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 LAP6[1] by Mary Allen Wilkes of Washington University. The assembly portion is derived from several programs used for the PDP-8 computer including PAL-D[2].

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.

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

[2] PAL-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-MS[1] 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 Ø-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 4Ø2Ø 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 RSØ8, DF32 and RKØ8 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 76ØØ 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 74ØØ of field 1 if another device in addition to LINCtape is present. Locations 74ØØ-7777 of field 1 are then written onto tape Ø. Thus, the system now knows that blocks 322 and 323 of LINCtape Ø contain all the necessary information and they do not have to be rebuilt each time. Blocks 3ØØ-467 of tape Ø (with the exception of the index) are copied to blocks Ø-167 of logical unit 1ØØ, providing 1ØØ is not on

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

LINCtape (logical unit 1ØØ 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 73ØØ 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 Ø-7); first word contains the unit number, second word contains 7630, the read routine entry toint, the third word contains Ø because there is no correction necessary. In addition, there are three more units; namely, 100, 110 and 111. 1ØØ is used internally to describe the DIAL-MS system. Thus, if you are running a tape system, DIAL-MS resides on blocks 3ØØ-367 of unit Ø. The Editor resides on block Ø of unit 1ØØ so the entry point in the table is 1ØØ (unit #1ØØ), 7630 (pointer to the LINCtape routine), 3ØØ (number of blocks to add to unit 1ØØ 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 1ØØ; the MTABLE tells it where the device and block number really are. Unit 11Ø is the source unit; its first block is also Ø. Thus, to reference block 3 of the source, it is block 3 of unit 11Ø. 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 Ø). Only these three logical units are presently implemented; more can be added without any trouble.

The disk units are 1Ø-17, with the pointer to 743Ø (this is where the disk routine will be). Note that units 2Ø-45 do not appear in the table if the user has multiple RKØ8s. The controller will look for units 1Ø-17 if any unit between 2Ø 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 (LINCtape 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 777Ø 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 3ØØ-3Ø7 of the Editor off device 1ØØ and jumps to 4Ø21, instead of to 4Ø2Ø. Jumping to 4Ø2Ø 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 3Ø through 167 of the page may be used by them.

e. The read entry point is at 3Ø of the page and the write entry point is at 32 of the page.

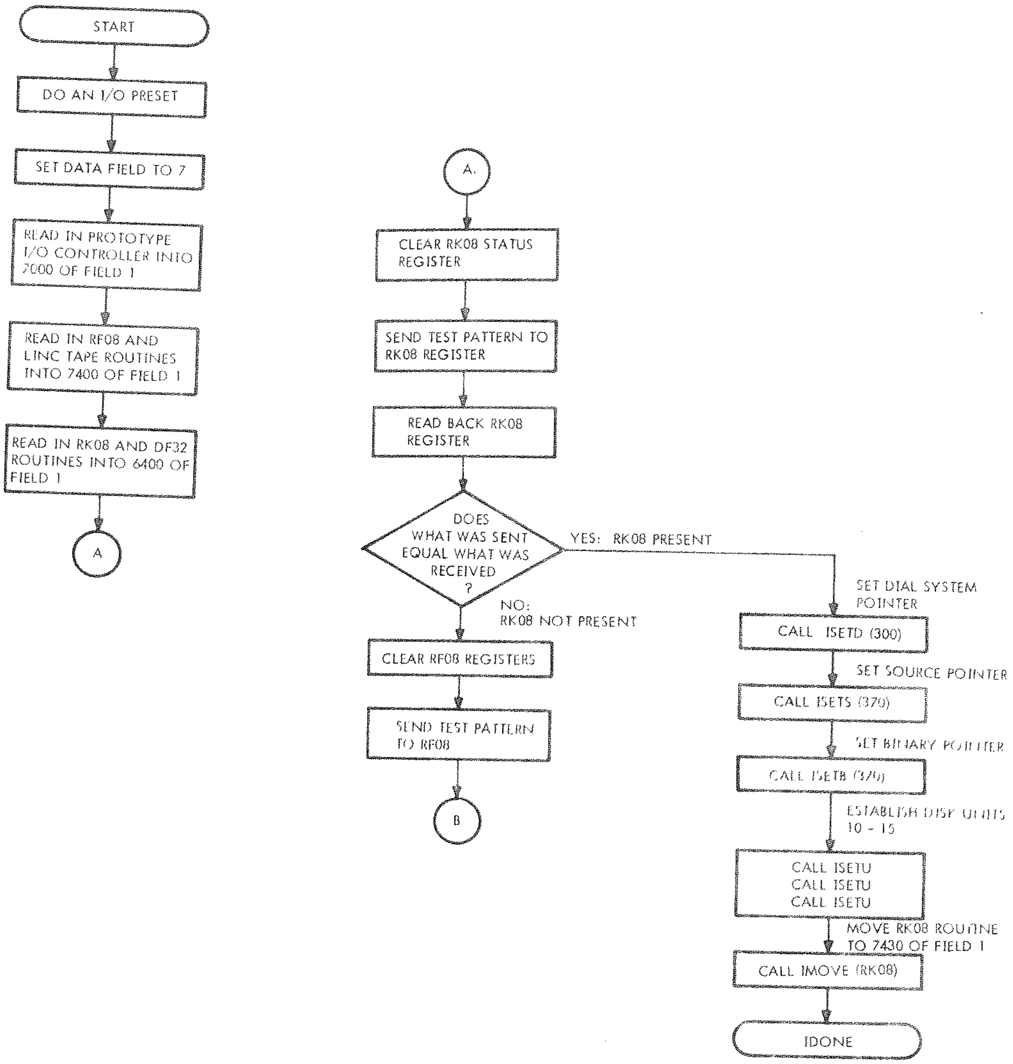
f. The calling sequence is similar to the calling sequence to the I/O controller, but the arguments are in-line, rather than pointed to by a pointer.

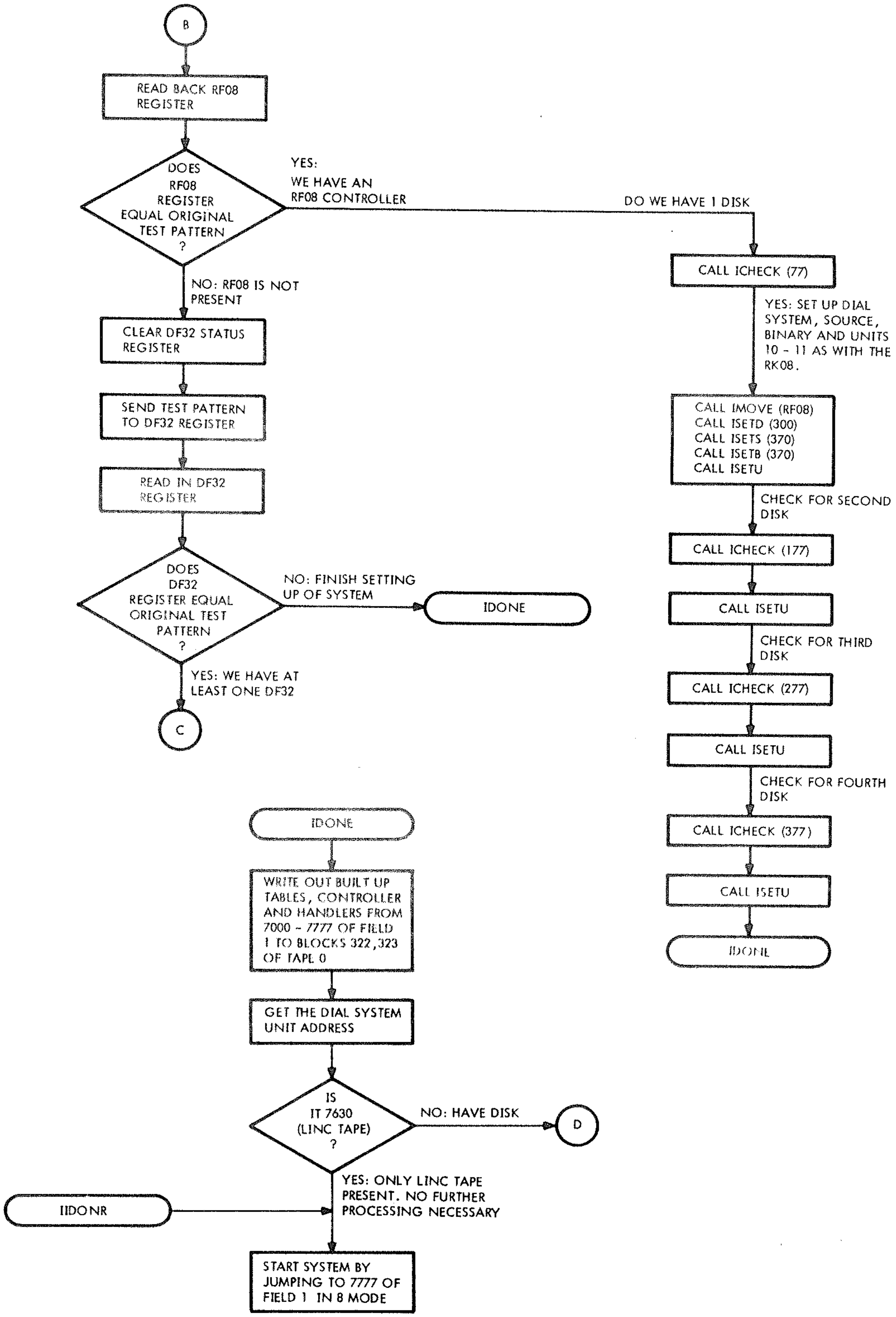
g. There is no code at 15Ø or 151 of the page so that if they are ever located in 76ØØ, no code will be over the disk data break locations.

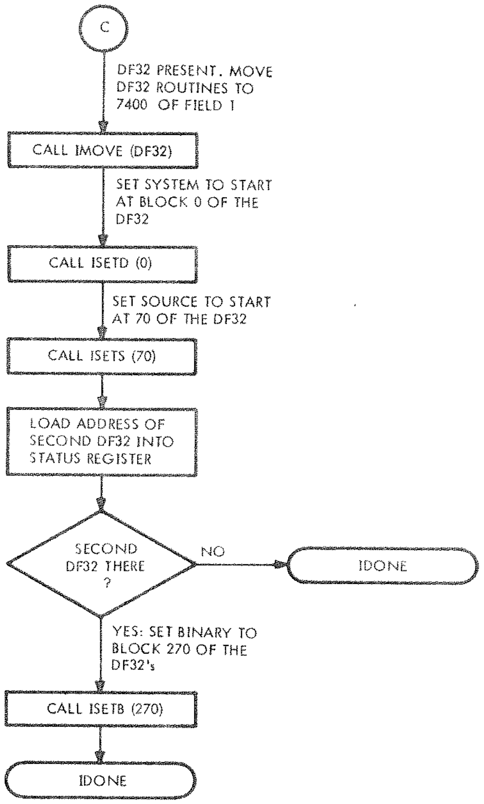
The I/O handlers also share one other feature. They only look at the rightmost digit of the calling unit, thus insuring the device independence of the system. While the physical nature of each handler is important, only the flow charts are necessary to understand each one. They are basically straightforward code. At present, there are four handlers implemented: LINCtape and RFØ8, DF32, and RKØ8, 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)

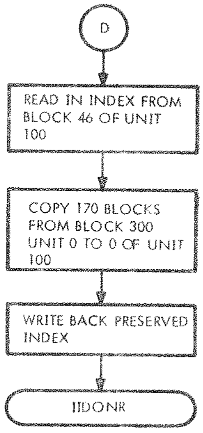
6.0 PROGRAM LISTING (Attached)

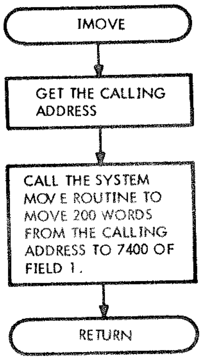

START
DO AN I/O PRESET
SET DATA FIELD TO 7
READ IN PROTOTYPE I/O CONTROLLER INTO 7000 OF FIELD 1
READ IN RF08 AND LINC TAPE ROUTINES INTO 7400 OF FIELD 1
READ IN RK08 AND DF32 ROUTINES INTO 6400 OF FIELD 1
A
A.
CLEAR RK08 STATUS REGISTER
SEND TEST PATTERN TO RK08 REGISTER
READ BACK RK08 REGISTER
DOES WHAT WAS SENT EQUAL WHAT WAS RECEIVED ?
YES: RK08 PRESENT
NO: RK08 NOT PRESENT
CLEAR RF08 REGISTERS
SEND TEST PATTERN TO RF08
B
SET DIAL SYSTEM POINTER
CALL ISETD (300)
SET SOURCE POINTER
CALL ISETS (370)
SET BINARY POINTER
CALL ISETB (370)
ESTABLISH DISK UNITS 10 - 15
CALL ISETU
CALL ISETU
CALL ISETU
MOVE RK08 ROUTINE TO 7430 OF FIELD 1
CALL IMOVE (RK08)
IDONE

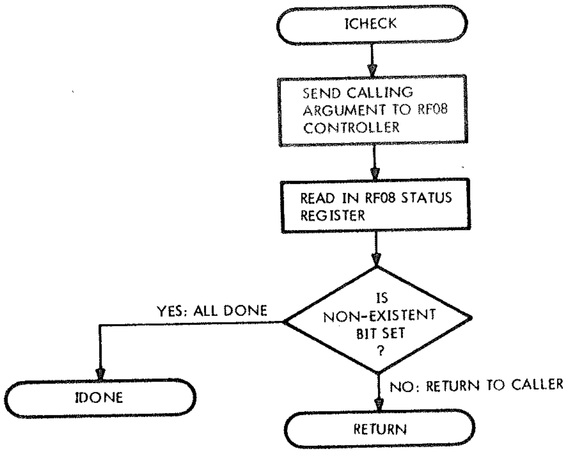

B
READ BACK RF08 REGISTER
DOES RF08 REGISTER EQUAL ORIGINAL TEST PATTERN ?
YES: WE HAVE AN RF08 CONTROLLER
DO WE HAVE 1 DISK
CALL ICHECK (77)
YES: SET UP DIAL SYSTEM, SOURCE, BINARY AND UNITS 10 - 11 AS WITH THE RK08.
CALL IMOVE (RF08)
CALL ISETD (300)
CALL ISETS (370)
CALL ISETB (370)
CALL ISETU
CHECK FOR SECOND DISK
CALL ICHECK (177)
CALL ISETU
CHECK FOR THIRD DISK
CALL ICHECK (277)
CALL ISETU
CHECK FOR FOURTH DISK
CALL ICHECK (377)
CALL ISETU
IDONE
NO: RF08 IS NOT PRESENT
CLEAR DF32 STATUS REGISTER
SEND TEST PATTERN TO DF32 REGISTER
READ IN DF32 REGISTER
DOES DF32 REGISTER EQUAL ORIGINAL TEST PATTERN ?
NO: FINISH SETTING UP OF SYSTEM
IDONE
YES: WE HAVE AT LEAST ONE DF32
C
IDONE
WRITE OUT BUILT UP TABLES, CONTROLLER AND HANDLERS FROM 7000 - 7777 OF FIELD 1 TO BLOCKS 322,323 OF TAPE 0
GET THE DIAL SYSTEM UNIT ADDRESS
IS IT 7630 (LINC TAPE) ?
NO: HAVE DISK
D
YES: ONLY LINC TAPE PRESENT. NO FURTHER PROCESSING NECESSARY
IIDONR
START SYSTEM BY JUMPING TO 7777 OF FIELD 1 IN 8 MODE

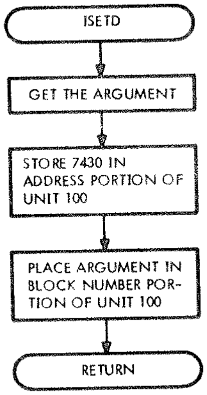

C
DF32 PRESENT. MOVE DF32 ROUTINES TO 7400 OF FIELD 1
CALL IMOVE (DF32)
SET SYSTEM TO START AT BLOCK 0 OF THE DF32
CALL ISETD (0)
SET SOURCE TO START AT 70 OF THE DF32
CALL ISETS (70)
LOAD ADDRESS OF SECOND DF32 INTO STATUS REGISTER
SECOND DF32 THERE ?
NO
IDONE
YES: SET BINARY TO BLOCK 270 OF THE DF32's
CALL ISETB (270)
IDONE

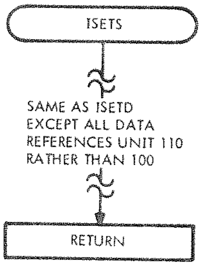
DISK INITIALIZER

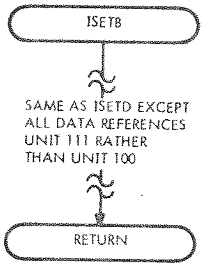

D
READ IN INDEX FROM BLOCK 46 OF UNIT 100
COPY 170 BLOCKS FROM BLOCK 300 UNIT 0 TO 0 OF UNIT 100
WRITE BACK PRESERVED INDEX
IIDONR

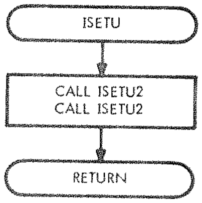

IMOVE
GET THE CALLING ADDRESS
CALL THE SYSTEM MOVE ROUTINE TO MOVE 200 WORDS FROM THE CALLING ADDRESS TO 7400 OF FIELD 1.
RETURN

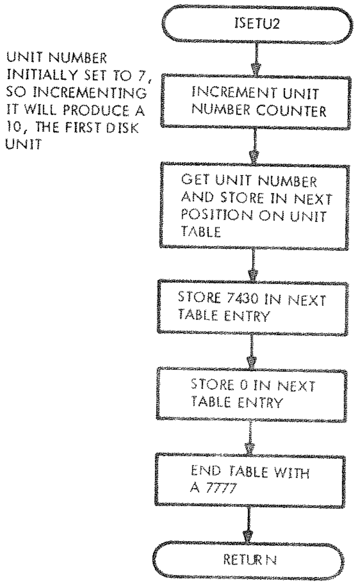

ICHECK
SEND CALLING ARGUMENT TO RF08 CONTROLLER
READ IN RF08 STATUS REGISTER
IS NON-EXISTENT BIT SET ?
YES: ALL DONE
IDONE
NO: RETURN TO CALLER
RETURN

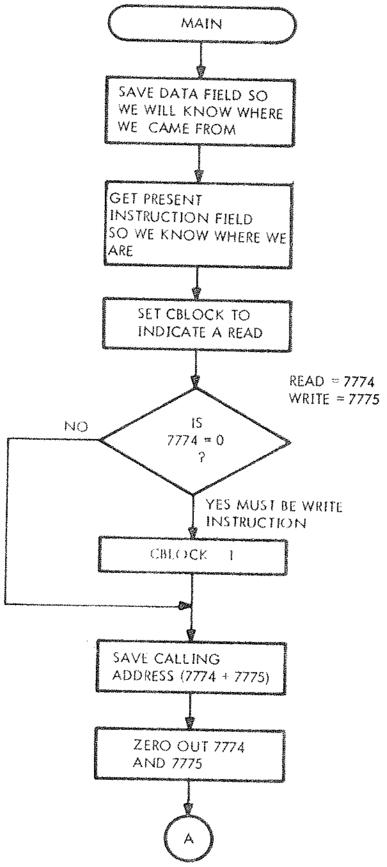

ISETD
GET THE ARGUMENT
STORE 7430 IN ADDRESS PORTION OF UNIT 100
PLACE ARGUMENT IN BLOCK NUMBER PORTION OF UNIT 100
RETURN

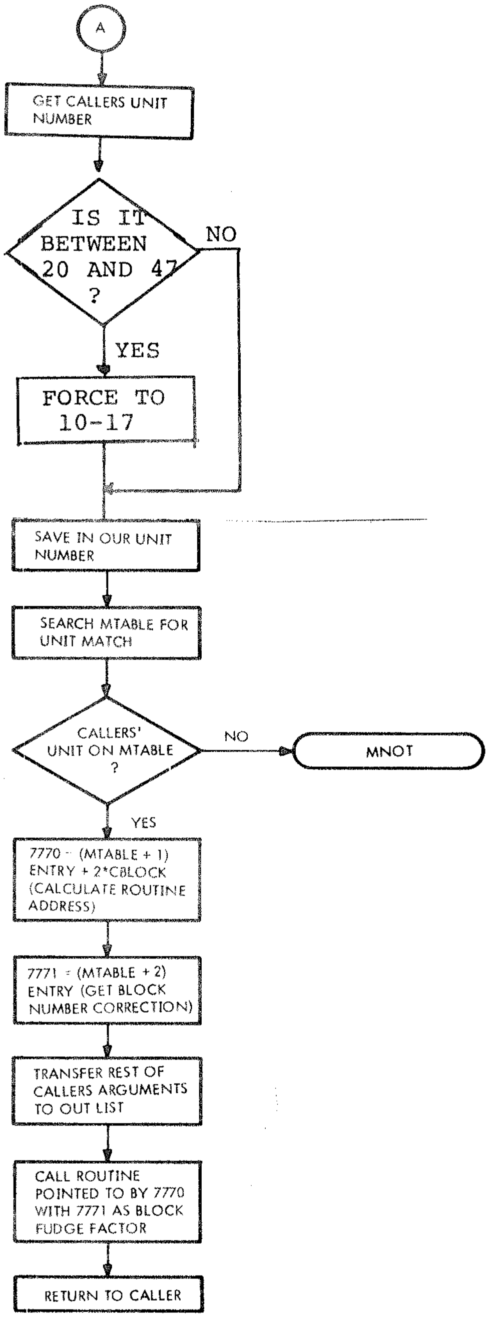

ISETS
SAME AS ISETD
EXCEPT ALL DATA
REFERENCES UNIT 110
RATHER THAN 100
RETURN

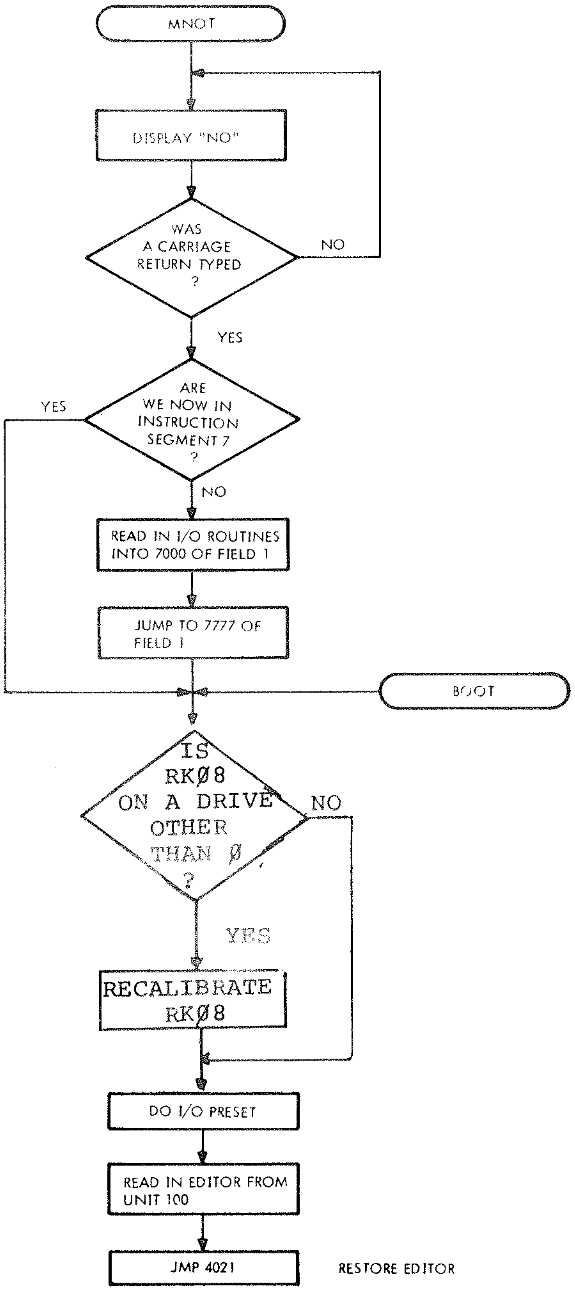

ISETB
SAME AS ISETD EXCEPT
ALL DATA REFERENCES
UNIT 111 RATHER
THAN UNIT 100
RETURN


ISETU
CALL ISETU2
CALL ISETU2
RETURN

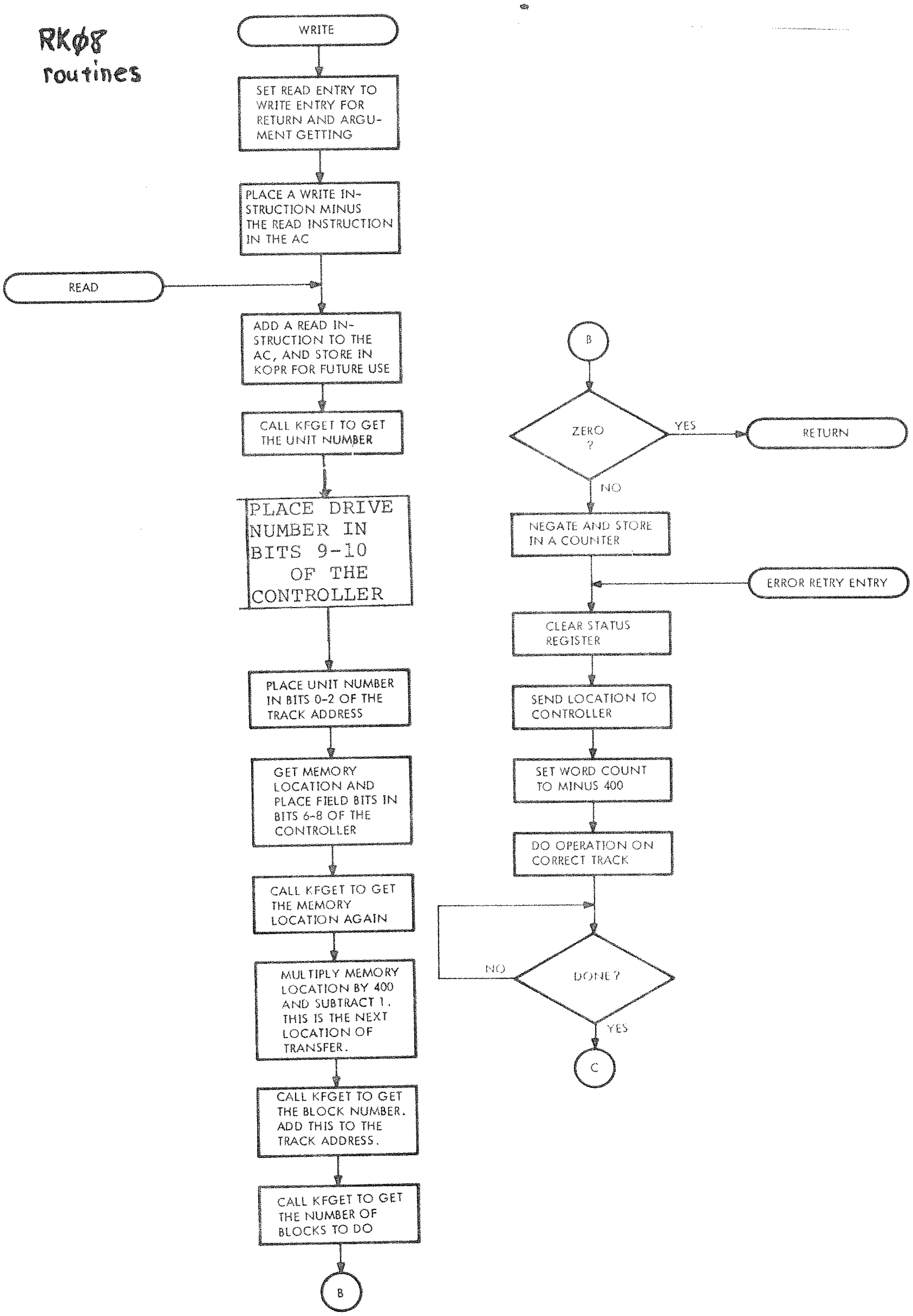

ISETU2
UNIT NUMBER
INITIALLY SET TO 7,
SO INCREMENTING
IT WILL PRODUCE A
10, THE FIRST DISK
UNIT
INCREMENT UNIT
NUMBER COUNTER
GET UNIT NUMBER
AND STORE IN NEXT
POSITION ON UNIT
TABLE
STORE 7430 IN NEXT
TABLE ENTRY
STORE 0 IN NEXT
TABLE ENTRY
END TABLE WITH
A 7777
RETURN

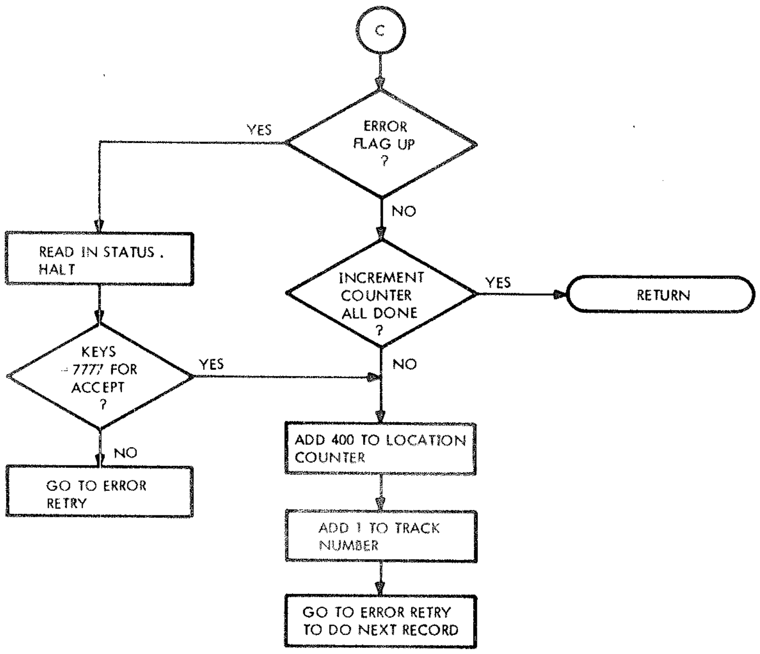

MAIN
SAVE DATA FIELD SO
WE WILL KNOW WHERE
WE CAME FROM
GET PRESENT
INSTRUCTION FIELD
SO WE KNOW WHERE WE
ARE
SET CBLOCK TO
INDICATE A READ
READ = 7774
WRITE = 7775
NO
IS
7774 = 0
?
YES MUST BE WRITE
INSTRUCTION
CBLOCK = 1
SAVE CALLING
ADDRESS (7774 + 7775)
ZERO OUT 7774
AND 7775
A


A
GET CALLERS UNIT NUMBER
IS IT BETWEEN 20 AND 47 ?
NO
YES
FORCE TO 10-17
SAVE IN OUR UNIT NUMBER
SEARCH MTABLE FOR UNIT MATCH
CALLERS' UNIT ON MTABLE ?
NO
MNOT
YES
7770 ← (MTABLE + 1) ENTRY + 2*CBLOCK (CALCULATE ROUTINE ADDRESS)
7771 ← (MTABLE + 2) ENTRY (GET BLOCK NUMBER CORRECTION)
TRANSFER REST OF CALLERS ARGUMENTS TO OUT LIST
CALL ROUTINE POINTED TO BY 7770 WITH 7771 AS BLOCK FUDGE FACTOR
RETURN TO CALLER

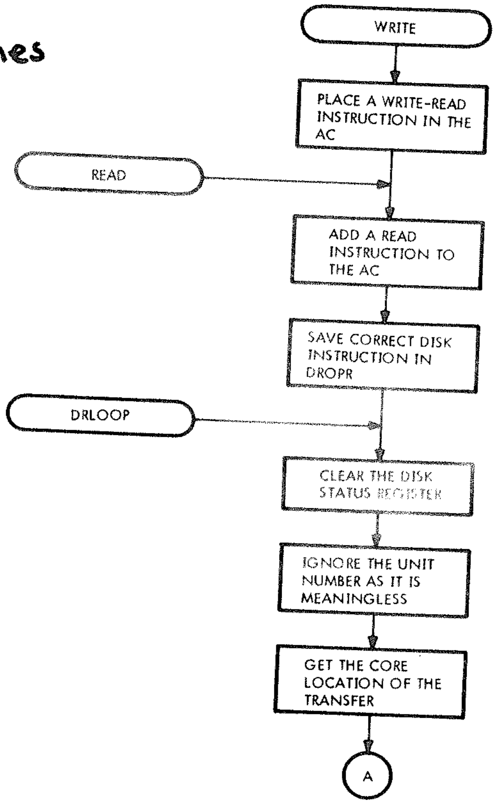

MNOT
DISPLAY "NO"
WAS A CARRIAGE RETURN TYPED ?
NO
YES
ARE WE NOW IN INSTRUCTION SEGMENT 7 ?
YES
NO
READ IN I/O ROUTINES INTO 7000 OF FIELD 1
JUMP TO 7777 OF FIELD 1
BOOT
IS RKØ8 ON A DRIVE OTHER THAN Ø ?
NO
YES
RECALIBRATE RKØ8
DO I/O PRESET
READ IN EDITOR FROM UNIT 100
JMP 4021
RESTORE EDITOR

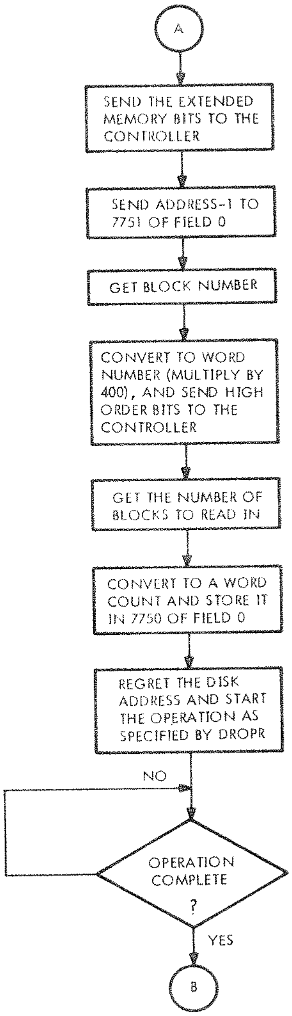
RKØ8
routines

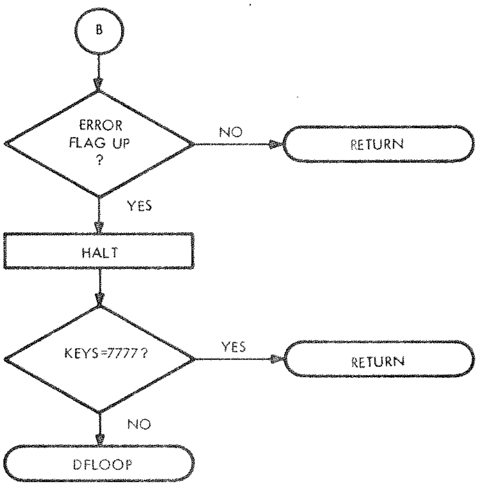

WRITE
SET READ ENTRY TO WRITE ENTRY FOR RETURN AND ARGUMENT GETTING
PLACE A WRITE INSTRUCTION MINUS THE READ INSTRUCTION IN THE AC
READ
ADD A READ INSTRUCTION TO THE AC, AND STORE IN KOPR FOR FUTURE USE
CALL KFGET TO GET THE UNIT NUMBER
PLACE DRIVE NUMBER IN BITS 9-10 OF THE CONTROLLER
PLACE UNIT NUMBER IN BITS 0-2 OF THE TRACK ADDRESS
GET MEMORY LOCATION AND PLACE FIELD BITS IN BITS 6-8 OF THE CONTROLLER
CALL KFGET TO GET THE MEMORY LOCATION AGAIN
MULTIPLY MEMORY LOCATION BY 400 AND SUBTRACT 1. THIS IS THE NEXT LOCATION OF TRANSFER.
CALL KFGET TO GET THE BLOCK NUMBER. ADD THIS TO THE TRACK ADDRESS.
CALL KFGET TO GET THE NUMBER OF BLOCKS TO DO
B
B
ZERO ?
YES
RETURN
NO
NEGATE AND STORE IN A COUNTER
ERROR RETRY ENTRY
CLEAR STATUS REGISTER
SEND LOCATION TO CONTROLLER
SET WORD COUNT TO MINUS 400
DO OPERATION ON CORRECT TRACK
NO
DONE ?
YES
C



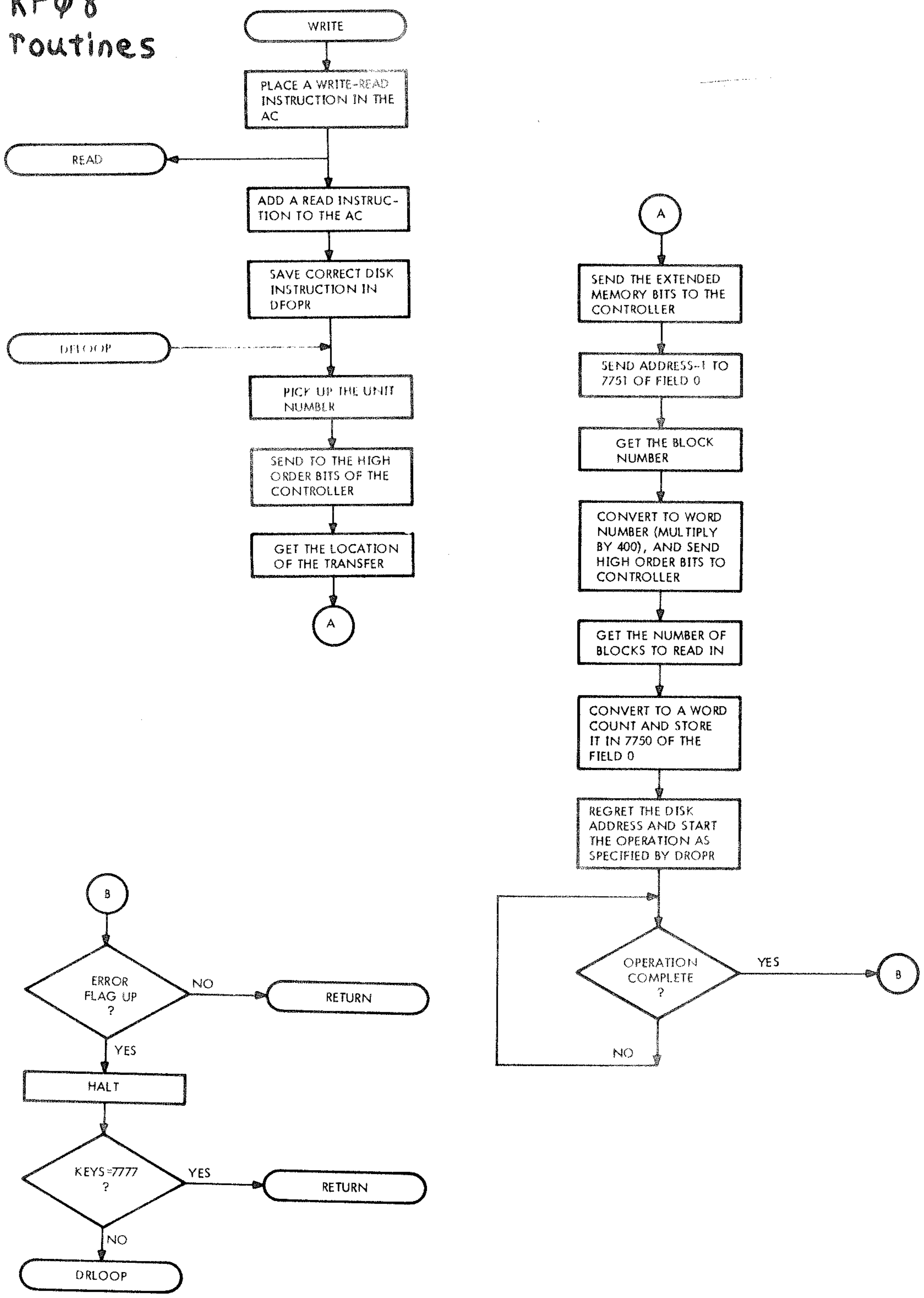
DF32
routines

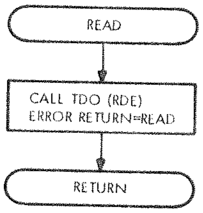

WRITE
PLACE A WRITE-READ INSTRUCTION IN THE AC
READ
ADD A READ INSTRUCTION TO THE AC
SAVE CORRECT DISK INSTRUCTION IN DROPR
DRLOOP
CLEAR THE DISK STATUS REGISTER
IGNORE THE UNIT NUMBER AS IT IS MEANINGLESS
GET THE CORE LOCATION OF THE TRANSFER
A

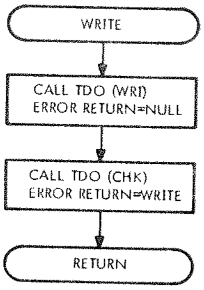

A
SEND THE EXTENDED MEMORY BITS TO THE CONTROLLER
SEND ADDRESS-1 TO 7751 OF FIELD 0
GET BLOCK NUMBER
CONVERT TO WORD NUMBER (MULTIPLY BY 400), AND SEND HIGH ORDER BITS TO THE CONTROLLER
GET THE NUMBER OF BLOCKS TO READ IN
CONVERT TO A WORD COUNT AND STORE IT IN 7750 OF FIELD 0
REGRET THE DISK ADDRESS AND START THE OPERATION AS SPECIFIED BY DROPR
NO
OPERATION COMPLETE ?
YES
B

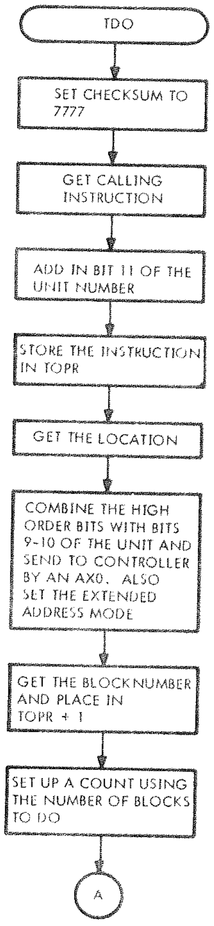

B
ERROR FLAG UP ?
NO
RETURN
YES
HALT
KEYS=7777 ?
YES
RETURN
NO
DFLOOP

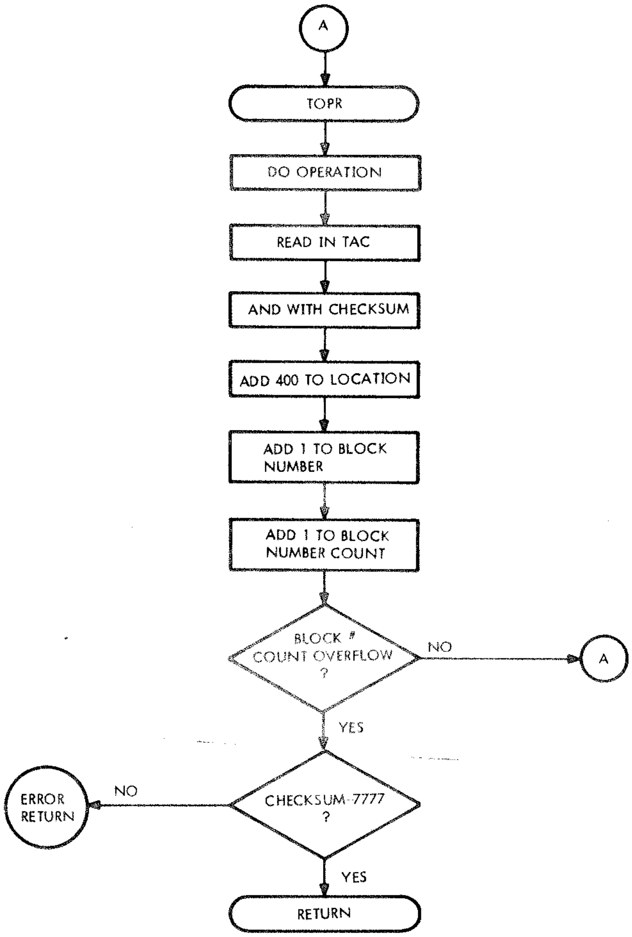
RFØ8
routines


WRITE
PLACE A WRITE-READ INSTRUCTION IN THE AC
READ
ADD A READ INSTRUCTION TO THE AC
SAVE CORRECT DISK INSTRUCTION IN DFOPR
DFLOOP
PICK UP THE UNIT NUMBER
SEND TO THE HIGH ORDER BITS OF THE CONTROLLER
GET THE LOCATION OF THE TRANSFER
A
A
SEND THE EXTENDED MEMORY BITS TO THE CONTROLLER
SEND ADDRESS-1 TO 7751 OF FIELD 0
GET THE BLOCK NUMBER
CONVERT TO WORD NUMBER (MULTIPLY BY 400), AND SEND HIGH ORDER BITS TO CONTROLLER
GET THE NUMBER OF BLOCKS TO READ IN
CONVERT TO A WORD COUNT AND STORE IT IN 7750 OF THE FIELD 0
REGRET THE DISK ADDRESS AND START THE OPERATION AS SPECIFIED BY DROPR
OPERATION COMPLETE ?
YES
B
NO
B
ERROR FLAG UP ?
NO
RETURN
YES
HALT
KEYS=7777 ?
YES
RETURN
NO
DRLOOP


READ
CALL TDO (RDE)
ERROR RETURN=READ
RETURN


WRITE
CALL TDO (WRI)
ERROR RETURN=NULL
CALL TDO (CHK)
ERROR RETURN=WRITE
RETURN


TDO
SET CHECKSUM TO 7777
GET CALLING INSTRUCTION
ADD IN BIT 11 OF THE UNIT NUMBER
STORE THE INSTRUCTION IN TOPR
GET THE LOCATION
COMBINE THE HIGH ORDER BITS WITH BITS 9-10 OF THE UNIT AND SEND TO CONTROLLER BY AN AXO. ALSO SET THE EXTENDED ADDRESS MODE
GET THE BLOCKNUMBER AND PLACE IN TOPR + 1
SET UP A COUNT USING THE NUMBER OF BLOCKS TO DO
A


A
TOPR
DO OPERATION
READ IN TAC
AND WITH CHECKSUM
ADD 400 TO LOCATION
ADD 1 TO BLOCK NUMBER
ADD 1 TO BLOCK NUMBER COUNT
BLOCK # COUNT OVERFLOW ?
NO
A
YES
CHECKSUM-7777 ?
NO
ERROR RETURN
YES
RETURN

```
*20
/DISK-DIAL DISK ROUTINES
/
/COPYRIGHT 1970,        DIGITAL EQUIPMENT CORPORATION
/                       MAYNARD,MASS, 01754
/
/
/THIS IS THE SYSTEM BUILD AND I-O ROUTINES ALL IN ONE.
/
/
/       UPDATED FOR MULTIPLE RK08S 8/11/70
/
/
/       WRITTEN BY JACK BURNESS
/
/
/
/
/
/
        EJECT
        /
        /
        /
                PMODE
        /
        /
        /
        /
                SETUP1=322              /FIRST HANDLER SET UP BLOCK
                SETUP2=323              /SECOND HANDLER SETUP BLOCK
                INITB=311               /INITIALIZATION BLOCK
                DIOC=345                /CONTROLLER BLOCK
                DIHAN1=365              /FIRST HANDLER BLOCK
                DIHAN2=366              /SECOND HANDLER BLOCK
        /
        /
        /
        /
        /
        /
        /
                DIALUNIT=100            /DEFINE THE SYSTEM UNIT NOW
                DIALCORE=10             /PLACE TO LOAD DIAL INTO
                DIALBLOCK=0             /PLACE WHERE DIAL RESIDES ON LOGICAL UNIT 0
                DIALNUMBER=10           /DIAL IS 8 BLOCK LONG,
        /
        /
        /
        /
        /
        /
        /
        /
        /
                EJECT
```

```
            /
            /
            /
            /
            /
                    FIELD   Ø
            /
            /
            /
            /
                    *4Ø2Ø
            /
            /
            /
                    LMODE
            /
            /
ØØ2Ø  6Ø23          JMP     .+3         /SKIP PAST THE PAGE ZERO POINTERS.
ØØ21  7774          READ
ØØ22  7775          WRITE               /POINTERS TO THE READ-WRITE ROUTINES.
ØØ23  1Ø2Ø          LDA I               /GET THE I/O PRESET CHARACTER
ØØ24  ØØ2Ø          2Ø
ØØ25  ØØØ4          ESF                 /DO AN I/O PRESET
ØØ26  Ø647          LDF     7           /SET THE DATA FIELD TO UPPER CORE
ØØ27  Ø7ØØ          RDC                 /READ IN I O  CONTROLLER
ØØ3Ø  6345          6\DIOC
ØØ31  Ø7ØØ          RDC                 /READ IN THE FIRST GROUP OF HANDLERS
ØØ32  7365          7\DIHAN1
ØØ33  Ø7ØØ          RDC                 /READ IN THE SECOND GROUP OF HANDLERS
ØØ34  5366          5\DIHAN2
ØØ35  ØØ11          CLR                 /CLEAR THE AC NOW.
ØØ36  ØØØ2          PDP                 /GET INTO 8 MODE
                    PMODE
4Ø37  724Ø          CLA CMA             /SETAC TO ALL 1S
4Ø4Ø  6742          DCLS                /SO THAT WE MAY CLEAR THE RANDOM BITS
4Ø41  72ØØ          CLA                 /OF THE STATUS REGISTER.
4Ø42  1353          TAD     A77         /GET A TEST NUMBER IN THE AC NOW
4Ø43  6732          DLDC                /SEND TO THE CONTROLLER.
4Ø44  72ØØ          CLA                 /CLEAR THE AC IN CASE THERE IS NO CONTROLLER.
4Ø45  6736          DRDC                /READ IT BACK NOW.
4Ø46  1361          TAD     AM77        /IS IT STILL THERE?
4Ø47  765Ø          SNA CLA
4Ø5Ø  5764          JMP I   AIRKØ8      /YEP, GO SET UP THE RKØ8 HANDLER
4Ø51  66Ø1          DCMA                /CLEAR DISK FLAGS
4Ø52  66Ø1          DCMA
4Ø53  1353          TAD     A77         /AN RFØ8 TEST
4Ø54  6643          DXAL                /OUT TO RFØ8
4Ø55  72ØØ          CLA
4Ø56  6645          DXAC                /AND BACK AGAIN( TO BE SURE)
4Ø57  1361          TAD     AM77        /NOW THE TEST
4Ø6Ø  765Ø          SNA CLA             /TEXT?
4Ø61  5326          JMP     IRFØ8       /RFØ8 IS HERE
4Ø62  66Ø1          DCMA
4Ø63  66Ø1          DCMA                /CLEAR DISK FLAGS AGAIN
4Ø64  1354          TAD     A1ØØ        /GOOD DF32 TEST.
4Ø65  6615          DEAL
4Ø66  72ØØ          CLA
4Ø67  6616          DEAC
4Ø7Ø  1362          TAD     AM1ØØ
4Ø71  764Ø          SZA CLA             /HOW ABOUT THE DF32 BEING THERE???
4Ø72  5766          JMP I   AIDONE      /ITS NOT THERE EITHER....
4Ø73  1373          TAD     ADF32       /POINTER TO THE DF32 ROUTINES
4Ø74  4313          JMS     IMOVE
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0167    4075  4767           JMS I   AISETD
0170    4076  0300           0                 /CALL TO SET UP THE SOURCE WORK AREA
0171    4077  4770           JMS I   AISETS
0172    4100  0070           70                /CHECK FOR TWO DISKS
0173    4101  1360           TAD     A1000
0174    4102  6615           DEAL
0175    4103  7200           CLA                        /READ BACK THE REGISTER
0176    4104  6616           DEAC                       /AND CHECK TO SEE IF OK
0177    4105  1363           TAD     AM1000
0200    4106  7640           SZA CLA                    /NOT THERE
0201    4107  5766           JMP I   AIDONE             /SET THE BINARY NOW
0202    4110  4771           JMS I   AISETB             /270 IS THE CORRECT INCREMENT.
0203    4111  0270           270                        /ALL IS WELL.
0204    4112  5766           JMP I   AIDONE
0205                 /
0206                 /
0207                 /
0210                 /
0211                 /
0212                 /
0213                 /
0214                 /
0215                 /
0216                 /
0217    4113  0000   IMOVE,  0                 /MOVES IN CORRECT CORE LOAD.
0220    4114  6201           CDF     0         /SELECT CALLING SEQUENCE.
0221    4115  6212           CIF     10        /ZAPPO
0222    4116  3321           DCA     IADD
0223    4117  4774           JMS I   AMOVE     /DO MOVE
0224    4120  6211           CDF     10        /SYSTEM DATA CRAP
0225    4121  0000   IADD,   0
0226    4122  6211           CDF     10        /TO SYSTEM AREA
0227    4123  7430           7430
0230    4124  0150           150               /COUNT
0231    4125  5713           JMP I   IMOVE     /RETURN TO CALLER
0232                 /
0233                 /
0234                 /
0235                 /
0236                 /
0237                 /
0240                 /
0241                 /
0242                 /
0243    4126  1353   IRF08,  TAD     A77       /CHECK TO SEE IF FIRST DISK IS THERE
0244    4127  4765           JMS I   AICHECK
0245    4130  1375           TAD     ARF08            /POINTER TO THE RF08 ROUTINES.
0246    4131  4313           JMS     IMOVE     /CALL IN THE MOVEPER TO SELECT RF08.
0247    4132  4767           JMS I   AISETD    /SET UP FOR DIAL SYSTEM
0250    4133  0300           300
0251    4134  4770           JMS I   AISETS    /SET FOR SOURCE
0252    4135  0370           370
0253    4136  4771           JMS I   AISETB    /SET FOR BINARY
0254    4137  0370           370               /ALSO 370
0255    4140  4772           JMS I   AISETU    /SET THE UNITS FOR 0 AND 1
0256    4141  1355           TAD     A177      /2 DISKS?
0257    4142  4765           JMS I   AICHECK
0260    4143  4772           JMS I   AISETU    /YEP
0261    4144  1356           TAD     A277      /3 DISKS?
0262    4145  4765           JMS I   AICHECK   /YEP
0263    4146  4772           JMS I   AISETU         IT UP
0264    4147  1357           TAD     A377      /FOUR DISKS?
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4252  6212          CIF     1Ø
4253  4772          JMS I   BWRITE        /CALL THE WRITE SUBROUTINE
4254  435Ø          ILOUTP                /POI[illegible] TO THE OUTPUT CONTROL
4255  1352          TAD     IB2
4256  1347          TAD     LTEN          /UPDATE IB2
4257  3352          DCA     IB2
426Ø  2373          ISZ     BM2Ø          /ALL DONE????
4261  5244          JMP     ILOOP         /NOPE. DO MORE
                /
                /
4262  6212  IIDONE, CIF     1Ø
4263  4772          JMS I   BWRITE        /REWRITE THE DIRECTORY NOW,
4264  4354          DSAVI                 /SAVE AREA ON THE DISK
4265  6212  IIDONR, CIF     1Ø            /RESET TO UPPER CORE LOCATIONS,
4266  5774          JMP I   BSYSBOT       /CALL THE SYSTEM BOOTSTRAP NOW
                /
                /
                /
                /
                /
                /
4267  ØØØØ  ISETD,  Ø
427Ø  62Ø1          CDF     Ø
4271  1667          TAD I   ISETD
4272  2267          ISZ     ISETD         /BOP UP RETURN
4273  6211          CDF     1Ø
4274  3763          DCA I   MSYSP2
4275  1375          TAD     B743Ø
4276  3762          DCA I   MSYSP1
4277  5667          JMP I   ISETD
                /
                /
                /
43ØØ  ØØØØ  ISETS,  Ø
43Ø1  62Ø1          CDF     Ø
43Ø2  17ØØ          TAD I   ISETS
43Ø3  23ØØ          ISZ     ISETS
43Ø4  6211          CDF     1Ø
43Ø5  3765          DCA I   MSYSP5
43Ø6  1375          TAD     B743Ø
43Ø7  3764          DCA I   MSYSP4
431Ø  57ØØ          JMP I   ISETS
                /
                /
                /
4311  ØØØØ  ISETB,  Ø
4312  62Ø1          CDF     Ø
4313  1711          TAD I   ISETB
4314  2311          ISZ     ISETB
4315  6211          CDF     1Ø
4316  3767          DCA I   MSYS1Ø
4317  1375          TAD     B743Ø
432Ø  3766          DCA I   MSYSP7
4321  5711          JMP I   ISETB
                /
                /
                /
                /
4322  ØØØØ  ISETU2, Ø
4323  6211          CDF     1Ø
4324  2376          ISZ     B7
4325  1376          TAD     B7
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4327  2377          ISZ     BDSYS
4330  1375          TAD     B743Ø
4331  3777          DCA I   BDSYS
4332  2377          ISZ     BDSYS
4333  3777          DCA I   BDSYS
4334  2377          ISZ     BDSYS
4335  724Ø          CLA CMA
4336  3777          DCA I   BDSYS
4337  5722          JMP I   ISETU2
            /
            /
            /
434Ø  ØØØØ  ISETU,  Ø
4341  4322          JMS     ISETU2          /BOP UP 1 UNIT
4342  4322          JMS     ISETU2          /BOP UP TWO UNITS
4343  574Ø          JMP I   ISETU           /RETURN TO CALLER
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4344  ØØØØ  ILINP,  Ø                       /UNIT
4345  ØØØØ          Ø                       /CORE LOC
4346  Ø3ØØ  IB1,    3ØØ                     /BLOCK N UMBER
4347  ØØ1Ø  LTEN,   1Ø                      /NUMBER OF BLOCKS TO READ IN
            /
            /
            /
            /
435Ø  Ø1ØØ  ILOUTP, 1ØØ                     /LOGICAL UNIT 1ØØ
4351  ØØØØ          Ø                       /CORE LOCATION Ø
4352  ØØØØ  IB2,    Ø
4353  ØØ1Ø          1Ø                      /WRITE OUT THE 1Ø RECORDS.
            /
            /
            /
            /
            /
            /
            /
            /
4354  Ø1ØØ  DSAVI,  1ØØ                     /INDEX POINTER CRAP.
4355  ØØ2Ø          2Ø
4356  ØØ46          46
4357  ØØØ2          2
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4360    6430    BRKØ8,   RKØ8
4361    4113    BIMOVE,  IMOVE
4362    7331    MSYSP1,  MSYS+1
4363    7332    MSYSP2,  MSYS+2
4364    7334    MSYSP4,  MSYS+4
4365    7335    MSYSP5,  MSYS+5
4366    7337    MSYSP7,  MSYS+7
4367    734Ø    MSYS1Ø,  MSYS+1Ø
                /
437Ø    Ø15Ø    BM763Ø,  -763Ø
4371    7774    BREAD,   READ
4372    7775    BWRITE,  WRITE
4373    776Ø    BM2Ø,    -2Ø
4374    7777    BSYSBOT,SYSBOT
4375    743Ø    B743Ø,   743Ø
4376    ØØØ7    B7,      7
4377    7341    BDSYS,   DSYS
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                          *6ØØØ                  /LOCATIONS FOR THE "NO" MESSAGE
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                  /
6ØØØ   ØØØØ               Ø                      /FOR JMPS IN LMODE
6ØØ1   ØØØØ       DX,     Ø                      /CONTAINS THE X VALUE FOR THE NO
6ØØ2   ØØØØ       DCHAR,  Ø                      /CONTAINS THE DISPLAY TABLE POINTERS FOR THE NO.
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        *643Ø
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/
        RKØ8=,                  /THE RKØ8 ROUTINES GO HERE,
/
/
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/
        *643Ø                   /ALL ROUTINES ARE ORIGINED AT 3Ø OF THE PAGE,
/
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/
        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
        DRWC=6752
        DLWC=6753
        DLCA=6755
        DRCA=6757
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                   /
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                   /
6430  0000  KREAD,  0                   /READ ENTRY POINT
6431  5236          JMP     KCOMM       /GO TO THE COMMON ENTRY PLACE
6432  0000  KWRITE, 0                   /WRITE ENTRY POINT
6433  1232          TAD     KWRITE      /SET UP A PHOONEY CALL
6434  3230          DCA     KREAD       /SAVE AWAY
6435  7305          CLA CLL IAC RAL     /+2 TO MAKE READ INSTRUCTION A WRITE INSTRUCTION.
                   /
6436  1365  KCOMM,  TAD     KOLDR       /GET THE READ IN THE AC
6437  3316          DCA     KOPR        /AND SAVE AWAY NOW.
6440  1630          TAD I   KREAD       /GET THE UNIT NOW.
6441  0361          AND     KL70        /JUST THE DEVICE BITS.
6442  7450          SNA                 /IS THE DEVICE 0?
6443  1252          TAD     KLPH10      /YEP, MAKE IT A 10 TYPE.
6444  1361          TAD     KL70        /SUBTRACT ONE FROM DEVICE NOW(10-47 BECOMES  0-37).
6445  0360          AND     KL30        /IGNORE CRAP BITS.
6446  7112          CLL RTR             /ROTATE TO RK08 CONTROLLER POSITION (9 & 10)
6447  3352          DCA     KLOC        /SAVE FOR A SECOND TILL WE LOAD THE CONTROLLER.
6450  4353          JMS     KFGET       /GET THE UNIT NOW
6451  7112          CLL RTR             /ROTATE TO BITS 0-2  OF THE AC.
6452  7012  KLPH10, RTR                 /INSTRUCTION AND PHOOONEY LITTERAL
6453  0363          AND     KL7400      /CHOP OFF STRAY BITS(LINC WAS 0 TO START WITH)
6454  3351          DCA     KTRACK      /AND NOW SAVE IN THE TRACK WORD
6455  1630          TAD I   KREAD       /GET THE CORE LOCATION NOW.
6456  7010          RAR                 /JUST GET THE FIELD BITS.
6457  0361          AND     KL70        /CHOP OFF THE OTHER CRAP.
6460  1352          TAD     KLOC        /NOW PUT IN THE UNIT NUMBER (0-3)
6461  6732          DLDC                /SEND OUT TO THE CONTROLLER NOW
6462  4353          JMS     KFGET       /REGET THE CORE LOCATION.
6463  7012          RTR
6464  7012          RTR                 /MAKE INTO A 7400 TYPE NUMBER
6465  7010          RAR
6466  0363          AND     KL7400      /CHOP OFF THE STRAY BITS
6467  1364          TAD     KL7777      /SUBTRACT ONE FOR THE CONTROLLER.
6470  3352          DCA     KLOC        /AND SAVE IN THE LOCATION POINTER
6471  4353          JMS     KFGET       /NOW GET THE BLOCK NUMBER.
6472  1351          TAD     KTRACK      /NOW ADD IN THE MAIN UNIT DESIGNATOR BITS
6473  3351          DCA     KTRACK      /AND RE-STORE BACK IN THE TRACK POINTER
6474  4353          JMS     KFGET       /GET THE NUMBER OF BLOCKS TO DO.
6475  7450          SNA                 /SEE IF ITS ZERO.
6476  5630          JMP I   KREAD       /IF ITS ZERO, THEN EXIT, ALL IS WELL
6477  7041          CIA                 /NEGATE IT NOW
6500  3350          DCA     KCOUNT      /NOW STORE AWAY IN THE COUNTER LOC.
6501  5306          JMP     KERR        /NOW SET UP THE W.C. AND C.A.  AND START OPR GOING
                   /
6502  1352  KNEXT,  TAD     KLOC        /GET NEXT RECORD. GET THE LAST LOC.
6503  1362          TAD     KL400       /ADD 400 TO BOP TO THE NEXT CORE SECTOR
6504  3352          DCA     KLOC        /AND NOW STASH AWAY.
6505  2351          ISZ     KTRACK      /ALSO BOP UP THE TRACK ADDRESS BY 1.
                   /
6506  7240  KERR,   CLA CMA             /SET THE AC TO ALL ONES TO CLEAR
6507  6742          DCLS                /THE DISK STATUS REGISTER
6510  7200          CLA                 /CLEAR THE AC BECAUSE DCLS DOESNT
6511  1352          TAD     KLOC        /GET THE LOCATION IN THE AC.
6512  6755          DLCA                /AND SEND TO THE CONTROLLER NOW
6513  1363          TAD     KL7400      /SET THE AC TO -400
6514  6753          DLWC                /AND SEND TO THE CONTROLLER AS THE WORD COUNT
6515  1351          TAD     KTRACK        W GET THE TRACK AND SECTOR IN THE AC.
                   /
6516  0000  KOPR,   0                   /NOW DO THE CORRECT DISK OPERATION
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6517  6745            DSKC              /WAIT FOR COMPLETION NOW.
6520  7410            SKP               /SKIP IF NOT DONE
6521  5345            JMP      KEND     /IF [illegible] TEST WHETHER MORE RECORDS TO GO
6522  6747            DSKE              /IS THERE AN ERROR FLAG UP????
6523  5317            JMP      .-4      /NOPE. WAIT FOR EITHER COMPLETION OR ERROR FLAG.
                /
6524  6741  KUGH,     DRDS              /READ IN THE STATUS WORD IF ERROR OCCURED.
6525  7402            HLT               /BRING CPU TO A GRINDING HALT.
6526  7604            LAS               /READ IN THE KEYS NOW.
6527  3232            DCA      KWRITE   /SAVE THE KEYS FOR A SECOND
6530  7240            CLA CMA           /NOW PREPARE TO CLEAR THE STATUS REGISTER
6531  6742            DCLS              /CLEAR THE STATUS REGISTER
6532  7200            CLA               /CLEAR THE AC TO BE SURE
6533  6751            DCLA              /ZAP THE DISK OVER, JUST IN CASE.
6534  6747            DSKE              /IS THE ERROR FLAG UP AGAIN?             JMS myclock
6535  7410            SKP               /NOPE. TEST COMPLETION FLAG.
6536  5324            JMP      KUGH     /ERROR FLAG UP, GIVE ERROR AGAIN.
6537  6745            DSKC              /COMPLETION FLAG UP.
6540  5334            JMP      .-4      /NOPE. WAIT AROUND.        JMS myclock
6541  1232            TAD      KWRITE   /NOW RETRIVE THE KEYS.
6542  7040            CMA               /COMPLEMENT THE KEYS NOW.
6543  7640            SZA CLA           /ACCEPT????                      Return to .-4
6544  5306            JMP      KERR     /NOPE. RETRY THIS BLOCK NOW.
                /
                /
                /
                /
                /
6545  2350  KEND,     ISZ      KCOUNT   /BOP UP THE COUNTER.
6546  5302            JMP      KNEXT    /NOT DONE. GET THE NEXT RECORD.
6547  5630            JMP I    KREAD    /FINISHED. RETURN TO THE CALLER
                /
                /
                /
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                /
                /
6550  0000  KCOUNT,  0                 /CONTAINS -NUMBER OF RECORDS TOGO
6551  0000  KTRACK,  0                 /CONTAINS CURRECT TRACK AND SECTOR.
6552  0000  KLOC,    0                 /CONTAINS CURRENT LOC-1 BEING USED.
                /
                /
                /
                /
                /
6553  0000  KFGET,   0
6554  1630            TAD I    KREAD    /GET THE ARGUMENT NOW
6555  2230            ISZ      KREAD    /PUSH TO NEXT ARGUMENT
6556  5753            JMP I    KFGET    /RETURN TO THE CALLER.
                /
                /
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                /
6557  0007  KL7,     7
6560  0030  KL30,    30
6561  0070  KL70,    70
6562  0400  KL400,   400
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6564  7777  KL7777, 7777
              /
6565  6733  KDLDR,  DLDR
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6630  0000  DRREAD, 0                          /DF32 READ-WRITE ROUTINES.
6631  5236          JMP     DR1                /INTO MAIN PROCESSOR
6632  0000  DRWRIT, 0                          /WRITE ENTRY POINT
6633  1232          TAD     DRWRIT
6634  3230          DCA     DRREAD             /SET UP ARG GETTER
6635  7326          CLA CLL CML RTL            /+2
6636  1327  DR1,    TAD     DRMAR              /ADD IN READ INSTRUCTION.
6637  3303          DCA     DROPR              /SAVE THE CORRECT INSTRUCTION.
6640  6601  DRLOOP, DCMA                       /CLEAR THE STATUS REGISTER
6641  2230          ISZ     DRREAD             /UNT MEANINGLESS FOR DF32S
6642  1630          TAD I   DRREAD             /GET THE CORE LOCATION
6643  7010          RAR                        /SHIFT OVER 1 PLACE
6644  0330          AND     DRL70              /ZAP OUT CRAP
6645  3232          DCA     DRWRIT             /AND SAVE AWAY FOR NOW.
6646  6224          RIF                        /GET THIS FIELD
6647  1253          TAD     DRCDF              /ADD IN A CDF 0
6650  3333          DCA     DRXCDF             /NOW STORE FIELD RESTORE INSTRUCTION.
6651  1630          TAD I   DRREAD             /REGET THE CORE LOCATION
6652  4335          JMS     DRRTR              /ROR 5 AND AND WITH 7400.
6653  6201  DRCDF,  CDF     0                  /SET TO SETUP DATA BREAK LOACATIONS
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6655 7Ø4Ø           CMA                 /SUBTRACT 1 FOR A GOOD LOCATION
6656 3745           DCA I   DRMAD       /STORE AWAY FOR NOW
6657 4332           JMS     DRXX        /RESET TO THIS DATA FIELD
666Ø 223Ø           ISZ     DRREAD      /UP UP TO BLOCK NUMBER
6661 163Ø           TAD I   DRREAD      /GET THE BLOCK NUMBER
6662 7ØØ6           RTL                 /ROTATE TO BITS 1-5 OF THE AC
6663 Ø346           AND     DRL37ØØ     /AND OUT CRAP
6664 1232           TAD     DRWRIT      /ADD IN MEMORY FIELD
6665 6615           DEAL                /SEND TO COMTROLLER,
6666 72ØØ           CLA
6667 163Ø           TAD I   DRREAD      /GET THE BLOCK NUMBER AGAIN
667Ø 4335           JMS     DRRTR       /INTO 74ØØS BITS
6671 3232           DCA     DRWRIT      /AND SAVE FOR THE DROPR
6672 223Ø           ISZ     DRREAD      /BOP TO NUMBER OF RECS,
6673 163Ø           TAD I   DRREAD      /GET THE NUMBER OF RECS,
6674 223Ø           ISZ     DRREAD      /BOP PAST THE CRAP FOR RETRUN
6675 4335           JMS     DRRTR       /ROTATE INTO 74ØØS BITS
6676 62Ø1           CDF     Ø           /SET TO Ø FOR DATA BREAK
6677 7Ø41           CIA                 /NEGATE
67ØØ 3744           DCA I   DRMWC       /DATA BREAK SET UP NOW
67Ø1 4332           JMS     DRXX        /RESTORE THIS FIELD
67Ø2 1232           TAD     DRWRIT      /GET LOW ORDER BITS OF BLOCK NUMBER
67Ø3 ØØØØ   DROPR,  Ø                   /XEC. DISK INSTRUCTION
67Ø4 72ØØ           CLA
67Ø5 6621           DFSE
67Ø6 5314           JMP     DRERR       /WAIT FOR DONE OR ERROR FLAG,
67Ø7 6622           DFSC
671Ø 53Ø5           JMP     .-3         /HANG AROUND FOR A WHILE,
6711 6621           DFSE                /CHECK ERROR FLAG TO BE SURE
6712 5314           JMP     DRERR       /ERROR!
6713 5352           JMP     DRCLRF      /EXIT, ALL IS WELL
            /
            /
6714 6616   DRERR,  DEAC                /READ IN THE ERROR REG,
6715 74Ø2           HLT                 /HALT NOW,
6716 76Ø4           LAS                 /GET HIS REQUEST,
6717 7Ø4Ø           CMA                 /NEGATE FOR TEST
672Ø 765Ø           SNA CLA
6721 5352           JMP     DRCLRF      /EXIT NOW
6722 73Ø7           CLA CLL IAC RTL     /+4
6723 7Ø41           CIA                 /-4
6724 123Ø           TAD     DRREAD      /RESET ARG POINTER
6725 323Ø           DCA     DRREAD      /NOW
6726 524Ø           JMP     DRLOOP      /AND TRY AGAIN,
            /
            /
            /
            /
6727 66Ø3   DRMAR,  DMAR
673Ø ØØ7Ø   DRL7Ø,  7Ø
6731 Ø3ØØ   DRL3ØØ, 3ØØ
6732 ØØØØ   DRXX,   Ø
6733 ØØØØ   DRXCDF, Ø
6734 5732           JMP I   DRXX
            /
6735 ØØØØ   DRRTR,  Ø
6736 7Ø12           RTR
6737 7Ø12           RTR
674Ø 7Ø1Ø           RAR
6741 Ø343           AND     DRL74ØØ
6742 5735           JMP I   DRRTR
            /
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6744  7750  DRMWC,  7750
6745  7751  DRMAD,  7751
6746  3700  DRL3700,3700
            /
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            /
            /
                    *,&7600+152             /ORIGIN PASS DATA BREAK LOCATIONS.
            /
            /
            /
6752  6601  DRCLRF, DCMA                    /CLEAR DF32 FLAGS IN CASE HE"S USING INTERUPTS.
6753  6601          DCMA                    /YOU REALLY NEED TWO OF THEM.
6754  5630          JMP I   DRREAD          /AND RETURN.
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      7ØØØ  72ØØ   MAIN,  CLA                     /CLEAR THE AC TO BE SURE
      7ØØ1  6ØØ2          IOF                     /TURN OFF INTERUPTS IN CASE WE"RE IN FOCAL 12.
      7ØØ2  6214          RDF                     /GET THE CALLING FIELD
      7ØØ3  1336          TAD     LCDF            /ADD IN THE BASE CDF
      7ØØ4  3334          DCA     RCDF            /AND SAVE AWAY
      7ØØ5  6224          RIF                     /READ IN THIS FIELD
      7ØØ6  1336          TAD     LCDF            /AND SET UP THIS DATA FIELD CHANGE
      7ØØ7  3331          DCA     TCDF            /STASH AWAY.
      7Ø1Ø  3321          DCA     CBLOCK          /CLEAR THE REQUEST WORD
      7Ø11  433Ø          JMS     STCDF           /SET DATA FIELD TO THIS FIELD
      7Ø12  1737          TAD I   MREAD           /GET THE READ ADDRESS
      7Ø13  745Ø          SNA                     /WAS IT A READ?
      7Ø14  2321          ISZ     CBLOCK          /NOPE. A WRITE. SET UP CALLING ADDRESS
      7Ø15  174Ø          TAD I   MWRITE          /ADD IN WRITE CALL LOCATION.
      7Ø16  3343          DCA     MRETL           /AND STASH AWAY.
      7Ø17  3737          DCA I   MREAD           /CLEAR THE READ LOCATION
      7Ø2Ø  374Ø          DCA I   MWRITE          /AND THE WRITE LOCATION FOR NEXT TIME THROUGH
      7Ø21  1341          TAD     PTABLE          /GET THE POINTER TO THE UNITS TABLE.
      7Ø22  3342          DCA     TEMP            /AND SAVE AWAY IN A TEMPRARY.
      7Ø23  4333          JMS     SRCDF           /SET TO CALLERS FIELD
      7Ø24  1743          TAD I   MRETL           /GET THE START OF CALLERS ARGUEMENTS.
      7Ø25  3344          DCA     MCALL           /STASH AWAY
      7Ø26  2343          ISZ     MRETL           /AND BOP UP FOR THE RETURN
      7Ø27  1744          TAD I   MCALL           /GET THE USERS UNIT NOW.
      7Ø3Ø  1353          TAD     M2Ø             /IS IT GREATER OR EQUAL TO 2Ø?
      7Ø31  751Ø          SPA
      7Ø32  5241          JMP     LESS2Ø          /NOPE. ITS LESS THEN 2Ø.
      7Ø33  1354          TAD     M3Ø             /IS IT GREATER OR EQUAL TO 5Ø?
      7Ø34  75ØØ          SMA
      7Ø35  524Ø          JMP     GRAT5Ø          /BIGGER THEN 47.
      7Ø36  Ø346          AND     L7              /ITS BETWEEN 2Ø AND 47, AN EXTENDED UNIT, GET
      7Ø37  1355          TAD     M4Ø             /THE UNITS BITS AND MAKE INTO 1X TYPE NUMBER
      7Ø4Ø  135Ø   GRAT5Ø, TAD    L3Ø             /MAKE BACK  INTO ORGINAL NUMBER NOW.
      7Ø41  1347   LESS2Ø, TAD    L2Ø             /DEPENDING ON WHERE RANGE OCCURED.
      7Ø42  3317          DCA     CUNIT           /AND STASH AWAY NOW FOR THE TEST.
      7Ø43  433Ø          JMS     STCDF           /SET TO THIS CDF
                   /
                   /
                   /
      7Ø44  1742   MLOOP,  TAD I   TEMP           /GET NEXT UNIT ON TABLE
      7Ø45  751Ø           SPA                    /MINUS=END OF LIST???
      7Ø46  5257           JMP     MNOT           /UNIT NOT THERE
      7Ø47  7Ø41           CIA
      7Ø5Ø  1317           TAD     CUNIT          /GET THE CALLING UNIT
      7Ø51  765Ø           SNA CLA                /A MATCH???
      7Ø52  5264           JMP     MTRUE          /SURE IS
      7Ø53  7325           CLA!CLL IAC CML RAL    /+3
      7Ø54  1342           TAD     TEMP           /BOP TO NEXT ENTRY ON TABLE
      7Ø55  3342           DCA     TEMP           /AND PLACE BACK
      7Ø56  5244           JMP     MLOOP          /GO TRY THIS ONE.
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7Ø57   6141       MNOT,    LINC                          /GET OVER INTO SUPER MODE
                           LMODE
1Ø6Ø   1Ø2Ø                LDA I
1Ø61   Ø2ØØ                2ØØ                           /SET FOR FULL SIZE LETTERS
1Ø62   ØØØ4                ESF                           /ZAP IT OUT NOW
1Ø63   74ØØ                JMP       MNL                 /NOW DISPLAY IT, BABY,
                  /
                  /
                  /
                  /
                           PMODE
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7064  2342  MTRUE,  ISZ     TEMP            /PUSH PAST TO NEXT ITEM
7065  1321          TAD     CBLOCK          /GET WHETER READ OR WRITE(Ø OR 1)
7066  7104          CLL RAL                 /MAKE IT A TWO
7067  1742          TAD I   TEMP            /GET THE CORRECT ROUTINE ADDRESS
7070  3751          DCA I   L777Ø           /STORE IN 777Ø
7071  2342          ISZ     TEMP            /PUSH PAST THE CRAP
7072  1742          TAD I   TEMP            /GET THE FUDGE FACTOR
7073  3752          DCA I   L7771           /AND STORE AWAY
7074  1751          TAD I   L777Ø           /REGET THE ROUTINE ADDRESS
7075  3342          DCA     TEMP            /SAVE IN TEMP FOR NOW,
7076  4333          JMS     SRCDF           /SET TO CALLERS CDF
7077  1744          TAD I   MCALL           /REGET THE USERS UNIT NOW,
71ØØ  3317          DCA     CUNIT           /AND STASH AWAY,
71Ø1  2344          ISZ     MCALL           /PUSH TO CORE LOC
71Ø2  1744          TAD I   MCALL           /GET THE CORE LOC
71Ø3  332Ø          DCA     CCORE           /AND STASH AWAY
71Ø4  2344          ISZ     MCALL           /GET TO BLOCK NUMBER
71Ø5  433Ø          JMS     STCDF           /SET TO THIS DATA FIELD
71Ø6  1752          TAD I   L7771           /RECALL THE FUDGE FACTOR
71Ø7  4333          JMS     SRCDF           /SET TO CALLERS LOC
711Ø  1744          TAD I   MCALL           /ADD IN USERS BLOCK NUMBER
7111  3321          DCA     CBLOCK          /NOW SAVE AWAY
7112  2344          ISZ     MCALL           /BOP TO NEXT ONE
7113  1744          TAD I   MCALL
7114  3322          DCA     CNUM            /SAVE THE NUMBER OF BLOCKS NOW,
7115  433Ø          JMS     STCDF           /SET TO THIS CDF
7116  4742          JMS I   TEMP            /CALL THE CORRECT ROUTINE NOW,
7117  ØØØØ  CUNIT,  Ø
712Ø  ØØØØ  CCORE,  Ø
7121  ØØØØ  CBLOCK, Ø
7122  ØØØØ  CNUM,   Ø
7123  73Ø5          CLA CLL IAC RAL         /+2 IN THE AC,
7124  1334          TAD     RCDF            /ADD IN USERS CDF TO MAKE   CIF CDF USERSFIELD
7125  3326          DCA     .+1             /SET UP RETURN CRAP
7126  ØØØØ          Ø
7127  5743          JMP I   MRETL           /RETURN TO CALLER
                /
                /
                /
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                /
                /
                /
                /
713Ø  ØØØØ  STCDF,  Ø
7131  ØØØØ  TCDF,   Ø                       /SET TO THIS DATA FIELD
7132  573Ø          JMP I   STCDF           /RETURN
                /
                /
                /
7133  ØØØØ  SRCDF,  Ø
7134  ØØØØ  RCDF,   Ø                       /SET TO USERS DATA FIELD
7135  5733          JMP I   SRCDF              TURN TO THE CALLER
                /
                /
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                  /
7136  6201  LCDF,    CDF
7137  7774  MREAD,   7774
7140  7775  MWRITE,  7775
7141  7300  PTABLE,  MTABLE
7142  ØØØØ  TEMP,    Ø
7143  ØØØØ  MRETL,   Ø
7144  ØØØØ  MCALL,   Ø
7145  ØØØ6  L6,      6
7146  ØØØ7  L7,      7
7147  ØØ2Ø  L2Ø,     2Ø
715Ø  ØØ3Ø  L3Ø,     3Ø
7151  777Ø  L777Ø,   777Ø
7152  7771  L7771,   7771
7153  776Ø  M2Ø,     -2Ø
7154  775Ø  M3Ø,     -3Ø
7155  774Ø  M4Ø,     -4Ø
            /
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            /
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            /
            /
                     LMODE                  /TELL ASSY WE ARE IN LINC MODE WHEN WE GET HERE
            /
            /
            /
            /
1156  ØØØ2  BOOTER,  PDP                    /GET OVER INTO THE GOOD MODE.
                     PMODE
7157  Ø345           AND     L6             /SEE WHAT THE AC CONTAINS.
716Ø  765Ø           SNA CLA                /BITS 9 OR 1Ø ON?
7161  5365           JMP     RKØ8OK         /NOPE. DISK IS OK. ALL IS WELL.
7162  6751           DCLA                   /DISK WAS ON WRONG DRIVE. REPOSITION NOW.
7163  6745           DSKC                   /AND WAIT FOR IT,BABY
7164  5363           JMP     .-1            /HO HUM
7165  374Ø  RKØ8OK,  DCA I   MWRITE         /ZAP OUT THE WRITE ENTRY IN CASE ROUTINES BOMBED.
7166  4737           JMS I   MREAD          /CALL THE READ ROUTINE
7167  7174           DPBOOT                 /POINTER TO BOOTSRAP INFO
717Ø  6141           LINC
                     LMODE                  /GET OVER INTO LINC MODE
1171  Ø643           LDF     3
1172  Ø6Ø2           LIF     2              /SET TO DO STANDARD CALL
1173  6Ø21           JMP     4Ø21           /JMP TO SYSTEM RESTART LOCATION.
            /
            /
                     PMODE                  /GET BACK INTO 8 MODE
            /
            /
            /
            /
7174  Ø1ØØ  DPBOOT,  DIALUNIT
7175  ØØ1Ø           DIALCORE
7176  ØØØØ           DIALBLOCK
7177  ØØ1Ø           DIALNUMBER
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2124            /
2125            /
2126            /
2127            /
2130            /
2131            /
2132            /
2133            /
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2143            /
2144                    EJECT
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72ØØ  ØØØØ  MOVE,   Ø                       /THIS ROUTINE MOVES MEMORY LOCATIONS IN CORE.
72Ø1  72ØØ          CLA                     /CLEAR TO BE SURE.
72Ø2  4236          JMS     SWGET           /GET THE STARTING DATA FIELD
72Ø3  3222          DCA     SWIN            /AND SAVE AWAY
72Ø4  4236          JMS     SWGET           /GET THE STARTING LOC
72Ø5  3244          DCA     SWLIN           /AND SAVE IT
72Ø6  4236          JMS     SWGET           /GET THE TO DATA FILED
72Ø7  3224          DCA     SWOUT           /AND SAVE IT
721Ø  4236          JMS     SWGET           /GET THE TWO LOC
7211  3245          DCA     SWLOUT          /AND SAVE IT.
7212  6214          RDF                     /GET THE CALLING DATA FIELD
7213  1246          TAD     SLCDF           /SAVE RETURN
7214  3234          DCA     SWRET
7215  4236          JMS     SWGET           /GET THE AMOUNT
7216  745Ø          SNA
7217  5234          JMP     SWRET           /NO GOOD. RETURN TO CALLER
722Ø  7Ø41          CIA
7221  3236          DCA     SWGET           /SAVE AWAY
7222  ØØØØ  SWIN,   Ø                       /SET INPUT DATA FIELD
7223  1644          TAD I   SWLIN           /GET INPUT DATA
7224  ØØØØ  SWOUT,  Ø                       /SET TO OTHER MOVE FIELD
7225  3645          DCA I   SWLOUT          /SAVE IT AWAY
7226  2245          ISZ     SWLOUT          /INCREMENT TO LOCS.
7227  7ØØØ          NOP
723Ø  2244          ISZ     SWLIN           /INPUT TOO
7231  7ØØØ          NOP
7232  2236          ISZ     SWGET           /DONE.
7233  5222          JMP     SWIN            /NOPE. GO BACK UP NOW.
7234  ØØØØ  SWRET,  Ø
7235  56ØØ          JMP I   MOVE            /RETURN TO THE CALLER
                  /
                  /
                  /
                  /
7236  ØØØØ  SWGET,  Ø
7237  16ØØ          TAD I   MOVE
724Ø  22ØØ          ISZ     MOVE
7241  5636          JMP I   SWGET
                  /
                  /
                  /
7242  ØØØØ  SWTMP1, Ø
7243  ØØØØ  SWTMP2, Ø
7244  ØØØØ  SWLIN,  Ø
7245  ØØØØ  SWLOUT, Ø
7246  62Ø3  SLCDF,  CDF CIF
                  /
                  /
                  /
                  /
                  /
7247  3Ø77  DTABLE, 3Ø77                    /THE "NO" MESSAGF
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7251  ØØØØ          ØØØØ                        /THE SPACE BETWEEN THE N AND THE O
7252  4177          4177
7253  7741          7741                        /END OF THE "NO" MESSAGE
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                    LMODE
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1254  1Ø2Ø   CHECKF, LDA I                      /GET THE I-O PRESET CODE INTO THE AC
1255  ØØ2Ø          2Ø
1256  ØØØ4          ESF                         /DEVICES SHOULD BE CLEAR NOW BECAUSE OF THE I-O PRESET,
1257  ØØ11          CLR                         /GET RID OF THE CODE NOW,
126Ø  Ø647          LDF     7                   /AND SET DATA FIELD TO BE SURE,
1261  Ø5ØØ          IOB                         /NOW READ IN THE INSTRUCTION FIELD
                    PMODE
7262  6224          RIF
                    LMODE                       /BACK INTO LMODE NOW,
1263  142Ø          SHD I
1264  1616          1616                        /IS IT OK(I,F,=7)
1265  7272          JMP     CHBOOT              /YEP, NORMAL REBOOTSTRAP
1266  Ø7ØØ          RDC                         /THE I/O ROUTINES NOW,
1267  6322          6\SETUP1
127Ø  Ø7ØØ          RDC
1271  7323          7\SETUP2
             /
             /
1272  Ø6Ø7   CHBOOT, LIF     7                  /SET THE I,F, TO 7 FOR REBOOTSTRAP,
1273  1ØØØ          LDA                         /NOW GET THE OLD RKØ8 STATUS INTO THE AC,
1274  ØØØ1          DX&1777                     /BEFORE WE GO UP TO THE ROUTINES,
1275  7156          JMP     BOOTER              /DO THE BOOT NOW,
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                    PMODE
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                        *7300                   /THIS IS WHERE THE UNIT TABLE RESIDES.
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 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    MSYS,   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    DSYS,   7777                    /START OF DISK UNITS OR END OF TABLE
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                            LMODE
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      14ØØ  ØØ61    MNL,    SET I   DX&1777         /SET THE HORIZONTAL POINTER TO THE CENTER OF SCRREN
      14Ø1  Ø36Ø            36Ø
      14Ø2  ØØ62            SET I   DCHAR&1777      /SET CHARACTER POINTER TO POINT TO THE "NO" CHARS.
      14Ø3  1246            DTABLE-1&1777           /WHERE THEY ARE IN MEMORY
      14Ø4  ØØ11            CLR                     /CLEAR THE AC TO SET THE VERTICAL TO ZERO.
      14Ø5  1762            DSC I   DCHAR&1777      /DISPALY A CHARACTER NOW.
      14Ø6  1762            DSC I   DCHAR&1777      /AND ANOTHER UNITL THE NO IS DISPLAYED.
      14Ø7  1762            DSC I   DCHAR&1777
      141Ø  1762            DSC I   DCHAR&1777
      1411  1762            DSC I   DCHAR&1777      /THE NO IS DONE NOW.
                    /
      1412  Ø415            KST                     /NOW SEE IF A CHARACTER HAS BEEN TYPED.
      1413  74ØØ            JMP     MNL             /NOPE. LOOP!
      1414  Ø5ØØ            IOB                     /READ IN THE CHARACTER NOW.
                            PMODE
      7415  6Ø36            KRB
                            LMODE
      1416  146Ø            SAE I                   /IS A C.R.
      1417  Ø215            215
      142Ø  74ØØ            JMP     MNL             /NOPE. LOOP.
      1421  Ø456            SKP                     /SKIP PAST BOOT ENTRY.
                    /
                            PMODE
                    /
      7422  6141    BOOTCK, LINC                    /GET OVER INTO SUPER MODE<?>
                            LMODE
                    /
      1423  ØØ11            CLR                     /CLEAR THE AC TO BE SURE.
      1424  Ø5ØØ            IOB
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1426  4001          STC     DX&1777          /AND SAVE FOR A SECOND,
1427  7254          JMP     CHECKF           /AND NOW GO DO THE REBOOTSTRAP,
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                        PMODE
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/               DISK DEFINITIONS (DF32-RFØ8)
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/
        DCMA=66Ø1
        DMAR=66Ø3
        DMAW=66Ø5
        DCEA=6611
        DSAC=6612
        DEAL=6615
        DEAC=6616
        DFSE=6621
        DISK=6623
        DIML=6615
        DFSC=6622
        DIMA=6616
        DMAC=6626
        DMMT=6646
        DCXA=6641
        DXAL=6643
        DXAC=6645
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/
        RFØ8=.                  /DEFINE THE RFØ8 LOCATIONS.
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                          /
                                  *7430                                /MAIN DISK THINGS,
                          /
                          /
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                          /
        7430    0000    DFREAD, 0                                      /RF08 READ ENTRY
        7431    5236            JMP     DFR1                    /GO TO THE MAIN READ ENTRY
        7432    0000    DFWRIT, 0                               /MAIN RF08 WRITE ENTRY
        7433    1232            TAD     DFWRIT                  /GET THE WRITE ENTRY
        7434    3230            DCA     DFREAD                  /AND SAVE IN THE READ ENTRY FOR EASY ARG PICKING UP,
        7435    7326            CLA CLL CML RTL                 /+2 IN THE AC,
        7436    1341    DFR1,   TAD     DFMAR                   /GET THE READ INSTRUCTION (DMAR)
        7437    3307            DCA     DFOPR                   /AND SAVE IT FOR LATER
        7440    6601    DFLOOP, DCMA                            /ERROR REENTRY POINT, CLEAR DISK STATUS,
        7441    4342            JMS     DFGET                   /GET THE FIRST ARGUEMENT(THE UNIT NUMBER)
        7442    7106            CLL RTL
        7443    7004            RAL                             /ROTATE INTO BITS 6-8
        7444    0360            AND     DFL70                   /AND OUT UNIT BITS NOW
        7445    7106            CLL RTL                         /FINISH ROTATING NOW,
        7446    6643            DXAL                            /AND SEND TO CONTROLLER,
        7447    1630            TAD I   DFREAD                  /GET THE CORE LOCATION,
        7450    7010            RAR                             /RORTATE RIGHT ONE PLACE,
        7451    0360            AND     DFL70                   /JUST MAKE IT BITS 6-8 FOR MEMORY FIELD REF,
        7452    6615            DIML                            /AND SEND IT OUT,
        7453    6224            RIF                             /READ IN THE PRESENT FIELD NOW FOR REFERENCE,
        7454    1262            TAD     DFCDF                   /ADD IN A CDF Ø
        7455    3362            DCA     DFXCDF                  /SAVE FOR RESTORING THIS DATA FIELD,
        7456    4342            JMS     DFGET                   /GET THE CORE LOC AGAIN AND BOP ARG GETTER
        7457    4352            JMS     DFRTR                   /ROTATE DISK BITS AROUND,
        7460    7041            CIA
        7461    7040            CMA                             /SUBTRACT ONE FOR 3 CYCLE DATA BREAK
        7462    6201    DFCDF,  CDF     Ø                       /SET DATA FIELD TO Ø FOR SETTING UP 3 CYCLE BREAK
        7463    3746            DCA I   DFMAD                   /SAVE IN MEMORY ADDRESS,
        7464    4361            JMS     DFXX                    /RESET TO THIS FIELD
        7465    6645            DXAC                            /READ IN THE DISK REGISTER
        7466    3232            DCA     DFWRIT                  /SAVE IN A TEMP FOR A SECOND
        7467    1630            TAD I   DFREAD                  /GET THE BLOCK NUMBER NOW
        7470    7012            RTR
        7471    7012            RTR
        7472    0365            AND     DFL377                  /JUST NECESSARY BITS,
        7473    1232            TAD     DFWRIT                  /RECALL THE OLD DISK BLOCK NUMBER
        7474    6643            DXAL                            /NOW TELL DISK FULL EXTENSDED REGISTER,
        7475    4342            JMS     DFGET                   /NOW GET THE BLOCK NUMBER AND BOP
        7476    4352            JMS     DFRTR                   /ROTATE 5 RIGHT AND ANDJ,
        7477    3232            DCA     DFWRIT                  /AND SAVE AWAY TILL DFOPR
        7500    4342            JMS     DFGET                   /FINALLY GET THE NUMBER OF RECORDS
        7501    4352            JMS     DFRTR                   /ROTATE 5 RIGHT AND AND OUT,
        7502    7041            CIA
        7503    6201            CDF     Ø                       /SET TO STORE IN WORD COUNT
        7504    3767            DCA I   DFMWC                   /SAVE AWAY NOW
        7505    4361            JMS     DFXX                    /RESTORE THIS DATA FIELD
        7506    1232            TAD     DFWRIT                  /RECALL THE LOWER BITS OF BLOCK NUMBER
        7507    0000    DFOPR,  Ø                               /START THE DISK MOVING,BABY!!!
        7510    6623            DISK                            /WAIT FOR EVENT TO HAPPEN
        7511    5310            JMP     .-1                     /ALL DONE,...,
        7512    6621            DFSE                            /HOW ABOUT AN ERROR,
        7513    5630            JMP I   DFREAD                  /NO ERROR, RETURN
        7514    6616            DIMA                            /READ IN THE PROCESSOR STATUS REGISTER,
        7515    0366            AND     DFL1003                 /JUST LEAVE IN VARIOUS ERROR BITS.
        7516    7112            CLL RTR                         /ROTATE NXD STATUS INTO LINK
        7517    7640            SZA CLA                         /NXD SHOULD BE ONLY BITS ON,
```

JMS DCHECK
where DCHECK
RETURNS TO .-1

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7521  6201             CDF     0          /PREPARE TO REGET THE WORD COUNT.
7522  1767             TAD I   DFMWC      /WEVE GOT IT,
7523  4361             JMS     DFXX       /RESET TO THIS DATA FIELD.
7524  7650             SNA CLA            /TEST STATUS
7525  5630             JMP I   DFREAD     /ITS CLEAR, ALL IS WELL , RETURN TO CALLER.
7526  6616  DFBAD1,    DIMA               /REREAD IN STATUS
7527  7402             HLT                /HALT WITH THE ERROR IN THE AC,
7530  7604             LAS                /READ THE SWITCHES,
7531  7040             CMA                /NEGATE
7532  7650             SNA CLA            /ACCEPT OR RETRY [7777=ACCPET, ANYTHING ELSE=RETRY]
7533  5630             JMP I   DFREAD     /ITS ACCEPTED, RETURN,
7534  7307             CLA CLL IAC RTL    /+4 IN THE AC
7535  7041             CIA                /MAKE IT A -4
7536  1230             TAD     DFREAD     /BACK UP PAST THE ARGS,
7537  3230             DCA     DFREAD     /SO THAT RETRY WILL WORK,
7540  5240             JMP     DFLOOP     /TRY AGAIN.
            /
            /
            /
            /
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            /
7541  6603  DFMAR,     DMAR               /READ INSTRUCTION
7542  0000  DFGET,     0                  /GETS AN ARGUEMENT AND BOPS
7543  1630             TAD I   DFREAD
7544  2230             ISZ     DFREAD
7545  5742             JMP I   DFGET      /RETURN TO CALLER
7546  7751  DFMAD,     7751               /THE ADDRESS
            /
            /
            /
                       *7552              /PAST THE DATA BREAK LOACTIONS.
            /
            /
            /
            /
            /
7552  0000  DFRTR,     0
7553  7012             RTR
7554  7012             RTR
7555  7010             RAR                /THIS ROUTINE TAKES BITS 8-11 AND
7556  0364             AND     DFL7400    /PLACES THEM IN BITS 0-3 OF THE AC,
7557  5752             JMP I   DFRTR      /RETURN TO CALLER,
7560  0070  DFL70,     70
7561  0000  DFXX,      0
7562  0000  DFXCDF,    0
7563  5761             JMP I   DFXX
7564  7400  DFL7400,7400
7565  0377  DFL377,    377
7566  1003  DFL1003,1003
7567  7750  DFMWC,     7750               /THE WORD COUNT POINTER,
            /
            /
            /
            /
            /
            /
            /
            /
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                      /
                      /
                              *7570                    /SYSCOM AREA FOR THESE ROUTINES,
                      /
                      /
                      /
      7570   0000             0
      7571   0000             0
      7572   7000             MAIN
      7573   7422             BOOTCK
      7574   0000             0
      7575   0000             0
      7576   5772             JMP I    .-4
      7577   5773             JMP I    .-4
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        76ØØ  1227  SYSLOD, TAD     TPOINT          /GET THE NEXT BIT LOAD MAP WORD
        76Ø1  745Ø          SNA                     /ALL DONE????
        76Ø2  5217          JMP     SYSGO           /YEP, GO TO HEADER START-UP OF PROG,
        76Ø3  71Ø4          CLL RAL                 /ROTATE BIT INTO LINC
        76Ø4  3227          DCA     TPOINT          /SET UP TPOINT FOR THE NEXT BLOCK,
        76Ø5  742Ø          SNL                     /WAS THIS A LOADED BLOCK???
        76Ø6  5215          JMP     SYSLD2          /NOPE, DONT READ IT IN
        76Ø7  423Ø          JMS     TREAD           /READ IT IN, BUBBY
        761Ø  ØØØØ  LUNIT,  Ø                       /UNIT
        7611  ØØØØ  LLOC,   Ø                       /CORE LOC
        7612  ØØØØ  LBLOCK, Ø                       /BLOCK NUMBER
        7613  ØØØØ  LNUM,   Ø                       /NUMBER OF BLOCKS TO READ IN,
        7614  2212          ISZ     LBLOCK          /BOP UP THE BLOCK NUMBER
        7615  2211  SYSLD2, ISZ     LLOC            /BOP UP THE LOCATION COUNTER BY 4ØØ
        7616  52ØØ          JMP     SYSLOD          /GO BACK AND GET ANOTHER BIT-WORD-MASK
                    /
        7617  6141  SYSGO,  LINC                    /GET OVER TO LINC MODE FOR THE STARTUP
                            LMODE
        162Ø  1Ø2Ø          LDA I                   /DO AN I/O PRESET
        1621  ØØ2Ø          2Ø
        1622  ØØØ4          ESF                     /OUT IT GOES
        1623  Ø643          LDF     3               /SET THE D.F TO POINT TO LOWER CORE,
        1624  ØØ11          CLR                     /CLEAR THE AC FOR A CLEAN START
        1625  ØØØ6          DJR                     /DONT DESTROY LOCATION 6ØØØ IN UPPER MEM
        1626  7774          JMP     7774            /START PROG GOING NOW,
                    /
                    /
                            PMODE                   /TELL ASEMBLER WERE BACK IN PMODE
                    /
                    /
                    /
                    /
                    /
                    /
                    /
                            *7627
                    /
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                    /
        7627  ØØØØ  TPOINT
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                EJECT
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                              *763Ø
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      763Ø  ØØØØ      TREAD,  Ø
      7631  5247              JMP     TTREAD          /GO TO THE READ DOITER,
      7632  ØØØØ      TWRITE, Ø
      7633  1232              TAD     TWRITE          /GET THE WRITE ADDRESS
      7634  323Ø              DCA     TREAD           /AND SOTRE BACK IN THE READ FOR THE ARG GETTER,
      7635  4253              JMS     TDO             /CALL THE DOER
                              LMODE
      1636  Ø7Ø6              WRI                     /A WRITE INSTRUCTION
                              PMODE
      7637  Ø4ØØ      TL4ØØ,  4ØØ                     /A NOP IN CASE OF "PHOONEY" ERROR.
      764Ø  4253              JMS     TDO             /NOW DO CHECK
                              LMODE
      1641  Ø7Ø7              CHK
                              PMODE
      7642  5233              JMP     TWRITE+1        /AN ERROR, TRY AGAIN
                      /
      7643  73Ø7      TTRET,  CLA CLL IAC RTL         /+4 TO SKIP PAST ARGUEMENTS
      7644  123Ø              TAD     TREAD           /CALLING ADDRESS
      7645  323Ø              DCA     TREAD           /RETURN ADDRESS
      7646  563Ø              JMP I   TREAD           /RETURN TO CALLER
                      /
      7647  4253      TTREAD, JMS     TDO             /DO THE READ NOW
                              LMODE
      165Ø  Ø7Ø2              RDE
                              PMODE
      7651  5247              JMP     TTREAD          /ON AN ERROR, RETRY
      7652  5243              JMP     TTRET           /RETURN IF NO ERROR,
                      /
                      /
                      /
                      /
                      /
      7653  ØØØØ       TDO,   Ø
      7654  123Ø              TAD     TREAD           /GET THE CALLING ADDRESS
      7655  335Ø              DCA     TCALLY          /SAVE AWAY
      7656  1653              TAD I   TDO             /GET THE OPERATION
      7657  2253              ISZ     TDO             /BOP UP THE RETURN ADDRESS
      766Ø  3331              DCA     TOPR            /SAVE IT AWAY
      7661  724Ø              CLA CMA                 /SET FOR OPERATION OK
      7662  3362              DCA     TRET            /RETURN CHECKER
      7663  175Ø              TAD I   TCALLY          /GET THE UNIT NUMBER
      7664  Ø356              AND     TL7             /CHOP OFF CRAP,
      7665  711Ø              CLL RAR                 /SET TO RIGHT PLACES IN AXO,
      7666  3327              DCA     TAXO            /SAVE IN THE TAPE REGISTER WORD,
      7667  7ØØ6              RTL                     /NOW ROTATE SINGLE UNITS BIT
      767Ø  7ØØ6              RTL                     /BACK AGAIN TO BIT 8,
      7671  1331              TAD     TOPR            /ADD IN THE INSTRUCTION AND
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3377    7674  1750           TAD I   TCALLY        /GET THE CORE LOCATION NOW,
34ØØ    7675  Ø36Ø           AND     TL16Ø         /JUST GET THE FIELD BITS NOW,
34Ø1    7676  71Ø6           CLL RTL               /AND ROTATE TO BITS
34Ø2    7677  7ØØ6           RTL                   /Ø-2
34Ø3    77ØØ  7ØØ4           RAL
34Ø4    77Ø1  1327           TAD     TAXO          /ADD IN THE TAPE REGISTER WORD,
34Ø5    77Ø2  1357           TAD     TL2Ø          /ALSO ADD IN THE EXTENDED ADDRESS BIT,
34Ø6    77Ø3  3327           DCA     TAXO          /AND SAVE IT AWAY,
34Ø7    77Ø4  175Ø           TAD I   TCALLY        /GET THE CORE LOCATION AGAIN,
341Ø    77Ø5  7Ø12           RTR                   /ROTATE TO BITS Ø-3,
3411    77Ø6  7Ø12           RTR
3412    77Ø7  7Ø1Ø           RAR
3413    771Ø  Ø361           AND     TL74ØØ        /AND AND OUT STRAY CRAP,
3414    7711  3232           DCA     TWRITE        /AND SAVE AWAY, TWRITE IS FREE NOW.
3415    7712  235Ø           ISZ     TCALLY        /BOP TO THE BLOCK NUMBER
3416    7713  175Ø           TAD I   TCALLY        /GET THE BLOCK NUMBER
3417    7714  3332           DCA     TBLOCK        /AND SAVE AWAY,
342Ø    7715  235Ø           ISZ     TCALLY        /BOP TO THE NUMBER OF BLOCKS TO READ IN,
3421    7716  175Ø           TAD I   TCALLY        /GET THE NUMBER NOW,
3422    7717  7Ø41           CIA                   /NEGATE,
3423    772Ø  745Ø           SNA                   /NO BLOCKS?
3424    7721  5352           JMP     TOUT          /NO BLOCKS, RETURN,
3425    7722  3351           DCA     TCOUNT        /SET UP THE COUNT NOW.
3426                 /
3427                 /
343Ø    7723  1232   TLOOP,  TAD     TWRITE        /GET THE CORE ADDRESS.
3431    7724  6141           LINC                  /GET INTO LINC MODE
3432                         LMODE
3433    1725  ØØ23           TMA                   /SEND TO THE CONTROLLER,
3434    1726  1Ø2Ø           LDA I                 /GET THE FUNCTIONS,
3435    1727  ØØØØ   TAXO,   Ø                     /AND SEND IT TO THE CONTROLLER,
3436    173Ø  ØØØ1           AXO                   /WITH AN AXO,
3437                 /
344Ø    1731  ØØØØ   TOPR,   Ø                     /NOW DO THE ACTUAL TAPE INSTRUCTION,
3441    1732  ØØØØ   TBLOCK, Ø                     /WITH THE BLOCK NUMBER HERE, THIS HANGS UNTIL DONE,
3442                 /
3443    1733  ØØØ2           PDP                   /BACK INTO 8 MODE
3444                         PMODE                 /FOR NORMAL CRAP
3445                 /
3446    7734  Ø362           AND     TRET          /CHECK FOR ALL 7777S
3447    7735  3362           DCA     TRET
345Ø    7736  1237           TAD     TL4ØØ         /ADD 4ØØ TO THE LOC
3451    7737  1232           TAD     TWRITE
3452    774Ø  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                 /
346Ø                 /
3461                 /
3462                 /
3463                 /
3464                         *775Ø
3465    775Ø  ØØØØ   TCALLY, Ø                     /PLACE OF D.B. LOCATIONS,
3466    7751  ØØØØ   TCOUNT, Ø
3467                 /
347Ø                 /
                     /
        7752  2362   TOUT,   ISZ     TRET             THE CHECKSUM OK????
3473    7753  5653           JMP I   TDO           /NOPE, EXIT
```

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7755  [illegible]           JMP I    TDO                /RETURN,
                     /
                     /
                     /
                     /
                     /
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                     /
7756  0007     TL7,      7
7757  0020     TL20,     ~~20~~ 30
7760  0160     TL160,    160
7761  7400     TL7400,   7400
7762  0000     TRET,     0
                     /
                     /
                     /
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                     /
                             *7770                   /SYSTEM COMMUNCATIONS REGION
                     /
                     /
                     /
7770  0000               0                           /CONTAINS THE ACTIVE ADDRESS OF I/O
7771  0000               0                           /CONTAINS THE NECESSARY FUDGE FACTOR
7772  7000               MAIN                        /POINTER TO I/O INTERPRETER
7773  7422               BOOTCK                      /POINTS TO BOOTSTRAP
7774  0000     READ,     0                           /READ ENTRY POINT
7775  0000     WRITE,    0                           /WRITE ENTRY POINT
7776  5772               JMP I    7772               /DOES THE CORRECT OPERATION
7777  5773     SYSBOT,   JMP I    7773               /CALLS THE SYSTEM BOOTSTRAP,
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                             EJECT
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3554                              /
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3562                              /
3563                              /
3564                              /
3565
```

```
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
AISETB  4171   0326  0202 0253
AISETD  4167   0324  0167 0247
AISETS  4170   0325  0171 0251
AISETU  4172   0327  0255 0260 0263 0266
AMOVE   4174   0331  0223
AM100   4162   0315  0162
AM1000  4163   0316  0177
AM77    4161   0314  0140 0151
ARF08   4175   0332  0245
A100    4154   0307  0156
A1000   4160   0313  0173
A177    4155   0310  0256
A277    4156   0311  0261
A377    4157   0312  0264
A77     4153   0306  0134 0145 0243
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
BSYSBO  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
CHBOOT  7272   2314  2305
CHECKF  7254   2272  2564
CNUM    7122   1772  1764
CUNIT   7117   1767  1633 1644 1750
DCEA    6611   2645
DCHAR   6002   0754  2527 2532 2533 2534 2535 2536
DCHP    6737   1036
DCLA    6751   1032  1202 2071
DCLS    6742   1042  0132 1153 1200
DCMA    6601   2642  0143 0144 0154 0155 1376 1530 1531 2744
DCXA    6641   2660
DEAC    6616   2650  0161 0176 1454
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
r  `R   7541   3056  2742
     C  7567   3112  3010 3026
Dr uPR  7507   3013  2743
                     [illegible] 2753 2773 3017 3031 3037 3042 3043 3060 3061
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SYMBOL   VALUE  DEF   REFERENCES

DFSC     6622   2654  1445
DFSE     6621   2651  1443 1447 3Ø16
DFWRIT   7432   2736  2737 2772 2777 3ØØ3 3Ø12
DFXCDF   7562   31Ø5  2761
DFXX     7561   31Ø4  277Ø 3Ø11 3Ø27 31Ø6
DF32     663Ø   1343  Ø33Ø
DIALBL   ØØØØ   ØØ54  2115
DIALCO   ØØ1Ø   ØØ53  2114
DIALNU   ØØ1Ø   ØØ55  2116
DIALUN   Ø1ØØ   ØØ52  2113
DIHAN1   Ø365   ØØ41  Ø123
DIHAN2   Ø366   ØØ42  Ø125
DIMA     6616   2655  Ø4Ø6 3Ø2Ø 3Ø32
DIML     6615   2653  2756
DIOC     Ø345   ØØ4Ø  Ø121
DISK     6623   2652  3Ø14
DLCA     6755   1Ø51  1156
DLDC     6732   1Ø33  Ø135 1123
DLDR     6733   1Ø34  1266
DLDW     6735   1Ø35
DLWC     6753   1Ø5Ø  116Ø
DMAC     6626   2656
DMAR     66Ø3   2643  1473 3Ø56
DMAW     66Ø5   2644
DMMT     6646   2657
DMNT     6743   1Ø43
DPBOOT   7174   2113  2Ø76
DRCA     6757   1Ø52
DRCDF    6653   1411  14Ø5
DRCLRF   6752   153Ø  1451 1461
DRDA     6734   1Ø37
DRDC     6736   1Ø4Ø  Ø137 2562
DRDS     6741   1Ø41  1173
DRERR    6714   1454  1444 145Ø
DRLOOP   664Ø   1376  1466
DRL3ØØ   6731   1475
DRL37Ø   6746   1514  1421
DRL7Ø    673Ø   1474  14Ø2
DRL74Ø   6743   1511  15Ø6
DRMAD    6745   1513  1414
DRMAR    6727   1473  1374
DRMWC    6744   1512  1436
DROPR    67Ø3   1441  1375
DRREAD   663Ø   1366  1372 1377 14ØØ 14Ø7 1416 1417 1425 143Ø 1431 1432 1464 1465 1532
DRRTR    6735   15Ø2  141Ø 1426 1433 15Ø7
DRWC     6752   1Ø47
DRWRIT   6632   137Ø  1371 14Ø3 1422 1427 144Ø
DRXCDF   6733   1477  14Ø6
DRXX     6732   1476  1415 1437 15ØØ
DR1      6636   1374  1367
DSAC     5612   2646
DSAVI    4354   Ø626  Ø437 Ø462
DSKC     6745   1Ø44  1165 12Ø6 2Ø72
DSKE     6747   1Ø46  117Ø 12Ø3
DSKT     6746   1Ø45
DSYS     7341   2417  Ø7ØØ
DTABLE   7247   2242  253Ø
DX       6ØØ1   Ø753  2316 2525 2563
DXAC     6645   2662  Ø15Ø 2771
DXAL     6643   2661  Ø146 Ø4Ø5 2752 3ØØØ
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SYMBOL  VALUE  DEF   REFERENCES

IB1     4346   Ø6Ø4  Ø444 Ø445
IB2     4352   Ø614  Ø451 Ø453
ICHECK  4214   Ø4Ø4  Ø322 Ø411
IDONE   4222   Ø414  Ø323 Ø372
IIDONE  4262   Ø46Ø
IIDONR  4265   Ø463  Ø434
ILINP   4344   Ø6Ø2  Ø442
ILOOP   4244   Ø44Ø  Ø455
ILOUTP  435Ø   Ø612  Ø45Ø
IMOVE   4113   Ø217  Ø166 Ø231 Ø246 Ø661
INITB   Ø311   ØØ37
IRFØ8   4126   Ø243  Ø153
IRKØ8   42ØØ   Ø357  Ø321
ISETB   4311   Ø523  Ø326 Ø363 Ø525 Ø526 Ø533
ISETD   4267   Ø473  Ø324 Ø357 Ø475 Ø476 Ø5Ø3
ISETS   43ØØ   Ø5Ø7  Ø325 Ø361 Ø511 Ø512 Ø517
ISETU   434Ø   Ø561  Ø327 Ø365 Ø366 Ø367 Ø564
ISETU2  4322   Ø54Ø  Ø555 Ø562 Ø563
KCOMM   6436   11ØØ  1Ø72
KCOUNT  655Ø   1235  1142 1221
KDLDR   6565   1266  11ØØ
KEND    6545   1221  1167
KERR    65Ø6   1152  1143 1213
KFGET   6553   1245  1112 1124 1133 1136 125Ø
KLOC    6552   1237  1111 1122 1132 1145 1147 1155
KLPH1Ø  6452   1114  11Ø5
KL3Ø    656Ø   126Ø  11Ø7
KL4ØØ   6562   1262  1146
KL7     6557   1257
KL7Ø    6561   1261  11Ø3 11Ø6 1121
KL74ØØ  6563   1263  1115 113Ø 1157
KL7777  6564   1264  1131
KNEXT   65Ø2   1145  1222
KOPR    6516   1163  11Ø1
KREAD   643Ø   1Ø71  1Ø75 11Ø2 1117 114Ø 1223 1246 1247
KTRACK  6551   1236  1116 1134 1135 115Ø 1161
KUGH    6524   1173  12Ø5
KWRITE  6432   1Ø73  1Ø74 1176 121Ø
LBLOCK  7612   3231  3233
LCDF    7136   2Ø26  1574 1577
LESS2Ø  7Ø41   1632  1623
LLOC    7611   323Ø  3234
LNUM    7613   3232
LTEN    4347   Ø6Ø5  Ø443 Ø452
LUNIT   761Ø   3227
L2Ø     7147   2Ø37  1632
L3Ø     715Ø   2Ø4Ø  1631
L6      7145   2Ø35  2Ø66
L7      7146   2Ø36  1627
L777Ø   7151   2Ø41  174Ø 1744
L7771   7152   2Ø42  1743 1756
MAIN    7ØØØ   1571  3134 3534
MCALL   7144   2Ø34  1616 162Ø 1747 1751 1752 1754 176Ø 1762 1763
MLOOP   7Ø44   164Ø  1652
MNL     74ØØ   2525  1675 2541 255Ø
MNOT    7Ø57   167Ø  1642
MOVE    72ØØ   2157  Ø331 2214 2222 2223
     D  7137   2Ø27  16Ø3 161Ø 2Ø75
     L  7143   2Ø33  16Ø7 1615 1617 1777
MSYS    733Ø   24Ø6  Ø662 Ø663 Ø664 Ø665 Ø666 Ø667
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SYMBOL  VALUE  DEF   REFERENCES

MSYSP   4364   0664  0516
MSYSP   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
RK08OK  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
SYSLOD  7600   3217  3235
TAXO    7727   3435  3371 3404 3406
TBLOCK  7732   3441  3417 3453
TCALLY  7750   3465  3360 3366 3376 3377 3407 3415 3416 3420 3421
TCDF    7131   2012  1600
TCOUNT  7751   3466  3425 3454
TDO     7653   3356  3323 3330 3343 3361 3362 3473 3474 3475
TEMP    7142   2032  1613 1640 1650 1651 1734 1737 1741 1742 1745 1766
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 3337 3340 3341 3357
TRET    7762   3511  3365 3446 3447 3472
TTREAD  7647   3343  3317 3347
TTRET   7643   3336  3350
TWRITE  7632   3320  3321 3334 3414 3430 3451 3452
WRITE   7775   3537  0113 0673
```