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JSBR I2 1670 Fetch & Link
P1 = 002002
P2 = 0/0225
P3 = BIT (DM4 report), Sort Work File Id
P4 → Follow on Program Name

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LOS SORT

5 nesting

Step	Instruction		Address	Comment	Octal	Step
00	NOOP			(No offset address)	000000	00
01	JSBR	I2	1627	Release Block		01
02	P1= 1700-					02
03	JSBR	I2	1627	Release Block		03
04	P1= 2000-					04
05	LDA	I2	0155	=P3 of Fetch		05
06	ANDA	2	1752	(Leaves Sort Work File Id)		06
07	IORA	2	0323	000400		07
10	STA		1612			10
11	JSBR	I2	1700	Get next FCB (word 1)		11
12	P1= /					12
13	ANDA	2	1752	(Leaves Disc No.)		13
14	IORA	2	0341	002000 (4 records)		14
15	STA	I	1701	2011-		15
16	STA	I	1702	2015-		16
17	INCB			→ FCB word 2		17
20	LDA	I2	B	→ Stored Buffer Control Block		20
21	STA	I	1703	2007-		21
22	ADB	2	0205	→ FCB word 7		22
23	LDA	I2	B	= Base Buffer No.		23
24	STA	I	1700	2020-		24
25	INCB			→ FCB word 8		25
26	LDA	I2	B	→ FSB		26
27	LDA	I2	A	= No. of records in Sort Work File		27
30	STA		1707			30
31	LDA	I2	0067	3400- = Reporting Task No.		31
32	LDB	I2	0155	=P3 of Fetch		32
33	BPOS					33
34	CLA			DM4 report		34
35	STA	I	1705	2040- Save Reporting Task No.		35
36	INSZ	2	0155			36
37	LDB	I2	0155	=P4 of Fetch → Follow on Program Name		37
40	STB		1644			40
41	A=Ø					41
42	JSBR		1732	FLASH "Sorting"		42
43	JSBR	I2	1741	Move & Load Follow on Program Name		43
44	P1= /					44
45	P2= 2036-					45
46	P3= 4 chars					46
47	CLA					47
50	JSBR	I2	1412	Stop of I/O Station		50
51	STA	I	1706	3744- (Force reload Printer program)		51
52	C2A/COMPA			Bare Slot No. = -1		52
53	LDB		1707	= No. of Records		53
54	JUMP	I	1704	2100- INTO SORT.		54
55						55
56						56
57						57
60						60
61						61
62						62
63						63
64						64
65						65
66						66
67						67
70						70
71						71
72						72
73						73
74						74
75						75
76						76
77						77

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20S Sort

Step	Instruction		Address	Comment	Octal	Step
00				→ Store Drive Sector No. 2020-		00
01				2011-		01
02				2015-		02
03	Offset Addresses			→ → Shared Buffer Control Block 2007-		03
04				→ SORT 2100-		04
05				→ Store Reporting Task No. 2040-		05
06				→ Page Name Last Loaded into Monitor partition 3744-		06
07				Number of Records in Sort Work File 40/5	000000	07
10				CR BEL		10
11				SO T		11
12				A S		12
13				K SP		13
14						14
15						15
16						16
17				SP S		17
20				O R		20
21				"Tasks in Sorting in "demo" T I		21
22				N G		22
23				SP		23
24						24
25						25
26				I		26
27				T E		27
30				M S		30
31				SO NUL		31
32	*ENTRY			FLASH "Sorting"	← BA →	32
33	LDA	Z	0040	=Task No.		33
34	JSBR	IR	1612	Octal→ASCII		34
35	P1=1714-					35
36	JSBR	IR	1765	Record Count →ASCII		36
37	P1=0,0,1,6				000106	37
40	P2=1707-					40
41	P3=1723½-					41
42	LDA	I	1705	2040- =Reporting Task No.		42
43	JSBR	IR	1654	FLASH Single Station "Sorting"		43
44	P1=1710-					44
45	JSBR	IR	1625	SUSPEND		45
46	JUMP	I	1732	Return.		46
47						47
50						50
51						51
52						52
53						53
54						54
55						55
56						56
57						57
60						60
61						61
62						62
63						63
64						64
65						65
66						66
67						67
70						70
71						71
72						72
73						73
74						74
75						75
76						76
77						77

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los Sort

Step	Instruction	Address	Comment	Octal	Step
00			→ Low Buffer 0000-		00
01			→ HIGH Buffer 1000-		01
02			→ Update Counter, High Buffer 2031-		02
03	Offset		→ Update Counter, Low Buffer 2032-		03
04	Addresses		→ Top of Buffer 2000-		04
05			→ Median Record No's 2060-		05
06					06
07			→ Shared Buffer Control Block (FCB word 2)	000000	07
10				000000	10
11			Transfer Low { R/W, Sectors, Disc No.	-	11
12			Buffer 0000-		12
13			Start Sector }	-	13
14				000000	14
15			Transfer HIGH { R/W, Sectors, Disc No.	-	15
16			Buffer 1000-		16
17			Start Sector }	-	17
20			BASE SECTOR, SORT FILE	-	20
21			Top Slot No.	-	21
22			BASE Slot No.	-	22
23			HIGH RUNNER Slot No.	-	23
24			LOW RUNNER Slot No.	-	24
25			→ HIGH Record	-	25
26			→ low Record	-	26
27			HIGH BLOCK No.	377777	27
30			low BLOCK No.	377777	30
31			High Update Counter	000000	31
32			Low Update Counter	000000	32
33			→ High Update Counter	-	33
34			→ Low Update Counter	-	34
35			→ CURRENT Record (Bubble Sort)	-	35
36			Follow-on Program Name {		36
37					37
40			Test No. to report to	-	40
41					41
42					42
43					43
44					44
45					45
46					46
47					47
50					50
51					51
52					52
53					53
54					54
55					55
56					56
57					57
60			M K		60
61			2 SP		61
62			C O		62
63	MEDIAN Record		P Y		63
64	No's		R I		64
65			G H		65
66			T SP		66
67			1 9		67
70			8 7		70
71			SP J		71
72			SP A		72
73			SP T		73
74			E M		74
75			P 2		75
76			E 01		76
77			A N		77

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LOS Sort

Step	Instruction		Address	Comment	Octal	Step
00	DECB			*NEXT LOWER PARTITION		00
01	STB		0021	Top Slot No. (NB 1st Slot is Slot No. 0)		01
02	STA		0022	Bare Slot No. *NEXT UPPER PARTITION		02
03	INCA					03
04	STA		0024	Low Record Slot No.		04
05	JSBR		0400	SKIP if PARTITION SPLIT		05
06	JUMP		0114	Partition Loop Loop, exited.		06
07	LDA		0022	Bare Slot (old)		07
10	STA	I	0026	Into low record } Stack Lower Partition		10
11	INS2	I	0034	Low updated		11
12	LDA		0024	=Bounding Slot (Next Bare Slot)		12
13	JUMP		0102	Process Upper Partition.		13
14	LDA		0022	Bare Slot No.		14
15	ANDS					15
16	JUMP		0123	All partitions low sorted } Unstack		16
17	JSBR		0315	GET HIGH (Old Bare Slot) Lower Partition		17
20	LDA	I	0025	=Earlier Bare Slot		20
21	LDB		0022	Correct Bare Slot = Next Top Slot +1		21
22	JUMP		0100			22
23	JSBR		0152	Write Low Buffer *SORT DONE		23
24	JSBR		0165	Write HIGH Buffer		24
25	CLA					25
26	STA	I	0007	(Shared Buffer Control Block) }		26
27	LDA		0040	=Reporting Task No.		27
30	ANDS					30
31	JUMP		0134	don't report		31
32	JSBR	IR	1654	FLASH Single Station "Sort Done"		32
33	P1=2371-					33
34	JUMP		0146			34
35						35
36						36
37						37
40						40
41						41
42						42
43						43
44						44
45						45
46	JSBR	IR	1670	FETCH & LINK		46
47	P1= 002006			Printer Program Library		47
50	P2= 2036-			→ Program Name		50
51	JUMP	I	1402	to Control Prgm (Program not found)		51
52	*ENTRY			REWRITE LOW BUFFER (if updated)	← BA →	52
53	LDA		0032	Low Update counter		53
54	ANDS/CLA					54
55	JUMP	I	0152	Return – No updates outstanding		55
56	STA		0032	Clear Low Update counter		56
57	LDA		0011	} Lock		57
60	CLSA/COMPSA					60
61	STA		0011			61
62	JSBR	IR	1615	TRANSFER (WRITE Low Buffer)		62
63	P1=2010-					63
64	JUMP	I	0152	Return.		64
65	*ENTRY			REWRITE HIGH BUFFER (if updated)	← BA →	65
66	LDA		0031	High Update counter		66
67	ANDS/CLA					67
70	JUMP	I	0165	Return – No updates outstanding		70
71	STA		0031	Clear High Update counter		71
72	LDA		0015	} Lock		72
73	CLSA/COMPSA					73
74	STA		0015			74
75	JSBR	IR	1615	TRANSFER (WRITE High Buffer)		75
76	P1=2014-					76
77	JUMP	I	0165	Return.		77

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los Sort

Step	Instruction		Address	Comment	Octal	Step
00	*ENTRY			FETCH low Block	← BA →	00
01	STA		0030	low Block No. required		01
02	JSBR		0152	Write low Buffer		02
03	LDA		0030	low Block No.		03
04	LSA2			x4 (Sectors per Block)	001702	04
05	ADA		0020	Base Sector, Sort Work File		05
06	STA		0013	Start Sector, Transfer low		06
07	LDA		0011	}		07
10	CASA			} Read		10
11	STA		0011	}		11
12	JSBR	I2	1615	TRANSFER (READ low Buffer)		12
13	Y1= 2010-					13
14	JUMP	I	0200	Return.		14
15	*ENTRY			GET low RECORD	← BA →	15
16	LDA		0024	low Runner Slot No.		16
17	RSA6			÷64 (Records per Block)	001506	17
20	CMPA		0027	Block No. currently in HIGH Buffer		20
21	JUMP		0236	Record is already in HIGH Buffer		21
22	CMPA		0030	Block No. currently in low Buffer		22
23	SKIP			Record is already in low Buffer		23
24	JSBR		0200	FETCH low Block		24
25	LDA		0003	2032- } reset → low Update counter		25
26	STA		0034	}		26
27	LDB		0000	0000- → low Buffer		27
30	LDA		0024	low Runner Slot No.		30
31	ANDA	Z	0277	000077		31
32	LSA3			x8 (record length)	001703	32
33	ADA	Z	B			33
34	STA		0026	→ low Record		34
35	JUMP	I	0215	Return.		35
36	LDA		0002	2031- } low updates *Merge low into HIGH Buffer		36
37	STA		0034	will occur in High Buffer }		37
40	LDB		0001	1000- → High Buffer		40
41	JUMP		0230	Merge.		41
42	*ENTRY			INCREMENT low RECORD	← BA →	42
43	LDB		0026	→ low Record		43
44	ADB	Z	0210	CF8 (Record Length)		44
45	CMPB		0001	1000-		45
46	JSBR		0252	End of Buffer - Advance low Block		46
47	STB		0026	→ low Record		47
50	INS2		0024	low Runner Slot No.		50
51	JUMP	I	0242	Return.		51
52	*ENTRY			Advance low Block	← BA →	52
53	LDA		0030	low Block No.		53
54	INCA					54
55	CMPA		0027	High Block No.		55
56	JUMP		0262	Buffers now have adjacent blocks		56
57	JSBR		0200	FETCH next low Block		57
60	LDB		0000	0000- Start of low Buffer		60
61	JUMP	I	0252	Return.		61
62	LDA		0002	2031- } Low updates *Merge low into HIGH Buffer		62
63	STA		0034	will occur in High Buffer }		63
64	JUMP	I	0252	Return.		64
65	*ENTRY			Reduce High Block	← BA →	65
66	LDA		0027	High Block No.		66
67	DECA					67
70	CMPA		0030	low Block No.		70
71	JUMP		0275	Buffers have adjacent blocks		71
72	JSBR		0300	FETCH previous High Block		72
73	LDB		0004	2000- End of High Buffer		73
74	JUMP	I	0265	Return.		74
75	LDA		0003	2032- } High updates *Merge HIGH into low Buffer		75
76	STA		0033	will occur in low Buffer }		76
77	JUMP	I	0265	Return.		77

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Step	Instruction		Address	Comment	Octal	Step
00	*ENTRY			FETCH HIGH BLOCK	← BA →	00
01	STA		0027	High Block No. required		01
02	JSBR		0165	Work High Buffer		02
03	LDA		0027	High Block No.		03
04	LSA2			x4 (Sectors per block)	001702	04
05	ADA		0020	Base Sector, Sort Work File		05
06	STA		0017	Start Sector, Transfer High		06
07	LDA		0015	} Read		07
10	CLSA					10
11	STA		0015			11
12	JSBR	IR	1615	TRANSFER (READ High Buffer)		12
13	P= 2014-					13
14	JUMP	I	0300	Return.		14
15	*ENTRY			GET HIGH RECORD	← BA →	15
16	STA		0023	High Record Sect No.		16
17	RSA6			÷64 (Records per Block)	001506	17
20	CMPA		0030	Block No. currently in Low Buffer		20
21	JUMP		0335	Record is already in Low Buffer		21
22	CMPA		0027	Block No. currently in High Buffer		22
23	SKIP			Record is already in High Buffer		23
24	JSBR		0300	FETCH High Block		24
25	LDA		0002	2031- } Next → High Update Counter		25
26	STA		0033			26
27	LDA		0023	High Record Sect No.		27
30	ANDA	Z	0277			30
31	LSA3			x8 (Record length)	001703	31
32	ADA		0001	1000- → High Buffer		32
33	STA		0025	→ High Record		33
34	JUMP	I	0315	Return.		34
35	STA		0027	High Block No. required *MOVE low → High Buffer		35
36	JSBR		0165	Work High Buffer		36
37	JSBR	IR	1707	Move Low Buffer → High Buffer		37
40	P1 = 0000-					40
41	P2 = 1000-					41
42	P3 = 512 words				001000	42
43	LDA		0032	Low Update Counter		43
44	STA		0031	→ High Update Counter		44
45	LDA		0002	2031- } Next → High Update Counter		45
46	STA		0033			46
47	LDA		0013	} Start Sector, Low Transfer		47
50	STA		0017	→ High Transfer		50
51	CLA					51
52	STA		0032	Clear Low Update counter		52
53	CLA/COMPA					53
54	STA		0030	Cancel Low Buffer contents		54
55	JUMP		0327	Merge		55
56	*ENTRY			DECREMENT HIGH RECORD	← BA →	56
57	LDB		0025	→ High Record		57
60	CMPB		0001	1000-		60
61	JSBR		0265	Reduce High Block No.		61
62	SFB	Z	0210	CF8 (Record length)		62
63	STB		0025	→ High Record		63
64	DES2		0023	High Record Sect No.		64
65	NOOP					65
66	JUMP	I	0356	Return.		66
67						67
70						70
71						71
72						72
73						73
74				"Sort done"		74
75						75
76						76
77						77

CR BEL
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los Sat

Step	Instruction		Address	Comment	Octal	Step
00	*ENTRY			SKIP IF PARTITION SPLIT	← BA →	00
01	JSBR	IR	1625	SUSPEND		01
02	LDA		0021	Top Slot No.		02
03	SFA		0024	Low Runner Slot No.		03
04	SFA	Z	0223	CF19		04
05	ANEG					05
06	JUMP		0435	No more items, no split partition.		06
07	ADA	Z	0222	CF18		07
10	APOS					10
11	JUMP	I	0400	Ø or 1 item, no partition is sorted.		11
12	LDA		0021	Top Slot *Memory Resident BUBBLE SORT		12
13	JSBR		0315	GET HIGH		13
14	JSBR		0215	GET LOW		14
15	INS2	I	0033	High Update Counter } Increase Low Update		15
16	INS2	I	0034	Low Update Counter } Count Occur.		16
17	LDA		0025	→HIGH		17
20	SFA	Z	0210	CF8 } decrement *NEXT ELEMENT		20
21	STA		0035	→Current } Current		21
22	JSBR		0555	SWAP if CURRENT > HIGH		22
23	LDA		0035	→Current		23
24	COMPA		0026	→Low		24
25	SKIP					25
26	JUMP		0420	data left element		26
27	LDA		0025	→HIGH *NEXT PASS		27
30	SFA	Z	0210	CF8		30
31	STA		0025	→HIGH		31
32	COMPA		0026	→Low		32
33	JUMP	I	0400	Return - Partition is Sorted.		33
34	JUMP		0420	data left element.		34
35	LDA		0021	Top Slot *SPLIT PARTITION		35
36	JSBR		0315	GET HIGH		36
37	JSBR		0215	GET LOW		37
40	JSBR		0700	Select Median (Move to Low)		40
41	JUMP		0446			41
42	JSBR		0356	DECREMENT HIGH *Next HIGH		42
43	LDA		0023	High Runner Slot No		43
44	COMPA		0024	Low Runner Slot No.		44
45	JUMP		0457	Split completed.		45
46	JSBR		0600	Skip if HIGH < MEDIAN (Move High → Low)		46
47	JUMP		0442	No Swap		47
50	JSBR		0242	INCREMENT LOW *Next LOW		50
51	LDA		0024	Low Runner Slot No.		51
52	COMPA		0023	High Runner Slot No.		52
53	JUMP		0457	Split Completed.		53
54	JSBR		0615	Skip if LOW > MEDIAN (Move Low → High)		54
55	JUMP		0450	No Swap		55
56	JUMP		0442			56
57	LDA		0005	→Median *SPLIT COMPLETED		57
60	LDB		0025	→High		60
61	JSBR		0500	Move Data (Median → High)		61
62	INS2	I	0033	High Update counter		62
63	INS2		0400	(Skip)		63
64	JUMP	I	0400	Return		64
65						65
66						66
67						67
70						70
71						71
72						72
73						73
74						74
75						75
76						76
77						77

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los Sat

Step	Instruction		Address	Comment	Octal	Step
00	*ENTRY			MOVE DATA	← BA →	00
01	STA	Z	0176			01
02	LDA	Z	0207	CF7		02
03	STA	Z	0177	Counter		03
04	INS2	Z	0176	*Next WORD		04
05	INCB					05
06	LDA	IZ	0176			06
07	STA	IZ	B			07
10	DES2	Z	0177			10
11	JUMP		0504	auto next word.		11
12	JUMP	I	0500	Return.		12
13	*ENTRY			SWAP DATA	← BA →	13
14	STA	Z	0176			14
15	LDA	Z	0207	CF7		15
16	STA	Z	0177	Counter		16
17	STB	Z	0175			17
20	INS2	Z	0175	*Next WORD PAIR		20
21	INS2	Z	0176			21
22	LDA	IZ	0176			22
23	LDB	IZ	0175			23
24	STA	IZ	0175			24
25	STB	IZ	0176			25
26	DES2	Z	0177			26
27	JUMP		0520	auto next word pair.		27
30	JUMP	I	0513	Return.		30
31	*ENTRY			COMPARE (& SWAP if ≠)	← BA →	31
32	STA	Z	0176			32
33	LDA	Z	0207	CF7		33
34	STA	Z	0177	Counter		34
35	INS2	Z	0176	*Next WORD PAIR		35
36	INCB					36
37	LDA	IZ	0176	=Word n		37
40	CMPA	IZ	B	=Test Word n		40
41	JUMP		0552			41
42	INS2		0531	not equal (skip)		42
43	XORA	IZ	B			43
44	ANEG			B17's equal?		44
45	JUMP	I	0531	Yes, so GT flag is OK		45
46	LDA	IZ	0176	}		46
47	ABOS/CLGT			} Compare B17 to set GT flag.		47
50	SETGT			}		50
51	JUMP	I	0531	Return.		51
52	DES2	Z	0177			52
53	JUMP		0535	auto next word Pair		53
54	JUMP	I	0531	Return (equal)		54
55	*ENTRY			SWAP if CURRENT > HIGH	← BA →	55
56	LDA		0035	→ Current		56
57	LDB		0025	→ HIGH		57
60	JSBR		0531	COMPARE		60
61	JUMP	I	0555	Return (equal)		61
62	SKGT					62
63	JUMP	I	0555	Return (<)		63
64	LDA		0035	→ Current		64
65	LDB		0025	→ High		65
66	JSBR		0513	SWAP		66
67	JUMP	I	0555	Return.		67
70						70
71						71
72						72
73						73
74						74
75						75
76						76
77						77

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10S Sat

Step	Instruction		Address	Comment	Octal	Step
00	*ENTRY			SKIP if HIGH < MEDIAN (& move High → low)	← BA →	00
01	LDA		0025	→ HIGH		01
02	LDB		0005	→ MEDIAN		02
03	JSBR		0531	COMPARE		03
04	JUMP	I	0600	Return (equal)		04
05	SKNGT					05
06	JUMP	I	0600	Return (>)		06
07	LDA		0025	→ HIGH		07
10	LDB		0026	→ LOW		10
11	JSBR		0500	Move Data (High → Low)		11
12	INS2	I	0034	Low Update counter		12
13	INS2		0600	(Skips)		13
14	JUMP	I	0600	Return.		14
15	*ENTRY			SKIP if LOW > MEDIAN (& move Low → High)	← BA →	15
16	LDA		0026	→ LOW		16
17	LDB		0005	→ MEDIAN		17
20	JSBR		0531	COMPARE		20
21	JUMP	I	0615	Return (equal)		21
22	SKGT					22
23	JUMP	I	0615	Return (<)		23
24	LDA		0026	→ LOW		24
25	LDB		0025	→ HIGH		25
26	JSBR		0500	Move Data (Low → High)		26
27	INS2	I	0033	High Update Counter		27
30	INS2		0615	(Skips)		30
31	JUMP	I	0615	Return.		31
32						32
33						33
34						34
35						35
36						36
37						37
40						40
41						41
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Step	Instruction		Address	Comment	Octal	Step
00	*ENTRY			SELECT MEDIAN (B move to low)	← BA →	00
01	LDB		0026	→ low		01
02	ADB	Z	0306	CF80 (+10 words)		02
03	STB		0035	→ Current (may be in either block)		03
04	LDA		0026	→ low		04
05	JSBR		0531	COMPARE (low - CURRENT)		05
06	JUMP		0774	low = Current, use low.		06
07	LDA		0026	→ low		07
10	LDB		0025	→ HIGH		10
11	STGT					11
12	JUMP		0727	low < Current		12
13	JSBR		0531	COMPARE (low - HIGH)		13
14	JUMP		0774	Current < low = High, use low.		14
15	STGT					15
16	JUMP		0774	Current < low < High, use low.		16
17	LDA		0035	→ Current		17
20	LDB		0025	→ HIGH		20
21	JSBR		0531	COMPARE (CURRENT - HIGH)		21
22	JUMP		0741	Current = High < low, use High		22
23	STGT					23
24	JUMP		0741	Current < High < low, use High		24
25	LDA		0035	→ Current		25
26	JUMP		0770	High < Current < low, use Current		26
27	JSBR		0531	COMPARE (low - HIGH)		27
30	JUMP		0774	low = High < Current, use low		30
31	STNGT					31
32	JUMP		0774	High < low < Current, use low		32
33	LDA		0035	→ Current		33
34	LDB		0025	→ HIGH		34
35	JSBR		0531	COMPARE (CURRENT - HIGH)		35
36	JUMP		0741	low < Current = High, use High		36
37	STGT					37
40	JUMP		0725	low < Current < High, use Current		40
41	LDA		0025	→ HIGH		41
42	JUMP		0770	low < High < Current, use High		42
43						43
44						44
45						45
46						46
47						47
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64						64
65						65
66						66
67						67
70	INS2	I	0034	low Update Counter		70
71	INS2	I	0033	High Update Counter		71
72	LDB		0026	→ low *Swap with, low		72
73	JSBR		0513	SWAP DATA		73
74	LDA		0026	→ low *Move low → Median		74
75	LDB		0005	→ MEDIAN		75
76	JSBR		0500	MOVE DATA		76
77	JUMP	I	0700	Return.		77