCode         Mnemonic         OpCode         Mnemonic         OpC           C60         EXRL         E331         CLGF         E3C           C62         PFDRL         E332         LTGF         E50           C64         CCULD         E324         CCULD         E50	
C62 PFDRL E332 LTGF E500	E CLHE
1	
C64 CGHRL E334 CGH E50	
C65 CHRL E336 PFD E502	
C66 CLGHRL E338 AGH E501 C67 CLHRL E339 SGH E501	
C68 CGRL E33A LLZRGF E544	
C6A CLGRL E33B LZRF E544	
C6C CGFRL ■ E33C MGH E540	
C6D CRL E33E STRV E554	
C6E CLGFRL E33F STRVH E555	
C6F CLRL E346 BCTG E558	
C7 BPP ■ E347 BIC E555	
C80 MVCOS E348 LLGFSG E550	C CHSI
C81 ECTG E349 STGSC E55I	CLFHSI
C82 CSST E34C LGG E560	
C84 LPD E34D LGSC E56	
C85 LPDG E350 STY E634	
CC6 BRCTH E351 MSY E638	
CC8 AIH E353 MSC E637	
CCA ALSIH E354 NY E630	
CCB ALSIHN E355 CLY E631 CCD CIH E356 OY E631	
CCF CLIH E357 XY E649	
D0 TRTR E358 LY E650	
D1 MVN E359 CY E652	
D2 MVC E35A AY E658	
D3 MVZ E35B SY E655	
D4 NC E35C MFY E65A	A VCVDG
D5 CLC E35E ALY E65I	3 VPSOP
D6 OC E35F SLY E65I	
D7 XC E370 STHY E67	
D9 MVCK E371 LAY E673	
DA MVCP E372 STCY E677	
DB MVCS E373 ICY E678	
DC TR E375 LAEY E679	
DD TRT	
DE ED E377 LGB E671 DF EDMK E378 LHY E671	
E1 PKU E379 CHY E700	
E2 UNPKU E37A AHY E70	
E302 LTG E37B SHY E702	
E303 LRAG E37C MHY E700	
E304 LG E380 NG E704	
E306 CVBY E381 OG E709	VLREP VLREP
E308 AG E382 XG E706	S VL
E309 SG E383 MSGC E703	
E30A ALG E384 MG E708	
E30B SLG E385 LGAT E709	
E30C MSG E386 MLG E70/	
E30D DSG E387 DLG E701 E30E CVBG E388 ALCG E701	
E30F LRVG E389 SLBG E712	
E312 LT E38E STPQ E713	
E313 LRAY E38F LPQ E71/	
E314 LGF E390 LLGC E718	
E315 LGH E391 LLGH E72:	
E316 LLGF E394 LLC E722	
E317 LLGT E395 LLH E72	
E318 AGF E396 ML E730	
E319 SGF E397 DL E730	
E31A ALGF E398 ALC E736	
E31B SLGF E399 SLB E731	
E31C   MSGF   E39C   LLGTAT   E736   E31D   DSGF   ■ E39D   LLGFAT   E736	
E31D DSGF E39D LLGFAI E73F	
E31F LRVH E3C0 LBH E73I	
E320 CG E3C2 LLCH E740	
E321 CLG E3C3 STCH E74:	
E324 STG E3C4 LHH E742	
E325 NTSTG E3C6 LLHH E745	
E326 CVDY E3C7 STHH E744	
E32A LZRG E3C8 LFHAT E74	
E32E CVDG E3CA LFH E746	
E32F STRVG E3CB STFH E74/	
E330 CGF E3CD CHF E74	O VREP

E752         VCTZ         E768         WFC         E896         STMY           E756         VLR         E7CC         VFSO         E888         LMH           E756         VSEG         E7D4         VUPLL         E898         LMH           E760         VMRL         E7D6         VUPL         E888         LMH           E760         VMRH         E7D6         VUPL         E800         STAMY           E761         VMRH         E7D70         VUPL         EBD0         STAMY           E762         VSUMG         E7D8         VTM         EBD0         STAMY           E764         VSUM         E7D8         VTM         EBD0         STAK           E765         VCKSM         E7D8         VCC         EBDF         SLLK           E766         VCKSM         E7DF         VLC         EBE0         LOCH           E768         WN         E7E7         VFD         EBE1         STOCG           E768         WNO         E7E7         VFM         EBE6         LAOG           E766         VX         E7EA         VFCH         EBE7         LAX           E760         VX         E7EA         VFC	OpCode	Mnemonic		OpCode	Mnemonic		OpCode	Mnemonic
E756         V.R         E7CC         VFSO         E896         LMH           E756         V.STR         E7CE         VFSO         E898         LMY           E761         WRL         E7D6         VUPL         EB8A         LAMY           E761         WMRL         E7D6         VUPL         EB0C         TP           E762         LYGP         E7D8         VTM         EBDD         SLAK           E766         VSUMG         E7D9         VECL         EBDF         SLLK           E766         VSUMG         E7D8         VEC         EBDF         SLLK           E766         VSUMG         E7DE         VLC         EBE0         LOCFH           E767         VSUMG         E7DE         VLC         EBE0         LOCG           E768         VN         E7E3         VFA         EBE1         STOCFH           E768         VN         E7E3         VFA         EBE3         STOCG           E760         VX         E7E8         VFCH         EBEA         LANG           E760         VX         E7E8         VFCH         EBEA         LANG           E770         VSELU         E7E7         VFM	E750	VPOPCT		E7CA	WFK		EB8F	CLCLU
E756         V.R         E7CC         VFSO         E896         LMH           E756         V.STR         E7CE         VFSO         E898         LMY           E761         WRL         E7D6         VUPL         EB8A         LAMY           E761         WMRL         E7D6         VUPL         EB0C         TP           E762         LYGP         E7D8         VTM         EBDD         SLAK           E766         VSUMG         E7D9         VECL         EBDF         SLLK           E766         VSUMG         E7D8         VEC         EBDF         SLLK           E766         VSUMG         E7DE         VLC         EBE0         LOCFH           E767         VSUMG         E7DE         VLC         EBE0         LOCG           E768         VN         E7E3         VFA         EBE1         STOCFH           E768         VN         E7E3         VFA         EBE3         STOCG           E760         VX         E7E8         VFCH         EBEA         LANG           E760         VX         E7E8         VFCH         EBEA         LANG           E770         VSELU         E7E7         VFM	E752	VCTZ		E7CB	WFC		EB90	STMY
E756         V.ISTR         E7CE         VSEG         E7D4         VUPLL         EB8A         LAMY           E756         V.WSEG         E7D6         VUPLH         EB8A         STAMY           E760         VMRIL         E7D6         VUPLH         EB8D         STAMY           E762         V.UMGP         E7D8         VTM         EBBD         STAMY           E764         VSUM         E7D8         VTM         EBBD         STAMY           E766         VCKSM         E7D8         VCC         EBBC         SCILK           E766         VCKSM         E7D8         VCC         EBBD         SSILK           E768         VN         E7DF         VLC         EB60         LOCPH           E768         VN         E7E2         VFS         EBE2         LOG6           E768         VN         E7E7         VPD         EBE4         LANG           E768         VN         E7E8         VFD         EBE4         LANG           E768         VX         E7EA         VFCHE         EBE3         LAOG           E769         VX         E7EA         VFCHE         EBE8         LAA           E760								
E75C         VISTR         E7D4         VUPLL         E898         LAMY           E761         VMRL         E7D5         VUPL         E800         TP           E761         VMRH         E7D6         VUPL         EBDC         STAMY           E762         VLVGP         E7D8         VTM         EBDD         SLAK           E766         VSUMG         E7D8         VEC         EBDF         SLLK           E766         VSUMG         E7DE         VLC         EBED         SLLK           E767         VSUMG         E7DE         VLC         EBED         LOCFH           E768         VN         E7E2         VFA         EBE1         STOCFH           E768         VN         E7E3         VFA         EBE3         STOCG           E768         VN         E7E8         VFCD         EBE7         LANG           E760         VIX         E7E8         VFCH         EBE8         LAAG           E760         VIX         E7E8         VFCH         EBE8         LAAG           E774         VSL         E7E9         VFMA         EBF2         LAC           E7773         VSERLU         E7F6         <								
E756         VSEG         E7D5         VUPLH         E800         TP           E761         VMRH         E7D6         VUPH         EBO0         TP           E761         VMRH         E7D6         VUPH         EBD0         SRAK           E762         VSUMG         E7D8         VTM         EBDD         SLAK           E765         VSUMG         E7D8         VEC         EBDD         SLAK           E766         VSKSM         E7D8         VEC         EBDD         SLLK           E768         VN         E7D8         VLC         EBD0         SLLK           E768         VN         E7E2         VFD         EBE1         STOCG           E768         VN         E7E3         VFD         EBE4         LANG           E768         VN         E7E8         VFCD         EBE7         LAXG           E768         VN         E7E8         VFCD         EBE3         LANG           E769         VX         E7E8         VFCH         EBE8         LANG           E772         VSEIJW         E7F8         VFCH         EBE8         LAX           E773         VSLDB         E7F8         VFMAX <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td>						1		
E760         WMRH         E761         WMRH         E762         WUNGP         E7D6         YUPH         EBDC         SRAK           E762         WLVGP         E7D8         VTM         EBDC         SRAK           E765         YUSUMG         E7D8         VCC         EBDF         SILK           E766         YUSUMG         E7D8         VCC         EBGD         SILK           E767         YSUMG         E7E6         VCC         EBE1         STOCCH           E768         VN         E7E6         YER         EBE2         LOCG           E76B         VN         E7E5         VFD         EBE3         LOCG           E76C         VNX         E7E8         VFC         EBE3         LAGG           E76E         VNN         E7E8         VFCHE         EBE8         LAAG           E76E         VNN         E7E8         VFCHE         EBE8         LAAG           E776         VSLIV         E7E7         VYFM         EBE6         LAOG           E773         VERILU         E7FE         VYFOHE         EBE7         LAX           E773         VERLU         E7FE         VAVG         EBF7         LAX								
E761         VMRH         E7762         VLVGP         E708         VTM         EBDD         SRAK           E764         VSUMG         E708         VTM         EBDD         SRAK           E766         VSUMG         E708         VCC         EBDF         SLLK           E7676         VSUMG         E70F         VLC         EBDD         SLK           E768         VN         E72E         VFD         EBE1         LOCFH           E768         VN         E72E         VFD         EBE2         LOCG           E760         VX         E76B         VX         E7E8         VFCE         EBE7         LANG           E76F         VX         E76B         VX         E7E8         VFCH         EBE8         LANG           E76F         VX         E76F         VCC         E7E7         VFM         EBE8         LANG           E772         VERIM         E772         VFM         EBE8         LAAG         E7E8         VFCH         EBE8         LAAU         E7E7         VSL         E7FE         VFM         EBF6         LAX         E7FE         VFM         EBF6         LAX         E7FE         VFM         EBF6         LAX<	-						-	
E768								
E766	E761	VMRH		E7D7	VUPH		EBDC	SRAK
Ē756         VSUMG         E7DB         VEC         EBDF         SLLK           Ē767         VSUMQ         E7DF         VLC         EBBO         LOCFH           Ē768         VN         E7EZ         VFS         EBEZ         LOCG           Ē768         VN         E7EZ         VFS         EBEZ         LOCG           Ē768         VN         E7ES         VFA         EBE3         STOCCH           Ē768         VN         E7ES         VFA         EBE3         LOCG           Ē760         VX         E7ES         VFD         EBE4         LANG           Ē760         VN         E7ER         VFCH         EBE8         LAAG           Ē776         VSL         E7ER         VFCH         EBE8         LAAG           Ē773         VERILU         E7FE         VFHMN         EBF2         LOC           Ē7774         VSL         E7FT         VAVG         EBF8         LAA           Ē7775         VSLB         E7FT         VAC         EBF8         LAA           Ē7770         VSRL         E7FT         VSCBI         EFF5         VSCBI         EBF7         LAX           Ē7770         VSRLB<	E762	VLVGP		E7D8	VTM		EBDD	SLAK
Ē756         VSUMG         E7DB         VEC         EBDF         SLLK           Ē767         VSUMQ         E7DF         VLC         EBBO         LOCFH           Ē768         VN         E7EZ         VFS         EBEZ         LOCG           Ē768         VN         E7EZ         VFS         EBEZ         LOCG           Ē768         VN         E7ES         VFA         EBE3         STOCCH           Ē768         VN         E7ES         VFA         EBE3         LOCG           Ē760         VX         E7ES         VFD         EBE4         LANG           Ē760         VN         E7ER         VFCH         EBE8         LAAG           Ē776         VSL         E7ER         VFCH         EBE8         LAAG           Ē773         VERILU         E7FE         VFHMN         EBF2         LOC           Ē7774         VSL         E7FT         VAVG         EBF8         LAA           Ē7775         VSLB         E7FT         VAC         EBF8         LAA           Ē7770         VSRL         E7FT         VSCBI         EFF5         VSCBI         EBF7         LAX           Ē7770         VSRLB<	E764	VSUM		E7D9	VECL		EBDE	SRLK
E766								
E768								
E768         VN         E7E2         VFS         EBE2         LOCG           E768         VO         E7E3         VFA         EBE3         STOCG           E760         VN         E7E5         VFD         EBE4         LANG           E760         VX         E7E8         VFOH         EBE6         LAOG           E766         VIX         E7E8         VFCH         EBE7         LAXG           E766         VIX         E7E8         VFCH         EBE8         LAALG           E776         VCO         VESILV         E7E8         VFCH         EBE8         LAALG           E772         VERIM         E9F8         TO         CE7F1         VAVG         EBF3         STOC           E773         VSLB         E7F9         VAVG         EBF8         LAA         LAA           E775         VSLB         E7F9         VAVG         EBF8         LAA           E776         VSLB         E7F9         VAVG         EBF8         LAA           E770         VSRLB         E7F7         VSCBI         EBFA         LAA           E771         VSRLB         E7F9         VCHQ         EC44         BRXLG								
E768         VNC         F76A         VO         E76B         F76A         VO         E76B         VO         E76F         VFD         EBE4         LANG         EP6B         LAOG         EP76D         VX         E76B         VYC         EBE7         VFCH         EBE8         LAAG         EP6B         LAXG         EP76F         VX         E76B         VYCHE         EBE8         LAAG         EP6F         VFCH         EBE8         LAAG         EP76F         VX         E77B         VYCHH         EBE8         LAAG         EP76F         VYCH         EBE7         LAX         EP76F         VYCH         EP6F         LAA         LBF7         LOC         EP76         VYMQL         EBF7         LAX         EP778         VSL         EP779         VAVGL         EBF7         LAX         EP778         VSL         EP779         VAVGL         EBF7         LAX         EP777         VSL         EP778         VSC         EP779         VAVGL         EBF7         LAX         EP777         VSR         EC42         LOCHI         EVAG         EP777         VSR         EC42         LOCHI         EVAG         EP779         VCH         EC45         BRXLG         EP779         VML         EC46         LOC								
E76A         VO         F76B         VNO         E76C         F76D         E8E4         LANG         E76C         F76D         VN         E76C         VNX         E76E         VNX         E76E         VNN         E76E         VNN         E76F         VOC         E772         VENIM         E772         VERIM         E772         VERIM         E772         VERIM         E774         VSL         E776         VOX         E771         VACC         E8F6         LAO         LAO         E777         VSLDB         E777         VSRD         E778         VCFQ         E244         BRXHG         E779         VCHL         E045         BRXHG         E779         VCHL         E046         LOCHII								
Ē76B         VNO         F7E7F         VFM         ĒBĒĞ         LAOĞ           Ē76C         VNX         F7E8         VFCE         ĒBĒĞ         LAVĞ           Ē76F         VN         F7EA         VFCH         ĒBĒBA         LAAĞ           Ē770         VESLV         F7EB         VFCH         ĒBĒBA         LAALĞ           Ē7770         VESLU         F7FF         VFMAX         ĒBF3         STOC           Ē773         VSLB         Ē7F7         VAQC         ĒBF6         LAO           Ē7775         VSLB         Ē7F7         VSLB         Ē7F7         VAQC         ĒBFA         LAA           Ē7778         VSLBB         Ē7F7         VSCBI         ĒBFA         LAA           Ē7778         VSLB         Ē7F7         VS CBI         ĒBFA         LAA           Ē7770         VSRL         Ē7F7         VS         ĒC42         LOCHI           Ē7770         VSRL         Ē7F7         VS CBI         ĒBFA         LAA           Ē7770         VSRL         Ē7F8         VCHL         ĒC45         BRXLG           Ē7772         VSRLB         Ē7F8         VCHL         ĒC46         LOCHII           Ē								
E76C         VNX         F76D         VX         E76E         E76E         VYC         E76E         E76E         VYC         E76E         VYCHE         EBE8         LAXG         E76E         VFCHE         EBE8         LAXG         E76E         VFCHE         EBE8         LAXG         E76E         VFCHE         EBE8         LAXG         EF6F         VFCHE         EBE8         LAXG         EF7E         VFMMX         EBF3         LAXG         EF7E         VFMMX         EBF3         LAXG         EF7E         VFMMX         EBF3         LAXG         EF7E         VAYGL         EBF4         LAX         EF7E         VAYGL         EBF4         LAX         EF7E         VAYGL         EBF5         LAXG         EBF4         LAXG         EBF4         LAX         EF7E         VAYGL         EBF6         LAXG         EBF4         LAXG         EBF4	E76A			E7E5				
E76D         VX         L76E         VRN         E76E         C76E         VRN         E77E         VFCH         EBEA         LAAG         EAG         LAAG         E77E         VFCH         EBF2         LOC         C77C         VERILV         E77E         VFMIN         EBF3         STOC         EFFE         LAA         EBF3         STOC         EFFT         VAVGL         EBF6         LAO         LAO         EFFT         VAVG         EBF7         LAX         EFF7         VAVG         EBF7         LAX         EFF7         VAVG         EBF7         LAX         EFF8         LAA         LAA         LAA         EFF8         LAA         LAA         LAA         LAA         LAA         LAA         LAA         LAA         LAA	E76B	VNO		E7E7			EBE6	LAOG
E76D         VX         L76E         VRN         E76E         C76E         VRN         E77E         VFCH         EBEA         LAAG         EAG         LAAG         E77E         VFCH         EBF2         LOC         C77C         VERILV         E77E         VFMIN         EBF3         STOC         EFFE         LAA         EBF3         STOC         EFFT         VAVGL         EBF6         LAO         LAO         EFFT         VAVG         EBF7         LAX         EFF7         VAVG         EBF7         LAX         EFF7         VAVG         EBF7         LAX         EFF8         LAA         LAA         LAA         EFF8         LAA         LAA         LAA         LAA         LAA         LAA         LAA         LAA         LAA	E76C	VNX		E7E8	VFCE		EBE7	LAXG
F76E							FRF8	
F76F								
E770			_					
E772						1		
E773         VERLLV         E7F1         VACC         EBF6         LAO           E774         VSL         E7F2         VAVG         EBF7         LAX           E775         VSLB         E7F3         VA         EBF8         LAA           E778         VESRIV         E7F         VSCBI         EBFA         LAA           E778         VESRIV         E7F         VSCQ         EC42         LOCHI           E777         VSRL         E7F9         VCHL         EC45         BRXLG           E77D         VSRL         E7F9         VCHL         EC45         BRXLG           E77D         VSRA         E7FC         VMNL         EC46         LOCGHI           E77F         VSRAB         E7FD         VMXL         EC51         RISBLG           E77F         VSRAB         E7FD         VMXL         EC51         RISBLG           E780         VFEE         E7FF         VMX         EC55         RISBG           E781         VFENE         E7FF         VMX         EC56         RISBG           E781         VFENE         E7FF         VMX         EC56         RISBG           E781         VFENE         E8 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td>						1		
E774         VSL         E7F2         VAVG         EBF8         LAX           E775         VSLB         E7F3         VA         EBF8         LAA           E777         VSLDB         E7F5         VSCBI         EBFA         LAAL           E778         VESRIV         E7F7         VS         EC42         LOCHI           E77A         VESRAV         E7F9         VCHL         EC45         BRXLG           E77D         VSRLB         E7FB         VCH         EC45         BRXLG           E77D         VSRLB         E7FB         VCH         EC46         LOCGHI           E77E         VSRAB         E7FC         VMNL         EC51         RISBLG           E77E         VSRAB         E7FC         VMNL         EC51         RISBLG           E781         VFEE         E7FE         VMN         EC54         RNSBG           E781         VFENE         E7FF         VMN         EC55         RISBG           E781         VFENE         E7FF         VMN         EC56         ROSBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E785         VPSERM         E8						1		
E775         VSLB         E775         VA         EBFA         LAA           E777         VSLDB         E7F5         VSCBI         EBFA         LAAL           E778         VESRLV         E7F7         VS         EC42         LOCHI           E77A         VESRAV         E7F8         VCEQ         EC44         BRXHG           E77D         VSRLB         E7F9         VCH         EC45         BRXLG           E77D         VSRAB         E7FC         VMNL         EC46         LOCGHII           E77E         VSRAB         E7FD         VMXL         EC51         RISBLG           E77E         VSRAB         E7FD         VMXL         EC54         LOCGHII           E77E         VSRAB         E7FD         VMXL         EC54         RISBLG           E781         VFENE         E7FE         VMX         EC54         RISBLG           E781         VFENE         E7FF         VMX         EC54         RISBLG           E781         VFENE         E8         MVCIN         EC54         RISBLG           E782         VFAE         E8         MVCIN         EC54         RISBLG           E784         VPERM	E773	VERLLV		E7F1	VACC	1	EBF6	
E777         VSLDB         E7F5         VSCBI         EBFA         LAAL           E778         VESRIV         E7F7         VS         EC42         LOCHI           E77C         VSRL         E7F8         VCEQ         EC44         BRXHG           E7TC         VSRL         E7F9         VCHL         EC45         BRXLG           E7TD         VSRLB         E7FB         VCHL         EC45         BRXLG           E77T         VSRAB         E7FD         VMNL         EC4E         LOCHII           E77F         VSRAB         E7FD         VMXL         EC51         RISBLG           E780         VFEE         E7FE         VMX         EC54         RISBLG           E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VSEL         E80A         LMG         EC59         RISBHG           E780         VFMS         E80A	E774				VAVG	1		
E777         VSLDB         E7F5         VSCBI         EBFA         LAAL           E778         VESRIV         E7F7         VS         EC42         LOCHI           E77C         VSRL         E7F8         VCEQ         EC44         BRXHG           E7TC         VSRL         E7F9         VCHL         EC45         BRXLG           E7TD         VSRLB         E7FB         VCHL         EC45         BRXLG           E77T         VSRAB         E7FD         VMNL         EC4E         LOCHII           E77F         VSRAB         E7FD         VMXL         EC51         RISBLG           E780         VFEE         E7FE         VMX         EC54         RISBLG           E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VSEL         E80A         LMG         EC59         RISBHG           E780         VFMS         E80A		VSLB			VA	1		
E778         VESRIV         E7F7         VS         EC42         LOCHI           E77A         VESRAV         E7F8         VCCQ         EC44         BRXHG           E77D         VSRLB         E7FB         VCH         EC45         BRXLG           E77D         VSRAB         E7FC         VMNL         EC46         LOCGHI           E77F         VSRAB         E7FC         VMNL         EC4E         LOCHHI           E780         VFEE         E7FD         VMXL         EC51         RISBLG           E780         VFENE         E7FF         VMX         EC55         RISBG           E781         VFENE         E7FF         VMX         EC55         RISBG           E781         VFENE         E7FF         VMX         EC56         ROSBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC56         ROSBG           E784         VPDI         E9         PKA         EC59         RISBGN           E784         VPERM         EB0A         SRAG         EC66         CGRJ           E786         VPERM         E						1		
E77A         VESRAV         E7F8         VCEQ         EC44         BRXHG           E77C         VSRIL         E7F9         VCHL         EC45         BRXLG           E77D         VSRAB         E7FC         VMNL         EC4E         LOCHHI           E77F         VSRAB         E7FC         VMNL         EC4E         LOCHHI           E77F         VSRAB         E7FD         VMNL         EC51         RISBLG           E780         VFEE         E7FE         VMN         EC54         RNSBG           E781         VFENE         E7FF         VMX         EC55         RISBG           E781         VFENE         E8         MVCIN         EC56         ROSBG           E784         VPENE         E8         MVCIN         EC56         RYSBG           E785         VBPERM         EA         UNPKA         EC57         RXSBG           E786         VPERM         EB04         LMG         EC57         RXSBG           E786         VFBERM         EB04         SRAG         EC64         CGRJ           E786         VFBS         EB0C         SRLG         EC70         CGIT         CLGIT           E787				-				
E77C         VSRL         E7FB         VCHL         EC46         BRXLG           E77D         VSRAB         E7FC         VMNL         EC46         LOCGHI           E77F         VSRAB         E7FC         VMNL         EC4E         LOCHHI           E77F         VSRAB         E7FD         VMXL         EC51         RISBLG           E780         VFEE         E7FE         VMX         EC55         RISBG           E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VBPERM         EA         UNPKA         EC59         RISBGN           E78A         VSTRC         EB04         LMG         EC59         RISBG           E78A         VSTRC         EB0A         SRAG         EC66         CGRJ           E78B         VFMS         EB0A         SRLG         EC70         CGIT           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E79E         VFMLS         E						1		
E77D         VSRAB         E7FB         VCH         EC46         LOCGHI           E77E         VSRAB         E7FC         VMNL         EC4E         LOCHII           E77B         VSRAB         E7FD         VMXL         EC51         RISBLG           E780         VFEE         E7FE         VMN         EC54         RNSBG           E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MYCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E784         VPDI         E9         PKA         EC59         RISBGN           E788         VBPERM         EA         UNPKA         EC59         RISBGN           E784         VPDI         EB04         LMG         EC50         RISBGN           E786         VPERM         EB04         LMG         EC50         RISBGN           E786         VPERM         EB0C         SRAG         EC64         CGRJ           E787         VPKA         EB0F         TRACG         EC70         CGIT           E795         VPKLS         E								
E77E         VSRAB         E7FC         VMNL         EC4E         LOCHHI           E77F         VSRAB         E7FD         VMXL         EC51         RISBLG           E780         VFEE         E7FE         VMN         EC53         RISBG           E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VBPERM         EA         UNPKA         EC57         RXSBG           E785         VSTRC         EB04         LMG         EC53         RISBHG           E786         VPERM         EB04         LMG         EC50         RISBHG           E786         VFBRM         EB0C         SRLG         EC66         CLGRJ           E786         VFMS         EB0C         SRLG         EC71         CLGIT           E787         VPKLS         EB14         CSY         EC73         CLFIT           E798         VPKLS         EB14         CSY         EC73         CLFIT           E799         VPKMS <td< td=""><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	-							
E77F         VSRAB         E7FD         VMXL         EC51         RISBLG           E780         VFEE         E7FE         VMX         EC54         RNSBG           E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VBPERM         EA         UNPKA         EC59         RISBLG           E78A         VSTRC         EB04         LMG         EC59         RISBLG           E78A         VSEL         EB0A         SRAG         EC64         CGRJ           E78B         VFMS         EB0C         SRLG         EC65         CLGTJ           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E798         VFMS         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E797         VPKS         EB1C         RLL         EC77         CLRJ           E797         VFNMA         EB20 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
E780         VFEE         E7FE         VMN         EC54         RNSBG           E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MVCIN         EC656         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E788         VBPERM         EA         UNPKA         EC59         RISBGN           E780         VSTRC         EB04         LMG         EC59         RISBGN           E780         VSTRC         EB04         LMG         EC59         RISBGN           E780         VSEL         EB08         SLAG         EC64         CGRJ           E780         VSEL         EB00         SLLG         EC70         CGIT           E781         VFMS         EB0C         SRLG         EC70         CGIT           E784         VPK         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CS2Y         EC73         CLFIT           E797         VPKS         EB1C         RLLG         EC76         CRJ           E799         VFNMS         EB1D <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
E781         VFENE         E7FF         VMX         EC55         RISBG           E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VBPERM         EA         UNPKA         EC59         RISBGN           E786         VSTRC         EB04         LMG         EC50         RISBHG           E786         VFERM         EB0A         SRAG         EC64         CGRJ           E780         VSEL         EB0B         SLAG         EC65         CLGRJ           E787         VFMS         EB0C         SRLG         EC70         CGIT           E787         VFMA         EB0D         SLLG         EC71         CLGIT           E787         VPKLS         EB14         CSY         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E797         VPKS         EB10         RLL         EC77         CLRJ           E798         VFNMA         EB20         CLMY         EC77         CLRJ           E799         VFNMA         EB20 <td>E77F</td> <td>VSRAB</td> <td></td> <td>E7FD</td> <td>VMXL</td> <td></td> <td>EC51</td> <td>RISBLG</td>	E77F	VSRAB		E7FD	VMXL		EC51	RISBLG
E782         VFAE         E8         MVCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VBPERM         EA         UNPKA         EC59         RISBHG           E78A         VSTRC         EB04         LMG         EC5D         RISBHG           E78B         VSEL         EB0A         SRAG         EC64         CGRJ           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E78F         VFMS         EB0D         SLLG         EC71         CLGIT           E798F         VFMA         EB0D         SLLG         EC72         CIT           E794         VPK         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E795         VPKLS         EB1C         RLL         EC76         CRJ           E797         VPKS         EB1C         RLL         EC76         CRJ           E797         VPKMS         EB1C         LMH         EC76         CLBJ           E794         VML         EB21	E780	VFEE		E7FE	VMN		EC54	RNSBG
E782         VFAE         E8         MYCIN         EC56         ROSBG           E784         VPDI         E9         PKA         EC57         RXSBG           E785         VBPERM         EA         UNPKA         EC59         RISBGN           E78A         VSTRC         EB04         LMG         EC59         RISBGN           E78B         VSEL         EB0A         SRAG         EC64         CGRJ           E78D         VSEL         EB0A         SRAG         EC65         CLGRJ           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E78F         VFMA         EB0D         SLLG         EC71         CLGIT           E794         VPK         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E795         VPKLS         EB1C         RLL         EC76         CRJ           E797         VPKS         EB1C         RLL         EC76         CRJ           E797         VPNMA         EB20         CLMH         EC7C         CGIJ           E794         VML         EB23	E781	VFENE		E7FF	VMX		EC55	RISBG
E784         VPDI         E9         PKA         EC57         RXSBG           E785         VBPERM         EA         UNPKA         EC59         RISBGN           E78A         VSTRC         EB04         LMG         EC59         RISBGN           E78C         VPERM         EB04         SRAG         EC64         CGRJ           E78C         VPERM         EB06         SRLG         EC670         CGIT           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E78F         VFMA         EB0D         SLLG         EC71         CLGIT           E78F         VFMA         EB0F         TRACG         EC72         CIT           E79F         VFK         EB0F         TRACG         EC72         CLT           E79F         VFNMS         EB1C         RLL         EC76         CRJ           E79F         VFNMA         EB20         CLMH         EC77         CLRJ           E749F         VFNMA         EB20         CLMH         EC77         CLGJ           E7A9         VML         EB23         CLT         EC72         CUJ           E7A2         VML         EB23	E782	VFAE		E8	MVCIN			ROSBG
E785         VBPERM         EA         UNPKA         EC59         RISBGN           E78A         VSTRC         EB04         LMG         EC5D         RISBHG           E78C         VPERM         EB0A         SRAG         EC64         CGRJ           E78D         VSEL         EB0B         SLAG         EC65         CLGRJ           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E78F         VFMA         EB0D         SLLG         EC71         CLGIT           E798         VPKLS         EB14         CSY         EC72         CIT           E799         VPKLS         EB1C         RLLG         EC76         CRJ           E79E         VFNMA         EB20         CLMH         EC77         CLRJ           E79F         VFNMA         EB20         CLMH         EC77         CLRJ           E79F         VFNMA         EB20         CLMY         EC7D         CLGIJ           E7A1         VMLH         EB23         CLT         EC7E         CLJ           E7A2         VML         EB23         STCTG         EC7E         CLJ           E7A3         VML         EB25								
E78A         VSTRC         EB04         LMG         EC5D         RISBHG           E78C         VPERM         EB0A         SRAG         EC64         CGRJ           E78D         VSEL         EB0B         SLAG         EC64         CGRJ           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E78F         VFMA         EB0D         SLLG         EC71         CLGIT           E798         VPKLS         EB14         CSY         EC73         CLFIT           E795         VPKLS         EB1C         RLLG         EC76         CRJ           E795         VPKUS         EB1C         RLLG         EC76         CRJ           E797         VPKS         EB1C         RLLG         EC76         CRJ           E798         VFNMS         EB1C         RLLG         EC77         CLRJ           E799F         VFNMA         EB20         CLMH         EC77         CLRJ           E741         VMLH         EB21         CLT         EC77         CLRJ           E7A2         VML         EB23         STCTG         EC7F         CLIJ           E7A3         VMLD         EB25								
E78C         VPERM         EBOA         SRAG         EC64         CGRJ           E78E         VSEL         EBOB         SLAG         EC65         CLGRJ           E78E         VFMS         EBOC         SRLG         EC70         CGIT           E78F         VFMA         EBOD         SLLG         EC71         CLGIT           E79F         VPKL         EBOF         TRACG         EC72         CIT           E79F         VPKLS         EB14         CSY         EC76         CRJ           E797         VPKS         EB1C         RLLG         EC76         CRJ           E79F         VFNMS         EB1D         RLL         EC77         CLFI           E79F         VFNMA         EB20         CLMH         EC7C         CLRJ           E79F         VFNMA         EB20         CLMH         EC7C         CLGJ           E7A1         VML         EB23         CLT         EC7D         CLGIJ           E7A2         VML         EB23         STCTG         EC7F         CLJ           E7A3         VMLD         EB26         STMH         EC09         AGHIK           E7A5         VMLO         EB26								
E78D         VSEL         EB0B         SLAG         EC65         CLGRJ           E78E         VFMS         EB0C         SRLG         EC70         CGIT           E78F         VFMA         EB0D         SLLG         EC71         CLGIT           E794         VPK         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E797         VPKS         EB1D         RLL         EC76         CRJ           E79E         VFNMA         EB20         CLMH         EC77         CLRJ           E79F         VFNMA         EB20         CLMH         EC7C         CGJ           E7A1         VMLH         EB23         CLT         EC7E         CLJ           E7A2         VML         EB24         STMG         EC7F         CLU           E7A3         VML         EB24         STCTG         ECD8         AHIK           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A5         VMC         EB2B								
E78E         VFMS         EB0C         SRLG         EC70         CGIT           E78F         VFMA         EB0D         SLLG         EC71         CLGIT           E794         VPK         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E795         VPKLS         EB1C         RLL         EC76         CRJ           E79F         VFNMS         EB1D         RLL         EC77         CLRJ           E79F         VFNMA         EB20         CLMH         EC7C         CGIJ           E7A1         VMLH         EB21         CLMY         EC7D         CLGIJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A3         VML         EB24         STMG         EC7F         CLIJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB2B         CLGT         ECDA         ALGHSIK           E7A7         VMO         EB2C								
E78F         VFMA         EB0D         SLLG         EC71         CLGIT           E794         VPK         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E797         VPKS         EB1C         RLLG         EC76         CRJ           E797         VPNMS         EB1D         RLL         EC77         CLRJ           E798         VFNMM         EB20         CLMH         EC77         CLRJ           E797         VPNMA         EB20         CLMH         EC77         CLRJ           E741         VMLH         EB23         CLT         EC7D         CLGIJ           E7A2         VML         EB23         STCTG         ECD8         AHIK           E7A3         VMLE         EB25         STCTG         ECD8         AHIK           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A7         VMO         EB26         STCMY         EC4         CGRB           E7A7         VMA         EB27								
E794         VPK         EB0F         TRACG         EC72         CIT           E795         VPKLS         EB14         CSY         EC73         CLFIT           E797         VPKS         EB1C         RLLG         EC76         CRJ           E79E         VFNMA         EB20         CLMH         EC77         CLRJ           E79F         VFNMA         EB20         CLMH         EC7D         CLGJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A3         VMH         EB24         STMG         EC7F         CLU           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A5         VMC         EB2B         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2B         CLGT         ECDA         ALHSIK           E7A7         VMA         EB2C         STCMH         ECDB         ALGHSIK           E7A8         VMAH         EB27	E78E	VFMS		EB0C	SRLG		EC70	CGIT
E795         VPKLS         EB14         CSY         EC73         CLFIT           E797         VPKS         EB1C         RLLG         EC76         CRJ           E79F         VFNMS         EB1D         RLL         EC77         CLRJ           E79F         VFNMA         EB20         CLMH         EC77         CLRJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A3         VMH         EB24         STMG         EC7F         CLJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB28         CLGT         ECDA         ALHSIK           E7A6         VMC         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2F         LCTLG         EC5         CLGRB           E7AA         VMAL         EB31         CDSY         EC7C         CGIB           E7AF         VMAC         EB34	E78F	VFMA		EB0D	SLLG		EC71	CLGIT
E795         VPKLS         EB14         CSY         EC73         CLFIT           E797         VPKS         EB1C         RLLG         EC76         CRJ           E79F         VFNMS         EB1D         RLL         EC77         CLRJ           E79F         VFNMA         EB20         CLMH         EC77         CLRJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A3         VMH         EB24         STMG         EC7F         CLJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB28         CLGT         ECDA         ALHSIK           E7A6         VMC         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2F         LCTLG         EC5         CLGRB           E7AA         VMAL         EB31         CDSY         EC7C         CGIB           E7AF         VMAC         EB34	E794	VPK		EB0F	TRACG		EC72	CIT
E797         VPKS         EB1C         RLLG         EC76         CRJ           E798         VFNMS         EB1D         RLL         EC77         CLRJ           E799F         VFNMA         EB20         CLMH         EC77         CLRJ           E7A1         VMLH         EB21         CLMY         EC7D         CLGIJ           E7A2         VML         EB23         CLT         EC7E         CIJ           E7A3         VML         EB24         STMG         EC7F         CLIJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB28         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A7         VMAL         EB2D         STCMY         EC64         CGRB           E7A7         VMAL         EB2D         STCMY         EC64         CGRB           E7A8         VMAL         EB2F         LCTLG         EC65         CLGRB           E7A6         VMAL         EB31 <td>F795</td> <td>VPKLS</td> <td></td> <td>FB14</td> <td></td> <td></td> <td></td> <td>CLEIT</td>	F795	VPKLS		FB14				CLEIT
E79E         VFNMS         EB1D         RLL         EC77         CLRJ           E79F         VFNMA         EB20         CLMH         EC7C         CGIJ           E7A1         WLH         EB21         CLMY         EC7D         CLGIJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A3         VMH         EB24         STMG         EC7F         CLJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB28         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         EC6E         CGRB           E7A9         VMAL         EB2F         LCTLG         EC65         CLGRB           E7AB         VMAL         EB31         CDSY         EC7F         CLRB           E7AC         VMALE         EB31         CDSY         EC7F         CLRB           E7AF         VMAC         EB44								
E79F         VFNMA         EB20         CLMH         EC7C         CGIJ           E7A1         VMLH         EB21         CLMY         EC7D         CLGIJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A3         VMH         EB24         STMG         EC7F         CLJ           E7A3         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB2B         CLGT         ECDA         ALHSIK           E7A6         VMC         EB2C         STCMH         ECDB         ALGHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMAL         EB2P         LCTLG         EC6E4         CGRB           E7AA         VMAL         EB2P         LCTLG         EC6E5         CLGRB           E7AA         VMAL         EB31         CDSY         EC7C         CGIB           E7AD         VMALO         EB3E         CDSG         EC7C         CGIB           E7AF         VMAC         EB44								
E7A1         VMLH         EB21         CLMY         EC7D         CLGIJ           E7A2         VML         EB23         CLT         EC7E         CLJ           E7A3         VMH         EB24         STMG         EC7F         CLJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB2B         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A7         VMAL         EB2D         STCMY         EC64         CGRB           E7A8         VMAL         EB2D         STCMY         EC64         CGRB           E7A8         VMAL         EB2D         LCTLG         EC55         CLGRB           E7A8         VMAL         EB31         CDSY         EC76         CRB           E7AC         VMALE         EB31         CDSY         EC77         CLRB           E7AF         VMAO         EB3E         CDSG         EC76         CGIB           E7AF         VMAO         EB45								
E7A2         VML         EB23         CLT         EC7E         CJJ           E7A3         VMH         EB24         STMG         EC7F         CLIJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A5         VME         EB28         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7A9         VMALH         EB2D         STCMY         ECE5         CLGRB           E7A8         VMAL         EB2F         LCTLG         ECE5         CLGRB           E7A0         VMALE         EB31         CDSY         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AC         VMALE         EB31         CDSY         ECF6         CRB           E7AC         VMALE         EB32         CDSG         ECF6         CRB           E7AF         VMALE         EB44<								
E7A3         VMH         EB24         STMG         EC7F         CLIJ           E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB28         CLGT         ECDA         ALHSIK           E7A6         VMC         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2F         LCTLG         ECE5         CLGRB           E7AA         VMAL         EB30         CSG         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AD         VMALO         EB3E         CDSG         ECFC         CGIB           E7AF         VMAC         EB44         BXHEG         ECFC         CGIB           E7AF         VMAC         EB45         BXLEG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
E7A4         VMLE         EB25         STCTG         ECD8         AHIK           E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB28         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A7         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2F         LCTLG         ECE5         CLGRB           E7AB         VMAH         EB30         CSG         ECF6         CRB           E7AB         VMALD         EB3E         CDSG         ECF7         CLRB           E7AD         VMALO         EB3E         CDSG         ECFC         CGIB           E7AF         VMAD         EB45         BXLEG         ECFE         CIB           E7BF         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMS         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MVIY         ED05         LXDB           E7BD         VSBCBI         EB56 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
E7A5         VMLO         EB26         STMH         ECD9         AGHIK           E7A6         VME         EB2B         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AB         VMAL         EB2F         LCTLG         ECE5         CLGRB           E7AB         VMALE         EB31         CDSY         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AC         VMALE         EB44         BXHG         ECFD         CLGIB           E7AE         VMAE         EB44         BXHG         ECFD         CLGIB           E7AF         VMAD         EB45         BXLEG         ECFE         CLIB           E7B8         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VAC         E						1		
E7A6         VME         EB2B         CLGT         ECDA         ALHSIK           E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2F         LCTLG         ECE5         CLGRB           E7AA         VMALE         EB30         CSG         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AD         VMALO         EB3E         CDSG         ECFC         CGIB           E7AF         VMAC         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFF         CLIB           E7B4         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MYIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BD         VGFMA         EB55 <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td>						1		
E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2D         LCTLG         ECE5         CLGRB           E7AB         VMAH         EB30         CSG         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AD         VMALO         EB3E         CDSG         ECFC         CGIB           E7AE         VMAE         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B8         VMSL         EB51         TMY         ED05         LXDB           E7B9         VACC         EB54         MIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VSBCBI         EB56         CIY         ED07         MXDB           E7BF         VSBI         EB57	E7A5	VMLO		EB26	STMH	1	ECD9	AGHIK
E7A7         VMO         EB2C         STCMH         ECDB         ALGHSIK           E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2D         LCTLG         ECE5         CLGRB           E7AB         VMAH         EB30         CSG         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AD         VMALO         EB3E         CDSG         ECFC         CGIB           E7AE         VMAE         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B8         VMSL         EB51         TMY         ED05         LXDB           E7B9         VACC         EB54         MIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VSBCBI         EB56         CIY         ED07         MXDB           E7BF         VSBI         EB57	E7A6	VME		EB2B	CLGT	1	ECDA	ALHSIK
E7A9         VMALH         EB2D         STCMY         ECE4         CGRB           E7AA         VMAL         EB2F         LCTLG         ECE5         CLGRB           E7AB         VMAL         EB30         CSG         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AC         VMALO         EB3E         CDSG         ECF7         CLRB           E7AE         VMAL         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7BF         VMSL         EB51         TMY         ED04         LDEB           E7B8         VAC         EB51         TMY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BB         VSBCBI         EB56         CIY         ED08         KEB           E7BF         VSBI         EB67         XIY         ED09         CEB           E7C1         VCDLG         EB6A		VMO		EB2C		1		
E7AA         VMAL         EB2F         LCTLG         ECE5         CLGRB           E7AB         VMAH         EB30         CSG         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AE         VMALO         EB3E         CDSG         ECFC         CGIB           E7AE         VMAE         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B4         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MVIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BD         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         CIY         ED08         KEB           E7BF         VSBI         EB67         XIY         ED09         CEB           E7C1         VCDLG         EB6A						1		
E7AB         VMAH         EB30         CSG         ECF6         CRB           E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AD         VMALO         EB3E         CDSG         ECFC         CGIB           E7AE         VMAE         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B8         VACC         EB52         MVIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LVEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ALSI         ED0A         AEB           E7C1         VGDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A         <								
E7AC         VMALE         EB31         CDSY         ECF7         CLRB           E7AD         VMALO         EBSE         CDSG         ECFC         CGIB           E7AE         VMAC         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B4         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MVIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         CIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A						1		
E7AD         VMALO         EB3E         CDSG         ECFC         CGIB           E7AE         VMAE         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B4         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MYIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C1         VCDLG         EB6A         ASI         ED0A         AEB           E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0C         MDEB           E7C3         VCDG         EB7E						1		
E7AE         VMAE         EB44         BXHG         ECFD         CLGIB           E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B4         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MVIY         ED05         LXDB           E7BB         VACC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VGGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLR         EB80         <								
E7AF         VMAO         EB45         BXLEG         ECFE         CIB           E7B4         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MVIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLR         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81 <td< td=""><td></td><td></td><td></td><td>-</td><td></td><td>1</td><td></td><td></td></td<>				-		1		
E7B4         VGFM         EB4C         ECAG         ECFF         CLIB           E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACC         EB52         MYIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLI         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB						1		
E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACCC         EB52         MVIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VGGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLR         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB	E7AF	VMAO		EB45	BXLEG	1	ECFE	CIB
E7B8         VMSL         EB51         TMY         ED04         LDEB           E7B9         VACCC         EB52         MVIY         ED05         LXDB           E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VGGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLR         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB	E7B4	VGFM		EB4C	ECAG	1	ECFF	CLIB
E7B9         VACCC         EBS2         MVIY         ED05         LXDB           E7BB         VAC         EBS4         MIY         ED06         LXEB           E7BC         VGFMA         EBS5         CLIY         ED07         MXDB           E7BD         VSBCBI         EBS6         OIY         ED08         KEB           E7BF         VSBI         EBS7         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB	E7B8	VMSL		EB51	TMY	1	ED04	
E7BB         VAC         EB54         NIY         ED06         LXEB           E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCDLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB		VACCC						
E7BC         VGFMA         EB55         CLIY         ED07         MXDB           E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VGGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB								
E7BD         VSBCBI         EB56         OIY         ED08         KEB           E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VGGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB		-				1		
E7BF         VSBI         EB57         XIY         ED09         CEB           E7C0         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB								
E7CO         VCLGD         EB6A         ASI         ED0A         AEB           E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB						1		
E7C1         VCDLG         EB6E         ALSI         ED0B         SEB           E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB						1		
E7C2         VCGD         EB7A         AGSI         ED0C         MDEB           E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB						1	-	
E7C3         VCDG         EB7E         ALGSI         ED0D         DEB           E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB						1		-
E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB	E7C2	VCGD		EB7A	AGSI	1	ED0C	MDEB
E7C4         VFLL         EB80         ICMH         ED0E         MAEB           E7C5         VFLR         EB81         ICMY         ED0F         MSEB	E7C3	VCDG		EB7E	ALGSI	1	ED0D	DEB
E7C5 VFLR EB81 ICMY ED0F MSEB						1		
						1		
	E7C7	VFI		EB8E	MVCLU	1	ED10	TCEB

OpCode ED11 ED12	Mnemonic TCDB
ED12	TCDB
	TCXB
ED14 ED15	SQEB SQDB
ED13	MEEB
ED18	KDB
ED19	CDB
ED1A	ADB
ED1B	SDB
ED1C	MDB
ED1D	DDB
ED1E ED1F	MADB MSDB
ED1F ED24	LDE
ED25	LXD
ED26	LXE
ED2E	MAE
ED2F	MSE
ED34	SQE
ED35	SQD
ED37 ED38	MEE MAYL
ED39	MYL
ED3A	MAY
ED3B	MY
ED3C	MAYH
ED3D	MYH
ED3E	MAD
ED3F ED40	MSD SLDT
ED40 ED41	SRDT
ED41	SLXT
ED49	SRXT
ED50	TDCET
ED51	TDGET
ED54	TDCDT
ED55	TDGDT
ED58	TDCXT
ED59 ED64	TDGXT LEY
ED64 ED65	LDY
ED66	STEY
ED67	STDY
EDA8	CZDT
EDA9	CZXT
EDAA	CDZT
EDAB EDAC	CXZT
EDAC	CPXT
EDAE	CDPT
EDAF	CXPT
EE	PLO
EF	LMD
F0	SRP
F1	MVO
F2	PACK
F3 F8	UNPK ZAP
F8 F9	CP
FA	AP
FB	SP
FC	MP
FD	DP



## **Condition Codes**

Condition Code →	0	1	2	3
Mask Bit Value →	8	4	2	1
General Instructions				
Add	Zero	< Zero	> Zero	Overflow
Add Halfword	Zero	< Zero	> Zero	Overflow
Add Halfword Immediate	Zero	< Zero	> Zero	Overflow
Add High	Zero	< Zero	> Zero	Overflow
Add Immediate	Zero	< Zero	> Zero	Overflow
Add Immediate High	Zero	< Zero	> Zero	Overflow
Add Logical	Zero, no carry	Not zero, no	Zero, carry	Not zero, carry
	_	carry		l
Add Logical High	Zero, no carry	Not zero, no carry	Zero, carry	Not zero, carry
Add Logical Immediate	Zero, no carry	Not zero, no carry	Zero, carry	Not zero, carry
Add Logical with Carry	Zero, no carry	Not zero, no carry	Zero, carry	Not zero, carry
Add Logical with Signed Immediate	Zero, no carry	Not zero, no carry	Zero, carry	Not zero, carry
Add Logical with Signed Immediate High	Zero, no carry	Not zero, no carry	Zero, carry	Not zero, carry
AND	Zero	Not zero	_	<u> </u> _
AND Immediate	ANDed bits	ANDed bits	_	_
7 II ID III III II II II II II II II II I	zero	not zero		
Checksum	Checksum		_	CPU-deter-
Onoohoum	complete	_	_	mined com-
	complete			pletion
Cipher Message	Normal com-	Verification	_	Partial com-
Oipriei Messaye	pletion	mismatch	_	pletion
Cinhar Maccago with Authorti	Normal com-	Verification	Partial com-	Partial com-
Cipher Message with Authenti-	pletion	mismatch		pletion (time
cation	pietion	IIIISIIIattii	pletion (LAAD	' '
Cinhar Massass with Chaining	Name of some	Varification	or LPC zero)	out)
Cipher Message with Chaining	Normal com- pletion	Verification	_	Partial com-
Cinhar Massass with Cinhar		mismatch Verification		pletion
Cipher Message with Cipher Feedback	Normal com- pletion	verification mismatch	_	Partial com- pletion
Cipher Message with Counter	Normal com-	Verification	_	Partial com-
Olpher Message with Counter	pletion	mismatch		pletion
Cipher Message with Output	Normal com-	Verification		Partial com-
Feedback	pletion	mismatch	_	pletion
Compare	Equal	First op low	First op high	pietion
Compare and Form Codeword	Equal	First op low	First op high	
Compare and Form Codeword	Lquai	and ctl = 0, or	and ctl = 0, or	
			first op low	
		first op high and ctl = 1	and ctl = 1	
Compare and Swap	Equal	Not equal	and cli = 1	
Compare and Swap	Equal		_	
Compare and Swap and Store		Not equal	_	_
Compare Double and Swap	Equal	Not equal	— Eirot on high	_
Compare Halfword	Equal	First op low	First op high	
Compare Halfword Immediate	Equal	First op low	First op high	_
Compare Halfword Relative Long	Equal	First op low	First op high	_
Compare High	Equal	First op low	First op high	-
Compare Immediate	Equal	First op low	First op high	<b> </b> -
Compare Immediate High	Equal	First op low	First op high	<b> </b> —
Compare Logical	Equal	First op low	First op high	l—
Compare Logical Characters under Mask	Equal, or Mask is zero	First op low	First op high	_
Compare Logical High	Equal	First op low	First op high	l_
Compare Logical Immediate	Equal	First op low	First op high	l_
Compare Logical Immediate High	Equal	First op low	First op high	_
Compare Logical Long	Equal	First op low	First op high	l_
Compare Logical Long Extended	Equal	First op low	First op high	CPU-deter- mined com-
Compare Logical Long Uni-	Equal	First op low	First op high	pletion CPU-deter-
code	Lyudi	i iist op iow	i ii ar oh iiiidii	mined com-
Compare Logical Relative	Equal	First op low	First op high	pletion —
Long Compare Logical String	Equal	First op low	First op high	CPU-deter- mined com-
Compare Relative Long	Equal	First op low	First op high	pletion —

Condition Code →	0	1	2	3
Mask Bit Value →	8	4	2	1
Compare until Substring Equal	Equal sub-	Last bytes	Last bytes	CPU-deter-
	string	equal	unequal	mined com-
				pletion
Compression Call	Second op	First op end,	_	CPU-deter-
	end	not second op		mined com-
		end		pletion
Compute Intermediate Mes-	Normal com-	<del>-</del>	_	Partial com-
sage Digest	pletion			pletion
Compute Last Message Digest	Normal com-	<del>-</del>	_	Partial com-
	pletion			pletion
Compute Message Authentica-	Normal com-	Verification	_	Partial com-
tion Code	pletion	mismatch		pletion
Convert UTF-16 to UTF-32	Data pro-	First op full	Invalid low	CPU-deter-
	cessed		surrogate	mined com-
				pletion
Convert UTF-16 to UTF-8	Data pro-	First op full	Invalid low	CPU-deter-
	cessed		surrogate	mined com-
				pletion
Convert UTF-32 to UTF-16	Data pro-	First op full	Invalid UTF-32	CPU-deter-
	cessed		character	mined com-
				pletion
Convert UTF-32 to UTF-8	Data pro-	First op full	Invalid UTF-32	CPU-deter-
	cessed		character	mined com-
				pletion
Convert UTF-8 to UTF-16	Data pro-	First op full	Invalid UTF-8	CPU-deter-
	cessed		character	mined com-
				pletion
Convert UTF-8 to UTF-32	Data pro-	First op full	Invalid UTF-8	CPU-deter-
	cessed		character	mined com-
				pletion
Exclusive OR	Zero	Not zero	_	_
Exclusive OR Immediate	XORed bits	XORed bits	_	_
	zero	not zero		
Find Leftmost One	No one bit	_	One bit found	_
	found			
Insert Characters under Mask	All zero, or	Leftmost bit =	Not zero, but	_
	mask is zero	1	with leftmost	
			bit = 0	
Load and Test	Zero	< Zero	> Zero	_
Load Complement	Zero	< Zero	> Zero	Overflow
Load Negative	Zero	< Zero	_	_
Load Positive	Zero	_	> Zero	Overflow
Move Long	Operand	First op	First op longer	Overlap
•	lengths equal	shorter		· ·
Move Long Extended	Operand	First op	First op longer	CPU-deter-
•	lengths equal	shorter		mined com-
				pletion
Move Long Unicode	Operand	First op	First op longer	CPU-deter-
•	lengths equal	shorter		mined com-
				pletion
Move String	_	Second op	_	CPU-deter-
Ť		moved		mined com-
				pletion
Multiply Single (MSC, MSGC,	Zero, no over-	< Zero, no	> Zero, no	Overflow
MSGRKC, MRRKC)	flow	overflow	overflow	
OR	Zero	Not zero	_	_
OR Immediate	ORed bits	ORed bits not	_	_
	zero	zero		
Perform Cryptographic Compu-	Normal com-	Verification	_	Partial com-
tation	pletion	mismatch		pletion
Perform Locked Operation (test	Equal	First op not	First op equal,	_
bit zero)	4	equal	third op not	
			equal	
Perform Locked Operation (test	Code valid	l_		Code invalid
bit one)				
Perform Random Number	Normal com-	<b> </b> _	_	Partial com-
Operation	pletion			pletion
	Zero	Not zero	_	_
Population Count		Selected bits	_	_
Population Count Rotate Then AND Selected				
Rotate Then AND Selected	Selected bits	not zero		
Rotate Then AND Selected Bits	zero	not zero	_	_
Rotate Then AND Selected Bits Rotate Then Exclusive OR	zero Selected bits	Selected bits	_	_
Rotate Then AND Selected Bits	zero			_

Condition Code →	0	1	2	3
Mask Bit Value →	8	4	2	1
Rotate Then OR Selected Bits	Selected bits	Selected bits	_	_
	zero	not zero		
Search String, Search String	<b> </b> -	Character	Character not	CPU-deter-
Unicode		found	found	mined com-
				pletion
Set Program Mask <sup>4</sup>	See Note	See Note	See Note	See Note
Shift Left (Double / Single)	Zero	< Zero	> Zero	Overflow
Shift Right (Double / Single)	Zero	< Zero	> Zero	
Store Clock (STCK, STCKE or STCKF)	Set state	Not-set state	Error state	Stopped state or not opera-
oroid )				tional
Store Facility List Extended	Complete list	_	_	Incomplete list
Ctore I domity Elec Externace	stored			stored
Subtract	Zero	< Zero	> Zero	Overflow
Subtract Halfword	Zero	< Zero	> Zero	Overflow
Subtract High	Zero	< Zero	> Zero	Overflow
Subtract Logical	_	Not zero, bor-	Zero, no bor-	Not zero, no
Subtract Logical High		row Not zero, bor-	row Zero, no bor-	borrow Not zero, no
Subtract Logical Flight		row	row	borrow
Subtract Logical Immediate	_	Not zero, bor-	Zero, no bor-	Not zero, no
		row	row	borrow
Subtract Logical with Borrow	Zero, borrow	Not zero, bor-	Zero, no bor-	Not zero, no
		row	row	borrow
Test Addressing Mode	24-bit mode	31-bit mode	_	64-bit mode
Test and Set	Leftmost bit	Leftmost bit	_	_
Test under Meek (TM)	zero All zeros, or	one Mixed 0's and		All ones
Test under Mask (TM)	mask is zero	1's	_	All Offes
Test under Mask (TMH, TMHH,	All zeros or	Mixed 0's and	Mixed 0's and	All ones
TMHL, TML, TMLH, TMLL)	mask is zero	1's and left-	1's and left-	7 111 01100
,		most bit zero	most bit one	
Test under Mask High, Low	All zeros or	Mixed 0's and	Mixed 0's and	All ones
	mask is zero	1's and left-	1's and left-	
Transaction Desir	Cusasastul	most bit zero	most bit one	
Transaction Begin Transaction End	Successful In TX mode		Not in TX	
nansaction End	III IX IIIode		mode	
Translate and Test, Translate	All zeros	Not zero, scan	Not zero, scan	_
and Test Reverse		incomplete	complete	
Translate and Test Extended,	All selected	Nonzero func-	_	CPU-deter-
Translate and Test Reverse	function codes	tion code		mined com-
Extended Translate Extended	zero	selected		pletion
Translate Extended	Data pro- cessed	First op byte equal test byte		CPU-deter- mined com-
	cesseu	equal lest byte		pletion
Translate One to One, One to	Character not	Character	_	CPU deter-
Two, Two to One, Two to	found	found		mined com-
Two				pletion
Unpack ASCII	Sign plus	Sign minus	_	Sign invalid
Unpack Unicode	Sign plus	Sign minus	_	Sign invalid
Update Tree	Compare equal at cur-	Path com- plete, no		Path not com- plete and
	rent node on	nodes com-		compared req-
	path	pared equal		ister negative
	ľ			•
Decimal Instructions	l_	l _	_	
Add Decimal	Zero	< Zero	> Zero	Overflow
Compare Decimal	Equal	First op low	First op high	_
Edit Edit and Mark	Zero Zero	< Zero < Zero	> Zero > Zero	
Shift and Round Decimal	Zero	< Zero	> Zero	Overflow
Subtract Decimal	Zero	< Zero	> Zero	Overflow
Test Decimal	Digits and sign	Sign invalid	Digit invalid	Sign and digit
	valid			invalid
Zero and Add	Zero	< Zero	> Zero	Overflow
Floating-Point				
Instructions				
Add	Zero	< Zero	> Zero	NaN
Add Normalized	Zero	< Zero	> Zero	_
Add Unnormalized	Zero	< Zero	> Zero	<del></del> .
Compare (BFP)	Equal	First op low	First op high	Unordered
Compare (HFP)	Equal	First op low	First op high	_

Compare Biased Exponent Convert HFP to HFP Zero Corvert to Fixed Convert to Fixed Convert to Logical Convert to Logical Convert to Packed Zero Convert to Packed Zero Convert to Packed Zero Convert to Packed Zero Convert to Dacked Zero Zero Zero Zero Zero Zero Zero Zero	pare and Signal pare blassed Exponent pare blassed Exponent (Equal First op low First op high First	Condition Code →	0	1	2	3
Comyert BFP to HFP Convert BFP to HFP Convert tBFP to BFP Zero	pare Blased Exponent yetr HFP to BFP yetr HFP to BFP Zero vert to Fixed yetr HFP to BFP Zero vert to Fixed Zero vert to Packed Zero vert to Zero vert to Packed Zero vert to Zero vert vert vert vert vert vert vert vert	Mask Bit Value →	8	4	2	1
Convert BFP to HFP   Zero   Zero   Zero   Special cand	Zero   Zero   Zero   Zero   Special case   Speci	Compare and Signal	Equal	First op low	First op high	Unordered
Convert to Fixed   Zero   Zero   Zero   Zero   Special corower to Logical   Zero   Zero   Zero   Zero   Zero   Special corower to Logical   Zero   Zero   Zero   Zero   Zero   Special corower to Zero   Zero   Zero   Zero   Zero   Special corower to Zero   Zero   Zero   Zero   Zero   Special corower to Zero	Vert HFP to BFP	Compare Biased Exponent	Equal	First op low	First op high	Unordered
Convert to Fixed   Zero   Zero   Zero   Zero   Zero   Special corover to Logical   Zero   Zero   Zero   Zero   Zero   Zero   Special corover to Packed   Zero   Zero   Zero   Zero   Zero   Special corover to Zoned   Zero	vert to Discola	Convert BFP to HFP	Zero	< Zero	> Zero	Special case
Convert to Logical Convert to Packed Convert to Packed Convert to Coned Divide to Integer  Divide to Integer  Complete, quotient normal Cad and Test (BFP) Load and Test (BFP) Load Complement (BFP) Load Complement (BFP) Load Complement (BFP) Load Negative (BFP) Load Negative (BFP) Load Positive (BFP) Load Positive (BFP) Cond Perform Floating-Point Operation (T=1) Subtract Normalized Subtract Subtract Unnormalized Subtract Unnormalized Subtract Compare Equals Load Count to Block Boundary Vector Compare Equals Vector Compare High Logicals Vector Convert to Binarys Vector Convert to Decimals Vector Convert to Decimals Vector Convert to Decimals Vector Divide Decimals Vector Find Any Element Equal Vector Find Element Compare Vector Find Element Equals Vector Find Element Equals Vector Find Element Equals Vector Find Element Not Equal Vector Find Element Not Equal Vector For Compare And Signal Vecto	vert to Logical vert to Packed Zero Zero Zero Special case vert to Zoned Zero Zero Zero Special case server to Zoned Zero Remainder complete, quotient normal complete, quotient normal complete, quotient normal complete, quotient normal complete, quotient very flow or NaN 2 Zero Zero Zero Zero Zero Zero Zero Zero	Convert HFP to BFP	Zero	< Zero	> Zero	Special case
Convert to Packed Convert to Packed Convert to Zoned Divide to Integer  Remainder complete, quotient over- mal Load and Test (BFP) Load Canghement (BFP) Load Complement (BFP) Load Complement (BFP) Load Complement (BFP) Load Negative (HFP) Load Negative (HFP) Load Positive (HFP) Load Po	vert to Zoned le to intéger  le to invenir le complete, quoitent over mail  le udeitent rocmplete, quoitent over mail  le valorient rocmplete, quoitent over mail  le udeitent server  le to re verte vere par vere pour le varie	Convert to Fixed	Zero	< Zero	> Zero	
Convert to Zoned Divide to Integer  Remainder complete, quotient normal complete, quotient over man complete, quotient normal complete, quotient or han complete, quotient or han complete, quotient normal complete, quotient or han complete, quotient or han complete, quotient or han complete, quotient or han complete, quotient normal complete, quotient or han complete, complete	Zero   Remainder   Complete, quotient normal   Complete   Quotient normal   Complement (BFP)   Zero   Zero   Zero   Zero   Zero   NaN   Zero   Zero   Zero   Zero   Zero   NaN   Zero   Zero   Zero   Zero   Zero   Zero   NaN   Zero	Convert to Logical	Zero			Special case
Divide to Integer    Remainder complete, quotient normal complete, quotient normal complete, quotient normal complete, quotient overmal flow or NaN	Remainder complete, quotient normal at and Test (BFP) at and Test (BFP) Zero	Convert to Packed		< Zero	> Zero	Special case
Complete, quotient normal vertifier or NaN   Zero	d and Test (BFP) at and Test (HFP) at and Test (HFP) at and Test (HFP) but (Complement (BFP) cor (Complement (HFP) but (Begative (BFP) cor (Complement (HFP) but (Begative (BFP) cor (T=0) brink (BFP) cor (T=0) corn (T=0)	Convert to Zoned	_0.0			
Quotient normal   Quotient ormal   Quotient normal   Quotient normal   Gero   Sero   Subtract (Incorrell)   Subtract Normalized   Sero   Ser	di and Test (BFP)  di and Test (HFP)  de l'and Test (Here)  d	Divide to Integer				
mal   flow or NaN   2ero   2	d and Test (BFP) Jand Test (HFP) Jand Test (H					
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Load and Test (HFP) Load Complement (HFP) Load Complement (HFP) Load Negative (BFP) Load Negative (BFP) Load Negative (BFP) Load Positive (BFP) Load Rogative (BFP) Load Positive (BFP) Load Care	2 and Test (HFP)   2 cero					
Load Complement (BFP) Load Complement (HFP) Load Omplement (HFP) Load Negative (HFP) Load Ostitive (BFP) Load Ostitive (BFP) Load Ostitive (HFP) Load Ostitive (HFP) Load Ostitive (HFP) Load Positive (HFP) Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=1) Subtract Subtract Normalized Zero	Complement (BFP)   Complement					NaN
Load Complement (HFP) Load Negative (BFP) Load Positive (HFP) Load Positive (Heptonic Invalid Invalid Invalid Invalid Invalid Invalide Positive (Positive Positive Positive Positive Posit	Complement (HFP)   Zero   Z					_
Load Negative (BFP) Load Negative (BFP) Load Positive (Broton Invalid Positi	Negative (HFP)   Zero   Zero   Zero   Zero   NaN					NaN
Load Negative (HFP) Load Positive (HFP) Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=0) Subtract Subtract Normalized Zero	Negative (HFP)   Positive (BFP)   Positive (HFP)   Positive (HFP)   Zero   Trap exception   —   Function valid   NaN   N				> Zero	<del></del>
Load Positive (HFP) Load Positive (HFP) Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=1) Subtract Subtract Normalized Subtract Unnormalized Zero	I Positive (HFP) I Positive (Positive (Positive A) I Positive (Positive A)				_	NaN
Load Positive (HFP) Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=1) Subtract Normalized Subtract Unnormalized Test Data Class Test Data Group  Vector-Facility Instructions Load Count to Block Boundary Vector Compare Equal Vector Compare High Logical Vector Compare High Subtract Vector Convert to Binary Vector Convert to Binary Vector Divide Decimal Vector Flement Compare Vector Flement Compare Vector Find Any Element Equal Vector Find Any Element Equal Vector Find Element Equal Vector Find Element Not Equal Vector Find Element Not Equal Vector Formpare And Signal Vector Formpare	If Positive (HFP)  If If If Positive (HFP)  If If Positive (HFP)  If If If If Positive (HFP)  If I			< Zero	I	<del></del>
Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=0) Perform Floating-Point Operation (T=1) Subtract Subtract Vormalized Zero	Normal result   Normal resu			_		NaN
Perform Floating-Point Operation (T=1) Subtract Normalized Zero < Zero > Zero > Zero — — — — — — — — — — — — — — — — — — —	on (T=0) orm Floating-Point Opera- orn (T=1) orm Floating-Point Opera- orn (T=1) orn Floating-Point Opera- orn (T=1) orn Floating-Point Opera- orn (T=1) orn Floating-Point Opera- oract Normalized     Zero			l <del></del>		_
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tion (T=1) Subtract Normalized Subtract Unnormalized Test Data Class Test Data Class Test Data Group  Vector-Facility Instructions Load Count to Block Boundary Vector Add Decimal Vector Compare Decimal Vector Compare High Logical Vector Compare High Logical Vector Compare High S Vector Find Any Element Equal Vector Find Any Element Equal Vector Find Any Element Equal S Vector Find Element Equal Vector Find Element Equal Vector Find Element Rot Equal element found, no zeros if ZS=1 Zero found Vector Find Element Not Equal element found, no zeros Vector Find Element Not Equal element found, and zero Vector Find Element Not Equal element found, less than Vector Frompare And Signal Vector Frompare And Signal Vector Frompare And Signal Vector Frompare And Signal	ract Tract Normalized Zero			exception		
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Test Data Class  Zero (no match)  —  —  —  —  —  —  —  —  —  —  —  —  —	Data Class  Data Group  Zero (no match))  Zero (no match))  One (match)  One (matc					_
Test Data Group    Match   Zero (no match)   Zer	Data Group   Da				> Zero	_
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Vector Add Decimal <sup>5</sup> No overflow         —         Overflow           Vector Compare Decimal         Equal         —         First op low           Vector Compare Equal <sup>5</sup> All elements equal         —         No element equal           Vector Compare High Logical <sup>5</sup> All elements high         —         No element high           Vector Compare High <sup>5</sup> All elements high         —         No element high           Vector Convert to Binary <sup>5</sup> No overflow         —         —           Vector Divide Decimal <sup>5</sup> No overflow         —         —           Vector Element Compare         Equal         Low         High         —           Vector Find Any Element         Equal         Low         High         —           Vector Find Element Equal <sup>5</sup> Zero found         Equal element found, no zeros if zeros         Equal element found, and zero         Not equal element found, and zero           Vector Find Element Not         Zero found         Equal element found, less than         Equal element f	or Add Decimal <sup>5</sup> or Compare Decimal or Compare Equal <sup>5</sup> or Compare High Logical <sup>5</sup> or Compare High <sup>5</sup> or Find Element Equal <sup>5</sup> or Find Element Round or Find Element Round or Find Element Round or Find Element Equal <sup>5</sup> or FP Compare Equal <sup>5</sup> All elements equal All elements equal Elements equal Elements equal Elements equal All elements equal Elements equal Elements equal All elements equal Elements equal All elements equal Elements equal All elements equal All elements equal All elements equal All elements equal Elements equal All		10			. 10
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		Equal <sup>5</sup> Vector FP Compare High <sup>5</sup>	All elements >		— First element	
	egual low high unordered	Equal <sup>5</sup>	Elements	First element		(or unordered) Elements

Condition Code →	0	1	2	3
Mask Bit Value →	8	4	2	1
Vector FP Test Data Class	Match	Selected bit 1	_	No match
Immediate		for some (but not all) ele- ments		
Vector Isolate String <sup>5</sup>	Zero element found		_	All elements nonzero
Vector Multiply and Shift Deci- mal <sup>5</sup>	No overflow	_	_	Overflow
Vector Multiply Decimal <sup>5</sup>	No overflow	_	_	Overflow
Vector Pack Logical Saturate <sup>5</sup>	No saturation	Some satu- rated		All saturated
Vector Pack Saturate <sup>5</sup>	No saturation	Some satu- rated		All saturated
Vector Perform Sign Operation Decimal <sup>5</sup>	No overflow	_	_	Overflow
Vector Remainder Decimal <sup>5</sup>	No overflow	_	_	Overflow
Vector Shift and Divide Deci- mal <sup>5</sup>	No overflow	_	_	Overflow
Vector Shift and Round Deci- mal <sup>5</sup>	No overflow	_	_	Overflow
Vector String Range Compare <sup>5</sup>	Zero found	At least one in ranges, no	At least one in ranges, zero	No ranges match, no
		zero	found	zeros
Vector Subtract Decimal <sup>5</sup>	No overflow	<del>-</del>	<del>-</del>	Overflow
Vector Test Decimal <sup>5</sup>	Digits and sign valid	Sign invalid	Digit invalid	Sign and digit invalid
Vector Test Under Mask	All zeros or mask zero	Mixed	_	All ones
Control Instructions				
Compare and Replace DAT Table Entry	Equal	Not equal	_	_
Compare and Swap and Purge	Equal	Not equal	_	_
Diagnose <sup>1</sup>	See note	See note	See note	See note
Extract Stacked State	Branch state	Program call	_	_
Insert Address Space Control	entry Primary-space	state entry Secondary-	Access regis-	Home-space
·	mode	space mode	ter mode	mode
Load Address Space Parameters	Parameters loaded	Primary not available	Secondary not authorized or	Space-switch event
Load Page-Table-Entry	Address	Address	not available Invalid bit on	Exception
Address	returned; STE.P=0	returned; STE.P=1	in RTE or STE.	condition exists.
Load PSW <sup>3</sup>	See note	See note	See note	See note
Load PSW Extended <sup>3</sup>	See note	See note	See note	See note
Load Real Address <sup>2</sup>	Translation	Segment table	Page table	See note
	available	entry invalid	entry invalid	
Move Page	Data moved	First op invalid, both valid in ES,	Second op invalid	_
		locked, or ES		
Move to Primary	Length ≤ 256	error —	_	Length > 256
Move to Secondary	Length ≤ 256	_	_	Length > 256
Move with Key	Length ≤ 256	_	_	Length > 256
Move with Optional Specifications	Length ≤ 4096	_	_	Length > 4096
Page In	Operation completed	ES data error	_	ES block not available
Page Out	Operation completed	ES data error	_	ES block not available
Perform Timing Facility Function	Function per- formed	_	_	Function not available
Perform Topology Function	Initiated	_	Rejected	_
Program Return	See note	See note	See note	See note
Reset Reference Bit Extended	Ref = 0, Chg = 0	Ref = 0, Chg =	Ref = 1, Chg = 0	Ref = 1, Chg = 1
Resume Program <sup>3</sup>	See note	See note	See note	See note
Set Clock	Set	Secure	_	Not opera- tional
	·	·	·	- 31.00

Condition Code →	0	1	2	3
Mask Bit Value →	8	4	2	1
Signal Processor	Accepted	Status stored	Busy	Not opera-
Store System Information	Info provided	_	_	tional Info not avail- able
Test Access	ALET = 0	ALET uses DUALD	ALET uses PSALD	ALET = 1 or causes ART exception
Test Pending External Interruption	None pending	One or more pending	_	_
Test Block	Usable	Unusable	_	<b> </b> -
Test Protection	Fetch and store allowed	Fetch allowed; no store allowed	No fetch or store allowed	Translation not available
Input/Output				
Instructions Cancel Subchannel	Function			Not opera-
Cancel Subchannel	started	_		tional
Clear Subchannel	Function	_	_	Not opera-
	started			tional
Halt Subchannel	Function started	Non-interme- diate status pending	Busy	Not opera- tional
Modify Subchannel	Function exe- cuted	Status pend- ing	Busy	Not opera- tional
Reset Channel Path	Function started	_	Busy	Not opera- tional
Resume Subchannel	Function started	Status pend- ing	Not applicable	Not opera- tional
Start Subchannel	Function started	Status pend- ing	Busy	Not opera- tional
Store Channel Report Word	CRW stored	Zeros stored	-	-
Store Subchannel	SCHIB stored	_		Not opera- tional
Test Pending Interruption	Interruption not pending	Interruption code stored	_	_
Test Subchannel	IRB stored;	IRB stored;	<b> </b> _	Not opera-
	status pending	not status pending		tional

### Notes:

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- <sup>1</sup> For Diagnose, the resulting condition code is model-dependent.
- For Load Real Address, condition code 3 is set if address-space-control element not available, region-table entry outside table or invalid, segment-table entry outside table, or, for LRA in 24-or 31-bit mode when bits 0-32 of entry address not all zeros, segment- or page-table entry invalid.
- For Load PSW, Load PSW Extended, and Resume Program, the condition code is loaded from the condition-code field of the second operand.
- For Set Program Mask, the condition code is loaded from bit positions 2 and 3 of the first operand.
- For various vector-facility instructions, the condition code is optionally set based on the CS control in the M<sup>5</sup> field of the instruction.

### **Assembler Instructions**

Function	Mnemonic	Meaning
Option control	*PROCESS	Specify assembler options
·	ACONTROL	Dynamically modify options
Data definition	CCW	Define channel command word
	CCW0	Define format-0 channel command word
	CCW1	Define format-1 channel command word
	DC	Define constant
	DS	Define storage
Program	ALIAS	Rename external symbol
sectioning	AMODE	Specify addressing mode
and linking	CATTR	Define class/part name and attributes
-	COM	Identify common control section
	CSECT	Identify control section
	CXD	Cumulative length of external dummy section
	DSECT	Identify dummy section
	DXD	Define external dummy section

Function	Mnemonic	Meaning
	ENTRY	Identify entry-point symbol
	EXTRN	Identify external symbol
	LOCTR	Specify multiple location counters
	RMODE	Specify residence mode
	RSECT	Identify read-only control section
	START	Start assembly
	WXTRN	Identify weak external symbol
	XATTR	Declare external symbol attributes
Base register	DROP	Drop base address register
assignment	USING	Use base address and register
Control of	AEJECT	Start new page in macro definition
listing	ASPACE	Space lines in macro definition
· ·	CEJECT	Conditional start new page
	EJECT	Start new page
	PRINT	Control listing contents
	SPACE	Space listing
	TITLE	Identify assembly output
Program control	ADATA	Provide data for SYSADATA file
i rogiam control	CNOP	Conditional no operation
	COPY	Copy predefined source coding
	END	End assembly
	EOU	Equate symbol
	EXITCTL	
	ICTL	Program control data for I/O exits
	ISEQ	Input format control
	LTORG	Input sequence checking
	OPSYN	Begin literal pool
		Equate operation code
	ORG POP	Set location counter
	PUNCH	Restore ACONTROL, PRINT, or USING status Punch a record
	PUNCH	
	REPRO	Save current ACONTROL, PRINT, or USING status Reproduce following record
0	ACTO	On distance of the bounds of t
Conditional	ACTR	Conditional assembly branch counter
assembly	AGO	Unconditional branch
	AIF	Conditional branch
	AINSERT	Create input record
	ANOP	Assembly no operation
	AREAD	Assign input record to SETC symbol
	GBLA	Define global SETA symbol
	GBLB	Define global SETB symbol
	GBLC	Define global SETC symbol
	LCLA	Define local SETA symbol
	LCLB	Define local SETB symbol
	LCLC	Define local SETC symbol
	MHELP	Trace macro flow
	MNOTE	Generate message
	SETA	Set arithmetic variable symbol
	SETAF	Set arithmetic variable symbol from external function
	SETB	Set binary variable symbol
	SETC	Set character variable symbol
	SETCF	Set character variable symbol from external function
Macro definition	MACRO	Macro definition header
Macro definition	MACRO MEND	Macro definition header Macro definition trailer

Source: SC26-4940

### **CNOP Alignment**

	Quadword														
			Doubl	eword							Doubl	eword			
	Full	word			Full	word			Full	word			Full	word	
Half	word	Half	word	Half	word	Half	word	Halfword Halfword		word	Halfword		Halfv	word	
Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte	Byte
0,4		2,4		0,4		2,4		0,4		2,4		0,4		2,4	
0,8 0,16		2,8 2,16		4,8 4,16		6,8 6,16		0,8 8,16		2,8 10,16		4,8 12,16		6,8 14,16	

For byte offset and boundary values greater than 16, see IBM High Level Assembler for z/OS, z/VM & z/VSE Language Reference (SC26-4940).

# Extended-Mnemonic Instructions for Branch on Condition and Branch Indirect on Condition

	Extende	ed Mnemoni	ic for:		
Use	BC	BCR	BIC	Meaning	M <sub>1</sub> Value*
Control	В	BR	BI	Unconditional branch	15
	NOP	NOPR	_	No operation	0
After	ВН	BHR	BIH	Branch on A High	2
Compare	BL	BLR	BIL	Branch on A Low	4
Instructions	BE	BER	BIE	Branch on A Equal B	8
(A:B)	BNH	BNHR	BINH	Branch on A Not High	13
	BNL	BNLR	BINL	Branch on A Not Low	11
	BNE	BNER	BINE	Branch on A Not Equal B	7
After	BP	BPR	BIP	Branch on Plus	2
Arithmetic	BM	BMR	BIM	Branch on Minus	4
Instructions	BZ	BZR	BIZ	Branch on Zero	8
	BO	BOR	BIO	Branch on Overflow	1
	BNP	BNPR	BINP	Branch on Not Plus	13
	BNM	BNMR	BINM	Branch on Not Minus	11
	BNZ	BNZR	BINZ	Branch on Not Zero	7
	BNO	BNOR	BINO	Branch on No Overflow	14
After Test	ВО	BOR	BIO	Branch if Ones	1
under Mask	BM	BMR	BIM	Branch if Mixed	4
Instruction	BZ	BZR	BIZ	Branch if Zeros	8
	BNO	BNOR	BINO	Branch if Not Ones	14
	BNM	BNMR	BINM	Branch if Not Mixed	11
	BNZ	BNZR	BINZ	Branch if Not Zeros	7

### Source: SC26-4940.

### **Extended-Mnemonic Instructions for Relative-Branch Instructions**

	Extended		Machine
Use	Mnemonic	Meaning	Instr.
General	BRU or J	Unconditional Branch Relative	BRC 15,I <sub>2</sub>
Branch Rel.	BRUL or JLU	Unconditional Branch Relative	BRCL 15,I <sub>2</sub>
on Condition	JNOP*	No Operation	BRC 0,I <sub>2</sub>
After	BRH or JH*	Branch Relative on A High	BRC 2,I <sub>2</sub>
Compare	BRL or JL*	Branch Relative on A Low	BRC 4,I <sub>2</sub>
Instructions	BRE or JE*	Branch Relative on A Equal B	BRC 8,I <sub>2</sub>
	BRNH or JNH*	Branch Relative on A Not High	BRC 13,I <sub>2</sub>
	BRNL or JNL*	Branch Relative on A Not Low	BRC 11,I <sub>2</sub>
	BRNE or JNE*	Branch Relative on A Not Equal B	BRC 7,I <sub>2</sub>
After	BRP or JP*	Branch Relative on Plus	BRC 2,I <sub>2</sub>
Arithmetic	BRM or JM*	Branch Relative on Minus	BRC 4,I <sub>2</sub>
Instructions	BRZ or JZ*	Branch Relative on Zero	BRC 8,I <sub>2</sub>
	BRO or JO*	Branch Relative on Overflow	BRC 1,I <sub>2</sub>
	BRNP or JNP*	Branch Relative on Not Plus	BRC 13,I <sub>2</sub>
	BRNM or JNM*	Branch Relative on Not Minus	BRC 11,I <sub>2</sub>
	BRNZ or JNZ*	Branch Relative on Not Zero	BRC 7,I <sub>2</sub>
	BRNO or JNO*	Branch Relative on No Overflow	BRC 14,I <sub>2</sub>

Not applicable for BIC

Extended mnemonic replaces the  $M_1$  field; second operand, not shown, is  $D_2(X_2,B_2)$  for RX and RXY formats and  $R_2$  for RR format.

	Extended		Machine
Use	Mnemonic	Meaning	Instr.
After Test	BRO or JO*	Branch Relative if Ones	BRC 1,I <sub>2</sub>
under Mask	BRM or JM*	Branch Relative if Mixed	BRC 4,I <sub>2</sub>
Instruction	BRZ or JZ*	Branch Relative if Zeros	BRC 8,I <sub>2</sub>
	BRNO or JNO*	Branch Relative if Not Ones	BRC 14,I <sub>2</sub>
	BRNM or JNM*	Branch Relative if Not Mixed	BRC 11,l <sub>2</sub>
	BRNZ or JNZ*	Branch Relative if Not Zeros	BRC 7,I <sub>2</sub>
Other Branch	JAS	Branch Relative and Save	BRAS R <sub>1</sub> ,I <sub>2</sub>
Relative	JASL	Branch Relative and Save Long	BRASL R <sub>1</sub> ,I <sub>2</sub>
Instructions	JCT	Branch Relative on Count (32)	BRCT R <sub>1</sub> ,I <sub>2</sub>
	JCTG	Branch Relative on Count (64)	BRCTG R <sub>1</sub> ,I <sub>2</sub>
	JXH	Branch Relative on Index High (32)	BRXH R <sub>1</sub> ,R <sub>3</sub> ,I <sub>2</sub>
	JXHG	Branch Relative on Index High (64)	BRXHG R <sub>1</sub> ,R <sub>3</sub> ,I <sub>2</sub>
	JXLE	Br. Rel. on Index Low or Equal (32)	BRXLE R <sub>1</sub> ,R <sub>3</sub> ,I <sub>2</sub>
	JXLEG	Br. Rel. on Index Low or Equal (64)	BRXLG R <sub>1</sub> ,R <sub>3</sub> ,I <sub>2</sub>

### Extended-Mnemonic Suffixes for Compare-and-Branch, and Compare-and-Trap Instructions

Suffix	Meaning	M <sub>3</sub> Value	Suffix	Meaning	M <sub>3</sub> Value
Н	High	2	NH	Not High	13
L	Low	4	NL	Not Low	11
E	Equal	8	NE	Not Equal	7

Explanation:

These suffixes may be appended to the following mnemonics: CGIB, CGIJ, CGIT, CGRB, CGRJ, CGRT, CIB, CIJ, CIT, CLFIT, CLGIB, CLGIJ, CLGIT, CLGRB, CLGRJ, CLGRT, CLGT, CLIB, CLIJ, CLRB, CLRJ, CLRT, CLT, CRB, CRJ, CRT. When the suffix is coded, the M<sub>3</sub> operand must be omitted.

### Extended-Mnemonic Suffixes for Load/Store-on-Condition Instructions

Suffix	Meaning	M <sub>3</sub> Value	Suffix	Meaning	M <sub>3</sub> Value
0 *	One / Overflow	1	NO *	Not one / Not overflow	14
H	High	2	NH	Not High	13
P *	Plus	2	NP *	Not Plus	13
L	Low	4	NL	Not Low	11
M *	Minus / Mixed	4	NM *	Not Minus / Mixed	11
E	Equal	8	NE	Not Equal	7
Z *	Zero	8	NZ *	Not Zero	7

Explanation:

These suffixes may be appended to the following mnemonics: LOC, LOCG, LOCGHI, LOCGR, LOCHHI, LOCHI, LOCR, STOC, STOCFH, STOCG. Suffixes marked with an asterisk (\*) may not be available on earlier versions of the High Level Assembler.

### Extended-Mnemonic Suffixes for Rotate-Then-Insert / AND / OR / **Exclusive OR-Selected-Bits Instructions**

Extended-Mnemonic		Basic-Mne	monic	
Syntax		Equivalent		Meaning
LHHR	$R_1,R_2$	RISBHGZ	R <sub>1</sub> ,R <sub>2</sub> ,0,31	LOAD (HIGH ← HIGH)
LHLR	$R_1,R_2$	RISBHGZ	R <sub>1</sub> ,R <sub>2</sub> ,0,31,32	LOAD (HIGH ← LOW)
LLCHHR	$R_1,R_2$	RISBHGZ	R <sub>1</sub> ,R <sub>2</sub> ,24,31	LOAD LOG. CH. (HIGH ← HIGH)
LLCHLR	$R_1,R_2$	RISBHGZ	R <sub>1</sub> ,R <sub>2</sub> ,24,31,32	LOAD LOG. CH. (HIGH ← LOW)
LLCLHR	$R_1,R_2$	RISBLGZ	R <sub>1</sub> ,R <sub>2</sub> ,24,31,32	LOAD LOG. CH. (LOW ← HIGH)
LLHFR	$R_1,R_2$	RISBLGZ	R <sub>1</sub> ,R <sub>2</sub> ,0,31,32	LOAD (LOW ← HIGH)
LLHHHR	$R_1,R_2$	RISBHGZ	R <sub>1</sub> ,R <sub>2</sub> ,16,31	LOAD LOG. HW. (HIGH ← HIGH)
LLHHLR	$R_1,R_2$	RISBHGZ	R <sub>1</sub> ,R <sub>2</sub> ,16,31,32	LOAD LOG. HW. (HIGH ← LOW)
LLHLHR	$R_1,R_2$	RISBLGZ	R <sub>1</sub> ,R <sub>2</sub> ,16,31,32	LOAD LOG. HW. (LOW ← HIGH)
NHHR	$R_1,R_2$	RNSBG	R <sub>1</sub> ,R <sub>2</sub> ,0,31	AND HIGH (HIGH ← HIGH)
NHLR	$R_1,R_2$	RNSBG	R <sub>1</sub> ,R <sub>2</sub> ,0,31,32	AND HIGH (HIGH ← LOW)
NLHR	$R_1,R_2$	RNSBG	R <sub>1</sub> ,R <sub>2</sub> ,32,63,32	AND HIGH (LOW ← HIGH)
OHHR	$R_1,R_2$	ROSBG	R <sub>1</sub> ,R <sub>2</sub> ,0,31	OR HIGH (HIGH ← HIGH)
OHLR	$R_1,R_2$	ROSBG	R <sub>1</sub> ,R <sub>2</sub> ,0,31,32	OR HIGH (HIGH ← LOW)
OLHR	$R_1,R_2$	ROSBG	R <sub>1</sub> ,R <sub>2</sub> ,32,63,32	OR HIGH (LOW ← HIGH)
OHHR OHLR	R <sub>1</sub> ,R <sub>2</sub> R <sub>1</sub> ,R <sub>2</sub> R <sub>1</sub> ,R <sub>2</sub>	ROSBG ROSBG	R <sub>1</sub> ,R <sub>2</sub> ,0,31 R <sub>1</sub> ,R <sub>2</sub> ,0,31,32	OR HIGH (HIGH ← HIGH) OR HIGH (HIGH ← LOW)

Source: SC26-4940.
\* To obtain BRCL instead of BRC, add L at the end of the B mnemonic or insert L after the J of the J mnemonic. For example, change BRNZ or JNZ to BRNZL or JLNZ.

Extended-Mnemonic		Basic-Mne		
Syntax		Equivalen	t	Meaning
RISBGNZ	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> ,I <sub>5</sub>	RISBGN	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> +128,I <sub>5</sub>	Set zero-remaining-bits control to 1.
RISBGZ	$R_1, R_2, I_3, I_4, I_5$	RISBG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> +128,I <sub>5</sub>	Set zero-remaining-bits control to 1.
RISBHGZ	$R_1, R_2, I_3, I_4, I_5$	RISBHG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> +128,I <sub>5</sub>	Set zero-remaining-bits control to 1.
RISBLGZ	$R_1, R_2, I_3, I_4, I_5$	RISBLG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> ,I <sub>4</sub> +128,I <sub>5</sub>	Set zero-remaining-bits control to 1.
RNSBGT	$R_1, R_2, I_3, I_4, I_5$	RNSBG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> +128,I <sub>4</sub> ,I <sub>5</sub>	Set test-results control to 1.
ROSBGT	$R_1, R_2, I_3, I_4, I_5$	ROSBG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> +128,I <sub>4</sub> ,I <sub>5</sub>	Set test-results control to 1.
RXSBGT	$R_1, R_2, I_3, I_4, I_5$	RXSBG	R <sub>1</sub> ,R <sub>2</sub> ,I <sub>3</sub> +128,I <sub>4</sub> ,I <sub>5</sub>	Set test-results control to 1.
XHHR	$R_1,R_2$	RXSBG	R <sub>1</sub> ,R <sub>2</sub> ,0,31	EXCL. OR HIGH (HIGH ← HIGH)
XHLR	$R_1,R_2$	RXSBG	R <sub>1</sub> ,R <sub>2</sub> ,0,31,32	EXCL. OR HIGH (HIGH ← LOW)
XLHR	$R_1,R_2$	RXSBG	R <sub>1</sub> ,R <sub>2</sub> ,32,63,32	EXCL. OR HIGH (LOW ← HIGH)
Source: SA	22-7832			

## **Extended-Mnemonics for Vector-Facility Instructions**

See z/Architecture Principles of Operation (SA22-7832) Chapters 21-24

## **Summary of Constants**

	Implied			Trunca-
	Length,	Default Align-		tion/
Type	Bytes	ment	Format	Padding
Α	4	Word	Value of address or expression	Left
AD	8	Doubleword	Value of address or expression	Left
В	-	Byte	Binary digits	Left
С	-	Byte	Characters	Right
CA	-	Byte	Characters (ASCII)	Right
CE	-	Byte	Characters (EBCDIC)	Right
CU	Even	Byte	Characters, translated to Unicode	Right
D	8	Doubleword	Long hex floating point	Right
DB	8	Doubleword	Long binary floating point	Right
DD	8	Doubleword	Long decimal floating point	Right
DH	8	Doubleword	Long hex floating point	Right
E	4	Word	Short hex floating point	Right
EB	4	Word	Short binary floating point	Right
ED	4	Word	Short decimal floating point	Right
EH	4	Word	Short hex floating point	Right
F	4	Word	Fixed-point binary	Left
FD	8	Doubleword	Fixed-point binary	Left
G	Even	Byte	Graphic (double-byte) characters	
Н	2	Halfword	Fixed-point binary	
J	4	Word	Symbol naming a DXD, DSECT, or class	Left
JD	8	Doubleword	Symbol naming a DXD, DSECT, or class	Left
L	16	Doubleword	Extended hex floating point	Right
LB	16	Doubleword	Extended binary floating point	Right
LD	16	Doubleword	Extended decimal floating point	Right
LH	16	Doubleword	Extended hex floating point	Right
LQ	16	Quadword	Extended hex floating point	Right
Р	-	Byte	Packed decimal	Left
Q	4	Word	Symbol naming a DXD, DSECT, or part	Left
QD	8	Doubleword	Symbol naming a DXD, DSECT, or part	Left
QY	3	Halfword	Symbol naming a DXD, DSECT, or part in long- displacement form	_
R	4	Word	PSECT address value	Left
RD	8	Doubleword	PSECT address value	Left
S	2	Halfword	Address in base-displacement form	_
SY	3	Halfword	Address in base-and-long-displacement form	_
V	4	Word	Externally defined address value	_
VD	8	Doubleword	Externally defined address value	_
X	-	Byte	Hexadecimal digits	Left
Υ	2	Halfword	Value of address or expression	Left
Z	-	Byte	Zoned decimal	Left
	SC26-494			

Source: SC26-4940.

# **Assigned Storage Locations**

Hex Addr	Dec Addr	Addr Type	Function
0-7	0-7	A	IPL PSW <sup>†</sup>
8-F	8-15	Α	CCW-type IPL: IPL CCW1 <sup>†</sup>
10-17	16-23	Α	
			CCW-type IPL: IPL CCW2 <sup>†</sup>
10-13	16-19	A	LD-IPL: Machine-loader execution-space size <sup>T</sup>
14-17	20-23	Α	LD-IPL: System-IPL parameter-list pointer <sup>†</sup>
80-83	128-131	R	External-interruption parameter
84-85	132-133	R	CPU address associated with external interruption, or zeros
86-87	134-135	R	External-interruption code (see table on page 45)
88-8B 8C-8F	136-139 140-143	R R	SVC-interruption identification: 0-12 zeros, 13-14 ILC, 15 zero, 16-31 code
			Program-interruption identification: 0-12 zeros, 13-14 ILC, 15 zero, 16-31 code (see table on page 45)
90-93	144-147	R	Data-exception code or vector-exception code: 0-23 zeros, 24- 31 code (for DXC, see table on page 46; for VXC, see table on page 47)
94-95	148-149	R	Monitor-class number: 0-7 zeros, 8-15 number
96-97	150-151	R	PER code, ATMID, AI (see table on page 48)
98-9F	152-159	R	PER address
A0	160	R	Exception access identification: 0-3 zeros, 4-7 access-register number
A1	161	R	PER access identification: 0-3 zeros, 4-7 access-register number
A2	162	R	Operand access identification (if page-translation exception recognized by MOVE PAGE): 0-3 R <sub>1</sub> , 4-7 R <sub>2</sub>
A3	163	A/R	Store-status/machine-check architectural-mode identification: ( 6 zeros, 7 one
A8-AF	168-175	R	Translation-exception identification (see table on page 47)
B0-B7	176-183	R	Monitor code
B8-BB	184-187 188-191	R	Subsystem-identification word: 0-12 zeros, 13-14 SSID,15 one 16-31 subchannel number
BC-BF C0-C3	192-195	R R	I/O-interruption parameter I/O-interruption-identification word: 0-1 zeros, 2-4 I/O-interrup-
00-03	132-133	n	tion subclass, 5-31 zeros
C8-CB	200-203	R	STFL facility list (see "Facility Indications" on page 49)
E8-EF	232-239	R	Machine-check-interruption code (see diagram on page 48)
F4-F7	244-247	R	External-damage code (see diagram on page 49)
F8-FF	248-255	R	Failing-storage address
100-107	256-263	R	Enhanced-Monitor Counter-Array Origin
108-10B	264-267	R	Enhanced-Monitor Counter-Array Size
10C-10F	268-271	R	Enhanced-Monitor Exception Count
110-117	272-279	R	Breaking-event address
120-12F	288-303	R	Restart old PSW
130-13F	304-319	R	External old PSW
140-14F	320-335	R R	Supervisor-call old PSW
150-15F 160-16F	336-351 352-367	R R	Program old PSW Machine-check old PSW
170-101 170-17F	368-383	R	Input/output old PSW
1A0-1AF	416-431	R	Restart new PSW
1B0-1BF	432-447	R	External new PSW
1C0-1CF	448-463	R	Supervisor-call new PSW
1D0-1DF	464-479	R	Program new PSW
1E0-1EF	480-495	R	Machine-check new PSW
1F0-1FF	496-511	R	Input/output new PSW
11B0-11B7	4528-4535	R	Machine-check-extended-save-area address
11C0-11FF	4544-4607	R	Available for programming
1200-127F	4608-4735		Store-status/machine-check floating-point-register save area
1280-12FF 1300-130F	4736-4863 4864-4879	A/R A/R	Store-status/machine-check general-register save area Store-status PSW save area or machine-check fixed-logout
1010 1010	4000 4004	,	area‡
1318-131B 131C-131F	4888-4891 4892-4895	A A/R	Store-status prefix save area Store-status/machine-check floating-point-control-register save area
	4900-4903	A/R	Store-status/machine-check TOD-programmable-register save

R Real address.

A/R A if store status; R if machine check.

† When the configuration-z/Architecture-architectural-mode (CZAM) facility is installed.

Contents may vary among models; see System Library manuals.

## **External-Interruption Codes**

At real-storage locations 134-135 (86-87 hex)

Code (Hex)	Condition
0040	Interrupt key
1004	Clock comparator
1005	CPU timer
1007	Warning-track interruption
1200	Malfunction alert
1201	Emergency signal
1202	External call
1406	Timing alert
1407	Measurement alert
2401	Service signal

## **Program-Interruption Codes**

At real-storage locations 142-143 (8E-8F hex)

Code (Hex)	Condition	IL	c s	Set			str. ndinç	j	
0001	Operation exception		1	2	3		5	3	
0002	Privileged-operation exception			2	3		9	3	
0003	Execute exception			2	3		9	3	
0004	Protection exception		1	2	3		5	S T	
0005	Addressing exception		1	2	3		5	S T	
0006	Specification exception	0	1	2	3	С	9	3	
0007	Data exception		1	2	3	С	5	S T	
8000	Fixed-point-overflow exception		1	2	3	С			
0009	Fixed-point-divide exception		1	2	3	С	9	3	
000A	Decimal-overflow exception			2	3	С			
000B	Decimal-divide exception			2	3		9	3	
000C	HFP-exponent-overflow exception		1	2	3	С			
000D	HFP-exponent-underflow exception		1	2	3	С			
000E	HFP-significance exception		1	2		С			
000F	HFP-floating-point-divide exception		1	2			5	3	
0010	Segment-translation exception		1	2	3		N		
0011	Page-translation exception		1	2	3		N		
0012	Translation-specification exception		1	2	3		9	3	
0013	Special-operation exception		1	2	3		9	3	
0015	Operand exception			2			9	3	
0016	Trace-table exception		1	2			N		
0018	Transaction constraint		1	2	3		9	3	
001B	Vector-processing				3		9	3	
001C	Space-switch event	0	1	2		С			
001D	HFP-square-root exception			2			9		
001F	PC-translation-specification exception			2			5	3	
0020	AFX-translation exception		1	2			N		
0021	ASX-translation exception		1	2			N		
0022	LX-translation exception			2			N		
0023	EX-translation exception			2			N		

Code (Hex)	Condition	ILC Set	Instr. Ending
0024	Primary-authority exception	2	N
0025	Secondary-authority exception	1 2	N
0026	LFX-translation exception	2	N
0027	LSX-translation exception	2	N
0028	ALET-specification exception	1 2 3	S
0029	ALEN-translation exception	1 2 3	N
002A	ALE-sequence exception	1 2 3	N
002B	ASTE-validity exception	1 2 3	N
002C	ASTE-sequence exception	1 2 3	N
002D	Extended-authority exception	1 2 3	N
002E	LSTE sequence	2	N
002F	ASTE instance	1 2 3	N
0030	Stack-full exception	2	N
0031	Stack-empty exception	1 2	N
0032	Stack-specification exception	1 2	N
0033	Stack-type exception	1 2	N
0034	Stack-operation exception	1 2	N
0038	ASCE-type exception	1 2 3	N
0039	Region-first-translation exception	1 2 3	N
003A	Region-second-translation exception	1 2 3	N
003B	Region-third-translation exception	1 2 3	N
0040	Monitor event	2	С
0800	PER basic event (code may be combined with another code)	0 1 2 3	С
0800	PER nullification event	0	N
0119	Crypto-operation exception	2	N
0200	Transactional-execution-aborted event	1 2 3	С

## **Data-Exception Code (DXC)**

At real-storage location 147 (93 hex) and in byte 2 of floating-point-control register

Code	
(Hex)	Data Exception
00	General operand
01	AFP register
02	BFP instruction
03	DFP instruction
04	Quantum exception
07	Simulated quantum exception
08	IEEE inexact and truncated
0B	IXS inexact
0C	IEEE inexact and incremented
10	IEEE underflow, exact
13	IXS underflow, exact
18	IEEE underflow, inexact and truncated
1B	IXS underflow, inexact
1C	IEEE underflow, inexact and incremented
20	IEEE overflow, exact
23	IXS overflow, exact
28	IEEE overflow, inexact and truncated
2B	IXS overflow, inexact
2C	IEEE overflow, inexact and incremented
40	IEEE division by zero
43	IXS division by zero
80	IEEE invalid operation
83	IXS invalid operation
FE	Vector instruction
FF	Compare-and-trap or load-and-trap instruction

C Completed
ILC Instruction-length code
N Nullified

S

Suppressed Terminated

## **Vector-Exception Code (VXC)**

At real-storage location 147 (93 hex) and in byte 2 of floating-point-control register

١	VIX	VXC		Vector Interrupt Code (VIC)							
	VIX	VXC		Value	Meaning						
ı	)	4 7		0001	IEEE invalid operation						
				0010	IEEE division by zero						
	Vector Inde	x (VIX)		0011	IEEE overflow						
	ndex to the	leftmost elen	nent that recognized the	0100	IEEE underflow						
	exception			0101	IEEE inexact						

## PER Code, ATMID, and AI

At real-storage locations 150-151

	PER Code	ATMID	Al
- 1	0	8	14 15

Program	-Event-Recording (PER Code)	Addressing and-Translation-Mode ID (ATM							
Bit	<u>Meaning</u>	Bit	Meaning						
0	Successful-branching event	8	PSW bit 31						
1	Instruction-fetching event	9	ATMID-validity bit						
2	Storage-alteration event	10	PSW bit 32						
3	Reserved	11	PSW bit 5						
4	Store-using-real-address event	12-13	PSW bits 16-17						
5	Zero-address-detection event	PER ASC	CE Identification (AI)						
6	Transaction-end event	14-15	0 - primary; 1 - AR-specified;						
7	Instruction-fetch-nullification event		2 - secondary; 3 - home						

## **Translation-Exception Identification**

At real-storage locations 168-175 (A8-AF hex)

Interrup- tion Code (Hex)	Exception or Event	Format of Information Stored*
0004	Protection	If 61 zero: rest unpredictable, If 61 one: suppression, 0-51 address; 52-53 access-exception fetch/store indication; bits 56, 60, and 61 form a 3-bit protection code, 62-63 ASCE identification, rest unpredictable, location 160 valid; if DAT was off, rest unpredictable
0010	Segment translation	0-51 address; 52-53 access-exception fetch/store indication; 54-61 unpredictable, 62-63 ASCE identification
0011	Page translation	0-51 address; 52-53 access-exception fetch/store indication; 54-60 unpredictable, if 61, zero, not MOVE PAGE; if 61 one, MOVE PAGE (see location 162); 62-63 ASCE identification
001C	Space switch	From primary-space mode: 32 old primary-space- switch-event control, 33-47 zeros, 48-63 old PASN From home-space mode: 32 home-space-switch- event control, 33-63 zeros
0020	AFX translation	32-47 zeros, 48-63 address-space number
0021	ASX translation	32-47 zeros, 48-63 address-space number
0022	LX translation	32-43 zeros, 44-63 program-call number
0023	EX translation	32-43 zeros, 44-63 program-call number
0024	Primary authority	32-47 zeros, 48-63 address-space number
0025	Secondary authority	32-47 zeros, 48-63 address-space number
0026 0027	LFX translation LSX translation	When bit 44 is 0: 32-43 zeros, 44-63 program-call number. When bit 44 is 1, 32-63 program-call num- ber

Interrup- tion Code (Hex)	Exception or Event	Format of Information Stored*
0038	ASCE type	0-51 address; 52-53 access-exception fetch/store indication; 54-61 unpredictable, 62-63 ASCE identification
0039	Region-first translation	0-51 address; 52-53 access-exception fetch/store indication; 54-61 unpredictable, 62-63 ASCE identification
003A	Region-second translation	0-51 address; 52-53 access-exception fetch/store indication; 54-61 unpredictable, 62-63 ASCE identification
003B	Region-third translation	0-51 address; 52-53 access exception fetch/store indication; 54-61 unpredictable, 62-63 ASCE identification

14

V E F G C R C P R R

00000000

# **Machine-Check Interruption Code**

At real-storage locations 232-239 (E8-EF hex)

C E D D

	U				4				0						14		10							
	I E	A R	D A	0	G S	0	0	0	0	0	P R	F C	A P	0	C	C	0	0	0	0	0	0	0	0
ı	32				36				40		42				46		48							
	Bit				Ме	an	ing																	
	0				(SE	0) 8	Syst	em	da	ıma	age													
	1				(PE	D) I	nstr	uct	ion	-pr	OCE	essi	ng	daı	ma	ge								
	2				(SF	3 (8	Syst	em	re	COV	/ery	1												
	4				(CE	D) <sup>-</sup>	Γimi	ng	fac	ilit	y da	ama	age											
	5				(EI	D) E	Exte	rna	al d	am	age	Э												
	7				(DC	G) I	Deg	rac	lati	on														
	8				(W	) W	<i>l</i> arn	ing																
	9				(CF	2) (	Cha	nne	el re	epc	ort p	en	din	g										
	10				(SF	9) (	Serv	rice	-pr	006	ess	or c	lan	nag	е									
	11				(Cł	() (	Cha	nne	el-s	ub	sys	tem	n da	ama	age									
	14				(B)	Ва	icke	dι	ıр															
	16				(SE	Ξ) S	Stor	age	e er	ror	un	cor	rec	ted										
	17				(SC	C) S	Stor	age	e ei	101	CO	rre	cte	b										
	18				(KE	Ξ) ξ	Stor	age	e-ke	еу е	erro	r u	ncc	rre	cte	d								
	19				(DS	S) S	Stor	age	e de	egr	ada	tio	n											
	20				(W	P)	PS۱	N-N	ЛW	P١	/alio	dity												
	21				,	,	PSV								•									
	22				(PN	I (N	PSV	۷p	rog	rar	n-n	nas	k a	nd	cor	dit	ion-	-co	de	vali	dity	1		
	23				(IA	) P	SW	-ins	stru	ctio	on-a	add	lres	s v	alic	lity								
	24				(FA	() F	ailir	ng-	sto	ag	e-a	ddı	ess	s va	lidi	ty								
	25				(VF	۲) ۱	/ect	or-	reg	iste	er v	alic	lity											
	26				(EC	C) E	Exte	rna	al-d	am	nag	e-c	ode	va	lidi	ty								
	27				(FF	P) F	loa	tinç	g-po	oin	t-re	gist	er	vali	dity	1								
	28				(GF	R) (	Gen	era	al-re	egi	ster	va	lidi	ty										

(CR) Control-register validity

(RI) Reserved for IBM use

(ST) Storage logical validity (IE) Indirect storage error

(AR) Access-register validity

(AP) Ancillary report

(CT) CPU-timer validity

(CC) Clock-comparator validity

(DA) Delayed-access exception

(GS) Guarded-storage-registers validity

(PR) TOD-programmable-register validity

(FC) Floating-point-control-register validity

29

30

31

32 33

34

36

42

43

44

<sup>\*</sup> Bits 0-31 (bytes 168-171) unchanged if not described.

### **External-Damage Code**

At real-storage address 244-247 (F4-F7 hex)

0	)	0	0	0	0	0	0	0	X N	X F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	)								8	9	10						16								24							31

### Bit Meaning

- 8 (XN) Expanded storage not operational
- 9 (XF) Expanded-storage control failure

## **Facility Indications**

Bit Meaning when Bit is One

The first 32 facility indications are stored at real-storage locations 200-203 (C8-CB hex) by STFL; the specified number of doublewords of facility indications are stored at second-operand location by STFLE.

	Dit	meaning when bit is one
-	0	The instructions marked "N3" in the instruction-summary figures in Chapters 7 and 10 are installed.
	1	The z/Architecture architectural mode is installed.
	2	The z/Architecture architectural mode is active. When bits 2 and 168 are both zero, the ESA/390 architectural mode is active; when bit 2 is zero and bit 168 is one, the ESA/390 compatibility mode is active.
	3	The DAT-enhancement facility is installed in the z/Architecture architectural mode. The DAT-enhancement facility includes the INVALIDATE DAT TABLE ENTRY (IDTE) and COMPARE AND SWAP AND PURGE (CSPG) instructions.
	4	INVALIDATE DAT TABLE ENTRY (IDTE) performs the invalidation-and-clearing operation by selectively clearing TLB segment-table entries when a segment-table entry or entries are invalidated. IDTE also performs the clearing-by-ASCE operation. Unless bit 4 is one, IDTE simply purges all TLBs. Bit 3 is one if bit 4 is one.
	5	INVALIDATE DAT TABLE ENTRY (IDTE) performs the invalidation-and-clearing operation by selectively clearing TLB region-table entries when a region-table entry or entries are invalidated. Bits 3 and 4 are ones if bit 5 is one.
	6	The ASN-and-LX reuse facility is installed in the z/Architecture architectural mode.
	7	The store-facility-list-extended facility is installed.
	8	The enhanced-DAT facility 1 is installed in the z/Architecture architectural mode.
	9	The sense-running-status facility is installed in the z/Architecture architectural mode.
	10	The conditional-SSKE facility is installed in the z/Architecture architectural mode.
	11	The configuration-topology facility is installed in the z/Architecture architectural mode.
	13	The IPTE-range facility is installed in the z/Architecture architectural mode.
	14	The nonquiescing key-setting facility is installed in the z/Architecture architectural mode.
	16	The extended-translation facility 2 is installed.
	17	The message-security assist is installed.
	18	The long-displacement facility is installed in the z/Architecture architectural mode.
	19	The long-displacement facility has high performance. Bit 18 is one if bit 19 is one.
	20	The HFP-multiply-add/subtract facility is installed.
	21	The extended-immediate facility is installed in the z/Architecture architectural mode.
	22	The extended-translation facility 3 is installed in the z/Architecture architectural mode.
	23	The HFP-unnormalized-extension facility is installed in the z/Architecture architectural mode.
	24	The ETF2-enhancement facility is installed.
	25	The store-clock-fast facility is installed in the z/Architecture architectural mode.
	26	The parsing-enhancement facility is installed in the z/Architecture architectural mode.
	27	The move-with-optional-specifications facility is installed in the z/Architecture architectural mode.
	28	The TOD-clock-steering facility is installed in the z/Architecture architectural mode.
	30	The ETF3-enhancement facility is installed in the z/Architecture architectural mode.
	31	The extract-CPU-time facility is installed in the z/Architecture architectural mode.
	32	The compare-and-swap-and-store facility is installed in the z/Architecture architectural mode.
	33	The compare-and-swap-and-store facility 2 is installed in the z/Architecture architectural mode.
	34	The general-instructions-extension facility is installed in the z/Architecture architectural mode.
	35	The execute-extensions facility is installed in the z/Architecture architectural mode.
		The subsected as a facility is in a final in the subsection of the standard and a subsection of the standard and the standard

The enhanced-monitor facility is installed in the z/Architecture architectural mode.

The floating-point extension facility is installed in the z/Architecture architectural mode.

#### Rit Meaning when Bit is One

49

- 39 Assigned to IBM internal use.
- 4١ The set-program-parameters facility is installed in the z/Architecture architectural mode.
- 41 The floating-point-support-enhancement facilities (FPR-GR-loading, FPS-sign-handling, and DFP-rounding) are installed in the z/Architecture architectural mode.
- 12 The DFP (decimal-floating-point) facility is installed in the z/Architecture architectural mode.
- 43 The DFP (decimal-floating-point) facility has high performance. Bit 42 is one if bit 43 is
- 11 The PFPO instruction is installed in the z/Architecture architectural mode.
- 45 The distinct-operands, fast-BCR-serialization, high-word, and population-count facilities, the interlocked-access facility 1, and the load/store-on-condition facility 1 are installed in the z/Architecture architectural mode.
- 47 The CMPSC-enhancement facility is installed in the z/Architecture architectural mode.
- The decimal-floating-point zoned-conversion facility is installed in the z/Architecture archi-48 tectural mode
- The execution-hint, load-and-trap, and processor-assist facilities and the miscellaneousinstruction-extensions facility 1, are installed in the z/Architecture architectural mode. 50 The constrained transactional-execution facility is installed in the z/Architecture architec-
- tural mode. This bit is meaningful only when bit 73 is one.
- 51 The local-TLB-clearing facility is installed in the z/Architecture architectural mode.
- The interlocked-access facility 2 is installed. 52
- 53 The load/store-on-condition facility 2 and load-and-zero-rightmost-byte facility are installed in the z/Architecture architectural mode.
- 57 The message-security-assist-extension 5 is installed in the z/Architecture architectural mode.
- 58 The miscellaneous-instruction-extensions facility 2 is installed in the z/Architecture architectural mode.
- 66 The reset-reference-bits-multiple facility is installed in the z/Architecture architectural mode
- 67 The CPU-measurement counter facility is installed in the z/Architecture architectural
- 68 The CPU-measurement sampling facility is installed in the z/Architecture architectural mode.
- 73 The transactional-execution facility is installed in the z/Architecture architectural mode. Bit 49 is one when bit 73 is one
- 7/ The store-hypervisor-information facility is installed in the z/Architecture architectural mode (see z/VM CP Programming Services [SC24-6179]).
- 75 The access-exception-fetch/store-indication facility is installed in the z/Architecture architectural mode. 76 The message-security-assist-extension 3 is installed in the z/Architecture architectural
- mode. 77 The message-security-assist-extension 4 is installed in the z/Architecture architectural
- 78 The enhanced-DAT facility 2 is installed in the z/Architecture architectural mode.
- 80 The decimal-floating-point packed-conversion facility is installed in the z/Architecture architectural mode.
- 129 The vector facility for z/Architecture is installed in the z/Architecture architectural mode.
- The instruction-execution-protection facility is installed in the z/Architecture architectural 130 mode.
- The side-effect-access facility and the enhanced-suppression-on-protection facility 2 are 131 installed in the z/Architecture architectural mode.
- 133 The guarded-storage facility is installed in the z/Architecture architectural mode.
- 134 The vector-packed-decimal facility is installed in the z/Architecture architectural mode. 135
- The vector-enhancements facility 1 is installed in the z/Architecture architectural mode.
- 138 The configuration z/Architecture architectural mode facility is installed.
- 139 The multiple-epoch facility is installed in the z/Architecture architectural mode.
- 142 The store-CPU-counter-multiple facility is installed.
- 144 The test-pending-external-interruption facility is installed in the z/Architecture architectural mode.
- 145 The insert-reference-bits-multiple facility is installed in the z/Architecture architectural
- 146 The message-security-assist-extension 8 is installed in the z/Architecture architectural
  - The ESA/390-compatibility-mode facility is installed in the configuration.

# **Control Registers**

CR	Bits	Name of Field	Associated with	lni
0	8	Transactional-execution control	Transactional-execution	0
	9	Program-interruption filtering override	Transactional-execution	0
	10	Clock-comparator sign control	TOD clock	0
	30	Warning-track-interruption enable- ment	Virtual machines	0
	32	Trace TOD-clock control	TOD clock	0
	33	SSM-suppression control	SSM instruction	0
	34	TOD-clock-sync control	TOD clock	0
	35	Low-address-protection control	Low-address protection	(
	36	Extraction-authority control	Instruction authorization	(
	37	Secondary-space control	Instruction authorization	(
	38	Fetch-protection-override control	Key-controlled protection	(
	39	Storage-protection-override control	Key-controlled protection	(
	40	Enhanced-DAT-enablement control	Dynamic address translation	(
	43	Instruction-execution-protection- enablement control	Instruction-execution protection	(
	44	ASN-and-LX-reuse control	Instruction authorization	(
	45	AFP-register control	Floating point	(
	46	Vector enablement control	Vector facility for z/Architecture	
	48	Malfunction-alert subclass mask	External interruptions	
	49	Emergency-signal subclass mask	External interruptions	
	50	External-call subclass mask	External interruptions	Ι,
	52	Clock-comparator subclass mask	External interruptions	Ι,
	53	CPU-timer subclass mask	External interruptions	١,
	54	Service-signal subclass mask	External interruptions	Ι,
	56	Unused (See note)		
	57	Interrupt-key subclass mask	External interruptions	
	58	Unused (See note)		
	59	ETR subclass mask	External interruptions	Ι,
	61	Crypto control	Cryptography	1
1	0-63	Primary address-space-control ele-	Dynamic address translation	
		ment		
	0-51	Primary region-table or segment- table origin or real-space token origin	Dynamic address translation	(
	54	Primary subspace-group control	Subspace groups	(
	55	Primary private-space control	Dynamic address translation	1
	56	Primary storage-alteration-event control	Program-event recording	'
	57	Primary space-switch-event control	Program interruptions	1
	58	Primary real-space control	Dynamic address translation	1
	60-61	Primary designation-type control	Dynamic address translation	
	62-63	Primary table length	Dynamic address translation	
2	33-57	Dispatchable-unit-control-table origin	Access-register translation	
	59	Guarded-storage facility enablement	Guarded-storage facility	
	61	Transaction diagnostic scope	Transactional execution	
	62-63	Transaction diagnostic control	Transactional execution	
3	0-31	Secondary ASTE Instance Number	Instruction authorization	T
	32-47	PSW-key mask	Instruction authorization	
	48-63	Secondary ASN	Address spaces	
4	0-31	Primary ASTE Instance Number	Instruction authorization	T
	32-47	Authorization index	Instruction authorization	1
	48-63	Primary ASN	Address spaces	
5	33-57	Primary-ASTE origin	Access-register translation	
6	32-39	I/O-interruption subclass mask	I/O interruptions	
7	0-63	Secondary address-space-control element	Dynamic address translation	
	0-51	Secondary region-table or segment- table origin or real-space token origin	Dynamic address translation	'
	54	Secondary subspace-group control	Subspace groups	
	55	Secondary private-space control	Dynamic address translation	
	56	Secondary storage-alteration-event control	Program-event recording	'
	58	Secondary real-space control	Dynamic address translation	
	60-61	Secondary designation-type control	Dynamic address translation	(

CR	Bits	Name of Field	Associated with	Init*
8	16-31	Enhanced-monitor masks	MONITOR CALL instruction	0
	32-47	Extended authorization index	Access-register translation	0
	48-63	Monitor masks	MONITOR CALL instruction	0
9	32	Successful-branching-event mask	Program-event recording	0
	33	Instruction-fetching-event mask	Program-event recording	0
	34	Storage-alteration-event mask	Program-event recording	0
	36	Store-using-real-address-event mask	Program-event recording	0
	37	Zero-address-detection-event mask	Program-event recording	0
	38	Transaction-end-event mask	Program-event recording	0
	39	Instruction-fetching-nullification-event mask	Program-event recording	0
	40	Branch-address control	Program-event recording	0
	41	Event-suppression control	Program-event recording	0
	42	Storage-alteration-space control	Program-event recording	0
10	0-63	PER starting address	Program-event recording	0
11	0-63	PER ending address	Program-event recording	0
12	0	Branch-trace control	Tracing	0
	1	Mode-trace control	Tracing	0
	2-61	Trace-entry address	Tracing	0
	62	ASN-trace control	Tracing	0
	63	Explicit-trace control	Tracing	0
13	0-63	Home address-space-control element	Dynamic address translation	0
	0-51	Home region-table or segment-table origin or real-space token origin	Dynamic address translation	0
	54	Home subspace-group control	Subspace groups	0
	55	Home private-space control	Dynamic address translation	0
	56	Home storage-alteration-event control	Program-event recording	0
	57	Home space-switch-event control	Program interruptions	0
	58	Home real-space control	Dynamic address translation	0
	60-61	Home designation-type control	Dynamic address translation	0
	62-63	Home table length	Dynamic address translation	0
14	32	Unused (See note)		1
	33	Unused (See note)		1
	35	Channel-report-pending subclass mask	I/O machine-check handling	0
	36	Recovery subclass mask	Machine-check handling	0
	37	Degradation subclass mask	Machine-check handling	0
	38	External-damage subclass mask	Machine-check handling	1
	39	Warning subclass mask	Machine-check handling	0
	42	TOD-clock-control-override control	TOD clock	0
	44	ASN-translation control	Instruction authorization	0
	45-63	ASN-first-table origin	ASN translation	0
15	0-60	Linkage-stack-entry address	Linkage-stack operations	0

\* Value after initial CPU reset.

Note: This bit is not used but is initialized to one for consistency with the System/370 definition.

# Floating-Point-Control (FPC) Register

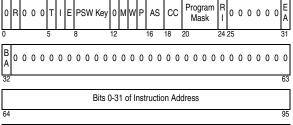
Masks	Masks Flags								DXC (see page 46)				
I I I I I M M M M M i z o u x	I M 0 0 q	S S F F i z	S F o	SFu	S F x	S F q	0	0	or VCX (see page 47)	0	DRM	0	BRM
0		8							16	24			31

Bit	<u>Meaning</u>
0	(IMi) IEEE-invalid-operation mask

- (IMz) IEEE-division-by-zero mask 2 (IMo) IEEE-overflow mask
- 3 (IMu) IEEE-underflow mask 4 (IMx) IEEE-inexact mask
- 5 (IMg) Quantum-exception mask (SFi) IEEE-invalid-operation flag
- (SFz) IEEE-division-by-zero flag 9 (SFo) IEEE-overflow flag 10 (SFu) IEEE-underflow flag 11
- (SFx) IEEE-inexact flag 13 (SFq) Quantum-exception flag
- 16-23 (DXC) Data-exception code (see table on page 46)
- 25-27 (DRM) DFP Rounding mode
- 000 Round to nearest with ties to even
  - 001 Round toward 0 010 Round toward +∞
  - 011 Round toward -∞
  - 100 Round to nearest with ties away from 0 101 Round to nearest with ties toward 0
  - 110 Round away from 0
  - 111 Round to prepare for shorter precision
- (BRM) BFP Rounding mode 29-31
  - 000 Round to nearest 001 Round toward 0
  - 010 Round toward +∞
  - 011 Round toward -∞
  - 111 Round to prepare for shorter precision

## Program-Status Word (PSW)

### z/Architecture PSW



96			
Rit	Meaning		

_	
1	(R) Program-event-recording mask
5	(T = 1) DAT mode

(I) Input/output mask 6 (E) External mask 12 Zero indicates a 16-byte PSW

16-17

(M) Machine-check mask 13 (W = 1) Wait state 15 (P = 1) Problem state

> xx Real mode (T = 0) 00 - Primary-space mode (T = 1) 01 - Access-register mode (T = 1) 10 - Secondary-space mode (T = 1)

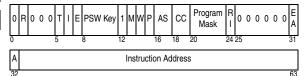
11 - Home-space mode (T = 1) (CC) Condition code 18-19 Fixed-point-overflow mask 20

21 Decimal-overflow mask 22 HFP-exponent-underflow mask

24 Reserved for IBM use HFP-significance mask 23 31/32 Extended/basic addressing mode

00 - 24-bit mode 01 - 31-bit mode 10 - Invalid 11 - 64-bit mode

### **Short-Format PSW**



Meaning 12

One indicates a short-format PSW

## **Dynamic Address Translation**

### Virtual-Address Format

← 11 →	← 11 →	← 11 →	← 11 →	← 8 →	← 12 →
RFX	RSX	RTX	SX	PX	BX
0	11	22	33	44	52 63
Field M	—— RX — leaning				

RX Region index (region = 2G bytes)

RFX Region first index RSX Region second index

RTX Region third index

SX Segment index (segment = 1M bytes)

PX Page index (page = 4K bytes)

BX Byte index

### Address-Space-Control Element (ASCE)

### Region-Table or Segment-Table Designation (RTD or STD)

	Region-Table or Segment-Table Origin		GI	S	ΧR	DT	DL
0		52	54		58	60	63
Bit	<u>Meaning</u>						
54	(G) Subspace-group control						
55	(P) Private-space control						
56	56 (S) Storage-alteration-event control						
57	57 (X) Space-switch-event control						
58	(R) Real-space control (R = 0)						
60-61	(DT) Designation-type control						
	11 Region-first-table						
	10 Region-second-table						
	01 Region-third-table						
	00 Segment-table						
62-63	(DL) Designation length (x 4K bytes)						

### Real-Space Designation (RSD)



Bit Meaning

58 (R) Real-space control (R = 1)

Note: Other bits are as in RTD or STD.

#### **Table Values**

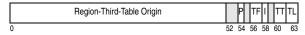
	laava	lass	Incr. En-	Max.	Max. En-	Max Table Maps		
Table	Incre- ment	Incr. Size	tries	Size	tries	Regions	Bytes	
Region First	1-4	4KB	512	16KB	2K	8G	16E =16×2 <sup>60</sup>	
Region Second	1-4	4KB	512	16KB	2K	4M	$8P = 8 \times 2^{50}$	
Region Third	1-4	4KB	512	16KB	2K	2K	$4T = 4 \times 2^{40}$	
Segment	1-4	4KB	512	16KB	2K	1	$2G = 2 \times 2^{30}$	
Page	1	2KB	256	2KB	256	_	$1M = 2^{20}$	

### Region-Table Entry (RTE)

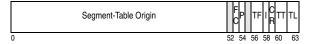
### Region-First-Table Entry (RFTE)

Region-Second-Table Origin		Р	TF	ı	TT	TL
0	52	54	56	58	60	63

### Region-Second-Table Entry (RSTE)



### Region-Third-Table Entry (RTTE, FC=0)



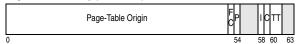
### Region-Third-Table Entry (RTTE, FC-1)



#### Bit Meaning

- 47 (AV) Access-control (ACC) and fetch-protection (F) validity bit
- 48-51 (ACC) Access-control bits
- 52 (F) Fetch-protection bit
- 53 (FC) Format control
- 54 (P) DAT protection bit
- 55 (IEP) Instruction-execution-protection bit (format-1 RTTE only)
- 56-57 (TF) Table offset (for next-lower-level table)
  - 58 (I) Invalid bit (for set of regions in RFTE or RSTE, or for region in RTTE
  - 59 (CR) Common-region bit
  - 60-61 (TT) Table-type bits (for this table) 11=Region first table
    - 10=Region second table
    - 01=Region third table
  - 62-63 (TL) Table length (for next-lower-level table) (x 4K bytes)

### Segment-Table Entry (STE, FC=0)



### Segment-Table Entry (STE, FC=1)



### Bit Meaning

- 47 (AV) Access-control (ACC) and fetch-protection (F) validity bit
- 48-51 (ACC) Access-control bits
- 52 (F) Fetch-protection bit
- 53 (FC) Format control
- 54 (P) DAT-protection bit 55 (IEP) Instruction-execution-protection bit (format-1 STE only)
- 58 (I) Segment-invalid bit
- 59 (CS) Common-segment bit
  - 60-61 (TT) Table-type bits (for this table): 00=Segment table

### Page-Table Entry (PTE)



### Bit Meaning

- 53 (I) Page-invalid bit
- 54 (P) DAT-protection bit
- 55 (IEP) Instruction-execution-protection bit (format-1 STE only)

### **ASN Translation**

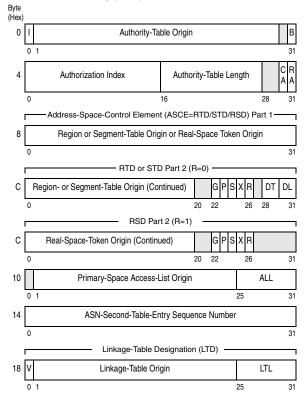
### Address-Space Number (ASN)

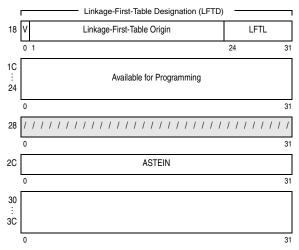
ASN-First- Table Index	ASN-Se Table I	
0	10	15

### **ASN-First-Table Entry**

I	ASN-Second-Table Origin	0 0 0 0 0 0
0 1		26 31
Bit	<u>Meaning</u>	
0	(I) AFX-invalid bit	

### ASN-Second-Table Entry (ASTE)





### Byte.Bit Meaning

0.0 (I) ASX-invalid bit

0.31 (B) Base-space bit 4.30 (CA) Controlled-ASN bit

4.31 (RA) Reusable-ASN bit

10.25-31 (ALL) Access-list length (x 128 bytes)

18.0 (V) Subsystem-linkage control

18.25-31 (LTL) Linkage-table length (x 128 bytes)

18.24-31 (LFTL) Linkage-first-table length (x 256 bytes)

### **PC-Number Translation**

### Program-Call Number (20-Bit)

	Linkage Index	Entry Index	
32	44	56	63

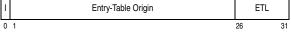
### Program-Call Number (32-Bit, Bit 44=0)

	0	LFX	LSX	Entry Index	
32	44		51	56	63

### Program-Call Number (32-Bit, Bit 44=1)

	LFX1	1	LFX2	LSX	Entry Index	
32		44		51	56	63

### Linkage-Table Entry (LTE)



Bit Meaning

0 (I) LX-invalid bit

26-31 (ETL) Entry-table length (x 128 bytes)

### Linkage-First-Table Entry (LFTE)

(I) LFX-invalid bit

1	Linkage-Second-Table Origin		
0 1		24	31
Bit	Meaning		

### Linkage-Second-Table Entry (LSTE)

(ETL) Entry-table length (x 128 bytes)

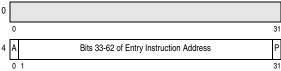
	• • • •		
1	Entry-Table Origin		ETL
0 1		:	26 31
	LSTESN		
32			63
<u>Bit</u> 0	Meaning (I) LSX-invalid bit		

### **Entry-Table Entry (ETE)**

Byte (Hex)

0

### If Bit 10.1 (G) Is Zero



## If Bit 10.1 (G) Is One

Р
31

Bits 0-31 of Entry Instruction Address

8	Authorization Key Mask		Address-Space Number		
	0		16	31	
С		Entry Key Mask			

	U					'	0			3
10	Т	GRIKME	cs	EK			E	Entry Ext. Authori	ty Index	
	0	3	8		12	1	6			31
14			ASN-S	Second	-Table	-Entr	v Addre	ess		

	,		
	0 1	26 3	1
18	Bits 0-31 of Entry Parameter		

	0		31
1C		Bits 32-63 of Entry Parameter	

### Byte.Bit Meaning

4.0 (A) Entry addressing mode4.31 (P) Entry problem state

10.0 (T) PC-type bit (zero: basic; one: stacking)

10.1 (G) Entry extended addressing mode

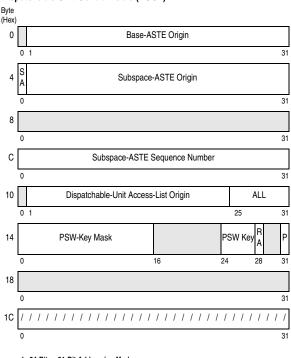
10.2	(RI) Reserved for IBM use
10.3	(K) PSW-key control (zero: unchanged; one: replace if stacking
10.4	(M) PSW-key-mask control (zero: Or; one: replace if stacking)
10.5	(E) EAX control (zero: unchanged; one: replace if stacking)
10.6	(C) Address-space-control control
10.7	(S) Secondary-ASN control
10.8-11	(EK) Entry key

## **Access-Register Translation**

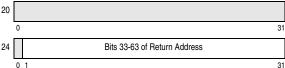
## Access-List-Entry Token (ALET)

0 0 0	0 0 0 0 P	ALESN	Access-List-Entry Number	
0	7	8	16	31
Bit	Meaning			
7	(P) Primary-list bit (zero: use DUCT; one: use primary ASTE)			
8-15	(ALESN) Access-list-entry sequence number			

### Dispatchable-Unit-Control Table (DUCT)







## In 64-Bit Addressing Mode

	In 64-Bit Addressing Mode		
20	Bits 0-31 of Return Address		
	0		31
24	Bits 32-63 of Return Address		
	0		31
28			
	0		31
2C	Trap-Control-Block Address		Ε
	0	29	31
30 : 3C			
3C			

#### Byte.Bit Meaning

0

4.0 (SA) Subspace-active bit

10.25-31 (ALL) Access-list length (x 128 bytes)

14.28 (RA) Reduced-authority bit

14.31 (P) Problem-state bit

2C.31 (E) TRAP-enabled bit Available for programming

Access-List Entry (ALE)

Acces	ss-List Entry	(ALE)			
I	F <sub>O</sub> P	ALESN	Access-List-Entry (ALE	Authorization EAX)	Index
0 1	6	8	16		31
32					63
	ASN-S	Second-Table-Entry	Origin (ASTEO)		
64				90	95
	ASN-S	econd-Table-Entry	Sequence Number (AS	TESN)	
96					127
<u>Bit</u>	Meaning				
0	(I) AI FNLiny	alid hit			

(I) ALEN-invalid bit (FO) Fetch-only bit

(P) Private bit

8-15 (ALESN) Access-list-entry sequence number

# **Linkage-Stack Entries**

#### **Entry Descriptor**

	.,			
U	Entry Type	Section ID	Remaining Free Space	
0	1	8	16	31
	Next-Er	ntry Size		
32			48	63

31

#### Bit Meaning

0 (U) Unstack-suppression bit

1-7 Entry type:

Header entry = 0001001 binary Trailer entry = 0001010 binary Branch state entry = 0001100 binary Program-call state entry = 0001101 binary Available for program use = 1xxxxxxx binary

#### Header Entry (Entry Type 0001001)

	Bits 0-31 of Backward Stack-Entry Address		
0			31
	Bits 32-60 of Backward Stack-Entry Address		В
32		61	63
	Entry Descriptor (First Half)		
64			95
	Entry Descriptor (Second Half)		
96			127
Dia.	Maguina		

Bit Meaning

63 (B) Backward stack-entry validity bit

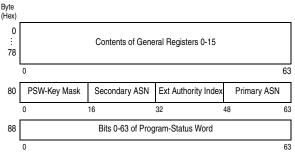
#### Trailer Entry (Entry Type 0001010)

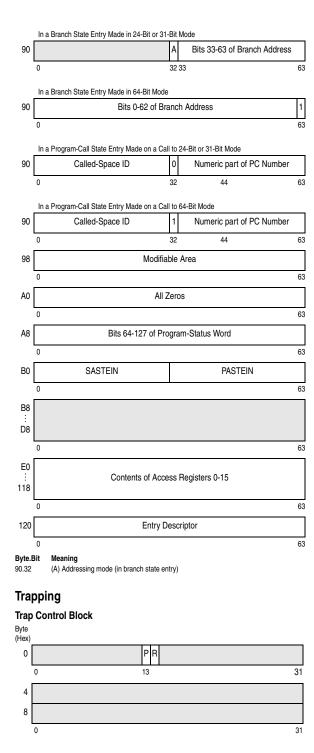
	Bits 0-31 of Forward-Section-Header Address		
0			31
	Bits 32-60 of Forward-Section-Header Address		F
32		61	63
	Entry Descriptor (First Half)		
64			95
	Entry Descriptor (Second Half)		
96			127

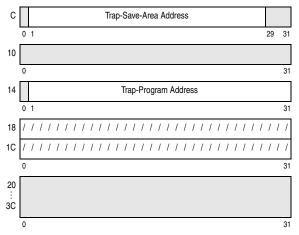
Bit Meaning

63 (F) Forward-section validity bit

# Branch State Entry (Entry Type 0001100) and Program-Call State Entry (Entry Type 0001101)







#### Byte.Bit Meaning

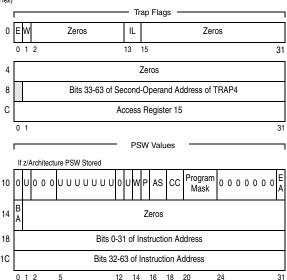
 (P) PSW control (zero: PSW.31 must be zero, ESA/390 PSW stored; one: z/Architecture PSW stored)

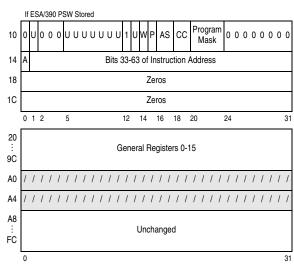
0.14 (R) General-register control (zero: bits 32-63 stored; one: bits 0-63 stored)

/// Available for programming

#### **Trap Save Area**

Byte (Hex)





#### Byte.Bit Meaning

0.0 (E) TRAP was target of EXECUTE
0.1 (W) TRAP is TRAP4 (not TRAP2)
0.13-14 (IL) Instruction-length code
10-1F PSW values (see PSW on page 54)

U Unpredictable

/// Available for programming

## **Trace-Entry Formats**

### **Identification of Trace Entries**

Trace-Entry Bits		s	Trace Entry		
0-7	8-11	12-15	Туре	Format	
00000000			Branch	1	
00010000		000N	Set Secondary ASN	1	
00100001			Program Call	11	
00100010			Program Call	21	
00100001		0	Program Call	3 <sup>1</sup>	
00100010		0	Program Call	41	
00100010		100E	Program Call	5 <sup>1</sup>	
00100010		101E	Program Call	6 <sup>1</sup>	
00100011		111E	Program Call	7 <sup>1</sup>	
00110001		000N	Program Transfer	1	
00110001		100N	Program Transfer	2	
00110010		0000	Program Return	1	
00110010		0010	Program Return	2	
00110010		1000	Program Return	4	
00110010		1010	Program Return	5	
00110010		110N	Program Transfer	3	
00110011		0011	Program Return	3	
00110011		1011	Program Return	6	
00110011		1100	Program Return	7	
00110011		1110	Program Return	8	

Trace-Entry Bits		s	Trace Entry		
0-7	8-11	12-15	Туре	Format	
00110100		1111	Program Return	9	
01000001			Branch in Subspace Group	1	
01000010			Branch in Subspace Group	2	
01010001	0010		Mode Switch	2	
01010001	0011		Mode Switch	1	
01010001	1010		Mode-Switching Branch	1	
01010001	1011		Mode-Switching Branch	2	
01010010	0110		Mode Switch		
01010010	1100		Branch		
01010010	1111		Mode-Switching Branch	3	
0111	0		Trace	1	
0111	1		Trace	2	
1			Branch		

Format-1 and -2 entries are made when the ASN-and-LX-reuse facility (ALRF) is not enabled. Entries of formats 3-7 are made when the facility is enabled.

#### **Branch**

F1 (Branch, RP, or TRAP2/4 to 24-Bit Mode)

0000000		Bits 40-63 of Branch Address	
0	8		31

F2 (Branch, RP, or TRAP2/4 to 31/64-Bit Mode)



F3 (Branch, RP, or TRAP2/4 to 64-Bit Mode)

010100101100	All Zeros	Bits 0-31 of Branch Address
0 8	12	32 63
Bits 32-6	63 of Branch Address	
64	95	

Note: "Branch" is BAKR, BALR, BASR, BASSM, BSA, or BSG.

#### Branch in Subspace Group (if ASN Tracing on)

F1 (in 24/31-Bit Mode)

01	000001P	Bits 9-31 of ALET	Α	Bits 33-63 of Branch Address	
0	8	•	3		63

F2 (in 64-Bit Mode)

01000010P	Bits 9-31 of ALET		Bits 33-63 of Branch Address	
0 8		32		63
Bits 32	-63 of Branch Address			
64	(	95		

E Indicates, when one, that the extended-addressing-mode bit, PSW bit 31, was set to one.

N Indicates, when one, that an entry was made because of PTI or SSAIR.

#### Mode Switch

F1 (BASSM, BSM, PC, PR, RP, or SAM64 from 24/31-Bit to 64-Bit Mode)

01010001	0011		All Zeros	Α	Updated Instruction Address	
0	8	12		32		63

F2 (BASSM, BSM, PC, PR, RP, SAM24/31 from 64-Bit to 24/31-Bit Mode)

010100	01001	0	All Zeros	Bits 32-63 of Updated Inst. Address	
0	8	12		32	63

F3 (BASSM, BSM, PC, PR, RP, SAM24/31 from 64-Bit to 24/31-Bit Mode)

010	100100110	)	All Zeros		Bits 0-31 of Updated Inst. Addres	s
0	8	12		3	32	63
	Bits 32-63	of Upd	ated Inst. Address			
64				95	į	

#### Mode-Switching Branch

F1 (BASSM or RP from 64-Bit to 24/31-Bit Mode)

0101	0001101	0	All Zeros	А	Branch Address	
0	8	12		32		63

F2 (BASSM or RP from 24/31-Bit to 64-Bit Mode)

01	010001	1011		All Zeros	Bits 32-63 of Branch Address	
0	8	3	12		32	63

F3 (BASSM or RP from 24/31-Bit to 64-Bit Mode)

010100101111	All Zeros	Bits 0-31 of Branch Address
0 8 1	2	32 63
Bits 32-63	3 of Branch Address	
64	95	•

#### **Program Call**

F1 (in 24/31-Bit Mode, ALRF Not Enabled)

00100	001 PSW Key		All Zeros	A	Bits 33-62 of Return Address	F
0	8	12		32		63

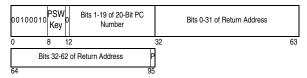
F2 (in 64-Bit Mode, ALRF Not Enabled)

00100010 PSW Key	All Zeros	Bits 0-31 of Return Address	
0 8 12	2	32	63
Bits 32-62	of Return Address	P	
64	(	5	

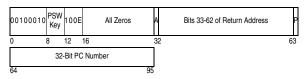
F3 (in 24/31-Bit Mode, ALRF Enabled, 20-Bit PC Number)

0010000	1 PSV Key	0	Bits 1-19 of 20-Bit PC Num- ber	Α	Bits 33-62 of Return Address	P
0	8	1	2	32		63

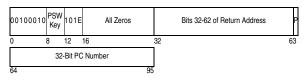
#### F4 (in 64-Bit Mode, ALRF Enabled, 20-Bit PC Number)



#### F5 (in 24/31-Bit Mode, ALRF Enabled, 32-Bit PC Number)



# F6 (in 64-Bit Mode, ALRF Enabled, 32-Bit PC Number, Bits 0-31 of Return Address All Zeros)

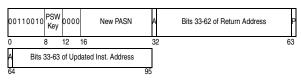


# F7 (in 64-Bit Mode, ALRF Enabled, 32-Bit PC Number, Bits 0-31 of Return Address Not All Zeros)

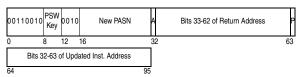
00100011	PSW Key	111E	All Zeros		Bits 0-31 of Return A	ddress
0	8	12	16		32	63
Bit	s 32-6	2 of R	eturn Address	Р	32-Bit PC Numb	er
64					96	127

#### Program Return

#### F1 (in 24/31-Bit to 24/31-Bit Mode)



#### F2 (in 64-Bit to 24/31-Bit Mode)



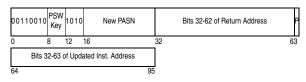
#### F3 (in 64-Bit to 24/31-Bit Mode)

00110	011 PSW Key	001	1	New PASN	А	Bits 33-62 of Return Address	P
0	8	12	16		32		63
				Updated Ir	struction	Address	
64							127

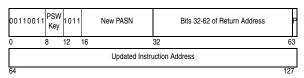
#### F4 (in 24/31-Bit to 64-Bit Mode)

0011	10010 PSW Key	1000	New PASN		Bits 32-62 of Return Address	P
0	8	12	16	32		63
A	Bits 33-63	of Upo	dated Inst. Address			
64			9	95		

#### F5 (in 64-Bit to 64-Bit Mode)



#### F6 (in 64-Bit to 64-Bit Mode)



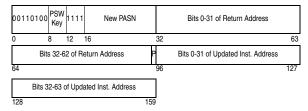
#### F7 (in 24/31-Bit to 64-Bit Mode)

00110011	PSW Key	1100	New PASN			Bits 0-31 of Return Address	
0	8	12	16		32		63
Bit	s 32-6	2 of R	eturn Address	Р	Α	Updated Instruction Address	
64					96		127

#### F8 (in 64-Bit to 64-Bit Mode)

0011	0011 PSW Key	1110	New	PASN		Bits 0-31 of Return Address	
0	8	12	16		32		63
	Bits 32-6	32 of R	eturn Addre	ss F	o	Bits 32-63 of Updated Inst. Address	
64					96		127

#### F9 (in 64-Bit to 64-Bit Mode)



## **Program Transfer**

F1 (in 24/31-Bit Mode)

001	10001	PSW Key	000N	New PASN		Bits 32-63 of R2 Before	
0		8	12	16	32		63

#### F2 (in 64-Bit Mode, Bits 0-31 of R2 All Zeros)

00	0110001	PSW Key	100N		New PASN		Bits 32-63 of R2 Before	
0		8	12	16		32		63

#### F3 (in 64-Bit Mode, Bits 0-31 of R2 Not All Zeros)

00110001	PSW Key	100N	New PASN	Bits 0-31 of R2 Before	
0	8	12	16	32	63
	Bits 3	2-63 c	f R2 Before		
64			9	5	

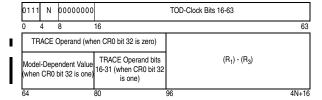
#### Set Secondary ASN

F1

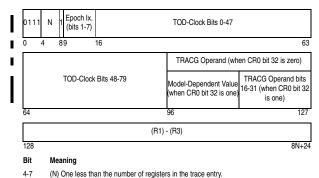
00010000	000000N	New SASN	
0	8	16	31

#### Trace

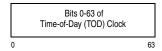
#### F1 (TRACE)



#### F2 (TRACG)



## **Operand of Store Clock and Store Clock Fast**



Note: Bit 51 of the TOD clock corresponds to one microsecond.

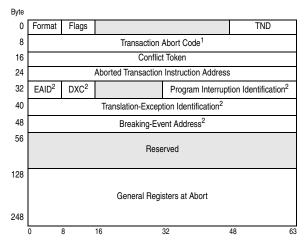
## Operand of Store Clock Extended

Epoch Index	Time-of-Day (TOD) Clock	Programmable Field	
0	8	112	127

Note: Bit 51 of the TOD clock (bit 59 of the operand) corresponds to one microsecond.

## Transaction Diagnostic Block (TDB)

TBEGIN-specified TDB is the operand of the TBEGIN instruction when B1  $\neq$  0; Program-interruption TDB is at real locations 6,144 - 6,399.



#### Explanation:

- 1 Transaction abort codes:
  - 2 External interruption
  - 4 Non-filtered program interruption
  - 5 Machine-check interruption
  - 6 I/O interruption
  - 7 Fetch overflow
  - 8 Store overflow
  - 9 Fetch conflict 10 - Store conflict

- 11 Restricted instruction12 Filtered program inter
- 12 Filtered program interruption
- 13 Nesting depth exceeded
- 14 Cache fetch-related condition15 Cache store-related condition
- 16 Cache other condition
- 255 Miscellaneous condition
- >255 TABORT instruction
- Field is stored only in the TBEGIN-specified TDB; otherwise, the field is reserved. The program interruption identification is only stored for program-interruption conditions. The EAID and translation-exception identification are stored only for access-list-controlled or DAT protection, ASCE-type, page translation, region-first translation, region-second translation, region-third translation, and segment translation program-interruption conditions. The DXC is stored only for data program-exception conditions.

TND Transaction nesting depth

## **Guarded-Storage Facility Registers and Parameters**

## Guarded-Storage-Designation (GSD) Register

Guarded-Storage Origin (GSO)																				
0													31							
GSO (continued)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	GLS	/	/	GS	SC	
32															53	56	5	58		63
Dit Maaning																				

#### Bit

- Meaning
  Guarded-storage origin (GSO), where J is 64-GSC 0-J
- 53-55 Guarded-load shift (GLS); valid values are 0-4
  58-63 Guarded-storage characteristic (GSC); valid va
- Guarded-storage characteristic (GSC); valid values are 25-56

### Guarded-Storage Control Block

	Reserved	
	i leaci veu	
0		63
	Guarded-Storage-Designation (GSD) Register (see above)	
64		127
	Guarded-Storage-Section-Mask (GSSM) Register	
128		191
	Guarded-Storage-Event-Parameter-List-Address (GSEPLA) Register (see below)	
192		255

#### **Guarded-Storage-Event Parameter List**

			GSEAM							(	GSE	ECI					GSEAI				
Reserved		0 0	0	0	0 0	Е	В	T X	C	0	0	0	0	0	N	N 0 T AS		AR			
			Reserved																		
Guarded-Storage-Event Handler Address (GSEHA)																					
	Guarded-Storage-Event Instruction Address (GSEIA)																				
	G	auarde	d-S	Stora	age-E	ver	nt C	)pei	ran	d A	ddr	ess	(G	SE	O.F	١)					
	Guarded-Storage-Event Intermediate Result (GSEIR)																				
Guarded-Storage-Event Return Address (GSERA)																					
Bits Meaning																					

Bits	Meaning
0-7	Reserved
8-15	Guarded-storage-event addressing mode (GSEAM)
	14 - Extended-addressing mode (E)
	15 - Basic Addressing mode (B)
16-23	Guarded-storage-event cause indication (GSECI)
	16 - CPU was in the transactional-execution mode (TX)
	17 - CPU was in the constrained transactional-execution mode (CX)
	23 - Instruction causing the event; 0-LGG, 1=LLGFSG
24-31	Guarded-storage-event access information (GSEAI)
	25 - DAT mode (copy of PSW bit 5)
	26-27 - Address-space indication (copy of PSW bits 16-17)
	28-31 - AR number (when in the AR mode; otherwise unpredictable
32-63	Reserved
64-127	Guarded-storage-event handler address (GSEHA)
128-191	Guarded-storage-event instruction address (GSEIA)
192-255	Guarded-storage-event operand address (GSEOA)
256-319	Guarded-storage-event intermediate result (GSEIR)
320-383	Guarded-storage-event return address (GSERA)

# Operation-Request Block (ORB)

#### Command-Mode ORB

Word

ioiu														
0		Interruption	Parameter											
1	Key SCMYFPIAUBHT LPM LD0000													
2	0 Channel-Program Address													
3	CSS Priority Reserved CU Priority Reserved													
4	Reserved													
5		Reserved												
6		Reserved												
7		Reserved												
	0 8 16 24													

## Transport-Mode ORB

Word.Bit Meaning 1.0-3 (Key) Subchannel key

Word

voiu															
0				lr	nte	rru	ption	Parameter							
1	Key	0 0 0 0	0 0	0 0	0	В	0 0	LPM	0 (	0 (	0	0	0 (	X	
2	0 Channel-Program Address														
3	CSS Priority Reserved Reserved for Pgm. Reserved														
4		Reserved													
5							Rese	erved							
6		Reserved													
7		Reserved													
	0 8 16 24												31		

1.4	(S) Suspend control
1.5	(C) Streaming-mode control
1.6	(M) Modification control
1.7	(Y) Synchronization control
1.8	(F) CCW-format control
1.9	(P) Prefetch control
1.10	(I) Initial-status-interruption control
1.11	(A) Address-limit-checking control
1.12	(U) Suppress-suspended-interruption control
1.13	(B) Channel-Program Type
1.14	(H) Format-2-IDAW control
1.15	(T) 2K-IDAW control
1.16-23	(LPM) Logical-path mask
1.24	(L) Incorrect-length-suppression mode
1.25	(D) Modified-CCW-indirect-data-addressing control
1.31	(X) ORB-extension control
3.0-7	Channel-subsystem priority
3.16-23	Control-unit priority

## **Channel-Command Word (CCW)**

#### Format-0 CCW

Co	ommand Code		Data Address			
0		8		31		
	Flags		Byte C	ount		
32		40	48	63		
Bit	Meaning					
32	(CD) Cause	es use of data-	address portion of next CCW			
33	(CC) Cause	(CC) Causes use of command code and data address of next CCW				
34	(SLI) Causes suppression of possible incorrect-length indication					
35	(Skip) Suppresses transfer of information to main storage					
36	(PCI) Caus	es an interme	diate-interruption condition to occur			
37	(IDA) Caus	es bits 8-31 of	CCW to specify location of first IDAW			

(Suspend) Causes suspension before execution of this CCW

(MIDA) Causes bits 8-31 of CCW to specify location of first MIDAW

#### Format-1 CCW

38

39

Cor	nmand Code	Flags		Byte Count			
0	8		16		3		
0			Data Address				
32					6		
<u>Bit</u>	Meaning						
8	(CD) Causes u	se of data-addres	ss portion of next (	CCW			
9	(CC) Causes u	se of command c	ode and data add	ress of next CCW			
10	(SLI) Causes s	(SLI) Causes suppression of possible incorrect-length indication					
11	(Skip) Suppres	ses transfer of inf	formation to main	storage			
12	(PCI) Causes a	(PCI) Causes an intermediate-interruption condition to occur					
13	(IDA) Causes b	its 33-63 of CCW	I to specify locatio	n of first IDAW			
14	(Suspend) Cau	ses suspension b	pefore execution o	f this CCW			
15	(MIDA) Causes	bits 33-63 of CC	CW to specify locat	tion of first MIDAW			

# Indirect-Data-Address Word (IDAW)

#### Format-1 IDAW

0	Data Address
_	1 21

#### Format-2 IDAW

E	Bits 0-31 of Data Address
0	31
В	its 32-63 of Data Address
32	63

## Modified-CCW-Indirect-Data-Address Word (MIDAW)

	Reserved						
0					31		
	Reserved	Flags		Count			
32		40	48		63		
	Bits 0-31 of Data Address						
64					95		
		Bits 32	2-63 of Data Addres	SS			
96					127		
<b>Bit</b> 40	Meaning Last MIDAW	,					

41 Skip
42 Data-transfer-interruption control
43-47 Reserved

# **Transport Control Word (TCW)**

	•		`		•		
Word							
0	F	000000	Flags				
1		Reserved	TCCBL	RW	Re	eserved	
2			0		- A -l-l		
3			Outp	ul-Dal	a Address		
4			la a c	. D-1-	Address		
5			inpu	t-Data	Address		
6			Transport	Ctatua	Diagle Address		
7			ransport-	Status	-Block Address		
8	T 10 10 1 18 1 1 1 1						
9	Transport-Command-Control-Block Address						
10	Output Count						
11			I	nput (	Count		
12							
				Rese	rved		
14							
15	Interrogate-TCW Address						
	0	2	8	14 15 1	6	24	31

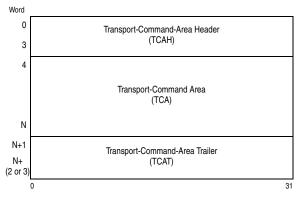
Word.Bit	Meaning
0.0-1	Format
0.13	Input transport-indirect-data addressing (TIDA)
0.14	Transport-command-control-block TIDA
0.15	Output TIDA
0.16-17	TIDAW Format
1.8-13	(TCCBL) Transport-Command-Control-Block Length
1.14	(R) Read Operations
1.15	(W) Write Operations

## Transport-Indirect-Data-Address Word (TIDAW)

	Flags	Reserved	
0		8	31
		Count	
32		48	63
		Bits 0-31 of Data Address	
64			95
		Bits 32-63 of Data Address	
96			127
Bit	Meaning		
0	Last TIDA Skip		
1	σκιρ		

- Data-transfer-interruption control
- (TTIC) TIDAW Transfer In Channel 3
- Insert CBC Control
- 5-7 Reserved

## **Transport Command Control Block (TCCB)**



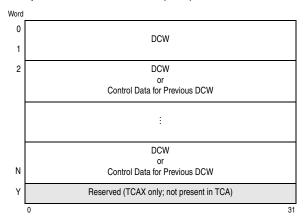
#### Transport Command Area Header (TCAH)

Word		•			
0	Format	Reserved			
1		TCAL			
2	Service-A	Service-Action Code Reserved			
3	Reserved				
	0	8	16	24	31

Word.Bit Meaning

1.24-31 (TCAL) Transport-Command-Area Length

# Transport-Command Area (TCA) and Transport-Command-Area Extension (TCAX)



### **Device-Command Word (DCW)**

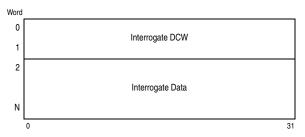
, , ,					
Command Code	Flags	Rese	rved Control-D	ata Count	
0	8	16	24	31	
		Count			
32				63	

Bit Meaning

9 (CC) Causes use of next DCW

10 (SLI) Suppresses incorrect-length indication

#### Interrogate TCA



## Interrogate Data

Word						
0	Format	RC	RCQ	LPM		
1	PAM	PIM	PIM Timeout			
2	Flags		Reserved			
3		Res	served			
4		Т	imo			
5	Time					
6	Program Identifier					
7	Program identilier					
8						
	Program-Dependent Data					
N						
	0	8	16	24 31		

Word.Bit	Meaning
0.8-15	(RC) Reason code
	<ol> <li>Interrogate reason not specified</li> </ol>
	1 Timeout
0.16-23	(RCQ) Reason-code qualifier
	<ol> <li>Interrogate reason qualifier not specified</li> </ol>
	1 Primary
	2 Secondary
0.24-31	(LPM) Logical-path mask
1.0-7	(PAM) Path-available mask
1.8-15	(PIM) Path-installed mask
2.0-7	Flags
	Multipath mode
	<ol> <li>Program path recovery</li> </ol>
	2 Critical

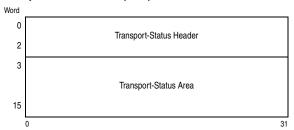
## **Transport Command Area Trailer (TCAT)**

Word	
0	Reserved
1	Write Count or Transport Count
2	Read Count (or not present)
	0

## CBC-Offset Block (COB)

Word	,
0	CBC Offset 0
1	CBC Offset 1
2	·
	÷
N	CBC Offset N
Υ	Reserved
	0 31

## **Transport Status Block (TSB)**



### Transport Status Header (TSH)

٠.			
V	V٨	ra	

vvora				
0	Length	Flags	DCW Offset	
1		Co	unt	
2		Rese	erved	
	0	8	16	31

Word.Bit Meaning

0.8 DCW-offset field valid 0.9 Count field valid 0.10 Cache miss 0.11 Time fields valid

0.13-15 Transport-Status Area (TSA) Format

TSA contents have no meaning

1 I/O-status TSA

2 Device-detected-program-check TSA

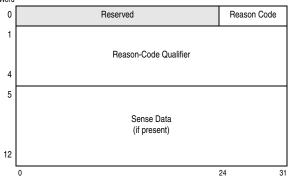
3 Interrogate TSA

#### I/O-Status TSA

Word	
0	Device Time
1	Defer Time
2	Queue Time
3	Device-Busy Time
4	Device-Active-Only Time
5	
	Additional Data (if present)
12	
	0 31

#### Device-Detected-Program-Check TSA





#### Word.Bit M

### Meaning

0.24-31 (RC) Reason Code

- No information
  - 1 TCCB transport failure

(RCQ) Reason-code-qualifier byte 0 (1.0-7)

- 0 No additional information
- 1 TCCB transport size error
- 2 TCCB CBC error
- 2 Invalid CBC detected on output data

RCQ word 0: Offset of first output-data byte for which error was detected RCQ word 1: Offset of last output-data byte for which error was detected

3 Incorrect TCCB length specification

#### RCQ byte 0

- 0 No additional information
- 1 TCAL value not 8 greater than TCW TCCBL value
- 2 TCAL value is less than 20 or greater than 252

## 4 TCAH specification error

#### RCQ byte 0

- No additional information
- 1 Format field specification error
- 2 Reserved field specification error
- 3 Service-action-code field specification error
- 5 DCW specification error

#### RCQ byte 0

- No additional information
- 1 Reserved field specification error
- 2 Flags field command-chaining specification error
- 3 Control-data-count field specification error
- 4 TCOB location error
- 5 TCOB duplication error
- 6 TCOB multiple-count error
  - 7 TCOB direction error
- 8 TCOB chaining error
- 9 TCOB count-specification error
- 10 TTE location error
- 11 TTE duplication error
- 12 TTE CD-count specification error
- 13 TTE count specification error
- 14 TTE direction error:
- 15 TTE chaining error
- 16 TCAX specification error

#### 6 Transfer-direction specification error

#### RCQ byte 0

- No additional information
- 1 Read-direction specification error
- 2 Write-direction field specification error
- 3 Read-write-conflict specification error

7 Transport-count specification error

RCQ byte 0

- 0 No additional information
- 1 Read-count specification error
- 2 Write-count specification error
- 8 Two I/O operations active

RCQ: No additional information

CBC-offset specification error

RCQ word 0: Byte offset of COB CBC-offset entry

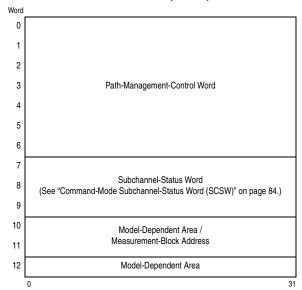
#### Interrogate TSA

rioru											
0	Format	Flags	Device Status								
1	Operation State	Reserved									
2											
	State-Dependent Information										
4											
5		Device-Le	vel Identifier								
6											
	Device-Dependent Information										
12											
	0	8	16 2	24 31							

Word.Bit	Meaning
0.8	Control-unit state valid
0.9	Device-state valid
0.10	Operation-state valid
0.16-23	(CS) Control-unit state
	0 Busy
	1 Recovery
	2 Interrogate maximum

- 0.24-31 (DS) Device-unit state
  - 0 Path-Group identification (in state-dependent-information field)
  - Path-Group
     Long busy
    - 2 Recovery
- 1.0-7 (OS) Operation state
  - 0 No I/O operation present.
  - 1 An I/O operation is present and executing.
  - 2 An I/O operation is present and awaiting completion of another operation initiated by another configuration.
  - 3 An I/O operation is present and awaiting completion of another operation initiated for the same device extent.
  - 4 An I/O operation is present and waiting to perform a device-dependent operation.

## Subchannel-Information Block (SCHIB)



#### Path-Management-Control Word (PMCW)

Word																									
0	Interruption Parameter																								
1	0 0 ISC 0 0 0 E LM MM D T V Device Number																								
2	LPM PNOM											L	.PL	JM						PΙ	M				
3	MBI											POM PAM							М						
4		CHPID	-0			CI	HPID	-1			CHPID-2 CHPID								-3						
5		CHPID-4 CHPID-5									CHPID-6 CHF							ΙP	PID-7						
6	0 0	0 0 0	0	0 0	0	0 0	0 0	0	0	0	0 0	0	0	0 0	(	0	0	0	0	0	0	F	Χ	S	
	0				8						16						24							31	

5		CHPID-4								CHPID-5								CHPID-6								CHPID-					
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	0								8							16								24							
Word.Bit Meaning																															
1.2-4	<ul> <li>-4 (ISC) Interrup</li> </ul>								ion-subclass code																						
1.8	(E) Subchann								el enabled																						
1.9-10	-10 (LM) limit mo								е																						

1.11-12

00 No Checking

01 Data address must be ≥ limit

10 Data address must be < limit

11 Reserved

(MM) Measurement-mode enable

00 Neither mode enabled

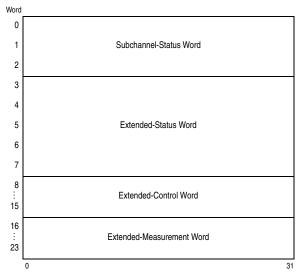
01 Device-connect-time-measurement enabled

10 Measurement-block-update enabled

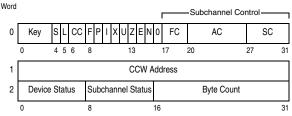
11 Both modes enabled

1.13	(D) Multipath mode
1.14	(T) Timing facility available
1.15	(V) Device number valid
2.0-7	(LPM) Logical-path mask
2.8-15	(PNOM) Path-not-operational mask
2.16-23	(LPUM) Last-path-used mask
2.24-31	(PIM) Path-installed mask
3.0-15	(MBI) Measurement-block index
3.16-23	(POM) Path-operational mask
3.24-31	(PAM) Path-available mask
4.0-7	(CHPID-0) Channel-path ID for logical path 0 (typical)
6.29	(F) Measurement-block-format control
6.30	(X) Extended-measurement-word-mode enable
6.31	(S) Concurrent sense

## Interruption-Response Block (IRB)



## Command-Mode Subchannel-Status Word (SCSW)



Word.Bit	Meaning
0.0-3	(Key) Subchannel key
0.4	(S) Suspend control
0.5	(L) Extended-status-word format (logout stored)
0.6-7	(CC) Deferred condition code
	00 Normal I/O interruption
	01 Status in SCSW
	10 Reserved
	11 Path not operational
0.8	(F) CCW-format control
0.9	(P) Prefetch control

0.10	(I) Initial-status-interruption control	
0.11	(X) IRB-format control	
0.12	(U) Suppress-suspended-interrupt	on control
0.13	(Z) Zero condition code	
0.14	(E) Extended control (information s	stored in ECW of IRB)
0.15	(N) Path not operational (PNOM no	onzero)
0.17-19	(FC) Function control	
	17 (40) Start, 18 (20) Halt, 19	9 (10) Clear
0.20-26	(AC) Activity control	
	20 (08) Resume pending	24 (80) Subchannel active
	21 (04) Start pending	25 (40) Device active
	22 (02) Halt pending	26 (20) Suspended
	23 (01) Clear pending	
0.27-31	(SC) Status control	
	27 (10) Alert	30 (02) Secondary
	28 (08) Intermediate	31 (01) Status pending
	29 (04) Primary	
2.0-15	Device status (0-7)	Subchannel status (8-15)
	0 (80) Attention	8 (80) Program-controlled interruption
	1 (40) Status modifier	9 (40) Incorrect length
	2 (20) Control-unit end	10 (20) Program check
	3 (10) Busy	11 (10) Protection check
	4 (08) Channel end	12 (08) Channel-data check
	5 (04) Device end	13 (04) Channel-control check
	6 (02) Unit check	14 (02) Interface-control check
	7 (01) Unit exception	15 (01) Chaining check

#### Transport-Mode Subchannel-Status Word (SCSW)

	isport-ivi	00	ш	Sub	cnann	lei.	-3	ld	เนร	vvc	ora (S	CSW)			
Word												-Subchar	nnel Co	ntrol	_
0	Key	0	L	CC	FMT	Χ	Q	0	ΕN	0	FC	A		SC	
	0	4	5	6	8	11		13			17	20		27	31
1								T	CW A	١dc	Iress				
2	Device	S	tat	us	Subcha	anr	nel	Si	tatus		FCX	Status	S	CHXS	
	0				8					16		·	24		31

Meaning	
(Key) Subchannel key	
(L) Extended-status-word format (logout sta	ored)
(CC) Deferred condition code	
00 Normal I/O interruption	
01 Status in SCSW	
10 Reserved	
11 Path not operational	
(FMT) Format	
(X) IRB-format control	
(Q) Interrogate complete	
(E) Extended control (information stored in	ECW of IRB)
(N) Path not operational (PNOM nonzero)	
(FC) Function control	
17 (40) Start, 18 (20) Halt, 19 (10) Cl	ear
(AC) Activity control	
21 (04) Start pending	23 (01) Clear pending
22 (02) Halt pending	25 (40) Device active
(SC) Status control	
27 (10) Alert	30 (02) Secondary
28 (08) Intermediate	31 (01) Status pending
29 (04) Primary	· · · · · · ·
	(L) Extended-status-word format (logout str (CC) Deferred condition code 00 Normal I/O interruption 01 Status in SCSW 10 Reserved 11 Path not operational (FMT) Format (X) IRB-format control (Q) Interrogate complete (E) Extended control (information stored in (N) Path not operational (PNOM nonzero) (FC) Function control 17 (40) Start, 18 (20) Halt, 19 (10) Cl (AC) Activity control 21 (04) Start pending 22 (02) Halt pending (SC) Status control 27 (10) Alert 28 (08) Intermediate

2.0-15	Device status (0-7)	Subchannel status (8-15)
	0 (80) Attention	8 (80) —
	1 (40) —	9 (40) Incorrect length
	2 (20) Control-unit end	10 (20) Program check
	3 (10) Busy	11 (10) Protection check
	4 (08) Channel end	12 (08) Channel-data check
	5 (04) Device end	13 (04) Channel-control check
	6 (02) Unit check	14 (02) Interface-control check
	7 (01) Unit exception	15 (01) Channel-subsystem retry failed
2.16-23	FCX status (16-23)	
	23 (01) TSB valid	

2.24-31

(SCHXS) Subchannel-extended status

24 (80) (F) Interrogate failed

25-31 (SESQ) SCHSX qualifier

- No status available.
- 1 Storage-request limit exceeded.
- 2 Program check when not an interrogate operation, TCW read/write data count not zero, and CE only or CE+DE only status received.
- 3 Transport mode not supported by the I/O device.
- 4 Transport mode not supported by the selected channel path.
- Program check on TCW. 6
- Device-detected program check condition due to indeterminate 7 cause.
- 8 Device-detected program check.
- Program check on TIDAW failing-storage-address (FSA) valid in ESW (see below) and contains TIDAW address.
- 32 TCW access exception - FSA field valid and contains TCW address.
- 33 TSB access exception - FSA field valid and contains TSB address.
- TCCB access exception FSA field valid and contains TCCB 34 address.
- 35 TIDAW access exception - FSA field valid and contains TIDAW address
- Data access exception FSA field valid and contains address of 36 data.
- 64 Invalid CBC error on read data.
- 66 Link protocol error condition.
- 67 Device-level recovery operation failed.
- IFCC due to failed device-level recovery operation program, pro-68 tection, or data check may also be set in subchannel status.
- Invalid CBC on status portion of transport response from device.
- Invalid CBC on TSB transported from device.
- Note: If FSA field valid for cases other than noted above, FSA field contains address of current TCW.

#### Extended-Status Word (ESW)

See chart on page 88 to determine the appropriate ESW format.

#### Format-0 ESW

Word

0	Subchannel Logout
1	Extended-Report Word
2	Failing-Storage Address
3	r alling-oldrage Address
4	Secondary-CCW Address
,	0 31

## Format-0 ESW Word 0 (Subchannel Logout)

0	ESF	LPUM	R	FVF	SA	TC	D	Ε	Α	SC
0	1	8	16		22	24	26		28	31

Bit Meaning

24-25

1-7 (ESF) Extended-status flags (1 key check, 2 measurement-block program check, 3 measurement-block data check, 4 measurement-block protection check, 5 CCW check, 6 IDAW check, 7:0)

8-15 (LPUM) Last-path-used mask

16 (R) Ancillary Report

17-21 (FVF) Field-validity flags (17 LPUM, 18 TC, 19 SC, 20 device status, 21 CCW address)

22-23 (SA) Storage-access code (00 access type unknown, 01 read, 10 write, 11 read backward)

(TC) Termination code (00 halt signal issued, 01 stop, stack, or normal termination, 10 clear signal issued)

26 (D) Device status check

27 (E) Secondary error 28 (A) I/O-error alert

29-31 (SC) Sequence code

#### Format-0 ESW Word 1 (Extended-Report Word)

0 L	E A P	T F S C R	SCNT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	3	8 1	10	16															31

#### Bit Meaning

- (L) Request logging only
- 2 (E) Extended-subchannel-logout pending
- 3 (A) Authorization check
- 4 (P) Path-verification-required
- 5 (T) Channel-path timeout
- 6 (F) Failing-storage-address validity
- 7 (S) Concurrent sense
- 8 (C) Secondary-CCW-address validity
- 9 (R) Failing-storage-address format (zero: 1-31 of word 2; one: words 2 and 3)
- 10-15 (SCNT) Concurrent-sense count

### Format-1 ESW Word 01

0 0 0	0 0 0 0 0	LPUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0		8	16															31

#### Bit Meaning

8-15 (LPUM) Last-path-used mask

## Format-2 ESW Word 0<sup>1</sup>

0 0	0 0 0 0 0 0	LPUM	DCTI	
0		8	16	31

#### Bit Meaning

8-15 (LPUM) Last-path-used mask

16-31 (DCTI) Device-connect-time interval

#### Format-3 ESW Word 01

0 0 0	0 0 0 0 0	LPUM	Unpredictable	
0	·	8	16	31

#### Bit Meaning

8-15 (LPUM) Last-path-used mask

Word 1 is the same as word 1 of a format-0 ESW. Words 2, 3, and 4 are zeros.

#### Information Stored in ESW

Subchannel Conditi		nich ESW Is	Stored by Te	est Subchan-			
Subchannel-Sta	atus Word	Path-Manag trol V	ement-Con- Vord		Extended-9	Status Wo SW)	rd
Status-Control Field  A I P S X L  0  * * 0 0 1  * * 1 * 1  1 0 0 0 1 1  0 0 0 0 1 1  1 0 0 0 1 1  * * 1 * 1  1 1 0 0 1 1  0 1 0 0 1  0 1 0 0 1  0 1 0 0 1  0 1 0 0 1  0 1 0 0 1  0 1 0 0 1	Sus-pended Bit - * 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Device- Connect- Time Mea- surement- Mode		Format U 0 0 0 U 3 3 1 1 1 2 U 1 1 1 2	Contented OF The Content of the Cont	R R R * * * Z Z Z D * Z Z Z
0 0 0 1 1	1 0	•	•	ations do not	_	ZMD	D
* 1 0 1 1	*						

#### Bit Meaning

- Not meaningful.
- Bits may be zeros or ones.
- Α
- D Accumulated device-connect-time-interval (DCTI) value stored in bytes 2 and 3.
- Intermediate status.
- L Extended-status-word format.
- М Last-path-used mask (LPUM) stored in byte 1.
- Р Primary status.
- R Subchannel-logout information stored in bytes 0-3.
- S Secondary status.
- U No format defined. Х
- Status pending.
- Bits are stored as zeros.

#### **Extended-Control Word (ECW)**

SCSW Bits		V Bits	ERW						
	5	14	Bit 7	ERW Bits 10-15	ECW Words 0-7				
	0	0	0	Zeros	Unpredictable				
	0	1	1	Number of concurrent-	Concurrent-sense information <sup>a</sup>				
				sense bytes <sup>a</sup>					
	1	0	0	Zeros	Unpredictable				
	1	1	0	Zeros	Model-dependent information				
	1	1	1	Number of concurrent- sense bytes	Concurrent-sense information				

a. The contents of the ECW are specified by bits 5 and 14 of word 0 of the SCSW. The combination of SCSW bit 5 zero, SCSW bit 14 one, and ERW bit 7 zero does not occur.

### **Extended-Measurement Word**

Word	
0	Device-Connect Time
1	Function-Pending Time
2	Device-Disconnect Time
3	Control-Unit-Queuing Time
4	Device-Active-Only Time
5	Device-Busy Time
6	Initial-Command-Response Time
7	Reserved
	0 31

## **Format 0 Measurement Block**

Word		
0	SSCH + RSCH Count	Sample Count
1	Device-Co	onnect Time
2	Function-P	ending Time
3	Device-Disc	connect Time
4	Control-Unit-	Queuing Time
5	Device-Acti	ve-Only Time
6	Device-E	Busy Time
7	Initial-Command	d-Response Time
	0	16 31

#### Format 1 Measurement Block

Word	
0	SSCH + RSCH Count
1	Sample Count
2	Device-Connect Time
3	Function-Pending Time
4	Device-Disconnect Time
5	Control-Unit-Queuing Time
6	Device-Active-Only Time
7	Device-Busy Time
8	Initial-Command-Response Time
9	Interrupt Delay Time
10	I/O Priority Delay Time
11	
:	Reserved
15	
I	0 31

## **Channel-Report Word (CRW)**

0 S	R C RSC	Α 0	ERC	Reporting-Source ID	
0	4	8	10	16	31

<u>SIT</u>	Meaning

- 1 (S) Solicited CRW
- (R) Overflow (one or more CRWs lost)(C) Chaining (meaningless if bit 2 is one)

Condition

- 4-7 (RSC) Reporting-source code (see Reporting-Source table)
- 8 (A) Ancillary report
- 10-15 (ERC) Error-recovery code (see Error-Recovery-Code table)
- 16-31 Reporting-source ID (see Reporting-Source table)

## **Error-Recovery Codes**

**ERC** 

0	0	0	0	0	1	Available
0	0	0	0	1	0	Initialized
0	0	0	0	1	1	Temporary error
0	0	0	1	0	0	Installed parameters initialized
0	0	0	1	0	1	Terminal
0	0	0	1	1	0	Permanent error with facility not initialized
0	0	0	1	1	1	Permanent error with facility initialized
0	0	1	0	0	0	Installed parameters modified

## **Reporting Source**

The reporting-source-ID format depends on the RSC field of the channel-report word, as follows:

RSC	Reporting Source	Reporting-Source ID	
0010	Monitoring facility	00000000 0000000	0
0 0 1 1	Subchannel (first or only CRW)	XXXXXXXX XXXXXX	Χ
0 0 1 1	Subchannel (chained CRW)	00000000 0088000	0
0 1 0 0	Channel path	00000000 YYYYYY	Υ
1001	Configuration-alert facility	00000000 YYYYYY	Υ
1011	Channel subsystem	00000000 0000000	0

 $<sup>{\</sup>sf S}={\sf Subchannel\text{-}set}$  identifier (SSID) when the MSS facility is installed and the CRW is chained immediately following a CRW for a subchannel.

#### I/O Command Codes

#### Standard Command-Code Assignments (CCW and DCW Bits 0-7)

x x x x 0 0 0 0 Invalid Command	mmmm 0 1 0 0 Sense
mmmm mm0 1 Write (a)	0 0 0 0 0 1 0 0 — Basic Sense
mmmm mm1 0 Read (a)	1 1 1 0 0 1 0 0 — Sense ID
0 0 0 0 0 0 1 0 — Read IPL	x x x x 1 0 0 0 Transfer in channel (c)
mmmm mm1 1 Control	0 0 0 0 1 0 0 0 Transfer in channel (d)
0 0 0 0 0 0 1 1 — Control no operation	mmmm 1 0 0 0 Invalid command (e)
0 1 mm 0 0 0 0 Transport (b)	mmmm 1 1 0 0 Read backwards (f)
x - Bit Ignored m - Modifier bit for specific type of I/O device	a May designate control data in a DCW b DCW only c Format-0 CCW d Format-1 CCW e Format-1 CCW and nonzero m bit f CCW only

#### Standard Meanings of Bits of First Sense Byte

	۰	iara moainingo or Bito or i not	000	0 2 ) 10
В	Bit	Designation	Bit	Designation
-	0	Command reject	4	Data check
	1	Intervention required	5	Overrun
:	2	Bus-out check	6	(Device dependent)
;	3	Equipment check	7	(Device dependent)

X = Subchannel number

Y = Channel-path ID (CHPID)

#### **Hexadecimal and Decimal Conversion**

Use the following figure to preform hexadecimal and decimal conversions.

From hex: locate each hex digit in its corresponding column position and note the decimal equivalents. Add these to obtain the decimal value.

From decimal: (1) locate the largest decimal value in the table that will fit into the decimal number to be converted, and (2) note its hex equivalent and hex column position. (3) Find the decimal remainder. Repeat the process on this and subsequent remainders.

**Note:** Hexadecimal equivalents of all numbers from 0 to 255 are listed in "Character Assignments" on page 96.

				_	0	-	5	က	4	2	9	7	∞	၈	10	7	12	13	14	15		
			4567	Dec																		
		Byte	4	Hex	0	1	2	3	4	2	9	2	8	6	A	В	ပ	Ω	ш	ш		
		B	3	Dec	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240		
			0123	Нех	0	-	2	3	4	2	9	7	8	6	٧	В	ပ	٥	ш	ш	2	
	Halfword		4567	Dec	0	256	512	292	1,024	1,280	1,536	1,792	2,048	2,304	2,560	2,816	3,072	3,328	3,584	3,840	3	
			45	Нех	0	-	2	3	4	2	9	7	8	6	A	В	ပ	٥	ш	ш		
		Byte	Byte	0123	Dec	0	4,096	8,192	12,288	16,384	20,480	24,576	28,672	32,768	36,864	40,960	45,056	49,152	53,248	57,344	61,440	4
			0	Hex	0	-	2	3	4	2	9	7	8	6	A	В	၁	٥	ш	ш		
Word				4567	Dec	0	65,536	131,072	196,608	262,144	327,680	393,216	458,752	524,288	589,824	092,360	720,896	786,432	851,968	917,504	983,040	5
×			4	Hex	0	-	2	3	4	2	9	7	8	6	Α	В	O	Ω	ш	ш		
		Byte	0123	Dec	0	1,048,576	2,097,152	3,145,728	4,194,304	5,242,880	6,291,456	7,340,032	8,388,608	9,437,184	10,485,760	11,534,336	12,582,912	13,631,488	14,680,064	15,728,640	9	
				Hex	0	1	2	3	4	5	9	7	8	6	Α	В	O	D	Е	F		
	Halfword		4567	Dec	0	16,777,216	33,554,432	50,331,648	67,108,864	83,886,080	100,663,296	117,440,512	134,217,728	150,994,944	167,772,160	184,549,376	201,326,592	218,103,808	234,881,024	251,658,240	7	
		_		Hex	0	-	2	3	4	2	9	7	8	6	Α	В	ပ	٥	ш	ш		
		Byte	0123	Dec	0	268,435,456	536,870,912	805,306,368	1,073,741,824	1,342,177,280	1,610,612,736	1,879,048,192	2,147,483,648	2,415,919,104	2,684,354,560	2,952,790,016	3,221,225,472	3,489,660,928	3,758,096,384	4,026,531,840	8	
			Bits:	Нех	0	-	2	က	4	2	9	7	80	6	ď	Ф	O	Ω	ш	ш		

### Powers of 2 and 16

m	n	2 <sup><i>m</i></sup> and 16 <sup><i>n</i></sup>	Symbol
0	0	1	
1		2	
2		4	
3	1	8 16	
5	'	32	
6		64	
7		128	
8	2	256	
9		512	
10		1 024	K (kilo)
11	•	2 048	
12	3	4 096 8 192	
13 14		16 384	
15		32 768	
16	4	65 536	
17		131 072	
18		262 144	
19		524 288	
20	5	1 048 576	M (mega)
21		2 097 152	
22		4 194 304	
23	6	8 388 608 16 777 216	
25	0	33 554 432	
26		67 108 864	
27		134 217 728	
28	7	268 435 456	
29		536 870 912	
30		1 073 741 824	G (giga)
31		2 147 483 648	
32	8	4 294 967 296	
33		8 589 934 592	
34 35		17 179 869 184 34 359 738 368	
36	9	68 719 476 736	
37	Ů	137 438 953 472	
38		274 877 906 944	
39		549 755 813 888	
40	10	1 099 511 627 776	T (tera)
41		2 199 023 255 552	
42		4 398 046 511 104	
43	11	8 796 093 022 208 17 592 186 044 416	
44	11	35 184 372 088 832	
46		70 368 744 177 664	
47		140 737 488 355 328	
48	12	281 474 976 710 656	
49		562 949 953 421 312	
50		1 125 899 906 842 624	P (peta)
51		2 251 799 813 685 248	
52	13	4 503 599 627 370 496	
53 54		9 007 199 254 740 992 18 014 398 509 481 984	
55		36 028 797 018 963 968	
56	14	72 057 594 037 927 936	
57		144 115 188 075 855 872	
58		288 230 376 151 711 744	
59		576 460 752 303 423 488	
60	15	1 152 921 504 606 846 976	E (exa)
61		2 305 843 009 213 693 952	
62		4 611 686 018 427 387 904	
63		9 223 372 036 854 775 808	

т	n										2 <sup>m</sup> a	and	16 <sup>n</sup>	Symbol
64	16						18	446	744	073	709	551	616	
65							36	893	488	147	419	103	232	
66							73	786	976	294	838	206	464	
67							147	573	952	589	676	412	928	
68	17						295	147	905	179	352	825	856	
69							590	295	810	358	705	651	712	
70						1	180	591	620	717	411	303	424	Z (zetta)
71						2	361	183	241	434	822	606	848	
72	18					4	722	366	482	869	645	213	696	
73						9	444	732	965	739	290	427	392	
74										478				
75										957				
76	19									914				
77										828				
78										657				
79										314				
80	20									629				Y (yotta)
81										258				
82										516				
83	0.1									033				
84	21									066				
85										133				
86										267				
87	00									534				
88	22									068				
89										137				(aaa mata)
90					237									(see note)
91	00				475									
92 93	23				951 903									
94					807									
95					614									
96	24				228									
97					456									
98					912									
99					825									
100	25		1		650									(see note)
101			2	535										(
102				070										
103				141										
104	26		20	282	409	603	651	670	423	947	251	286	016	
105			40	564	819	207	303	340	847	894	502	572	032	
106			81	129	638	414	606	681	695	789	005	144	064	
107			162	259	276	829	213	363	391	578	010	288	128	
108	27		324	518	553	658	426	726	783	156	020	576	256	
109			649	037	107	316	853	453	566	312	041	152	512	
110			298											(see note)
111			596											
112	28	Ę		296										
113			384											
114			769											
115	00	41		374										
116	29	83		749										
117			153											
118			306											
119	20		613											(ann note)
120	30	1 329												(see note)
121 122		2 658 5 316												
123		10 633												
	21	21 267												
124 125	31													
126		42 535 85 070												
127	32	170 141 340 282												

Note: No Système international d'unités (SI) symbols greater than Y (yotta) are defined.

**Character Assignments** 

Cilaia	0.0.	Assigninen						
Dec	Hex	EBCDIC <sup>1</sup>	ISO-8 <sup>2</sup>		Dec	Hex	EBCDIC <sup>1</sup>	ISO-8 <sup>2</sup>
0	00	NUL	NUL		64	40	SP	@
1	01	SOH	SOH		65	41	RSP	Ā
2	02	STX	STX		66	42	â	В
3	03	ETX	ETX		67	43	ä	С
4	04	SEL	EOT		68	44	à	D
5	05	HT	ENQ		69	45	á	E
6	06	RNL	ACK		70	46	ã	F
7	07	DEL	BEL		71	47	å	G
8	08	GE	BS		72	48	ç	H
		SPS	HT			49		ï
9	09				73		ñ	
10	0A	RPT	LF		74	4A	¢	J
11	0B	VT	VT		75	4B		K
12	0C	FF	FF		76	4C	<	L
13	0D	CR	CR		77	4D	(	M
14	0E	SO	SO		78	4E	+	N
15	0F	SI	SI		79	4F	1	0
16	10	DLE	DLE		80	50	&	P
17	11	DC1	DC1		81	51	é	Q
18	12	DC2	DC2		82	52	ê	R
19	13	DC3	DC3		83	53	ë	S
20	14	RES/ENP	DC4		84	54	è	T
21	15	NL	NAK		85	55	í	U
22	16	BS	SYN		86	56	î	V
23	17	POC	ETB		87	57	ï	W
24	18	CAN	CAN		88	58	ì	Х
25	19	EM	EM		89	59	В	Ϋ́
26	1A	UBS	SUB		90	5A	!	Z
27	1B	CU1	ESC		91	5B	\$	[
28	1C	IFS	IFS		92	5C	*	\
29	1D	IGS	IGS		93	5D	)	]
30	1E	IRS	IRS		94	5E		٨
31	1F	ITB/IUS	IUS		95	5F		
32	20	DS	SP		96	60	-	<u>,                                      </u>
33	21	SOS					/	
			!		97	61		a
34	22	FS			98	62	Â	b
35	23	WUS	#		99	63	Ä	С
36	24	BYP/INP	\$		100	64	À	d
37	25	LF	%		101	65	Á	е
38	26	ETB	&		102	66	Ã	f
39	27	ESC	1		103	67	Å	g
40	28	SA	(		104	68	Ç	h
41						69	Ñ	
	29	SFE	)		105			i
42	2A	SM/SW	1		106	6A	1	j
43	2B	CSP	+	١.	107	6B	,	k
44	2C	MFA	,		108	6C	%	1
45	2D	ENQ	-		109	6D	_	m
46	2E	ACK			110	6E	>	n
47	2F	BEL	/		111	6F	?	0
48	30		0	1	112	70	Ø	р
49	31		1		113	71	É	
50	32	SYN	2	1	114	72	Ê	q
							Ë	r
51	33	IR DD	3		115	73		S
52	24	PP	4		116	74	È	t
53	35	TRN	5		117	75	ĺ	u
54	36	NBS	6		118	76	Î	v
55	37	EOT	7		119	77	Ϊ	w
56	38	SBS	8	1	120	78	ì	х
57	39	IT	9		121	79		y
58	3A	RFF	:		122	7A	:	y Z
59	3B	CU3	;		123	7B	#	{
60	3C	DC4	<		124	7C	@	1
61	3D	NAK	=		125	7D	1	}
62	3E		>		126	7E	=	~
63	3F	SUB	?		127	7F	"	•

Dec	Hex	EBCDIC <sup>1</sup>	ISO-8 <sup>2</sup>
128	80	Ø	
129	81	а	
130	82	b	BPH
131	83	С	NBH
132	84	d	IND
133	85	е	NEL
134	86	f	SSA
135	87	g	ESA
136	88	h	HTS
137	89	i	HTJ
138	8A	«	VTS
139	8B	>>	PLD
140	8C	ð	PLU
141	8D	ý	RI
142	8E	þ	SS2
143	8F	±	SS3
144	90	•	DCS
145	91	j	PU1
146	92	k	PU2
147	93	i.	STS
148	94	m	CCH
149	95	n	MW
150	96	0	SPA
151	97	p	EPA
152	98	q	SOS
153	99	r	
154	9A	a	SCI
155	9B	Ω.	CSI
156	9C	æ	ST
157	9D		OSC
158	9E	Æ	PM
159	9F	π. D	APC
160	A0	μ	RSP
161	A1	μ ~	i
162	A2	s	¢
163	A3	t	£
164	A4	u u	D
165	A5	v	¥
166	A6	w	+
167	A6 A7	w X	· §
168	A8		3
169	A9	у	©
170	AA	Z :	a a
171	AB	i	~ «
	AC	j G	-
172 173	AC AD	Ý	SHY
173	AE AE		® ®
175	AF	þ ®	-
176	B0	۸ ا	0
	B1	£	
177 178	B2	¥	± 2
178		<b>*</b>	3
180	B3 B4	©	,
		-	
181	B5	§ ¶	μ ¶
182	B6 B7	¶ 1/4	1
183		1/4	
184	B8	1/2	1
185	B9	3/4	1 0
186	BA	[	
187 188	BB	]	»
188	BC	ä	1/4
			1/2
189	BD	,	21
	BE BF	, X	3∕4 ¿

Dec	Hex	EBCDIC <sup>1</sup>	ISO-8 <sup>2</sup>
192	CO	{	À
193	C1	A A	Á
194	C2	В	Â
195	C3	C	Ã
196	C4	D	Ä
197	C5	E	
198	C6	F	Å Æ
199	C7	G	C
200	C8	Н	Ç È
201	C9	1	É
202	CA	SHY	Ê
203	СВ	ô	É È Ë
204	CC	Ö	Ī
205	CD	ò	ĺ
206	CE	ó	î
207	CF	õ	Ï
208	D0	}	Ð
209	D1	Ĵ	Ñ
210	D2	K	Ò
211	D3	L	Ó
212	D4	М	Ò Ó Ô
213	D5	N	ÕÖ
214	D6	0	Ö
215	D7	Р	
216	D8	Q	× Ø Ù Ú
217	D9	R	Ù
218	DA	1	Ú
219	DB	û	Û
220	DC	ü	U
221	DD	ù	Ý
222	DE	ú	Þ
223	DF	ÿ	В
224	E0	/	à
225	E1	÷	á
226	E2	S	â
227	E3	T U	ã
228	E4	U	ä
229	E5	V W	å
230	E6		æ
231	E7	X Y	ç
232	E8		è
233	E9	Z 2	é
234	EA	2	ê
235	EB	Ô	ë
236	EC	Ö	j
237	ED	Ò Ó	ĺ
238	EE	O ē	î
239	EF	Õ 0	ï
240	F0		ð
241	F1	1	ñ
242	F2	2	ò
243	F3	3 4	ó ô
244	F4		
245	F5	5	Õ
246 247	F6 F7	6 7	ö ÷
248	F8	8	
248	F9	9	ø ù
250	FA	3	ú
251	FB	Û	û
252	FC	Ü	ü
253	FD	Ù	ý
254	FE	Ú	þ
255	FF	EO	ÿ
200			j

#### Notes:

ACK Acknowledge

- The EBCDIC characters are based on code page 037.
- The ISO-8 controls are from ISO 6429, and the graphics are from ISO 8859-1. The ISO-8 graphics are code page 00819, named ISO/ANSI Multilingual.

ΙT

Indent Tab

Partial Line Down

#### **Control Character Representations**

BEL	Bell	ITB	Intermediate Transmission Block
BS	Backspace	IUS	International Unit Separator
BYP	Bypass	LF	Line Feed
CAN	Cancel	MFA	Modify Field Attribute
CR	Carriage Return	NAK	Negative Acknowledge
CSP	Control Sequence Prefix	NBS	Numeric Backspace
CU1	Customer Use 1	NL	New Line .
CU3	Customer Use 3	NUL	Null
DC1	Device Control 1	POC	Program-Operator Communication

DC1 DC2 DC3 DC4 DEL POC PP RES Program-Operator Communication Device Control 1 Device Control 2 Presentation Position Device Control 3 Restore Required Form Feed Device Control 4 RFF RNL Delete Required New Line DLE Data Link Escape RPT Repeat SA SBS DS Digit Select Set Attribute EM End of Medium Subscript

ENP Enable Presentation SEL SFE Select ENQ EO EOT Start Field Extended Enquiry Eight Ones Šİ Shift In SM End of Transmission Set Mode ESC Shift Out Escape ETB End of Transmission Block SOH Start of Heading ETX End of Text SOS Start of Significance FF Form Feed SPS Superscript FS Field Separator STX Start of Text GE Graphic Escape SUB Substitute Horizontal Tab SW HΤ Switch

IFS Interchange File Separator Interchange Group Separator SYN Synchronous Idle IGS TRN Transparent INP Inhibit Presentation **UBS** Unit Backspace IR Index Return VT Vertical Tab IRS Interchange Record Separator WUS Word Underscore

#### **Additional ISO-8 Control Character Representations** APC PLD

Application Program Command Break Permitted Here Cancel Character RPH PLU Partial Line Up CCH CSI DCS Privacy Message Private Use One Private Use Two PM Control Sequence Introducer PÜ1 Device Control String PU2 Single Character Introducer ESA End of Selected Area SCI Character Tabulation w/ Justification HTJ SOS Start of String Start of Guarded Area Start of Selected Area HTS Character Tabulation Set SPA IFS Information Separator Four SSA IGS Information Separator Three SS2 Single Shift Two IND SS3 Single Shift Three Index IRS Information Separator Two ST String Terminator Set Transmit State STS MW Message Waiting No Break Here NBH US Information Separator One VTS NFI Next Line Line Tabulation Set OSC Operating System Command

Formatting Character Representations

NSP Numeric Space Space Required Space RSP Syllable Hyphen

#### Two-Character BSC Data Link Controls

Function	EBCDIC	ASCII	
ACK-0	DLE,X'70'	DLE,0	
ACK-1	DLE,X'61'	DLE,1	
WACK	DLE,X'68'	DLE,;	
RVI	DLE.X'7C'	DLE.<	

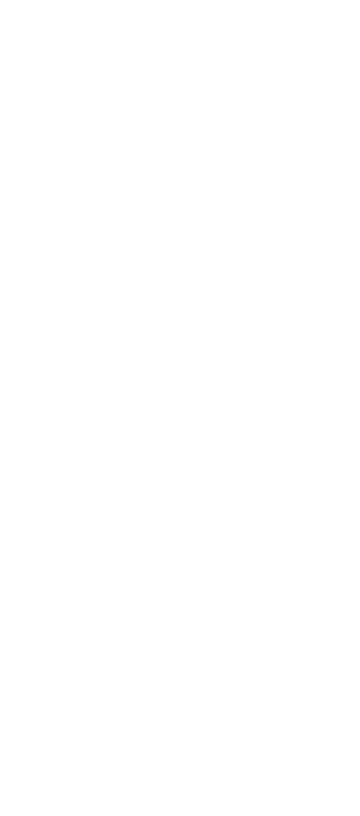
#### Commonly Used Editing Pattern Characters

Code (Hex)	Meaning	Code (Hex)	Meaning	
20	Digit selector	5B	Dollar sign	
21	Start of significance	5C	Asterisk	
22	Field separator	6B	Comma	
40	Blank	C3D9	CR (credit)	
4B	Period	C4C2	DB (debit)	

### **ANSI-Defined Printer Control Characters**

#### (A in RECFM field of DCB)

Code	Action before Printing Record
blank	Space 1 line
0	Space 2 lines
-	Space 3 lines
+	Suppress space
1	Skip to line 1 on new page





File Number: S-390-00

