

IDENTIFICATION

Product Code:	DEC-12-ZR5B-D
Product Name:	DIAL-MS BUILD Program Description
Date Created:	December 1, 1970
Maintainer:	Software Services

LAP6-DIAL is an editor, filing system and assembler for use with the PDP-12 computer. The editor and filing portions are derived from the basic LINC program LAP6¹ by Mary Allen Wilkes of Washington University. The assembly portion is derived from several programs used for the PDP-8 computer including PAL-D².

The Digital Equipment Corporation wishes to express to the author, Mary Allen Wilkes (Clark), and the Computer Research Laboratory of Washington University, St. Louis, Missouri, its appreciation for the development set forth in LAP6 as well as its thanks for permission to use parts of the LAP6 program.

¹M. A. Wilkes, LAP6 Handbook, Computer Research Laboratory Tech. Rep. No. 2, Washington University, St. Louis, May 1, 1967.

²PAL-D Assembler Programmer's Reference Manual DEC-D8-ASAA-D.

1.0 PROGRAM OVERVIEW

BUILD is the name of the routine which "customizes" DIAL-MS for a given configuration. BUILD determines what devices a user has and creates a set of I/O routines for DIAL-MS¹ to use. At present, BUILD resides in blocks 310, 345, 365, and 366 of the DIAL-MS system.

BUILD is composed of three separate logical components. The first is the actual code that decides which devices are present and constructs the necessary tables for the I/O controller to use. The second component is the I/O controller which dispatches the calls for operations to the correct handlers with any necessary modifications made in the data. The individual I/O handlers are the third logical part. Each I/O handler operates just one device, and each is independent of the controller and other routines. The three components of BUILD are described in the following section.

2. INITIALIZATION

The initialization phase resides at block 310 on the DIAL-MS system. Note that this is part of the Editor (locations 0-377). The DIAL-MS Editor requires that the pointers to the read and write routines reside at locations 21 and 22, respectively. Therefore, while the initialization phase starts at location 4020 in LINCmode it immediately jumps past the pointers at 21 and 22. It then reads in the prototype I/O controller located at block 345, plus all the handlers for all the possible devices (LINCtape and RS08, DF32 and RK08 disks) which are located at blocks 365 and 366 of the DIAL-MS tape. Initially the handlers and controllers are set up to support only LINCtape, with the LINCtape handler residing at 7600 of field 1. The program then checks for the various devices by device IOT's. If the device is present, the program alters the device table slightly to include these new unit codes. It will also move the new secondary device handler to location 7400 of field 1 if another device in addition to LINCtape is present. Locations 7400-7777 of field 1 are then written onto tape 0. Thus, the system now knows that blocks 322 and 323 of LINCtape 0 contain all the necessary information and they do not have to be rebuilt each time. Blocks 300-467 of tape 0 (with the exception of the index) are copied to blocks 0-167 of logical unit 100, providing 100 is not on

¹LAP6-DIAL-MS is commonly referred to as DIAL-MS.

LINCtape (logical unit 100 is discussed in the I/O controller section). The system then does a standard bootstrap of the DIAL-MS Editor.

3. I/O CONTROLLER

The I/O controller is essentially the dispatcher for DIAL-MS. Calls are made to read or write operations, and the controller passes this information on to the correct handler. The controller is a field independent routine (may be located in any field and called from any field). The calling sequences are discussed at length in the DIAL-MS manual. Inside the controller, there exists a table located at 7300 which contains the values of the units that are available, where the routines are to do the operations, and the amount to add (or subtract) from the block numbers when going from one device to another. This table is commonly referred to as the MTABLE. Each unit is given three words in this table. The first word is the actual unit number. The second is the calling address of the read handler for this unit. The last word is the number of blocks to add onto the user's calling argument to transform it correctly to the physical block number on the device. A minus unit number indicates the end of the table. In prototype form, the table contains eleven units. Eight of these are the LINCtapes (units 0-7); first word contains the unit number, second word contains 7630, the read routine entry point, the third word contains 0 because there is no correction necessary. In addition, there are three more units; namely, 100, 110 and 111. 100 is used internally to describe the DIAL-MS system. Thus, if you are running a tape system, DIAL-MS resides on blocks 300-367 of unit 0. The Editor resides on block 0 of unit 100 so the entry point in the table is 100 (unit #100), 7630 (pointer to the LINCtape routine), 300 (number of blocks to add to unit 100 calls to make it come out to the correct LINCtape blocks). This is how DIAL-MS can work off any device. The system is always on device 100; the MTABLE tells it where the device and block number really are. Unit 110 is the source unit; its first block is also 0. Thus, to reference block 3 of the source, it is block 3 of unit 110. The MTABLE tells the controller how to transform these numbers into physical device calls. Unit 111 is the binary unit (the first block of it is also 0). Only these three logical units are presently implemented; more can be added without any trouble.

The disk units are 10-17, with the pointer to 7430 (this is where the disk routine will be). Note that units 20-45 do not appear in the table if the user has multiple RK08s. The controller will look for units 10-17 if any unit between 20 and 47 is given as an argument to the controller. Note that it is trivial to make the values for the disk units those for the tape units, and vice versa. All that is necessary is to change the pointers to the handler locations. At present, only two handlers are in core at any one time (LINtape plus perhaps a disk handler). This can easily be changed to permit more handlers to be present if a user has a special device he wants to use.

An important point of interest about the I/O controller is that the controller leaves the read address of the handler just used at location 7770 and the number of blocks to add to any calling sequence in location 7771. This is necessary because some program (e.g., the Loader) may destroy the I/O controller, and then call the handlers directly, rather than going through the controller.

The only other routines not discussed are the bootstrap and the MOVE routines. The bootstrap merely reads in blocks 300-307 of the Editor off device 100 and jumps to 4021, instead of to 4020. Jumping to 4020 would cause the system to reload the I/O routines. The MOVE routine is so trivial that it will not be discussed here.

4. I/O HANDLERS

The I/O handlers are the low level routines of DIAL-MS. They control the physical devices. Though they may vary greatly in design and structure, they all have several things in common:

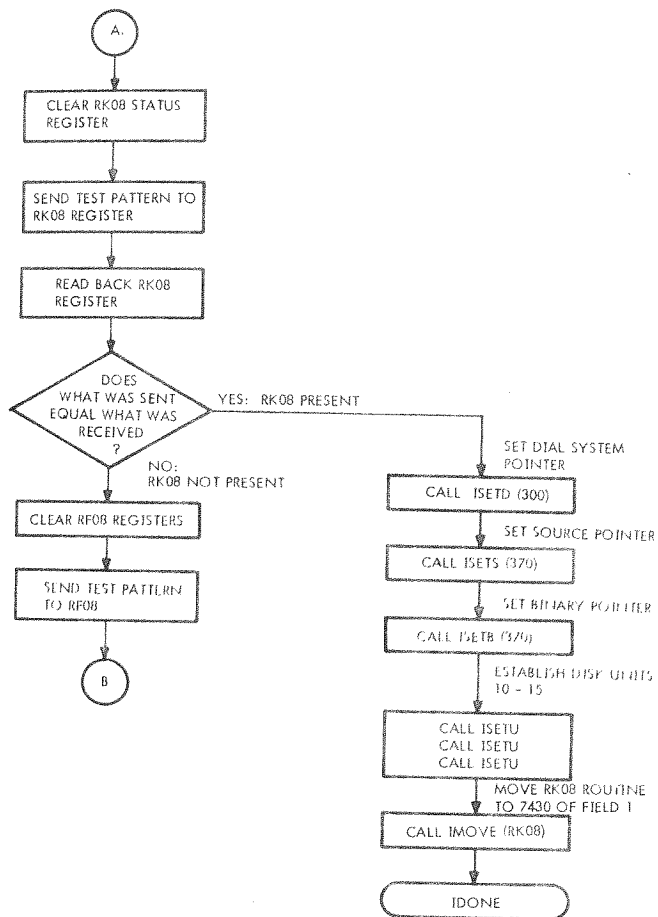
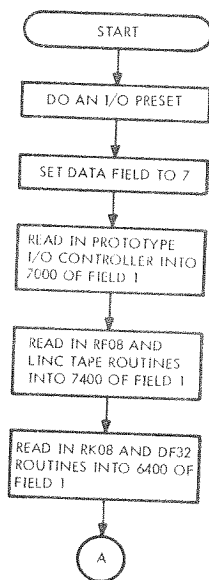
- a. They are all page independent (can be randomly located on any page in core and still function).
- b. No outside routines or constants are needed.
- c. They are field independent, but may be called only from the field in which they presently reside.
- d. Only location 30 through 167 of the page may be used by them.
- e. The read entry point is at 30 of the page and the write entry point is at 32 of the page.
- f. The calling sequence is similar to the calling sequence to the I/O controller, but the arguments are in-line, rather than pointed to by a pointer.

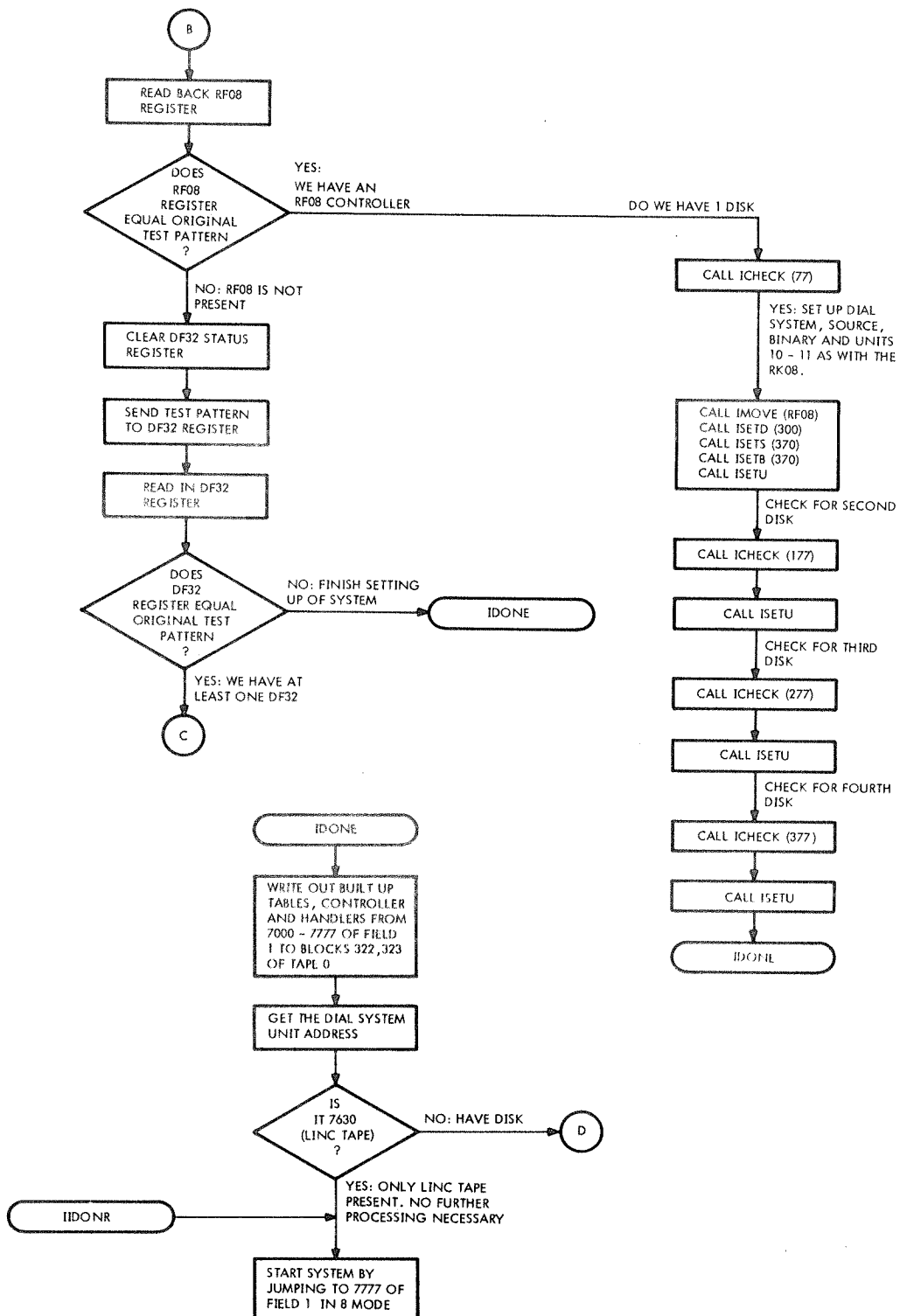
- g. There is no code at 150 or 151 of the page so that if they are ever located in 7600, no code will be over the disk data break locations.

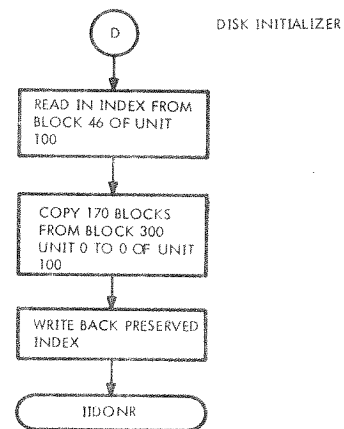
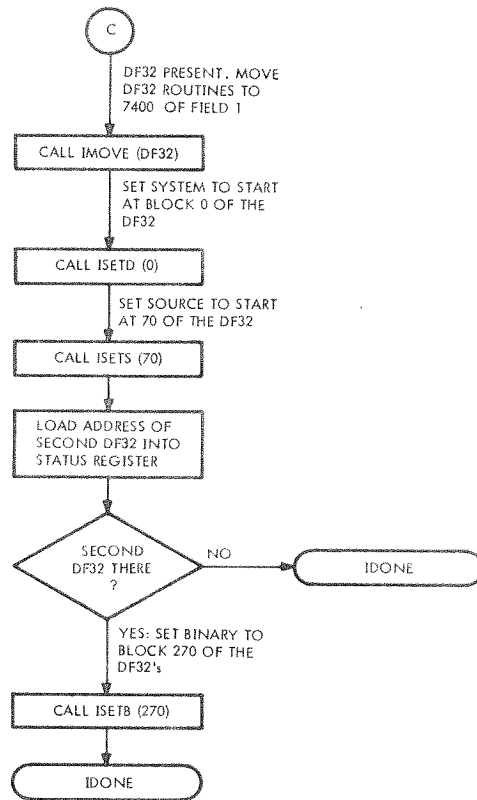
The I/O handlers also share one other feature. They only look at the rightmost digit of the calling unit, thus insuring the device independence of the system. While the physical nature of each handler is important, only the flow charts are necessary to understand each one. They are basically straightforward code. At present, there are four handlers implemented: LINCtape and RF08, DF32, and RK08, and disks. Any other device may be supported by merely writing a handler for it which conforms to the above standards.

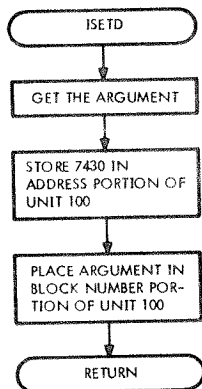
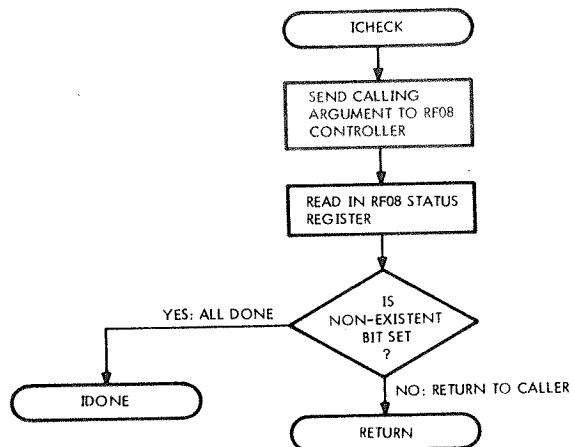
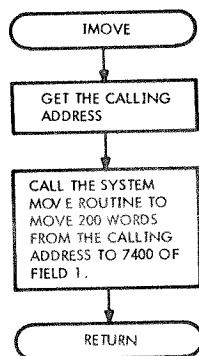
5.0 FLOW DIAGRAM (Attached)

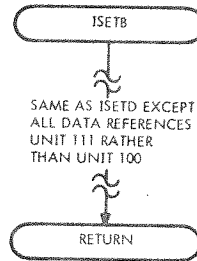
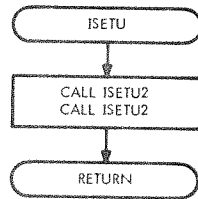
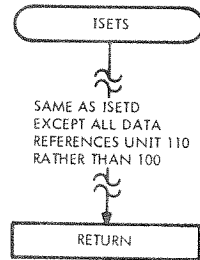
6.0 PROGRAM LISTING (Attached)



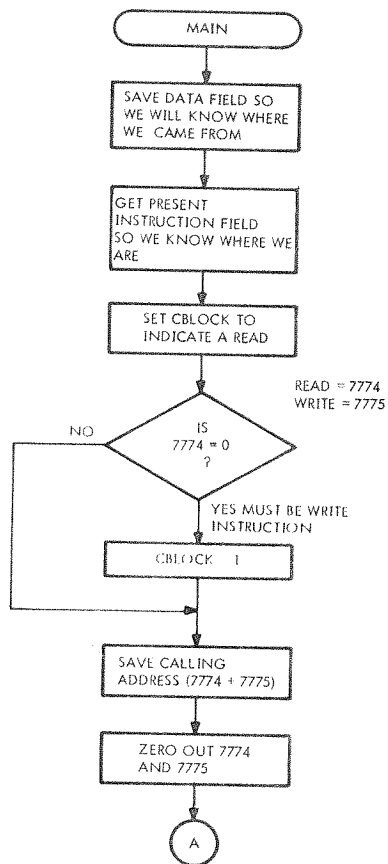
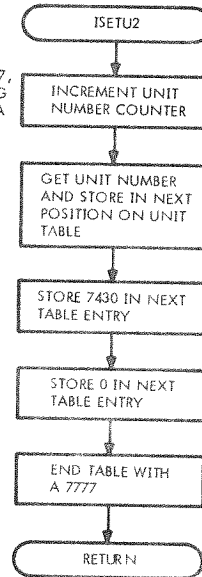


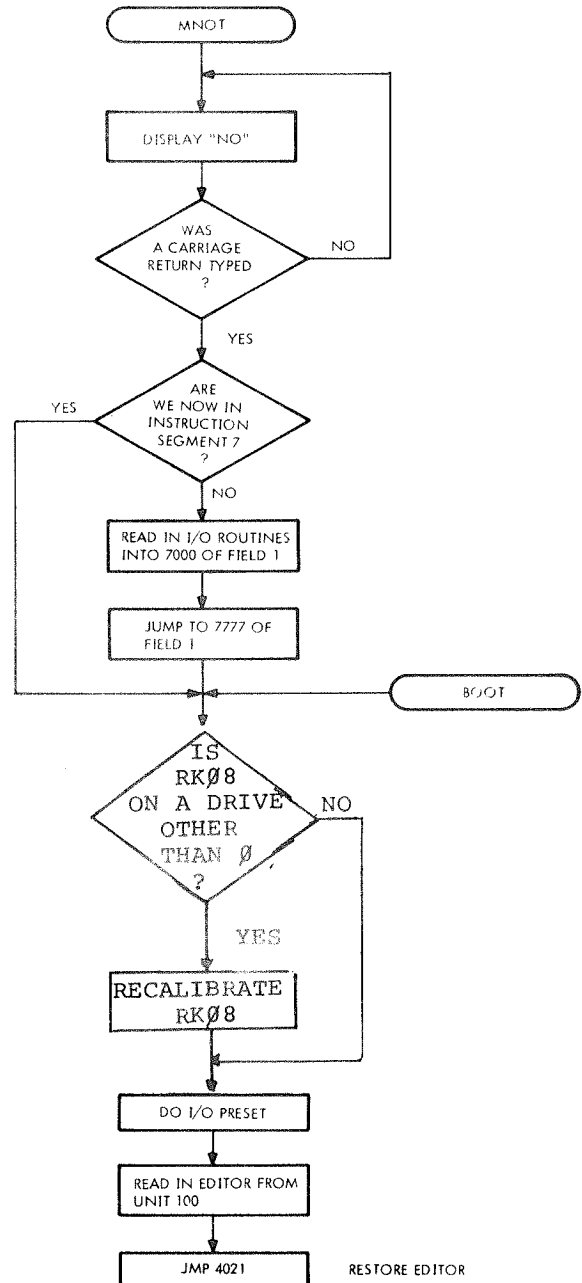
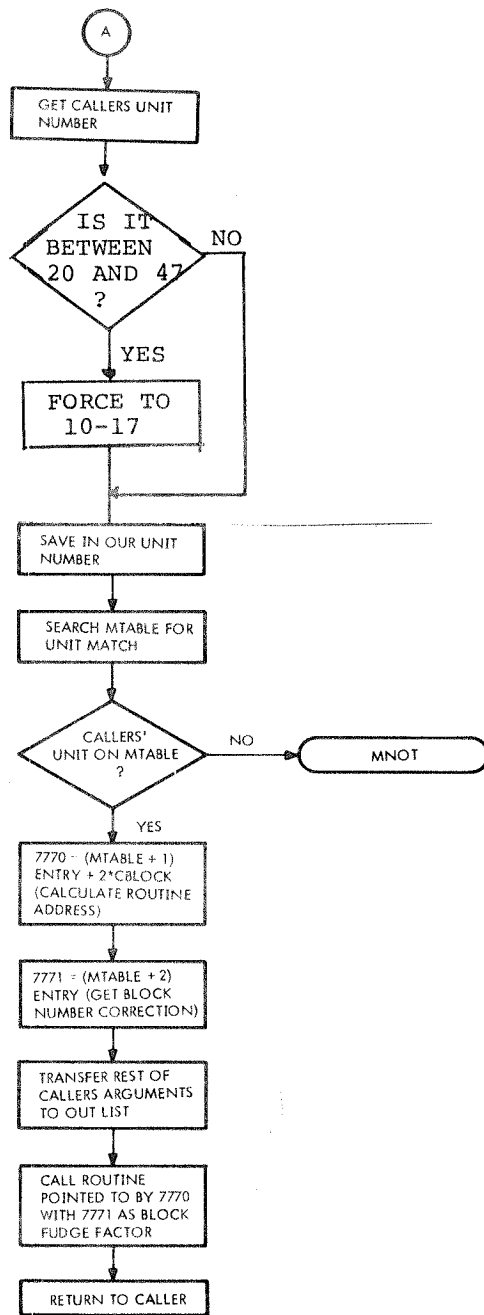




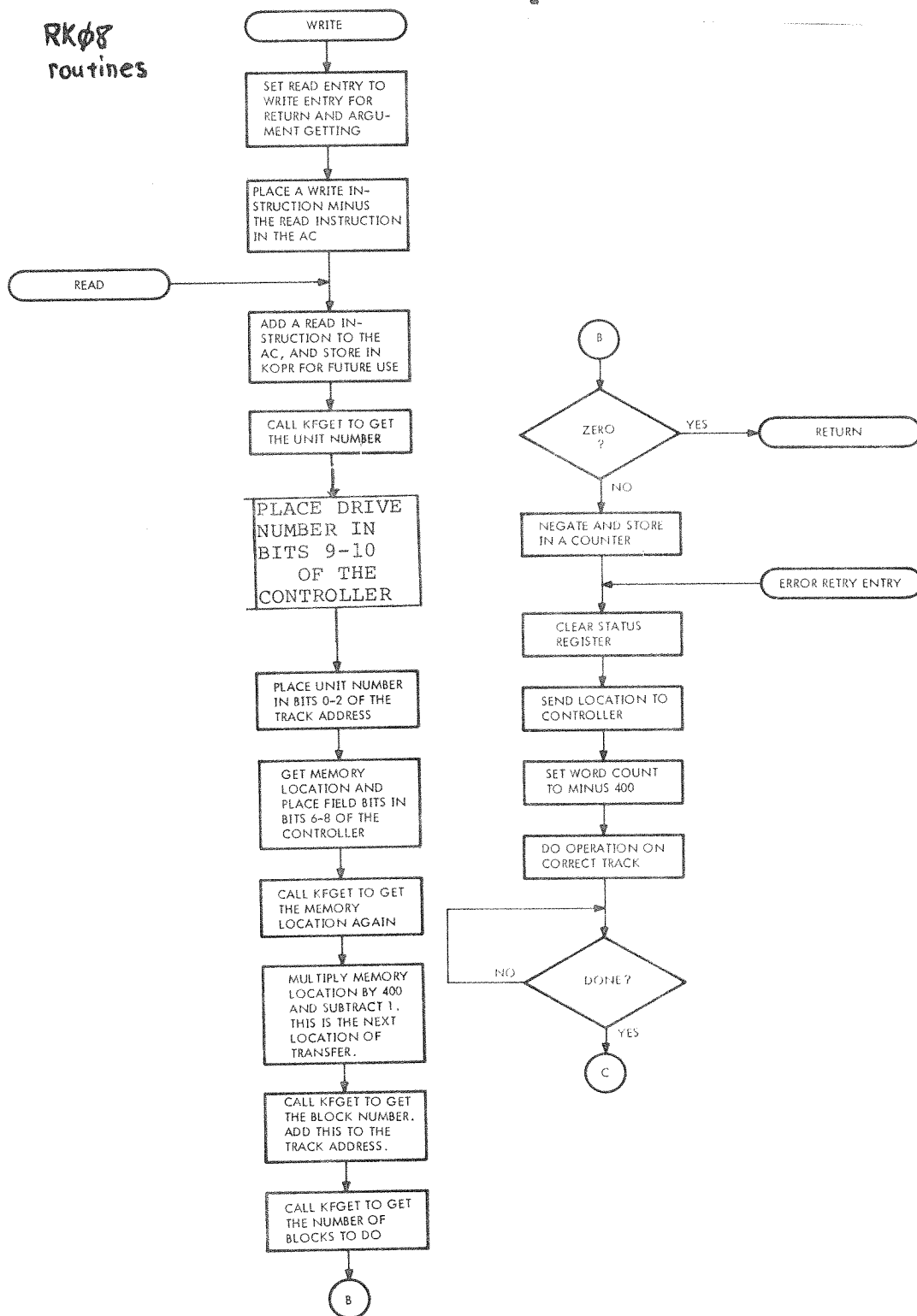


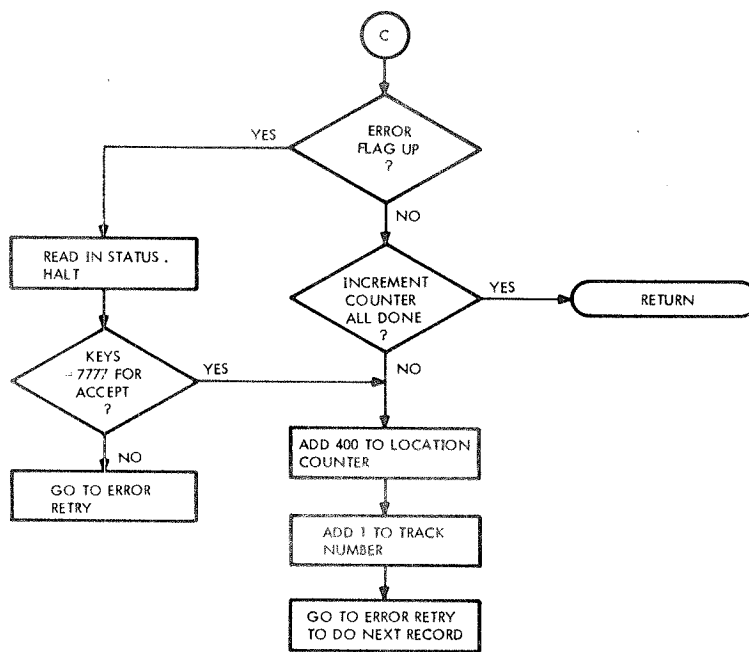
UNIT NUMBER
INITIALLY SET TO 7,
SO INCREMENTING
IT WILL PRODUCE A
10, THE FIRST DISK
UNIT



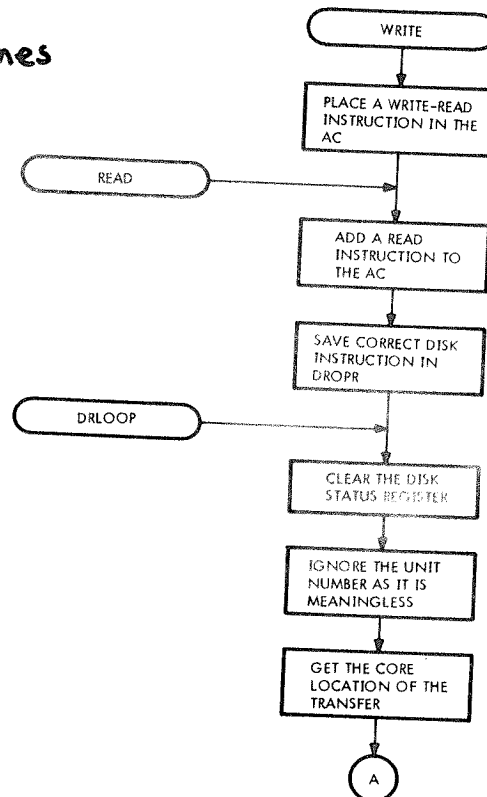


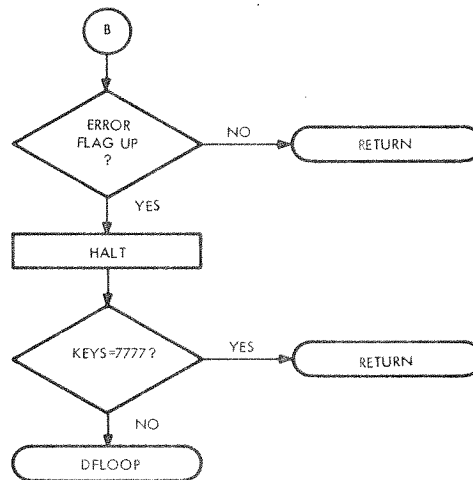
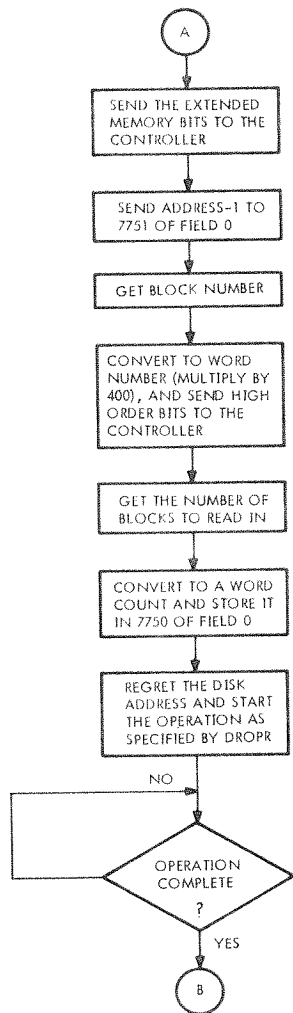
RK08
routines



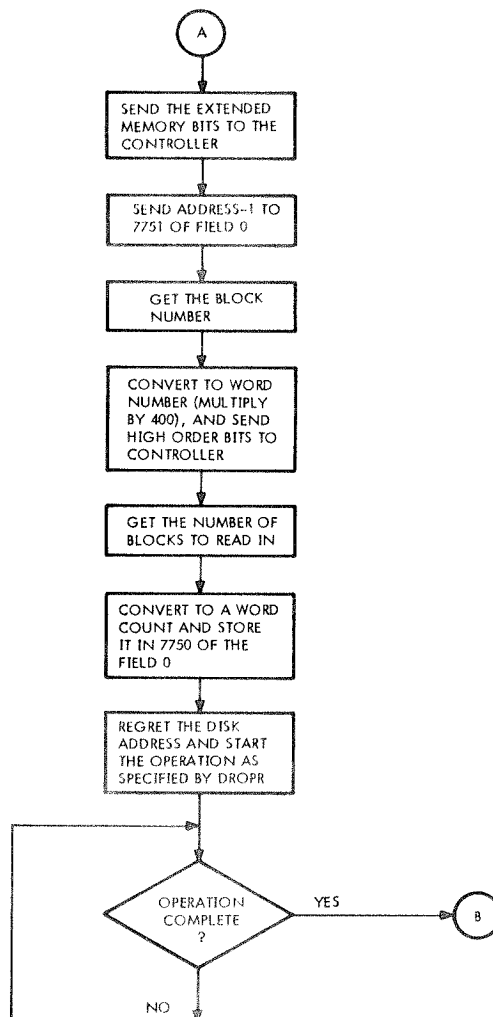
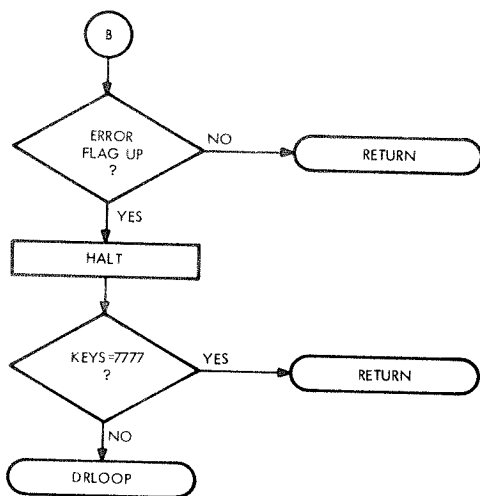
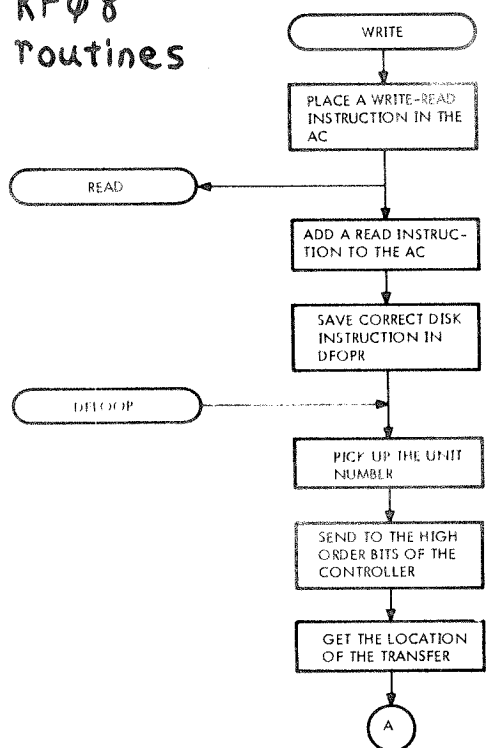


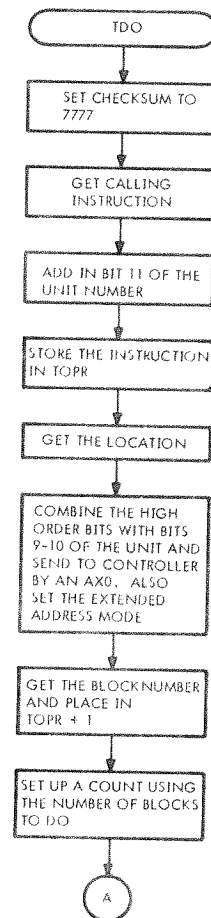
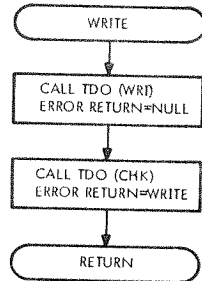
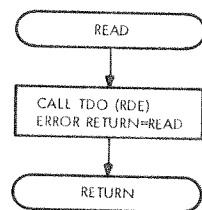
DF32 routines

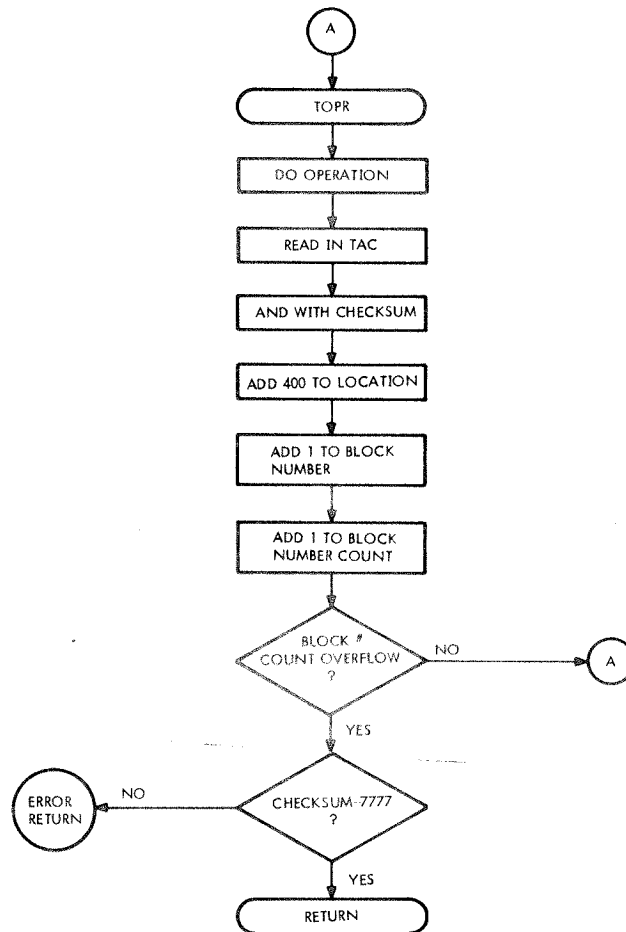




RFØ8 Routines







```

0000 *20
0001 /DISK-DIAL DISK ROUTINES
0002 /
0003 /COPYRIGHT 1970,
0004 /
0005 /
0006 /
0007 /THIS IS THE SYSTEM BUILD AND I-O ROUTINES ALL IN ONE.
0010 /
0011 /
0012 /
0013 /
0014 /
0015 /
0016 /
0017 /
0020 /
0021 /
0022 /
0023 /
0024 /

```

0023
0026
0027
0030
0031
0032
0033
0034
0035
0036
0037
0040
0041
0042
0043
0044
0045
0046
0047
0050
0051
0052
0053
0054
0055
0056
0057
0060
0061
0062
0063
0064
0065
0066
0067

PMODE

SETUP1=322
SETUP2=323
INITB=311
DI0C=345
DIHAN1=365
DIHAN2=366

/FIRST HANDLER SET UP BLOCK
/SECOND HANDLER SETUP BLOCK
/INITIALIZATION BLOCK
/CONTROLLER BLOCK
/FIRST HANDLER BLOCK
/SECOND HANDLER BLOCK

DIALUNIT=100
DIALCORE=10
DIALBLOCK=0
DIALNUMBER=10

/DEFINE THE SYSTEM UNIT NOW
/PLACE TO LOAD DIAL INTO
/PLACE WHERE DIAL RESIDES ON LOGICAL UNIT 0
/DIAL IS 8 BLOCK LONG.

EJECT

ADDRESS	INSTR	OPERAND	COMMENT
0071			
0072			
0073			
0074			
0075			
0076			
0077			
0100			
0101			
0102			
0103			
0104			
0105			
0106			
0107			
0110			
0111	JMP	*+3	/SKIP PAST THE PAGE ZERO POINTERS,
0112	READ		/POINTERS TO THE READ-WRITE ROUTINES,
0113	WRITE		/GET THE I/O PRESET CHARACTER
0114	LDA I		
0115	20		
0116	ESF		/DO AN I/O PRESET
0117	LDF		/SET THE DATA FIELD TO UPPER CORE
0120	RDC		/READ IN I O CONTROLLER
0121	6\DI0C		
0122	RDC		/READ IN THE FIRST GROUP OF HANDLERS
0123	7\DIHAN1		
0124	RDC		/READ IN THE SECOND GROUP OF HANDLERS
0125	5\DIHAN2		
0126	CLR		/CLEAR THE AC NOW,
0127	PDP		/GET INTO 8 MODE
0130	PMODE		
0131	CLA CMA		/SETAC TO ALL IS
0132	OCLS		/SO THAT WE MAY CLEAR THE RANDOM BITS
0133	CLA		/OF THE STATUS REGISTER,
0134	TAD	A77	/GET A TEST NUMBER IN THE AC NOW
0135	DLDC		/SEND TO THE CONTROLLER,
0136	CLA		/CLEAR THE AC IN CASE THERE IS NO CONTROLLER,
0137	DRDC		/READ IT BACK NOW,
0140	TAD	AM77	/IS IT STILL THERE?
0141	SNA CLA		
0142	JMP I	AIRK08	/YEP, GO SET UP THE RK08 HANDLER
0143	DCMA		/CLEAR DISK FLAGS
0144	052		
0145	053		
0146	054		
0147	055		
0150	056		
0151	057		
0152	060		
0153	061		
0154	062		
0155	063		
0156	064		
0157	065		
0160	066		
0161	067		
0162	070		
0163	071		
0164	072		
0165	073		
0166	074		
0220			
0221			
0222			
0223			
0224			
0225			
0226			
0227			
0230			
0231			
0232			
0233			
0234			
0235			
0236			
4037			
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4074			
4313			

0167	4075	4767	JMS I	AIDONE
0170	4076	0000	0	
0171	4077	4770	JMS I	AISETS
0172	4100	0070	70	
0173	4101	1360	TAD	A1000
0174	4102	6615	DEAL	
0175	4103	7200	CLA	
0176	4104	6616	DEAC	
0177	4105	1363	TAD	AM1000
0200	4106	7640	SZA CLA	
0201	4107	5766	JMP I	AIDONE
0202	4110	4771	JMS I	AISSETB
0203	4111	0270	270	
0204	4112	5766	JMP I	AIDONE
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0240				
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0255				
0256				
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0610				

Address	Instruction	Comment
0446	CIF	10
0447	JMS I	BWRITE
0450	ILOUTP	
0451	TAD	IB2
0452	TAD	LTEN
0453	DCA	IB2
0454	ISZ	BM20
0455	JMP	ILOOP
0456	/	
0457	/	
0460	IIDONE,	10
0461	JMS I	BWRITE
0462	DSAVI	
0463	CIF	10
0464	JMP I	BSYSBOT
0465	/	
0466	/	
0467	/	
0470	/	
0471	/	
0472	/	
0473	ISETD,	
0474	CDF	0
0475	TAD I	ISETD
0476	ISZ	ISETD
0477	CDF	10
0500	DCA I	MSYSP2
0501	TAD	B7430
0502	DCA I	MSYSP1
0503	JMP I	ISETD
0504	/	
0505	/	
0506	/	
0507	ISETS,	
0510	CDF	0
0511	TAD I	ISETS
0512	ISZ	ISETS
0513	CDF	10
0514	DCA I	MSYSP5
0515	TAD	B7430
0516	DCA I	MSYSP4
0517	JMP I	ISETS
0520	/	
0521	/	
0522	/	
0523	ISETB,	
0524	CDF	0
0525	TAD I	ISETB
0526	ISZ	ISETB
0527	CDF	10
0530	DCA I	MSYS10
0531	TAD	B7430
0532	DCA I	MSYSP7
0533	JMP I	ISETB
0534	/	
0535	/	
0536	/	
0537	/	
0540	ISETU2,	0
0541	CDF	10
0542	ISZ	B7
0543	TAD	B7

0545	4327	2377	ISZ	BDSYS	
0546	4330	1375	TAD	B7430	
0547	4331	3777	DCA I	BDSYS	
0550	4332	2377	ISZ	BDSYS	
0551	4333	3777	DCA I	BDSYS	
0552	4334	2377	ISZ	BDSYS	
0553	4335	7240	CLA CMA		
0554	4336	3777	DCA I	BDSYS	
0555	4337	5722	JMP I	ISSETU2	
0556			/		
0557			/		
0560			/		
0561	4340	0000	ISSETU,		/BOP UP 1 UNIT
0562	4341	4322		ISSETU2	/BOP UP TWO UNITS
0563	4342	4322		ISSETU	/RETURN TO CALLER
0564	4343	5740			
0565			/		
0566			/		
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0600			/		
0601			/		
0602	4344	0000	IL INP,	0	/UNIT
0603	4345	0000		0	/CORE LOC
0604	4346	0300	IB1,	300	/BLOCK NUMBER
0605	4347	0010	LTEN,	10	/NUMBER OF BLOCKS TO READ IN
0606			/		
0607			/		
0610			/		
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Address	Operation	Source	Destination	Comments
0644	/			
0645	/			
0646	/			
0647	/			
0650	/			
0651	/			
0652	/			
0653	/			
0654	/			
0655	/			
0656	/			
0657	/			
0660		BRK08,	RK08	
0661		BIMOVE,	IMOVE	
0662		MSYSP1,	MSYS+1	
0663		MSYSP2,	MSYS+2	
0664		MSYSP4,	MSYS+4	
0665		MSYSP5,	MSYS+5	
0666		MSYSP7,	MSYS+7	
0667		MSYS10,	MSYS+10	
0670	/			
0671		BM7630,	-7630	
0672		BREAD,	READ	
0673		BWRITE,	WRITE	
0674		BM20,	-20	
0675		BSYS80T,	SY80T	
0676		B7430,	7430	
0677		B7,	7	
0700		BDSYS,	DSYS	
0701	/			
0702	/			
0703	/			
0704	/			
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/LOCATIONS FOR THE "NO" MESSAGE

/FOR JMS IN LMODE
/CONTAINS THE X VALUE FOR THE NO
/CONTAINS THE DISPLAY TABLE POINTERS FOR THE NO.

*6000

6000 0000
6001 0000
6002 0000
DX,
DCHAR,

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0
0

EJECT

0767
0770
0771
0772
0773
0774
0775
0776
0777
1000
1001
1002
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*6430

RK08=, /THE RK08 ROUTINES GO HERE,

*6430

/ALL ROUTINES ARE ORIGINATED AT 30 OF THE PAGE,

DCLA=6751
DLDC=6732
DLDR=6733
DLDW=6735
DCHP=6737
DRDA=6734
DRDC=6736
DRDS=6741
DCLS=6742
DMNT=6743
DSKC=6745
DSKT=6746
DSKE=6747
URWC=6752
DLWC=6753
DLCA=6755
DRCA=6757

ADDRESS	OPERATION	COMMENT
1000		
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1102	021/	0/42	DSKC		/WAIT FOR COMPLETION NOW,
1166	6520	7410	SKP		/SKIP IF NOT DONE
1167	6521	5345	JMP	KEND	/IF TEST WHETHER MORE RECORDS TO GO
1170	6522	6747	DSKE		/IS MAKE AN ERROR FLAG UP???
1171	6523	5317	JMP	,-4	/NOPE, WAIT FOR EITHER COMPLETION OR ERROR FLAG,
1172					
1173	6524	6741	DRDS		/READ IN THE STATUS WORD IF ERROR OCCURED,
1174	6525	7402	HLT		/BRING CPU TO A GRINDING HALT,
1175	6526	7604	LAS		/READ IN THE KEYS NOW,
1176	6527	3232	DCA	KWRITE	/SAVE THE KEYS FOR A SECOND
1177	6530	7240	CLA	CMA	/NOW PREPARE TO CLEAR THE STATUS REGISTER
1200	6531	6742	DCLS		/CLEAR THE STATUS REGISTER
1201	6532	7200	CLA		/CLEAR THE AC TO BE SURE
1202	6533	6751	DCLA		/ZAP THE DISK OVER, JUST IN CASE,
1203	6534	6747	DSKE		/IS THE ERROR FLAG UP AGAIN?
1204	6535	7410	SKP		/NOPE, TEST COMPLETION FLAG,
1205	6536	5324	JMP	KUCH	/ERROR FLAG UP, GIVE ERROR AGAIN,
1206	6537	6745	DSKC		/COMPLETION FLAG UP,
1207	6540	5334	JMP	,-4	/NOPE, WAIT AROUND,
1210	6541	1232	TAD	KWRITE	/NOW RETRIEVE THE KEYS,
1211	6542	7040	CMA		/COMPLEMENT THE KEYS NOW,
1212	6543	7640	SZA	CLA	/ACCEPT???
1213	6544	5306	JMP	KERR	/NOPE, RETRY THIS BLOCK NOW,
1214					
1215					
1216					
1217					
1220					
1221	6545	2350	KEND,		/BOOP UP THE COUNTER,
1222	6546	5302	ISZ	KCOUNT	/NOT DONE, GET THE NEXT RECORD,
1223	6547	5630	JMP	KNEXT	/FINISHED, RETURN TO THE CALLER
1224			JMP	I	
1225					
1226					
1227					
1228					
1229					
1230					
1231					
1232					
1233					
1234					
1235	6550	0000	KCOUNT,	0	/CONTAINS -NUMBER OF RECORDS TOGO
1236	6551	0000	KTRACK,	0	/CONTAINS CURRENT TRACK AND SECTOR,
1237	6552	0000	KLOC,	0	/CONTAINS CURRENT LOC-1 BEING USED,
1240					
1241					
1242					
1243					
1244					
1245	6553	0000	KFGET,	0	
1246	6554	1630	TAD	I	/GET THE ARGUMENT NOW
1247	6555	2230	ISZ	KREAD	/PUSH TO NEXT ARGUMENT
1250	6556	5753	JMP	I	/RETURN TO THE CALLER,
1251					
1252					
1253					
1254					
1255					
1256					
1257	6557	0007	KL	7,	7
1260	6560	0030	KL	30,	30
1261	6561	0070	KL	70,	70
1262	6562	0400	KL	400,	400
1263					

JMS m/c lase 8

JMS m/c lase 8

Return to -4

1264	6564	7777	KL7777, 7777
1265			/
1266	6565	6733	KDLOR, DLOR
1267			/
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DF32=.

*6630

6630	0000	DRREAD, 0	JMP	DR1	/DF32 READ-WRITE ROUTINES,
6631	5236	DRWRIT, 0	TAD	DR1	/INTO MAIN PROCESSOR
6632	0000		DCA	DRWRIT	/WRITE ENTRY POINT
6633	1232		CLA CLL	DRREAD	
6634	3230		TAD	CML RTL	
6635	7326	DR1,	TAD	DRMAR	/SET UP ARG GETTER
6636	1327		DCA	DROPR	/+2
6637	3303	DRLOOP,	DCMA	DRREAD	/ADD IN READ INSTRUCTION,
6640	6601		ISZ	DRREAD	/SAVE THE CORRECT INSTRUCTION,
6641	2230		RAR	DRREAD	/CLEAR THE STATUS REGISTER
6642	1630		AND	DRL70	/UNT MEANINGLESS FOR DF32S
6643	7010		DCA	DRWRIT	/GET THE CORE LOCATION
6644	0330		RIF		/SHIFT OVER 1 PLACE
6645	3232		TAD		/ZAP OUT CRAP
6646	6224		DCA		/AND SAVE AWAY FOR NOW.
6647	1253		RIF		/GET THIS FIELD
6650	3333		TAD		/ADD IN A CDF 0
6651	1630		DCA	DRXCDF	/NOW STORE FIELD RESTORE INSTRUCTION,
6652	4335		TAD I	DRREAD	/REGET THE CORE LOCATION
6653	6201	DRCDF,	JMS	DRRTR	/ROR 5 AND AND WITH 7400,
6654	7400		CDF	0	/SET TO SFTUP DATA BREAK INSTRUCTIONS

ADDRESS	DATA	INSTR	COMMENT
1413	6655	CMA I	/SUBTRACT 1 FOR A GOOD LOCATION
1414	3745	DCA I	/STORE AWAY FOR NOW
1415	4332	JMS DRXX	/RESET TO THIS DATA FIELD
1416	2230	ISZ DRREAD	/UP UP TO BLOCK NUMBER
1417	6661	TAD I DRREAD	/GET THE BLOCK NUMBER
1420	7006	RTL	/ROTATE TO BITS 1-5 OF THE AC
1421	6663	AND	/AND OUT CRAP
1422	1232	TAD	/ADD IN MEMORY FIELD
1423	6665	DEAL	/SEND TO CONTROLLER,
1424	7200	CLA	
1425	6667	TAD I	/GET THE BLOCK NUMBER AGAIN
1426	6670	JMS DRTR	/INTO 7400S BITS
1427	3232	DCA	/AND SAVE FOR THE DROP
1430	6672	ISZ DRREAD	/BOP TO NUMBER OF RECS,
1431	6673	TAD I DRREAD	/GET THE NUMBER OF RECS,
1432	6674	ISZ DRREAD	/BOP PAST THE CRAP FOR RETRUN
1433	6675	JMS DRTR	/ROTATE INTO 7400S BITS
1434	6676	DCF	/SET TO 0 FOR DATA BREAK
1435	6677	CIA	/NEGATE
1436	6700	DCA I	/DATA BREAK SET UP NOW
1437	4332	JMS DRXX	/RESTORE THIS FIELD
1440	6702	TAD DRWRIT	/GET LOW ORDER BITS OF BLOCK NUMBER
1441	6703	0	/XEC. DISK INSTRUCTION
1442	6704	CLA	
1443	6705	DFSE	
1444	6706	JMP	/WAIT FOR DONE OR ERROR FLAG,
1445	6707	DFSC	
1446	6710	JMP	/HANG AROUND FOR A WHILE,
1447	6711	DFSE	/CHECK ERROR FLAG TO BE SURE
1450	6712	JMP	/ERROR!
1451	6713	JMP	/EXIT, ALL IS WELL
1452			
1453			
1454	6714	DEAC	/READ IN THE ERROR REG.
1455	7402	HLT	/HALT NOW.
1456	7604	LAS	/GET HIS REQUEST.
1457	7040	CMA	/NEGATE FOR TEST
1460	6720	SNA CLA	
1461	6721	JMP	/EXIT NOW
1462	6722	CLA CLL	/+4
1463	6723	CIA	/-4
1464	6724	TAD	/RESET ARG POINTER
1465	6725	DCA	/NOW
1466	6726	JMP	/AND TRY AGAIN.
1467			
1470			
1471			
1472			
1473	6727	DMAR,	
1474	6730	DRL70,	
1475	6731	DRL300,	
1476	6732	DRXX,	
1477	6733	DRXCF,	
1500	6734	JMP I	DRXX
1501			
1502	6735	DRRTR,	
1503	6736	RTR	
1504	6737	RTR	
1505	6740	RAR	
1506	6741	AND	
1507	6742	JMP I	DRRTR
1508			
1509			
1510			

[illegible]

Address	Instruction	Comment
1560	/	
1561	/	
1562	/	
1563	/	
1564	/	
1565	/	
1566	/	
1567	/	
1570	/	
1571	CLA	/CLEAR THE AC TO BE SURE
1572	IOF	/TURN OFF INTERRUPTS IN CASE WE'RE IN FOCAL 12.
1573	RDF	/GET THE CALLING FIELD
1574	TAD	/ADD IN THE BASE CDF
1575	DCA	/AND SAVE AWAY
1576	RIF	/READ IN THIS FIELD
1577	TAD	/AND SET UP THIS DATA FIELD CHANGE
1600	DCA	/STASH AWAY.
1601	DCA	/CLEAR THE REQUEST WORD
1602	JMS	/SET DATA FIELD TO THIS FIELD
1603	TAD	/GET THE READ ADDRESS
1604	SNA	/WAS IT A READ?
1605	ISZ	/NOPE. A WRITE. SET UP CALLING ADDRESS
1606	TAD	/ADD IN WRITE CALL LOCATION.
1607	MRETL	/AND STASH AWAY.
1608	MREAD	/CLEAR THE READ LOCATION
1610	DCA	/AND THE WRITE LOCATION FOR NEXT TIME THROUGH
1611	DCA	/GET THE POINTER TO THE UNITS TABLE.
1612	DCA	/AND SAVE AWAY IN A TEMPARY.
1613	DCA	/SET TO CALLERS FIELD
1614	JMS	/GET THE START OF CALLERS ARGUMENTS.
1615	TAD	/STASH AWAY
1616	ISZ	/AND BOP UP FOR THE RETURN
1617	MRETL	/GET THE USERS UNIT NOW.
1620	MCALL	/IS IT GREATER OR EQUAL TO 20?
1621	TAD	/NOPE. ITS LESS THEN 20.
1622	SPA	/IS IT GREATER OR EQUAL TO 50?
1623	JMP	/BIGGER THEN 47.
1624	TAD	/ITS BETWEEN 20 AND 47, AN EXTENDED UNIT. GET
1625	SMA	/THE UNITS BITS AND MAKE INTO 1X TYPE NUMBER
1626	JMP	/MAKE BACK INTO ORIGINAL NUMBER NOW.
1627	AND	/DEPENDING ON WHERE RANGE OCCURED.
1630	TAD	/AND STASH AWAY NOW FOR THE TEST.
1631	TAD	/SET TO THIS CDF
1632	LESS20,	
1633	TAD	
1634	DCA	
1635	JMS	
1636	/	
1637	/	
1640	ML00P,	/GET NEXT UNIT ON TABLE
1641	SPA	/MINUS=END OF LIST???
1642	JMP	/UNIT NOT THERE
1643	CIA	
1644	TAD	/GET THE CALLING UNIT
1645	SNA	/A MATCH???
1646	JMP	/SURE IS
1647	CLA	/+3
1648	CLA:CLL	/BOP TO NEXT ENTRY ON TABLE
1649	TAD	/AND PLACE BACK
1650	DCA	/TRY THIS ONE.
1651	JMP	
1652		
1653		
1654		
1655		

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 १७ १८
 १९ २०
 २१ २२

ADDRESS	INSTR	OPERAND	COMMENT
1657	/		
1660	/		
1661	/		
1662	/		
1663	/		
1664	/		
1665	/		
1666	/		
1667	/		
1670	7057	6141	MNOT,
1671			LINC
1672			LMODE
1673	1060	10200	LDA I
1674	1061	0200	200
1675	1062	0004	ESF
1676	1063	7400	JMP
1677	/		MNL
1700	/		
1701	/		
1702	/		
1703	/		
1704	/		
1705	/		
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1725	/		
			EJECT

ADDRESS	INSTR	OP	DATA	COMMENT
1726	/			
1727	/			
1730	/			
1731	/			
1732	/			
1733	/			
1734	MTRU	ISZ	7064	TEMP
1735		TAD	2342	CBLOCK
1736		CLL	1321	
1737		TAD	7104	RAL
1740		DCA	7067	TEMP
1741		ISZ	3751	L7770
1742		TAD	2342	TEMP
1743		TAD	1742	TEMP
1744		DCA	3752	L7771
1745		TAD	1751	L7770
1746		DCA	3342	TEMP
1747		JMS	4333	SRCDF
1750		TAD	1744	MCALL
1751		DCA	3317	MCALL
1752		ISZ	2344	MCALL
1753		TAD	1744	MCALL
1754		DCA	3320	CCORE
1755		ISZ	2344	MCALL
1756		JMS	4330	STCDF
1757		TAD	1752	L7771
1760		JMS	4333	SRCDF
1761		TAD	1744	MCALL
1762		DCA	3321	CBLOCK
1763		ISZ	2344	MCALL
1764		TAD	1713	MCALL
1765		DCA	3322	CNUM
1766		JMS	4330	STCDF
1767		JMS	4742	TEMP
1770		CUNIT	0	
1771		CCORE	0	
1772		CBLOCK	0	
1773		CNUM	0	
1774		CLA	CLL	IAC RAL
1775		TAD	7123	RCDF
1776		DCA	1334	+1
1777		JMP	5743	MRETL
2000	/			
2001	/			
2002	/			
2003	/			
2004	/			
2005	/			
2006	/			
2007	/			
2010	/			
2011		STCDF	7130	0000
2012		TCDF	7131	0000
2013		JMP	7132	5730
2014	/			
2015	/			
2016	/			
2017		SRCDF	7133	0000
2020		RCDF	7134	0000
2023	/	JMP	7135	5733
2023	/			

2026	7136	6201	LCDF,	COF	
2027	7137	7774	MREAD,	7774	
2030	7140	7775	MWRITE,	7775	
2031	7141	7300	PTABLE,	MYABLE	
2032	7142	0000	TEMP,	0	
2033	7143	0000	MRETL,	0	
2034	7144	0000	MCALL,	0	
2035	7145	0006	L6,	6	
2036	7146	0007	L7,	7	
2037	7147	0020	L20,	20	
2040	7150	0030	L30,	30	
2041	7151	7770	L7770,	7770	
2042	7152	7771	L7771,	7771	
2043	7153	7760	M20,	-20	
2044	7154	7750	M30,	-30	
2045	7155	7740	M40,	-40	
2046					
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2064	1156	0002	BOOTER,	PDP	
2065				PMODE	
2066	7157	0345	AND	L6	
2067	7160	7650	SNA CLA		
2070	7161	5365	JMP	RK080K	
2071	7162	6751	DCLA		
2072	7163	6745	DSKC		
2073	7164	5363	JMP	'-1	
2074	7165	3740	RK080K,	DCA I	
2075	7166	4737	JMS I	MWRITE	
2076	7167	7174	DPBOOT	MREAD	
2077	7170	6141	LINC		
2100				PMODE	
2101	1171	0643	LDF	3	
2102	1172	0602	LIF	2	
2103	1173	6021	JMP	4021	
2104					
2105					
2106					
2107					
2110					
2111					
2112					
2113	7174	0100	DPBOOT,	DIALUNIT	
2114	7175	0010		DIALCORE	
2115	7176	0000		DIALBLOCK	
2116	7177	0010		DIALNUMBER	
2117					
2120					
2121					
2122					
2123					

/TELL ASSY WE ARE IN LINC MODE WHEN WE GET HERE

/GET OVER INTO THE GOOD MODE,

/SEE WHAT THE AC CONTAINS,

/BITS 9 OR 10 ON?

/NOPE, DISK IS OK, ALL IS WELL,

/DISK WAS ON WRONG DRIVE, REPOSITION NOW,

/AND WAIT FOR IT,BABY

/HO HUM

/ZAP OUT THE WRITE ENTRY IN CASE ROUTINES BOMBED,

/CALL THE READ ROUTINE

/POINTER TO BOOTSTRAP INFO

/GET OVER INTO LINC MODE

/SET TO DO STANDARD CALL

/JMP TO SYSTEM RESTART LOCATION,

/GET BACK INTO 8 MODE

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Address	Instruction	Comment
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2147	/	
2150	/	
2151	/	
2152	/	
2153	/	
2154	/	
2155	/	
2156	/	
2157	MOVE, 0000	
2160	7200 0000	
2161	7201 7200	CL A
2162	7202 4236	JMS
2163	7203 3222	DCA
2164	7204 4236	JMS
2165	7205 3244	DCA
2166	7206 4236	JMS
2167	7207 3224	DCA
2168	7210 4236	JMS
2169	7211 3245	DCA
2170	7212 6214	RDF
2171	7213 1246	TAD
2172	7214 3234	DCA
2173	7215 4236	JMS
2174	7216 7450	SNA
2175	7217 5234	JMP
2176	7220 7041	CIA
2177	7221 3236	DCA
2178	7222 0000	SWIN,
2179	7223 1644	SWOUT,
2180	7224 0000	
2181	7225 3645	DCA I
2182	7226 2245	ISZ
2183	7227 7000	NOP
2184	7230 2244	ISZ
2185	7231 7000	NOP
2186	7232 2236	ISZ
2187	7233 5222	JMP
2188	7234 0000	SWRET,
2189	7235 5600	JMP I
2190	/	
2191	/	
2192	/	
2193	SWGET, 0000	
2194	7237 1600	TAD I
2195	7240 2200	ISZ
2196	7241 5636	JMP I
2197	/	
2198	/	
2199	/	
2200	SWGET, 0000	
2201	7237 1600	TAD I
2202	7240 2200	ISZ
2203	7241 5636	JMP I
2204	/	
2205	/	
2206	/	
2207	SWTMP1, 0000	
2208	7243 0000	SWTMP2, 0
2209	7244 0000	SWLIN, 0
2210	7245 0000	SWLOUT, 0
2211	7246 6203	SLCDF, CDF CIF
2212	/	
2213	/	
2214	/	
2215	/	
2216	/	
2217	/	
2218	/	
2219	/	
2220	/	
2221	/	
2222	/	
2223	/	
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[illegible]

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*7300

/THIS IS WHERE THE UNIT TABLE RESIDES.

7300 0000 MTABLE, 0
7301 7630 7630
7302 0000 0
7303 0001 1
7304 7630 7630
7305 0000 0
7306 0002 2
7307 7630 7630
7310 0000 0
7311 0003 3
7312 7630 7630
7313 0000 0
7314 0004 4
7315 7630 7630
7316 0000 0
7317 0005 5
7320 7630 7630
7321 0000 0
7322 0006 6
7323 7630 7630
7324 0000 0
7325 0007 7
7326 7630 7630
7327 0000 0
7330 0100 100
7331 7630 7630
7332 0300 300
7333 0110 110
7334 7630 7630
7335 0370 370
7336 0111 111
7337 7630 7630
7340 0370 370
7341 7777 7777

MSYS,

/START OF DISK UNITS OR END OF TABLE

DSYS,

103C3

Address	Hex	Label	Text
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/AND SAVE FOR A SECOND,
/AND NOW GO DO THE REBOOTSTRAP,

DX81777
CHECKF

STC
JMP

PMODE

EJECT

1426 4801
1427 7254

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DISK DEFINITIONS (DF32-RF08)

DCMA=6601
DMAR=6603
DMAW=6605
DCEA=6611
DSAC=6612
DEAL=6615
DEAC=6616
DFSE=6621
DISK=6623
DIML=6615
DFSC=6622
DIWA=6616
DMAC=6626
DMMT=6646
DCXA=6641
DXAL=6643
DXAC=6645

*7430

RF08=.

/DEFINE THE RF08 LOCATIONS.

2734	7430	DFREAD, Ø	JMP	DFR1	/RFØ8 READ ENTRY
2735	7431	5236			/GO TO THE MAIN READ ENTRY
2736	7432	ØØØØ	DFWRIT, Ø		/MAIN RFØ8 WRITE ENTRY
2737	7433	1232	TAD	DFWRIT	/GET THE WRITE ENTRY
2740	7434	323Ø	DCA	DFREAD	/AND SAVE IN THE READ ENTRY FOR EASY ARG PICKING UP,
2741	7435	7326	CLA CLL	CML RTL	/+2 IN THE AC.
2742	7436	1341	TAD	DFMAR	/GET THE READ INSTRUCTION (DMAR)
2743	7437	33Ø7	DCA	DFOPR	/AND SAVE IT FOR LATER
2744	744Ø	66Ø1	JMS	DFGET	/ERROR REENTRY POINT, CLEAR DISK STATUS,
2745	7441	4342	DCMA		/GET THE FIRST ARGUMENT(THE UNIT NUMBER)
2746	7442	71Ø6	CLL RTL		
2747	7443	7ØØ4	RAL		/ROTATE INTO BITS 6-8
275Ø	7444	Ø36Ø	AND	DFL7Ø	/AND OUT UNIT BITS NOW
2751	7445	71Ø6	CLL RTL		/FINISH ROTATING NOW,
2752	7446	6643	DXAL		/AND SEND TO CONTROLLER,
2753	7447	163Ø	TAD I	DFREAD	/GET THE CORE LOCATION,
2754	745Ø	7Ø1Ø	RAR		/ROTATE RIGHT ONE PLACE,
2755	7451	Ø36Ø	AND	DFL7Ø	/JUST MAKE IT BITS 6-8 FOR MEMORY FIELD REF,
2756	7452	6615	DIML		/AND SEND IT OUT,
2757	7453	6224	RIF		/READ IN THE PRESENT FIELD NOW FOR REFERENCE,
276Ø	7454	1262	TAD	DFCDF	/ADD IN A CDF Ø
2761	7455	3362	DCA	DFXCDF	/SAVE FOR RESTORING THIS DATA FIELD,
2762	7456	4342	JMS	DFGET	/GET THE CORE LOC AGAIN AND BOP ARG GETTER
2763	7457	4352	JMS	DFRTR	/ROTATE DISK BITS AROUND,
2764	746Ø	7Ø41	CIA		
2765	7461	7Ø4Ø	CMA		/SUBTRACT ONE FOR 3 CYCLE DATA BREAK
2766	7462	62Ø1	CDF	Ø	/SET DATA FIELD TO Ø FOR SETTING UP 3 CYCLE BREAK
2767	7463	3746	DCA I	DFMAD	/SAVE IN MEMORY ADDRESS,
277Ø	7464	4361	JMS	DFXX	/RESET TO THIS FIELD
2771	7465	6645	DXAC		/READ IN THE DISK REGISTER
2772	7466	3232	DCA	DFWRIT	/SAVE IN A TEMP FOR A SECOND
2773	7467	163Ø	TAD I	DFREAD	/GET THE BLOCK NUMBER NOW
2774	747Ø	7Ø12	RTR		
2775	7471	7Ø12	RTR		
2776	7472	Ø365	AND	DFL377	/JUST NECESSARY BITS,
2777	7473	1232	TAD	DFWRIT	/RECALL THE OLD DISK BLOCK NUMBER
3ØØØ	7474	6643	DXAL		/NOW TELL DISK FULL EXTENDED REGISTER,
3ØØ1	7475	4342	JMS	DFGET	/NOW GET THE BLOCK NUMBER AND BOP
3ØØ2	7476	4352	JMS	DFRTR	/ROTATE 5 RIGHT AND ANDJ,
3ØØ3	7477	3232	DCA	DFWRIT	/AND SAVE AWAY TILL DFOPR
3ØØ4	75ØØ	4342	JMS	DFGET	/FINALLY GET THE NUMBER OF RECORDS
3ØØ5	75Ø1	4352	JMS	DFRTR	/ROTATE 5 RIGHT AND AND OUT,
3ØØ6	75Ø2	7Ø41	CIA		
3ØØ7	75Ø3	62Ø1	CDF	Ø	/SET TO STORE IN WORD COUNT
3Ø1Ø	75Ø4	3767	DCA I	DFMWC	/SAVE AWAY NOW
3Ø11	75Ø5	4361	JMS	DFXX	/RESTORE THIS DATA FIELD
3Ø12	75Ø6	1232	TAD	DFWRIT	/RECALL THE LOWER BITS OF BLOCK NUMBER
3Ø13	75Ø7	ØØØØ	Ø		/START THE DISK MOVING,BABY!!
3Ø14	751Ø	6623	DISK		/WAIT FOR EVENT TO HAPPEN
3Ø15	7511	531Ø	JMP	-1	/ALL DONE.....
3Ø16	7512	6621	DFSE		/HOW ABOUT AN ERROR,
3Ø17	7513	563Ø	JMP I	DFREAD	/NO ERROR, RETURN
3Ø2Ø	7514	6616	DIMA		/READ IN THE PROCESSOR STATUS REGISTER,
3Ø21	7515	Ø366	AND	DFL1ØØ3	/UST LEAVE IN VARIOUS ERROR BITS,
22	7516	7112	CLL RTR		/OTATE NXD STATUS INTO LINK
3Ø23	7517	764Ø	SZA CLA		/NXD SHOULD BE ONLY BITS ON,

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13363

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EJECT

Address	Instruction	Comment
3277	/	
3300	/	
3301	/	
3302	/	
3303	/	
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3305	/	
3306	/	
3307	/	
3310	/	
3311	/	
3312	/	
3313	/	
3314	/	
3315	/	
3316	TREAD, 0	7630 0000
3317	JMP	7631 5247
3320	TWRITE, 0	7632 0000
3321	TAD	7633 1232
3322	DCA	7634 3230
3323	JMS	7635 4253
3324	LMODE	
3325	WRI	1636 0706
3326	PMODE	
3327	TL400,	7637 0400
3330		7640 4253
3331	JMS	
3332	CHK	1641 0707
3333	PMODE	
3334	JMP	7642 5233
3335	/	
3336	TTRET,	7643 7307
3337	CLA CLL	7644 1230
3340	TAD	7645 3230
3341	DCA	7646 5630
3342	JMP I	
3343	JMS	7647 4253
3344	LMODE	
3345	ROE	1650 0702
3346	PMODE	
3347	JMP	7651 5247
3350	JMP	7652 5243
3351	/	
3352	/	
3353	/	
3354	/	
3355	/	
3356	TDO,	7653 0000
3357	TAD	7654 1230
3360	DCA	7655 3350
3361	TAD I	7656 1653
3362	ISZ	7657 2253
3363	DCA	7660 3331
3364	CLA CMA	7661 7240
3365	DCA	7662 3362
3366	TAD I	7663 1750
3367	AND	7664 0356
3370	CLL RAR	7665 7110
3371	DCA	7666 3327
3372	RTL	7667 7006
3373	RTL	7670 7006
3374	TOPR	7671 1331

3377	7674	1750	TAD I	TCALLY	/GET THE CORE LOCATION NOW,
3400	7675	0360	AND	TL160	/JUST GET THE FIELD BITS NOW,
3401	7676	7106	CLL RTL		/AND ROTATE TO BITS
3402	7677	7006	RTL		/0-2
3403	7700	7004	RAL		
3404	7701	1327	TAD	TAXO	/ADD IN THE TAPE REGISTER WORD,
3405	7702	1357	TAD	TL20	/ALSO ADD IN THE EXTENDED ADDRESS BIT,
3406	7703	3327	OCA	TAXO	/AND SAVE IT AWAY,
3407	7704	1750	TAD I	TCALLY	/GET THE CORE LOCATION AGAIN,
3410	7705	7012	RTR		/ROTATE TO BITS 0-3,
3411	7706	7012	RTR		
3412	7707	7010	RAR		
3413	7710	0361	AND	TL7400	/AND AND OUT STRAY CRAP,
3414	7711	3232	OCA	TWRITE	/AND SAVE AWAY, TWRITE IS FREE NOW.
3415	7712	2350	ISZ	TCALLY	/BOP TO THE BLOCK NUMBER
3416	7713	1750	TAD I	TCALLY	/GET THE BLOCK NUMBER
3417	7714	3332	DCA	TBLOCK	/AND SAVE AWAY,
3420	7715	2350	ISZ	TCALLY	/BOP TO THE NUMBER OF BLOCKS TO READ IN,
3421	7716	1750	TAD I	TCALLY	/GET THE NUMBER NOW,
3422	7717	7041	CIA		/NEGATE,
3423	7720	7450	SNA	TOUT	/NO BLOCKS?
3424	7721	5352	JMP	TCOUNT	/NO BLOCKS, RETURN,
3425	7722	3351	DCA		/SET UP THE COUNT NOW,
3426					
3427					
3430	7723	1232	TAD	TWRITE	/GET THE CORE ADDRESS,
3431	7724	6141	LINC		/GET INTO LINC MODE
3432			LMODE		
3433	1725	0023	TMA		/SEND TO THE CONTROLLER,
3434	1726	1020	LDA I		/GET THE FUNCTIONS,
3435	1727	0000	0		/AND SEND IT TO THE CONTROLLER,
3436	1730	0001	AXO		/WITH AN AXO,
3437					
3440	1731	0000	0		/NOW DO THE ACTUAL TAPE INSTRUCTION,
3441	1732	0000	0		/WITH THE BLOCK NUMBER HERE, THIS HANGS UNTIL DONE,
3442					
3443	1733	0002	PDP		/BACK INTO 8 MODE
3444			PHODE		/FOR NORMAL CRAP
3445					
3446	7734	0362	AND	TRET	/CHECK FOR ALL 777S
3447	7735	3362	OCA	TRET	
3450	7736	1237	TAD	TL400	/ADD 400 TO THE LOC
3451	7737	1232	TAD	TWRITE	
3452	7740	3232	DCA	TWRITE	
3453	7741	2332	ISZ	TBLOCK	/BOP UP THE BLOCK NUMBER
3454	7742	2351	ISZ	TCOUNT	/ALL DONE???
3455	7743	5323	JMP	TLOOP	/NOPE, DO SOMMSE MORE.,,
3456	7744	5352	JMP	TOUT	/ALL DONE, CHECK CHECKSUM AND EXIT,
3457					
3460					
3461					
3462					
3463					
3464	7750	0000	*7750		
3465	7751	0000	TCALLY, 0		/PLACE OF D.B. LOCATIONS,
3466			TCOUNT, 0		
3467					
3470					
3473	7752	2362	TOUT,	TRET	THE CHECKSUM OK???
	7753	5653	ISZ	TDO	/NOPE, EXIT
			JMP I		

ADDRESS	INSTR	DATA	COMMENT
3476	JMP I	T00	/RETURN.
3477	/		
3500	/		
3501	/		
3502	/		
3503	/		
3504	/		
3505	/		
3506	TL7,	7	
3507	TL20,	20 10	
3510	TL160,	160	
3511	TL7400,	7400	
3512	TRET,	0	
3513	/		
3514	/		
3515	/		
3516	/		
3517	/		
3520	/		
3521	/		
3522	/		
3523	/		
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3530	/		
3531	/		
3532	/		
3533	0		/CONTAINS THE ACTIVE ADDRESS OF I/O
3534	0		/CONTAINS THE NECESSARY FUDGE FACTOR
3535	MAIN		/POINTER TO I/O INTERPRETER
3536	BOOTCK		/POINTS TO BOOTSTRAP
3537	0		/READ ENTRY POINT
3540	WRITE,		/WRITE ENTRY POINT
3541	JMP I	7772	/DOES THE CORRECT OPERATION
3542	JMP I	7773	/CALLS THE SYSTEM BOOTSTRAP.
3543	/		
3544	/		
3545	/		
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3551	/		
3552	/		
3553	EJECT		

*/SYSTEM COMMUNICATIONS REGION

7756	0007		
7757	0020		
7760	0160		
7761	7400		
7762	0000		
7770	0000		
7771	0000		
7772	7000		
7773	7422		
7774	0000		
7775	0000		
7776	5772		
7777	5773		

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SYMBOL	VALUE	DEF	REFERENCES
ADF32	4173	0330	0165
AICHEC	4165	0322	0244 0257 0262 0265
AIDONE	4166	0323	0164 0201 0204 0267
AIRK08	4164	0321	0142
AIS08	4164	0326	0202 0253
AIS08	4171	0324	0167 0247
AIS08	4167	0325	0171 0251
AIS08	4170	0327	0255 0260 0263 0266
AIS08	4172	0327	0255 0260 0263 0266
AIS08	4174	0331	0223
AMOVE	4162	0315	0162
AM100	4163	0316	0177
AM100	4161	0314	0140 0151
AM77	4175	0332	0245
ARF08	4154	0307	0156
A100	4160	0313	0173
A100	4155	0310	0256
A177	4156	0311	0261
A277	4157	0312	0264
A377	4153	0306	0134
A77	4377	0700	0544 0545 0547 0550 0551 0552 0554
BDSYS	4377	0700	0544 0545 0547 0550 0551 0552 0554
BIMOVE	4361	0661	0371
BM20	4373	0674	0454
BM7630	4370	0671	0431
BOOTCK	7422	2555	3135 3535
BOOTER	7156	2064	2317
BREAD	4371	0672	0436 0441
BRK08	4360	0660	0370
BSYS80	4374	0675	0464
BWRITE	4372	0673	0447 0461
B7	4376	0677	0542 0543
B7430	4375	0676	0501 0515 0531 0546
CBLOCK	7121	1771	1601 1605 1735 1761
CCORE	7120	1770	1753
CH00T	7272	2314	2305
CHECKF	7254	2272	2564
CNUM	7122	1772	1764
CUNIT	7117	1767	1633 1644 1750
DCEA	6611	2645	2527 2532 2533 2534 2535 2536
DCHAR	6002	0754	2527 2532 2533 2534 2535 2536
DCHP	6737	1036	1202 2071
DCLA	6751	1032	0132 1153 1200
DCLS	6742	1042	0143 0144 0154 0155 1376 1530 1531 2744
DCMA	6601	2642	0143 0144 0154 0155 1376 1530 1531 2744
DCXA	6641	2660	0161 0176 1454
DEAC	6616	2650	0157 0174 1423
DEAL	6615	2647	0157 0174 1423
DFBAD1	7526	3032	3024
DFCDF	7462	2766	2760
DFGET	7542	3057	2745 2762 3001 3004 3062
DFLOOP	7440	2744	3044
DFL100	7566	3111	3021
DFL377	7565	3110	2776
DFL70	7560	3103	2750 2755
DFL740	7564	3107	3101
DFMAD	7546	3063	2767
FR	7541	3056	2742
FR	7567	3112	2743
FR	7507	3013	2743
DRUPR	7507	3013	2743

SYMBOL	VALUE	DEF	REFERENCES
DFSC	6622	2654	1445
DFSE	6621	2651	1443
DFWRIT	7432	2736	1447 3016
DFXCDF	7562	3105	2737 2772 3003 3012
DFXX	7561	3104	2761
DF32	6630	1343	2770 3011 3027 3106
DIALBL	0000	0054	0330
DIALCO	0010	0053	2115
DIALNU	0010	0055	2114
DIALUN	0100	0052	2116
DIHAN1	0365	0041	2113
DIHAN2	0366	0042	0123
DIMA	6616	2655	0125
DIML	6615	2653	0406 3020 3032
DIOC	0345	0040	2756
DISK	6623	2652	0121
DLCA	6755	1051	3014
OLDC	6732	1033	1156
OLDR	6733	1034	0135 1123
DLDW	6735	1035	1266
DLWC	6753	1050	1160
DMAC	6626	2656	
DMAR	6603	2643	1473 3056
DMAW	6605	2644	
DMT	6646	2657	
DMNT	6743	1043	
DPB00T	7174	2113	2076
DRCA	6757	1052	
ORCDF	6653	1411	1405
ORCLRF	6752	1530	1451 1461
DRDA	6734	1037	
ORDC	6736	1040	0137 2562
ORDS	6741	1041	1173
DRERR	6714	1454	1444 1450
ORLOOP	6640	1376	1466
ORL300	6731	1475	
ORL370	6746	1514	1421
ORL70	6730	1474	1402
ORL740	6743	1511	1506
ORMAD	6745	1513	1414
ORMAR	6727	1473	1374
ORMWC	6744	1512	1436
OROPR	6703	1441	1375
ORREAD	6630	1366	1372
ORRTR	6735	1502	1377 1400 1407 1416 1417 1425 1430 1431 1432 1464 1465 1532
ORWC	6752	1047	1410 1426 1433 1507
ORWRIT	6632	1370	1371 1403 1422 1427 1440
ORXCDF	6733	1477	1406
ORXX	6732	1476	1415 1437 1500
OR1	6636	1374	1367
OSAC	5612	2646	
OSAVI	4354	0626	0437 0462
OSKC	6745	1044	1165 1206 2072
OSKE	6747	1046	1170 1203
OSKT	6746	1045	
OSYS	7341	2417	0700
OTABLE	7247	2242	2530
DX	6001	0753	2316 2525 2563
DXAC	6645	2662	0150 2771
DXAL	6643	2661	0146 0405 2752 3000

SYMBOL	VALUE	DEF	REFERENCES
IB1	4346	0604	0444 0445
IB2	4352	0614	0451 0453
ICHECK	4214	0404	0322 0411
IDONE	4222	0414	0323 0372
IIDONE	4262	0460	
IIDONR	4265	0463	0434
ILINP	4344	0602	0442
ILOOP	4244	0440	0455
ILOUTP	4350	0612	0450
IMOVE	4113	0217	0166 0231 0246 0661
INITB	0311	0037	
IRF08	4126	0243	0153
IRK08	4200	0357	0321
ISETB	4311	0523	0326 0363 0525 0526 0533
ISETD	4267	0473	0324 0357 0475 0476 0503
ISETS	4300	0507	0325 0361 0511 0512 0517
ISETU	4340	0561	0327 0365 0366 0367 0564
ISETU2	4322	0540	0555 0562 0563
KCOMM	6436	1100	1072
KCOUNT	6550	1235	1142 1221
KDLDL	6565	1266	1100
KEND	6545	1221	1167
KERR	6506	1152	1143 1213
KFGET	6553	1245	1112 1124 1133 1136 1250
KLOC	6552	1237	1111 1122 1132 1145 1147 1155
KLPH10	6452	1114	1105
KL30	6560	1260	1107
KL400	6562	1262	1146
KL7	6557	1257	
KL70	6561	1261	1103 1106 1121
KL7400	6563	1263	1115 1130 1157
KL7777	6564	1264	1131
KNEXT	6502	1145	1222
KOPR	6516	1163	1101
KREAD	6430	1071	1075 1102 1117 1140 1223 1246 1247
KTRACK	6551	1236	1116 1134 1135 1150 1161
KUGH	6524	1173	1205
KWRITE	6432	1073	1074 1176 1210
L8LOCK	7612	3231	3233
LCDF	7136	2026	1574 1577
LESS20	7041	1632	1623
LLOC	7611	3230	3234
LNUM	7613	3232	
LTEN	4347	0605	0443 0452
LUNIT	7610	3227	
L20	7147	2037	1632
L30	7150	2040	1631
L6	7145	2035	2066
L7	7146	2036	1627
L7770	7151	2041	1740 1744
L7771	7152	2042	1743 1756
MAIN	7000	1571	3134 3534
MCALL	7144	2034	1616 1620 1747 1751 1752 1754 1760 1762 1763
MLOOP	7044	1640	1652
MNL	7400	2525	1675 2541 2550
MNOT	7057	1670	1642
MOVE	7200	2157	0331 2214 2222 2223
MOVE	7137	2027	1603 1610 2075
MOVE	7143	2033	1607 1615 1617 1777
MSYS	7330	2406	0662 0663 0664 0665 0666 0667

SYMBOL VALUE DEF REFERENCES

MSYSF	4364	0664	0516	
MSYSI	4365	0665	0514	
MSYSP7	4366	0666	0532	
MSYS10	4367	0667	0530	
MTABLE	7300	2356	2031	
MTRUE	7064	1734	1646	
MWRITE	7140	2030	1606	1611 2074
M20	7153	2043	1621	
M30	7154	2044	1624	
M40	7155	2045	1630	
PTABLE	7141	2031	1612	
RCDF	7134	2020	1575	1774
READ	7774	3536	0112	0672
RF08	7430	2712	0332	
RK08	6430	1007	0660	
RK080K	7165	2074	2070	
SETUP1	0322	0035	0421	2307
SETUP2	0323	0036	0423	2311
SLCDF	7246	2234	2172	
SRCDF	7133	2017	1614	1746 1757 2021
STCDF	7130	2011	1602	1634 1755 1765 2013
SWGET	7236	2221	2161	2163 2165 2167 2174 2200 2211 2224
SWIN	7222	2201	2162	2212
SWLIN	7244	2232	2164	2202 2207
SWLOUT	7245	2233	2170	2204 2205
SWOUT	7224	2203	2166	
SWRET	7234	2213	2173	2176
SWTMP1	7242	2230		
SWTMP2	7243	2231		
SYSBOT	7777	3541	0675	
SYSGO	7617	3237	3221	
SYSLD2	7615	3234	3225	
SYSLD	7600	3217	3235	
TAXO	7727	3435	3371	3404 3406
TBLOCK	7732	3441	3417	3453
TCALLY	7750	3465	3360	3376 3377 3407 3415 3416 3420 3421
TCDF	7131	2012	1600	
TCOUNT	7751	3466	3425	3454
TDO	7653	3356	3323	3330
TEMP	7142	2032	1613	1640
TLOOP	7723	3430	3455	
TL160	7760	3507	3400	
TL20	7757	3506	3405	
TL400	7637	3327	3450	
TL7	7756	3505	3367	
TL7400	7761	3510	3413	
TOPR	7731	3440	3363	3374 3375
TOUT	7752	3472	3424	3456
TPOINT	7627	3266	3217	3223
TREAD	7630	3316	3226	3322
TRET	7762	3511	3365	3337 3340 3341 3357
TTREAD	7647	3343	3317	3347
TTRET	7643	3336	3350	
TWRITE	7632	3320	3321	3334 3414 3430 3451 3452
WRITE	7775	3537	0113	0673

