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OS/16 MT2 ALO DIRECT ACCESS LOADER
INSTRUCTION MANUAL

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INTRODUCTION

The OS/16 MT2 ALO Direct Access Loader (DAL), 03-098F02 (see Appendix 3), is a program which is stored in two Bipolar TTL Read Only Memory (ROM) integrated circuits. The ROMs are used in conjunction with the INTERDATA Auto-Boot Loader Option (ALO) to load a core-image of OS/16 MT2 from a disc. For a detailed description of the ALO operation refer to the *Auto Load Option (ALO) User's Manual,* Publication Number 29-522.

SCOPE

This document contains the necessary information to install the ROM devices in an Auto-Boot Loader Unit, verify the contents of the ROM devices, and operate the ALO to perform the bootload operation.

INSTALLATION INFORMATION

The ROM chips must be installed in the sockets located on the Auto Boot Loader as indicated:

19-186F12	ROM0A	Location A37
19-186F13	ROM0B	Location A30

Refer to *Model 6/16 Maintenance Manual,* Publication Number 29-470, for the location of the ROM sockets and installation information for the Auto Boot Loader.

OPERATING INSTRUCTIONS

The following instructions summarize the steps necessary to operate the 16-Bit ALO bootloader. This program can be used to load the core-image of OS/16 MT2 from a disc.

1. Figure 1 shows the ALO switch. Initially insure that the switch is in the center (Enable ALO) position.

Switch position	Meaning
Left	Disable ALO
Center	Enable ALO
Right	Test ALO

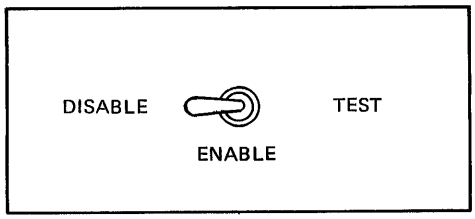

Figure 1. ALO Switch

2. Insure that the disc is ready for operation.

3. Using Display Panel switches set up the device definition table shown in Table 1.

TABLE 1. REQUIRED DEVICE DEFINITION TABLE

MEMORY LOCATION	CONTENTS
X'7A' X'7B' X'7C' X'7D' X'7E', X'7F'	DISC FILE ADDRESS DEVICE CODE (see below) DISC CONTROLLER ADDRESS SELCH ADDRESS OS SELECTOR NUMBER (See Appendix 1)
DEVICE CODE	**DEVICE**
X'30' X'31' X'32' X'33' X'34'	2.5 MB DISC (FIXED) 2.5 MB DISC (REMOVABLE) 10 MB DISC (FIXED) 10 MB DISC (REMOVABLE) 40 MB DISC
X'35' X'36'	67MB DISC 256MB DISC

4. When Device Definition Table entries are complete, depress INIT switch on the Display Panel.

5. If the ALO completed the load successfully, the appropriate Operating System title is printed on the system's console device. If an error condition is detected during the loading process, the Processor halts with the Disc Controller Device Address and Disc File Error Status displayed on the Hexadecimal or Binary Display Panel. (Refer to Figure 2.) If the OS image having the specified OS Selector Number is not found, 0001 is displayed in the Display Panel. If the console device is inoperable, 66666666 is displayed on the processor display panel. Refer to Appendix 2 for the Loader operation.

6. Turn the ALO switch to the Disable (left) position. The system is now ready for use.

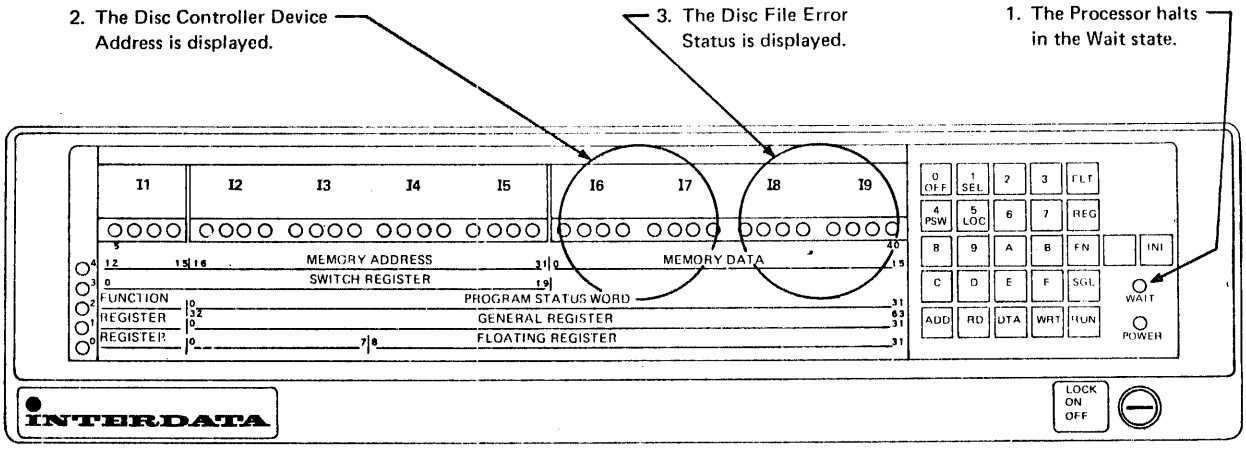

Figure 2. Hexadecimal Display Panel Conditions on Error Termination

MAINTENANCE

The ROM devices can be tested using the ALO Support Program (06-194) in the Test mode. The program compares the information stored in the ALO Direct Access ROMs with the ROM data tape (03-098F02M14). For the detailed test procedure, refer to the ALO Support Program Description (06-194).

APPENDIX 1
OS SELECTOR NUMBER

Memory locations X'7A' through X'7D' define the volume (i.e., disc file) from which the OS image is loaded as defined in Table 1. This volume may contain any number of OS Images. The OS Selector Number is contained in locations X'7E' – X'7F' (one halfword). The OS Selector Number defines which one of these OS Images is to be loaded by the bootstrap loader.

The Loader assumes that the specified volume has a file directory containing file descriptors of the form:

OS16xxxx,hhh

	File Name	Extension
where:	xxxx	= any ASCII characters
	hhh	= Extension Field (X'000' – X'FFF')

In order to load a particular OS Image, the user must copy the corresponding extension field (hhh) into the memory locations X'7E' – X'7F' as an OS Selector Number.

The loader searches the file directory for a filename starting with the characters "OS16" and an extension field which matches the specified OS Selector Number. When it finds this file, it is loaded into memory. If no such file is found, the loader terminates with an error code of 1 in the Display Panel.

NOTES

1. If there are two (2) images on the volume with the same extension (hhh), the loader loads the first one in the directory.

2. An OS Image file must be a contiguous file. Files other than contiguous files are ignored by the loader.

APPENDIX 2
OS/16 MT2 BOOTSTRAP LOADER OPERATION

1. Loaded into main memory at X'1000' through X'12F5'
2. Started at X'100E'
3. After initial set up, search directory for proper OS revision specified by user at location X'7E'.
4. If specified version cannot be found, display X'0001' on the processor display console.
5. If OS is found, determine top of memory. Then part of the Bootstrap Loader (Disc file loader, X'1140' through X'13FE', i.e., X'2BE' bytes) is relocated near top of memory so that OS can be loaded in the lower portion of the memory.
6. Start disc file loader. This loader reads OS from the specified disc pack. Any error during the load operation causes the controller address and error status to be displayed on the processor display console. Refer to Figure 2.
7. If the OS is loaded into main memory, the OS is started at location X'60'.
8. If the system console is inoperable, X'66666666' is displayed on the Processor Display Console; otherwise, the message OS/16-MT2 is printed on the system console.

PROG= BOOT16 ASSEMBLED BY CAL/16 00-00


```
                          1  **BOOT16                                                                  B1600000
                          3  *                                                                         B1600020
                          4  * THIS PROGRAM IS A LOADER THAT READS A MEMORY IMAGE OF OS/16-MT2        B1600030
                          5  * FROM A 2.5,10,40,66 OR 256 MEGABYTE DISC DRIVE.                       B1600040
                          6  *                                                                         B1600050
                          7  * DEFINITION TABLE:                                                      B1600060
                          8  *                                                                         B1600070
                          9  *    MEMORY LOCATION          CONTENTS                                   B1600080
                         10  *    ------ --------          --------                                -  B1600090
                         11  *        X'78'              BINARY INPUT DEVICE ADR                     B1600100
                         12  *        X'79'              BINARY DEVICE INPUT COMMAND                 B1600110
                         13  *        X'7A'              DISC DEVICE NUMBER                          B1600120
                         14  *        X'7B'              DEVICE CODE (SEE DEVICE TABLE BELOW)     -  B1600130
                         15  *        X'7C'              DISC CONTROLLER ADDRESS                  -  B1600140
                         16  *        X'7D'              SELCH ADDRESS                               B1600150
                         17  *        X'7E',X'7F'        OS EXTENSION NUMBER IN HEX                  B1600160
                         18  *    ------------------------------------------------------------------  B1600170
                         19  *                                                                         B1600180
                         20  *    DEVICE CODE              DISC                                       B1600190
                         21  *    ------ ----              ----                                       B1600200
                         22  *        X'30'              2.5 MB DISC (FIXED)                         B1600210
                         23  *        X'31'              2.5 MB DISC (REMOVABLE)                     B1600220
                         24  *        X'32'              10 MB DISC  (FIXED)                         B1600230
                         25  *        X'33'              10 MB DISC  (REMOVABLE)                     B1600240
                         26  *        X'34'              40 MB DISC                                  B1600250
                         27  *        X'35'              66 MB DISC                                  B1600260
                         28  *        X'36'              256 MB DISC                                 B1600270
                         29  *                                                                         B1600280
                         30  * THE PROGRAM WILL PERFORM THE FOLLOWING UPON EXECUTION:                 B1600290
                         31  *       1.READ THE VOLUME DESCRIPTOR FROM CYL0,SECTOR0,HEAD0 OF THE       B1600300
                         32  *         DISC                                                            B1600310
                         33  *       2.EXTRACT FROM THE VOLUME DESCRIPTOR THE STARTING LOGICAL SECT-    B1600320
                         34  *         OR OF THE DIRECTORY                                             B1600330
                         35  *       3.SEARCH THE DIRECTORY FOR A FILE WITH NAME "OS16XXXX.YYY"         B1600340
                         36  *         WHERE "XXXX" CAN BE ANY ALPHAMERIC CHARACTERS, AND "YYY" IS      B1600350
                         37  *         THE EXTENSION SPECIFIED IN LOCATIONS X'7E' AND X'7F'.            B1600360
                         38  * THE LOADER THEN RELOCATES ITSELF TO THE TOP OF CORE, LOADS THE          B1600370
                         39  * OS, SETS UP SPT.FLBA AND SPT.OVFD, AND STARTS THE OS AT X'60'           B1600380
                         40  *                                                                         B1600390
                         41  *                                                                         B1600400
                         42  * SYSGEN PARAMETERS:                                                     B1600410
0001                     43  LSU      EQU    1                  CHIPS                                B1600420
                         44  *                                                                         B1600430
0000R                    45          COPY   SPT                                                       B1600440
```

SYSTEM POINTER TABLE

```
                        47  *                                                                          PCB00910
                        48  *         SPT - SYSTEM POINTER TABLE                                       PCB00920
                        49  *                                                                          PCB00930
                        50  SPT       STRUC                                                          PCB00940
0000                    51  SPT.INIT  US      12              BRANCH TO SYSINIT                      PCB00950
000C                    52  SPT.CRSH  US      2               CRASH CODE                             PCB00960
000E                    53  SPT.CE    US      2               COMMAND ENTRY                          PCB00970
0010                    54  SPT.UBOT  US      2               USER BOTTOM                            PCB00980
0012                    55  SPT.FBOT  US      2               FCB BOTTOM                             PCB00990
0014                    56  SPT.MTOP  US      2               MACHINE TOP                            PCB01000
0016                    57  SPT.OSID  US      8               NAME OF OS                             PCB01010
001E                    58  SPT.TTAB  US      2               TCB TABLE                              PCB01020
0020                    59  SPT.NTCB  US      1               # OF TCBS                              PCB01030
0021                    60  SPT.CTCB  US      1               CURRENT TCB INDEX                      PCB01040
0022                    61  SPT.DMT   US      2               DMT ADDR                               PCB01050
0024                    62  SPT.VMT   US      2               VMT ADDR                               PCB01060
0026                    63  SPT.JRNL  US      2               JOURNAL LIST ADDRESS                   PCB01070
0028                    64  SPT.FLBA  US      4               FLBA OF OS OVERLAY FILE                PCB01080
002C                    65  SPT.OVFD  US      16              NAME OF OS OVERLAY FILE                PCB01090
003C                    66  SPT.SDCB  US      2               POINTER TO DCB OF OS OVERLAY DEVICE    PCB01100
          0062          67  ADR.SPT   EQU     X'62'           A(A(SPT))                              PCB01110
003E                    68            ENDS                                                           PCB01120
0000R                   69            COPY    VD                                                     B1600450
```

VOLUME DESCRIPTOR

```
                                                                  PCB04990
            *                                                     PCB05000
            *         VD - VOLUME DESCRIPTOR                      PCB05010
            *                                                     PCB05020
            VD        STRUC                                       PCB05030
0000        VD.VOL    DS      4      VOLUME NAME                  PCB05040
0004        VD.ATRB   DS      4      VOLUME ATTRIBUTES            PCB05050
0008        VD.FDP    DS      4      FIRST DIRECTORY BLOCK POINTER PCB05060
000C        VD.OSP    DS      4      OS IMAGE POINTER             PCB05070
0010        VD.OSS    DS      4      OS IMAGE SIZE (IN SECTORS)   PCB05080
0014        VD.MAP    DS      4      BIT MAP POINTER              PCB05090
0018                  ENDS                                        B1600460
0000R                 COPY    DIR
```

DIRECTORY BLOCK

```
                          84  *                                                                          PCB05130
                          85  *        DIR - DIRECTORY BLOCK                                             PCB05140
                          86  *                                                                          PCB05150
                          87  DIR      STRUC                                                             PCB05160
0000                      88  DIR.FNM  DS      8              FILENAME                                   PCB05170
0008                      89  DIR.EXT  DS      3              EXTENTION                                  PCB05180
000B                      90  DIR.VERS DS      1              VERSION                                    PCB05190
000C                      91  DIR.FLBA DS      4              FIRST LOGICAL BLOCK ADDRESS                PCB05200
0010                      92  DIR.LLBA DS      4              LAST LOGICAL BLOCK ADDRESS                 PCB05210
0014                      93  DIR.KEYS DS      0              KEYS                          -2 BYTES     PCB05220
0014                      94  DIR.WKEY DS      1              WRITE KEY                                  PCB05230
0015                      95  DIR.RKEY DS      1              READ KEY                                   PCB05240
0016                      96  DIR.LRCL DS      2              LOGICAL RECORD LENGTH                      PCB05250
0018                      97  DIR.DATE DS      4              DATE/TIME OF CREATION                      PCB05260
001C                      98  DIR.LUSE DS      4              LAST USE DATE/TIME                         PCB05270
0020                      99  DIR.WCNT DS      2              WRITE COUNT                                PCB05280
0022                     100  DIR.RCNT DS      2              READ COUNT                                 PCB05290
0024                     101  DIR.ATRB DS      1              ATTRIBUTES                                 PCB05300
0025                     102  DIR.BKSZ DS      1              BLOCK SIZE                                 PCB05310
0026                     103  DIR.FLRO DS      0              FIRST LOGICAL RECORD OFFSET -2 BYTES       PCB05320
0026                     104  DIR.INBS DS      1              INDEX BLOCK SIZE                           PCB05330
0027                     105           DS      1              RESERVED                                   PCB05340
0028                     106  DIR.CSEC DS      4              CURRENT SECTOR/# OF LOGICAL RECORDS        PCB05350
002C                     107           DS      4              RESERVED                                   PCB05360
          0010           108  DIRA.ACM EQU     X'10'          DIRECTORY ACTIVE FLAG                      PCB05370
0030                     109           ENDS                                                              PCB05380
          00F4           110  DIRB     EQU     DIR*5+4        LENGTH OF DIRECTORY BLOCK                  PCB05390
```

```
                    112  *                                                                  B1600480
                    113  * REGISTER EQUATES                                                 B1600490
                    114  *                                                                  B1600500
0000                115  U0        EQU    0          REMAINDER                            B1600510
0001                116  U1        EQU    1          QUOTIENT                             B1600520
0002                117  U2SELCH   EQU    2          SELCH ADDRESS                        B1600530
0003                118  U3CTRL    EQU    3          CONTROLLER ADDRESS                   B1600540
0004                119  U4DEV     EQU    4          DISC ADDRESS                         B1600550
0005                120  U5DEVCD   EQU    5          DEVICE CODE                          B1600560
0006                121  U6LOOP    EQU    6          DISC READ LOOP ADDRESS               B1600570
0007                122  U7STARTA  EQU    7          VOLUME DESCRIPTOR START ADDRESS      B1600580
0008                123  U8ENDA    EQU    8          VOLUME DESCRIPTOR ENDING ADDRESS     B1600590
0009                124  U9CYLN    EQU    9          DISC CYLINDER NUMBER                 B1600600
000A                125  UALSECN   EQU    10         LOGICAL SEC NUM LSB'S                B1600610
000B                126  UBSECN    EQU    11         DISC SECTOR NUMBER                   B1600620
000C                127  UCLSECN   EQU    12         DISC LOGICAL SECTOR NUMBER           B1600630
000D                128  UDBIAS    EQU    13         TOP OF OS IMAGE BIAS                 B1600640
000E                129  UELINK    EQU    14         LINK ADDRESS FOR SUBROUTINE CALLS    B1600650
000F                130  UF        EQU    15         USER REGISTER 15                     B1600660
                    131  *                                                                  B1600670
0001                132  R1        EQU    1          REG 1                                B1600680
0002                133  R2        EQU    2          REG 2                                B1600690
0003                134  R3        EQU    3          REG 3                                B1600700
0004                135  R4        EQU    4          REG 4                                B1600710
007A                136  DEVA      EQU    X'7A'      DISC FILE ADDRESS LOCATION           B1600720
007B                137  DEVCD     EQU    X'7B'      DEVICE CODE LOCATION                 B1600730
007C                138  CTRLA     EQU    X'7C'      CONTROLLER ADDRESS LOCATION          B1600740
007D                139  SELCHA    EQU    X'7D'      SELCH ADDRESS LOCATION               B1600750
007E                140  EXT       EQU    X'7E'      FILE EXTENSION                       B1600760
0060                141  OSINITA   EQU    X'60'      OS INITIALIZATION ADDRESS            B1600770
1000                142  BOOTADR   EQU    X'1000'    BOOT ADDRESS START LOCATION          B1600780
```

BOOTSTRAP LOADER / ABSOLUTE SEGMENT 1

```
                          144            IFZ     LSU                                                    B1600810
                          145            ORG     X'80'                                                  B1600815
                          146  BOOTLDR   LIS     R1,0              INITIALIZE II NEW PSW                B1600820
                          147            LDAI    R3,INIT                                                B1600830
                          148            STA     R1,X'34'                                               B1600840
                          149            STA     R3,X'34'+ADC                                           B1600850
                          150            LPSW    X'34'                                                  B1600860
                          151            SPACE   5                                                      B1600870
                          152  INIT      EQU     *                                                      B1600880
                          153            LB      U4DEV,X'78'       GET BINARY INPUT UNIT NUMBER         B1600890
                          154  BOOTSTRP  RB      U4DEV,BOTRANGE    READ IN SUCCEEDING SEGMENTS          B1600900
                          155            B       BOOTSTRT          GO TO IT                             B1600910
                          156            DO      X'CC'-*/2                                              B1600920
                          157            DC      H'0'                                                   B1600930
                          158            ELSE                                                           B1600940
0000R                     159            ORG     BOOTADR-8                                              B1600945
0FF8  0000                160            DC      H'0'              PSW                                  B1600950
0FFA  100E                161            DC      A(BOOTSTRT)       LOC                                  B1600960
0FFC                      162            ENDC                                                           B1600970
0FFC  1000                163  BOTRANGE  DC      BOOTADR                                                B1600980
0FFE  12F6                164            DC      LOADLAST                                               B1600990
```

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```
                      *----------------------------------MAIN LOGIC STARTS HERE   B1601010
                                 IFZ     LSU                                       B1601015
                                 ORG     BOOTADR                                   B1601020
                                 ENDC                                              B1601025
            1000      SEGMENT2   EQU     *                                         B1601030
                      *                                                            B1601040
                      *........CONVERT HEX TO ASCII SUBROUTINE                      B1601050
                      *                                                            B1601060
1000  CAF0 0030       CNV        AHI     UF,X'30'                                  B1601070
1004  C5F0 003A                  CLHI    UF,X'3A'                                  B1601080
1008  028E                       BLR     UELINK                                    B1601090
100A  26F7                       AIS     UF,7                                      B1601100
100C  030E                       BR      UELINK                                    B1601110
                      *                                                            B1601120
            100E      BOOTSTRT   EQU     *                                         B1601130
100E  D1C0 0078                  LM      UCLSECN,X'78'        PICK UP X'78' TO X'7F'  B1601140
1012  D0C0 13F6                  STM     UCLSECN,SAVE         SAVE IT              B1601150
1016  07DD                       XAR     UDBIAS,UDBIAS        BIAS=0               B1601160
1018  C810 1000                  LHI     U1,CNV               A(CNV) FOR BALR      B1601170
101C  D3F0 007E                  LB      UF,EXT                                    B1601180
1020  C4F0 000F                  NHI     UF,X'F'                                   B1601190
1024  01E1                       BALR    UELINK,U1            CONVERT TO ASCII     B1601200
1026  D2F0 12E2                  STB     UF,VERS                                   B1601210
102A  D3F0 007F                  LB      UF,EXT+1             GET SECOND CHAR OF EXT  B1601220
102E  90F4                       SRLS    UF,4                                      B1601230
1030  01E1                       BALR    UELINK,U1            CONVERT 2ND TO ASCII B1601240
1032  D2F0 12E3                  STB     UF,VERS+1                                 B1601250
1036  D3F0 007F                  LB      UF,EXT+1                                  B1601260
103A  C4F0 000F                  NHI     UF,X'F'                                   B1601270
103E  01E1                       BALR    UELINK,U1            CONVERT 3RD CHARACTER TO ASCII  B1601280
1040  D2F0 12E4                  STB     UF,VERS+2                                 B1601290
1044  D320 007D                  LB      U2SELCH,SELCHA       GET SELCH ADR.       B1601300
1048  D330 007C                  LB      U3CTRL,CTRLA         GET CTRL ADR         B1601310
104C  D340 007A                  LB      U4DEV,DEVA           GET DEV ADR          B1601320
1050  D350 007B                  LB      U5DEVCD,DEVCD        GET DEV CODE         B1601330
1054  C870 12F6                  LDAI    U7STARTA,VDBUF       SET UP INPUT BUF  LIMITS  B1601340
1058  C880 13F5                  LDAI    U8ENDA,VDBUFE                             B1601350
105C  07AA                       XAR     UALSECN,UALSECN                           B1601360
105E  07CC                       XAR     UCLSECN,UCLSECN      SET LOGICAL SECTOR NO TO 0  B1601370
1060  41E0 1188                  BAL     UELINK,READ          READ VD              B1601380
                      *                                                            B1601390
                      *........SEARCH DIRECTORY FOR PROPER OS REVISION              B1601400
                      *                                                            B1601410
1064  48A0 12FE                  LH      UALSECN,VDBUF+VD.FDP                      B1601420
1068  48C0 1300                  LH      UCLSECN,VDBUF+VD.FDP+2                    B1601430
106C  4300 1098                  B       XX.070               GO CHECK IT          B1601440
1070  C870 12F6       XX.000     LDAI    U7STARTA,VDBUF                            B1601450
1074  41E0 1188                  BAL     UELINK,READ                               B1601460
1078  C8E0 12FA                  LDAI    UELINK,VDBUF+4       POINT TO FIRST ENTRY B1601470
107C  2415                       LIS     U1,5                 LOOP COUNTER         B1601480
            107E      XX.010     EQU     *                                         B1601490
107E  D30E 0024                  LB      U0,DIR.ATRB(UELINK)                       B1601500
1082  C300 0010                  THI     U0,DIRA.ACM          ACTIVE ENTRY ?       B1601510
1086  213F                       BNZS    XX.100                                    B1601520
```

BOOTSTRAP LOADER / RELOCATABLE SEGMENT 2

```
1088  CAE0 0030          220  XX.050   AHI   UELINK,DIR          BUMP DIR POINTER                          B1601530
108C  2711               221           SIS   U1,1               DEC ENTRY COUNTER                         B1601540
108E  2058               222           BNZS  XX.010                                                       B1601550
1090  48A0 12F6          223           LH    UALSECN,VDBUF                                               B1601560
1094  48C0 12F8          224           LH    UCLSECN,VDBUF+2    DONE WITH THISSECT. ANYMORE?             B1601570
1098  4250 1070          225  XX.070   BNZ   XX.000             YES, GET MORE                             B1601580
109C  08AA               226           LHR   UALSECN,UALSECN                                             B1601590
109E  2053               227           BNZS  XX.070                                                       B1601600
10A0  4300 12B2          228           B     E.1                                                          B1601610
           10A4          229  XX.100   EQU   *                                                            B1601620
10A4  9005               230           SRLS  U0,5               ISOLATE FILE TYPE                         B1601630
10A6  4250 1088          231  XX.110   BNZ   XX.050             IF NOT CONTIG, BRANCH                     B1601640
10AA  C860 4F53          232           LHI   U6LOOP,C'OS'                                                 B1601650
10AE  456E 0000          233           CLH   U6LOOP,DIR.FNM(UELINK)                                       B1601660
10B2  2036               234           BNES  XX.110             IF NOT AN OS FILE, BRANCH                 B1601670
10B4  C860 3136          235           LHI   U6LOOP,C'16'                                                 B1601680
10B8  456E 0002          236           CLH   U6LOOP,DIR.FNM+2(UELINK)                                     B1601690
10BC  203B               237  XX.120   BNES  XX.110             IF NOT A 16 BIT OS FILE, BRANCH           B1601700
10BE  486E 0008          238           LH    U6LOOP,DIR.EXT(UELINK)   GET FILE EXTENSION                  B1601710
10C2  4560 12E2          239           CLH   U6LOOP,VERS                                                  B1601720
10C6  2035               240           BNES  XX.120             IF NOT THE CORRECT EXT, BRANCH            B1601730
10C8  D36E 000A          241           LB    U6LOOP,DIR.EXT+2(UELINK)                                     B1601740
10CC  D460 12E4          242           CLB   U6LOOP,VERS+2                                                B1601750
10D0  203A               243           BNES  XX.120             IF NOT CORRECT, BRANCH                    B1601760
                         244  *                                                                           B1601770
                         245  *.........IF HERE, FILE FOUND. DETERMINE TOP-OF-CORE                        B1601780
                         246  *         AND RELOCATE BOOT, THEN DETERMINE EXTENT                          B1601790
                         247  *         OF 'OS', TRANSFER TO HIGH CORE TO LOAD IT.                        B1601800
                         248  *                                                                           B1601810
10D2  080E               249           LDAR  U0,UELINK          SET TEST PATTERN                          B1601820
10D4  0766               250           XAR   U6LOOP,U6LOOP                                                B1601830
10D6  CA60 2000          251  MEMLOOP  AAI   U6LOOP,X'2000'     BUMP STORE POINTER BY 8K                  B1601840
10DA  2336               252           BZS   TOPFOUND           BRANCH OUT IF 64K                         B1601850
           10DC          253  INCRCN   EQU   *                 DISPLAY PANEL MODE                        B1601860
10DC  4006 0000          254           STH   U0,0(U6LOOP)       STORE TEST PATTERN                        B1601870
10E0  4506 0000          255           CLH   U0,0(U6LOOP)       SEE IF DATA IN CORE                       B1601880
10E4  2257               256           BES   MEMLOOP            LOOP IF NOT FOUND                         B1601890
                         257  *                                                                           B1601900
                         258  *.........GET FILE SIZE. IF TOO BIG, TRUNCATE TO                           B1601910
                         259  *         ACCEPTABLE SIZE AND LOAD IT                                       B1601920
                         260  *                                                                           B1601930
           10E6          261  TOPFOUND EQU   *                                                            B1601940
10E6  48AE 000C          262           LH    UALSECN,DIR.FLBA(UELINK)    PICK UP FILE 1ST LBA          B1601950
10EA  48CE 000E          263           LH    UCLSECN,DIR.FLBA+2(UELINK)                                   B1601960
10EE  480E 0010          264           LH    U0,DIR.LLBA(UELINK)   PICK UP FILE LAST LBA                  B1601970
10F2  481E 0012          265           LH    U1,DIR.LLBA+2(UELINK)                                        B1601980
10F6  0B1C               266           SHR   U1,UCLSECN         COMPUTE FILE SIZE                         B1601990
10F8  0F0A               267           SCHR  U0,UALSECN                                                   B1602000
10FA  07FF               268           XAR   UF,UF              ZERO REG FOR ACHR                         B1602010
10FC  2611               269           AIS   U1,1                                                         B1602020
10FE  0E0F               270           ACHR  U0,UF                                                        B1602030
1100  ED00 0008          271           SLL   U0,8               * 256=END ADDRESS OF OS                   B1602040
1104  CB60 02BE          272           SHI   U6LOOP,LASTLOC-SEGMENT3 COMPUTE MAX LOADABLE ADDRESS         B1602050
1108  0800               273           LDAR  U0,U0              IS FILE TOO BIG ?                         B1602060
```

BOOTSTRAP LOADER / RELOCATABLE SEGMENT 2

```
110A  2334                 BZS   XX.190                   BRANCH NO                      B1602070
110C  0886       XX.180    LHR   U8ENDA,U6LOOP                                           B1602080
110E  0816                 LDAR  U1,U6LOOP                GET NEW BIAS                   B1602090
1110  2304                 BS    XX.200                                                  B1602100
1112  0516       XX.190    CLHR  U1,U6LOOP                IS FILE TOO BIG?               B1602110
1114  2284                 BNLS  XX.180                                                  B1602120
1116  0881                 LHR   U8ENDA,U1                                               B1602130
1118  0777       XX.200    XAR   U7STARTA,U7STARTA        SET OS LOAD ADR                B1602140
111A  2781                 SIS   U8ENDA,1                 POINT TO LAST BYTE TO BE READ  B1602150
111C  C8D1 EEC0            LDAI  UDBIAS,-SEGMENT3(U1) SET BIAS OF MOVED LOADER           B1602160
1120  C8F0 1140            LDAI  UF,SEGMENT3                                             B1602170
1124  480F 0000  RELOCATE  LDA   U0,0(UF)                 RELOCATE SEGMENT 3             B1602180
1128  4001 0000            STA   U0,0(U1)                                                B1602190
112C  26F2                 AIS   UF,ADC                                                  B1602200
112E  2612                 AIS   U1,ADC                                                  B1602210
1130  C5F0 13FE            CLAI  UF,LASTLOC                                              B1602220
1134  2088                 BLS   RELOCATE                                                B1602230
1136  0AED                 AAR   UELINK,UDBIAS                                           B1602240
1138  40ED 12F4            STA   UELINK,FDPOINT(UDBIAS)                                  B1602250
113C  430D 1140            B     SEGMENT3(UDBIAS)                                        B1602260
```

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                  1140              295  SEGMENT3 EQU     *                                                    B1602280
1140    41ED 1188                   296           BAL     UELINK,READ(UDBIAS) READ OS                          B1602290
1144    D1ED 15F6                   297           LM      UELINK,SAVE(UDBIAS)                                  B1602300
1148    D0E0 0078                   298           STM     UELINK,X'78'        RESTORE 78-7B                    B1602310
114C    D1ED 15FA                   299           LM      UELINK,SAVE2(UDBIAS)                                 B1602320
1150    D0E0 007C                   300           STM     UELINK,X'7C'        RESTORE X'7C'-X'7F'              B1602330
1154    4810 0062                   301           LH      U1,ADR.SPT          GET A(SPT)                       B1602340
1158    486D 12F4                   302           LH      U6LOOP,FDPOINT(UDBIAS)                               B1602350
115C    D1A6 0000                   303           LM      UALSECN,DIR.FNM(U6LOOP)                              B1602360
1160    D0A1 0030                   304           STM     UALSECN,SPT.OVFD+4(U1)                               B1602370
1164    D1E6 000C                   305           LM      UELINK,DIR.FLBA(U6LOOP)  MOVE FILE FLBA              B1602380
1168    D0E1 0028                   306           STM     UELINK,SPT.FLBA(U1)   INTO SPT                       B1602390
116C    4300 0060                   307           B       OSINITA             BRANCH TO THE OPERATING SYSTEM   B1602400
                                    308  *                                                                    B1602410
                                    309  *........DOUBLE PRECISION DIVIDE SUBROUTINE                          B1602420
                                    310  *                                                                    B1602430
                                    311  *        REG   USE                                                   B1602440
                                    312  *        ---   ---                                                   B1602450
                                    313  *        0     WORK REGISTER                                         B1602460
                                    314  *        A     DIVIDEND MSB                                          B1602470
                                    315  *        B     DIVISOR   MSB                                         B1602480
                                    316  *        C     DIVIDEND  LSB                                         B1602490
                                    317  *        E     LINK                                                  B1602500
                                    318  *        F     DIVISOR   LSB                                         B1602510
                                    319  *                                                                    B1602520
1170    0700                        320  DD       XHR     U0,U0                                                B1602530
1172    078B                        321           XAR     UBSECN,UBSECN       GET A ZERO                       B1602540
1174    0BCF                        322  DL1      SHR     UCLSECN,UF                                           B1602550
1176    0FAB                        323           SCHR    UALSECN,UBSECN                                       B1602560
1178    2113                        324           BMS     DL2                                                  B1602570
117A    2601                        325           AIS     U0,1                                                 B1602580
117C    2204                        326           BS      DL1                                                  B1602590
117E    0ACF                        327  DL2      AHR     UCLSECN,UF                                           B1602600
1180    0EAB                        328           ACHR    UALSECN,UBSECN                                       B1602610
1182    08AC                        329           LDAR    UALSECN,UCLSECN     UA=REMAINDER                     B1602620
1184    08C0                        330           LDAR    UCLSECN,U0          UC=ANSWER                        B1602630
1186    030E                        331           BR      UELINK                                               B1602640
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                  1188              333  READ     EQU   *                                          B1602660
1188   DE2D 121E                    334            OC    U2SELCH,SHSTOP(UDBIAS) STOP THE SELCH      B1602670
118C   C550 0033                    335            CLHI  U5DEVCD,51                                 B1602680
1190   422D 11EC                    336            BP    RDSK2(UDBIAS)                              B1602690


                                    338  *----------------------------DIABLO DISK INPUT ROUTINE    B1602710


1194   DE3D 121E                    340  RDSK1    OC    U3CTRL,CTRESET(UDBIAS) RESET CONTROLLER    B1602730
1198   9D3F                         341  WAIT10   SSR   U3CTRL,UF           CTRL IDLE ?             B1602740
119A   2221                         342            BFBS  2,WAIT10                                   B1602750
                  119C              343  WAIT15   EQU   *                                          B1602760
119C   9D4F                         344            SSR   U4DEV,UF           DEVICE UNAVAILABLE?     B1602770
119E   421D 12B8                    345            BTC   1,DEVER(UDBIAS)    YES,ERROR               B1602780
11A2   C3F0 0010                    346            THI   UF,X'10'                                   B1602790
11A6   2035                         347            BNZS  WAIT15                                     B1602800
11A8   D0AD 13EA                    348            STM   UALSECN,RSAVE(UDBIAS)    SAVE REGISTERS    B1602810
11AC   C8F0 0030                    349            LHI   UF,48               INIT DIVISOR LSB'S      B1602820
                  11AF              350  SHGORD   EQU   *-1                 SELCH GO/READ COMMAND   B1602830
11B0   41ED 1170                    351            BAL   UELINK,UD(UDBIAS)  CALL DOUB.DIV.          B1602840
11B4   089C                         352            LHR   U9CYLN,UCLSECN                             B1602850
11B6   08BA                         353            LHR   UBSECN,UALSECN     REMAINDER TO SECTOR NUM B1602860
11B8   48AD 13EA                    354            LH    UALSECN,RSAVE(UDBIAS)    RESTORE LOG SEC NUM B1602870
11BC   48CD 13EE                    355            LH    UCLSECN,RSAVE+4(UDBIAS)                  B1602880
11C0   D1ED 13F2                    356            LM    UELINK,RSAVE+8(UDBIAS)                   B1602890
11C4   C5B0 0018                    357            CLHI  UBSECN,24           IS IT IN TRACK 0        B1602900
11C8   2182                         358            BLS   RDKLOOP1            YES, USE HEADER 0       B1602910
11CA   26B8                         359            AIS   UBSECN,8            NO, USE HEADER 1        B1602920
11CC   9849                         360  RDKLOOP1 WHR   U4DEV,U9CYLN         SEND CYLN NO TO DISK    B1602930
11CE   DE4D 12E7                    361            OC    U4DEV,U1SEEK(UDBIAS) SEEK                  B1602940
11D2   9D3F                         362  WAIT11   SSR   U3CTRL,UF           CONTROLLER IDLE ?       B1602950
11D4   2221                         363            BFBS  2,WAIT11           NO, WAIT                B1602960
11D6   9D4F                         364  WAIT12   SSR   U4DEV,UF           SEEK INCOMPLETE ?       B1602970
11D8   427D 12B8                    365            BTC   7,DEVER(UDBIAS)    YES, ERROR              B1602980
11DC   2083                         366            BTBS  8,WAIT12           DISC NOT READY ?        B1602990
11DE   9827                         367            WHR   U2SELCH,U7STARTA                           B1603000
11E0   9828                         368            WHR   U2SELCH,U8ENDA                             B1603010
11E2   9849                         369            WHR   U4DEV,U9CYLN                               B1603020
11E4   9A3B                         370            WDR   U3CTRL,UBSECN                              B1603030
11E6   416D 127A                    371            BAL   U6LOOP,DKCOMMON(UDBIAS) GO TO COMMON PATH B1603040
11EA   220F                         372            BS    RDKLOOP1           LOOP                    B1603050
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BOOTSTRAP LOADER / RELOCATABLE SEGMENT 3

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                          374  *----------------------------40, 66, 256 MB DISC INPUT ROUTINE          B1603070


                    11EC  376  RDSK2   EQU   *                                                       B1603090
11EC  9D4F          11EC  377          SSR   U4DEV,UF                                                B1603100
11EE  C3F0 0019     11F0  378          THI   UF,X'19'          SAFE ? READY ? ON-LINE ?              B1603110
11F2  423D 12B8     11F4  379          BNZ   DEVER(UDBIAS)                                           B1603120
11F6  D0AD 15EA     11F8  380          STM   UALSECN,RSAVE(UDBIAS)    SAVE REGISTERS                 B1603130
11FA  C8F5 FFCC     11FC  381          LHI   UF,-52(U5DEVCD)    FORM INDEX INTO SPC TABLE            B1603140
11FE  0AFF          11FF  382          AAR   UF,UF              HALFWORD TABLE                       B1603150
1200  48FF 12EC     1202  383          LH    UF,SPC(UF)         PICK UP # OF SECTORS PER CYLINDER    B1603160
1204  41ED 1170     1206  384          BAL   UELINK,DD(UDBIAS)  CALL DOUB.DIV.                       B1603170
1208  089C          1209  385          LHR   U9CYLN,UCLSECN     QUOTIENT TO CYL NUM                  B1603180
120A  08CA          120B  386          LDAR  UCLSECN,UALSECN    GET HEAD/SECTOR                      B1603190
120C  07AA          120D  387          XAR   UALSECN,UALSECN                                         B1603200
120E  C8F5 FFCC     1210  388          LHI   UF,-52(U5DEVCD)    FORM INDEX INTO SPT TABLE            B1603210
1212  D5FF 12E8     1214  389          LB    UF,SPTT(UF)        PICK UP # OF SECTORS PER TRACK       B1603220
1216  41ED 1170     1218  390          BAL   UELINK,DD(UDBIAS)  CALL DOUB. DIV.                      B1603230
121A  40CD 12F2     121C  391          STH   UCLSECN,HEADN(UDBIAS)                                   B1603240
                    121E  392  SHSTOP  EQU   *                  SELCH STOP COMMAND                   B1603250
121E  08BA          121F  393          LHR   UBSECN,UALSECN     REMAINDER TO SECTOR NUM              B1603260
1220  48AD 15EA     1222  394          LH    UALSECN,RSAVE(UDBIAS)    RESTORE LOG SEC NUM           B1603270
1224  48CD 15EE     1226  395          LH    UCLSECN,RSAVE+4(UDBIAS)                                 B1603280
1228  D1ED 15F2     122A  396          LM    UELINK,RSAVE+8(UDBIAS)                                  B1603290
                    122C  397  RDKLOOP2 EQU   *                                                     B1603300
122C  DE4D 126E     122E  398          OC    U4DEV,D2RATTN(UDBIAS) RESET ATTENTION FLIP FLOP       B1603310
1230  9D3F          1231  399  WAIT21  SSR   U3CTRL,UF          CONTROLLER IDLE ?                    B1603320
1232  2221          1233  400          BFBS  2,WAIT21                                                B1603330
1234  9849          1235  401          WHR   U4DEV,U9CYLN       SEND CYL NO                          B1603340
1236  DE4D 12D0     1238  402          OC    U4DEV,D2SETCYL(UDBIAS) SET CYLINDER                   B1603350
123A  9D3F          123B  403  WAIT22  SSR   U3CTRL,UF          CTRL IDLE ?                          B1603360
123C  2221          123D  404          BFBS  2,WAIT22                                                B1603370
123E  DE4D 12A2     1240  405          OC    U4DEV,D2RHEAD(UDBIAS)  CLEAR HEAD REG.                  B1603380
1242  9D3F          1243  406  WAIT23  SSR   U3CTRL,UF          CTRL IDLE ?                          B1603390
1244  2221          1245  407          BFBS  2,WAIT23           NO, WAIT                             B1603400
1246  D84D 12F2     1248  408          WH    U4DEV,HEADN(UDBIAS)     SEND HEAD NUMBER              B1603410
124A  DE4D 12D1     124C  409          OC    U4DEV,D2SETHED(UDBIAS)  ST HEAD                       B1603420
124E  9D3F          124F  410  WAIT24  SSR   U3CTRL,UF          CTRL IDLE ?                          B1603430
1250  2221          1251  411          BFBS  2,WAIT24                                                B1603440
1252  DE4D 12E7     1254  412          OC    U4DEV,D2SEEK(UDBIAS) SEEK                               B1603450
1256  9D3F          1257  413  WAIT25  SSR   U3CTRL,UF          CTRL IDLE ?                          B1603460
1258  2221          1259  414          BFBS  2,WAIT25                                                B1603470
125A  9D4F          125B  415  WAIT26  SSR   U4DEV,UF                                               B1603480
125C  2081          125D  416          BTBS  8,WAIT26                                                B1603490
125E  C3F0 0053     1260  417          THI   UF,X'53'           ERROR ?                              B1603500
1262  423D 12B8     1264  418          BNZ   DEVER(UDBIAS)                                           B1603510
1266  48FD 12F2     1268  419          LH    UF,HEADN(UDBIAS)                                        B1603520
126A  91FA          126B  420          SLLS  UF,10                                                   B1603530
126C  06F9          126D  421          OAR   UF,U9CYLN                                               B1603540
                    126E  422  D2RATTN EQU   *                  RESET GATED ATTN COMMAND             B1603550
126E  C86D 122C     1272  423          LDAI  U6LOOP,RDKLOOP2(UDBIAS)                                 B1603560
1272  9827          1273  424          WHR   U2SELCH,U7STARTA                                        B1603570
```

BOOTSTRAP LOADER / RELOCATABLE SEGMENT 3

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1274   9828                425          WHR    U2SELCH,U8ENDA                B1603580
1276   9A3B                426          WDR    U3CTRL,UBSECN                 B1603590
1278   983F                427          WHR    U3CTRL,UF                     B1603600
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BOOTSTRAP LOADER / RELOCATABLE SEGMENT 3

```
                         429  *------------------------------DISK COMMON ROUTINE                                  B1603620


                    127A 431  DKCOMMON EQU   *                                                                  B1603640
127A  DE3D 12E6     432          OC     U3CTRL,CTREAD(UDBIAS)     READ -> CTRL                                B1603650
127E  DE2D 11AF     433          OC     U2SELCH,SHGORD(UDBIAS)    GO & READ -> SELCH                          B1603660
1282  9D2F          434  WAIT31  SSR    U2SELCH,UF                SELCH BUSY ?                                B1603670
1284  2081          435          BTBS   8,WAIT31                                                               B1603680
1286  DE2D 121E     436          OC     U2SELCH,SHSTOP(UDBIAS)    STOP SELCH                                  B1603690
128A  9920          437          RHR    U2SELCH,U0                READ THE RESTR OF END ADR (0:16 <-0)        B1603700
128C  DE2D 121E     438          OC     U2SELCH,SHSTOP(UDBIAS)                                                  B1603710
1290  9D3F          439  WAIT32  SSR    U3CTRL,UF                 CTRL IDLE ?                                 B1603720
1292  2221          440          BFBS   2,WAIT32                                                               B1603730
1294  421D 12BC     441          BTC    1,CTRLER(UDBIAS)          DATA TRANSFER ERROR                         B1603740
1298  C3F0 0010     442          THI    UF,X'10'                  CYLINDER OVERFLOW                           B1603750
129C  033E          443          BZR    UELINK                    NO, RETURN                                  B1603760
129E  0B07          444          SAR    U0,U7STARTA               U0 = LENGTH OF DATA BLK READ - ADC          B1603770
12A0  2602          445          AIS    U0,ADC                                                                B1603780
                    12A2 446  D2RHEAD  EQU   *                     RESET HEAD REGISTER COMMAND                 B1603790
12A2  C400 FF00     447          NHI    U0,X'FF00'                ADJUST TO 256-BYTE BOUNDARY                 B1603800
12A6  0A70          448          AAR    U7STARTA,U0               GET NEW START ADR                           B1603810
12A8  2691          449          AIS    U9CYLN,1                  ADD CYL NO BY 1                             B1603820
12AA  07BB          450          XAR    UBSECN,UBSECN                                                         B1603830
12AC  40BD 12F2     451          STH    UBSECN,HEADN(UDBIAS)                                                  B1603840
12B0  0306          452          BR     U6LOOP                                                                B1603850
12B2  24F1          453  E.1     LIS    UF,1                                                                  B1603860
12B4  2410          454          LIS    U1,0                                                                  B1603870
12B6  2304          455          BS     ERCOM                                                                 B1603880
12B8  0814          456  DEVER   LDAR   U1,U4DEV                                                              B1603890
12BA  2302          457          BS     ERCOM                                                                 B1603900
12BC  0813          458  CTRLER  LDAR   U1,U3CTRL                                                             B1603910
12BE  2401          459  ERCOM   LIS    U0,1                      ADDRESS THE DISPLAY                         B1603920
12C0  DE0D 10DC     460          OC     U0,INCRCN(UDBIAS)                                                     B1603930
12C4  9A0F          461          WDR    U0,UF                                                                 B1603940
12C6  9A01          462          WDR    U0,U1                                                                 B1603950
12C8  DE0D 12E5     463          OC     U0,NORMCN(UDBIAS)                                                     B1603960
12CC  D1ED 13F6     464          LM     UELINK,SAVE(UDBIAS)                                                   B1603970
                    12D0 465  D2SETCYL EQU   *                     SET CYLINDER NUMBER COMMAND                 B1603980
                    12D1 466  D2SETHED EQU   *+1                   SET HEAD NUMBER COMMAND                     B1603990
12D0  DDE0 0078     467          STM    UELINK,X'78'                                                          B1604000
12D4  D1ED 13FA     468          LM     UELINK,SAVE2(UDBIAS)                                                  B1604010
12D8  DDE0 007C     469          STM    UELINK,X'7C'                                                          B1604020
12DC  910F          470          SLLS   U0,15                     GET A X'8000'                               B1604030
12DE  9510          471  HANGWAIT EPSR   U1,U0                    HANG IT UP                                  B1604040
12E0  2201          472          BS     HANGWAIT                  DO IT AGAIN                                 B1604050
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BOOTSTRAP LOADER / RELOCATABLE SEGMENT 3

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                                                                                 B1604070
                     *                                                           B1604080
                     *..........STORAGE AND CONSTANTS                            B1604090
                     *          THE DS PSEUDO-OP MAY NOT BE USED                 B1604100
                     *                                                           B1604110
12E2  000000         VERS      DB     0,0,0                                      B1604120
12E5  80             NORMCN    DB     X'80'                                      B1604130
           121E      CTRESET   EQU    SHSTOP          CONTROLLER RESET COMMAND   B1604140
12E6  C1             CTREAD    DB     X'C1'                                      B1604150
                     * DISC COMMANDS FOR 2.5-10 AND 40 MB FILES RESPECTIVELY     B1604160
12E7  C2             D1SEEK    DB     X'C2'                                      B1604170
           12E7      D2SEEK    EQU    D1SEEK                                     B1604180
12E8  144040         SPTI      DB     20,64,64                                   B1604190
12EC  0190           SPC       DC     H'400'          52                         B1604200
12EE  0140                     DC     H'320'          53                         B1604210
12F0  04C0                     DC     H'1216'         54                         B1604220
12F2  0000           HEADN     DC     0                                          B1604230
12F4  0000           FDPOINT   DC     A(0)                                       B1604240
           12F6      LOADLAST  EQU    *               LAST LOCATION TO LOAD      B1604250
                     *                                                           B1604260
           13EA      RSAVE     EQU    *+DIRB                                     B1604270
           12F6      VDBUF     EQU    *                                          B1604280
           13F5      VDBUFE    EQU    VDBUF+255                                  B1604290
           13F6      SAVE      EQU    VDBUF+256       SAVE FOR X'78'-X'7B'       B1604300
           13FA      SAVE2     EQU    SAVE+4          SAVE FOR X'7C'-X'7F'       B1604310
           13FE      LASTLOC   EQU    SAVE2+4         LAST LOCATION TO RELOCATE  B1604320
12F6                           END
```

BOOTSTRAP LOADER / RELOCATABLE SEGMENT 3

NO ERRORS

CAL/16 00-00

ABSTOP	12F6				
ADC	0002	287	288	445	
ADR.SPT	0062	301			
BOOTADR	1000	159	163		
BOOTSTRT	100E	161			
BOTRANGE	0FFC				
CNV	1000	184			
CTREAD	12E6	432			
CTRESET	121E	340			
CTRLA	007C	198			
CTRLER	12BC	441			
D1SEEK	12E7	361	484		
D2RATTN	126E	398			
D2RHEAD	12A2	405			
D2SEEK	12E7	412			
D2SETCYL	12D0	402			
D2SETHED	12D1	409			
DD	1170	351	384	390	
DEVA	007A	199			
DEVCD	007B	200			
DEVER	12B8	345	365	379	418
DIR	0030	110	220		
DIR.ATRB	0024	217			
DIR.BKSZ	0025				
DIR.CSEC	0028				
DIR.DATE	0018				
DIR.EXT	0008	238	241		
DIR.FLBA	000C	262	263	305	
DIR.FLRO	0026				
DIR.FNM	0000	233	236	303	
DIR.INBS	0026				
DIR.KEYS	0014				
DIR.LLBA	0010	264	265		
DIR.LRCL	0016				
DIR.LUSE	001C				
DIR.RCNT	0022				
DIR.RKEY	0015				
DIR.VERS	000B				
DIR.WCNT	0020				
DIR.WKEY	0014				
DIRA.ACM	0010	218			
DIRB	00F4	493			
DKCOMMON	127A	371			
DL1	1174	326			
DL2	117E	324			
E.1	12B2	228			
ERCOM	12BE	455	457		
EXT	007E	185	189	193	
FDPOINT	12F4	292	302		
HANGWAIT	120E	472			

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HEADN	12F2	391	408	419	451									
IMPTOP	0000R													
INCRCN	10DC	460												
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BOOTSTRAP LOADER / RELOCATABLE SEGMENT 3

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