

Einheitlicher
Sammenstand
Elektronischer
Rechengeräte

Urbeschreibung

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Reichstandortsgemeinschaft – Rsg

Reichsforschungsgemeinschaft für Rechenwissenschaft und -lehre – Rfg-r

British Forseeec Fellowship for Recon- and Telllore

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Einführung

Der ESER ist ein Entwurf Zusammenstände, die als Ziel die Rechnung und Austausch der Angaben vereinfachen hat. Ein ESER Zusammenstand besteht aus einem **Hauptspeicher**, einigen **Recheneinheiten** und einigen **Durchgangeinheiten**.

Im ESER werden die Rechnungen und Austausche durch **Verfahren** ausgedrückt. Wenn ein Verfahren ausgeführt wird, finden drei Verläufe statt:

- der Zugriff;
- die Unterbrechung; und
- die Ausführung.

Zugriff

Beim Zugriff wird eine **Angabe** zwischen einer Einheit und dem Hauptspeicher übertragen.

Unterbrechung

Bei der Unterbrechung macht eine Einheit eine Recheneinheit ein neues Verfahren ausführen.

Ausführung

Bei der Ausführung führt eine Einheit ein Verfahren aus.

Teil I

Zugriff

Abschnitt 1

Hauptspeicher

Der Hauptspeicher besteht aus **Orte**.

Stellenketten

Die Orte speichern **Stellenketten**. In einer Stellenkette werden die Stellen ab 1 gezählt und sie gleichen entweder 0 oder 1. Eine Kette, die aus n Stellen besteht, wird eine **n -heit** genannt.

Jeder Ort im Hauptspeicher speichert eine einzige Achtheit. Um eine Stellenkette zu speichern, die größere als eine Achtheit ist, wird sie in Achtheiten geteilt und die Achtheiten in folgenden Orten gespeichert.

Achtheit

1	8
1	

Sechzehnheit

1	8 9	16
1	2	

Zweiunddreißigkeit

1	8 9	16 17	24 25	32
1	2	3	4	

Vierundsechzigheit

1	8 9	16 17	24 25	32
1	2	3	4	
33	40 41	48 49	56 57	64
5	6	7	8	

Hundertachtundzwanzigkeit

1	8 9	16 17	24 25	32
1	2	3	4	
33	40 41	48 49	56 57	64
5	6	7	8	
65	72 73	80 81	88 89	96
9	10	11	12	
97	104 105	112 113	120 121	128
13	14	15	16	

Zweihundertsechsfünzigheit

1	8 9	16 17	24 25	32
1	2	3	4	
33	40 41	48 49	56 57	64
5	6	7	8	
65	72 73	80 81	88 89	96
9	10	11	12	
97	104 105	112 113	120 121	128
13	14	15	16	
129	136 137	144 145	152 153	160
17	18	19	20	
161	168 169	176 177	184 185	192
21	22	23	24	
193	200 201	208 209	216 217	224
25	26	27	28	
225	232 233	240 241	248 249	256
29	30	31	32	

Anschriften

Eine **Anschrift** ist eine ganze Zahl, die einen Ort bestimmt. Eine Stellenkette, die größere als eine Achtheit ist, wird durch die Anschrift ihrer ersten Achtheit bestimmt.

Jede Anschrift ist eine **Wahranschrift** oder eine **Kunstanschrift**.

Wahranschriften

Eine Wahranschrift bestimmt einen einzigen Ort im Hauptspeicher. Die Wahranschrift 0 bestimmt den ersten Ort, und folgende Wahranschriften bestimmen folgenden Orte.

Kunstanschriften

Eine Kunstanschrift hat zwei Gestalten.

1-Gestalt

1	10 11	20 21	32
G	1-S	A	

G Grundbeschreibungszahl

1-S 1-Seitenschlüsselzahl

A Abstand

2-Gestalt

1	10 11	32
G	A	

G Grundbeschreibungszahl

A Abstand

Abschnitt 2

Einheiten

Eine Einheit greift den Hauptspeicher zu, wenn eine Stellenkette zwischen dieser Einheit und bestimmten Orte darin übertragen wird.

1. Die Einheit ergibt die Wahrschrift, die den ersten zugehörigen Ort im Hauptspeicher bestimmt.
2. Die Stellenkette werden zwischen der Einheit und dem Hauptspeicher übertragen.

Wahrschriften

Wenn eine Stellenkette bestimmt wird, stillschweigend werden allen ihre Achtheiten bestimmt.

Übertragung

Je nach der Richtung der Übertragung entweder **liest** oder **schreibt** die Einheit beim Zugriff.

Lesen

Wenn eine Einheit aus dem Hauptspeicher liest, wird die Stellenkette aus dem bestimmten Ort im Hauptspeicher zur Einheit geschickt.

Schreiben

Wenn eine Einheit in den Hauptspeicher schreibt, wird die Stellenkette von der Einheit zum bestimmten Ort im Hauptspeicher geschickt.

Zugriffsfolge

Für jede Einheit und für jeden Hauptspeicherort, eine Lesung von der Einheit aus dem Hauptspeicherort überträgt den Wert, den die letzte Schreibung von derselben Einheit zu demselben Hauptspeicherort übertragen hat.

Kunstanschriften

Eine Kunstanschrift wird zu einer Wahrschrift verwandelt.

Seitenfeld

Das **Seitenfeld** speichert die Angaben, die für die Verwandlung nützlich sind.

Grundfeld

Ein Grundfeld enthält entweder 2-Seitenbeschreibungen, 2-Seitenschlüssel oder 1-Seitenfeldbeschreibungen.

5. Die Einheit gibt den Abstand zum Seitenzeiger, um die Wahrschrift zu ergeben.

Teil II

Unterbrechung

Abschnitt 3

Anbauen

In einer Unterbrechung wird ein Eintrag von einer Quelle zu einem Ziel übertragen.

Ziel

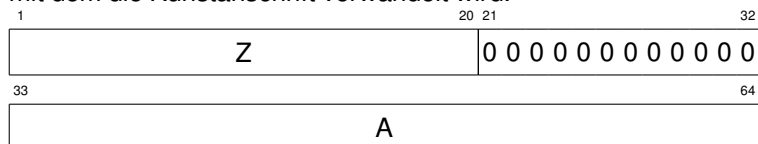
Ein Ziel ist eine Recheneinheit.

Tor

Ein Unterbrechungstor ist ein Hauptspeicherort, der mit einem Ziel verbunden wird.

Eintrag

Ein Unterbrechungseintrag enthält eine Kunstanschrift nach einer Angabe und einen Zeiger nach dem Grundfeld, mit dem die Kunstanschrift verwandelt wird.



Z Grundfeldzeiger

A Angabekunstanschrift

Quelle

Die Quelle ist die Einheit, die die Unterbrechung beginnt.

Abschnitt 4

Ablauf

Eine Unterbrechung findet statt, wenn die Quelle einen Unterbrechungseintrag in das Unterbrechungstor des Ziels schreibt.

1. Die Quelle schreibt den Eintrag in das Tor des Ziels.
2. Das Ziel übersetzt die Eintragskunstanschrift mit dem Grundfeld, den der Eintraggrundfeldzeiger zeigt.
3. Das Ziel verarbeitet die Angabe, die die gerade ausgegebene Wahranschrift zeigt.

Das Ziel muss den Anweisungskreislauf anfangen, nachdem es die Angabe verarbeitet hat.

Teil III

Ausführung

Abschnitt 5

Betrieb

Im ESER folgen die Recheneinheiten einen genauen Betrieb.

Anweisungskreislauf

Eine Recheneinheit folgt dem Anweisungskreislauf.

1. Die Einheit liest eine Anweisung.
2. Wenn die Anweisung nicht erkannt wird, findet der Sonderfall **AEA** statt.
3. Die Einheit macht alle Zugriffe, die vor der Anweisung gemacht werden sollen.
4. Die Einheit führt die Anweisung aus.
5. Die Einheit macht alle Zugriffe, die nach der Anweisung gemacht werden sollen.

Sonderfälle

Wenn ein Sonderfall statt findet, führt die Einheit eine **Falle** aus.

Eine Falle ist ein besonderes Verfahren, das den Zustand der Einheit beim Sonderfall als Eingabe bekommt.

Abschnitt 6

Recheneinheiten

Im ESER werden die Recheneinheiten nach einem bestimmten Entwurf gebaut.

Nahspeicher

Der Nahspeicher hängt nicht vom Hauptspeicher ab.

0-15 – Angaben

1		32
	0	
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	

AZ – Anweisungszeiger

1		31	32
	A		Z

A Zeiger

Z Zustand

0 Laufend

1 Stehend

ZE – Zustandseintrag

1		20	21	29	30	31	32
	G	0	0	0	0	0	0
33				B	0		
	AZ						

G Grundfeldzeiger

B Bedingung

AZ Anweisungszeiger

Angaben

Eine Angabe kann entweder eine Standbeistrichzahl oder eine Gleitbeistrichzahl sein.

Standbeistrichzahlen

Sei $Z_U(S, M)$ die Zahl, die eine Stellenkette S mit wenigsten Macht M in einer unvorzeichnenden Deutung ausdrückt.

$$Z_U(S, M) = 2^M \sum_{i=1}^{|S|} 2^{|S|-i} S_i$$

Sei $Z_Z(S, M)$ die Zahl, die eine Stellenkette S mit wenigsten Macht M in einer vorzeichnenden Deutung ausdrückt.

$$Z_Z(S, M) = 2^M \left(-2^{|S|-1} S_1 + \sum_{i=2}^{|S|} 2^{|S|-i} S_i \right)$$

U/Z1

1	8
S	

U/Z2

1	16
S	

U/Z4

1	32
S	

Gleitbeistrichzahlen

Sei $X(V, M, B)$ die Zahl, die eine Vorzeichenstelle V , eine Machtstellenkette M und eine Bruchstellenkette B ausdrücken.

$$X(V, M, B) = (-1)^V 2^{Z_U(M, 0) - 2^{|M|-1}} Z_U(B, -1 - |B|)$$

X4

1	2	9	10	32
V	M	B		

X8

1	2			12	13			32
V		M				B		
33								64
						B		

X16

1	2					16	17	32
V		M				B		
33								64
						B		
65								96
						B		
97								128
						B		

X32

1	2							20	21	32
V		M						B		
33										64
								B		
65										96
								B		
97										128
								B		
129										160
								B		
161										192
								B		
193										224
								B		
225										256
								B		

Anweisungen

Eine Anweisung beschreibt eine Änderung des Zustands der Einheit. Jede Anweisung hat einige **Gestalten**.

Regelungsanweisungen

Eine Regelungsanweisung ändert die Ausführung des Verfahrens, wenn ihre Bedingung befriedigt wird. Jede Stelle der Anweisungsbedingung bestimmt einen möglichen Wert der ZE-Bedingung, und die Anweisungsbedingung wird befriedigt, wenn die ZE-Bedingung einen Wert hat, dessen Anweisungsbedingungsstelle 1 gleicht.

Eine Regelungsanweisung hat drei Gestalten.

Beständergestalt

1	3	4	5		8	9		12	13		32
0	0	0	*		B		R			W	

In dieser Gestalt:

- ist das Ziel der Nahspeicherort *R*;
- ist die Quelle *W*.

Hauptspeichergestalt

1	3	4	5	8	9	12	13	16	17	32
0	1	0	*	B	R	Q	A			

In dieser Gestalt:

- ist das Ziel der Nahspeicherort R ;
- ist die Quelle der Hauptspeicherort, den die Zugabe A und des Nahspeicherortes Q bestimmt.

Nahspeichergestalt

1	3	4	5	8	9	12	13	16
1	1	0	*	B	R	Q		

In dieser Gestalt sind das Ziel und die Quelle die Nahspeicherorte R und Q .

WGL – Weglass

Nach dieser Anweisung:

- gleicht AZ der Zugabe AZ und der Quelle;
- gleicht das Ziel AZ vor der Ausführung.

1	3	4	5																													32																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
*	*	*	0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*</

SPR – Sprung

Nach dieser Anweisung:

- gleicht AZ der Quelle;
- gleicht das Ziel AZ vor der Ausführung.

1	3	4	5																													32																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
*	*	*	1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*</

Bewegungsanweisungen

Eine Bewegungsanweisung beschreibt eine Bewegung Angabe zwischen dem Hauptspeicher und dem Nahspeicher.

BWG – Bewegung

Nach dieser Anweisung:

- wird das Ziel durch die Quelle ersetzt;
- wird die ZE-Bedingung so geändert.
 - 00 nulle Quelle
 - 01 positive Quelle
 - 10 negative Quelle

Diese Anweisung hat vier Gestalten.

Beständergestalt

1	8	9	12	13	32
0	0	1	1	0	0
0	0	0	0	0	0
Z					W

In dieser Gestalt:

- ist das Ziel der Nahspeicherort Z ;
- ist die Quelle W .

Hauptspeichergestalt

1	8	9	12	13	16	17	18	20	21	32
0	1	1	1	0	0	0	0	0	0	0
Z					Q		Ä		G	A

In dieser Gestalt:

- ist das Ziel der Nahspeicherort Z ;
- wenn die Ä-Stelle 0 gleicht, ist die Quelle der Hauptspeicherort, den die Zugabe von A und vom Nahspeicherort Q bestimmt;

sonst:

- ist die Quelle der Hauptspeicherort, den der Nahspeicherort Q bestimmt;
- wird A zum Nahspeicherort Q nach der Anweisung zugegeben.

1	8	9	12	13	16	17	18	20	21	32
1	0	1	1	0	0	0	0	0	0	0
Z					Q		Ä		G	A

In dieser Gestalt:

- wenn die Ä-Stelle 0 gleicht, ist das Ziel der Hauptspeicherort, den die Zugabe von A und vom Nahspeicherort Z bestimmt;

sonst:

- wird A zum Nahspeicherort Z bevor der Anweisung zugegeben;
- ist das Ziel der Hauptspeicherort, den der Nahspeicherort Z bestimmt;
- ist die Quelle der Nahspeicherort Q .

Nahspeichergestalt

1	8	9	12	13	16
1	1	1	1	0	0
0	0	0	0	0	0
Z					Q

In dieser Gestalt sind das Ziel und die Quelle die Nahspeicherorte Z und Q .

UWG – Ungeschnittende Bewegung

Der Ablauf dieser Anweisung hängt von der Gestalt ab.

Diese Anweisung hat zwei Gestalten.

1	8	9	12	13	16	17	18	20	21	32
0	1	1	1	0	0	0	1	0	0	0
Z					Q		0		G	A

In dieser Gestalt:

- ist das Ziel der Nahspeicherort Z ;
- ist die Quelle der Hauptspeicherort, den die Zugabe A und des Nahspeicherortes Q bestimmt.

Außerdem wird der genaue Hauptspeicherort gespeichert.

1	8	9	12	13	16	17	18	20	21	32
1	0	1	1	0	0	0	1	0	0	0
Z					Q		0		G	A

In dieser Gestalt:

- ist das Ziel der Hauptspeicherort, den die Zugabe A und des Nahspeicherortes Z bestimmt;
- ist die Quelle der Nahspeicherort Q .

Außerdem scheitert diese Anweisung, wenn eine Schreibung zu dem genauen Hauptspeicherort nach der letzten **UWG** danach statt gefunden ist.

VWE – Verfahrenwechsel

Der Ablauf dieser Anweisung hängt von der Gestalt ab.

Diese Anweisung hat zwei Gestalten.

1	8	9	12	13	16	17	32
0	1	1	1	0	0	1	0
R				Q		A	

In dieser Gestalt:

- wird ZE in den Hauptspeicherort gespeichert, den der Nahspeicherort R bestimmt;
- wird ein neuer Zustandseintrag aus dem Hauptspeicherort geladen, den die Zugabe von A und vom Nahspeicherort Q bestimmt.

1	8	9	12	13	16
1	1	1	1	0	0
R				Q	

In dieser Gestalt:

- wird ZE in der Hauptspeicherort gespeichert, den der Nahspeicherort R bestimmt;
- wird ein neuer Zustandseintrag aus dem Hauptspeicherort geladen, den der Nahspeicherort Q bestimmt.

UTB – Unterbrechung

1	8	9	12	13	15	16	17	32
1	0	1	1	0	0	1	0	0
Z				Q		0		A

In dieser Anweisung:

- ist die Quelle die Paar Nahspeicherorte $(Q, Q + 1)$;
- ist das Ziel der Hauptspeicherort, den die Zugabe von A und vom Nahspeicherort Z bestimmt.

Stellenweiseanweisungen

Eine Stellenweiseanweisung beschreibt eine Rechnung über einzelne Stellen.

Jede Stellenweiseanweisung hat vier Gestalten.

Beständergestalt

1	4	5	8	9	12	13	32
0	0	1	0	*	*	*	*
Z				W			

In dieser Gestalt:

- ist das Ziel der Nahspeicherort Z ;
- ist die Quelle W .

Hauptspeichergestalt

1	4	5	8	9	12	13	16	17	18	20	21	32
0	1	1	0	*	*	*	*	Z	Q	Ä	G	A

In dieser Gestalt:

- ist das Ziel der Nahspeicherort Z ;
- wenn die Ä-Stelle 0 gleicht, ist die Quelle der Hauptspeicherort, den die Zugabe von A und vom Wert Q bestimmt;
- sonst:
 - ist die Quelle der Hauptspeicherort, den der Nahspeicherort Q bestimmt;
 - wird A zum Nahspeicherort Q nach der Anweisung zugegeben.

- wenn die \ddot{A} -Stelle 0 gleicht, ist das Ziel der Hauptspeicherort, den die Zugabe von A und vom Wert Z bestimmt;
- sonst:
- wird A zum Nahspeicherort Z vor der Anweisung zugegeben;
 - ist das Ziel der Hauptspeicherort, den der Nahspeicherort Z bestimmt;
- ist die Quelle der Nahspeicherort Q .

1	4	5	8	9	12	13	16
1	1	1	0	*	*	*	*
				Z	Q		

In dieser Gestalt sind das Ziel und die Quelle die Nahspeicherorte Z und Q .

LVS – Linksverschiebung

Nach dieser Anweisung wird das Ziel um die von der Quelle gegebene Anzahl von Stellen nach links verschoben.

Diagram illustrating memory layout for the first row (32 cells) and the second row (16 cells). The first row contains 32 cells, with indices 1, 4, 5, 8, 9, and 32 marked. The second row contains 16 cells, with indices 1, 4, 5, 8, 9, and 16 marked. Both rows show a pattern of asterisks and zeros.

Die ZE-Bedingung wird so geändert:

- 00 nulles Ergebnis
11 nichtnulles Ergebnis

RNS – Rechtsnullverschiebung

Nach dieser Anweisung wird das Ziel um die von der Quelle gegebene Anzahl von Stellen nach rechts verschoben. Die linken Stellen werden auf 0 gestellt.

The diagram shows a 32-bit register divided into two 16-bit sections. The top section, labeled 'ALU Result', contains the value 0001 followed by 12 asterisks. The bottom section, labeled 'Register Value', contains the value 0001 followed by 11 asterisks. Bit positions 1, 4, 5, 8, 9, and 16 are marked above the register.

Die ZE-Bedingung wird so geändert:

- 00 nulles Ergebnis
- 01 positives Ergebnis
- 10 negatives Ergebnis

RZS – Rechtsvorzeichenverschiebung

Nach dieser Anweisung wird das Ziel um die von der Quelle gegebene Anzahl von Stellen nach rechts verschoben. Die linken Stellen werden auf den Wert der ersten Stelle des Ziels vor der Anweisung gestellt.

1 4 5 8 9 32

* * * * 0 0 1 0 * * * * * * * * * * * * * * * * * *

1 4 5 8 9 16

* * * * 0 0 1 0 * * * * * * *

Die ZE-Bedingung wird so geändert:

- ```
00 nulles Ergebnis
01 positives Ergebnis
```

10 negatives Ergebnis

### DRH – Umdreh

Nach dieser Anweisung wird das Ziel um die von der Quelle gegebene Anzahl von Stellen nach rechts gedreht.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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Die ZE-Bedingung wird so geändert:

- 01 positives Ergebnis
- 10 negatives Ergebnis

### UND – Durchschnitt

Nach dieser Anweisung wird jede Stelle des Ziels durch den Durchschnitt der entsprechenden Stellen des Ziels und der Quelle ersetzt.

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|   |   |   |   |    |

Die ZE-Bedingung wird so geändert:

- 00 nulles Ergebnis
- 11 nichtnulles Ergebnis

### ODR – Vereinigung

Nach dieser Anweisung wird jede Stelle des Ziels durch die Vereinigung der entsprechenden Stellen des Ziels und der Quelle ersetzt.

|                                                     |   |   |   |   |    |
|-----------------------------------------------------|---|---|---|---|----|
| 1                                                   | 4 | 5 | 8 | 9 | 32 |
| * * * * 0 1 0 1 * * * * * * * * * * * * * * * * * * |   |   |   |   |    |
| 1                                                   | 4 | 5 | 8 | 9 | 16 |
| * * * * 0 1 0 1 * * * * * *                         |   |   |   |   |    |

Die ZE-Bedingung wird so geändert:

- 00 nulles Ergebnis
- 11 nichtnulles Ergebnis

### NIC – Nicht

Nach dieser Anweisung wird jede Stelle des Ziels durch den Wechsel der entsprechenden Stellen der Quelle ersetzt.

|                                                     |   |   |   |   |    |
|-----------------------------------------------------|---|---|---|---|----|
| 1                                                   | 4 | 5 | 8 | 9 | 32 |
| * * * * 0 1 1 0 * * * * * * * * * * * * * * * * * * |   |   |   |   |    |
| 1                                                   | 4 | 5 | 8 | 9 | 16 |
| * * * * 0 1 1 0 * * * * * * *                       |   |   |   |   |    |

Die ZE-Bedingung wird so geändert:

- 01 positives Ergebnis
- 10 negatives Ergebnis



## VZW – Vorzeichenwechsel

Nach dieser Anweisung wird das Ziel durch den Wechsel der Quelle ersetzt.

In der Beständergestalt wird die Quelle nullweitert.

|         |   |   |   |   |                                     |
|---------|---|---|---|---|-------------------------------------|
| 1       | 4 | 5 | 8 | 9 | 32                                  |
| * * * * | 0 | 1 | 1 | 1 | * * * * * * * * * * * * * * * * * * |

|         |   |   |   |   |             |
|---------|---|---|---|---|-------------|
| 1       | 4 | 5 | 8 | 9 | 16          |
| * * * * | 0 | 1 | 1 | 1 | * * * * * * |

Die ZE-Bedingung wird so geändert:

- 01 positives Ergebnis
- 10 negatives Ergebnis

## Rechenanweisungen

Eine Rechenanweisung beschreibt eine Rechnung.

Alle Rechenanweisungen rechnen Standbeistrichzahlen.

Jede Rechenanweisung hat vier Gestalten.

### Beständergestalt

|   |   |   |   |         |    |    |    |
|---|---|---|---|---------|----|----|----|
| 1 | 4 | 5 | 8 | 9       | 12 | 13 | 32 |
| 0 | 0 | 1 | 0 | * * * * | Z  |    | W  |

In dieser Gestalt:

- ist das Ziel der Nahspeicherort *Z*;
- ist die Quelle *W*.

### Hauptspeichergestalt

|   |   |   |   |         |    |    |    |    |    |    |    |    |
|---|---|---|---|---------|----|----|----|----|----|----|----|----|
| 1 | 4 | 5 | 8 | 9       | 12 | 13 | 16 | 17 | 18 | 20 | 21 | 32 |
| 0 | 1 | 1 | 0 | * * * * | Z  |    | Q  | Ä  | G  |    |    | A  |

In dieser Gestalt:

- ist das Ziel der Nahspeicherort *Z*;
  - wenn die Ä-Stelle 0 gleicht, ist die Quelle der Hauptspeicherort, den die Zugabe von *A* und vom Nahspeicherort *Q* bestimmt;
- sonst:
- ist die Quelle der Hauptspeicherort, den der Nahspeicherort *Q* bestimmt;
  - wird *A* zum Nahspeicherort *Q* nach der Anweisung zugegeben.

|   |   |   |   |         |    |    |    |    |    |    |    |    |
|---|---|---|---|---------|----|----|----|----|----|----|----|----|
| 1 | 4 | 5 | 8 | 9       | 12 | 13 | 16 | 17 | 18 | 20 | 21 | 32 |
| 1 | 0 | 1 | 0 | * * * * | Z  |    | Q  | Ä  | G  |    |    | A  |

In dieser Gestalt:

- wenn die Ä-Stelle 0 gleicht, ist das Ziel der Hauptspeicherort, den die Zugabe von *A* und vom Nahspeicherort *Z* bestimmt;
- sonst:
- wird *A* zum Nahspeicherort *Z* bevor der Anweisung zugegeben;
  - ist das Ziel der Hauptspeicherort, den der Nahspeicherort *Z* bestimmt;
- ist die Quelle der Nahspeicherort *Q*;



|       |   |   |   |   |                                                 |
|-------|---|---|---|---|-------------------------------------------------|
| 1     | 4 | 5 | 8 | 9 | 32                                              |
| * * * | 1 | 0 | 1 | 1 | * * * * * * * * * * * * * * * * * * * * * * * * |
| 1     | 4 | 5 | 8 | 9 | 16                                              |
| * * * | 1 | 0 | 1 | 1 | * * * * * * * *                                 |

Die ZE-Bedingung wird so geändert:

- 00 nulles Ergebnis
- 01 positives Ergebnis
- 10 negatives Ergebnis



## Abschnitt 7

# Durchgangeinheiten

Die Durchgangeinheiten vereinfachen die Angabeübertragung zu und aus dem Hauptspeicher. Jede Durchgangeinheit besteht aus einem **Gerät** und einer **Ausführungseinheit**. Hier wird beschrieben der Entwurf der Ausführungseinheit.

## Nahspeicher

### AZ – Anweisungszeiger

|   |   |    |    |    |
|---|---|----|----|----|
| 1 |   | 30 | 31 | 32 |
|   | A |    | 0  | Z  |

A Zeiger

Z Zustand

0 Laufend

1 Stehend

### UTZ – Unterbrechungstorzeiger

|   |   |    |
|---|---|----|
| 1 |   | 32 |
|   | Z |    |

### UEZ – Unterbrechungseintragszeiger

|   |   |    |
|---|---|----|
| 1 |   | 32 |
|   | Z |    |

### ZE – Zustandseintrag

|    |     |    |    |    |    |    |    |     |
|----|-----|----|----|----|----|----|----|-----|
| 1  |     | 20 | 21 | 24 | 25 | 30 | 31 | 32  |
|    | G   |    | 0  | 0  | 0  |    | S  | B   |
| 33 |     |    |    |    |    |    |    | 64  |
|    | AZ  |    |    |    |    |    |    |     |
| 65 |     |    |    |    |    |    |    | 96  |
|    | UTZ |    |    |    |    |    |    |     |
| 97 |     |    |    |    |    |    |    | 128 |
|    | UEZ |    |    |    |    |    |    |     |

G Grundfeldzeiger

S Sonderfallzeichen



L Länge

### Beständergestalt

|    |   |   |   |   |    |    |    |
|----|---|---|---|---|----|----|----|
| 1  | 2 | 3 | 4 | 5 | 10 | 11 | 32 |
| *  | * | 1 | 1 | 0 | 0  | 0  | 0  |
|    |   |   |   |   |    |    | L  |
| 33 |   |   |   |   |    |    | 64 |
| A  |   |   |   |   |    |    |    |

In dieser Gestalt:

- ist *L* die Zahl Achtheiten zu übertragen;
- ist die Zugabe von *AZ* und von *A* die Anschrift des Orts, der an der Übertragung beteiligt ist.

### Lesung

Nach dieser Anweisung wird die bestimmte Zahl Achtheiten vom Hauptspeicher in das Gerät übertragen.

|    |   |   |   |   |    |    |    |
|----|---|---|---|---|----|----|----|
| 1  | 2 | 3 | 4 | 5 | 10 | 11 | 32 |
| *  | * | * | 0 | 0 | 0  | 0  | 0  |
|    |   |   |   |   |    |    | A  |
| 1  | 2 | 3 | 4 | 5 | 10 | 11 | 32 |
| *  | * | * | 1 | 0 | 0  | 0  | 0  |
|    |   |   |   |   |    |    | L  |
| 33 |   |   |   |   |    |    | 64 |
| A  |   |   |   |   |    |    |    |

### Schreibung

Nach dieser Anweisung wird die bestimmte Zahl Achtheiten vom Gerät in den Hauptspeicher übertragen.

|    |   |   |   |   |    |    |    |
|----|---|---|---|---|----|----|----|
| 1  | 2 | 3 | 4 | 5 | 10 | 11 | 32 |
| *  | * | * | 0 | 0 | 0  | 0  | 0  |
|    |   |   |   |   |    |    | A  |
| 1  | 2 | 3 | 4 | 5 | 10 | 11 | 32 |
| *  | * | * | 1 | 0 | 0  | 0  | 0  |
|    |   |   |   |   |    |    | L  |
| 33 |   |   |   |   |    |    | 64 |
| A  |   |   |   |   |    |    |    |

## Betrieb

### Verfahren

Die Durchgangeinheit fängt ein Verfahren an, wenn sie mit einem Zustandseintrag unterbrochen wird, in dem *Z* von *AZ* **Laufend** ist.

### Fallen

Die Durchgangeinheit schreibt *ZE* zum Hauptspeicherort, der *UTZ* + 4 folgt.

Dann führt die Durchgangeinheit ein Verfahren aus, das aus einer einzigen Regelungsanweisung mit der folgenden Felden besteht:

- *Z* gleich 1;
- *U* gleich 1;
- *A* gleich 0.