



```

LL      AAAAAA  LL      000000  AAAAAA  DDDDDDD  EEEEEEEEE  RRRRRRR
LL      AAAAAA  LL      000000  AAAAAA  DDDDDDD  EEEEEEEEE  RRRRRRR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EEEEEEE  RRRRRRR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EEEEEEE  RRRRRRR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LL      AA      AA  LL      00      00  AA      AA  DD      DD  EE      EE  RR      RR
LLLLLLLLLL AA      AA  LLLLLLLLL 000000  AA      AA  DDDDDDD  EEEEEEEEE  RR      RR
LLLLLLLLLL AA      AA  LLLLLLLLL 000000  AA      AA  DDDDDDD  EEEEEEEEE  RR      RR

```

```

LL      IIIIII  SSSSSSS
LL      IIIIII  SSSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SSSSSS
LL      II      SSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
LL      IIIIII  SSSSSSS
LLLLLLLLLL IIIIII  SSSSSSS

```

```

....
....
....
....

```

(2)	49	DECLARATIONS
(3)	151	MAIN PROGRAM
(4)	203	PMBAST - MAILBOX AST ROUTINE
(5)	302	PWRRECAST - POWER RECOVERY AST ROUTINE
(6)	375	LOADMC - ROUTINE TO LOAD MICROCODE
(7)	480	SETCLOCK - ROUTINE TO SET LPA-11 CLOCK
(8)	527	ASSIGNRMB - ASSIGN A CHANNEL TO RETURN MAILBOX

```

0000 1      .TITLE  LALoader
0000 2      .IDENT  'V04-000'
0000 3
0000 4
0000 5      *****
0000 6      *
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0000 23     *  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.
0000 24     *
0000 25     *
0000 26     *****
0000 27
0000 28
0000 29     **
0000 30     FACILITY:      LPA-11 UTILITY PROGRAMS
0000 31
0000 32     ABSTRACT:
0000 33     THIS PROGRAM IS THE LPA-11 MICROCODE LOADER. IT LOADS MICROCODE
0000 34     WHEN REQUESTED BY A MAILBOX REQUEST AND RELOADS MICROCODE AFTER
0000 35     A POWER RECOVERY.
0000 36
0000 37     ENVIRONMENT:  USER MODE
0000 38
0000 39     AUTHOR:   STEVE BECKHARDT,      CREATION DATE:  4-OCT-78
0000 40
0000 41     MODIFIED BY:
0000 42
0000 43     V02-003 SRB0003      Steve Beckhardt      3-Sep-1980
0000 44     Changed microcode version number in mode word of initialize
0000 45     command from 4 to 5.
0000 46
0000 47     --

```

DECLARATIONS

```

0000 49      .SBTTL  DECLARATIONS
0000 50      :
0000 51      : INCLUDE FILES:
0000 52      :
0000 53      $DIBDEF      : DIB OFFSETS
0000 54      $LADEF      : LPA-11 DEFINITIONS
0000 55      :
0000 56      :
0000 57      : MACROS:
0000 58      :
0000 59      :
0000 60      :
0000 61      : EQUATED SYMBOLS:
0000 62      :
0000 63      :
00000001 0000 64 CLKMODE = 1      ; SET CLOCK MODE WORD
00000141 0000 65 CLKSTATUS = ^X141 ; SET CLOCK STATUS WORD
00000001 0000 66 DEFCLKRATE = 1    ; DEFAULT CLOCK RATE (1 MHZ)
FFFFFF9C 0000 67 DEFPRESET = -100 ; DEFAULT CLOCK PRESET
0000 68      :
000000D6 0000 69 DEVNFD = ^O326      ; DEVICE NOT FOUND ERROR (INITIALIZE QIO)
0000 70      :
00001100 0000 71 PROTMASK = ^X1100   ; MAILBOX PROTECTION MASK
0000 72      :
00000008 0000 73 MINMSGsiz = 8      ; MINIMUM MESSAGE SIZE
0000 74      :
0000 75      : OFFSETS INTO MAILBOX
0000 76      :
00000000 0000 77 MBX$L_TYPE = 0      ; MESSAGE TYPE
00000004 0000 78 MBX$B_CTRLR = 4    ; CONTROLLER LETTER
00000005 0000 79 MBX$B_MCTYPE = 5  ; MICROCODE TYPE
00000006 0000 80 MBX$W_RMBUNIT = 6   ; RETURN MAILBOX UNIT NUMBER
0000 81      :
0000 82      :
0000 83      : OWN STORAGE:
0000 84      :
0000 85      :
00000000 0000 86      .PSECT  _LPA$DATA, LONG
0000 87      :
00000000 0000 88 CNTRLR_TBL:      ; CONTROLLER TABLE
00000000 0000 89      .LONG  0
0000000C 0000 90      :
0000000C 0000 91 LAIOSB: .BLKQ  1    ; LPA-11 I/O STATUS BLOCK
0000 92      :
00000014 0000 93 PMBIOSB:      ;
00000014 0000 94      .BLKQ  1    ; PERM. MAILBOX I/O STATUS BLOCK
0000 95      :
0000 96      :
0000 97      :
0000 98      :
0000 99      :
0000 100     LACHAN:      ; LPA-11 CHANNEL
0000 101     .WORD  0
0000 102     :
0000 103     INITTBL:    ; TABLE FOR INITIALIZE QIO
0500 104     .WORD  ^X0500 ; MODE WORD (INCLUDES UCODE VERSION NUMBER)
00000030 001C 105     .BLKW  10 ; SPACE FOR TEN DEVICE ADDRESSES

```

```

$ST
ASS
CHA
CHA
CHA
CLK
CLK
CNT
DEF
DEF
DEV
DEV
DIB
DMD
INI
IOS
IOS
IOS
IOS
IOS
IOS
IOS
IOS
IOS
IOS
IOS
LAS
LAS
LAS
LAS
LAS
LAS
LAS
LAC
LAC
LAI
LAN
LAN
LAN
LOA
LPA
LPA
LPA
LPA
MBX
MBX
MBX
MBX
MIN
PMB
PMB
PMB
PMB
PMB
PRO
PWR
RMB
SET

```

DECLARATIONS

```
00000130 0030 106 DMDT: .BLKB 256 ; DEDICATED MODE DISPATCH TABLE
          0130 107
          0130 108 CHANBFR: ; BUFFER FOR CHANNEL CHARACTERISTICS
0000013C 0130 109 ;BLKB DIB$L DEVDEPEND+4
0000000C 013C 110 CHANBFRSIZ = .-CHANBFR
          013C 111
0000015C 013C 112 MBXBFR: .BLKB 32 ; MAILBOX BUFFER
          015C 113
          41 4C 015C 114 LANAME: .ASCII 'LA' ; LPA-11 DEVICE NAME
          015E 115 LACTRLR:
          20 015E 116 .ASCII ' ' ; SPACE FOR CONTROLLER LETTER
          30 015F 117 .ASCII '0' ; UNIT ZERO
00000004 0160 118 LANAMESIZ = .-LANAME
          0160 119
```

LAL  
Pse

PSE  
---  
\_SAB  
\_LF  
\_LF

Pha  
---  
Ini  
COW  
Pas  
Syn  
Pas  
Syn  
Pse  
Crc  
Ass

The  
206  
The  
589  
22

Mac  
---  
\_S2  
235  
The  
MAC

DECLARATIONS

```

00000000 121      .PSECT  _LPA$CODE, NOWRT, LONG
          0000 122
          0000 123 PMBNAMDSC:      ; PERMANENT MAILBOX NAME DESCRIPTOR
0000000A' 0000 124      .LONG  PMBNAMSIZ
0000002C' 0004 125      .LONG  PMBNAM
          0008 126
          0008 127 LANAMEDSC:      ; LPA-11 DEVICE NAME DESCRIPTOR
00000004' 0008 128      .LONG  LANAMESIZ
0000015C' 000C 129      .LONG  LANAME
          0010 130
          0010 131 CHANBFRDSC:      ; CHANNEL CHARACTERISTICS BUFFER DESCRIPTOR
0000000C' 0010 132      .LONG  CHANBFRSIZ
00000130' 0014 133      .LONG  CHANBFR
          0018 134
          0018 135
          0018 136 DEVTBL:      ; TABLE OF DEVICE ADDRESS FOR INITIALIZE QIO
          0018 137      .WORD  ^0170404 ; CLOCK A
          F11A 001A 138      .WORD  ^0170432 ; CLOCK B
          F100 001C 139      .WORD  ^0170400 ; A/D #1
          F120 001E 140      .WORD  ^0170440 ; A/D #2
          F110 0020 141      .WORD  ^0170420 ; D/A
          EFF8 0022 142      .WORD  ^0167770 ; DIGITAL I/O #1
          EFF0 0024 143      .WORD  ^0167760 ; DIGITAL I/O #2
          EFE8 0026 144      .WORD  ^0167750 ; DIGITAL I/O #3
          EFE0 0028 145      .WORD  ^0167740 ; DIGITAL I/O #4
          EFD8 002A 146      .WORD  ^0167730 ; DIGITAL I/O #5
          002C 147
52 45 44 41 4F 4C 24 41 50 4C 002C 148 PMBNAM: .ASCII 'LPA$LOADER' ; PERMANENT MAILBOX NAME
0000000A 0036 149 PMBNAMSIZ = .-PMBNAM

```

MAIN PROGRAM

```

0036 151      .SBTTL MAIN PROGRAM
0036 152      :++
0036 153      : FUNCTIONAL DESCRIPTION:
0036 154      :
0036 155      : THIS IS THE MAIN PROGRAM FOR THE LPA-11 MICROCODE LOADER.
0036 156      : IT PERFORMS SOME INITIALIZATION, SPECIFIES A POWER RECOVERY AST,
0036 157      : CREATES A MAILBOX, SPECIFIES A MAILBOX AST, AND THEN HIBERNATES.
0036 158      : ALL SUBSEQUENT PROCESSING IS PERFORMED IN ONE OF THE TWO AST ROUTINES.
0036 159      :
0036 160      : CALLING SEQUENCE:
0036 161      :
0036 162      : ENTERED WHEN PROGRAM IS STARTED
0036 163      :
0036 164      : INPUT PARAMETERS:
0036 165      :
0036 166      : NONE
0036 167      :
0036 168      : OUTPUT PARAMETERS:
0036 169      :
0036 170      : NONE
0036 171      :
0036 172      :--
0036 173
003C 0036 174      .ENTRY START,^M<R2,R3,R4,R5>
0038 175
0038 176      : PERFORM INITIALIZATION
0038 177      CLR  CNTRLR TBL          ; CLEAR CONTROLLER TABLE
003E 178      MOV  #256,LPA$$DMDT,DMDT ; COPY DED. MODE DISPATCH TABLE
0047
004C 179
004C 180      $SETSFM_S      #1          ; SET SYS. SERVICE FAILURE FXCP.
0055 181
0055 182      $SETPRA_S      PWRRECAST   ; SET POWER RECOVERY AST
0064 183
0064 184      : CREATE A PERMANENT MAILBOX AND MARK IT FOR DELETION TO CLEANUP
0064 185      : IF THIS PROCESS EXITS
0064 186      $CREMBX_S      PRMFLG = #1,-          ; PERMANENT
0064 187      CHAN = PMBCHAN,-          ; CHANNEL
0064 188      MAXMSG = #32,-          ; MAXIMUM MESSAGE SIZE
0064 189      BUFQUO = #64,-          ; BUFFER QUOTA
0064 190      PROMSK = #PROTMASK,-      ; PROTECTION MASK
0064 191      LOGNAM = PMBNAMDSC        ; LOGICAL NAME
0086 192
0086 193      $DELMBX_S      PMBCHAN
0094 194
0094 195      : SET UP MAILBOX AST
0094 196      $QIOW_S      FUNC = #IOS$ SETMODE!IOSM_WRTATTN,- ; FUNCTION
0094 197      CHAN = PMBCHAN,-          ; CHANNEL
0094 198      P1 = PMBAST              ; MAILBOX AST ADDRESS
0089 199
0089 200      : NOW HIBERNATE
0089 201      $HIBER_S

```



PMBAST - MAILBOX AST ROUTINE

```

00C0 203      .SBTTL  PMBAST - MAILBOX AST ROUTINE
00C0 204      :++
00C0 205      : FUNCTIONAL DESCRIPTION:
00C0 206      :
00C0 207      : THIS ROUTINE IS THE MAILBOX AST ROUTINE.  WAKING UP HERE MEANS
00C0 208      : A PROCESS HAS SENT US A MAILBOX REQUEST TO LOAD SOME MICROCODE.
00C0 209      : THE GENERAL FLOW IS TO READ THE MAILBOX, LOAD THE MICROCODE,
00C0 210      : AND OPTIONALLY SEND STATUS BACK.
00C0 211      :
00C0 212      : CALLING SEQUENCE:
00C0 213      :
00C0 214      : CALLS/G FROM AST DISPATCHER WHEN A MAILBOX WRITE OCCURS
00C0 215      :
00C0 216      : INPUT PARAMETERS:
00C0 217      :
00C0 218      : NONE
00C0 219      :
00C0 220      : OUTPUT PARAMETERS:
00C0 221      :
00C0 222      : NONE
00C0 223      :
00C0 224      :--
003C 00C0 225      :
00C0 226      .ENTRY  PMBAST, ^M<R2,R3,R4,R5>
00C2 227      :
00C2 228 10$:  : ENABLE SYSTEM SERVICE FAILURE EXCEPTIONS
00C2 229      $SETSFM_S      #1
00CB 230      :
00CB 231 15$:  : READ MAILBOX
00CB 232      $QIOW_S      FUNC = #IOS$ READVBLK!IOSM_NOW,- ; FUNCTION
00CB 233      CHAN = PMBCRAN,- ; CHANNEL
00CB 234      IOSB = PMBIOSB,- ; I/O STATUS BLOCK
00CB 235      P1 = MBXBFR,- ; BUFFER ADDRESS
00CB 236      P2 = #32 ; BUFFER SIZE
00F4 237      :
00' 000000C'EF B1 00F4 238      CMPW  PMBIOSB,S^#SS$_NORMAL ; WAS THERE A MESSAGE THERE?
23 13 00FB 239      BEQL  20$ ; YES
00FD 240      :
00FD 241      : MAILBOX IS EMPTY - REENABLE MAILBOX ASTS AND HIBERNATE AGAIN
00FD 242      $QIOW_S      FUNC = #IOS$ SETMODE!IOSM_WRTATTN,- ; FUNCTION
00FD 243      CHAN = PMBCRAN,- ; CHANNEL
00FD 244      P1 = PMBAST ; MAILBOX AST ADDRESS
011F 245      :
04 011F 246      RET
0120 247      :
0120 248 20$:  : HAVE A MESSAGE - MAKE SURE IT'S AT LEAST MINIMUM SIZE
08 000000E'EF B1 0120 249      CMPW  PMBIOSB+2,#MINMSG$IZ
A2 1F 0127 250      BLSSU  15$ ; TOO SMALL -IGNORE
0129 251      :
0129 252      : MESSAGE SIZE IS OK - GET LPA CONTROLLER LETTER
52 00000140'EF 9A 0129 253      MOVZBL MBXBFR+MBX$B_CTRLR,R2 ; GET CONTROLLER LETTER
0000015E'EF 52 90 0130 254      MOVB  R2,LACTRLR ; STORE IN LANAME
52 D7 0137 255      DECL  R2 ; CONVERT TO BIT NUMBER
52 E0 8F 8A 0139 256      BICB  #^XEO,R2 ; FROM 0 TO 31
013D 257      :
013D 258      : DISABLE SYSTEM SERVICE FAILURE EXCEPTIONS
013D 259      $SETSFM_S

```

PMBAST - MAILBOX ASST ROUTINE

```

0146 260
0146 261 ; ASSIGN A CHANNEL TO SPECIFIED LPA-11
0146 262 $ASSIGN_S DEVNAM = LANAMEDSC,- ; DEVICE NAME
0146 263 CHAN = LACHAN ; CHANNEL
34 50 E9 0159 264 BLBC R0,50$ ; ERROR
015C 265
015C 266 ; GET MICROCODE TYPE AND LOAD MICROCODE
54 00000141'EF 9A 015C 267 MOVZBL MBXBFR+MBX$B_MCTYPE,R4 ; MICROCODE TYPE
0114 30 0163 268 BSBW LOADMC ; LOAD I?
13 50 E9 0166 269 BLBC R0,40$ ; ERROR
0169 270
0169 271 ; SET APPROPRIATE BIT IN CONTROLLER TABLE
00 00000000'EF 52 E2 0169 272 BBSS R2,CNTRLR_TBL,30$
0171 273
0171 274 30$: ; START CLOCK AT A DEFAULT RATE
54 01 9A 0171 275 MOVZBL #DEFCLKRATE,R4 ; DEFAULT CLOCK RATE
55 FF9C 8F 3C 0174 276 MOVZWL #DEFPRESET,R5 ; DEFAULT PRESET
0200 30 0179 277 BSBW SETCLOCK ; SET CLOCK
017C 278
017C 279 40$: ; DEASSIGN CHANNEL TO LPA
7E 50 7D 017C 280 MOVQ R0,-(SP) ; SAVE STATUS IN R0, R1
017F 281 $DASSGN_S LACHAN
50 8E 7D 018D 282 MOVQ -(SP)+,R0 ; RESTORE STATUS
0190 283
0190 284 50$: ; OPTIONALLY SEND STATUS IN R0 AND R1 BACK TO REQUESTOR
53 00000142'EF 3C 0190 285 MOVZWL MBXBFR+MBX$W_RMBUNIT,R3 ; GET UNIT # OF RETURN MAILBOX
40 13 0197 286 BEQL 60$ ; NO RETURN MAILBOX
0199 287
0000013C'EF 50 7D 0199 288 MOVQ R0,MBXBFR ; STORE STATUS IN BUFFER
01A0 289
0215 30 01A0 290 BSBW ASSIGNRMB ; ASSIGN A CHANNEL TO RETURN MAILBOX
33 50 E9 01A3 291 BLBC R0,60$ ; CAN'T ASSIGN CHANNEL
01A6 292
01A6 293 ; SEND REPLY
01A6 294 $QIOW_S FUNC = #IOS$ WRITEVBLK!IOSM_NOW,- ; FUNCTION
01A6 295 CHAN = RMBCHAN,- ; CHANNEL
01A6 296 P1 = MBXBFR,- ; BUFFER ADDRESS
01A6 297 P2 = #8 ; SIZE OF MESSAGE
01CB 298
FEE6 31 01CB 299 $DASSGN_S RMBCHAN ; DEASSIGN CHANNEL TO RETURN MAILBOX
01D9 300 60$: BRW -10$ ; DO NEXT REQUEST

```

LAI  
VO  
8  
6  
0  
8  
0  
6  
6  
2  
6  
8  
8  
6  
6  
6  
6  
0  
8  
8  
6  
6  
A  
8  
6  
6  
6  
6

```

01DC 302      .SBTTL PWRRECAST - POWER RECOVERY AST ROUTINE
01DC 303      :++
01DC 304      : FUNCTIONAL DESCRIPTION:
01DC 305      :
01DC 306      : THIS ROUTINE IS THE POWER RECOVERY AST ROUTINE. FOR EACH LPA-11
01DC 307      : CONTROLLER THAT HAS BEEN LOADED BY THIS LOADER (SAVED IN CNTRLR_TBL),
01DC 308      : THIS ROUTINE GETS THE DEVICE CHARACTERISTICS, LOADS THE SAME MICROCODE
01DC 309      : AS WAS LAST LOADED, AND SETS THE CLOCK TO THE LAST CLOCK RATE SET.
01DC 310      :
01DC 311      : CALLING SEQUENCE:
01DC 312      :
01DC 313      : CALLS/G FROM AST DISPATCHER WHEN POWER RECOVERY OCCURS
01DC 314      :
01DC 315      : INPUT PARAMETERS:
01DC 316      :
01DC 317      : NONE
01DC 318      :
01DC 319      : OUTPUT PARAMETERS:
01DC 320      :
01DC 321      : NONE
01DC 322      :--
003C 01DC 323      :
01DC 324      :.ENTRY PWRRECAST, ^M<R2,R3,R4,R5>
01DE 325      :
01DE 326      : REENABLE POWER RECOVERY ASTS
01DE 327      $SETPRA_S      PWRRECAST
01EA 328      :
01EA 329      : DISABLE SYSTEM SEH CE FAILURE EXCEPTIONS
01EA 330      $SETSPM_S
01F3 331      :
52 D4 01F3 332      CLRL R2 ; LOOP COUNTER
01F5 333      :
6F 00000000'EF 52 E1 01F5 334 10$: : WAS NEXT CONTROLLER LOADED?
01FD 335      BBC R2,CNTRLR_TBL,80$ ; BR. IF NO
01FD 336      :
53 52 40 8F 89 01FD 337      : YES, CONVERT NUMBER TO CONTROLLER LETTER
53 D6 0202 338      BISB3 #^X40,R2,R3 ; OR IN ^X40
0204 339      INCL R3 ; ADD 1
0204 340      :
0000015E'EF 53 90 0204 341      MOVB R3,LACTRLR ; MOVE CONTROLLER LETTER INTO LANAME
020B 342      :
020B 343      : ASSIGN A CHANNEL TO LPA-11
020B 344      $ASSIGN_S      DEVNAM = LANAMEDSC,- ; DEVICE NAME
020B 345      CHAN = LACHAN ; CHANNEL
4B 50 E9 021E 346      BLBC R0,80$ ; UNABLE TO ASSIGN A CHANNEL
0221 347      :
0221 348      : GET CHANNEL INFO.
0221 349      $GETCHN_S      PRIBUF = CHANBFRDSC,- ; BUFFER
0221 350      CHAN = LACHAN ; CHANNEL
22 50 E9 0239 351      BLBC R0,70$ ; ERROR
53 00000138'EF D0 023C 352      :
0243 353      MOVL CHANBFR+DIBSL_DEVDEPEND,R3 ; GET DEV. DEP. CHARACTERISTICS
0243 354      :
54 53 02 01 EF 0243 355      : LOAD MICROCODE
002F 30 0243 356      EXTZV #LASV_MCTYPE,#LASS_MCTYPE,R3,R4 ; GET MICROCODE TYPE IN R4
10 50 E9 0248 357      BSBW LOADMC
024B 358      BLBC R0,70$ ; ERROR

```

LA  
V0  
8  
E  
8  
7  
8  
5  
A  
A  
6  
5  
6  
8  
6  
9  
0  
2  
9  
9  
6  
1  
7  
2  
2  
3  
3  
4  
6  
7  
2

					024E	359	
					024E	360	
54	53	03	0D	EF	024E	361	: SET CLOCK RATE
55	53	10	10	EE	0253	362	EXTZV #LASV_RATE,#LASS_RATE,R3,R4 ; GET CLOCK RATE
			0121	30	0258	363	EXTV #LASV_PRESÉT,#LASS_PRESÉT,R3,R5 ; GET CLOCK PRESET
			00 50	E9	025B	364	BSBW SETCLOCK ; SET CLOCK RATE
					025E	365	BLBC R0,70\$ ; ERROR
					025E	366	70\$: \$DASSGN_S LACHAN ; DEASSIGN CHANNEL
	85	52	20	F2	026C	367	
					026C	368	80\$: AOBLS #32,R2,10\$ ; REPEAT FOR 32 CONTROLLERS
					0270	369	
					0270	370	: REENABLE SYSTEM SERVICE FAILURE EXCEPTIONS
					0270	371	\$SETSFM_S #1
				04	0279	372	
					0279	373	RET

LAL  
V04  
21  
44  
74  
60  
71  
30  
01  
30  
01  
21  
10  
21  
99  
61  
61  
63  
01  
5E  
24  
9A  
90  
61  
A1  
9A  
61  
61  
70  
E9

LOADMC - ROUTINE TO LOAD MICROCODE

```

027A 375 .SBTTL LOADMC - ROUTINE TO LOAD MICROCODE
027A 376 :++
027A 377 : FUNCTIONAL DESCRIPTION:
027A 378 :
027A 379 : THIS ROUTINE IS THE ACTUAL MICROCODE LOADER. IT DOES THE FOLLOWING:
027A 380 : 1) LOADS THE SPECIFIED MICROCODE
027A 381 : 2) STARTS THE MICROPROCESSOR
027A 382 : 3) INITIALIZES THE LPA-11. THE INITIALIZE IS REPEATED
027A 383 : UNTIL THE CORRECT DEVICE CONFIGURATION ON THE LPA'S
027A 384 : BUS IS FOUND.
027A 385 :
027A 386 : CALLING SEQUENCE:
027A 387 :
027A 388 : BSBW/B
027A 389 :
027A 390 : INPUT PARAMETERS:
027A 391 :
027A 392 : R4 CONTAINS MICROCODE TYPE TO LOAD:
027A 393 : 1 = MULTIREQUEST MODE
027A 394 : 2 = DEDICATED A/D MODE
027A 395 : 3 = DEDICATED D/A MODE
027A 396 :
027A 397 : IMPLICIT INPUTS:
027A 398 :
027A 399 : LACHAN CONTAINS CHANNEL NUMBER OF LPA-11
027A 400 :
027A 401 : OUTPUT PARAMETERS:
027A 402 :
027A 403 : R0 CONTAINS COMPLETION CODE
027A 404 : R1 CONTAINS SECOND LONGWORD OF I/O STATUS BLOCK ON I/O ERRORS
027A 405 :
027A 406 : COMPLETION CODES:
027A 407 :
027A 408 : VARIOUS SYSTEM STATUS RETURNS
027A 409 : SS$_BADPARAM IS RETURNED IF R4 DOES NOT CONTAIN A 1,2, OR 3
027A 410 :--
027A 411 :
027A 412 :
027A 413 :
027C 414 :
027C 415 :
50 0000000'EF 3E 027C 416 ; SEE WHICH TYPE OF MICROCODE IS SPECIFIED IN R4
01 54 D1 027C 417 MOVAW LPASSMRMCODE,R0 ; ASSUME MULTIREQUEST MODE
1F 13 0283 418 CML R4,#1 ; IS IT?
0286 419 BEQL 10$ ; YES
50 0000000'EF 3E 0288 420 MOVAW LPASSADMCCDE,R0 ; ASSUME DED. A/D MODE
02 54 D1 028F 421 CML R4,#2 ; IS IT?
13 13 0292 422 BEQL 10$ ; YES
0294 423
50 0000000'EF 3E 0294 424 MOVAW LPASSDAMCODE,R0 ; ASSUME DED. D/A MODE
03 54 D1 029B 425 CML R4,#3 ; IS IT?
07 13 029E 426 BEQL 10$ ; YES
02A0 427
02A0 428 ; ERROR - BAD VALUE
50 0000'8F 3C 02A0 429 MOVZWL #SS$_BADPARAM,R0 ; RETURN STATUS
58 11 02A5 430 BRB 15$
02A7 431

```

70  
41  
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0C

LOADMC - ROUTINE TO LOAD MICROCODE

```

02A7 432 10$: ; RO POINTS TO MICROCODE IMAGE TO LOAD - DO IT!
02A7 433 $QIOW_S FUNC = #IOS_LOADMCODE,- ; FUNCTION
02A7 434 CHAN = LACHAN,- ; CHANNEL
02A7 435 IOSB = LAIOSB,- ; I/O STATUS BLOCK
02A7 436 P1 = (R0) - ; ADDRESS OF MICROCODE
02A7 437 P2 = #2048,- ; SIZE OF MICROCODE IMAGE
02A7 438 P3 = #0 ; STARTING MICRO PC
28 00000004'EF 2C 50 E9 02D0 439 BLBC R0,15$ ; ERROR
E9 02D3 440 BLBC LAIOSB,17$ ; ERROR
02DA 441
02DA 442 ; NOW START MICROPROCE SOR
02DA 443 $QIOW_S FUNC = #IOS_STARTMPROC,- ; FUNCTION
02DA 444 CHAN = LACHAN,- ; CHANNEL
02DA 445 IOSB = LAIOSB ; I/O STATUS BLOCK
69 00000004'EF 77 50 E9 02FF 446 15$: BLBC R0,70$ ; ERROR
E9 0302 447 17$: BLBC LAIOSB,60$ ; ERROR
0309 448
0309 449 ; NOW INITIALIZE IT
0000001C'EF FDOA CF 14 28 0309 450 MOVCL #20,DEVTBL,INITTBL+? ; START WITH ALL 10 DEVICE ADDRESSES
0313 451
0313 452 20$: $QIOW_S FUNC = #IOS_INITIALIZE,- ; FUNCTION
0313 453 CHAN = LACHAN,- ; CHANNEL
0313 454 IOSB = LAIOSB,- ; I/O STATUS BLOCK
0313 455 P1 = INITTBL,- ; ADDRESS OF INIT. TABLE
0313 456 P2 = #278 ; SIZE OF TABLE
28 00000004'EF 36 50 E9 0340 457 BLBC R0,70$ ; ERROR
E8 0343 458 BLBS LAIOSB,60$ ; SUCCESS!
034A 459
034A 460 ; INITIALIZE FAILED - IS IT BECAUSE OF A BAD DEVICE ADDRESS?
06 8F 00000009'EF 91 034A 461 CMPB LAIOSB+5,#DEVNFND ; IS IT DEVICE NOT FOUND?
1E 12 0352 462 BNEQ 60$ ; NO, ERROR
0354 463
0354 464 ; HAVE A DEVICE NOT FOUND ERROR - FIND CORRESPONDING ENTRY IN
0354 465 ; DEVICE TABLE AND SET IT EQUAL TO -1
0000001C'EF42 0000000A'EF 52 D4 0354 466 CLRL R2 ; LOOP COUNTER
0000001C'EF42 0A 12 0356 467 30$: CMPW LAIOSB+6,INITTBL+2[R2] ; MATCH?
0000001C'EF42 01 AE 0362 468 BNEQ 40$ ; NO
E4 52 0A F2 0364 469 MNEGW #1,INITTBL+2[R2] ; YES - SET TO -1
036C 470 BRB 20$ ; RETRY INITIALIZE
50 00000004'EF 7D 036E 471 40$: AOBLSS #10,R2,30$ ; TRY NEXT ENTRY
0372 472
0372 473 60$: ; PICK UP I/O STATUS BLOCK BEFORE RETURNING
0372 474 MOVQ LAIOSB,R0
0379 475
0379 476 70$: ; HAVE STATUS IN R0 (AND MAYBE R1 TOO)
3C BA 0379 477 POPR #^M<R2,R3,R4,R5>
05 037B 478 RSB

```

```

037C 480 .SBTTL SETCLOCK - ROUTINE TO SET LPA-11 CLOCK
037C 481 :++
037C 482 : FUNCTIONAL DESCRIPTION:
037C 483 :
037C 484 : THIS ROUTINE SETS THE LPA-11 CLOCK TO THE SPECIFIED RATE AND PRESET.
037C 485 :
037C 486 : CALLING SEQUENCE:
037C 487 :
037C 488 : BSBW/B
037C 489 :
037C 490 : INPUT PARAMETERS:
037C 491 :
037C 492 : R4 CONTAINS CLOCK RATE IN LOW 3 BITS
037C 493 : R5 CONTAINS CLOCK PRESET
037C 494 :
037C 495 : IMPLICIT INPUTS:
037C 496 :
037C 497 : LACHAN CONTAINS CHANNEL NUMBER OF LPA-11
037C 498 :
037C 499 : OUTPUT PARAMETERS:
037C 500 :
037C 501 : R0 CONTAINS COMPLETION CODE
037C 502 : R1 CONTAINS SECOND LONGWORD OF I/O STATUS BLOCK ON I/O ERRORS
037C 503 :
037C 504 : COMPLETION CODES:
037C 505 :
037C 506 : VARIOUS SYSTEM STATUS RETURNS
037C 507 :
037C 508 :--
037C 509 :
037C 510 SETCLOCK:
50 50 0141 8F 3C 037C 511 MOVZWL #CLKSTATUS,R0 ; CLOCK STATUS
50 03 01 54 F0 0381 512 INSV R4,#1,#3,R0 ; INSERT CLOCK RATE
0386 513
0386 514 : DO IT!
0386 515 $QIOW_S FUNC = #IOS$ SETCLOCK,- ; FUNCTION
0386 516 CHAN = LACHAN,- ; CHANNEL
0386 517 IOSB = LAIOSB,- ; I/O STATUS BLOCK
0386 518 P2 = #CLKMODE,- ; MODE WORD
0386 519 P3 = R0,- ; CLOCK STATUS
0386 520 P4 = R5 ; CLOCK PRESET
0386 521 BLBC R0,50$ ; ERROR
0380 522
50 00000004'EF 7D 0380 523 MOVQ LAIOSB,R0 ; PICK UP I/O STATUS BLOCK
0387 524
05 0387 525 50$: RSB

```

ASSIGNRMB - ASSIGN A CHANNEL TO RETURN M

```

0388 527 .SBTTL ASSIGNRMB - ASSIGN A CHANNEL TO RETURN MAILBOX
0388 528 : **
0388 529 : FUNCTIONAL DESCRIPTION:
0388 530 :
0388 531 : THIS ROUTINE ASSIGNS A CHANNEL TO THE RETURN MAILBOX.
0388 532 : IT ASSIGNS A CHANNEL TO THE NAME MBn WHERE N IS AN INPUT ARGUMENT.
0388 533 :
0388 534 : CALLING SEQUENCE:
0388 535 :
0388 536 : BSBW/B
0388 537 :
0388 538 : INPUT PARAMETERS:
0388 539 :
0388 540 : R3 CONTAINS THE MAILBOX NUMBER TO ASSIGN A CHANNEL TO
0388 541 :
0388 542 : OUTPUT PARAMETERS:
0388 543 :
0388 544 : R0 CONTAINS A COMPLETION CODE
0388 545 :
0388 546 : IMPLICIT OUTPUTS:
0388 547 :
0388 548 : RMBCHAN RECEIVES THE CHANNEL NUMBER OF THE CHANNEL ASSIGNED
0388 549 :
0388 550 : COMPLETION CODES:
0388 551 :
0388 552 : THE SAME ONES THAT ARE SUPPLIED BY THE $ASSIGN SYSTEM SERVICE
0388 553 :
0388 554 : --
0388 555 :
0388 556 ASSIGNRMB:
55 3C BB 0388 557 PUSHR #^M<R2,R3,R4,R5> ; SAVE SOME REGISTERS
038A 558
55 5E D0 038A 559 MOVL SP,R5 ; SAVE STACK POINTER
038D 560
038D 561 ; CONVERT NUMBER TO ASCII STRING ON STACK
038D 562
038D 563 10$: ; CONVERT NEXT DIGIT
54 53 53 0A 78 038D 564 CLRL R4 ; HIGH BITS OF DIVIDEND
7E 54 30 89 038F 565 EDIV #10,R3,R3,R4 ; QUO.-> R3 REM. -> R4
53 05 03C4 566 BISB3 #^X30,R4,-(SP) ; CONVERT TO ASCII AND PUSH ON STACK
F1 12 03C8 567 TSTL R3 ; REPEAT?
03CA 568 BNEQ 10$ ; BR. IF YES
03CC 569
03CC 570 ; NOW PUSH 'MB' ONTO STACK
7E 424D 8F B0 03CC 571 MOVW #^A'MB',-(SP)
03D1 572
03D1 573 ; NOW BUILD A STRING DESCRIPTOR ON STACK
53 55 5E C3 03D1 574 SUBL3 SP,R5,R3 ; OVERALL LENGTH OF STRING
6E 9F 03D5 575 PUSHAB (SP) ; PUSH ADDRESS OF STRING
53 DD 03D7 576 PUSHL R3 ; PUSH LENGTH
54 5E D0 03D9 577 MOVL SP,R4 ; R4 POINTS TO STRING DESCRIPTOR
03DC 578
03DC 579 ; NOW ASSIGN THE CHANNEL
03DC 580 $ASSIGN_S DEVNAM = (R4),- ; DEVICE NAME
03DC 581 CHAN = RMBCHAN ; CHANNEL
03ED 582
5E 55 D0 03ED 583 MOVL R5,SP ; RESTORE STACK POINTER

```



```
ASSIGNRMB - ASSIGN A CHANNEL TO RETURN M
3C BA 03F0 584 POPR #^M<R2,R3,R4,R5> ; RESTORE REGISTERS
   OS 03F2 585 RSB ; RETURN CODE IN R0 FROM $ASSIGN
     03F3 586
     03F3 587
     03F3 588
     03F3 589
      .END START
```



-----  
! Psect synopsis !  
-----

PSECT name	Allocation	PSECT No.	Attributes
. ABS .	00000000 ( 0.)	00 ( 0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
\$ABSS	00000000 ( 0.)	01 ( 1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
_LPASDATA	00000160 ( 352.)	02 ( 2.)	NOPIC USR CON REL LCL NOSHR EXE RD WRT NOVEC LONG
_LPASCODE	000003F3 ( 1011.)	03 ( 3.)	NOPIC USR CON REL LCL NOSHR EXE RD NOWRT NOVEC LONG

-----  
! Performance indicators !  
-----

Phase	Page faults	CPU Time	Elapsed Time
Initialization	37	00:00:00.10	00:00:00.45
Command processing	123	00:00:00.44	00:00:01.30
Pass 1	170	00:00:03.78	00:00:10.09
Symbol table sort	0	00:00:00.13	00:00:00.32
Pass 2	109	00:00:01.41	00:00:02.61
Symbol table output	7	00:00:00.06	00:00:00.06
Psect synopsis output	1	00:00:00.03	00:00:00.03
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	449	00:00:05.95	00:00:14.87

The working set limit was 1200 pages.  
20688 bytes (41 pages) of virtual memory were used to buffer the intermediate code.  
There were 10 pages of symbol table space allocated to hold 121 non-local and 20 local symbols.  
589 source lines were read in Pass 1, producing 26 object records in Pass 2.  
22 pages of virtual memory were used to define 21 macros.

-----  
! Macro library statistics !  
-----

Macro library name	Macros defined
_\$255\$DUA28:[SYSLIB]STARLET.MLB;2	18

235 GETS were required to define 18 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS\$:LALoader/Obj=Obj\$:LALoader MSRC\$:LALoader/UPDATE=(ENH\$:LALoader)

The image displays a complex grid of technical diagrams and code snippets, likely representing a system architecture or data flow. The diagrams are arranged in a grid pattern, with various labels and text elements. Key labels include:

- MELDR
- LALOAD MAP
- XFLORDER MAP
- LADAMCODE LIS
- LALOAD LIS
- LALOADER LIS
- XFLORDER LIS
- MARBLI
- MARBLI MAP
- LALOADER MAP
- LAMRMCODE LIS
- LADAMCODE LIS
- LADMT LIS
- MDL32
- MDL32 MAP

The diagrams consist of numerous small rectangular blocks, some containing text, some containing graphical elements like lines and boxes, and some containing code snippets. The overall layout is highly structured and detailed, typical of a technical manual or a system design document.