```
            TITLE - AMPERIF 7155/885 EMULATION - HSP DEF -
            TITLE2  HSP MICROCODE ASSEMBLER DEFINITIONS
            WIDTH   132
;
;****************************************************************************
;*                                                                          *
;*      HH    HH  SSSSSS   PPPPPPP      DDDDDDD   EEEEEEEE  FFFFFFFF        *
;*      HH    HH SS    SS  PP    PP      DD   DD  EE        FF              *
;*      HH    HH SS        PP    PP      DD   DD  EE        FF              *
;*      HHHHHHHH  SSSSSS   PPPPPPP       DD   DD  EEEEEE    FFFFFF          *
;*      HH    HH       SS  PP            DD   DD  EE        FF              *
;*      HH    HH SS    SS  PP            DD   DD  EE        FF              *
;*      HH    HH  SSSSSS   PP           DDDDDDD   EEEEEEEE  FF              *
;*                                                                          *
;* HSPDEF - AMPERIF 7155/885 EMULATION HSP MICROCODE ASSEMBLER DEFINITIONS *
;*                                                                          *
;****************************************************************************
;
;
;       ****  ****
;     *** **  ******
;   ***   **  ********
;  **     **  *********
; **      **  **********
;**       **  ***********                                           __     ___
;***********  ***********                                          /  \   /   |
;                                                                  \__/  |   _|
;***********    ____ __  __ ___  ___  __ ______    ______   __ __   __ _|   /_
;***********    /    '  || |/    |/   ||  '    \  /      \ |   |/ ||  ||      |
; **********   |   __   ||   _    _   ||   __   ||   ==   ||    _||   ||__  __|
;  *********   |  (__|  ||  | |  | |  ||  |__)  ||  ______||   /  |   |  |  |
;   ********   |        ||  | |  | |  ||        ||  \_____ |   |  |   |  |  |
;     ******    \____,__||__| |__| |__|| ,____/   \______/ |__|    |__|  |__|
;       ****                           |  |
;                                      |__|  c  o  r  p  o  r  a  t  i  o  n
;
;
;     ##################################################################
;     ##################################################################
;     ####                                                          ####
;     ####                  CONFIDENTIAL DOCUMENT                   ####
;     ####               ---------------------------                ####
;     ####    REPRODUCTION AND/OR DISCLOSURE  OF THE INFORMATION    ####
;     ####    CONTAINED  HEREIN  IS STRICTLY PROHIBITED  WITHOUT    ####
;     ####    PRIOR WRITTEN AUTHORIZATION BY AMPERIF CORPORATION    ####
;     ####                                                          ####
;     ##################################################################
;     ##################################################################
;
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
50              EJECT
51  ;
52  ; MNEMONIC DEFINIITION SOURCE FILE
53  ; FOR AMPERIF 7155/885 EMULATION HSP MICROCODE.
54  ;
55  ; INPUT FOR HALE DEFINITION PHASE COMPILER, HALE_D.
56  ;
57  ;*************************************************************************
58  ; AUTHORS
59  ;
60  ; VERSION 1.0+
61  ;           A. Monroe
62  ;
63  ;*************************************************************************
64  ; REVISION HISTORY
65  ;
66  ; REVISION 1.0, 6/7/90
67  ;;- 1.0.3, 11/1/90
68  ; - Changed CPU to ALU.
69  ; - Added several new shorthand instructions, ZR, N1R, IR, etc.
70  ; - Changed LDA, LDR, STA, STR, STAR, LDAR, to HA, HR, AH, RH,
71  ;   AR, RA.  This conforms better with the new instructions
72  ;   above.
73  ; - Removed several unused definitions: JMAP, EMCTRL, etc.
74  ;;- Changed EQU for internal labels (ones starting with ".")
75  ;;  to SET.  This helps idenify them easier in the cross
76  ;;  reference listing.
77  ;;- 1.0.2, 6/7/90
78  ;;- Deleted bad POP instruction.
79  ; - Made POPJMP instruction, based on model of JMP, JSB, etc.
80  ;   instructions.
81  ;;- 1.0.1, 6/5/90
82  ; - Removed default vaules for bus and sequencer fields, will
83  ;   now use default bits parameter in prom formatter program,
84  ;   HALE_P.
85  ;;- 1.0.0, 6/1/90
86  ; - First version.
87  ;
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
 88             EJECT
 89 ;
 90 ; INSTRUCTION FORMAT
 91 ; ------------------
 92 ;
 93 ; The HSP uses 32 bit words, as defined here.
 94             WORD 32
 95 ;
 96 ; The words have three main fields:
 97 ; HIGH SPEED BUS CONTROL, SEQUENCER, and ALU.
 98 ;
 99 ; ¦               ¦               ¦                               ¦
100 ; ¦HIGH SPEED BUS ¦2910 SEQUENCER ¦          29116A ALU           ¦
101 ; ¦               ¦               ¦                               ¦
102 ; ¦       ¦       ¦       ¦       ¦ ¦   ¦       ¦       ¦       ¦
103 ; ¦  SRC  ¦  DST  ¦ TEST  ¦ OPER  ¦W¦QAD¦FIELD 1¦FIELD 2¦ FIELD 3 ¦
104 ; ¦       ¦       ¦       ¦       ¦ ¦   ¦       ¦       ¦       ¦
105 ;  3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1
106 ;  1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
107 ;
108 ; Fields are often used independantly, so each field has its own
109 ; instructions.  HIGH SPEED BUS, SEQUENCER, and ALU instructions
110 ; can be combined, by a process called overlaying.  The separate
111 ; instructions are overlaid in the source code with "&" between
112 ; the separate fields' instructions to make a single instruction
113 ; word, such as:
114 ;
115 ;           TODA ADD,NRA & RDATA & WDATA & RFCT
116 ;
117 ; By convention, the ALU instruction is generally first.
118 ;
119 ; Each field has subfields.
120 ;
121 ; HIGH SPEED BUS CONTROL has SOURCE and DESTINATION CONTROL 4-bit
122 ; subfields.  These refer to input and output operations,
123 ; respectively, that can be performed on the high speed bus.
124 ; Input is at the start of an instruction cycle, output is at the
125 ; end.  These can be performed independantly, so both source and
126 ; destination operations are separate instructions.
127 ;
128 ; SEQUENCER has TEST CONDITION and OPERATION 4-bit subfields.
129 ; The operations include jumps, subroutine calls, push/pops,
130 ; loops, etc.  Many operations are conditional, and can be based
131 ; on true/false tests of either flags from the ALU, such as zero,
132 ; negative, carry, etc., or on high speed bus ready signals.
133 ;
134 ; ALU controls logic and arithmetic operations, such as adding,
135 ; anding, stores and loads.  it has five subfields, defined by
136 ; the AMD 29116A microprocessor.  The first is a 1-bit WORD or
137 ; BYTE MODE flag, which is always word mode in HSP code.  The
138 ; second is a 2-bit QUAD, which determines the sub-group of 29116
139 ; instruction group.  The other three fields can either be data,
140 ; opcodes, or register numbers, depending on the instruction.
141 ;
142 ; Symbols begining with "." are internal use only.
143 ;
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
144             EJECT
145 ;
146 ; HIGH SPEED BUS CONTROL
147 ; ---------------------
148 ;
149 ; HIGH SPEED BUS SOURCE EQUATES
150 ;
151 .ALU:       SET H#1     ;29116 Y-BUS TO BUS
152 .RCAR:      SET H#2     ;CACHE ADDRESS TO BUS
153 .RCACHE:    SET H#3     ;CACHE DATA TO BUS
154 .RDATA:     SET H#4     ;SOURCE PORT DATA TO BUS
155 .SRCSTAT:   SET H#5     ;SOURCE PORT STATUS TO BUS
156 .DSTSTAT:   SET H#6     ;DESTINATION PORT STATUS TO BUS
157 .R86:       SET H#7     ;ASP DATA TO BUS
158 .S86:       SET H#8     ;ASP STATUS TO BUS
159 ;EMSTAT:    SET H#9     ;(NOT USED)
160 ;REM:       SET H#A     ;(NOT USED)
161 .CON:       SET H#B     ;THIS INSTRUCTION'S ALU FIELD TO BUS
162 ;N.US2:     SET H#C     ;(NOT USED)
163 ;N.US3:     SET H#D     ;(NOT USED)
164 ;APUSTAT:   SET H#E     ;(NOT USED)
165 ;PRODUCT:   SET H#F     ;(NOT USED) AM29517 OUTPUT
166 ;
167 .WORD:      SUB 16V%D#  ;NUMERIC VALUE, 16 BITS WIDE
168 ;
169 ;
170 ; HIGH SPEED BUS DESTINATION EQUATES
171 ;
172 ;WY:        SET H#1     ;(NOT USED) AM29517 Y INPUT
173 .WCAR:      SET H#2     ;BUS TO CACHE ADDRESS
174 .WCACHE:    SET H#3     ;BUS TO CACHE DATA
175 .WDATA:     SET H#4     ;BUS TO SOURCE PORT DATA
176 .SRCCTRL:   SET H#5     ;BUS TO SOURCE CONTROL
177 .DSTCTRL:   SET H#6     ;BUS TO DESTINATION PORT CONTROL
178 .W86:       SET H#7     ;BUS TO ASP DATA
179 .SEQ:       SET H#8     ;BUS TO 2910 D-BUS
180 ;EMCTRL:    SET H#9     ;(NOT USED)
181 ;WEM:       SET H#A     ;(NOT USED)
182 .SRCSEL:    SET H#B     ;BUS TO SELECT SOURCE PORT
183 .DSTSEL:    SET H#C     ;BUS TO SELECT DESTINATION PORT
184 .WCARLOW:   SET H#D     ;BUS TO CACHE ADDRESS LOW BYTE
185 ;MULTCTR:   SET H#E     ;(NOT USED) AM29517 CONTROL REG
186 ;WX:        SET H#F     ;(NOT USED) AM29517 X INPUT
187 ;
188 ;
189 ; HIGH SPEED BUS SOURCE INSTRUCTIONS
190 ;
191 ALU:        DEF .ALU,     4X,8X,16X
192 RCAR:       DEF .RCAR,    4X,8X,16X
193 RCACHE:     DEF .RCACHE,  4X,8X,16X
194 RDATA:      DEF .RDATA,   4X,8X,16X
195 SRCSTAT:    DEF .SRCSTAT, 4X,8X,16X
196 DSTSTAT:    DEF .DSTSTAT, 4X,8X,16X
197 R86:        DEF .R86,     4X,8X,16X
198 S86:        DEF .S86,     4X,8X,16X
199 CON:        DEF .CON,     4X,8X,.WORD
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
200 ;
201 ; HIGH SPEED BUS DESTINATION INSTRUCTIONS
202 ;
203 WCAR:       DEF 4X,.WCAR,    8X,16X
204 WCACHE:     DEF 4X,.WCACHE,  8X,16X
205 WDATA:      DEF 4X,.WDATA,   8X,16X
206 SRCCTRL:    DEF 4X,.SRCCTRL, 8X,16X
207 DSTCTRL:    DEF 4X,.DSTCTRL, 8X,16X
208 W86:        DEF 4X,.W86,     8X,16X
209 SEQ:        DEF 4X,.SEQ,     8X,16X
210 SRCSEL:     DEF 4X,.SRCSEL,  8X,16X
211 DSTSEL:     DEF 4X,.DSTSEL,  8X,16X
212 WCARLOW:    DEF 4X,.WCARLOW, 8X,16X
213 ;
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
214             EJECT
215  ;
216  ; 2910A SEQUENCER
217  ; ----------------
218  ;
219  ; 2910A SEQUENCER TEST EQUATES
220  ;
221  LE:         EQU H#0     ;IF ALU STATUS (NEG EXOR OVR) OR ZERO
222  LT:         EQU H#1     ;IF ALU STATUS (NEG EXOR OVR)
223  Z:          EQU H#2     ;IF ALU ZERO STATUS
224  OVR:        EQU H#3     ;IF ALU OVERFLOW STATUS
225  FAIL:       EQU H#4     ;NEVER
226  C:          EQU H#5     ;IF ALU CARRY STATUS
227  GE:         EQU H#6     ;IF ALU STATUS ZERO OR NOT CARRY
228  N:          EQU H#7     ;IF ALU NEGATIVE STATUS
229  LINK:       EQU H#8     ;IF ALU LINK STATUS
230  FLAG1:      EQU H#9     ;IF ALU FLAG1 STATUS
231  FLAG2:      EQU H#A     ;IF ALU FLAG2 STATUS
232  FLAG3:      EQU H#B     ;IF ALU FLAG3 STATUS
233  DSTRDY:     EQU H#C     ;IF DESTINATION PORT READY
234  SRCRDY:     EQU H#D     ;IF SOURCE PORT READY
235  DSTSRC:     EQU H#E     ;IF BOTH SOURCE AND DESTINATION PORTS READY
236  PASS:       EQU H#F     ;ALWAYS
237  ;
238  ; 2910A SEQUENCER OPERATION FIELD EQUATES
239  ;
240  .JZ:        SET H#0     ;JUMP TO ADDRESS ZERO
241  .CJSB:      SET H#1     ;CONDITIONAL JUMP TO SUBROUTINE
242  ;JMAP:      SET H#2     ;JUMP TO ADDRESS FROM MAP PROM (NOT IMPLMENTED)
243  .CJP:       SET H#3     ;CONDITIONAL JUMP
244  .PUSH:      SET H#4     ;PUSH AND CONDITIONAL LOAD CNTR/REG
245  .JSRP:      SET H#5     ;JUMP TO EITHER NORMAL OR CNTR/REG SUBROUTINE
246  ;CJV:       SET H#6     ;CONDITIONAL JUMP VECTOR (NOT IMPLEMENTED)
247  .JRP:       SET H#7     ;JUMP TO EITHER NORMAL OR REG
248  .RFCT:      SET H#8     ;REPEAT STACK UNTIL CNTR/REG ZERO
249  .RPCT:      SET H#9     ;REPEAT UNTIL CNTR/REG ZERO
250  .CRTN:      SET H#A     ;CONDITION RETURN FROM SUBROUTINE
251  .CJPP:      SET H#B     ;POP AND CONDITIONAL JUMP
252  .LDCT:      SET H#C     ;LOAD CNTR/REG
253  .LOOP:      SET H#D     ;CONDITIONAL REPEAT
254  .CONT:      SET H#E     ;CONTINUE
255  .TWB:       SET H#F     ;CONDITIONAL REPEAT, OR JUMP IF CNT ZERO
256  ;
257  ; 2910A SEQUENCER INSTRUCTIONS
258  ; PARAMETER, IF ANY, IS A SEQUENCER TEST
259  ; EXPL:     CRTN Z
260  ;
261  JZ:         DEF 4X,4X,4X,.JZ,   16X
262  CJS:        DEF 4X,4X,4V,.CJSB, 16X ;***S/B CJSB:****
263  CJP:        DEF 4X,4X,4V,.CJP,  16X
264  PUSH:       DEF 4X,4X,4V,.PUSH, 16X
265  JSRP:       DEF 4X,4X,4V,.JSRP, 16X
266  JRP:        DEF 4X,4X,4V,.JRP,  16X
267  RFCT:       DEF 4X,4X,4X,.RFCT, 16X
268  RPCT:       DEF 4X,4X,4X,.RPCT, 16X
269  CRTN:       DEF 4X,4X,4V,.CRTN, 16X
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
270  CJPP:       DEF 4X,4X,4V,.CJPP, 16X
271  LDCT:       DEF 4X,4X,4X,.LDCT, 16X
272  LOOP:       DEF 4X,4X,4V,.LOOP, 16X
273  CONT:       DEF 4X,4X,4X,.CONT, 16X
274  TWB:        DEF 4X,4X,4V,.TWB,  16X
275  ;
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
276             EJECT
277 ;
278 ; 29116A ALU
279 ; ----------
280 ;
281 ; BYTE OR WORD MODE, ALWAYS WORD IN HSP
282 ;
283 .M:          SET B#1
284 ;
285 ; RAM REGISTER PARAMETERS
286 ;
287 R0:          EQU 5H#00:
288 R1:          EQU 5H#01:
289 R2:          EQU 5H#02:
290 R3:          EQU 5H#03:
291 R4:          EQU 5H#04:
292 R5:          EQU 5H#05:
293 R6:          EQU 5H#06:
294 R7:          EQU 5H#07:
295 R8:          EQU 5H#08:
296 R9:          EQU 5H#09:
297 R10:         EQU 5H#0A:
298 R11:         EQU 5H#0B:
299 R12:         EQU 5H#0C:
300 R13:         EQU 5H#0D:
301 R14:         EQU 5H#0E:
302 R15:         EQU 5H#0F:
303 R16:         EQU 5H#10:
304 R17:         EQU 5H#11:
305 R18:         EQU 5H#12:
306 R19:         EQU 5H#13:
307 R20:         EQU 5H#14:
308 R21:         EQU 5H#15:
309 R22:         EQU 5H#16:
310 R23:         EQU 5H#17:
311 R24:         EQU 5H#18:
312 R25:         EQU 5H#19:
313 R26:         EQU 5H#1A:
314 R27:         EQU 5H#1B:
315 R28:         EQU 5H#1C:
316 R29:         EQU 5H#1D:
317 R30:         EQU 5H#1E:
318 R31:         EQU 5H#1F:
319 ;
320 ; NON-RAM REGISTER PARAMETERS
321 ;
322 NRY:         EQU 5B#00000
323 NRA:         EQU 5B#00001
324 NRS:         EQU 5B#00100
325 NRAS:        EQU 5B#00101
```

```
326             EJECT
327 ;
328 ; SINGLE OPERAND INSTRUCTIONS
329 ;
330 ; SOR, SONR OPERATION PARAMETERS
331 ;
332 MOVE:       EQU 4B#1100
333 COMP:       EQU 4B#1101
334 INC:        EQU 4B#1110
335 NEG:        EQU 4B#1111
336 ;
337 .SOR.Q:     SET B#10
338 .SONR.Q:    SET B#11
339 ;
340 .SORA:      SET B#0000
341 .SORY:      SET B#0010
342 .SORS:      SET B#0011
343 .SOAR:      SET B#0100
344 .SODR:      SET B#0110
345 .SOIR:      SET B#0111
346 .SOZR:      SET B#1000
347 .SOZER:     SET B#1001
348 .SOSER:     SET B#1010
349 .SORR:      SET B#1011
350 ;
351 .SOA:       SET B#0100
352 .SOD:       SET B#0110
353 .SOI:       SET B#0111
354 .SOZ:       SET B#1000
355 .SOZE:      SET B#1001
356 .SOSE:      SET B#1010
357 ;
358 ; SOR INSTRUCTIONS
359 ;
360 ; PARAMS: OPERATION, REGISTER
361 ; EXPL:     SORA MOVE,R00
362 ;
363 SORA:       DEF 8X,8X,.M,.SOR.Q,4V,.SORA,5V
364 SORY:       DEF 8X,8X,.M,.SOR.Q,4V,.SORY,5V
365 SORS:       DEF 8X,8X,.M,.SOR.Q,4V,.SORS,5V
366 SOAR:       DEF 8X,8X,.M,.SOR.Q,4V,.SOAR,5V
367 SODR:       DEF 8X,8X,.M,.SOR.Q,4V,.SODR,5V
368 SOIR:       DEF 8X,8X,.M,.SOR.Q,4V,.SOIR,5V
369 SOZR:       DEF 8X,8X,.M,.SOR.Q,4V,.SOZR,5V
370 SOZER:      DEF 8X,8X,.M,.SOR.Q,4V,.SOZER,5V
371 SOSER:      DEF 8X,8X,.M,.SOR.Q,4V,.SOSER,5V
372 SORR:       DEF 8X,8X,.M,.SOR.Q,4V,.SORR,5V
373 ;
374 ; SONR INSTRUCTIONS
375 ;
376 ; PARAMS: OPERATION, DESTINATION
377 ; EXPL:     SOA INC,NRA
378 ;
379 SOA:        DEF 8X,8X,.M,.SONR.Q,4V,.SOA,5V
380 SOD:        DEF 8X,8X,.M,.SONR.Q,4V,.SOD,5V
381 SOI:        DEF 8X,8X,.M,.SONR.Q,4V,.SOI,5V
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
 382  SOZ:        DEF 8X,8X,.M,.SONR.Q,4V,.SOZ,5V
 383  SOZE:       DEF 8X,8X,.M,.SONR.Q,4V,.SOZE,5V
 384  SOSE:       DEF 8X,8X,.M,.SONR.Q,4V,.SOSE,5V
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
385             EJECT
386  ;
387  ; TWO OPERAND INSTRUCTIONS
388  ;
389  ; TOR1, TOR2, TONR OPERATION PARAMETERS
390  ;
391  SUBR:       EQU B#0000
392  SUBRC:      EQU B#0001
393  SUBS:       EQU B#0010
394  SUBSC:      EQU B#0011
395  ADD:        EQU B#0100
396  ADDC:       EQU B#0101
397  AND:        EQU B#0110
398  NAND:       EQU B#0111
399  EXOR:       EQU B#1000
400  NOR:        EQU B#1001
401  OR:         EQU B#1010
402  EXNOR:      EQU B#1011
403  ;
404  .TOR1.Q:    SET B#00
405  .TOR2.Q:    SET B#10
406  .TONR.Q:    SET B#11
407  ;
408  .TORAA:     SET B#0000
409  .TORIA:     SET B#0010
410  .TODRA:     SET B#0011
411  .TORAY:     SET B#1000
412  .TORIY:     SET B#1010
413  .TODRY:     SET B#1011
414  .TORAR:     SET B#1100
415  .TORIR:     SET B#1110
416  .TODRR:     SET B#1111
417  ;
418  .TODAR:     SET B#0001
419  .TOAIR:     SET B#0010
420  .TODIR:     SET B#0101
421  ;
422  .TODA:      SET B#0001
423  .TOAI:      SET B#0010
424  .TODI:      SET B#0101
425  ;
426  ; TOR1 INSTRUCTIONS
427  ;
428  ; PARAMS: OPERATION, REGISTER
429  ; EXPL:     TORAA OR,R1
430  ;
431  TORAA:      DEF 8X,8X,.M,.TOR1.Q,.TORAA,4V,5V
432  TORIA:      DEF 8X,8X,.M,.TOR1.Q,.TORIA,4V,5V
433  TODRA:      DEF 8X,8X,.M,.TOR1.Q,.TODRA,4V,5V
434  TORAY:      DEF 8X,8X,.M,.TOR1.Q,.TORAY,4V,5V
435  TORIY:      DEF 8X,8X,.M,.TOR1.Q,.TORIY,4V,5V
436  TODRY:      DEF 8X,8X,.M,.TOR1.Q,.TODRY,4V,5V
437  TORAR:      DEF 8X,8X,.M,.TOR1.Q,.TORAR,4V,5V
438  TORIR:      DEF 8X,8X,.M,.TOR1.Q,.TORIR,4V,5V
439  TODRR:      DEF 8X,8X,.M,.TOR1.Q,.TODRR,4V,5V
440  ;
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
441  ; TOR2 INSTRUCTIONS
442  ;
443  ; PARAMS: OPERATION, REGISTER
444  ; EXPL:     TODAR ADD,R14
445  ;
446  TODAR:     DEF 8X,8X,.M,.TOR2.Q,.TODAR,4V,5V
447  TOAIR:     DEF 8X,8X,.M,.TOR2.Q,.TOAIR,4V,5V
448  TODIR:     DEF 8X,8X,.M,.TOR2.Q,.TODIR,4V,5V
449  ;
450  ; TONR INSTRUCTIONS
451  ;
452  ; PARAMS: OPERATION, DESTINATION
453  ; EXPL:     TODA EXOR,NRY
454  ;
455  TODA:      DEF 8X,8X,.M,.TONR.Q,.TODA,4V,5V
456  TOAI:      DEF 8X,8X,.M,.TONR.Q,.TOAI,4V,5V
457  TODI:      DEF 8X,8X,.M,.TONR.Q,.TODI,4V,5V
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
458             EJECT
459  ;
460  ; SINGLE BIT SHIFT INSTRUCTIONS
461  ;
462  ; SHFTR, SHFTNR OPERATION PARAMETERS
463  ;
464  UPZ:        EQU B#0000
465  UP1:        EQU B#0001
466  UPL:        EQU B#0010
467  DNZ:        EQU B#0100
468  DN1:        EQU B#0101
469  DNL:        EQU B#0110
470  DNC:        EQU B#0111
471  DNOVR:      EQU B#1000
472  ;
473  .SHFTR.Q:   SET B#10
474  .SHFTNR.Q:  SET B#11
475  ;
476  .SHRR:      SET B#0110
477  .SHDR:      SET B#0111
478  ;
479  .SHA:       SET B#0110
480  .SHD:       SET B#0111
481  ;
482  ; SHFTR INSTRUCTIONS
483  ;
484  ; PARAMS: DIRECTION/BIT SOURCE, REGISTER
485  ; EXPL:     SHRR UPZ,R11
486  ;
487  SHRR:       DEF 8X,8X,.M,.SHFTR.Q,.SHRR,4V,5V
488  SHDR:       DEF 8X,8X,.M,.SHFTR.Q,.SHDR,4V,5V
489  ;
490  ; SHFTNR INSTRUCTIONS
491  ;
492  ; PARAMS: DIRECTION/BIT SOURCE, DESTINATION
493  ; EXPL:     SHA DNZ,NRA
494  ;
495  SHA:        DEF 8X,8X,.M,.SHFTNR.Q,.SHA,4V,5V
496  SHD:        DEF 8X,8X,.M,.SHFTNR.Q,.SHD,4V,5V
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
497             EJECT
498  ;
499  ; BIT ORIENTED INSTRUCTION
500  ;
501  ; BOR1, BOR2, BONR BIT POSITION PARAMETERS
502  ;
503  BIT0:       EQU B#0000
504  BIT1:       EQU B#0001
505  BIT2:       EQU B#0010
506  BIT3:       EQU B#0011
507  BIT4:       EQU B#0100
508  BIT5:       EQU B#0101
509  BIT6:       EQU B#0110
510  BIT7:       EQU B#0111
511  BIT8:       EQU B#1000
512  BIT9:       EQU B#1001
513  BIT10:      EQU B#1010
514  BIT11:      EQU B#1011
515  BIT12:      EQU B#1100
516  BIT13:      EQU B#1101
517  BIT14:      EQU B#1110
518  BIT15:      EQU B#1111
519  ;
520  .BOR1.Q:    SET B#11
521  .BOR2.Q:    SET B#10
522  .BONR.Q:    SET B#11
523  ;
524  .SETNR:     SET B#1101
525  .RSTNR:     SET B#1110
526  .TSTNR:     SET B#1111
527  ;
528  .LD2NR:     SET B#1100
529  .LDC2NR:    SET B#1101
530  .A2NR:      SET B#1110
531  .S2NR:      SET B#1111
532  ;
533  .BONR.2:    SET B#1100
534  ;
535  .TSTNA:     SET B#00000
536  .RSTNA:     SET B#00001
537  .SETNA:     SET B#00010
538  .A2NA:      SET B#00100
539  .S2NA:      SET B#00101
540  .LD2NA:     SET B#00110
541  .LDC2NA:    SET B#00111
542  .TSTND:     SET B#10000
543  .RSTND:     SET B#10001
544  .SETND:     SET B#10010
545  .A2NDY:     SET B#10100
546  .S2NDY:     SET B#10101
547  .LD2NY:     SET B#10110
548  .LDC2NY:    SET B#10111
549  ;
550  ; BOR1 INSTRUCTIONS
551  ;
552  ; PARAMS: BIT POSITION, REGISTER
```

Line - ANPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
553 ; EXPL:     SETNR BIT15,R10
554 ;
555 SETNR:      DEF 8X,8X,.M,.BOR1.Q,4V,.SETNR,5V
556 RSTNR:      DEF 8X,8X,.M,.BOR1.Q,4V,.RSTNR,5V
557 TSTNR:      DEF 8X,8X,.M,.BOR1.Q,4V,.TSTNR,5V
558 ;
559 ; BOR2 INSTRUCTIONS
560 ;
561 ; PARAMS: BIT POSITION, REGISTER
562 ; EXPL:     LD2NR BIT15,R4
563 ;
564 LD2NR:      DEF 8X,8X,.M,.BOR2.Q,4V,.LD2NR,5V
565 LDC2NR:     DEF 8X,8X,.M,.BOR2.Q,4V,.LDC2NR,5V
566 A2NR:       DEF 8X,8X,.M,.BOR2.Q,4V,.A2NR,5V
567 S2NR:       DEF 8X,8X,.M,.BOR2.Q,4V,.S2NR,5V
568 ;
569 ; BONR INSTRUCTIONS
570 ;
571 ; PARAMS: BIT POSITION
572 ; EXPL:     TSTNA BIT8
573 ;
574 TSTNA:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.TSTNA
575 RSTNA:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.RSTNA
576 SETNA:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.SETNA
577 A2NA:       DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.A2NA
578 S2NA:       DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.S2NA
579 LD2NA:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.LD2NA
580 LDC2NA:     DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.LDC2NA
581 TSTND:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.TSTND
582 RSTND:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.RSTND
583 SETND:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.SETND
584 A2NDY:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.A2NDY
585 S2NDY:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.S2NDY
586 LD2NY:      DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.LD2NY
587 LDC2NY:     DEF 8X,8X,.M,.BONR.Q,4V,.BONR.2,.LDC2NY
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
588             EJECT
589  ;
590  ; ROTATE INSTRUCTIONS
591  ;
592  .RTRA:      SET B#1100
593  .RTRY:      SET B#1110
594  .RTRR:      SET B#1111
595  ;
596  .RTAR:      SET B#0000
597  .RTDR:      SET B#0001
598  ;
599  .ROTNR.2:   SET B#1100
600  ;
601  .RTDY:      SET B#11000
602  .RTDA:      SET B#11001
603  .RTAY:      SET B#11100
604  .RTAA:      SET B#11101
605  ;
606  .ROTR1.Q:   SET B#00
607  .ROTR2.Q:   SET B#01
608  .ROTNR.Q:   SET B#11
609  ;
610  ; ROTR1 INSTRUCTIONS
611  ;
612  ; PARAMS: NUMBER OF BIT POSITIONS, REGISTER
613  ; EXPL:     RTRA 2,R11
614  ;
615  RTRA:       DEF 8X,8X,.M,.ROTR1.Q,4V:%D#,.RTRA,5V
616  RTRY:       DEF 8X,8X,.M,.ROTR1.Q,4V:%D#,.RTRY,5V
617  RTRR:       DEF 8X,8X,.M,.ROTR1.Q,4V:%D#,.RTRR,5V
618  ;
619  ; ROTR2 INSTRUCTIONS
620  ;
621  ; PARAMS: NUMBER OF BIT POSITIONS, REGISTER
622  ; EXPL:     RTAR 2,R12
623  ;
624  RTAR:       DEF 8X,8X,.M,.ROTR2.Q,4V:%D#,.RTAR,5V
625  RTDR:       DEF 8X,8X,.M,.ROTR2.Q,4V:%D#,.RTDR,5V
626  ;
627  ; ROTNR INSTRUCTIONS
628  ;
629  ; PARAMS: NUMBER OF BIT POSITIONS, REGISTER
630  ; EXPL:     RTDY 2
631  ;
632  RTDY:       DEF 8X,8X,.M,.ROTNR.Q,4V:%D#,.ROTNR.2,.RTDY
633  RTDA:       DEF 8X,8X,.M,.ROTNR.Q,4V:%D#,.ROTNR.2,.RTDA
634  RTAY:       DEF 8X,8X,.M,.ROTNR.Q,4V:%D#,.ROTNR.2,.RTAY
635  RTAA:       DEF 8X,8X,.M,.ROTNR.Q,4V:%D#,.ROTNR.2,.RTAA
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
636             EJECT
637 ;
638 ; ROTATE AND MERGE INSTRUCTIONS
639 ;
640 .MDAI:      SET B#0111
641 .MDAR:      SET B#1000
642 .MDRI:      SET D#1001
643 .MDRA:      SET B#1010
644 .MARI:      SET B#1100
645 .MRAI:      SET B#1110
646 ;
647 .ROTM.Q:    SET B#01
648 ;
649 ; ROTM INSTRUCTIONS
650 ;
651 ; PARAMS: NUMBER OF BIT POSITIONS, REGISTER
652 ; EXPL:     MDAI 7,R3
653 ;
654 MDAI:       DEF 8X,8X,.M,.ROTM.Q,4V:%D#,.MDAI,5V
655 MDAR:       DEF 8X,8X,.M,.ROTM.Q,4V:%D#,.MDAR,5V
656 MDRI:       DEF 8X,8X,.M,.ROTM.Q,4V:%D#,.MDRI,5V
657 MDRA:       DEF 8X,8X,.M,.ROTM.Q,4V:%D#,.MDRA,5V
658 MARI:       DEF 8X,8X,.M,.ROTM.Q,4V:%D#,.MARI,5V
659 MRAI:       DEF 8X,8X,.M,.ROTM.Q,4V:%D#,.MRAI,5V
660 ;
661 ; ROTATE AND COMPARE INSTRUCTIONS
662 ;
663 .CDAI:      SET B#0010
664 .CDRI:      SET B#0011
665 .CDRA:      SET B#0100
666 .CRAI:      SET B#0101
667 ;
668 .ROTC.Q:    SET B#01
669 ;
670 ; ROTC INSTRUCTIONS
671 ;
672 ; PARAMS: NUMBER OF BIT POSITIONS, REGISTER
673 ; EXPL:     CDAI 7,R5
674 ;
675 CDAI:       DEF 8X,8X,.M,.ROTC.Q,4V:%D#,.CDAI,5V
676 CDRI:       DEF 8X,8X,.M,.ROTC.Q,4V:%D#,.CDRI,5V
677 CDRA:       DEF 8X,8X,.M,.ROTC.Q,4V:%D#,.CDRA,5V
678 CRAI:       DEF 8X,8X,.M,.ROTC.Q,4V:%D#,.CRAI,5V
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
679             EJECT
680  ;
681  ; PRIORITIZE INSTRUCTIONS
682  ;
683  PRT1A:      EQU B#0111
684  PR1D:       EQU B#1001
685  ;
686  PRA:        EQU B#1000
687  PRZ:        EQU B#1010
688  PRI:        EQU B#1011
689  ;
690  ; PARAMS: PRT1A OR PR1D, REGISTER
691  ; EXPL:     PR1A PRT1A,R08
692  ;
693  PR1A:       DEF 8X,8X,.M,B#10,B#1000,4V,5V
694  PR1Y:       DEF 8X,8X,.M,B#10,B#1010,4V,5V
695  PR1R:       DEF 8X,8X,.M,B#10,B#1011,4V,5V
696  ;
697  ; PARAMS: PR[AZI], REGISTER
698  ; EXPL:     PR2A PRZ,R2
699  ;
700  PR2A:       DEF 8X,8X,.M,B#10,4V,B#0000,5V
701  PR2Y:       DEF 8X,8X,.M,B#10,4V,B#0010,5V
702  ;
703  PR3R:       DEF 8X,8X,.M,B#10,4V,B#0011,5V
704  PR3A:       DEF 8X,8X,.M,B#10,4V,B#0100,5V
705  PR3D:       DEF 8X,8X,.M,B#10,4V,B#0110,5V
706  ;
707  ; PARAMS: PR[AZI], NR[YA]
708  ; EXPL:     PRTD PRA,R1
709  ;
710  PRTA:       DEF 8X,8X,.M,B#11,4V,B#0100,5V
711  PRTD:       DEF 8X,8X,.M,B#11,4V,B#0110,5V
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
712             EJECT
713 ;
714 ; CRC INSTRUCTIONS
715 ;
716 ; PARAMS: REGISTER
717 ; EXPL:     CRCF R4
718 ;
719 CRCF:       DEF 8X,8X,B#1,B#10,B#0110,B#0011,5V
720 CRCR:       DEF 8X,8X,B#1,B#10,B#0110,B#1001,5V
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
                EJECT
;
; STATUS INSTRUCTIONS
;
.TNOZ:      SET B#00000
.TNO:       SET B#00010
.TZ:        SET B#00100
.TOVR:      SET B#00110
.TLOW:      SET B#01000
.TC:        SET B#01010
.TZC:       SET B#01100
.TN:        SET B#01110
.TL:        SET B#10000
.TF1:       SET B#10010
.TF2:       SET B#10100
.TF3:       SET B#10110
;
; SETST INSTRUCTIONS
; PARAMS: NONE
;
SONCZ:      DEF 8X,8X,B#0,B#11,B#1011,B#1010,B#00011
SL:         DEF 8X,8X,B#0,B#11,B#1011,B#1010,B#00101
SF1:        DEF 8X,8X,B#0,B#11,B#1011,B#1010,B#00110
SF2:        DEF 8X,8X,B#0,B#11,B#1011,B#1010,B#01001
SF3:        DEF 8X,8X,B#0,B#11,B#1011,B#1010,B#01010
;
; RSTST INSTRUCTIONS
; PARAMS: NONE
;
RONCZ:      DEF 8X,8X,B#0,B#11,B#1010,B#1010,B#00011
RL:         DEF 8X,8X,B#0,B#11,B#1010,B#1010,B#00101
RF1:        DEF 8X,8X,B#0,B#11,B#1010,B#1010,B#00110
RF2:        DEF 8X,8X,B#0,B#11,B#1010,B#1010,B#01001
RF3:        DEF 8X,8X,B#0,B#11,B#1010,B#1010,B#01010
;
; SVSTR INSTRUCTIONS
; PARAMS: REGISTER
; EXPL:     SVSTR R0
;
SVSTR:      DEF 8X,8X,.M,B#10,B#0111,B#1010,5V
;
; SVSTNR INSTRUCTIONS
; PARAMS: NRY OR NRA
; EXPL:     SVSTNR NRA
;
SVSTNR:     DEF 8X,8X,.M,B#11,B#0111,B#1010,5V
;
; TEST INSTRUCTIONS
; PARAMS: NONE
;
TNOZ:       DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TNOZ
TNO:        DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TNO
TZ:         DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TZ
TOVR:       DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TOVR
TLOW:       DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TLOW
TC:         DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TC
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
777 TZC:        DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TZC
778 TN:         DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TN
779 TL:         DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TL
780 TF1:        DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TF1
781 TF2:        DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TF2
782 TF3:        DEF 8X,8X,B#0,B#11,B#1001,B#1010,.TF3
783 ;
784 ; NO-OP INSTRUCTION
785 ;
786 .NOOP:      SUB B#0,B#11,B#1000,B#1010,B#00000  ;NOOP
787 NOOP:       DEF 8X,8X,.NOOP
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
 788            EJECT
 789 ;
 790 ; INSTRUCTION TO CHANGE DEFAULT WORD MODE IN ALU TO BYTE MODE.
 791 ; THIS MUST BE AFTER THE ALU INSTRUCTION.
 792 ;
 793 BYTEMODE:   DEF 8X,8X,B#0@,2X,4X,4X,5X
 794 ;
 795 ;
 796 ; INSTUCTION DATA INSTRUCTION
 797 ; USED BY "I" FIELDS, AS IN SOIR, TORIR, ETC.,
 798 ; AS THE DATA FOR INPUT ON THE INSTRUCTION FOLLOWING SUCH INSTRUCTIONS.
 799 ; SIMILAR TO "DATA" DIRECTIVE, BUT HAS ONLY 16 BITS,
 800 ; LEAVING BUS AND SEQUENCER FIELDS AT DEFAULT.
 801 ;
 802 IDAT:       DEF 8X,8X,.WORD
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
 803            EJECT
 804 ;
 805 ; DEFAULT INSTRUCTION
 806 ; IF ANY FIELD IS NOT SPECIFIED,
 807 ; USE THESE DEFAULTS.
 808 ;
 809 ; THOUGH NOT NORMALLY USED AS AN ACTUAL INSTRUCTION,
 810 ; IT IS USED AS A CHECK AGAINST THE VAULE SUPPLIED
 811 ; TO THE PROM FORMATTER FOR DEFAULT BITS.
 812 ;
 813 .DEFAULT:   DEF .ALU,H#0,PASS,.CONT,.NOOP
```

Line - AMPERIF 7155/885 EMULATION - HSP DEF - HSP MICROCODE ASSEMBLER DEFI

```
814             EJECT
815 ;
816 ; SHORTHAND INSTRUCTIONS
817 ;
818 ; SEQUENCER:
819 ;
820 ; JUMP, CONDITIONAL JUMP, JUMP TO SEQUENCER REGISTER
821 JMP:        DEF .CON, 4X, PASS, .CJP,  .WORD    ;CON [ADDR] & CJP PASS
822 CJMP:       DEF .CON, 4X, 4V,   .CJP,  .WORD    ;CON [ADDR] & CJP [TEST]
823 JMPR:       DEF 4X,   4X, FAIL, .JRP,  16X      ;JRP FAIL
824 ;
825 ; JUMP TO SUBROUTINE, CONDITIONAL JUMP TO SUBROUTINE, JUMP TO SEQ REG
826 JSB:        DEF .CON, 4X, PASS, .CJSB, .WORD    ;CON [ADDR] & CJS PASS
827 CJSB:       DEF .CON, 4X, 4V,   .CJSB, .WORD    ;CON [ADDR] & CJS [TEST]
828 JSBR:       DEF 4X,   4X, FAIL, .JSRP, 16X      ;JSRP FAIL
829 ;
830 ; RETURN
831 RTN:        DEF 4X,   4X, PASS, .CRTN, 16X      ;CRTN PASS
832 ;
833 ; PUSH PC TO STACK AND LOAD SEQUENCER COUNTER/REGISTER
834 PUSHLDCT:   DEF 4X, .SEQ, PASS, .PUSH, 16X      ;PUSH PASS & SEQ
835 ;
836 ; POP STACK AND JUMP
837 POPJMP:     DEF .CON, 4X, PASS, .CJPP, .WORD    ;CON [ADDR] & CJPP PASS
838 ;
839 ; ALU:
840 ;
841 ; COPY INSTRUCTIONS:
842 ; ACCUMULATOR TO REGISTER, ACCUMULATOR TO HIGH SPEED BUS,
843 ; REGISTER TO ACCUMULATOR, REGISTER TO HIGH SPEED BUS,
844 ; HIGH SPEED BUS TO ACCUMULATOR, HIGH SPEED BUS TO REGISTER
845 AR:         DEF 8X,8X,.M,.SOR.Q,MOVE,.SOAR,5V   ;SOAR MOVE,[REG]
846 AH:         DEF .ALU,4X,8X,.M,.SONR.Q,MOVE,.SOA,NRY ;SOA MOVE,NRY & ALU
847 RA:         DEF 8X,8X,.M,.SOR.Q,MOVE,.SORA,5V   ;SORA MOVE,[REG]
848 RH:         DEF .ALU,4X,8X,.M,.SOR.Q,MOVE,.SORY,5V  ;SORY MOVE,[REG] & ALU
849 HR:         DEF 8X,8X,.M,.SOR.Q,MOVE,.SODR,5V   ;SODR MOVE,[REG]
850 HA:         DEF 8X,8X,.M,.SONR.Q,MOVE,.SOD,NRA  ;SOD MOVE,NRA
851 ;
852 ; INCREMENT OR DECREMENT ACCUMULATOR OR REGISTER
853 INCA:       DEF 8X,8X,.M,.SONR.Q,INC,.SOA,NRA   ;SOA INC,NRA
854 INCR:       DEF 8X,8X,.M,.SOR.Q,INC,.SORR,5V    ;SORR INC,[REG]
855 DECA:       DEF 8X,8X,.M,.BONR.Q,BIT0,.BONR.2,.S2NA ;S2NA BIT0
856 DECR:       DEF 8X,8X,.M,.BOR2.Q,BIT0,.S2NR,5V  ;S2NR BIT0,[REG]
857 ;
858 ; LOAD CONSTANT INSTRUCTIONS:
859 ; ZERO, POSITIVE ONE, NEGATIVE ONE, OR NEXT INSTRUCTION DATA (IDAT)
860 ; TO ACCUMULATOR, REGISTER, OR HIGH SPEED BUS
861 ZA:         DEF 8X,8X,.M,.SONR.Q,MOVE,.SOZ,NRA  ;SOZ MOVE,NRA
862 ZR:         DEF 8X,8X,.M,.SOR.Q,MOVE,.SOZR,5V   ;SOZR MOVE,[REG]
863 ZH:         DEF .ALU,4X,8X,.M,.SONR.Q,MOVE,.SOZ,NRY ;SOZ MOVE,NRY & ALU
864 P1A:        DEF 8X,8X,.M,.SONR.Q,INC,.SOZ,NRA   ;SOZ INC,NRA
865 P1R:        DEF 8X,8X,.M,.SOR.Q,INC,.SOZR,5V    ;SOZR INC,[REG]
866 P1H:        DEF .ALU,4X,8X,.M,.SONR.Q,INC,.SOZ,NRY  ;SOZ INC,NRY & ALU
867 N1A:        DEF 8X,8X,.M,.SONR.Q,COMP,.SOZ,NRA  ;SOZ COMP,NRA
868 N1R:        DEF 8X,8X,.M,.SOR.Q,COMP,.SOZR,5V   ;SOZR COMP,[REG]
869 N1H:        DEF .ALU,4X,8X,.M,.SONR.Q,COMP,.SOZ,NRY ;SOZ COMP,NRY & ALU
```

```
Line  - AMPERIF 7155/885 EMULATION - HSP DEF -     HSP MICROCODE ASSEMBLER DEFI

 870  IA:         DEF 8X,8X,.M,.SONR.Q,MOVE,.SOI,NRA  ;SOI MOVE,NRA
 871  IR:         DEF 8X,8X,.M,.SOR.Q,MOVE,.SOIR,SV   ;SOIR MOVE,[REG]
 872  IH:         DEF 8X,8X,.M,.SONR.Q,MOVE,.SOI,NRY  ;SOI MOVE,NRY
 873                                                  ;(PUT "& ALU" ON IDAT).
 874                                                  ;USE "CON XXX" INSTEAD.
 875  ;
 876  ;
 877  ;
 878  ;
 879             END
```

```
.A2NA    X 00000004 .A2NDY   X 00000014 .A2NR    X 0000000E .ALU     X 00000001
.BONR.2  X 0000000C .BONR.Q  X 00000003 .BOR1.Q  X 00000003 .BOR2.Q  X 00000002
.CDAI    X 00000002 .CDRA    X 00000004 .CDRI    X 00000003 .CJP     X 00000003
.CJPP    X 0000000B .CJSB    X 00000001 .CON     X 0000000B .CONT    X 0000000E
.CRAI    X 00000005 .CRTN    X 0000000A .DEFAULT D          .DSTCTRL X 00000006
.DSTSEL  X 0000000C .DSTSTAT X 00000006 .JRP     X 00000007 .JSRP    X 00000005
.JZ      X 00000000 .LD2NA   X 00000006 .LD2NR   X 0000000C .LD2NY   X 00000016
.LDC2NA  X 00000007 .LDC2NR  X 0000000D .LDC2NY  X 00000017 .LDCT    X 0000000C
.LOOP    X 0000000D .M       X 00000001 .MARI    X 0000000C .MDAI    X 00000007
.MDAR    X 00000008 .MDRA    X 0000000A .MDRI    X 00000009 .MRAI    X 0000000E
.NOOP    D          .PUSH    X 00000004 .R86     X 00000007 .RCACHE  X 00000003
.RCAR    X 00000002 .RDATA   X 00000004 .RFCT    X 00000008 .ROTC.Q  X 00000001
.ROTM.Q  X 00000001 .ROTNR.2 X 0000000C .ROTNR.Q X 00000003 .ROTR1.Q X 00000000
.ROTR2.Q X 00000001 .RPCT    X 00000009 .RSTNA   X 00000001 .RSTND   X 00000011
.RSTNR   X 0000000E .RTAA    X 0000001D .RTAR    X 00000000 .RTAY    X 0000001C
.RTDA    X 00000019 .RTDR    X 00000001 .RTDY    X 00000018 .RTRA    X 0000000C
.RTRR    X 0000000F .RTRY    X 0000000E .S2NA    X 00000005 .S2NDY   X 00000015
.S2NR    X 0000000F .S86     X 00000008 .SEQ     X 00000008 .SETNA   X 00000002
.SETND   X 00000012 .SETNR   X 0000000D .SHA     X 00000006 .SHD     X 00000007
.SHDR    X 00000007 .SHFTNR. X 00000003 .SHFTR.Q X 00000002 .SHRR    X 00000006
.SOA     X 00000004 .SOAR    X 00000004 .SOD     X 00000006 .SODR    X 00000006
.SOI     X 00000007 .SOIR    X 00000007 .SONR.Q  X 00000003 .SOR.Q   X 00000002
.SORA    X 00000000 .SORR    X 0000000B .SORS    X 00000003 .SORY    X 00000002
.SOSE    X 0000000A .SOSER   X 0000000A .SOZ     X 00000008 .SOZE    X 00000009
.SOZER   X 00000009 .SOZR    X 00000008 .SRCCTRL X 00000005 .SRCSEL  X 0000000B
.SRCSTAT X 00000005 .TC      X 0000000A .TF1     X 00000012 .TF2     X 00000014
.TF3     X 00000016 .TL      X 00000010 .TLOW    X 00000008 .TN      X 0000000E
.TNO     X 00000002 .TNOZ    X 00000000 .TOAI    X 00000002 .TOAIR   X 00000002
.TODA    X 00000001 .TODAR   X 00000001 .TODI    X 00000005 .TODIR   X 00000005
.TODRA   X 00000003 .TODRR   X 0000000F .TODRY   X 0000000B .TONR.Q  X 00000003
.TOR1.Q  X 00000000 .TOR2.Q  X 00000002 .TORAA   X 00000000 .TORAR   X 0000000C
.TORAY   X 00000003 .TORIA   X 00000002 .TORIR   X 0000000E .TORIY   X 0000000A
.TOVR    X 00000006 .TSTNA   X 00000000 .TSTND   X 00000010 .TSTNR   X 0000000F
.TWB     X 0000000F .TZ      X 00000004 .TZC     X 0000000C .W86     X 00000007
.WCACHE  X 00000003 .WCAR    X 00000002 .WCARLOW X 0000000D .WDATA   X 00000004
.WORD    D          A2NA     D          A2NDY    D          A2NR     D
ADD      A 00000004 ADDC     A 00000005 AH       D          ALU      D
AND      A 00000006 AR       D          BIT0     A 00000000 BIT1     A 00000001
BIT10    A 0000000A BIT11    A 0000000B BIT12    A 0000000C BIT13    A 0000000D
BIT14    A 0000000E BIT15    A 0000000F BIT2     A 00000002 BIT3     A 00000003
BIT4     A 00000004 BIT5     A 00000005 BIT6     A 00000006 BIT7     A 00000007
BIT8     A 00000008 BIT9     A 00000009 BYTEMODE D          C        A 00000005
CDAI     D          CDRA     D          CDRI     D          CJMP     D
CJP      D          CJPP     D          CJS      D          CJSB     D
COMP     A 0000000D CON      D          CONT     D          CRAI     D
CRCF     D          CRCR     D          CRTN     D          DECA     D
DECR     D          DN1      A 00000005 DNC      A 00000007 DNL      A 00000006
DNOVR    A 00000008 DNZ      A 00000004 DSTCTRL  D          DSTRDY   A 0000000C
DSTSEL   D          DSTSRC   A 0000000E DSTSTAT  D          EXNOR    A 0000000B
EXOR     A 00000008 FAIL     A 00000004 FLAG1    A 00000009 FLAG2    A 0000000A
FLAG3    A 0000000B GE       A 00000006 HA       D          HR       D
IA       D          IDAT     D          IH       D          INC      A 0000000E
INCA     D          INCR     D          IR       D          JMP      D
JMPR     D          JRP      D          JSB      D          JSBR     D
JSRP     D          JZ       D          LD2NA    D          LD2NR    D
LD2NY    D          LDC2NA   D          LDC2NR   D          LDC2NY   D
LDCT     D          LE       A 00000000 LINK     A 00000008 LOOP     D
```

LT	A	00000001	MARI	D		MDAI	D		MDAR	D	
MDRA	D		MDRI	D		MOVE	A	0000000C	MRAI	D	
N	A	00000007	N1A	D		N1H	D		N1R	D	
NAND	A	00000007	NEG	A	0000000F	NOOP	D		NOR	A	00000009
NRA	A	00000001	NRAS	A	00000005	NRS	A	00000004	NRY	A	00000000
OR	A	0000000A	OVR	A	00000003	P1A	D		P1H	D	
P1R	D		PASS	A	0000000F	POPJMP	D		PR1A	D	
PR1D	A	00000009	PR1R	D		PR1Y	D		PR2A	D	
PR2Y	D		PR3A	D		PR3D	D		PR3R	D	
PRA	A	00000008	PRI	A	0000000B	PRT1A	A	00000007	PRTA	D	
PRTD	D		PRZ	A	0000000A	PUSH	D		PUSHLDCT	D	
R0	A	00000000	R1	A	00000001	R10	A	0000000A	R11	A	0000000B
R12	A	0000000C	R13	A	0000000D	R14	A	0000000E	R15	A	0000000F
R16	A	00000010	R17	A	00000011	R18	A	00000012	R19	A	00000013
R2	A	00000002	R20	A	00000014	R21	A	00000015	R22	A	00000016
R23	A	00000017	R24	A	00000018	R25	A	00000019	R26	A	0000001A
R27	A	0000001B	R28	A	0000001C	R29	A	0000001D	R3	A	00000003
R30	A	0000001E	R31	A	0000001F	R4	A	00000004	R5	A	00000005
R6	A	00000006	R7	A	00000007	R8	A	00000008	R86	D	
R9	A	00000009	RA	D		RCACHE	D		RCAR	D	
RDATA	D		RF1	D		RF2	D		RF3	D	
RFCT	D		RH	D		RL	D		RONCZ	D	
RPCT	D		RSTNA	D		RSTND	D		RSTNR	D	
RTAA	D		RTAR	D		RTAY	D		RTDA	D	
RTDR	D		RTDY	D		RTN	D		RTRA	D	
RTRR	D		RTRY	D		S2NA	D		S2NDY	D	
S2NR	D		S86	D		SEQ	D		SETNA	D	
SETND	D		SETNR	D		SF1	D		SF2	D	
SF3	D		SHA	D		SHD	D		SHDR	D	
SHRR	D		SL	D		SOA	D		SOAR	D	
SOD	D		SODR	D		SOI	D		SOIR	D	
SONCZ	D		SORA	D		SORR	D		SORS	D	
SORY	D		SOSE	D		SOSER	D		SOZ	D	
SOZE	D		SOZER	D		SOZR	D		SRCCTRL	D	
SRCRDY	A	0000000D	SRCSEL	D		SRCSTAT	D		SUBR	A	00000000
SUBRC	A	00000001	SUBS	A	00000002	SUBSC	A	00000003	SVSTNR	D	
SVSTR	D		TC	D		TF1	D		TF2	D	
TF3	D		TL	D		TLOW	D		TN	D	
TNO	D		TNOZ	D		TOAI	D		TOAIR	D	
TODA	D		TODAR	D		TODI	D		TODIR	D	
TODRA	D		TODRR	D		TODRY	D		TORAA	D	
TORAR	D		TORAY	D		TORIA	D		TORIR	D	
TORIY	D		TOVR	D		TSTNA	D		TSTND	D	
TSTNR	D		TWB	D		TZ	D		TZC	D	
UP1	A	00000001	UPL	A	00000002	UPZ	A	00000000	W86	D	
WCACHE	D		WCAR	D		WCARLOW	D		WDATA	D	
Z	A	00000002	ZA	D		ZH	D		ZR	D	

Definition Phase complete.
0 error(s) detected.

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -

```
                TITLE - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -
;
;**********************************************************************
;*                                                                    *
;*      HH    HH   SSSSSS   PPPPPPP      DDDDDDD    GGGGGG   NN    NN  *
;*      HH    HH  SS    SS  PP    PP      DD    DD  GG    GG  NNN   NN *
;*      HH    HH  SS        PP    PP      DD    DD  GG        NNNN  NN *
;*      HHHHHHHH   SSSSSS   PPPPPPP       DD    DD  GG        NN NN NN *
;*      HH    HH        SS  PP            DD    DD  GG  GGGG  NN  NNNN *
;*      HH    HH  SS    SS  PP            DD    DD  GG    GG  NN   NNN *
;*      HH    HH   SSSSSS   PP           DDDDDDD    GGGGGG   NN    NN  *
;*                                                                    *
;*         BANK 0 - DIAGNOSTIC CODE - ADDRESSES 0000 TO 0FFF          *
;*                                                                    *
;**********************************************************************
;
;
;       ****  ****
;     *** **  ******
;   ***   **  ********
;  **     **  *********
; **      **  **********
;**       **  ***********
;***********  ***********                                    __    ___
;                                                           /  \   /   |
;***********                                                \__/  |   _|
;***********  ____ _  _  __  __  _ ____   _____   _  _  _  _|  /_
;***********  /    '  || |/  |/  ||  '    \  /     \ | |/  || ||    |
; **********  |   __  ||  _   _  ||  __   ||   ==   ||   __|| ||_  _|
;  *********  | (__|  || | | | | || |__) ||  _____||  /    | | | |
;   ********  |       || | | | | ||       || \_____| |     | | | |
;     ******  \___,__||__| |__| |__|| ,___/ \______/ |__|   |__| |__|
;       ****                       | |
;                                  |__| c o r p o r a t i o n
;
;
;      ##################################################################
;      ##################################################################
;      ####                                                          ####
;      ####                  CONFIDENTIAL DOCUMENT                   ####
;      ####               ---------------------------                ####
;      ####    REPRODUCTION AND/OR DISCLOSURE  OF THE INFORMATION    ####
;      ####    CONTAINED  HEREIN  IS STRICTLY PROHIBITED  WITHOUT    ####
;      ####    PRIOR WRITTEN AUTHORIZATION BY AMPERIF CORPORATION    ####
;      ####                                                          ####
;      ##################################################################
;      ##################################################################
;
BANK:       EQU 0               ;RESIDES IN BANK 0, 0000 TO 0FFF
;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -

```
                EJECT
                INCLUDE HSPHIS.SRC
                TITLE2 HSPHIS - REVISION HISTORY
    ;
    ;*****************************************************************************
    ;*                                                                           *
    ;*      HH    HH   SSSSSS   PPPPPPP       HH    HH   IIII    SSSSSS       *
    ;*      HH    HH  SS    SS  PP    PP      HH    HH    II    SS    SS       *
    ;*      HH    HH  SS        PP    PP      HH    HH    II    SS             *
    ;*      HHHHHHHH   SSSSSS   PPPPPPP       HHHHHHHH    II     SSSSSS       *
    ;*      HH    HH        SS  PP            HH    HH    II          SS       *
    ;*      HH    HH  SS    SS  PP            HH    HH    II    SS    SS       *
    ;*      HH    HH   SSSSSS   PP            HH    HH   IIII    SSSSSS       *
    ;*                                                                           *
    ;*         HSP - HIGH SPEED PROCESSOR MICROCODE REVISION HISTORY             *
    ;*                                                                           *
    ;*****************************************************************************
    ;
    ; This file contains the revision history (changes) to the HSP
    ; microcode during its entire development.
    ;
    ;
    ; HSP MICROCODE AUTHORS
    ; =====================================
    ;
    ; DIAGNOSTIC CODE, BANK 0 . . . Version 1.0-1.6   Virgil Gillespie
    ;                                                 M. Craigie
    ;                               Version 1.7-1.8   Albert Monroe
    ;
    ; MAIN ONLINE CODE, BANK 1. . . Version 1.0-1.B   Virgil Gillespie
    ;                                                 T. Casorso
    ;                                                 M. Craigie
    ;                               Version 1.C-1.E   Albert Monroe
    ;
    ; COMBINED CODE . . . . . . . . Version 2.0+      Albert Monroe
    ;
                TITLE2 HSPHIS - COMBINED CODE - REV 2.4
```

```
                87              EJECT
                88  ;
                89  ; REVISION HISTORY
                90  ; ======================================
                91  ;
                92  ; COMBINED CODE SET
                93  ; ----------------
                94  ;
                95  ; REVISION 2.4, 2/11/93 (In development)
                96  ;;- 2.3.7
                97  ;;- Fixed logic of retry in ISUMSG.
                98  ;;- 2.3.6
                99  ;;- Correct loss of AOUTRDY check in ISUCMDX from previous
               100  ;;  edits.
               101  ;;- 2.3.5
               102  ; - Clear any outstanding EI as part of INITAMP.
               103  ;;- 2.3.4
               104  ; - Retry if error in ISUMSG.
               105  ;;- Clean up retry code in ISUCMD.
               106  ;;- 2.3.3
               107  ;;- Additional retries in ISUCMD.
               108  ;;- 2.3.2
               109  ; - XMC failures are now retried.  The XMC now waits more
               110  ;   than one minute before talking to anyone because of
               111  ;   problem with new drives that power up busy.  XMC waits
               112  ;   for drives to complete power up to issue busy release.
               113  ;   So if XMC communication fails, try again until works.
               114  ;   Bug ???? (New TRACER system has changed all the bug
               115  ;   numbers.  Don't know what this one is.)
               116  ;;- 2.3.1
               117  ;;- Increased delay before power up diags from 5 seconds to
               118  ;;  one minute and 5 seconds for XMC/drive power-up bug.
               119  ; - Reduced cylinder that offline diag read test (2EX) goes
               120  ;   to.  Fixes to CYLMAX in 1.7 made it go one too far, but
               121  ;   no one caught this until late 92.  Bug ????.
               122  ;
               123              TITLE2 HSPHIS - COMBINED CODE - REV 2.3
```

```
                EJECT
;
; REVISION 2.3, 6/8/91
; - Changed SEEK to set seeked flag for drive (SETSEEK) only
;   if seek function was sucessfully issued to Amperif.  Bug
;   74.
; - Simplified SEEK routine during other changes so that
;   F.SEEK flag is no longer needed, and code is smaller.
; - Changed SEEK logic so that if command is rejected by
;   Amperif, seek is not re-issued, just busy set.  Bug 74.
; - Moved RD3AMP and ISUCMD from HSPCMN to HSPONL, since they
;   are now only used in HSPONL.
; - Added tracing to XMC interface communications: ISUCMD,
;   ISUADR and RD3AMP, plus new TRACE.A entry point.
; - Added timeout exit in ISUCMD when sending a command with
;   status pending (F.STPEND).  Bug 74.
; - Created HSPHIS.SRC include file to hold all revision
;   history documentation.
; - Coverted to MAKE to control processing of HSP code.
; - Created XWAIT subroutines to handle CDC processing while
;   waiting for the XMC in some loop.  Bug 74.
; - Added XWAIT processing to ISUADR.  Bug 74.
; - Added tracing of functions during high speed reads and
;   writes, and during background processing (RSP2OTH).
; - Speeded up RSP2OTH subroutine.  Bug 74.
; - Changed offline diagnostic processing to wait for another
;   function after getting a terminate function (FFF), rather
;   than go to online code.  Now the only way to go online is
;   to hit the reset button.
; - Added call to INITAMP in shared memory offline diagnostic
;   function initialization (OD.SHINI) to be able to terminate
;   them with an FFF function.
; - Deleted use of CDC.ST in offine diagnostics (CKERROR and
;   SETALERT).  There is no CDC status for offline diagnostics.
;   It was used as an odd means to hold error status, but code
;   didn't work: it would set error, but never clear it.  Bug
;   95.
; - Added code in CKUPDATE to not check for update if there is
;   an outstanding shared memory error (F.SHFAIL).  CKUPDATE is
;   called as part of background processing from CKDEAD, which
;   could be called while processing the shared memory error
;   itself.  If the error is hard, then we could get into an
;   infinite loop of errors without ever reporting them.  Bug
;   96.
; - Changed processing of function from an access when another
;   access is already connected, to allow that access if the
;   current access has had a communication failure, i.e., there
;   has been a deadman timeout.  If we can't communicate with a
;   channel, there is no reason to have the channel stay
;   connected.  Otherwise, with ESS running on the host, the
;   HSP may spend all of its time processing a broken channel,
;   and the other channel will only get controller busy.  Bug
;   97.
;
                TITLE2 HSPHIS - COMBINED CODE - REV 2.2
```

```
                179             EJECT
                180     ;
                181     ; REVISION 2.2, 1/29/91
                182     ; - Change to clear shared memory failure flag, F.SHFAIL, on
                183     ;   deadstart.  CDC deadstart processing only retries errors or
                184     ;   hangs; it doesn't do detailed status functions, which would
                185     ;   clear the error after reporting it.
                186     ; - Corrected code in DSKDSTRT, RTN.ADDR, RTN.CYL, and STAT.DET
                187     ;   to use the new local memory copy of cylinder, track and
                188     ;   sector.  Bug 92.
                189     ; - Corrected bug in RTN.CYL that would return bad values
                190     ;   because of bad jump into middle of RTN.ADDR routine.
                191     ; - Updated CTSP2REG, CTSR2PAR, CTSP2SHM subroutines to
                192     ;   incorporate new local memory copy of cylinder, track and
                193     ;   sector.  Bug 92.
                194     ; - Rewrote trace subroutine, TRACE, to use less registers, and
                195     ;   to have a single trace address for logic analyzers, and
                196     ;   clear up confusion with saving the accumulator.
                197     ; - Added local memory copy of last seek parameters, in order
                198     ;   to handle multiple seeks to the same drive.  This happens
                199     ;   with ESS especially, where ESS sends a seek to record 0 in
                200     ;   order to test drives, without checking if a seek is
                201     ;   allready in progress.  The seek parameters for the second
                202     ;   seek must be saved, so that when the first seek completes
                203     ;   and is acted upon, the second seek address will be used,
                204     ;   not the current position saved in shared memory.  Bug 92.
                205     ; - Elimination of LPARAMS in local memory and REL.WD1 and
                206     ;   REL.WD2 in shared memory.  Bug 92.
                207     ; - Addition of TRACE.0 to write parameters to trace buffer.
                208     ;   This makes it possible to distinguish between functions,
                209     ;   and parameters that look like functions.
                210     ;
                211             TITLE2 HSPHIS - COMBINED CODE - REV 2.1
```

```
                EJECT
    ;
    ; REVISION 2.1, 12/12/90
    ; - Changed message issued to XMC/OCP on end of powerup
    ;   diagnostics.  Code is now 020 for powerup diagnostics
    ;   complete without error.  Bug 87.
    ; - Added message issued to XMC/OCP when coldstart initial-
    ;   ization is complete.  This is a code of 000, which used to
    ;   be issued as soon as powerup diagnostics were complete.
    ;   Bug 87.
    ; - Changed OD.CMPL to go to OD.IDLE, waiting for another
    ;   offline diagnostic or for offline diagnostic termination.
    ;   This allows running of several diagnostics without going
    ;   to online code, which is needed for shared memory offline
    ;   diagnostics.  This means that once an offline diagnostic is
    ;   run, a offline diagnostic termination function MUST be
    ;   issued to go back online.  Bug 87.
    ; - Created ISUMSG diagnostic subroutine to handle all special
    ;   NOOP functions sent to XMC as messages.
    ; - Changed offline diagnostic error handling (OD.ERROR) to
    ;   allow entering a new command after an error, instead of
    ;   exiting no matter what the command is.  Bug 87.
    ; - Added shared memory offline diagnostics: ILD-B 8xx for
    ;   writing, ILD-B 9xx for reading.  This allows a wrap-around
    ;   data testing, by having one controller write while the
    ;   other reads.  Bug 87.
    ; - Added clear of status pending flag, F.STPEND, to INITAMP.
    ;   Without this, INITAMP, when called from ABORT, could clear
    ;   a status sent by AMP, and then ISUCMD would hang waiting
    ;   for status to be sent.  Bug 49.
    ; - Added delay to shared memory power up diags that is
    ;   dependant on ID, to cover case of full subsystem power up.
    ;   Bug 70.
    ; - Added code to SHOFFLN to wait 2 seconds after setting
    ;   shared memory offline request to other controller, to
    ;   allow that controller time to see the request.  The best
    ;   solution, to have an acknowledgement from the other
    ;   controller, is to complicated to put in at this time.  Bug
    ;   70.
    ; - Added code to RES.UNIT to force a reserve if the unit is
    ;   reserved to the other controller, and the other controller
    ;   is powered down.  Also shortened time that shared memory
    ;   is reserved throughout RES.UNIT.  Bug 70.
    ; - Fixed SEN.ONE to use TIMEOUT register instead of TEMP0,
    ;   which could get corrupted by timeout routines.  This makes
    ;   it work the same as GET.ONE.
    ; - Standardized WRTPAD and RDPAD subroutines.
    ; - Cleaned up error exit for PROCGST.
    ; - Corrected timeout handling in STAT.EXT and STAT.DET.
    ; - Cleaned up RSTEI and RSTODID status tests in ISUADR; they
    ;   now use defined equates instead of hard coded hex values.
    ; - Added a check for HS Bus parity errors in SHMRD.  A H/W bug
    ;   (#83) causes parity errors for simultaneous write and read
    ;   of the same location of shared memory by both controllers.
    ;   The code added will ignore the first HS Bus parity error
```

```
267    ;   and retry.  The second will cause an abort.  Bug 83.
268    ; - Changed LDA, STAR, etc., to HA, AR, etc., as used by new
269    ;   HSPDEF.
270    ; - Converted to new shorthand instructions: ZR, N1R, IR, etc.
271    ; - Cleaned up test for CDC function table maximum in FNCDCODE.
272    ; - Rewrote SHMLK and SHMUNLK to use two separate locations,
273    ;   one for the A controller, one for B.  Also changed it to
274    ;   use SHMRD and SHMWRT instead of its own versions of these.
275    ;   This makes the code much simpler, and clears up a bug where
276    ;   both are writing to the same location at the same time,
277    ;   both changing the other's local memory.  Bug 83.
278    ; - Changed Amperif status pending (EI) procedures to use local
279    ;   memory instead of shared memory, since a status pending on
280    ;   one controller is not pending on the other.  This also
281    ;   reduced chances of simultaneous access of shared memory.
282    ;   Bug 83.
283    ; - Created WTAMPST subroutine to replace OOPSWAIT, HECKWAIT
284    ;   and DAMNWAIT loops in STATGEN, WRITE and READ.  This
285    ;   standardized code and enabled a timeout exit as coded in
286    ;   WTAMPST.  Bug 65.
287    ; - Fixed bug in INPDISP that would write 16 bit values to the
288    ;   host, causing parity errors.  Bug 17.
289    ; - Corrected deadman checking logic for MANPROC and INPDISP
290    ;   to reset after each word is transfered.  Bug 28.
291    ; - Cleaned up code in CK.SEEK, SET.SEEK, and created the
292    ;   subroutine CLRDSTAT.  This was made possible by change to
293    ;   connected unit flag, below.  Bug 39.
294    ; - Changed STATGEN to set 5000 general status if the parity
295    ;   error indication is set in the detailed status (word 16
296    ;   bit 6).  With CDCI parity, as detected by CKCERR, both the
297    ;   general status register and SYSERR could be zero, even
298    ;   though the parity was detected and set.
299    ; - Changed CKAMPST and SENSEID to not write sense byte data to
300    ;   remote shared memory if the status is for some unit other
301    ;   than CURUNIT.  This prevents Amperif error status for idle
302    ;   units from corrupting status for the other controller's
303    ;   current unit.  Bug 83.
304    ; - Changed unit connected status from a bit in CURUNIT to a
305    ;   bit in FLAGS: F.CNCTD.  This makes a lot of code much
306    ;   simpler.  Bug 83.
307    ; - Removed useless unit connected status from diagnostic code.
308    ; - Removed F.SIDEB flag.  Local memory location ID is now used
309    ;   exclusively.  Bug 12.
310    ; - Removed saving and restoring of CAR (local memory address)
311    ;   during DMINIT and DEADCK.  Bug 28.
312    ; - Rewrote CAR handling in XBUFRD.  Required by above change.
313    ;   Bug 28.
314    ; - Changed Detailed Status on parity errors for better
315    ;   isolation of error.  Word 16 bit 1 is set for local memory
316    ;   address parity, bit 6 is set if CDCI input data parity, and
317    ;   both are set if SYSPORT status bit 0, "BPARERR" is set,
318    ;   since this is an OR of many different parity errors.  Bug
319    ;   39.
320    ; - Put timeout error exit in WAITAMP.  Bug 65.
321    ; - Cleaned up code, labels and documentation for RDXMT and
```

```
                322     ;   WRTXMT.
                323     ; - Changed STAT.GEN for easier trace of 5000 statuses at
                324     ;   STAT5.
                325     ; - Changed XMTWEND and XMTREND to only reset deadman at entry.
                326     ;   Bug 28.
                327     ; - Deleted obsolete XMC.DUMP function.  It was a debug
                328     ;   routine to get timing info from a specially modified XMC
                329     ;   code, which no longer exists.  Code didn't work anyway.
                330     ; - Changed CKCERR to make it general, so that it could be
                331     ;   called to check for any channel parity error.  Changed
                332     ;   CKCERR and SETALERT to be able to report channel parity
                333     ;   errors more often and consistantly, and to insure that
                334     ;   error is reported to the correct channel.  This change
                335     ;   caused by discovery that not all parity errors from CDCI
                336     ;   are sent to SYSPORT "BPARERR" status.
                337     ; - Rewrote PROCFNC and parts of FNCDCODE to handle connect and
                338     ;   clear connect function more easily.  These changes were
                339     ;   required by above change.
                340     ; - Fixed bug in RD3AMPX routine that would do bad jump to
                341     ;   RD3AMPX+2.  Made lable RD3AMP1X to jump to.
                342     ; - Assigned area in HSPMRK for conditional assembly flags.
                343     ; - Added a conditional assembly for running without HSP board
                344     ;   ECO #'s 3505 and 3506 (shared memory error detection
                345     ;   signals), called SHMERRHW.  SHMERRHW is set to one if the
                346     ;   ECO's are installed.  This was required because of lack of
                347     ;   up-to-date HSP boards.  Bug 19.
                348     ; - Added code in INIT and CKSHERR to clear Shared Memory
                349     ;   error status.  Bug 19.
                350     ; - Changed shared memory diags to accept an error on first
                351     ;   read, since shared memory may be uninitialized from a
                352     ;   powerup.  Bug 19.
                353     ; - Added code to handle an EI with device end being lost.
                354     ;   Could happen during errors, e.g. Shared Memory parity, that
                355     ;   would clear the EI before written.  Code will now keep
                356     ;   track of number of times busy was sent to host.  After 256
                357     ;   times, assume device end was recieved but lost.  Bug 81.
                358     ; - Deleted obsolete CLRAMPF subroutine in favor of new INITAMP
                359     ;   subroutine.  Bug 76.
                360     ; - Fixed STAT.GEN to not send status of unrecoverable error
                361     ;   and busy together (5002).  Bug 81.
                362     ; - Increased delay before powerup diagnostics from 2 to 5
                363     ;   seconds.  After true powerup, XMC may take 2+ seconds to
                364     ;   initialize.  Bug 26.
                365     ; - Changed online shared memory subroutines, SHMRD, SHMWRT,
                366     ;   and SHMLK, to re-write the last used shared memory
                367     ;   location if an error is detected after a read or write.
                368     ;   This is because the parity bits are stored with the data,
                369     ;   and there is no way to clear them except by writing the
                370     ;   correct parity.  Bug 19.
                371     ; - Changed all bank 0 code to only use CKAMPSTX, etc., instead
                372     ;   of CKAMPST, etc., so that use of local and shared memory
                373     ;   would be consistant.  Most definitions of local and shared
                374     ;   memory are different between the two banks, so using the
                375     ;   same procedure will corrupt both memories.  Bug 68.
                376     ; - Reorganized offline diagnostic routines for clarity, fixed
```

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                377     ;   some minor bugs and confusion.  Bug 68.
                378     ; - Changed flag bit definitions to use conditional assemblies,
                379     ;   so that flag bits are only defined one way in each bank.
                380     ;   This allows easier porting of code between banks, by
                381     ;   reporting bit definition conficts during assembly.  Bug 68.
                382     ; - Fixed bugs in definition of cache/local memory in bank 0.
                383     ;   Bank 0 uses bank 1's shared memory equates as local memory.
                384     ;   This caused overlaps in definition of local memory.  Bug
                385     ;   68.
                386     ; - Deleted unused and non-working code to record timming in
                387     ;   local memory for offline diagnostics.  This also deleted
                388     ;   registers TEMPCAR and TEMPTIM.  This also fixed a few bugs.
                389     ;   Bug 68.
                390     ; - Moved default detailed status information from equate area
                391     ;   to inline code under STAT.DET.  Bug 17.
                392     ; - Added bit 5 word 9 to default detailed status bits: Status
                393     ;   Valid.  This bit was involved with CYLERR code, deleted
                394     ;   below.  Bug 17.
                395     ; - Eliminated F.ONEST flag, converted to faster method of two
                396     ;   different calls to CKAMPST.  Now CKAMPSTS does all
                397     ;   statuses, CKAMPST1 does only one.  This saves code and
                398     ;   fixes possible bug in misuse of flag in READ and WRITE,
                399     ;   which would leave flag not set under certain error
                400     ;   conditions.
                401     ; - Fixed quirky code in end of ISUADR that would depend on
                402     ;   the order of the flag bits in the FLAGS register.  New code
                403     ;   is shorter.
                404     ; - Corrected code in RDADRCKW and WRTADRCK to set correct bits
                405     ;   in detailed status word 2, bits 11 through 8.  Bugs 45, 47.
                406     ; - Added equates for EI status action and recovery action
                407     ;   codes.
                408     ; - Changed offline diagnostics to set error code 1D hex if any
                409     ;   illegal value is given, rather than ignore.  Bug 69.
                410     ; - Added Echo One Word function for CDC Ferret testing.
                411     ; - Changed shared memory subroutines to not automatically
                412     ;   increment address pointer register.  Incrementation is only
                413     ;   sometimes wanted.  Changed names to SHMWRTCU, SHMWRT,
                414     ;   SHMRDCU, and SHMRD.  Shortened SHMWRTCU and SHMRDCU by
                415     ;   a few instructions each.  Bug 19.
                416     ; - Removed nonsense code involving CYLERR, that would attempt
                417     ;   to return old status from a cylinder accessed up to 256
                418     ;   seeks ago.  There is no known reason to do this, and code
                419     ;   never worked anyway.  This involved deleting AMP.SEN2 and
                420     ;   CYLERR shared memory data areas, SAVERR and RSTERR
                421     ;   subroutines, and code from SEEK and STATGEN.  Bug 17.
                422     ; - Cleaned up accesses to shared memory in many places
                423     ;   throughout the code: duplicating CURUNIT calculation, calls
                424     ;   to SHMRD followed by overwrite of data, poor documentation.
                425     ;   Bug 19.
                426     ; - Fixed bug in STWRT and STWRTABS that would cause parity
                427     ;   errors on write if ls byte was non-zero.  Bug 17.
                428     ; - Added code to clear the sequencer stack at start of powerup
                429     ;   diagnostics.  Bug 75.
                430     ; - Added code to request update of shared memory from other
                431     ;   controller during coldstart initialization.  Bug 75.
```

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                ; - Added code to do update of shared memory, if requested by
                ;   the other controller, during IDLE and DEADCK.  Bug 75.
                ; - Created cache/local memory location ID to hold the
                ;   controller's idendifier, hex A or B, for controller A or B.
                ;   Calculated during coldstart initialization.  Bug 75.
                ; - Changed the way drives are reserved.  Now local memory is
                ;   not used, so drive reserve status not corrupted with power
                ;   failure.  Created subroutines REL.UNIT and CK.RES,
                ;   rewrote RES.UNIT and CLRREST (renamed REL.ALL) subroutines,
                ;   rewrote DRP.SKS routine.  Deleted UNIT.RES table in local
                ;   memory, changed SUNIT.RE to UNIT.RES in shared memory.
                ;   Created RES.FAIL table in local memory to know when to
                ;   respond with drive reserved to general status functions.
                ;   Bug 75.
                ; - Rewrote coldstart's BLK.IO code.  Old code had changes
                ;   that were incompatable with online code.  Reversed the
                ;   sense of the flag, and changed name to SEEKED.  Bug 68.
                ; - Removed code for F.IGNRDE flag.  Superfluous, and could
                ;   cause problems on infinite seek busy status if shared
                ;   memory problems.  Bug 61.
                ; - Fixed bug in ISUADR that wrote 16 bit value to UBI, causing
                ;   bus parity errors.  Bug 42.
                ; - Corrected code in UBIFT that would generate bus parity
                ;   errors by writing a 16 bit value when the UBI only handles
                ;   12 bit values.  Bug 17.
                ; - Created CKSYSERR subroutine, in HSPCMN, to check for
                ;   SYSPORT error status.  Bug 17.
                ; - Add check for high speed bus parity errors during powerup
                ;   diagnostics.  Bug 17.
                ; - Add check for parity errors during IDLE, DEADCK, and
                ;   PROCGST.  This will find any parity errors that have
                ;   occured during the last CDC function before sending status
                ;   back.  Bug 17.
                ; - Added code in STAT.GEN and STAT.DET/EXT to report parity
                ;   errors.  Added code in STAT.DET/EXT to clear parity errors
                ;   after they are reported.  Bug 17.
                ; - Made equate for shared memory control for clearer
                ;   documentation.  Bug 19.
                ; - Clear shared memory errors after detected and saved.  Bug
                ;   19.
                ; - Cleaned up unnecessary code in OCPILDB.
                ; - Changed STAT.DET and STAT.EXT to clear shared memory fail
                ;   flag, so that the host can retry the operation.  Bug 19.
                ; - Cleaned up status pending flag (F.STPEND) use.  Changed
                ;   when cleared in CKAMPST.  This stops the code from hanging
                ;   waiting for status that it has already received, but
                ;   couldn't save because of a shared memory error.  Flag is
                ;   now cleared before accessing the shared memory.  Bug 37.
                ; - As part of above correction, PENDUNIT cache location was
                ;   no longer needed, and was deleted.  Bug 37.
                ; - Correction to logic that determines when to issue an XMC
                ;   seek function in response to a CDC seek.  Bug 37.
                ; - Removed all SSD code.  It doesn't work, and will never be
                ;   used.
                ; - Corrected sending random controls to UBI when executing
```

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                487     ;   INITAMP.  Bug 26.
                488     ; - Moved initialization of the trace buffer pointer register
                489     ;   from CLRREG to coldstart initialization.
                490     ; - Removed redundant code in coldstart initialization to
                491     ;   release the shared memory lock.  CLRREST subroutine, which
                492     ;   is already part of warmstart initialization, already does
                493     ;   this.  Bug 19.
                494     ; - Added check in CLRREST and CLRSTAT to not access shared
                495     ;   memory if it has failed.  Bug 19.
                496     ; - Added a delay of 2 seconds to powerup diagnostics to let
                497     ;   drive units complete their reset.  Removed similar code in
                498     ;   both powerup display and UBI test.  Bug 76.
                499     ; - Deleted poor code to initialize the UBI in UBI powerup
                500     ;   test, added INITAMP instead.  Bug 76.
                501     ; - Changed register definitions to use conditional assemblies,
                502     ;   so that registers are only defined one way in each bank.
                503     ;   This allows easier porting of code between banks, by
                504     ;   reporting register conficts during assembly.  Bug 68.
                505     ; - Changed bank 0 register equates to not use temporary
                506     ;   registers.  Bug 68.
                507     ; - Moved CKAMPST, RD3AMP, ISUCMD, SVERR and RSTERR subroutines
                508     ;   to HSPCMN.SRC.  Bug 68.
                509     ; - Deleted obsolete extended length i/o code in issue command.
                510     ;   Extended length i/o concept has been discarded, and code in
                511     ;   XMC to support was removed long ago.  Bug 7.
                512     ; - Removed dependance on ACC to be intact throughout several
                513     ;   subroutines in RES.UNIT and CKAMPST.  Bugs 12, 28.
                514     ; - Deleted unused and non-working code to do offline
                515     ;   diagnostic functions from the host.
                516     ; - Delete unused buffer subroutines from online code.
                517     ; - Converted online's DELAY subroutine to delay 1us instead of
                518     ;   0.5us, and converted calling routines' parameters.
                519     ; - Moved DELAY and DELAYMS to HSPCMN.SRC.
                520     ; - Moved initialization of side A/B flag, SET.ID, to the
                521     ;   diagnostic bank, so that powerup diagnostics could reserve
                522     ;   the shared memory while testing it.  Bug 19.
                523     ; - Moved CKCDC subroutine, used for init to HSPCMN.SRC.
                524     ; - Moved delay for waiting for drives and XMC to initialize
                525     ;   from coldstart initialization to powerup display routine,
                526     ;   since that is the first time XMC is accessed.  Deleted
                527     ;   two sets of duplicated code to initialize XMC from
                528     ;   coldstart initialization.  Bug 26.
                529     ; - Removed obsolete SIOLOOP code from diagnostic bank.
                530     ; - Expanded pattern test for cache memory to include upper 8
                531     ;   bits of data word.  Bug 17.
                532     ; - Added BANK equates.  Now the common code in HSPCMN.SRC can
                533     ;   be slightly different in each bank by the use of "IF BANK"
                534     ;   conditional assembly statements.  Bugs 17, 19.
                535     ; - Created ABORT entry point for unrecoverable errors.  Bugs
                536     ;   17, 19.
                537     ; - If there is a shared memory error, any function other than
                538     ;   general status and extended or detailed status will abort,
                539     ;   which sends inactive to the host.  Bug 19.
                540     ; - Moved MULT subroutines to HSPCMN.SRC.
                541     ; - Added Amperif/UBI source status read mask for INITAMP.
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                542   ;  Bug 19.
                543   ; - Moved INITAMP subroutine to HSPCMN.SRC for below fix.
                544   ;  Bug 19.
                545   ; - Added INITAMP to PUPDISP, to initialize the UBI as part of
                546   ;  powerup diagnostics, to help insure that powerup
                547   ;  indications can be sent to XMC.  Bug 76.
                548   ; - Removed bad code that did a RDATA from shared memory in
                549   ;  an attempt to force shared memory into address mode.  In
                550   ;  fact, it just caused parity errors.  Bug 19.
                551   ; - Deleted non-working code to do rewrite of shared memory.
                552   ;  Bug 19.
                553   ; - Deleted old ASP driving subroutines from diagnostic code.
                554   ; - Created HSPCMN.SRC file to hold routines common to both
                555   ;  banks.  Common code will be moved to this file as they are
                556   ;  modified or created.  First are all the shared memory
                557   ;  subroutines.  Bug 19.
                558   ; - Placed error checking in shared memory subroutines STWRT,
                559   ;  STRD, STWRTABS, STRDABS, SHMLK, and SHMUNLK.  Bug 19.
                560   ; - Combined Long Read and Long Write register flags into one.
                561   ;  (Can't read and write at the same time.)  This frees a
                562   ;  bit in flag register for use below.  Bug 19.
                563   ; - Created a register flag for status buffer/shared memory
                564   ;  error, F.SHFAIL, set in CKSHERR.  Bug 19.
                565   ; - Return 5020 status on general status functions if the
                566   ;  shared memory has failed.  Bug 19.
                567   ; - Reorganized detailed and extended status routines to
                568   ;  bring detailed status routines up to date, clean up
                569   ;  comments, and make further updates easier.
                570   ; - Correct probable bug in STAT.DET that might have host
                571   ;  timeout waiting for active after function reply.
                572   ; - Changed detailed status processing to not access shared
                573   ;  memory if it has failed, and to note error in status.
                574   ;  Bug 19.
                575   ; - Added timeout for wait for release of the shared memory.
                576   ;  If timeout expires, or the other side is powered down (as
                577   ;  determined from sharedmem srcstat), the other side's lock
                578   ;  will be forced to be released.  Bug 19.
                579   ; - Expanded code date and revision level marking in code,
                580   ;  created HSPMRK.SRC.
                581   ; - Added addressing test to shared memory powerup diag test.
                582   ;  Bug 19.
                583   ; - Improved bit pattern test for shared memory powerup diags.
                584   ;  Bug 19.
                585   ; - Rewrote cache/local memory powerup diag test.  Bug 76.
                586   ; - Eliminated useless sense i/o commands from powerup diags.
                587   ;  originally, this was supposed to initialize the sense byte
                588   ;  data in shared memory, but XMC does not keep sense byte
                589   ;  data on a per-drive basis, so it could erase or duplicate
                590   ;  errors from one drive to many.  Bug 76.
                591   ; - Rewrote error processing for register and UBI powerup diag
                592   ;  test.  Bug 76.
                593   ; - Added powerup diagnostic pass-fail indicator.  A NOOP
                594   ;  function is sent to XMC with the address field having the
                595   ;  error code, or zero if ok.  This can be viewed on the OCP
                596   ;  as the last function on thumbwheel setting 4D0.  This was
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                597    ;  the original intent of the powerup diagnostics, but it
                598    ;  never worked before.  Bug 76.
                599    ; - Removed obsolete ASP driven UBI test from diagnostic code.
                600    ; - Standardized register usage for powerup diagnostics.  Bug
                601    ;  76.
                602    ; - Standardized long delay routines in diagnostic code by
                603    ;  making a DELAYMS subroutine.
                604    ; - Increased timeout value in RSP.RSRV from 7ms to 10ms.  Bug
                605    ;  28.
                606    ; - Improved check for CDCI installed (CKCDC).
                607    ;  Bug 28.
                608    ; - Added deadman timer to all CDCI interfaces.  Bug 28.
                609    ; - Documented save location for AMP status.
                610    ; - Added status buffer/shared memory powerup diagnostic test.
                611    ;  Bug 19.
                612    ; - Removed unused bad "GATEWAY" diagnostic code.
                613    ; - Rewrote powerup diagnostic error handling to have more than
                614    ;  one error bit.  Bug 19.
                615    ; - Corrected obsolete documentation in diagnostic code.
                616    ; - Changed RSP.RSRV timeout counter to accumulator, so that
                617    ;  TIMEOUT register will be available for calling routines.
                618    ;  Bug 28.
                619    ; - Speeded up UPDSECT subroutine to fix promblem of host
                620    ;  timeout at end of read and write functions.  Bug 28.
                621    ; - Implemented partial reset of deadman timer for each loop
                622    ;  within a single routine.  The low order register, DEADMAN,
                623    ;  is reset with a macro.  Reset of high order, in local
                624    ;  memory, would take too long.  Changed values of two
                625    ;  counters to make reset of low order register a one
                626    ;  instruction macro.  Bug 28.
                627    ; - Removed redundant code in DEADCK.  Bug 28.
                628    ; - Aligned begining of idle loop to nearest 40 hex address for
                629    ;  easier debug.
                630    ; - Updated RESP20TH to re-select saved source and destination
                631    ;  ports, not automatically AMP.PORT.  Bug 28.
                632    ; - Removed obsolete TIMEOUT subroutine to make more code
                633    ;  space.
                634    ; - Greatly increased timeout value for waiting for general
                635    ;  status function after a read or write.  This is a temporary
                636    ;  fix for bugs in both READ and WRITE routines that don't
                637    ;  handle the timeout condition correctly.
                638    ; - Changed use of accumulator for timeout counter to a
                639    ;  register.  The accumulator is too often corrupted.  This
                640    ;  fixed four bugs in read and write routines.
                641    ; - Elimated all relative jumps (e.g. JMP $+5) greater than
                642    ;  +/- 3, replaced with jumps to labels.  This will eliminate
                643    ;  many future problems.  By convention, no relative jump of
                644    ;  greater that +/- 3 are allowed.
                645    ; - Incorporated POPJMP shorthand instruction.
                646    ; - Made CLR.STK macro to re-initialize the sequencer stack.
                647    ; - Inhanced debug with analyzers by having output of 29116 ALU
                648    ;  Y bus to High Speed Bus as default bus source ("ALU").
                649    ;  This will make most ALU output visible to analyzer, so
                650    ;  making tracing problems easier.
                651    ; - Created SRC.AMP and DST.AMP macros.  Bug 28.
```

```
652    ; - Added response to other ports on waits of deadman timeouts
653    ;   during CDCI processing.  Reversed value of high order and
654    ;   low order counters for deadman timer so can call RESP2OTH
655    ;   more often.  Subroutine changed from DMTO to DEADCK.  Bug
656    ;   28.
657    ; - Made macros for selecting source and destination ports.
658    ;   Used the macros whenever possible, for CDCI and AMP port
659    ;   selection, so that port can be remembered via registers
660    ;   SVSRC and SVDST.  Bug 28.
661    ; - Made controller reserved routine in RESP2OTH a subroutine
662    ;   and called it from both RESP2OTH and PROCFNC.  PROCFNC
663    ;   will now not error on a time out on a non-reserved channel.
664    ;   Bug 28.
665    ; - Changed SRC.CDC and DST.CDC from subroutines to macros for
666    ;   speed.  Bug 28.
667    ; - Removed use of HSCDCP (TEMP.A), replaced with new SRC.CDC
668    ;   and DST.CDC subroutines.  Bug 28.
669    ; - Converted to HALE assembler.  This is a massive change to
670    ;   the source code, but not so much to the actual program.  It
671    ;   was necessitated by a bug in the old assembler, "A29116F",
672    ;   that would act irregularly as the source code file got too
673    ;   big (not the object code, just the source!).  Went to HALE
674    ;   instead of fixing A29116, as A29116 was primitive anyway,
675    ;   with no include files, syntax checking, or macros.  HALE
676    ;   was already in use by other Amperif projects, and is a
677    ;   supported by hilevel inc.  A29116 had no syntax, while HALE
678    ;   does, so there are massive changes to the source code, but
679    ;   mostly on an instruction by instruction basis.  Lables were
680    ;   changed to fit hale's restrictions of upper case only, 8
681    ;   char max, no "$" or "_" chars, and no leading numerals.
682    ; - Standardized CJPP instructions.
683    ; - Used the same equates for both banks, changing location of
684    ;   ERRCODE, CDCCHAN, etc.
685    ; - Standardized MULTCYL, MULTTRK, MULTSEC, and ADDC1234
686    ;   subroutines between the two banks.
687    ;
688            TITLE2 HSPHIS - BANK 1 CODE - REV 1.E
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPHIS - BANK 1 CODE - REV 1.E

```
                689             EJECT
                690     ;
                691     ; MAIN ONLINE CODE SET, BANK 1
                692     ; --------------------------
                693     ;
                694     ; REVISION 1.E, 5/21/90
                695     ; - Corrected typos in RTRNSTBF, INPPROC and WEOP.
                696     ; - Changed CDCI high speed bus port addresses to speed up port
                697     ;   selection/determination by elimininating port ID
                698     ;   translations.  Bugs 28, 12.
                699     ; - Moved RWSTBF out of idle, made it a routine.
                700     ; - Changed FLAGS references to use EQU names.
                701     ; - Changed CDCI switch 1 settings to not require the first
                702     ;   CDCI installed, and to allow continuous check of valid
                703     ;   installation for on-line failure, and to reflect changes to
                704     ;   the port numbers, above.  Old and new values shown below
                705     ;   for A side/B side in hex.
                706     ;                   WAS     NOW
                707     ;           PORTA   90/91   1A/1B
                708     ;           PORTB   AA/AA   2A/2B
                709     ;           PORTC   BB/BB   4A/4B
                710     ;           PORTD   CC/CC   8A/8B
                711     ;   Bug 28, 12.
                712     ; - Made a subroutine CHKCDC to determine if a port is
                713     ;   installed.  Bug 28.
                714     ; - Changed ACC_NUM, ACC_AVL, ACC_CON values to use the CDCI's
                715     ;   new port address values as above.  Bug 28.
                716     ; - Changed name of ACC_NUM to CP_POLL, ACC_CON to CP_CON, and
                717     ;   eliminated ACC_AVL.  This made notable changes to WARMSTRT,
                718     ;   INIT2, IDLE, CHKCDC, PROCFNC, DEADSTRT, RWSTBF, GETSTBF,
                719     ;   WRTHBUF, SRC_CDC, DST_CDC, INHIBDS, RESP2OTH, and RES_UNIT.
                720     ;   Bug 28.
                721     ; - Changed indicator for returned general status in trace
                722     ;   buffer from 8000 to F000, since 8000 is now indicator for
                723     ;   port D.  Bug 28.
                724     ; - Made equates for max word address for large and small
                725     ;   sectors.
                726     ; - Made equates for Amperif sector size and for Amperif
                727     ;   transfer length.
                728     ; - Changed trace buffer subroutine for easier debug.
                729     ; - Changed entry to INCEXIT, and changed name to SETCTSCHK.
                730     ; - Cleaned up use of CDCI control equates.
                731     ; - Cleaned up use of TEMP_0 in FNCREPLY.
                732     ; - Made equates for CDC and Amperif functions.
                733     ;
                734             TITLE2 HSPHIS - BANK 1 CODE - REV 1.D
```

```
735                 EJECT
736     ;
737     ; REVISION 1.D, 4/19/90
738     ; - Autoload re-fix.  NOS bug has only 1us active pulse
739     ;   starting 7us after function reply.  Moved function reply to
740     ;   right before test for active.  Included timeouts in loops.
741     ;   Tests for channel parity error.  Tests for reading function
742     ;   as data, as occurs when active pulse missed.  Bug 6.
743     ; - Move deadman timer initialization to a subroutine.  Bug 28.
744     ; - Set of URSPTO in WRIT4.2 wait loop if time out.  Bug 48.
745     ; - Changed timeout check in RESP2OTH subroutine to a shorter
746     ;   timeout that doesn't set error.  Bug 28.
747     ; - Changed function reply subroutine to send inactive at end
748     ;   of routine, in order to help get around NOS bug in
749     ;   autoload.  Bug 6.
750     ; - Code released as 64AA0.
751     ;
752     ; REVISION 1.C, 3/6/90
753     ; - First Amperif code.
754     ; - Zero length autoload fix.  Bug 6.
755     ; - Autoload controlware rev level overwrite fix.  Bug 6.
756     ; - Controlware rev level code rewritten.  Bug 6.
757     ; - Remove delay from INITAMP routine to handle timeouts during
758     ;   deadstart with multi-host.  Bug 26.
759     ; - Don't set busy with drive fail in general status.  Bug 20.
760     ; - In extended status clear motor speed and on-cylinder if
761     ;   ready and safe is cleared.  Bug 14.
762     ; - Disable extended length i/o code in ISUCMD. Extended length
763     ;   i/o concept has been discarded, and code in XMC/CDC to
764     ;   support this has been removed.  Should remove code in here
765     ;   also at some point.  Bug 7.
766     ; - Debug code added to HSP detected cylinder miscompare error.
767     ; - Correct typo in CMD_REJ.
768     ; - Added additional deadman timing to detect CDCI board
769     ;   failures. Added check for channel parity error after
770     ;   deadman time out, also re-initialize Amperif interface.
771     ;   Bug 28.
772     ; - Code released as 64-A0.
773     ;
774                 TITLE2 HSPHIS - BANK 1 CODE - REV 1.B AND BEFORE
```

```
                775             EJECT
                776     ;
                777     ; REVISION 1.B, 7/19/88
                778     ; - DEADMAN TIMER SUPPORT.
                779     ; - CLEAR THE STACK ON WARM-START.
                780     ; - CHANGES TO SHARED MEMORY INITIALIZATION ON RESETS.
                781     ; - FIX CODE BUG IN EXTENDED STATUS WORD 13 BIT 10 (ACCESS
                782     ;   CONNECTED BEFORE GENERAL STATUS).
                783     ; - REMOVE THE INITIATION OF DIAGNOSTIC FROM THE CDC CONSOLE.
                784     ; - SET BIT3 OF CDC WORD 18 IF LARGE SECTOR MODE.
                785     ;
                786     ; REVISION 1.A, 7/16/88
                787     ; - CHANGE TO AUTOLOAD FUNCTION.  DO NOT RESPOND TO "SPECIAL
                788     ;   FNC" (FUNCTIONS ABOVE 66 OCTAL) IF THE ACCESS IS NOT
                789     ;   CONNECTED.
                790     ; - REMOVE UNUSED COLDSTART CODE.
                791     ;
                792     ; REVISION 1.9, 3/18/88
                793     ; - FIRST RELEASED CODE.
                794     ; - CHANGES FOR LARGE WORD COUNT IN WORD LENGTH FIELD.
                795     ; - SUPPORT FOR VPX SPECIAL FUNCTIONS.
                796     ; - CLEAN UP OF DIAGNOSTIC (ILD B).
                797     ;
                798     ; REVISION 1.5, 9/12/87
                799     ; - SSD MODIFICATION TO MAP UNIT 16 SSD INTO UNIT 0 BELOW
                800     ;   CYLINDER 55.
                801     ;
                802     ; REVISION 1.4, 8/11/87
                803     ; - FORCE ERROR ON READ OR WRITE AFTER A RESET OR POWER UP IF
                804     ;   CHANNEL DOES NOT ISSUE A SEEK FIRST.
                805     ; - CHANGE WARMSTRT CODE TO ONLY CLEAR CUR_UNIT, RESERVED
                806     ;   DRIVES, STATUS BUFFER INTERLOCK, AND AMPERIF INTERFACE.
                807     ; - MOVE HARD MASTER RESET CODE TO AN ADDRESS TO BE USED BY A
                808     ;   CALL IN THE ASP SELRAM.
                809     ; - CLEAN UP ALL CODE DEBUG HANGS.
                810     ; - IN CK_AMPST ROUTINE SET DEVICE END IF STATUS ACTION CODE
                811     ;   IS A 5.
                812     ;
                813     ; REVISION 1.3, 7/23/87
                814     ; - TIME OUT WAITING FOR STATUS FROM AMPERIF TO PREVENT CDC
                815     ;   FROM RESTARTING CONTROLLER (CANNOT AUTOLOAD CONTLWARE
                816     ;   ERRORS).
                817     ;
                818     ; REVISION 1.2, 3/17/87
                819     ; - SHARED MEMORY / STATUS BUFFER HARDWARE ADDED.
                820     ; - ACC_CON, ACC_NUM, AND CUR_UNIT WAS MOVED FROM CACHE MEMORY
                821     ;   TO 29116 REGISTER.
                822     ; - SOURCE AND DESTINATION PORTS OTHER THAN STATUS BUFFER, WERE
                823     ;   RECORDED IN 29116 REG.
                824     ;
                825     ; REVISION 1.1, 9/15/86
                826     ; - FIRST VERSION.
                827     ;
                828             TITLE2 HSPHIS - BANK 0 CODE - REV 1.8 AND BEFORE
```

```
                EJECT
;
; DIAGNOSTIC CODE SET, BANK 0
; ---------------------------
;
; REVISION 1.8, 4/24/90
; - Corrected usage of CYLMAX.
; - Corrected typos in RTRNSTBF, DIAGIDLE and AMPFCN.
; - Changed port numbers for CDCI boards to match changes in
;   main code, rev E.
; - Updated equates used in copies of bank 1 routines.  Copied
;   rev E equates.
; - Changed BIT0 flag to BIT3, so as not to destroy bank 1's
;   BIT0 flag, the side A/B flag.  Bug 12.
; - Changed clear unit reserve routine in INIT to match bank
;   1's CLRRES subroutine.
; - Updated determination of A/B to match bank 1's rev E code.
;   Bug 12.
; - Made equates for size of large and small sectors.
; - Changed illegal instruction at FcnHang.
; - Changed labels that differ only in upper/lower case, such
;   as PARITY_Err and PARITY_ERR.
;
; REVISION 1.7, 1/17/90
; - First Amperif code.
; - Code released with 64-A0 and 64AA0.
; - Change to maximum cylinder.
; - Correct typo in CMD_REJ.
;
; REVISION 1.6, 7/13/88
; - CHANGE THE CLEAR OF THE UNIT RESERVATION AREA IN SHARED
;   MEMORY.
;
; REVISION 1.5, 3/18/88
; - FIRST RELEASED CODE.
; - CHANGES FOR LARGE WORD COUNT IN WORD LENGTH FIELD SUPPORT
;   FOR VPX SPECIAL FUNCTIONS.
; - CLEAN UP OF DIAGNOSTIC (ILD B).
;
; REVISION 1.1, 9/15/86
; - FIRST VERSION.
;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPHIS - BANK 0 CODE - REV 1.8 AND BEFORE

```
                872             EJECT
                873             INCLUDE HSPEQU.SRC
                874             TITLE2 HSPEQU - EQUATES AND DEFINITIONS
                875             WIDTH 132
                876 ;
                877 ;*****************************************************************************
                878 ;*                                                                           *
                879 ;*      HH    HH   SSSSSS   PPPPPPP      EEEEEEEE   QQQQQQ   UU    UU      *
                880 ;*      HH    HH  SS    SS  PP    PP     EE        QQ    QQ  UU    UU      *
                881 ;*      HH    HH  SS        PP    PP     EE        QQ    QQ  UU    UU      *
                882 ;*      HHHHHHHH   SSSSSS   PPPPPPP      EEEEEE    QQ QQ QQ  UU    UU      *
                883 ;*      HH    HH        SS  PP           EE        QQ  QQQQ  UU    UU      *
                884 ;*      HH    HH  SS    SS  PP           EE        QQ   QQQ  UU    UU      *
                885 ;*      HH    HH   SSSSSS   PP           EEEEEEEE   QQQQQQQ   UUUUUU      *
                886 ;*                                                      QQ                 *
                887 ;*      HSP - HIGH SPEED PROCESSOR MICROCODE EQUATES AND DEFINITIONS      *
                888 ;*                                                                           *
                889 ;*****************************************************************************
                890 ;
                891 ; This file contains all the equates, definitions, and macros
                892 ; used in both banks of the HSP code.  It also contains some
                893 ; documention on code usage and design.
                894 ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - EQUATES AND DEFINITIONS

```
                895             EJECT
                896     ;
                897     ; CONDITIONAL ASSEMBLY FLAGS
                898     ; ====================================
                899     ;
                900     ; SHARED MEMORY ERROR DETECTION H/W
                901     ; ECO's 3505 and 3506 on the HSP board are installed.  This
                902     ; enables the SHS.RPAR, SHS.OPEN and SHS.RPWR signals on shared
                903     ; memory source status.
                904     ;
                905     SHMERRHW:   EQU 1           ;INSTALLED                      ;201
                906     ;
                907             TITLE2 HSPEQU - REGISTER DEFINITIONS
```

```
                EJECT
;
; REGISTER EQUATES
; =======================================
;
TEMP0:      EQU R0          ;TEMP SCRATCH STORAGE
TEMP1:      EQU R1          ;TEMP
TEMP2:      EQU R2          ;TEMP
TEMP3:      EQU R3          ;TEMP
TEMP4:      EQU R4          ;TEMP
TEMP5:      EQU R5          ;USED IN WRITE AS SECTOR COUNTER
TEMP6:      EQU R6          ;ABOVE TWO ARE TEMP STORE IN GET.RWA    ;202
TEMP7:      EQU R7
TEMP8:      EQU R8          ;TEMP REG USED IN GETSTAT
TIMEOUT:    EQU R9          ;COUNTER FOR TIMEOUT ON LOOPS           ;201
WRDCNT:     EQU R10         ;USED FOR THE LENGTH OF THE DATA IN A SECTOR
;                            (LARGE SECTOR OR NORMAL)
SHMDATA:    EQU R11         ;THE DATA TO READ WRITE IN SHARED MEMORY
SHMADDR:    EQU R12         ;THE ADDRESS TO ACCESS IN THE SHARED MEMORY
IF BANK_EQ_0
;           EQU R13         ;(NOT USED)                             ;201
TEMPLNG:    EQU R14                                                 ;201
;           EQU R15         ;(NOT USED)                             ;201
;           EQU R16         ;(NOT USED)                             ;201
WRTSECLN:   EQU R17         ;NUMBER OF RECORD WRITTEN BEFORE TRUNC  ;201
RDSECLN:    EQU R18         ;NUMBER OF READ SECTORS BEFORE TRUNC    ;201
ELSE
ENDIF
TRACEPTR:   EQU R19         ;POINTER TO THE TRACE BUFFER
CDCFNC:     EQU R20         ;THE CDC FUNCTION CODE
AMPCTRL:    EQU R21         ;THE AMPERIF CONTROL REGISTER
AMPUNIT:    EQU R22         ;HOLDS THE AMPERIF MODULE ADDRESS FOR COMMANDS, ETC
AMPCMD:     EQU R23         ;HOLDS THE AMPERIF COMMAND
AMPWLEN:    EQU R24         ;THE AMPERIF WORD LENGTH FIELD FOR COMMANDS
FLAGS:      EQU R25         ;HSP STATUS FLAG BITS:
F.CMDREJ:   EQU BIT15       ;COMMAND REJECT, AMP DIDN'T LIKE COMMAND
;                            CLEARED ON ENTRY TO CKAMPST
;                            SET IN CKAMPST IF STATUS CONTAINED ATTENTION
;                            STATUS MODIFIER, C.U.E., OR BUSY. ALSO IF
;                            STATUS ACTION WAS = F, OR RECOVERY ACTION = 4.
F.FIFO:     EQU BIT14       ;USE THE CDCI FIFO
;                            SET IN WRITES BEFORE CALL TO FNCREPLY TO
;                            ENABLE THE CDC FIFO WHEN A REPLY TO A WRITE
;                            FUNCTION IS ISSUED TO CDC.
;                            CLEARED IN WRITE AFTER RETURN FROM FNCREPLY.
F.STCNCT:   EQU BIT13       ;STATUS FOR CONNECTED UNIT
;                            CLEARED ON ENTRY TO CKAMPST
;                            SET IN CKAMPST TO INDICATE THE STATUS WAS
;                            FROM THE CONNECTED UNIT.
F.INTVRQ:   EQU BIT12       ;INTERVENTION REQUIRED DRIVE STATUS
;                            CLEARED ON ENTRY TO CKAMPST
;                            SET IN CKAMPST TO INDICATE THE STATUS
;                            HAD A RECOVERY ACTION OF 6 (INTV REQ)
F.STPEND:   EQU BIT11       ;STATUS PENDING FROM AMPERIF
;                            SET IN SEEK, READ, WRITE ROUTINES WHEN
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - REGISTER DEFINITIONS

```
 988    ;                                COMMAND (EF) ISSUED TO AMP.  CLEARED
 989    ;                                IN CKAMPST WHEN STATUS (EI) RECEIVED.
 990    F.NSHMEM:   EQU BIT10           ;DON'T SHARE SHARED MEMORY.  ALL WRITES ;201
 991    ;                                TO SHMEM WILL GO ONLY TO OUR OWN COPY,
 992    ;                                NOT TO THE OTHER CNTRLR'S MEMORY.  FLAG
 993    ;                                BASED ON REQUEST FROM THE OTHER CTRLR.
 994    ;           EQU BIT9            ;(NOT USED)                             ;203
 995    F.LNGRW:    EQU BIT8            ;LONG READ/WRITE MODE                   ;201
 996    F.SHFAIL:   EQU BIT7            ;SHARED MEMORY GOT AN ERROR             ;201
 997    F.GAPSEC:   EQU BIT6            ;GAP SECTOR MODE
 998    F.2TO1:     EQU BIT5            ;2:1 INTERLACE MODE
 999    F.LRGSEC:   EQU BIT4            ;LARGE SECTOR (NOS/VE) MODE, 0=NORMAL MODE
1000    F.RDERR:    EQU BIT3            ;ERROR ON READ
1001    IF BANK_EQ_0
1002    F.SAVPAT:   EQU BIT2            ;RE-USE LAST DATA PATTERN               ;201
1003    F.RWAPAT:   EQU BIT1            ;USE REL WD ADDR AS DATA PATTERN        ;201
1004    ELSE
1007    ENDIF                                                                   ;201
1008    ;           EQU BIT0            ;(NOT USED)                             ;201
1009    ;
1010    ; REGISTERS, CONTINUED
1011    ;
1012    CURUNIT:    EQU R26             ;THE UNIT CONNECTED FLAG
1013    IF BANK_EQ_0
1014    ADDR:       EQU R27             ;ADDRESS FOR MEMORY TEST POWERUP DIAGS  ;201
1015    GD.DATA:    EQU R28             ;DATA FOR MEMORY TEST POWERUP DIAGS     ;201
1016    RD.DATA:    EQU R29             ;DATA AS READ FOR POWERUP DIAGS         ;201
1017    LOOPCNT:    EQU R30             ;LOOP CONTROL FOR POWERUP DIAGS         ;201
1018    ERR.CD:     EQU R31             ;0 IF NO ERRORS DETECTED, ILDB AND PWRUP;201
1019    ELSE
1025    ENDIF
1026    ;
1027    ; VALUES FOR DEADMAN TIMER
1028    ;
1029    DMTIME1:    EQU H#1000          ;LOW ORDER DEADMAN VALUE (REGISTER)     ;201
1030    DMTIME2:    EQU D#1600          ;HIGH ORDER DEADMAN VALUE (LOCAL MEM)   ;201
1031    ;
1032    ; MACRO TO INITIALIZE DEADMAN REGISTER
1033    ; MUST BE QUICK, AND MUST SET DEADMAN TO SAME VALUE AS DMTIME1 ABOVE.
1034    ;
1035    DMRINIT:    MACRO                                                       ;201
1036                LD2NR BIT12,DEADMAN
1037                ENDM
1038    ;
1039                TITLE2 HSPEQU - HIGH SPEED BUS PROCESSING EQUATES
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - HIGH SPEED BUS PROCESSING EQUATES

```
1040                EJECT
1041    ;
1042    ; HIGH SPEED BUS PORT PROCESSING EQUATES
1043    ; =======================================
1044    ;
1045    ; PORT SOURCE AND DESTINATION SELECTION
1046    ; -------------------------------------
1047    ;
1048    SYSPORT:    EQU H#0             ;SYSTEM PORT
1049    SHMPORT:    EQU H#3             ;SHARED MEMORY / STATUS BUFFER
1050    CDCP.A:     EQU H#1             ;1ST CDCI BOARD                         ;1E
1051    CDCP.B:     EQU H#2             ;2ND CDCI BOARD                         ;1E
1052    CDCP.C:     EQU H#4             ;3RD CDCI BOARD                         ;1E
1053    CDCP.D:     EQU H#8             ;4TH CDCI BOARD                         ;1E
1054    AMP.PORT:   EQU H#F             ;AMPERIF U-BUS INTERFACE
1055    ;
1056    ;
1057    ; SYSPORT
1058    ; -------
1059    ;
1060    ; SOURCE STATUS
1061    ;
1062    SS.DATA:    EQU BIT0            ;"BPARERR", BUS PARITY ERROR, CACHE DATA ERR
1063    SS.ADRL:    EQU BIT1            ;CACHE/LOCAL MEMORY LOW BYTE
1064    SS.ADRH:    EQU BIT2            ;CACHE/LOCAL MEMORY HIGH BYTE
1065    SS.DSTRT:   EQU BIT3            ;CDC DEADSTART FLAG
1066    SS.ERR.M:   EQU B#0111          ;CACHE/LOCAL MEM ERR MASK, BITS 0-2     ;201
1067    ; BITS 8-15 CONTAIN HSP SWITCH 1 SETTING
1068    ;
1069    ; CONTROL
1070    ;
1071    SC.BANK0:   EQU H#0             ;BANK SWITCH LOWER HALF
1072    SC.BANK1:   EQU H#2             ;BANK SWITCH UPPER HALF
1073    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - HIGH SPEED BUS PROCESSING EQUATES

```
1074                EJECT
1075    ;
1076    ; SHARED MEMORY / STATUS BUFFER
1077    ; ----------------------------
1078    ;
1079    ; SOURCE STATUS
1080    ;
1081    SHS.ADRL:   EQU BIT0            ;LOCAL MEMORY LOW ADDRESS PARITY ERROR
1082    SHS.ADRH:   EQU BIT1            ;LOCAL MEMORY HIGH ADDRESS PARITY ERROR
1083    SHS.DATA:   EQU BIT2            ;LOCAL MEMORY DATA PARITY ERROR
1084    IF SHMERRMM_EQ_1
1085    SHS.RPAR:   EQU BIT3            ;REMOTE PARITY ERROR
1086    SHS.OPEN:   EQU BIT4            ;OPEN CABLE
1087    SHS.RPWR:   EQU BIT5            ;REMOTE POWERED UP
1088    SHS.ER.M:   EQU B#011111        ;ERROR MASK, BITS 0,1,2,3,4             ;201
1089    ELSE
1094    ENDIF
1095    ;
1096    ; CONTROL
1097    ;
1098    SHC.RST:    EQU 0               ;ANY CONTROL RESETS ERRORS              ;201
1099    ;
```

```
1100                EJECT
1101    ;
1102    ; CDCI's
1103    ; ------
1104    ;
1105    ; SOURCE STATUS
1106    ;
1107    SFUNC:      EQU BIT0            ;CDC FUNCTION PRESENT
1108    SACTIVE:    EQU BIT1            ;CDC CHANNEL ACTIVE
1109    SINACT:     EQU BIT2            ;CDC CHANNEL INACTIVE
1110    SFULL:      EQU BIT3            ;CDC CHANNEL FULL
1111    SEMPTY:     EQU BIT4            ;CDC CHANNEL EMPTY
1112    FIFONEMP:   EQU BIT5            ;FIFO IS NOT EMPTY
1113    ;           EQU BIT6            ;(NOT USED)
1114    CPARERR:    EQU BIT7            ;CHANNEL PARITY ERROR ON CDC CHANNEL IN
1115    ; BITS 8-11 CONTAIN CDCI LOWER SWITCH 1 SETTING
1116    ;
1117    ; DESTINATION STATUS
1118    ;
1119    ;SFUNC:      EQU BIT0            ;CDC FUNCTION PRESENT
1120    ;SACTIVE:    EQU BIT1            ;CDC CHANNEL ACTIVE
1121    ;SINACT:     EQU BIT2            ;CDC CHANNEL INACTIVE
1122    ;SFULL:      EQU BIT3            ;CDC CHANNEL FULL
1123    ;SEMPTY:     EQU BIT4            ;CDC CHANNEL EMPTY
1124    RANK1EMP:   EQU BIT5            ;BUFFER RANK 1 EMPTY
1125    ;           EQU BIT6            ;(NOT USED)
1126    ;           EQU BIT7            ;(NOT USED)
1127    ;
1128    ; CONTROL
1129    ;
1130    C.FIFO:     EQU H#0001          ;ENABLE THE FIFO                        ;1E
1131    C.ACT:      EQU H#0008          ;SET ACTIVE, DON'T SET INACTIVE         ;1E
1132    C.DDS:      EQU H#8000          ;DISABLE DEADSTART FROM THIS PORT       ;1E
1133    C.INACT:    EQU H#0000          ;NONE OF THE ABOVE                      ;1E
1134    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - HIGH SPEED BUS PROCESSING EQUATES

```
1135                EJECT
1136    ;
1137    ; AMPERIF / UBI
1138    ; -------------
1139    ;
1140    ; SOURCE STATUS
1141    ;
1142    ST.BK1:     EQU BIT0            ;STATUS WORD IN BANK 1 OF AMP INTERF
1143    ST.BK2:     EQU BIT1            ;STATUS WORD IN BANK 2 OF AMP INTERF
1144    RSTEI:      EQU BIT2            ;RESET THE INTERRUPT CONDITION
1145    ;                               AND IGNORE THE STATUS WORD SENT
1146    DAT.BK1:    EQU BIT3            ;DATA WORD IN BANK 1
1147    DAT.BK2:    EQU BIT4            ;DATA WORD IN BANK 2
1148    RSTODID:    EQU BIT5            ;RESET I/O CONDITIONS AND DATA PATHS
1149    ;           EQU BIT6            ;(NOT USED)
1150    ;           EQU BIT7            ;(NOT USED)
1151    PAR1.RDY:   EQU BIT8            ;DATA PARCEL 1 READY TO READ
1152    PAR2.RDY:   EQU BIT9            ;DATA PARCEL 2 READY TO READ
1153    PAR3.RDY:   EQU BIT10           ;DATA PARCEL 3 READY TO READ
1154    AMP.P.ER:   EQU BIT11           ;PARITY ERROR ON AMPERIF WORD
1155    ENTAGS:     EQU BIT12           ;AMPERIF HAS NOT DISABLED THE U-BUS
1156    SETAUT:     EQU BIT13           ;AMPERIF WRAP IS IN PROGRESS (ODREQ>ODACK)
1157    ;
1158    AS.INP.M:   EQU H#0718          ;ANY INPUT READY STATUS MASK:          ;201
1159    ;                               DAT.BK1 OR BK2, PAR1, PAR2, OR PAR3.RDY
1160    ;
1161    ; DESTINATION STATUS
1162    ;
1163    REG.A:      EQU BIT0            ;DATA TO AMPERIF IS IN THE LOWER 12 BITS
1164    ;                               OF THE 36 BIT WORD (REG A)
1165    REG.B:      EQU BIT1            ;DATA TO AMPERIF IS IN THE LOWER 24 BITS
1166    ;                               OF THE 36 BIT WORD (REG A AND REG B)
1167    AOUTRDY:    EQU BIT2            ;DATA TO AMPERIF IS READY FOR OUTPUT
1168    ODREQ:      EQU BIT3            ;AMPERIF REQUEST OUTPUT DATA
1169    EFREQ:      EQU BIT4            ;AMPERIF REQUEST FUNCTION WORD
1170    SETODR:     EQU BIT5            ;AMPERIF REQUEST ADDRESS WORD
1171    HIOLD:      EQU BIT6            ;AMPERIF REQUEST BLOCK I/O
1172    FI.NEMP:    EQU BIT7            ;OUTPUT FIFO NOT EMPTY
1173    ;
1174    AD.OUT.M:   EQU H#0087          ;ANY OUTPUT WAITING STATUS MASK:       ;201
1175    ;                               REG.A OR B, AOUTRDY, OR FI.NEMP
1176    ;
1177    ; CONTROL
1178    ;
1179    AC.DWRAP:   EQU BIT0            ;WRAPS THE U-BUS FOR DIAG
1180    AC.DODR:    EQU BIT1            ;FORCES OUTPUT DATA REQUEST FOR DIAG
1181    AC.DIDR:    EQU BIT2            ;FORCES INPUT DATA REQUEST FOR DIAG
1182    EFINT:      EQU BIT3            ;REQUESTS AMP TO CONNECT FOR FUNCTION
1183    CLREFINT:   EQU BIT4            ;CLEAR EFINT TAG LINE
1184    SIDFLG:     EQU BIT5            ;INFORMS AMP THAT AN ADDRESS WORD IS AVAIL
1185    FNCOUT:     EQU BIT6            ;INFORMS AMP THAT A FUNCTION WORD IS AVAIL
1186    DATAOUT:    EQU BIT7            ;INFORMS AMP THAT DATA IS AVAIL
1187    AC.DACK:    EQU BIT8            ;DISABLES THE AUTOMATIC SENDING OF IDA
1188    EISENT:     EQU BIT9            ;INFORMS AMP THAT THE EI WAS RECEIVED
1189    URSPTO:     EQU BIT10           ;INFORMS AMP THAT DATA TRANSFER HAS STOPPED
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - HIGH SPEED BUS PROCESSING EQUATES

```
1190    FIFOCLR:    EQU BIT11           ;CLEARS FIFO AND REG A,B, AND C OF VALID DATA
1191    AC.RESET:   EQU BIT12           ;INFORMS AMP TO RESET ITS CONTROLLER
1192    AC.DABLE:   EQU BIT13           ;INFORMS AMP THAT THE HSP IS DISABLED
1193    ;
1194                TITLE2 HSPEQU - COMMANDS / FUNCTIONS
```

```
1195                EJECT
1196    ;
1197    ; AMPERIF / SPERRY FUNCTION EQUATES
1198    ; ====================================
1199    ;
1200    AF.NOOP:    EQU H#03            ;NO OPERATION COMMAND
1201    AF.SENSE:   EQU H#04            ;SENSE I/O COMMAND
1202    AF.SEEK:    EQU H#0B            ;TRACK POSITION RELATIVE SEEK
1203    AF.WRT:     EQU H#0D            ;WRITE DATA COMMAND
1204    AF.RD:      EQU H#0E            ;READ DATA COMMAND
1205    ;
1206    ;
1207    ; CDC FUNCTION EQUATES
1208    ; ====================================
1209    ;
1210    CF.CNCT:    EQU Q#000           ; CONNECT
1211    CF.SEEK1:   EQU Q#001           ; SEEK 1:1
1212    CF.SEEK2:   EQU Q#002           ; SEEK 2:1
1213    ;           EQU Q#003           ; --
1214    CF.RD:      EQU Q#004           ; READ
1215    CF.WRT:     EQU Q#005           ; WRITE
1216    CF.WRTV:    EQU Q#006           ; WRITE VERIFY
1217    CF.RDCW:    EQU Q#007           ; READ CHECKWORD
1218    CF.OPC:     EQU Q#010           ; OPERATION COMPLETE
1219    CF.DDRES:   EQU Q#011           ; DISABLE DRIVE RESERVE (844)
1220    CF.GSTAT:   EQU Q#012           ; GENERAL STATUS
1221    CF.DSTAT:   EQU Q#013           ; DETAILED STATUS
1222    ;  CONT     EQU Q#014           ;(CONTINUE)
1223    CF.DSKS:    EQU Q#015           ; DROP SEEKS
1224    ;  FNT      EQU Q#016           ;(FORMAT PACK)
1225    CF.RDADR:   EQU Q#017           ; RETURN DRIVE ADDR
1226    CF.DREL:    EQU Q#020           ; DRIVE RELEASE
1227    CF.RCADR:   EQU Q#021           ; RETURN CYLINDER ADDR
1228    ;  FLAW     EQU Q#022           ;(CLEAR/SET FLAW)
1229    CF.XSTAT:   EQU Q#023           ; EXTENDED DETAILED STATUS
1230    CF.RDG:     EQU Q#024           ; READ GAP SEC
1231    CF.WRTG:    EQU Q#025           ; WRITE GAP SEC
1232    CF.WRTVG:   EQU Q#026           ; WRITE VERIFY GAP SEC
1233    CF.RDCWG:   EQU Q#027           ; READ CHECKWORD GAP SEC
1234    CF.RDFAC:   EQU Q#030           ; READ FACTORY DATA
1235    CF.RDUM:    EQU Q#031           ; READ UTILITY MAP (844)
1236    CF.BXRD:    EQU Q#032           ; BLOCK XFER BUFFER READ
1237    CF.BXWRT:   EQU Q#033           ; BLOCK XFER BUFFER WRITE
1238    CF.RDP:     EQU Q#034           ; READ PROTECTED SEC
1239    CF.WRTL:    EQU Q#035           ; WRITE LAST SEC
1240    CF.WRTVL:   EQU Q#036           ; WRITE VERIFY LAST SEC
1241    CF.WRTP:    EQU Q#037           ; WRITE PROTECTED SEC
1242    ;  RDSH     EQU Q#040           ;(READ SHORT)
1243    ;  SSTRB    EQU Q#041           ;(SELECT STROBE AND OFFSET)
1244    CF.CCNCT:   EQU Q#042           ; CLEAR CONNECTED ACCESS
1245    CF.BRD:     EQU Q#043           ; BUFFER READ
1246    CF.BWRT:    EQU Q#044           ; BUFFER WRITE
1247    ;           EQU Q#045           ; --
1248    ;  WRTBD    EQU Q#046           ;(WRITE BUFFER TO DISK)
1249    ;  SCADR    EQU Q#047           ;(SCAN CYLINDER ADDRS)
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - COMMANDS / FUNCTIONS

```
1250    ;  OUTCH    EQU Q#050          ;(OUTPUT ON PROCSR CHNL)
1251    ;  XCWSQ    EQU Q#051          ;(EXECUTE CNTRL WORD SEQ)
1252    ;  ICHST    EQU Q#052          ;(INPUT PROCSR CHNL STATUS)
1253    ;  ECHOC    EQU Q#053          ;(ECHO OUTPUT CHNLS)
1254    ;  ISFLG    EQU Q#054          ;(ISSUE PROCSR FLAG PULSE)
1255    ;  ETIM     EQU Q#055          ;(ENABLE INPUT CHNL TIMING)
1256    ;  INTIM    EQU Q#056          ;(INPUT TIMING DATA)
1257    CF.ECHO1:  EQU Q#057          ; ECHO ONE WORD
1258    ;          EQU Q#060          ; --
1259    ;  ADMP     EQU Q#061          ;(AUTODUMP)
1260    CF.MANP:   EQU Q#062          ; MANIPULATE PROCSR
1261    CF.INDD:   EQU Q#063          ; INPUT DISPLAY DATA
1262    ;  TIMDF    EQU Q#064          ;(TIME DIFFERENCE COUNTER)
1263    ;          EQU Q#065          ; --
1264    ;  FERR     EQU Q#066          ;(FORCE ERROR)
1265    CF.IALD:   EQU Q#067          ; INTERLOCK AUTOLOAD
1266    ;
1267    CFTABMAX:  EQU Q#067          ;MAXIMUM FUNCTION ON JUMP TABLE        ;201
1268    ;
1269    CFSPC.M:   EQU Q#7700         ;SPECIAL FUNCTION MASK, Q#7XX, SEE NEXT TWO
1270    CF.ALDD:   EQU Q#100          ; AUTOLOAD FROM DISK, Q#1XX
1271    CF.DDST:   EQU Q#300          ; DISK DEADSTART, Q#3XX
1272    CFDSK.M:   EQU Q#037          ;DISK MASK FOR ABOVE
1273    ;
1274    CF.ALDPP:  EQU Q#414          ; AUTOLOAD FROM PP
1275    ;
1276    CF.ECHO2:  EQU Q#720          ; ECHO ONE WORD, 2ND DEFINITION
1277    ;
1278               TITLE2 HSPEQU - DRIVE CONSTANTS
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - DRIVE CONSTANTS

```
1279                EJECT
1280    ;
1281    ; DRIVE RELATED CONSTANTS
1282    ; ========================================
1283    ;
1284    ; CDC 7155 read/write lengths:
1285    ;
1286    ;   small sector (NOS, NOS/BE):
1287    ;   322 x 12 bit ppu words = 483 x 8 bit bytes
1288    ;
1289    ;   large sector (NOS/VE):
1290    ;   1376 x 12 bit ppu words = 2064 x 8 bit bytes
1291    ;   large sector divided into
1292    ;   four 344 x 12 bit ppu words = four 516 x 8 bit bytes
1293    ;
1294    ;
1295    ; XMC / HSSM sector length:
1296    ;
1297    ;   on Challenger III was
1298    ;   112 x 36 bit words = 504 x 8 bit bytes, not enough
1299    ;
1300    ;   changed on 7000 to
1301    ;   116 x 36 bit words = 522 x 8 bit bytes
1302    ;
1303    ; High Speed Read and Write processing:
1304    ; The HSP concatinates consequitive CDC read or write functions
1305    ; into a single XMC read or write function, whenever possible.
1306    ; A very large i/o word count is passed to the XMC on the first
1307    ; read or write, and then the HSP waits and concatinates all the
1308    ; following read or write functions as part of the first XMC
1309    ; read or write.  When a non-read or write CDC function is
1310    ; received, the XMC read or write is truncated.  The word count
1311    ; issued to the XMC is the largest value that will fit in the
1312    ; 16 bits allowed for that field, that is a multiple of the XMC
1313    ; sector length of 116, which is 564 x 116, or 65424, or FF90
1314    ; hex.
1315    ;
1316    CYLMAX:     EQU 842             ;MAX CYLINDER ADDRESS
1317    TKMAX:      EQU 40              ;MAX TRACK ADDRESS
1318    SECTMAX:    EQU 32              ;MAX SECTOR ADDRESS
1319    LSWRDMAX:   EQU 344-1           ;MAX LARGE SECTOR WORD, 344 12-BIT WRDS ;1E
1320    SSWRDMAX:   EQU 322-1           ;MAX SMALL SECTOR WORD, 322 12-BIT WRDS ;1E
1321    AMPSECSZ:   EQU 116             ;AMPERIF SECTOR SIZE, 116 36-BIT WORDS  ;1E
1322    HSSECCNT:   EQU 564             ;MAX NUMBER OF SECTORS THAT MAKE WORD
1323                                    ;COUNT <= FFFF.
1324    HSWDCNT:    EQU HSSECCNT*AMPSECSZ;AMPERIF WORD COUNT FOR HIGH SPEED XFER;1E
1325                                    ;LARGEST MULT OF 116 <= FFFF            ;1E
1326    ; FOR BUFFER ROUTINES
1327    SECLEN:     EQU 347             ;0 .. 347 CDC WORDS (12 BITS), 116*3-1
1328    ;
1329                TITLE2 HSPEQU - AMPERIF/HSP TRANSLATION
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - AMPERIF/HSP TRANSLATION

```
1330                EJECT
1331    ;
1332    ; AMPERIF/HSP TRANSLATION EQUATES
1333    ; ================================
1334    ;
1335    ; The 36 bit Amperif word to/from Amperif is broken down into 3
1336    ; parcels by the HSP.  Each of the parcels will contain 12 bits
1337    ; of the Amperif word in the low order bit positions.  When
1338    ; reading from Amperif or writing to Amperif, registers TEMP1,
1339    ; TEMP2 and TEMP3 contain parcel 1, 2 and 3, respectively.
1340    ;
1341    ;
1342    ;          Amperif bits 35 - 24    Amperif bits 23 - 12    Amperif bits 11 - 00
1343    ;        3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0
1344    ;        5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
1345    ;       | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
1346    ;       | | | | |-| |-------| | | | |-------| | | |---------------|---------------|
1347    ;Status | | | | | | |Status | | | | |Recovery | | |  Status Byte  |   Disk Unit   |
1348    ;Word   | | | | |C| |Action | | | | |Action | | |A S C B C D U U|               |
1349    ;(EI)   | | | | |T| |EIM.SA | | | | |EIM.RA | | |T M U S E E C E|   EIM.UNIT    |
1350    ;       | | | | |-| |-------| | | | |-------| | | |---------------|---------------|
1351    ;       | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
1352    ;       | |---------------| |---------------| |---------------| |---------------|
1353    ;Sense  | | Sense bytes # | | Sense bytes # | | Sense bytes # | | Sense bytes # |
1354    ;Byte   | |  0,  4,  8,   | |  1,  5,  9,   | |  2,  6, 10,   | |  3,  7, 11,   |
1355    ;Format | | 12, 16, 20    | | 13, 17, 21    | | 14, 18, 22    | | 15, 19, 23    |
1356    ;       | |---------------| |---------------| |---------------| |---------------|
1357    ;       | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
1358    ;       |-| | | |---------------|-----------| | |-------------------------------|
1359    ;Command| | | | |   Disk Unit   |  Command  | | | Transfer Length in words      |
1360    ;Word   | | | | |               |   Code    | | |              or               |
1361    ;(EF)   |1| | | |               |           | | | Backing Factor                |
1362    ;       |-| | | |---------------|-----------| | |-------------------------------|
1363    ;       | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
1364    ;       | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
1365    ;1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0| | | | | | | | | | | | | | | | | | | | | | | |
1366    ;5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0| | | | | | | | | | | | | | | | | | | | | | | |
1367    ;    HSP parcel 1 (in TEMP1)    | | | | | | | | | | | | | | | | | | | | | | | |
1368    ;                               | | | | | | | | | | | | | | | | | | | | | | | |
1369    ;                               | | | | | | | | | | | | | | | | | | | | | | | |
1370    ;                     1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0| | | | | | | | | | | | | |
1371    ;                     5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0| | | | | | | | | | | | | |
1372    ;                        HSP parcel 2 (in TEMP2)     | | | | | | | | | | | | | |
1373    ;                                                    | | | | | | | | | | | | | |
1374    ;                                                    | | | | | | | | | | | | | |
1375    ;                                          1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0
1376    ;                                          5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
1377    ;                                             HSP parcel 3 (in TEMP3)
1378    ;
1379    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - AMPERIF/HSP TRANSLATION

```
1380                EJECT
1381    ;
1382    ;           AMPERIF EI / STATUS WORD EQUATES
1383    ;
1384    ;               MASK OR BIT     PARCEL, DESC,          AMP BITS
1385    EIN.UNIT:   EQU H#001F          ;P3, UNIT NUMBER        0 -  7
1386    EI.UEX:     EQU BIT8            ;P3, UNIT EXCEPTION       8
1387    EI.UCK:     EQU BIT9            ;P3, UNIT CHECK           9
1388    EI.DE:      EQU BIT10           ;P3, DEVICE END          10
1389    EI.CE:      EQU BIT11           ;P3, CHANNEL END         11
1390    EI.BUSY:    EQU BIT0            ;P2, BUSY                12
1391    EI.CUE:     EQU BIT1            ;P2, CONTROL UNIT END    13
1392    EI.STMOD:   EQU BIT2            ;P2, STATUS MODIFIER     14
1393    EI.ATTN:    EQU BIT3            ;P2, ATTENTION           15
1394    EIN.RA:     EQU H#03C0          ;P2, RECOVERY ACTION   18 - 21
1395    EIN.SA:     EQU H#003C          ;P1, STATUS ACTION     26 - 29
1396    EI.CT:      EQU BIT7            ;P1, CHANNEL TRUNCATION  35
1397    ;
1398    ;           RECOVERY ACTION EQUATES
1399    ;
1400    RA.NONE:    EQU H#000_SHL_6     ;NO ERROR
1401    RA.WRTIN:   EQU H#001_SHL_6     ;WRITE INHIBITED
1402    RA.DATCK:   EQU H#002_SHL_6     ;DATA CHECK, CORRECTIBLE
1403    RA.BTKPT:   EQU H#003_SHL_6     ;BAD TRACK POINTER
1404    RA.CMDRJ:   EQU H#004_SHL_6     ;COMMAND REJECT
1405    RA.RDLRQ:   EQU H#005_SHL_6     ;READ LABEL REQUIRED
1406    RA.INTRQ:   EQU H#006_SHL_6     ;INTERVENTION REQUIRED
1407    RA.BOPAR:   EQU H#007_SHL_6     ;BUS OUT PARITY ERROR
1408    RA.EQCK:    EQU H#008_SHL_6     ;EQUIPMENT CHECK
1409    RA.PDCK:    EQU H#009_SHL_6     ;PERMANENT DATA CHECK
1410    RA.NOREC:   EQU H#00A_SHL_6     ;NO RECORD FOUND
1411    RA.ENV:     EQU H#00B_SHL_6     ;ENVIRONMENTAL DATA PRESENT
1412    RA.OVCF:    EQU H#00C_SHL_6     ;ONLY VALID COPY FIRST
1413    RA.OVCL:    EQU H#00D_SHL_6     ;ONLY VALID COPY LAST
1414    ;           EQU H#00E_SHL_6     ;(NOT USED)
1415    RA.OCPD:    EQU H#00F_SHL_6     ;OCP ILD-B DIAGNOSTIC REQUEST
1416    ;
1417    ;           STATUS ACTION EQUATES
1418    ;
1419    SA.INV:     EQU H#000_SHL_2     ;INVALID
1420    SA.PCHG:    EQU H#001_SHL_2     ;PACK CHANGE
1421    SA.RDLAB:   EQU H#002_SHL_2     ;READ LABEL COMMAND
1422    SA.COLL:    EQU H#003_SHL_2     ;EF/EI COLLISION
1423    SA.SK:      EQU H#004_SHL_2     ;SEEK INITIATED
1424    SA.SKC:     EQU H#005_SHL_2     ;SEEK COMPLETED
1425    SA.RWC:     EQU H#006_SHL_2     ;READ OR WRITE COMPLETED
1426    SA.SC:      EQU H#007_SHL_2     ;SENSE COMPLETED
1427    SA.SIOC:    EQU H#008_SHL_2     ;SENSE I/O COMPLETED
1428    SA.CTS:     EQU H#009_SHL_2     ;CHANNEL TRUNCATION ON SENSE COMMAND
1429    SA.CT:      EQU H#00A_SHL_2     ;CHANNEL TRUNCATION
1430    SA.SB:      EQU H#00B_SHL_2     ;ACQUIRE SENSE BYTES FOR UNIT CHECK
1431    ;           EQU H#00C_SHL_2     ;(NOT USED)
1432    SA.BOPAR:   EQU H#00D_SHL_2     ;BUS OUT PARITY ERROR
1433    SA.CDCK:    EQU H#00E_SHL_2     ;CORRECTIBLE DATA CHECK
1434    SA.EFTRM:   EQU H#00F_SHL_2     ;FORCED EF TERMINATION
```

```
1435    ;
1436    ;
1437    ;           AMPERIF SENSE BYTE EQUATES
1438    ;
1439    ;               MASK            PARCEL, SENSE BYTE #    AMP BITS
1440    SB3.M:      EQU H#00FF          ;P3,  3, 7,11,15,19,23   0 -  7
1441    SB2L.M:     EQU H#0E00          ;P3,  2, 6,10,14,18,22   9 - 11
1442    SB2H.M:     EQU H#001F          ;P2,  2, 6,10,14,18,22  12 - 16
1443    SB1L.M:     EQU H#0FC0          ;P2,  1, 5, 9,13,17,21  18 - 22
1444    SB1H.M:     EQU H#0003          ;P1,  1, 5, 9,13,17,21  23 - 25
1445    SB0.M:      EQU H#07F8          ;P1,  0, 4, 8,12,16,20  27 - 34
1446    ;
1447                TITLE2 HSPEQU - MEMORY USAGE
```

```
1448                EJECT
1449    ;
1450    ; STATUS BUFFER / SHARED MEMORY USAGE
1451    ; ====================================
1452    ;
1453    ; The Shared Memory is addressed as if it were a 16 bit memory.
1454    ;
1455    ; H#000-7ff status and control area for 32 units.
1456    ;           each unit has 64 locations.
1457    ; H#000-03F unit 0 area
1458    ; H#040-07F unit 1 area
1459    ; H#080-0BF unit 2 area
1460    ; H#0C0-0FF unit 3 area
1461    ; H#100-13F unit 4 area
1462    ;           etc.
1463    ;
1464    ; Storage offset equates from unit base address:
1465    ;
1466    IF BANK_EQ_1
1480    ENDIF
1481    SHM.TEST:   EQU H#03E           ;LOCATION FOR POWERUP DIAG TEST         ;201
1482    ;           EQU H#03F           ;RESERVED, SEE BELOW
1483    ;
1484    ; Locations used for interlocking and initialization of shared
1485    ; memory between the two HSP's.  Uses last location (3F) for
1486    ; each drive.
1487    ;
1488    DOUPDATE:   EQU H#03F           ;SHARED MEM UPDATE REQUEST              ;201
1489    IF BANK_EQ_1
1492    ENDIF
1493    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - MEMORY USAGE

```
1494                EJECT
1495    ;
1496    ; SENSE BYTES MAPPING IN SHARED MEMORY
1497    ; ====================================
1498    ;
1499    ; Sense bytes from Amperif (XMC) are stored in the shared
1500    ; memory for the drive that the sense bytes are for.  Although
1501    ; sense bytes are normal 8 bit bytes, the XMC interface uses 12
1502    ; bit bytes, 36 bit words.  Shared memory uses 16 bit words.
1503    ; To make matters more confusing, sense bytes are an IBM
1504    ; invention, and so use IBM's distasteful habit of numbering
1505    ; bits backwards; the MSB is bit 0, not bit 7.
1506    ;
1507    ;            HSP BIT POSITION IN SHARED MEMORY WORD
1508    ;             15 14 13 12 11 10  9  8  7  6  5  4  3  2  1  0
1509    ;             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
1510    ;             |__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|
1511    ; SHARED   +0                 0  0  0  0  0  0  0  0     1  1  SENSE BYTE
1512    ; MEMORY      _______________0__1__2__3__4__5__6__7_____0__1_  BIT
1513    ; ADDRESS  +1              1  1  1  1  1  1     2  2  2  2  2  SENSE BYTE
1514    ; --          _____________2__3__4__5__6__7_____0__1__2__3__4_  BIT
1515    ; OFFSET   +2              2  2  2     3  3  3  3  3  3  3  3  SENSE BYTE
1516    ; FROM        _____________5__6__7_____0__1__2__3__4__5__6__7_  BIT
1517    ; AMP.SENS +3                 4  4  4  4  4  4  4  4     5  5  SENSE BYTE
1518    ;             _______________0__1__2__3__4__5__6__7_____0__1_  BIT
1519    ;          +4              5  5  5  5  5  5     6  6  6  6  6  SENSE BYTE
1520    ;             _____________2__3__4__5__6__7_____0__1__2__3__4_  BIT
1521    ;          +5              6  6  6     7  7  7  7  7  7  7  7  SENSE BYTE
1522    ;             _____________5__6__7_____0__1__2__3__4__5__6__7_  BIT
1523    ;          +6                 8  8  8  8  8  8  8  8     9  9  SENSE BYTE
1524    ;             _______________0__1__2__3__4__5__6__7_____0__1_  BIT
1525    ;          +7              9  9  9  9  9  9     10 10 10 10 10  SENSE BYTE
1526    ;             _____________2__3__4__5__6__7_____0__1__2__3__4_  BIT
1527    ;          +8             10 10 10     11 11 11 11 11 11 11 11  SENSE BYTE
1528    ;             _____________5__6__7_____0__1__2__3__4__5__6__7_  BIT
1529    ;          +9                12 12 12 12 12 12 12 12     13 13  SENSE BYTE
1530    ;             _______________0__1__2__3__4__5__6__7_____0__1_  BIT
1531    ;          +10            13 13 13 13 13 13     14 14 14 14 14  SENSE BYTE
1532    ;             _____________2__3__4__5__6__7_____0__1__2__3__4_  BIT
1533    ;          +11            14 14 14     15 15 15 15 15 15 15 15  SENSE BYTE
1534    ;             _____________5__6__7_____0__1__2__3__4__5__6__7_  BIT
1535    ;          +12               16 16 16 16 16 16 16 16     17 17  SENSE BYTE
1536    ;             _______________0__1__2__3__4__5__6__7_____0__1_  BIT
1537    ;          +13            17 17 17 17 17 17     18 18 18 18 18  SENSE BYTE
1538    ;             _____________2__3__4__5__6__7_____0__1__2__3__4_  BIT
1539    ;          +14            18 18 18     19 19 19 19 19 19 19 19  SENSE BYTE
1540    ;             _____________5__6__7_____0__1__2__3__4__5__6__7_  BIT
1541    ;          +15               20 20 20 20 20 20 20 20     21 21  SENSE BYTE
1542    ;             _______________0__1__2__3__4__5__6__7_____0__1_  BIT
1543    ;          +16            21 21 21 21 21 21     22 22 22 22 22  SENSE BYTE
1544    ;             _____________2__3__4__5__6__7_____0__1__2__3__4_  BIT
1545    ;          +17            22 22 22     23 23 23 23 23 23 23 23  SENSE BYTE
1546    ;               _____________5__6__7_____0__1__2__3__4__5__6__7_  BIT
1547    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - MEMORY USAGE

```
1548                EJECT
1549    ;
1550    ; CACHE / LOCAL MEMORY LOCATION USAGE
1551    ; ======================================
1552    ;
1553    ID:         EQU 0               ;ID FOR THIS CONTROLLER, HEX A OR B     ;201
1554    SYSERR:     EQU ID+1            ;LAST SYSPORT ERROR STATUS              ;201
1555    SHERR:      EQU SYSERR+1        ;LAST SHARED MEMORY ERROR STATUS        ;201
1556    SHWAIT:     EQU SHERR+1         ;NUMBER OF WAITS FOR LOCK OF SHMEMORY   ;201
1557    TEMPCKS:    EQU SHWAIT+1        ;PARTIAL CHECK SUM FOR LS MODE, 2 WORDS ;201
1558    TEMPCKS2:   EQU TEMPCKS+1
1559    ;
1560    IF BANK_EQ_0
1561    ;
1562    ; NOTE: BANK 0 USES FOLLWING EQUATES AS OFFSET INTO CACHE/LOCAL MEMORY,
1563    ; NOT STATUS BUFFER/SHARED MEMORY AS BANK 1 CODE DOES.
1564    ;
1565    AMP.ST1:    EQU TEMPCKS2+1      ;LAST AMPERIF STATUS, 3 HSP WORDS       ;201
1566    AMP.ST2:    EQU AMP.ST1+1
1567    AMP.ST3:    EQU AMP.ST2+1
1568    CDC.ST:     EQU AMP.ST3+1       ;CURRENT CDC GENERAL STATUS WORD FOR THIS UNIT
1569    CDC.CYL:    EQU CDC.ST+1        ;CURRENT CDC CYLINDER
1570    CDC.TK:     EQU CDC.CYL+1       ;CURRENT CDC TRACK
1571    CDC.SEC:    EQU CDC.TK+1        ;CURRENT CDC SECTOR
1572    REL.WD1:    EQU CDC.SEC+1       ;HIGH ORDER 16 BITS OF RELATIVE WORD ADDRESS
1573    REL.WD2:    EQU REL.WD1+1       ;LOW ORDER 16 BITS OF REL WRD ADDR
1574    AMP.SENS:   EQU REL.WD2+1       ;AMPERIF SENSE BYTE DATA (18 WORDS)
1575    OCPFNC:     EQU AMP.SENS+18     ;CURRENT OFFLINE DIAG FUNCTION          ;201
1576    OCPNEW:     EQU OCPFNC+1        ;NEW OFFLINE DIAG FUNCTION, -1 IF NONE  ;201
1577    ERRCODE:    EQU OCPNEW+1        ;DIAGNOSTIC ERROR CODE                  ;201
1578    C.UNIT:     EQU ERRCODE+1       ;THE CURRENT UNIT (CONNECTED UNIT) FLAG ;201
1579    OLDCYL:     EQU C.UNIT+1        ;TEMP STORAGE FOR CYLINDER              ;18
1580    OLDTK:      EQU OLDCYL+1        ;TEMP STORAGE FOR TRACK
1581    OLDSECT:    EQU OLDTK+1         ;TEMP STORAGE FOR SECTOR
1582    CDCCHAN:    EQU OLDSECT+1       ;TEMP CDC CHANNEL THAT INITIATED DIAG FC;18
1583    EXPCY:      EQU CDCCHAN+1
1584    RECCY:      EQU EXPCY+1         ;EXPECTED AND RECEVED CYLINDER
1585    EXPSTK:     EQU RECCY+1
1586    RECSTK:     EQU EXPSTK+1        ;EXPECTED AND RECEIVED SECTOR/TRACK
1587    EXPCKS:     EQU RECSTK+1
1588    RECCKS:     EQU EXPCKS+1        ;EXPECTED AND RECEIVED CHECKSUM
1589    EXPCY1:     EQU RECCKS+1
1590    RECCY1:     EQU EXPCY1+1        ;EXPECTED AND RECEVED CYLINDER
1591    EXPSTK1:    EQU RECCY1+1
1592    RECSTK1:    EQU EXPSTK1+1       ;EXPECTED AND RECEIVED SECTOR/TRACK
1593    EXPCKS1:    EQU RECSTK1+1
1594    RECCKS1:    EQU EXPCKS1+1       ;EXPECTED AND RECEIVED CHECKSUM
1595    EXPDAT:     EQU RECCKS1+1       ;ERROR DATA EXPECTED
1596    RECDAT:     EQU EXPDAT+1        ;ERROR DATA RECEIVED
1597    LASTRAND:   EQU RECDAT+1        ;RANDOM NUMBER STORAGE
1598    LASTRAN1:   EQU LASTRAND+1
1599    LASTRAN2:   EQU LASTRAN1+1
1600    LASTRAN3:   EQU LASTRAN2+1
1601    BUF0ADR:    EQU LASTRAN3+1      ;DATA BUFFER FOR OFFLINE DIAGS          ;201
1602    BUF1ADR:    EQU BUF0ADR+H#200   ;READ DATA BUFFER FOR OFFLINE DIAGS
```

```
1603    ;
1604    ELSE
1646    ENDIF
1647    TRACEBEG:   EQU H#400           ;START OF TRACE BUFFER
1648    TRACEEND:   EQU H#F7F           ;END OF TRACE BUFFER
1649    ;
1650    ;
1651                TITLE2 HSPEQU - MACROS
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - MACROS

```
1652                EJECT
1653    ;
1654    ; MACROS
1655    ; ======================================
1656    ;
1657    ; SELECT AMPERIF PORT MACROS
1658    ;
1659    ; SELECTS AMPERIF AS SRC/DST, AND REMEMBERS PORT IN SVSRC/DST
1660    ; REGISTER, IF IN BANK 1 CODE.
1661    ;
1662    SRC.AMP:    MACRO                                                   ;201
1663    IF BANK_EQ_0
1664                CON AMP.PORT & SRCSEL
1665    ELSE
1666                IR SVSRC
1667                IDAT AMP.PORT & ALU & SRCSEL
1668    ENDIF
1669                ENDM
1670    ;
1671    DST.AMP:    MACRO                                                   ;201
1672    IF BANK_EQ_0
1673                CON AMP.PORT & DSTSEL
1674    ELSE
1675                IR SVDST
1676                IDAT AMP.PORT & ALU & DSTSEL
1677    ENDIF
1678                ENDM
1679    ;
1680    ; SELECT CDCI PORT MACROS
1681    ;
1682    ; SELECT THE CURRENTLY POLLED CDCI PORT, AND SAVED IN
1683    ; SVSRC/SVDST.  ONLY USED IN BANK 1.
1684    ;
1685    SRC.CDC:    MACRO                                                   ;201
1686                RA CPPOLL
1687                AR SVSRC & ALU & SRCSEL
1688                ENDM
1689    ;
1690    DST.CDC:    MACRO                                                   ;201
1691                RA CPPOLL
1692                AR SVDST & ALU & DSTSEL
1693                ENDM
1694    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPEQU - MACROS

```
1695                EJECT
1696    ;
1697    ; CLEAR STACK MACRO
1698    ;
1699    ; POP THE STACK AND CONTINUE WITH THE NEXT INSTRUCTION NINE
1700    ; TIMES, SINCE THE SEQUENCER STACK IS A MAXIMUM OF NINE DEEP.
1701    ;
1702    CLR.STK:    MACRO
1703                DUP 9                                                   ;201
1704                POPJMP $+1
1705                ENDM
1706    ;
1707    ; END OF EQUATES
1708    ;
1709                END
1710    ;
1711                TITLE2 POWERUP DIAGNOSTIC DOC
```

Addr Line - AMPERIF 7155/865 EMULATION - HSP DIAGNOSTICS - POWERUP DIAGNOSTIC DOC

```
1712                EJECT
1713    ;*************************************************************
1714    ;
1715    ; POWERUP DIAGNOSTICS
1716    ;
1717    ; The powerup diagnostics perform four basic tests in order:
1718    ;     (1) HSP ALU register test,
1719    ;     (2) HSP local memory,
1720    ;     (3) HSP Shared Memory test, and
1721    ;     (4) UBI FIFO check.
1722    ; If all of them are passed then the online code, in bank 1,
1723    ; is begun.
1724    ;
1725    ; But if an error is detected, that error is sent to the XMC as
1726    ; the address field of a NOOP function, and the code stays in the
1727    ; diagnostic bank.  This can be read on the OCP on the operation
1728    ; / maintenance data display, as the last function executed by
1729    ; the XMC, when the thumbwheel switches are set to 4D0.  the last
1730    ; 6 bits indicate the error.
1731    ;
1732    ; ---------------------------------
1733    ; !35                         543210!
1734    ; !00000000000000000000000000000001xxxxx!
1735    ; ---------------------------------
1736    ;                             !!!!!!!
1737    ;                             ! ------> Error Code.
1738    ;                              -------> Powerup Diagnostic
1739    ;                                       Error indicator.
1740    ;
1741    ; Below is a list of the error codes and their meaning, and
1742    ; probable field replacable unit (FRU) at fault.
1743    ;
1744    ; Lower 6 bits   Meaning                          FRU
1745    ; ------------  -------------------------------  -------------
1746    ; 000000 (H#00)  No error, system ready for use    --
1747    ; 100001 (H#21)  29116 register test failure       HSP
1748    ; 100010 (H#22)  Cache/local memory test failure   HSP
1749    ; 100011 (H#23)  High speed bus parity error       HSP Cables
1750    ; 100100 (H#24)  Shared memory miscompare error    HSP
1751    ; 100101 (H#25)  Shared memory local parity error  HSP
1752    ; 100110 (H#26)  Shared memory open cable          Sh Mem Cable
1753    ; 100111 (H#27)  Shared memory remote parity error Sh Mem Cable
1754    ; 101000 (H#28)  UBI FIFO test failure            UBI
1755    ;
1756                TITLE2 BANK SWITCHING
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     BANK SWITCHING

               1757              EJECT
               1758    ;
00000          1759              ORG H#0000          ;LEAVE ROOM FOR ASP RES H# 0 TO OFF
00000 BXF30108 1760    COLDBOOT:  JMP PWRUP                                          ;201
               1761              INCLUDE HSPMRK.SRC
               1762              TITLE2 HSPMRK - CODE REVISION LEVEL, DATE
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPMRK - CODE REVISION LEVEL, DATE

```
1763                EJECT
1764    ;*****************************************************************************
1765    ;*                                                                           *
1766    ;*      HH    HH   SSSSSS   PPPPPPP       MM    MM  RRRRRRR   KK    KK     *
1767    ;*      HH    HH  SS    SS  PP    PP      MMM  MMM  RR    RR  KK   KK      *
1768    ;*      HH    HH  SS        PP    PP      MMMMMMMM  RR    RR  KK KKK       *
1769    ;*      HHHHHHHH   SSSSSS   PPPPPPP       MM MM MM  RRRRRRR   KKKKK        *
1770    ;*      HH    HH        SS  PP            MM    MM  RR  RR    KKK KK       *
1771    ;*      HH    HH  SS    SS  PP            MM    MM  RR   RR   KK   KK      *
1772    ;*      HH    HH   SSSSSS   PP            MM    MM  RR    RR  KK    KK     *
1773    ;*                                                                           *
1774    ;*  HSPCDL - AMPERIF 7155/885 EMULATION HSP MICROCODE DATE/REV LEVEL MARK    *
1775    ;*                                                                           *
1776    ;*****************************************************************************
1777    ;
1778    ;
1779    ; CODE DATE AND REVISION LEVEL MARK.
1780    ;
1781    ; The code has constant values in the code to indicate what the
1782    ; code is.  This allows the HSP proms to be verified that they
1783    ; have the right code.  The data, which is never used as either
1784    ; instructions or data, is stored at addresses 0010 hex for bank
1785    ; 0 code, and 1010 hex for bank 1 code.  Each prom has the
1786    ; revision level in the form of the base level, release level,
1787    ; and pre release level , and then the prom number, 1 to 4, and
1788    ; the prom patch level (always zero for assemblies), and then
1789    ; the date the code was written, in the form of the last two
1790    ; digits of the year, the month, day.  This information is in in
1791    ; bcd format, one byte for each, in consectutive addresses.  Each
1792    ; prom has the same information, except for the prom number.
1793    ;
1794    ;
1795    ; CURRENT CODE DATE AND REVISION LEVEL
1796    ; ====================================
1797    ;
1798    ; Date: Febuary 11, 1993
1799    CDDATE.M:   EQU H#02            ;Month
1800    CDDATE.D:   EQU H#11            ;Day
1801    CDDATE.Y:   EQU H#93            ;Year
1802    ;
1803    ; Revision Level: 2.3.6
1804    CDREV.B:    EQU H#02            ;Base level
1805    CDREV.R:    EQU H#03            ;Release level
1806    CDREV.P:    EQU H#07            ;Pre-release level
1807    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPMRK - CODE REVISION LEVEL, DATE

```
                1808                EJECT
                1809    ;
                1810    ; MACRO TO DUPLICATE 8 BIT VALUE IN EACH PROM
                1811    ;
                1812    EACHPROM:   MACRO B             ;B = BYTE VALUE TO PUT IN EACH PROM     ;201
                1813                FF 8(B),8(B),8(B),8(B)
                1814                ENDM
                1815    ;
0000F           1816                ORG H#00CF                                                  ;201
                1817    ; BARRIER, HANG IF TRYING TO EXECUTING CODE HERE
0000F BXF3000F  1818                JMP $                                                       ;201
                1819    ; REVISION
                1820                EACHPROM CDREV.B    ;BASE LEVEL                             ;201
00010 02020202  1820 +              FF 8(CDREV.B),8(CDREV.B),8(CDREV.B),8(CDREV.B)
                1820 +              ENDM
                1821                EACHPROM CDREV.R    ;RELEASE LEVEL                          ;201
00011 03030303  1821 +              FF 8(CDREV.R),8(CDREV.R),8(CDREV.R),8(CDREV.R)
                1821 +              ENDM
                1822                EACHPROM CDREV.P    ;PRE-RELEASE LEVEL                      ;201
00012 07070707  1822 +              FF 8(CDREV.P),8(CDREV.P),8(CDREV.P),8(CDREV.P)
                1822 +              ENDM
                1823    ; PROM NUMBER, PATCHES
00013 01020304  1824                FF H#01,H#02,H#03,H#04 ;PROM NUMBER IN EACH PROM            ;201
00014 00000000  1825                FF H#00,H#00,H#00,H#00 ;PATCHES, ALWAYS ZERO FOR ASSEMBLIES ;201
                1826    ; DATE
                1827                EACHPROM CDDATE.Y   ;YEAR                                   ;201
00015 93939393  1827 +              FF 8(CDDATE.Y),8(CDDATE.Y),8(CDDATE.Y),8(CDDATE.Y)
                1827 +              ENDM
                1828                EACHPROM CDDATE.M   ;MONTH                                  ;201
00016 02020202  1828 +              FF 8(CDDATE.M),8(CDDATE.M),8(CDDATE.M),8(CDDATE.M)
                1828 +              ENDM
                1829                EACHPROM CDDATE.D   ;DAY                                    ;201
00017 11111111  1829 +              FF 8(CDDATE.D),8(CDDATE.D),8(CDDATE.D),8(CDDATE.D)
                1829 +              ENDM
                1830    ; CONDITIONAL ASSEMBLY FLAGS
                1831    ;           BIT0 = SHMERRHW
                1832                EACHPROM SHMERRHW                                           ;201
00018 01010101  1832 +              FF 8(SHMERRHW),8(SHMERRHW),8(SHMERRHW),8(SHMERRHW)
                1832 +              ENDM
                1833    ; FILLER
                1834                DUP 7                                                       ;201
                1835                EACHPROM 0          ;ZEROS                                  ;201
                1835 +              EACHPROM 0          ;ZEROS                                  ;201
                1835 +              EACHPROM 0          ;ZEROS                                  ;201
                1835 +              EACHPROM 0          ;ZEROS                                  ;201
                1835 +              EACHPROM 0          ;ZEROS                                  ;201
                1835 +              EACHPROM 0          ;ZEROS                                  ;201
                1835 +              EACHPROM 0          ;ZEROS                                  ;201
00019 00000000  1835 +              FF 8(0),8(0),8(0),8(0)
                1835 +              ENDM
0001A 00000000  1835 +              FF 8(0),8(0),8(0),8(0)
                1835 +              ENDM
0001B 00000000  1835 +              FF 8(0),8(0),8(0),8(0)
                1835 +              ENDM
0001C 00000000  1835 +              FF 8(0),8(0),8(0),8(0)
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPMRK - CODE REVISION LEVEL, DATE

               1835 +              ENDM
0001D 00000000 1835 +              FF 8(0),8(0),8(0),8(0)
               1835 +              ENDM
0001E 00000000 1835 +              FF 8(0),8(0),8(0),8(0)
               1835 +              ENDM
0201F 00000000 1835 +              FF 8(0),8(0),8(0),8(0)
               1835 +              ENDM
               1836    ;
               1837                END
               1838    ;
               1839    ; When going back to bank 1, the next instruction address is 1102
               1840    ;
00100          1841                ORG H#0100
               1842    GOTO.ONL:   EQU $
               1843                CON SYSPORT
00100 B8XX0000 1844                / & SRCSEL          ;SWITCH TO BANK 1: ONLINE CODE
               1845                CON SC.BANK1
00101 B5XX0002 1846                / & SRCCTRL
00102 XXXX7140 1847                NOOP
00103 XXXX7140 1848                NOOP
00104 XXXX7140 1849                NOOP
00105 XXXX7140 1850                NOOP
               1851                CON SC.BANK0
00106 B5XX0000 1852                / & SRCCTRL
00107 BXF30107 1853                JMP $               ;DID NOT SWITCH TO BANK 1, HANG
               1854    ;
               1855                TITLE2 POWERUP DIAGNOSTICS
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     POWERUP DIAGNOSTICS

               1856                EJECT
               1857    ;
               1858    ; POWERUP DIAGNOSTIC ERROR CODES
               1859    ;
               1860    PUP.OK:     EQU B#00000         ;NO ERROR, SYSTEM READY FOR USE        ;201
               1861    PUP.REG:    EQU B#00001         ;2911G REGISTER TEST FAILURE           ;201
               1862    PUP.CHE:    EQU B#00010         ;CACHE/LOCAL MEMORY TEST FAILURE       ;201
               1863    PUP.BUS:    EQU B#00011         ;HIGH SPEED BUS PARITY ERROR           ;201
               1864    PUP.SHM:    EQU B#00100         ;SHARED MEMORY MISCOMPARE ERROR        ;201
               1865    PUP.SHL:    EQU B#00101         ;SHARED MEMORY LOCAL PARITY ERROR      ;201
               1866    PUP.SHO:    EQU D#00110         ;SHARED MEMORY OPEN CABLE              ;201
               1867    PUP.SHR:    EQU B#00111         ;SHARED MEMORY REMOTE PARITY ERROR     ;201
               1868    PUP.UBI:    EQU B#01000         ;UBI FIFO TEST FAILURE                 ;201
               1869    ;
               1870    PWRUP:      EQU $               ;POWERUP DIAGNOSTICS                   ;201
               1871    ;DELAY FOR 5 SEC TO ALLOW THE XMC, DRIVES TO COMPLETE RESET DIAGNOSTICS
00108 XXXXD8E9 1872                IR TIMEOUT          ;CALL DELAY 1 SEC                      ;20301
00109 XXXX0005 1873                IDAT 5              ;FOR 5 TIMES                           ;20302
0010A XXXXD8E0 1874    PWRUP1:     JR TEMP0            ;CALL DELAY 1 MS                       ;201
0010B XXXX03E8 1875                IDAT 1000           ;FOR 1000 TIMES                        ;20301
0010C BXF10C30 1876                JSB DELAYMS         ;                                      ;201
0010D XXXXC1E9 1877                DECR TIMEOUT        ;DECREMENT NUMBER OF SECONDS           ;20301
0010E BX230110 1878                CJMP Z,PUPDIAGS     ;IF ZERO, DONE WAITING                 ;20301
0010F BXF3010A 1879                JMP PWRUP1          ;                                      ;20301
               1880    PUPDIAGS:   EQU $               ;POWERUP DIAGNOSTICS                   ;201
               1881                CLR.STK             ;CLEAR SEQUENCER STACK                 ;201
               1881 +              DUP 9                                                      ;201
00110 BXFB0111 1881 +              POPJMP $+1
00111 BXFB0112 1881 +              POPJMP $+1
00112 BXFB0113 1881 +              POPJMP $+1
00113 BXFB0114 1881 +              POPJMP $+1
00114 BXFB0115 1881 +              POPJMP $+1
00115 BXFB0116 1881 +              POPJMP $+1
00116 BXFB0117 1881 +              POPJMP $+1
00117 BXFB0118 1881 +              POPJMP $+1
00118 BXFB0119 1881 +              POPJMP $+1
               1881 +              ENDM
00119 XXXXD91F 1882                ZR ERR.CD           ;CLEAR POWERUP ERROR REGISTER          ;201
               1883    ; REGISTER TEST
0011A BXF10137 1884                JSB AREGT           ;SEE IF THE REGISTERS AND ACC WORK
0011B 1XXXD85F 1885                RH ERR.CD           ;CHECK FOR MESSAGES
0011C BX23011E 1886                CJMP Z,$+2          ;PASSED REGISTER TEST                  ;201
0011D BXF3012A 1887                JMP PUPDIAG9                                               ;201
               1888    ; CACHE/LOCAL MEMORY TEST
0011E BXF101C2 1889                JSB CACHETST        ;LOCAL/CACHE MEMORY TEST               ;201
0011F 1XXXD85F 1890                RH ERR.CD           ;CHECK FOR MESSAGES                    ;201
00120 BX230122 1891                CJMP Z,$+2          ;PASSED CACHE/LOCAL MEMORY RAM TEST    ;201
00121 BXF3012A 1892                JMP PUPDIAG9                                               ;201
               1893    ; STATUS BUFFER/SHARED MEMORY PLUS HIGH SPEED BUS TEST
00122 BXF1020C 1894                JSB SHMEMTST        ;SHARED MEMORY TEST                    ;201
00123 1XXXD85F 1895                RH ERR.CD           ;CHECK FOR MESSAGES                    ;201
00124 BX230126 1896                CJMP Z,$+2          ;PASSED SHARED MEMORY TEST             ;201
00125 BXF3012A 1897                JMP PUPDIAG9                                               ;201
               1898    ; UBI/AMPERIF INTERFACE TEST
00126 BXF102C2 1899                JSB UBIFT           ;UNIVERSAL BUS INTERFACE FIFO TEST     ;201
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     POWERUP DIAGNOSTICS

00127 1XXXD85F  1900              RH ERR.CD          ;CHECK FOR MESSAGES                    ;201
00128 BX23012A  1901              CJMP Z,$+2         ;PASSED UDI FIFO                       ;201
00129 BXF3012A  1902              JMP PUPDIAG9                                              ;201
                1903    ; END OF TESTS, NOTIFY XMC/OCP OF SUCCESS OR FAILURE
                1904    PUPDIAG9: EQU $                                                   ;201
0012A BXF10C0A  1905              JSB INITAMP        ;INITIALIZE AMPERIF INTERFACE          ;201
0012B XXXXD81F  1906              RA ERR.CD          ;MOVE CODE TO ACC                      ;201
0012C XXXXEB82  1907              SETNA BIT5         ;BIT 5 INDICATES POWERUP MSG           ;201
0012D BXF10409  1908              JSB ISUMSG         ;ISSUE MSG FNC TO XMC                  ;201
0012E 1XXXD85F  1909              RH ERR.CD          ;IF CODE IS ZERO, EVERYTHING IS A-OK... ;201
0012F BX230380  1910              CJMP Z,COLDINIT    ;GOTO INIT, WHICH GOES TO ONLINE CODE  ;201
                1911    ; POWERUP FAIL, HANG IN LOOP OUTPUTTING REGS TO BUS FOR DEBUG
                1912    PUPDIAG8: EQU $                                                   ;201
00130 1XXXD85B  1913              RH ADDR            ;ADDRESS FOR MEMORY TEST POWERUP DIAGS ;201
00131 1XXXD85C  1914              RH GD.DATA         ;DATA FOR MEMORY TEST POWERUP DIAGS    ;201
00132 1XXXD85D  1915              RH RD.DATA         ;DATA AS READ FOR POWERUP DIAGS        ;201
00133 1XXXD85E  1916              RH LOOPCNT         ;LOOP CONTROL FOR POWERUP DIAGS        ;201
00134 1XXXD85F  1917              RH ERR.CD          ;ERROR CODE FOR POWERUP DIAGS          ;201
00135 XXXX7140  1918              NOOP               ;WAIT FOR IT TO BE SEEN                ;201
00136 BXF30130  1919              JMP PUPDIAG8       ;AND REPEAT FOREVER                    ;201
                1920    ;
                1921              TITLE2 PWRUP DIAGS - REGISTER TEST
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - REGISTER TEST

               1922              EJECT
               1923    ;
               1924    ;*********************************************************************
               1925    ;
               1926    ;                    AREGT
               1927    ;          29116 Register test
               1928    ;
               1929    ;  The purpose of this test is to exercise the 29116 ram space
               1930    ;  (registers).  This test will write a walking ones pattern to
               1931    ;  each register, read each pattern back, and verify that it was good.
               1932    ;
               1933    AREGT:      EQU $
00137 XXXXE386 1934                LD2NA BIT1          ;SET ACCUMULATOR TO 1                 ;201
00138 BXF10140 1935    AREG.1:     JSB REGTST          ;WRITE AND READ REGISTERS WITH ACC VALUE;201
00139 BX73013D 1936                CJMP N,AREG.9       ;NEG FLAG MEANS FAIL                  ;201
0013A XXXXEC01 1937                SHA UPZ,NRA         ;SHIFT UP 1 BIT, LSB=0, MSB GOES TO LINK
0013B BX83013F 1938                CJMP LINK,AREG.X    ;RETURN IF 1 BIT SHIFTED TO LINK      ;201
0013C BXF30138 1939                JMP AREG.1          ;CONTINUE OTHERWISE                   ;201
               1940    ;
               1941    AREG.9:     EQU $                                                     ;201
0013D XXXXD8FF 1942                IR ERR.CD           ;INDICATE FAIL                        ;201
0013E XXFA0001 1943                IDAT PUP.REG & RTN  ;AND RETURN                           ;201
               1944    AREG.X:     EQU $                                                     ;201
               1945                ZR ERR.CD           ;INDICATE SUCCESS                     ;201
0013F XXFAD91F 1946                / & RTN             ;AND RETURN                           ;201
               1947    ;
               1948    REGTST:     EQU $               ;WRITE PATTERN IN ACC TO REGISTERS
00140 XXXXD880 1949                AR R0
00141 XXXXD881 1950                AR R1
00142 XXXXD882 1951                AR R2
00143 XXXXD883 1952                AR R3
00144 XXXXD884 1953                AR R4
00145 XXXXD885 1954                AR R5
00146 XXXXD886 1955                AR R6
00147 XXXXD887 1956                AR R7
00148 XXXXD888 1957                AR R8
00149 XXXXD889 1958                AR R9
0014A XXXXD88A 1959                AR R10
0014B XXXXD88B 1960                AR R11
0014C XXXXD88C 1961                AR R12
0014D XXXXD88D 1962                AR R13
0014E XXXXD88E 1963                AR R14
0014F XXXXD88F 1964                AR R15
00150 XXXXD890 1965                AR R16
00151 XXXXD891 1966                AR R17
00152 XXXXD892 1967                AR R18
00153 XXXXD893 1968                AR R19
00154 XXXXD894 1969                AR R20
00155 XXXXD895 1970                AR R21
00156 XXXXD896 1971                AR R22
00157 XXXXD897 1972                AR R23
00158 XXXXD898 1973                AR R24
00159 XXXXD899 1974                AR R25
0015A XXXXD89A 1975                AR R26
0015B XXXXD89B 1976                AR R27
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - REGISTER TEST

0015C XXXXD89C  1977              AR R28
0015D XXXXD89D  1978              AR R29
0015E XXXXD89E  1979              AR R30
0015F XXXXD89F  1980              AR R31              ;AND CONTINUE
                1981    ;
                1982    ;READS REGISTERS AND COMPARES
                1983    ;
00160 XXXX9100  1984              TORAY EXOR,R0       ;RIGHT VALUE ?
00161 BX230163  1985              CJMP Z,$+2          ;  YES - TRY NEXT REGISTER
00162 BXF301C1  1986              JMP REGTST9         ;  NO  - ERROR RETURN
00163 XXXX9101  1987              TORAY EXOR,R1
00164 BX230166  1988              CJMP Z,$+2
00165 BXF301C1  1989              JMP REGTST9
00166 XXXX9102  1990              TORAY EXOR,R2
00167 BX230169  1991              CJMP Z,$+2
00168 BXF301C1  1992              JMP REGTST9
00169 XXXX9103  1993              TORAY EXOR,R3
0016A BX23016C  1994              CJMP Z,$+2
0016B BXF301C1  1995              JMP REGTST9
0016C XXXX9104  1996              TORAY EXOR,R4
0016D BX23016F  1997              CJMP Z,$+2
0016E BXF301C1  1998              JMP REGTST9
0016F XXXX9105  1999              TORAY EXOR,R5
00170 BX230172  2000              CJMP Z,$+2
00171 BXF301C1  2001              JMP REGTST9
00172 XXXX9106  2002              TORAY EXOR,R6
00173 BX230175  2003              CJMP Z,$+2
00174 BXF301C1  2004              JMP REGTST9
00175 XXXX9107  2005              TORAY EXOR,R7
00176 BX230178  2006              CJMP Z,$+2
00177 BXF301C1  2007              JMP REGTST9
00178 XXXX9108  2008              TORAY EXOR,R8
00179 BX23017B  2009              CJMP Z,$+2
0017A BXF301C1  2010              JMP REGTST9
0017B XXXX9109  2011              TORAY EXOR,R9
0017C BX23017E  2012              CJMP Z,$+2
0017D BXF301C1  2013              JMP REGTST9
0017E XXXX910A  2014              TORAY EXOR,R10
0017F BX230181  2015              CJMP Z,$+2
00180 BXF301C1  2016              JMP REGTST9
00181 XXXX910B  2017              TORAY EXOR,R11
00182 BX230184  2018              CJMP Z,$+2
00183 BXF301C1  2019              JMP REGTST9
00184 XXXX910C  2020              TORAY EXOR,R12
00185 BX230187  2021              CJMP Z,$+2
00186 BXF301C1  2022              JMP REGTST9
00187 XXXX910D  2023              TORAY EXOR,R13
00188 BX23018A  2024              CJMP Z,$+2
00189 BXF301C1  2025              JMP REGTST9
0018A XXXX910E  2026              TORAY EXOR,R14
0018B BX23018D  2027              CJMP Z,$+2
0018C BXF301C1  2028              JMP REGTST9
0018D XXXX910F  2029              TORAY EXOR,R15
0018E BX230190  2030              CJMP Z,$+2
0018F BXF301C1  2031              JMP REGTST9
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - REGISTER TEST

```
00190 XXXX9110  2032            TORAY EXOR,R16
00191 BX230193  2033            CJNP Z,$+2
00192 BXF301C1  2034            JNP REGTST9
00193 XXXX9111  2035            TORAY EXOR,R17
00194 BX230196  2036            CJNP Z,$+2
00195 BXF301C1  2037            JNP REGTST9
00196 XXXX9112  2038            TORAY EXOR,R18
00197 BX230199  2039            CJNP Z,$+2
00198 BXF301C1  2040            JNP REGTST9
00199 XXXX9113  2041            TORAY EXOR,R19
0019A BX23019C  2042            CJNP Z,$+2
0019B BXF301C1  2043            JNP REGTST9
0019C XXXX9114  2044            TORAY EXOR,R20
0019D BX23019F  2045            CJNP Z,$+2
0019E BXF301C1  2046            JNP REGTST9
0019F XXXX9115  2047            TORAY EXOR,R21
001A0 BX2301A2  2048            CJNP Z,$+2
001A1 BXF301C1  2049            JNP REGTST9
001A2 XXXX9116  2050            TORAY EXOR,R22
001A3 BX2301A5  2051            CJNP Z,$+2
001A4 BXF301C1  2052            JNP REGTST9
001A5 XXXX9117  2053            TORAY EXOR,R23
001A6 BX2301A8  2054            CJNP Z,$+2
001A7 BXF301C1  2055            JNP REGTST9
001A8 XXXX9118  2056            TORAY EXOR,R24
001A9 BX2301AB  2057            CJNP Z,$+2
001AA BXF301C1  2058            JNP REGTST9
001AB XXXX9119  2059            TORAY EXOR,R25
001AC BX2301AE  2060            CJNP Z,$+2
001AD BXF301C1  2061            JNP REGTST9
001AE XXXX911A  2062            TORAY EXOR,R26
001AF BX2301B1  2063            CJNP Z,$+2
001B0 BXF301C1  2064            JNP REGTST9
001B1 XXXX911B  2065            TORAY EXOR,R27
001B2 BX2301B4  2066            CJNP Z,$+2
001B3 BXF301C1  2067            JNP REGTST9
001B4 XXXX911C  2068            TORAY EXOR,R28
001B5 BX2301B7  2069            CJNP Z,$+2
001B6 BXF301C1  2070            JNP REGTST9
001B7 XXXX911D  2071            TORAY EXOR,R29
001B8 BX2301BA  2072            CJNP Z,$+2
001B9 BXF301C1  2073            JNP REGTST9
001BA XXXX911E  2074            TORAY EXOR,R30
001BB BX2301BD  2075            CJNP Z,$+2
001BC BXF301C1  2076            JNP REGTST9
001BD XXXX911F  2077            TORAY EXOR,R31
001BE BX2301C0  2078            CJNP Z,$+2
001BF BXF301C1  2079            JNP REGTST9
                2080    ; DONE
                2081            ZH              ;CLEAR FLAGS                    ;201
001C0 1XFAF900  2082            / & RTN         ;AND RETURN                     ;201
                2083    REGTST9: N1H            ;SET NEGATIVE FLAG              ;201
001C1 1XFAFB00  2084            / & RTN         ;AND RETURN                     ;201
                2085    ;
                2086            TITLE2 PWRUP DIAGS - CACHE MEMORY TEST
```

```
Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - CACHE MEMORY TEST

          2087              EJECT
          2088    ;*****************************************************************
          2089    ;
          2090    ; CACHE/LOCAL MEMORY POWERUP DIAGNOSTIC TEST
          2091    ;
          2092    ; This subroutine is a powerup diagnostic to test the local HSP
          2093    ; memory (aka cache memory).
          2094    ;
          2095    ; It has two phases.  The first phase is an addressing test.
          2096    ; Each location is written with its address.  Then each location
          2097    ; is read and compared.
          2098    ;
          2099    ; The second phase is a bit pattern test.  It writes, reads, and
          2100    ; compares each location with repeating bit patterns of 01, 10,
          2101    ; 001, 110, all 1's, and all 0's, before testing the next
          2102    ; location.
          2103    ;
          2104    ;*****************************************************************
          2105    ;
          2106    CACHETST:   EQU $                                              ;201
001C2 XXXXD91F    2107              ZR ERR.CD          ;START WITH NO ERRORS     ;201
          2108              CON SYSPORT        ;SELECT SYSPORT TO CHECK FOR ERRORS ;201
001C3 0BXX0000    2109              / & SRCSEL                                   ;201
001C4 5XXXF8C1    2110              HA & SRCSTAT       ;DISREGARD INITIAL PARITY ERRORS ;201
001C5 0XF101CC    2111              JSB CADRTST        ;TEST LOCAL ADDRESSING    ;201
001C6 0X7301CA    2112              CJNP N,CACHETS9    ;IF ERRORS, DON'T CONTINUE ;201
001C7 0XF101E1    2113              JSB CPATTST        ;TEST LOCAL WITH BIT PATTERNS ;201
001C8 0X7301CA    2114              CJNP N,CACHETS9    ;                         ;201
001C9 XXFAXXXX    2115              RTN                ;RETURN OK                ;201
          2116    CACHETS9:   EQU $                                              ;201
001CA XXXXD8FF    2117              IR ERR.CD          ;INDICATE ERROR AND RETURN ;201
001CB XXFA0302    2118              IDAT PUP.CHE & RTN                           ;201
          2119    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - CACHE MEMORY TEST

```
                2120                EJECT
                2121    ;
                2122    ; LOCAL CACHE MEMORY ADDRESSING TEST
                2123    ;
                2124    CADRTST:    EQU $                                           ;201
                2125    ; WRITE ADDRESSES
001CC XXXXD91B  2126                ZR ADDR             ;ADDR HAS ADDRESS TO TEST   ;201
                2127    CADRTST1:   EQU $                                           ;201
001CD XXXXD81B  2128                RA ADDR             ;COPY ADDRESS TO DATA       ;201
001CE XXXXD89C  2129                AR GD.DATA                                      ;201
001CF BXF101FB  2130                JSB CHWRT           ;WRITE ADDRESS              ;201
001D0 XX7AXXXX  2131                CRTN N              ;ERROR                      ;201
001D1 XXXXDD7B  2132                INCR ADDR           ;NEXT ADDR                  ;201
001D2 XXXX94DB  2133                TORIY AND,ADDR      ;IF FFF+1, DONE             ;201
001D3 XXXX0FFF  2134                IDAT H#0FFF                                     ;201
001D4 BX2301D6  2135                CJMP Z,$+2                                      ;201
001D5 BXF301CD  2136                JMP CADRTST1        ;WRITE NEXT ADDR            ;201
                2137    ; READ AND COMPARE ADDRESSES
001D6 XXXXD91B  2138                ZR ADDR             ;BEGINNING AGAIN            ;201
                2139    CADRTST2:   EQU $                                           ;201
001D7 XXXXD81B  2140                RA ADDR             ;COPY ADDRESS TO DATA       ;201
001D8 XXXXD89C  2141                AR GD.DATA                                      ;201
001D9 BXF101FF  2142                JSB CHRD            ;READ AND COMPARE           ;201
001DA XX7AXXXX  2143                CRTN N              ;ERROR                      ;201
001DB XXXXDD7B  2144                INCR ADDR           ;NEXT ADDR                  ;201
001DC XXXX951B  2145                TORIY EXOR,ADDR     ;IF FFF+1, DONE             ;201
001DD XXXX1000  2146                IDAT H#1000                                     ;201
001DE BX2301E0  2147                CJMP Z,$+2                                      ;201
001DF BXF301D7  2148                JMP CADRTST2        ;WRITE NEXT ADDR            ;201
                2149    ; DONE, ALL OK
001E0 XXFAF901  2150                ZA & RTN                                        ;201
                2151    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    PWRUP DIAGS - CACHE MEMORY TEST

               2152              EJECT
               2153    ;
               2154    ; LOCAL CACHE MEMORY BIT PATTERN TEST.
               2155    ; SUBROUTINE TO TEST LOCATIONS IN CACHE MEMORY
               2156    ; WITH THE BIT PATTERNS 01, 10, 001, 110, ALL 1'S, AND ALL 0'S.
               2157    ;
               2158    CPATTST:    EQU $                                                ;201
001E1 XXXXD91B 2159                ZR ADDR             ;ADDR HAS ADDRESS TO TEST        ;201
               2160    CPATTST1:   EQU $                                                ;201
001E2 XXXXD8FC 2161                IR GD.DATA          ;GD.DATA HOLDS TEST DATA         ;201
001E3 XXXX5555 2162                IDAT B#0101010101010101 ;FIRST TEST IS REPEATING 01  ;201
001E4 BXF10208 2163                JSB CHEWRC          ;WRITE/READ/COMPARE TEST         ;201
001E5 XX7AXXXX 2164                CRTN N              ;ERROR                           ;201
001E6 XXXXDB7C 2165                SORR COMP,GD.DATA   ;NEXT TEST IS 10                 ;201
001E7 BXF10208 2166                JSB CHEWRC          ;                                ;201
001E8 XX7AXXXX 2167                CRTN N                                               ;201
001E9 XXXXD8FC 2168                IR GD.DATA          ;                                ;201
001EA XXXX2492 2169                IDAT B#0010010010010010 ;NEXT TEST IS 001 (HAS ODD PARITY) ;201
001EB BXF10208 2170                JSB CHEWRC          ;                                ;201
001EC XX7AXXXX 2171                CRTN N              ;                                ;201
001ED XXXXDB7C 2172                SORR COMP,GD.DATA   ;NEXT TEST IS 110 (ODD PARITY)    ;201
001EE BXF10208 2173                JSB CHEWRC          ;                                ;201
001EF XX7AXXXX 2174                CRTN N                                               ;201
001F0 XXXXD81C 2175                NIR GD.DATA         ;NEXT TEST IS ALL 1'S (11111111) ;201
001F1 BXF10208 2176                JSB CHEWRC          ;                                ;201
001F2 XX7AXXXX 2177                CRTN N                                               ;201
001F3 XXXXD91C 2178                ZR GD.DATA          ;LAST TEST IS ALL 0'S (00000000) ;201
001F4 BXF10208 2179                JSB CHEWRC          ;                                ;201
001F5 XX7AXXXX 2180                CRTN N              ;                                ;201
001F6 XXXXDD7B 2181                INCR ADDR           ;NEXT ADDR                       ;201
001F7 XXXX951B 2182                TORIY EXOR,ADDR     ;IF FFF+1, DONE                  ;201
001F8 XXXX1000 2183                IDAT H#1000                                          ;201
001F9 XX2AXXXX 2184                CRTN Z                                               ;201
001FA BXF301E2 2185                JMP CPATTST1        ;TEST NEXT ADDR                  ;201
               2186    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - CACHE MEMORY TEST

```
                2187                EJECT
                2188    ;
                2189    ; SUBROUTINE TO WRITE A LOCATION IN CACHE MEMORY, THE ADDRESS IN ADDR,
                2190    ; WITH A VALUE IN GD.DATA.
                2191    ;
                2192    CHWRT:      EQU $                                               ;201
001FB 12XXD85B  2193                RH ADDR & WCAR      ;SET ADDR                       ;201
001FC 13XXD85C  2194                RH GD.DATA & WCACHE ;AND WRITE DATA                 ;201
001FD BXF108AE  2195                JSB CKSYSERR        ;CHECK FOR CACHE MEMORY ERRORS  ;201
001FE XXFAXXXX  2196                RTN                 ;RETURN WITH N SET IF ERROR     ;201
                2197    ;
                2198    ; SUBROUTINE TO READ AND COMPARE A LOCATION IN CACHE MEMORY, THE
                2199    ; ADDRESS IN ADDR, WITH THE VALUE IN GD.DATA.
                2200    ;
                2201    CHRD:       EQU $                                               ;201
001FF 12XXD85B  2202                RH ADDR & WCAR      ;SET ADDR                       ;201
00200 3XXXF8C1  2203                HA & RCACHE         ;AND READ DATA                  ;201
                2204    ; COMPARE DATA
00201 XXXX911C  2205                TORAY EXOR,GD.DATA  ;ACC = DATA?                    ;201
00202 BX200204  2206                CJNP L,$+2                                          ;201
00203 BXF00206  2207                JNP CHRD9           ;MISCOMPARE                     ;201
00204 BXF108AE  2208                JSB CKSYSERR        ;CHECK FOR CACHE MEMORY ERRORS  ;201
00205 XXFAXXXX  2209                RTN                 ;RETURN NEG SET OR NOT          ;201
                2210    ; MISCOMPARE, CHECK FOR OTHER ERRORS WHICH HAVE PRECEDENCE
                2211    CHRD9:      EQU $                                               ;201
00206 BXF108AE  2212                JSB CKSYSERR        ;CHECK FOR OTHER ERRORS         ;201
00207 1XFAFB00  2213                N1H & RTN           ;ERROR IF STATUS BAD OR NOT     ;201
                2214    ;
                2215    ; SUBROUTINE TO TEST A LOCATION IN CACHE MEMORY, THE ADDRESS IN ADDR,
                2216    ; WITH A VALUE IN GD.DATA.  DOES A WRITE/READ/COMPARE TEST.
                2217    ;
                2218    CHEWRC:     EQU $                                               ;201
00208 BXF101FB  2219                JSB CHWRT           ;WRITE DATA                     ;201
00209 XX7AXXXX  2220                CRTN N                                              ;201
0020A BXF101FF  2221                JSB CHRD            ;READ AND COMPARE               ;201
0020B XXFAXXXX  2222                RTN                 ;RETURN WITH NEG SET OR NOT     ;201
                2223    ;
                2224                TITLE2 PWRUP DIAGS - SHARED MEMORY TEST
```

```
Addr        Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - SHARED MEMORY TEST

            2225              EJECT
            2226    ;*****************************************************************
            2227    ;
            2228    ; STATUS BUFFER/SHARED MEMORY POWERUP DIAGNOSTIC TEST
            2229    ;
            2230    ; This subroutine is a powerup diagnostic to test the shared
            2231    ; memory (aka status buffer).  It is designed so that it will not
            2232    ; alter data needed by the other side (controller), in case the
            2233    ; other side is online.
            2234    ;
            2235    ; It has three phases.  The first two test all of memory in
            2236    ; "local mode", that doesn't affect the other side's memory.  The
            2237    ; last one will test reserved locations in both local and remote
            2238    ; shared memory.
            2239    ;
            2240    ; The first phase is an addressing test of local shared memory.
            2241    ; Each location of local shared memory is written with its
            2242    ; address.  Then each location is read and compared.
            2243    ;
            2244    ; The second phase is a bit pattern test of local shared memory.
            2245    ; It writes/reads/compares each location with repeating bit
            2246    ; patterns of 01, 10, 001, 110, all 1's, and all 0's, before
            2247    ; testing the next location.
            2248    ;
            2249    ; The third phase does write/read/compare on both local and
            2250    ; remote shared memory.  Two consecutive locations within each
            2251    ; drive status area are reserved exclusively for this testing.
            2252    ; This makes 32 pairs of two locations, each 128 locations
            2253    ; apart.  Each location will be tested with the bit patterns used
            2254    ; above before testing the next location.
            2255    ;
            2256    ; Shared Memory is used as 8 bits x 1000 hex locations, not 16
            2257    ; bits x 800 hex as in main online code.
            2258    ;
            2259    ; In addition to checking for errors of the shared memory, this
            2260    ; also checks for parity errors detected on high speed bus during
            2261    ; these operations.
            2262    ;
            2263    ;*****************************************************************
            2264    ;
            2265    SHMEMTST:   EQU $                                              ;201
0020C BXF10B86  2266            JSB CLRSYS          ;CLEAR BUS PARITY ERRORS       ;201
            2267                CON SHMPORT         ;SELECT SHARED MEMORY AS SOURCE ;201
0020D BBXX0003  2268            / & SRCSEL                                         ;201
            2269                CON SHMPORT         ; AND AS DESTINATION           ;201
0020E BCXX0003  2270            / & DSTSEL                                         ;201
            2271                CON SHC.RST         ;RESET SHARED MEMORY, CLEAR ERRORS ;201
0020F B5XX0000  2272            / & SRCCTRL                                        ;201
00210 XXXXD91F  2273            ZR ERR.CD           ;START WITH NO ERRORS          ;201
00211 B2XX0002  2274            CON SHERR & WCAR    ;CLEAR SHMEMORY ERROR STATUS WORD ;201
00212 13XXF900  2275            ZH & WCACHE                                        ;201
            2276    ;
00213 BXF103F4  2277            JSB SET.ID          ;INITIALIZE ID LOCATION AND ACC WITH ID ;201
00214 XXXXD800  2278            AR TEMP0            ;USE ID AS PARAM FOR DELAY     ;201
00215 BXF10C30  2279            JSB DELAYNS         ;DELAY TIME DEPENDANT ON ID    ;201
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - SHARED MEMORY TEST

00216 BXF10285  2280              JSB SHOFFLN         ;TELL OTHER SIDE STARTING SHMEM DIAGS   ;201
00217 BX730221  2281              CJMP N,SHMEMTS9     ;                                       ;201
                2282    ;
00218 BXF10224  2283              JSB LADRTST         ;TEST LOCAL ADDRESSING                  ;201
00219 BX730221  2284              CJMP N,SHMEMTS9     ;IF ERRORS, DON'T CONTINUE              ;201
0021A BXF1023C  2285              JSB LPATTST         ;TEST LOCAL WITH BIT PATTERNS           ;201
0021B BX730221  2286              CJMP N,SHMEMTS9     ;                                       ;201
0021C BXF10245  2287              JSB RPATTST         ;TEST REMOTE WITH BIT PATTERNS          ;201
0021D BX730221  2288              CJMP N,SHMEMTS9     ;                                       ;201
                2289    ;
0021E BXF1029D  2290              JSB SHONLN          ;TELL OTHER SIDE DONE WITH SHMEM DIAGS  ;201
0021F BX730221  2291              CJMP N,SHMEMTS9     ;                                       ;201
00220 1XFAF980  2292              ZH & RTN            ;RETURN OK                              ;201
                2293    ; ERROR, GET STATUS ERROR BITS AS SAVED BY CKSHERR.
                2294    ; ERRORS ARE CHECKED IN ORDER OF PRECEDENCE
                2295    SHMEMTS9:   EQU $                                                   ;201
00221 BXF1029D  2296              JSB SHONLN          ;TELL OTHER SIDE DONE WITH SHMEM DIAGS  ;201
00222 BXF102A2  2297              JSB SHERR.CD        ;CALCULATE SHARED MEMORY ERROR CODE     ;201
00223 1XFAFB00  2298              NIH & RTN           ;SET NEG AND RETURN                     ;201
                2299    ;
```

```
Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - SHARED MEMORY TEST

          2300              EJECT
          2301    ;
          2302    ; LOCAL SHARED MEMORY ADDRESSING TEST
          2303    ;
          2304    LADRTST:    EQU $                                                 ;201
          2305    ; WRITE ADDRESSES
00224 XXXXD8FB    2306              IR ADDR           ;ADDR HAS ADDRESS TO TEST     ;201
00225 XXXX3000    2307              IDAT H#3000       ;BITS 12 & 13 SET FOR LOCAL MODE ;201
          2308    LADRTST1:   EQU $                                                 ;201
00226 XXXXD81B    2309              RA ADDR           ;COPY ADDRESS TO DATA         ;201
00227 XXXXC4DC    2310              TOAIR AND,GD.DATA ;USING LOWER 8 BITS           ;201
00228 XXXX00FF    2311              IDAT H#00FF                                     ;201
00229 BXF1026C    2312              JSB SHWRT         ;WRITE ADDRESS                ;201
0022A XX7AXXXX    2313              CRTN N                                          ;201
0022B XXXXDD7B    2314              INCR ADDR         ;NEXT ADDR                    ;201
0022C XXXX94DB    2315              TORIY AND,ADDR    ;IF FFF+1, DONE               ;201
0022D XXXX0FFF    2316              IDAT H#0FFF                                     ;201
0022E BX230230    2317              CJMP Z,$+2                                      ;201
0022F BXF30226    2318              JMP LADRTST1      ;WRITE NEXT ADDR              ;201
          2319    ; READ AND COMPARE ADDRESSES
00230 XXXXD8FB    2320              IR ADDR           ;BEGINNING AGAIN              ;201
00231 XXXX3000    2321              IDAT H#3000       ;                             ;201
          2322    LADRTST2:   EQU $                                                 ;201
00232 XXXXD81B    2323              RA ADDR           ;COPY ADDRESS TO DATA         ;201
00233 XXXXC4DC    2324              TOAIR AND,GD.DATA ;USING LOWER 8 BITS           ;201
00234 XXXX00FF    2325              IDAT H#00FF                                     ;201
00235 BXF10275    2326              JSB SHRD          ;READ AND COMPARE             ;201
00236 XX7AXXXX    2327              CRTN N                                          ;201
00237 XXXXDD7B    2328              INCR ADDR         ;NEXT ADDR                    ;201
00238 XXXX94DB    2329              TORIY AND,ADDR    ;IF FFF+1, DONE               ;201
00239 XXXX0FFF    2330              IDAT H#0FFF                                     ;201
0023A XX2AXXXX    2331              CRTN Z            ;RETURN WITH ZERO FLAG        ;201
0023B BXF30232    2332              JMP LADRTST2      ;WRITE NEXT ADDR              ;201
          2333    ;
```

```
 Addr          Line - AMPERIF 7155/835 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - SHARED MEMORY TEST

               2334              EJECT
               2335    ;
               2336    ; LOCAL SHARED MEMORY BIT PATTERN TEST
               2337    ;
               2338    LPATTST:    EQU $                                                   ;201
0023C XXXXD8FB 2339                IR ADDR             ;ADDR HAS ADDRESS TO TEST           ;201
0023D XXXX3000 2340                IDAT H#3000         ;BITS 12 & 13 SET FOR LOCAL MODE    ;201
               2341    LPATTST1:   EQU $                                                   ;201
0023E BXF10254 2342                JSB PATTST          ;TEST WITH DIFFERENT VALUES         ;201
0023F XX7AXXXX 2343                CRTN N                                                  ;201
00240 XXXXDD7B 2344                INCR ADDR           ;NEXT ADDR                          ;201
00241 XXXX940B 2345                TORIY AND,ADDR      ;IF FFF+1, DONE                     ;201
00242 XXXX0FFF 2346                IDAT H#0FFF                                             ;201
00243 XX2AXXXX 2347                CRTN Z                                                  ;201
00244 BXF3023E 2348                JMP LPATTST1        ;TEST NEXT ADDR                     ;201
               2349    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - SHARED MEMORY TEST

```
                2350                EJECT
                2351    ;
                2352    ; REMOTE SHARED MEMORY BIT PATTERN TEST
                2353    ;
                2354    RPATTST:    EQU $                                                   ;201
00245 XXXXD91E  2355                ZR LOOPCNT          ;LOOP THROUGH EACH DRIVE STATUS     ;201
                2356    RPATTST1:   EQU $                                                   ;201
00246 XXXX8D9E  2357                RTRA 6,LOOPCNT      ;MULT BY 64, DRIVE STATUS AREA SIZE ;201
00247 XXXXC49B  2358                TOAIR ADD,ADDR      ;ADD OFFSET FOR A TST LOC IN SHARED MEM ;201
00248 XXXX003E  2359                IDAT SHM.TEST                                           ;201
00249 XXXXCC1B  2360                SHRR UPZ,ADDR       ;WORD ADDR TO BYTE ADDR, MULT BY 2  ;201
0024A BXF10254  2361                JSB PATTST          ;TEST FIRST BYTE WITH DIFFERENT VALUES ;201
0024B XX7AXXXX  2362                CRTN N                                                  ;201
0024C XXXXDD7B  2363                INCR ADDR           ;TEST NEXT BYTE                     ;201
0024D BXF10254  2364                JSB PATTST          ;                                   ;201
0024E XX7AXXXX  2365                CRTN N                                                  ;201
0024F XXXXDD7E  2366                INCR LOOPCNT        ;NEXT DRIVE                         ;201
00250 XXXX951E  2367                TORIY EXOR,LOOPCNT  ;IF 31+1, DONE                      ;201
00251 XXXX0020  2368                IDAT 32                                                 ;201
00252 XX2AXXXX  2369                CRTN Z                                                  ;201
00253 BXF30246  2370                JMP RPATTST1        ;TEST NEXT DRIVE STATUS AREA        ;201
                2371    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - SHARED MEMORY TEST

               2372              EJECT
               2373    ;
               2374    ; SUBROUTINE TO TEST A LOCATION IN SHARED MEMORY, THE ADDRESS IN ADDR,
               2375    ; WITH THE BIT PATTERNS 01, 10, 001, 110, ALL 1'S, AND ALL 0'S.
               2376    ;
               2377    PATTST:     EQU $                                                   ;201
00254 XXXXD8FC 2378               IR GD.DATA          ;DATA  HOLDS TEST DATA              ;201
00255 XXXX0055 2379               IDAT B#01010101     ;FIRST TEST IS REPEATING 01         ;201
00256 BXF10281 2380               JSB SHWRC           ;WRITE/READ/COMPARE TEST            ;201
00257 XX7AXXXX 2381               CRTN N              ;ERROR                              ;201
00258 XXXXD8FC 2382               IR GD.DATA          ;                                   ;201
00259 XXXX00AA 2383               IDAT B#10101010     ;NEXT TEST IS REPEATING 10          ;201
0025A BXF10281 2384               JSB SHWRC           ;                                   ;201
0025B XX7AXXXX 2385               CRTN N                                                  ;201
0025C XXXXD8FC 2386               IR GD.DATA          ;                                   ;201
0025D XXXX0049 2387               IDAT B#01001001     ;NEXT TEST IS REPEATING 001         ;201
0025E BXF10281 2388               JSB SHWRC           ;THIS HAS ODD PARITY                ;201
0025F XX7AXXXX 2389               CRTN N              ;                                   ;201
00260 XXXXD8FC 2390               IR GD.DATA          ;                                   ;201
00261 XXXX00B6 2391               IDAT B#10110110     ;NEXT TEST IS REPEATING 110         ;201
00262 BXF10281 2392               JSB SHWRC           ;THIS HAS ODD PARITY                ;201
00263 XX7AXXXX 2393               CRTN N                                                  ;201
00264 XXXXD8FC 2394               IR GD.DATA          ;                                   ;201
00265 XXXX00FF 2395               IDAT B#11111111     ;NEXT TEST IS ALL 1'S               ;201
00266 BXF10281 2396               JSB SHWRC           ;                                   ;201
00267 XX7AXXXX 2397               CRTN N                                                  ;201
00268 XXXXD8FC 2398               IR GD.DATA          ;                                   ;201
00269 XXXX0000 2399               IDAT B#00000000     ;LAST TEST IS ALL 0'S               ;201
0026A BXF10281 2400               JSB SHWRC           ;                                   ;201
0026B XXFAXXXX 2401               RTN                 ;DONE, RETURN WITH N SET OR NOT     ;201
               2402    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - SHARED MEMORY TEST

```
                2403                EJECT
                2404    ;
                2405    ; SUBROUTINE TO WRITE A LOCATION IN SHARED MEMORY, THE ADDRESS IN ADDR,
                2406    ; WITH A VALUE IN GD.DATA.
                2407    ;
                2408    SHWRT:      EQU $                                                   ;201
0026C BXF10B9E  2409                JSB CKSHERR         ;CHECK FOR SHARED MEMORY ERRORS     ;201
0026D XX7AXXXX  2410                CRTN N              ;ERROR                              ;201
0026E 14XXD85B  2411                RH ADDR & WDATA     ;SET ADDR                           ;201
0026F XXXX7140  2412                NOOP                ;                                   ;201
00270 14XXD85C  2413                RH GD.DATA & WDATA  ;AND WRITE DATA                     ;201
00271 XXXX7140  2414                NOOP                ;DELAY TO ALLOW REMOTE WRITE (IF ANY) ;201
00272 XXXX7140  2415                NOOP                ;                                   ;201
00273 BXF10B9E  2416                JSB CKSHERR         ;CHECK FOR SHARED MEMORY ERRORS     ;201
00274 XXFAXXXX  2417                RTN                 ;RETURN WITH N SET IF ERROR         ;201
                2418    ;
                2419    ; SUBROUTINE TO READ AND COMPARE A LOCATION IN SHARED MEMORY, THE
                2420    ; ADDRESS IN ADDR, WITH THE VALUE IN GD.DATA.
                2421    ;
                2422    SHRD:       EQU $                                                   ;201
00275 BXF10B9E  2423                JSB CKSHERR         ;CHECK FOR SHARED MEMORY ERRORS     ;201
00276 XX7AXXXX  2424                CRTN N              ;ERROR                              ;201
00277 14XXD85B  2425                RH ADDR & WDATA     ;SET ADDR                           ;201
00278 XXXX7140  2426                NOOP                ;                                   ;201
00279 4XXXF8C1  2427                HA & RDATA          ;AND READ DATA                      ;201
                2428    ; COMPARE DATA
0027A XXXX911C  2429                TORAY EXOR,GD.DATA  ;ACC = DATA?                        ;201
0027B BX23027D  2430                CJMP Z,$+2                                              ;201
0027C BXF3027F  2431                JMP SHRD9           ;MISCOMPARE                         ;201
0027D BXF10B9E  2432                JSB CKSHERR         ;CHECK FOR SHARED MEMORY ERRORS     ;201
0027E XXFAXXXX  2433                RTN                 ;RETURN NEG SET OR NOT              ;201
                2434    ; MISCOMPARE, CHECK FOR OTHER ERRORS WHICH HAVE PRECEDENCE
                2435    SHRD9:      EQU $                                                   ;201
0027F BXF10B9E  2436                JSB CKSHERR         ;CHECK FOR OTHER ERRORS             ;201
00280 1XFAFB00  2437                N1H & RTN           ;ERROR IF STATUS BAD OR NOT         ;201
                2438    ;
                2439    ; SUBROUTINE TO TEST A LOCATION IN SHARED MEMORY, THE ADDRESS IN ADDR,
                2440    ; WITH A VALUE IN GD.DATA.  DOES A WRITE/READ/COMPARE TEST.
                2441    ;
                2442    SHWRC:      EQU $                                                   ;201
00281 BXF1026C  2443                JSB SHWRT           ;WRITE DATA                         ;201
00282 XX7AXXXX  2444                CRTN N              ;ERROR                              ;201
00283 BXF10275  2445                JSB SHRD            ;READ AND COMPARE                   ;201
00284 XXFAXXXX  2446                RTN                 ;RETURN WITH NEG SET OR NOT         ;201
                2447    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - SHARED MEMORY TEST

```
                2448                EJECT
                2449    ;
                2450    ; SUBROUTINE TO INFORM THE OTHER CONTROLLER THAT WE ARE TESTING
                2451    ; SHARED MEMORY, AND TO NOT WRITE TO OUR SHARED MEMORY.
                2452    ; IF BOTH ARE DOING DIAGS, THE SECOND CONTROLLER WILL WAIT FOR
                2453    ; THE FIRST TO COMPLETE DIAGS.
                2454    ;
                2455    SHOFFLN:    EQU $                                               ;201
00285 XXXXD8E9  2456                IR TIMEOUT          ;MAXIMUM WAIT                   ;201
00286 XXXX1388  2457                IDAT 5000           ;OF 5 SECONDS (5000 CALLS TO DELAY 1MS) ;201
                2458    SHOFFLN1:   EQU $                                               ;201
00287 XXXXF8E1  2459                IA                  ;DELAY 1000US = 1MS             ;201
00288 XXXX03E8  2460                IDAT 1000                                           ;201
00289 BXF10C26  2461                JSB DELAY                                           ;201
0028A XXXXC1E9  2462                DECR TIMEOUT        ;IF WAIT TOO LONG, JUST CONTINUE ;201
0028B BX230293  2463                CJNP Z,SHOFFLN2                                     ;201
0028C XXXXD8EC  2464                IR SHMADDR          ;READ DOUPDATE                  ;201
0028D XXXX003F  2465                IDAT DOUPDATE       ;                               ;201
0028E BXF10B80  2466                JSB SHMRD           ;                               ;201
0028F BX730293  2467                CJNP N,SHOFFLN2     ;IF ERROR, ASSUME ITS BECAUSE OF PWR UP ;201
00290 XXXX950B  2468                TORIY EXOR,SHMDATA  ;IF 3, OTHER IS DOING SHMEM DIAGS, WAIT ;201
00291 XXXX0003  2469                IDAT H#3            ;                               ;201
00292 BX230287  2470                CJNP Z,SHOFFLN1     ;ELSE, OK TO START DIAGS OURSELVES ;201
                2471    SHOFFLN2:   EQU $                                               ;201
00293 B2XX0002  2472                CON SHERR & WCAR    ;CLEAR SHMEMORY ERROR STATUS WORD ;201
00294 13XXF900  2473                ZH & WCACHE                                         ;201
00295 XXXXD8EB  2474                IR SHMDATA          ;WRITE OFFLINE CODE             ;201
00296 XXXX0003  2475                IDAT H#3            ;OF 3                           ;201
00297 BXF10B8D  2476                JSB SHMWRT          ;TO DOUPDATE                    ;201
00298 XX7AXXXX  2477                CRTN N                                              ;201
00299 XXXXD8E0  2478                IR TEMP0            ;WAIT 2 SECONDS (2000MS)        ;201
0029A XXXX07D0  2479                IDAT 2000           ;TO INSURE OTHER SIDE WILL SEE OFFLINE ;201
0029B BXF10C30  2480                JSB DELAYMS                                         ;201
0029C 1XFAF900  2481                ZH & RTN            ;THEN RETURN WITH ZERO FLAG SET ;201
                2482    ;
                2483    ; SUBROUTINE TO INFORM THE OTHER CONTROLLER THAT WE ARE DONE TESTING
                2484    ; SHARED MEMORY, AND TO RESUME WRITES TO OUR SHARED MEMORY
                2485    ;
                2486    SHONLN:     EQU $                                               ;201
0029D XXXXD90B  2487                ZR SHMDATA          ;WRITE ONLINE CODE OF ZERO      ;201
0029E XXXXD8EC  2488                IR SHMADDR          ;TO SHARED MEMORY LOCATION DOUPDATE ;201
0029F XXXX003F  2489                IDAT DOUPDATE       ;IN DRIVE 0 AREA                ;201
002A0 BXF10B8D  2490                JSB SHMWRT          ;                               ;201
002A1 XXFAXXXX  2491                RTN                 ;RETURN WITH NEG SET IF ERROR   ;201
                2492    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - SHARED MEMORY TEST

```
                2493                EJECT
                2494    ;
                2495    ; SUBROUTINE TO SET THE REGISTER ERR.CD FOR A SHARED MEMORY ERROR.
                2496    ; ERR.CD WILL AS DEFINE FOR POWERUP DIAGNOSTICS:
                2497    ;
                2498    ; 3     HIGH SPEED BUS PARITY ERROR
                2499    ; 4     SHARED MEMORY MISCOMPARE ERROR
                2500    ; 5     SHARED MEMORY LOCAL PARITY ERROR
                2501    ; 6     SHARED MEMORY OPEN CABLE
                2502    ; 7     SHARED MEMORY REMOTE PARITY ERROR
                2503    ;
                2504    ; THIS SUBROUTINE IS USED BY SHARED MEMORY POWERUP DIAGNOSTICS
                2505    ; AND BY SHARED MEMORY OFFLINE DIAGNOSTICS.
                2506    ;
                2507    SHERR.CD:   EQU $
002A2 B2XX8002  2508                CON SHERR & WCAR    ;GET BAD STATUS FROM CACHE          ;201
002A3 3XXXF8C1  2509                HA & RCACHE                                             ;201
                2510    ;
002A4 XXXXD8FF  2511                IR ERR.CD           ;LOCAL PARITY ERROR IF...           ;201
002A5 XXXX0005  2512                IDAT PUP.SHL                                            ;201
002A6 XXXXE180  2513                TSTNA SHS.ADRL      ;LOW ADDRESS PARITY ERROR,          ;201
002A7 BX2302A9  2514                CJMP Z,$+2                                              ;201
002A8 XXFAXXXX  2515                RTN                                                     ;201
002A9 XXXXE380  2516                TSTNA SHS.ADRH      ;HIGH ADDRESS PARITY ERROR,         ;201
002AA BX2302AC  2517                CJMP Z,$+2                                              ;201
002AB XXFAXXXX  2518                RTN                                                     ;201
002AC XXXXE580  2519                TSTNA SHS.DATA      ;OR DATA PARITY ERROR.              ;201
002AD BX2302AF  2520                CJMP Z,$+2                                              ;201
002AE XXFAXXXX  2521                RTN                                                     ;201
                2522    ;
                2523    IF SHMERRHW_EQ_1
002AF XXXXD8FF  2524                IR ERR.CD           ;OPEN CABLE ERROR IF...             ;201
002B0 XXXX0006  2525                IDAT PUP.SHO                                            ;201
002B1 XXXXE980  2526                TSTNA SHS.OPEN      ;OPEN CABLE, SHMEM NOT CONNTECTED.  ;201
002B2 BX2302B4  2527                CJMP Z,$+2                                              ;201
002B3 XXFAXXXX  2528                RTN                                                     ;201
                2529    ;
002B4 XXXXD8FF  2530                IR ERR.CD           ;REMOTE PARITY ERROR IF....         ;201
002B5 XXXX0007  2531                IDAT PUP.SHR                                            ;201
002B6 XXXXE780  2532                TSTNA SHS.RPAR      ;REMOTE PARITY ERROR STATUS.        ;201
002B7 BX2302B9  2533                CJMP Z,$+2                                              ;201
002B8 XXFAXXXX  2534                RTN                                                     ;201
                2535    ELSE
                2547    ENDIF
                2548    ;
002B9 XXXXD8FF  2549                IR ERR.CD           ;BUS PARITY ERROR IF...             ;201
002BA XXXX0003  2550                IDAT PUP.BUS                                            ;201
002BB B2XX0001  2551                CON SYSERR & WCAR   ;ANY SYSPORT ERROR BITS SET         ;201
002BC 3XXXF8C1  2552                HA & RCACHE                                             ;201
002BD BX2302BF  2553                CJMP Z,$+2                                              ;201
002BE XXFAXXXX  2554                RTN                                                     ;201
                2555    ;
002BF XXXXD8FF  2556                IR ERR.CD           ;MISCOMPARE ERROR IF...             ;201
002C0 XXXX0004  2557                IDAT PUP.SHM        ;NO OTHER ERROR.                    ;201
002C1 XXFAXXXX  2558                RTN                                                     ;201
```

```
2559    ;
2560                TITLE2 PWRUP DIAGS - UB1 TEST
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - UBI TEST

               2561              EJECT
               2562    ;*****************************************************************
               2563    ;
               2564    ;          U-BUS INTERFACE BOARD TEST
               2565    ;
               2566    ; This subroutine tests the UBI board.  It writes, reads, and
               2567    ; compares the values 0 to FFFF through the UBI FIFO.  It checks
               2568    ; for proper UBI status throughout.  After each transfer, SYSPORT
               2569    ; is checked for noted parity errors.
               2570    ;
               2571    ; Values are written to the FIFO until full, then three values,
               2572    ; 36 bits, are read back and compared, and then more values are
               2573    ; written.
               2574    ;
               2575    ; The test ends once all the values have been written, the data
               2576    ; not yet read is left in the FIFO.
               2577    ;
               2578    ; Special diagnostic controls, built into the UBI, are used so
               2579    ; that data is both written and read by the HSP.
               2580    ;
               2581    ; Status bits for writes are tested on the first three words
               2582    ; only.
               2583    ;
               2584    ;
               2585    UBIFT:      EQU $
               2586              SRC.AMP
               2586 +  IF BANK_EQ_0
002C2 8BXX000F 2586 +            CON AMP.PORT & SRCSEL
               2586 +  ELSE
               2586 +  ENDIF
               2586 +            ENDM
002C3 BXF10C0A 2587              JSB INITAMP         ;INITIALIZE AMPERIF INTERFACE          ;201
002C4 XXXXD91C 2588              ZR GD.DATA                                                 ;201
002C5 XXXXD91D 2589              ZR RD.DATA                                                 ;201
002C6 XXXXD91E 2590              ZR LOOPCNT          ;TEST 65K TIMES                        ;201
               2591              DST.AMP
               2591 +  IF BANK_EQ_0
002C7 8CXX000F 2591 +            CON AMP.PORT & DSTSEL
               2591 +  ELSE
               2591 +  ENDIF
               2591 +            ENDM
               2592              SRC.AMP
               2592 +  IF BANK_EQ_0
002C8 8BXX000F 2592 +            CON AMP.PORT & SRCSEL
               2592 +  ELSE
               2592 +  ENDIF
               2592 +            ENDM
               2593              LD2NY AC.DWRAP      ;SET DIAGNOSTIC BIT                    ;201
002C9 16XXE196 2594              / & ALU & DSTCTRL
002CA XXXXE586 2595              LD2NA AOUTRDY       ;CHECK FOR NO AOUTRDY, REG.A, OR REG.B ;201
002CB XXXXE182 2596              SETNA REG.A                                                ;201
002CC XXXXE382 2597              SETNA REG.B                                                ;201
               2598              TODA AND,NRY                                               ;201
002CD 6XXXE2C8 2599              / & DSTSTAT
002CE 8X2302D0 2600              CJMP Z,$+2                                                 ;201
```

```
 Addr      Line - AMPERIF 7155/805 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - UBI TEST

002CF BXF3033E  2601              JMP UBIFT9                                    ;201
                2602    ;
002D0 BXC302D2  2603              CJMP DSTRDY,$+2
002D1 BXF30300  2604              JMP UBIFT4
002D2 XXXXDD7C  2605              INCR GD.DATA
002D3 XXXX9CDC  2606              TORIR AND,GD.DATA                             ;201
002D4 XXXX0FFF  2607              IDAT H#0FFF         ;USE ONLY 12 BITS         ;201
                2608              RH GD.DATA          ;1ST WRITE
002D5 14XXD85C  2609              / & WDATA
002D6 XXXX7140  2610              NOOP
002D7 6XXXF8C1  2611              HA & DSTSTAT
002D8 XXXXE180  2612              TSTNA REG.A         ;TEST FOR REG.A
002D9 BX23033E  2613              CJMP Z,UBIFT9                                 ;201
002DA BXF10BAE  2614              JSB CKSYSERR        ;CHECK FOR PARITY ERRORS  ;201
002DB BX73033B  2615              CJMP N,UBIFT8                                 ;201
                2616              SRC.AMP                                       ;201
                2616 +  IF BANK_EQ_0
002DC B8XX000F  2616 +            CON AMP.PORT & SRCSEL
                2616 +  ELSE
                2616 +  ENDIF
                2616 +            ENDM
                2617    ;
002DD XXXXDD7C  2618              INCR GD.DATA
002DE XXXX9CDC  2619              TORIR AND,GD.DATA                             ;201
002DF XXXX0FFF  2620              IDAT H#0FFF         ;USE ONLY 12 BITS         ;201
                2621              RH GD.DATA          ;2ND WRITE
002E0 14XXD85C  2622              / & WDATA
002E1 XXXX7140  2623              NOOP
002E2 6XXXF8C1  2624              HA & DSTSTAT
002E3 XXXXE380  2625              TSTNA REG.B         ;TEST FOR REG.B
002E4 BX23033E  2626              CJMP Z,UBIFT9                                 ;201
002E5 BXF10BAE  2627              JSB CKSYSERR        ;CHECK FOR PARITY ERRORS  ;201
002E6 BX73033B  2628              CJMP N,UBIFT8                                 ;201
                2629              SRC.AMP                                       ;201
                2629 +  IF BANK_EQ_0
002E7 B8XX000F  2629 +            CON AMP.PORT & SRCSEL
                2629 +  ELSE
                2629 +  ENDIF
                2629 +            ENDM
                2630    ;
002E8 XXXXDD7C  2631              INCR GD.DATA
002E9 XXXX9CDC  2632              TORIR AND,GD.DATA                             ;201
002EA XXXX0FFF  2633              IDAT H#0FFF         ;USE ONLY 12 BITS         ;201
                2634              RH GD.DATA          ;3RD WRITE
002EB 14XXD85C  2635              / & WDATA
002EC XXXX7140  2636              NOOP
002ED XXXX7140  2637              NOOP
002EE 6XXXF8C1  2638              HA & DSTSTAT
002EF XXXXE580  2639              TSTNA AOUTRDY       ;TEST FOR AVAILABLE BIT
002F0 BX23033E  2640              CJMP Z,UBIFT9                                 ;201
002F1 BXF10BAE  2641              JSB CKSYSERR        ;CHECK FOR PARITY ERRORS  ;201
002F2 BX73033B  2642              CJMP N,UBIFT8                                 ;201
                2643              SRC.AMP                                       ;201
                2643 +  IF BANK_EQ_0
002F3 B8XX000F  2643 +            CON AMP.PORT & SRCSEL
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     PWRUP DIAGS - UBI TEST

           2643 +  ELSE
           2643 +  ENDIF
           2643 +          ENDM
           2644    ;
           2645    UBIFT5:     EQU $
002F4 XXXXDD7E  2646            INCR LOOPCNT        ;COUNT FROM 1 TO 0 (FFFF+1) BY 1
002F5 BX230339  2647            CJMP Z,UBIFT6       ;EXIT IF FINISHED
002F6 BXC302F8  2648            CJMP DSTRDY,$+2     ;CONTINUE IF THERE IS ROOM IN FIFO
002F7 BXF30300  2649            JMP UBIFT4          ;ELSE READ
002F8 XXXXDD7C  2650            INCR GD.DATA
002F9 XXXX9CDC  2651            TORIR AND,GD.DATA                                   ;201
002FA XXXX0FFF  2652            IDAT H#0FFF         ;USE ONLY 12 BITS               ;201
           2653            RM GD.DATA          ;WRITE A WORD
002FB 14XXD85C  2654            / & UDATA
002FC BXF10BAE  2655            JSB CKSYSERR        ;CHECK FOR PARITY ERRORS        ;201
002FD BX73033B  2656            CJMP N,UBIFT8                                       ;201
           2657            SRC.AMP                                             ;201
           2657 +  IF BANK_EQ_0
002FE BBXX000F  2657 +          CON AMP.PORT & SRCSEL
           2657 +  ELSE
           2657 +  ENDIF
           2657 +          ENDM
002FF BXF302F4  2658            JMP UBIFT5
           2659    ;
           2660    ; READ
           2661    UBIFT4:     EQU $
00300 XXXXEF86  2662            LD2WA DATAOUT                                       ;201
00301 XXXXE382  2663            SETWA AC.DODR                                       ;201
00302 XXXXE182  2664            SETWA AC.DWRAP                                      ;201
00303 15XXF880  2665            AM & SRCCTRL        ;SET DATA, ODREQ, AND KEEP DIAGS UP ;201
00304 XXXXE381  2666            RSTWA AC.DODR                                       ;201
00305 XXXXE582  2667            SETWA AC.DIDR                                       ;201
00306 15XXF880  2668            AM & SRCCTRL        ;WAIT, THEN DROP ODREQ, RAISE SETIDR ;201
00307 XXXX7140  2669            NOOP                ;DELAY BEFORE READING SRCSTAT
00308 XXXX7140  2670            NOOP
00309 XXXX7140  2671            NOOP
0030A 5XXXF8C1  2672            MA & SRCSTAT
0030B XXXXF180  2673            TSTWA PAR1.RDY      ;LOOK FOR PAR1.RDY
0030C BX23033E  2674            CJMP Z,UBIFT9                                       ;201
           2675    ;
0030D XXXXDD7D  2676            INCR RD.DATA        ;AN EQUIVALENT REGISTER TO RD.DATA
0030E XXXX9CDD  2677            TORIR AND,RD.DATA   ;MASK OFF TOP NIBBLE
0030F XXXX0FFF  2678            IDAT H#0FFF         ; SINCE ONLY 12 BITS ARE READ
00310 4XXXF8C1  2679            MA & RDATA          ;READ WORD INTO ACCUMULATOR     ;201
00311 XXXX911D  2680            TORAY EXOR,RD.DATA  ;CHECK FOR MISCOMPARE           ;201
00312 BX230314  2681            CJMP Z,$+2
00313 BXF3033E  2682            JMP UBIFT9          ;IF ERROR                       ;201
00314 BXF10BAE  2683            JSB CKSYSERR        ;CHECK FOR PARITY ERRORS        ;201
00315 BX73033B  2684            CJMP N,UBIFT8                                       ;201
           2685            SRC.AMP                                             ;201
           2685 +  IF BANK_EQ_0
00316 BBXX000F  2685 +          CON AMP.PORT & SRCSEL
           2685 +  ELSE
           2685 +  ENDIF
           2685 +          ENDM
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - PWRUP DIAGS - UBI TEST

```
              2686    ;
00317 5XXXF8C1 2687              HA & SRCSTAT
00318 XXXXF380 2688              TSTNA PAR2.RDY      ;TEST FOR 1ST READ BIT
00319 BX23033E 2689              CJMP Z,UBIFT9                                   ;201
0031A BXD3031C 2690              CJMP SRCRDY,$+2     ;SRCRDY SHOULD STILL BE PRESENT
0031B BXF3033E 2691              JMP UBIFT9                                      ;201
              2692    ; 2ND READ
0031C XXXXDD7D 2693              INCR RD.DATA
0031D XXXX9CDD 2694              TORIR AND,RD.DATA
0031E XXXX0FFF 2695              IDAT H#0FFF         ;MASK RD.DATA REG
0031F 4XXXF8C1 2696              HA & RDATA          ;2ND READ                   ;201
00320 XXXX911D 2697              TORAY EXOR,RD.DATA  ;COMPARE
00321 BX230323 2698              CJMP Z,$+2
00322 BXF3033E 2699              JMP UBIFT9                                      ;201
00323 BXF108AE 2700              JSB CKSYSERR        ;CHECK FOR PARITY ERRORS    ;201
00324 BX73033B 2701              CJMP N,UBIFT8                                   ;201
              2702              SRC.AMP                                         ;201
              2702 +  IF BANK_EQ_0
00325 BBXX000F 2702 +            CON AMP.PORT & SRCSEL
              2702 +  ELSE
              2702 +  ENDIF
              2702 +            ENDM
              2703    ;
00326 5XXXF8C1 2704              HA & SRCSTAT
00327 XXXXF580 2705              TSTNA PAR3.RDY      ;CHECK FOR 2ND READ BIT IN STATUS
00328 BX23033E 2706              CJMP Z,UBIFT9
00329 BXD3032B 2707              CJMP SRCRDY,$+2     ;SRCRDY SHOULD STILL BE PRESENT
0032A BXF3033E 2708              JMP UBIFT9                                      ;201
              2709    ; 3RD READ
0032B XXXXDD7D 2710              INCR RD.DATA
0032C XXXX9CDD 2711              TORIR AND,RD.DATA
0032D XXXX0FFF 2712              IDAT H#0FFF         ;MASK READ REG
0032E 4XXXF8C1 2713              HA & RDATA          ;3RD READ                   ;201
0032F XXXX911D 2714              TORAY EXOR,RD.DATA  ;COMPARE
00330 BX230332 2715              CJMP Z,$+2
00331 BXF3033E 2716              JMP UBIFT9                                      ;201
00332 BXF108AE 2717              JSB CKSYSERR        ;CHECK FOR PARITY ERRORS    ;201
00333 BX73033B 2718              CJMP N,UBIFT8                                   ;201
              2719              SRC.AMP                                         ;201
              2719 +  IF BANK_EQ_0
00334 BBXX000F 2719 +            CON AMP.PORT & SRCSEL
              2719 +  ELSE
              2719 +  ENDIF
              2719 +            ENDM
              2720    ;
00335 XXXXF986 2721              LD2NA ENTAGS        ;LOOK FOR NO PARITY ERROR,  ;201
              2722              TODA EXOR,NRY       ; CORRECT 3RD READ STATUS, AND ENTAGS ;201
00336 5XXXE300 2723              / & SRCSTAT                                     ;201
00337 BX2302F4 2724              CJMP Z,UBIFT5       ;WRITE TO FIFO IF NO ERROR  ;201
00338 BXF3033E 2725              JMP UBIFT9                                      ;201
              2726    ;
              2727    ; TEST COMPLETE
              2728    ;
              2729    UBIFT6:   EQU $                                           ;201
00339 BXF10C0A 2730              JSB INITAMP         ;RE-INITIALIZE THE UBI      ;201
```

```
0033A XXFAXXXX 2731              RTN                                          ;201
               2732   ;
               2733   ; PARITY ERROR
               2734   ;
               2735   UBIFT8:   EQU $            ;PARITY ERROR                ;201
0033B BXF10C0A 2736              JSB INITAMP      ;RE-INITIALIZE THE UBI       ;201
0033C XXXXD8FF 2737              IR ERR.CD                                     ;201
0033D XXFA0003 2738              IDAT PUP.BUS & RTN                            ;201
               2739   ;
               2740   ; UBI TEST ERROR
               2741   ;
               2742   UBIFT9:   EQU $            ;U BUS INTERFACE TEST FAILED ;201
0033E BXF10C0A 2743              JSB INITAMP      ;RE-INITIALIZE THE UBI       ;201
0033F XXXXD8FF 2744              IR ERR.CD                                     ;201
00340 XXFA0008 2745              IDAT PUP.UBI & RTN                            ;201
               2746   ;
               2747              TITLE2 COLDSTART INITIALIZATION
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     COLDSTART INITIALIZATION

               2748                EJECT
               2749    ;
00380          2750                ALIGN H#40
               2751    ;
               2752    ; POWERUP DIAGNOSTICS HAVE RUN SUCCESSFULLY.
               2753    ; DO COLDSTART INITIALIZATION AND GO TO BANK 1/ONLINE CODE.
               2754    ; DO INITIALIZATION IN ORDER OF SHARED MEMORY, CACHE, THEN REGISTERS,
               2755    ; SO THAT ANYTHING USED IN INITIALIZATION ITSELF WILL BE CLEARED.
               2756    ;
               2757    COLDINIT:   EQU $
               2758                CLR.STK             ;CLEAR THE SEQUENCER STACK          ;201
               2758 +              DUP 9                                                   ;201
00380 BXFB0381 2758 +               POPJMP $+1
00381 BXFB0382 2758 +               POPJMP $+1
00382 BXFB0383 2758 +               POPJMP $+1
00383 BXFB0384 2758 +               POPJMP $+1
00384 BXFB0385 2758 +               POPJMP $+1
00385 BXFB0386 2758 +               POPJMP $+1
00386 BXFB0387 2758 +               POPJMP $+1
00387 BXFB0388 2758 +               POPJMP $+1
00388 BXFB0389 2758 +               POPJMP $+1
               2758 +               ENDM
               2759    ;
               2760    ; CLEAR SHARED MEMORY IN LOCAL NODE
               2761    ;
00389 XXXXD8EC 2762                 IR SHMADDR                                              ;201
0038A XXXX1800 2763                 IDAT H#1800
0038B XXXXD90B 2764                 ZR SHMDATA
0038C B8F407FF 2765                 CON H#7FF & PUSHLDCT
0038D BXF10B0D 2766                 JSB SHMWRT
0038E BX730110 2767                 CJMP N,PUPDIAGS                                         ;201
               2768                 INCR SHMADDR                                            ;201
0038F XXX8DD6C 2769                 / & RFCT                                                ;201
               2770    ;
               2771    ; GET OTHER CONTROLLER'S SHARED MEMORY COPIED TO OURS
               2772    ;
00390 BXF1039C 2773                 JSB WFUPDATE        ;WAIT FOR OTHER TO UPDATE OUR SHAREDMEM ;201
               2774    ;
               2775    ; CLEAR LOCAL MEMORY
               2776    ;
               2777                 ZA                                                     ;201
00391 12XXF901 2778                 / & ALU & WCAR
00392 B8F40FFF 2779                 CON H#FFF & PUSHLDCT;ADDRESS 000 TO FFF
               2780                 ZH
00393 13XXF900 2781                 / & WCACHE
               2782                 INCA
00394 12X8FC81 2783                 / & ALU & WCAR & RFCT
00395 BXF103F4 2784                 JSB SET.ID          ;INITIALIZE ID LOCATION             ;201
               2785    ;
               2786    ; CLEAR REGISTERS, SET SPECIAL REGISTERS
               2787    ;
00396 BXF103D4 2788                 JSB CLRREG          ;CLEAR REGISTERS                    ;201
               2789    ;
00397 XXXXD8F3 2790                 IR TRACEPTR         ;INITIALIZE THE TRACE BUFFER POINTER ;202
00398 XXXX0400 2791                 IDAT TRACEBEG                                           ;202
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     COLDSTART INITIALIZATION

               2792   ;
               2793   ; SEND OK MSG AND GO TO ONLINE CODE (BANK 1)
               2794   ;
00399 XXXXF901 2795             ZA              ;CODE OF 000 MEANS OK                ;201
0039A BXF10409 2796             JSB ISUMSG                                           ;201
0039B BXF30100 2797             JMP GOTO.ONL    ;SWITCH BACK TO MAIN ONLINE CODE     ;201
               2798   ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     COLDSTART INITIALIZATION

               2799              EJECT
               2800    ;
               2801    ; WAIT FOR SHARED MEMORY UPDATE
               2802    ;
               2803    ; There are two copies of shared memory, one for each controller.
               2804    ; Any write to one is copied to the other.  Since we are just
               2805    ; being powered up, our shared memory is not current.  We must
               2806    ; request the other controller to update our shared memory for
               2807    ; us, since we can't read the other controller's shared memory.
               2808    ;
               2809    ; The location DOUPDATE in shared memory is used to request that
               2810    ; shared memory be updated.  The controller being powered up,
               2811    ; (that's us), sends a request via this location.  The other
               2812    ; controller, if online, will see it, read and rewrite all of
               2813    ; shared memory, thus updating the powered up controller's (our)
               2814    ; shared memory, and then indicate via shared memory that the
               2815    ; update has completed, by setting DOUPDATE to zero.  While the
               2816    ; other controller is updating, DOUPDATE is set to hex F.
               2817    ;
               2818    WFUPDATE:   EQU $                                          ;201
               2819                CON SHMPORT         ;SELECT SHARED MEMORY      ;201
039C BBXX0003  2820                / & SRCSEL                                     ;201
               2821    IF SHMERRHW_EQ_1
               2822    ;
               2823    ; IF OTHER SIDE IS NOT POWERED UP, THEN THERE IS NOTHING TO UPDATE
               2824    ;
               2825                TSTND SHS.RPWR      ;REMOTE POWERED UP?        ;201
039D 5XXXEB90  2826                / & SRCSTAT                                    ;201
039E XX2AXXXX  2827                CRTN Z              ;NO - DONE                 ;201
               2828    ELSE
               2831    ENDIF
               2832    ;
               2833    ; READ "DOUPDATE" TO SEE IF OTHER SIDE IS STARTING DIAGNOSTICS.
               2834    ; WAIT 2MS FIRST TO INSURE THAT THE OTHER CTRLR HAS TIME TO SEE
               2835    ; THAT WE HAVE FINISHED DIAGNOSTICS, AND TO START ITS OWN.
               2836    ;
039F XXXXF8E1  2837                IA                  ;WAIT 2000US = 2MS.        ;201
03A0 XXXX07D0  2838                IDAT 2000                                      ;201
03A1 BXF10C26  2839                JSB DELAY                                      ;201
03A2 XXXXD8EC  2840                IR SHMADDR          ;READ DOUPDATE LOCATION    ;201
03A3 XXXX003F  2841                IDAT DOUPDATE                                  ;201
03A4 BXF10B80  2842                JSB SHMRD                                      ;201
03A5 XXXX950B  2843                TORIY EXOR,SHMDATA  ;AND CHECK FOR DIAGS CODE: HEX 3   ;201
03A6 XXXX0003  2844                IDAT H#3                                       ;201
03A7 BX2303D0  2845                CJMP Z,WFUPDAT9     ;IF SO, THEN NO NEED TO UPDATE     ;201
               2846    ;
               2847    ; WRITE REQUEST TO UPDATE IN "DOUPDATE", EITHER HEX A OR B, FOR WHO
               2848    ; WE WANT TO DO THE UPDATE.
               2849    ;
03A8 B2XX0000  2850                CON ID & WCAR       ;GET OUR ID, HEX A OR B    ;201
03A9 3XXXD8CB  2851                HR SHMDATA & RCACHE                            ;201
03AA XXXX9D0B  2852                TORJR EXOR,SHMDATA  ;FLIP LSB TO CHANGE A TO B, OR B TO A  ;201
03AB XXXX0001  2853                IDAT H#0001         ;TO GET ID OF OTHER SIDE   ;201
03AC XXXXD8EC  2854                IR SHMADDR          ;WRITE REQUESTED SIDE      ;201
03AD XXXX003F  2855                IDAT DOUPDATE       ;IN SHARED MEMORY LOCATION DOUPDATE    ;201
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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     COLDSTART INITIALIZATION

003AE BXF10B8D  2856              JSB SHMWRT                                          ;201
                2857    ;
                2858    ; WAIT FOR REQUEST TO COMPLETE, THE OTHER CONTROLLER TO REQUEST US TO
                2859    ; DO THE UPDATE, THE OTHER CONTROLLER TO LOSE POWER, OR FOR FIVE
                2860    ; SECONDS TO GO BY WITH NOTHING HAPPENING.
                2861    ;
003AF XXXXD80B  2862              RA SHMDATA          ;COPY REQUESTED ID              ;201
003B0 XXXXDC9C  2863              AR GD.DATA          ;INTO GD.DATA                   ;201
003B1 XXXXDB1D  2864              NIR RD.DATA         ;SET FLAG THAT F HAS NOT BEEN READ ;201
                2865    WFUPDAT1: EQU $                                               ;201
003B2 XXXXD8E9  2866              IR TIMEOUT          ;WAIT FOR 5000 X 1MS TOTAL      ;201
003B3 XXXX1388  2867              IDAT 5000                                           ;201
                2868    WFUPDAT2: EQU $                                               ;201
003B4 XXXXC1E9  2869              DECR TIMEOUT                                        ;201
003B5 BX2303D0  2870              CJMP Z,WFUPDAT9     ;TIMEOUT, OTHER SIDE HUNG, FORGET IT ;201
003B6 XXXXF8E1  2871              IA                  ;DELAY 1000US = 1MS             ;201
003B7 XXXX03E8  2872              IDAT 1000                                           ;201
003B8 BXF10C26  2873              JSB DELAY                                           ;201
                2874              CON SHMPORT         ;SELECT SHARED MEMORY           ;201
003B9 BBXX0003  2875              / & SRCSEL                                          ;201
                2876    IF SHMERRHW_EQ_1
                2877              TSTND SH5.RPWR      ;REMOTE LOST POWER?             ;201
003BA 5XXXEB90  2878              / & SRCSTAT                                         ;201
003BB BX2303D0  2879              CJMP Z,WFUPDAT9     ;YES - FORGET IT                ;201
                2880    ELSE
                2883    ENDIF
003BC BXF10B8B  2884              JSB SHMRD           ;READ DOUPDATE                  ;201
003BD BX730110  2885              CJMP N,PUPDIAGS                                     ;201
003BE 1XXXD84B  2886              RH SHMDATA                                          ;201
003BF XX2AXXXX  2887              CRTN Z              ;ZERO MEANS UPDATE COMPLETE     ;201
003C0 XXXXD80B  2888              RA SHMDATA          ;HAS THE REQUEST NOT CHANGED?   ;201
003C1 XXXX811C  2889              TORAA EXOR,GD.DATA  ;                               ;201
003C2 BX2303B4  2890              CJMP Z,WFUPDAT2     ;NO CHANGE, WAIT AND TRY AGAIN  ;201
003C3 XXXXE185  2891              DECA                ;IF DIFF IS 1, THEN OTHER SIDE  ;201
003C4 BX2303D0  2892              CJMP Z,WFUPDAT9     ;IS ALSO REQUESTING UPDATE,     ;201
003C5 XXXX950B  2893              TORIY EXOR,SHMDATA  ;OR IF HEX 3, THEN OTHER IS IN DIAGS, ;201
003C6 XXXX0003  2894              IDAT H#3            ;IN EITHER CASE, NOTHING TO UPDATE, ;201
003C7 BX2303D0  2895              CJMP Z,WFUPDAT9     ;SO WE ARE DONE                 ;201
003C8 XXXX950B  2896              TORIY EXOR,SHMDATA  ;IF HEX F, THEN UPDATE IN PROCESS ;201
003C9 XXXX000F  2897              IDAT H#F            ;BY THE OTHER SIDE              ;201
003CA BX2303CC  2898              CJMP Z,$+2                                          ;201
003CB BXF30110  2899              JMP PUPDIAGS        ;ANY OTHER VALUE, ERROR, RESTART DIAGS ;201
003CC 1XXXD85D  2900              RH RD.DATA          ;IF F READ BEFORE,              ;201
003CD BX2303B4  2901              CJMP Z,WFUPDAT2     ;JUST WAIT UNTIL UPDATE COMPLETE ;201
003CE XXXXD91D  2902              ZR RD.DATA          ;ELSE, SET NOTE F READ THE FIRST TIME ;201
003CF BXF303B2  2903              JMP WFUPDAT1        ;AND RESET 5 SECOND TIMER       ;201
                2904    WFUPDAT9: EQU $                                               ;201
003D0 XXXXD90B  2905              ZR SHMDATA          ;UPDATE NOT NEEDED OR IMPOSSIBLE ;201
003D1 BXF10B8D  2906              JSB SHMWRT          ;CLEAR ANY UPDATE REQUEST       ;201
003D2 BX730110  2907              CJMP N,PUPDIAGS                                     ;201
003D3 XXFAXXXX  2908              RTN                 ;AND RETURN                     ;201
                2909    ;
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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     COLDSTART INITIALIZATION

               2910                EJECT
               2911    ;
               2912    ; SUBROUTINE CLEAR REGISTERS
               2913    ;
               2914    CLRREG:     EQU $
003D4 XXXXD900 2915                ZR R0
003D5 XXXXD901 2916                ZR R1
003D6 XXXXD902 2917                ZR R2
003D7 XXXXD903 2918                ZR R3
003D8 XXXXD904 2919                ZR R4
003D9 XXXXD905 2920                ZR R5
003DA XXXXD906 2921                ZR R6
003DB XXXXD907 2922                ZR R7
003DC XXXXD908 2923                ZR R8
003DD XXXXD909 2924                ZR R9
003DE XXXXD90A 2925                ZR R10
003DF XXXXD90B 2926                ZR R11
003E0 XXXXD90C 2927                ZR R12
003E1 XXXXD90D 2928                ZR R13
003E2 XXXXD90E 2929                ZR R14
003E3 XXXXD90F 2930                ZR R15
003E4 XXXXD910 2931                ZR R16
003E5 XXXXD911 2932                ZR R17
003E6 XXXXD912 2933                ZR R18
003E7 XXXXD913 2934                ZR R19
003E8 XXXXD914 2935                ZR R20
003E9 XXXXD915 2936                ZR R21
003EA XXXXD916 2937                ZR R22
003EB XXXXD917 2938                ZR R23
003EC XXXXD918 2939                ZR R24
003ED XXXXD919 2940                ZR R25
003EE XXXXD91A 2941                ZR R26
003EF XXXXD91B 2942                ZR R27
003F0 XXXXD91C 2943                ZR R28
003F1 XXXXD91D 2944                ZR R29
003F2 XXXXD91E 2945                ZR R30
               2946                ZR R31                                    ;201
003F3 XXFAD91F 2947                / & RTN
               2948    ;
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 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    COLDSTART INITIALIZATION

           2949              EJECT
           2950    ;
           2951    ; SET ID
           2952    ;
           2953    ; THIS SUBROUTINE DETERMINES IF WE ARE THE SIDE A OR B CONTROLLER,
           2954    ; AND SETS LOCAL MEMORY LOCATION "ID"
           2955    ; WITH AN ID NUMBER FOR WHICH CONTROLLER THIS CODE IS RUNNING UNDER.
           2956    ; HEX A FOR SIDE A, HEX B FOR SIDE B.
           2957    ;
           2958    ; READ THE CDCI BOARD PORTS' STATUS FOR SWITCHES TO SEE WHAT WE ARE.
           2959    ; THE SWITCH SETTING FOR ALL CDCI BOARDS HAVE THE SIDE IN HEX,
           2960    ; EITHER "A" (1010), OR "B" (1011).
           2961    ; THE FIRST VALID INSTALLED CDCI PORT WILL DETERMINE SIDE.
           2962    ;
           2963    SET.ID:     EQU $                                              ;201
003F4 XXXXD8E4 2964            IR TEMP4           ;INIT CDCI PORT SCANNER         ;201
003F5 XXXX0001 2965            IDAT CDCP.A        ;TO FIRST CDCI PORT             ;1E
           2966    SET.ID1:    EQU $                                              ;201
003F6 BXF10C36 2967            JSB CKCDC          ;CHECK IF CDC IS INSTALLED      ;1E
003F7 BX7303FD 2968            CJMP N,SET.ID2     ;                               ;201
           2969    ; INSTALLED, ARE WE A OR B?
003F8 5XXXF8C1 2970            MA & SRCSTAT       ;READ THE CDC STATUS            ;1E
003F9 XXXXE4C0 2971            TOAI AND,NRY       ;TO GET THE LSBIT SWITCH SETTING ;201
003FA XXXX0100 2972            IDAT H#0100        ;                               ;1E
003FB BX230402 2973            CJMP Z,SET.IDA     ;IF ZERO, WE'RE SIDE A          ;201
003FC BXF30405 2974            JMP SET.IDB        ;ELSE, WE'RE SIDE B             ;201
           2975    ; NOT INSTALLED, CHECK NEXT
           2976    SET.ID2:    EQU $                                              ;201
003FD XXXX9504 2977            TORIY EXOR,TEMP4   ;DID WE CHECK ALL PORTS?        ;1E
003FE XXXX0008 2978            IDAT CDCP.D        ;                               ;1E
003FF BX230402 2979            CJMP Z,SET.IDA     ;IF SO, NO PORTS INSTALLED, FORGET IT ;201
00400 XXXX83E4 2980            RTRR 1,TEMP4       ;ROTATE UP TO NEXT CDCI PORT TO CHECK ;1E
00401 BXF303F6 2981            JMP SET.ID1        ;AND TRY AGAIN                  ;201
           2982    SET.IDA:    EQU $                                              ;201
00402 XXXXF8E1 2983            IA                 ;SET ID OF HEX A                ;201
00403 XXXX000A 2984            IDAT H#A           ;                               ;201
00404 BXF30407 2985            JMP SET.ID3        ;                               ;201
           2986    SET.IDB:    EQU $                                              ;201
00405 XXXXF8E1 2987            IA                 ;SET ID OF HEX A                ;201
00406 XXXX000B 2988            IDAT H#B           ;                               ;201
           2989    SET.ID3:    EQU $                                              ;201
00407 B2XX0000 2990            CON ID & WCAR      ;WRITE ID TO LOCATION ID        ;201
           2991                AH & WCACHE        ;                               ;201
00408 13FAF880 2992            / & RTN                                            ;201
           2993    ;
           2994            TITLE2 DIAGNOSTICS - ISSUE MSG TO XMC
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 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     DIAGNOSTICS - ISSUE MSG TO XMC

           2995              EJECT
           2996    ;
           2997    ; DIAG MESSAGE ISSUE
           2998    ;
           2999    ; Subroutine to indicate results of the powerup diagnostics or
           3000    ; an offline diagnostic test.  It issues a NOOP function to the
           3001    ; XMC, with wordlengh field, which is normally undefined,
           3002    ; having the error status.  This will be visible on the OCP as
           3003    ; the last function received, at thumbwheel 4D0.  Also, the XMC
           3004    ; is expected to issue an appropriate message to the OCP in
           3005    ; response to NOOP functions, such as "TEST. CODE=xxx".
           3006    ;
           3007    ; Special message codes, in hex, and their meanings:
           3008    ;
           3009    ; 000..... Coldstart initialization complete, going online
           3010    ; 020..... Powerup diagnostic complete
           3011    ; 02x..... Powerup diagnostic error number "x"
           3012    ; FFA..... Offline diagnostic test complete
           3013    ; FF9..... Offline diagnostics terminated
           3014    ; xxx (else)... Offline diagnostic error number "xxx"
           3015    ;
           3016    ISUMSG:     EQU $                                              ;201
00409 XXXXD898 3017             AR AMPWLEN          ;CODE GOES INTO LOWER 12 BITS: AMPWLEN  ;201
0040A XXXXD8F7 3018             IR AMPCMD           ;USE XMC NOOP FUNCTION         ;201
0040B XXXX0003 3019             IDAT AF.NOOP                                       ;201
0040C XXXXD916 3020             ZR AMPUNIT          ;IGNORE UNIT                   ;201
0040D XXXXD91A 3021             ZR CURUNIT          ;                              ;201
           3022    ISUMSG1:    EQU $                                              ;20303
0040E BXF10AED 3023             JSB ISUCMDX         ;ISSUE NOOP TO XMC             ;201
0040F XXXXDB09 3024             NIR TIMEOUT                                        ;20304
           3025    ISUMSG2:    EQU $                                              ;20303
00410 XXXXC1E9 3026             DECR TIMEOUT        ;WAIT FOR EI BACK              ;20307
00411 BX230416 3027             CJMP Z,ISUMSG9      ;TIMEOUT WAITING?              ;20307
           3028                 TSTND ST.BK2                                       ;201
00412 5XXXE390 3029             / & SRCSTAT                                        ;201
00413 BX230410 3030             CJMP Z,ISUMSG2                                     ;20307
           3031    ISUMSG3:    EQU $                                              ;20303
00414 BXF10A80 3032             JSB CKAMPSTX        ;PROCESS EI                    ;201
00415 XXFAXXXX 3033             RTN                 ;DONE                          ;201
           3034    ISUMSG9:    EQU $                                              ;20304
00416 BXF10C0A 3035             JSB INITAMP         ;RE-INIT AMP                   ;20304
00417 BXF3040E 3036             JMP ISUMSG1         ;RE-ISSUE MSG                  ;20304
           3037    ;
           3038                TITLE2 OFFLINE DIAGNOSTICS - DIAGNOSTIC FUNCTIONS
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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGNOSTICS - DIAGNOSTIC FUNCTIONS

               3039                EJECT
               3040    ;
00440          3041                ALIGN H#40
               3042    ;
               3043    ; START OF OFFLINE DIAGNOSTIC PROCESSING
               3044    ;
               3045    ; Called from CKAMPST in bank 1 when it receives an E1 with a
               3046    ; recovery action of "F".  Low order bits, in TEMP3, hold the
               3047    ; three digit hex number typed in at OCP.  This is the offline
               3048    ; diagnostic test to run.
               3049    ;
               3050    OD.INIT:    EQU $
00440 B2XX0022 3051                CON OCPNEW & WCAR   ;STORE DIAG FUNCTION IN OCPNEW          ;201
00441 13XXD843 3052                RH TEMP3 & WCACHE                                           ;201
               3053    OD.START:   EQU $
               3054                CLR.STK                                                     ;201
               3054 +              DUP 9                                                       ;201
00442 BXFB0443 3054 +              POPJMP $+1
00443 BXFB0444 3054 +              POPJMP $+1
00444 BXFB0445 3054 +              POPJMP $+1
00445 BXFB0446 3054 +              POPJMP $+1
00446 BXFB0447 3054 +              POPJMP $+1
00447 BXFB0448 3054 +              POPJMP $+1
00448 BXFB0449 3054 +              POPJMP $+1
00449 BXFB044A 3054 +              POPJMP $+1
0044A BXFB044B 3054 +              POPJMP $+1
               3054 +              ENDM
0044B B2XX0022 3055                CON OCPNEW & WCAR   ;COPY NEW DIAG FUNCTION IN OCPNEW       ;201
0044C 3XXXD8D4 3056                HR CDCFNC & RCACHE  ;TO CDCFNC REG AND OCPFNC MEM ADDR      ;201
0044D 13XXFB00 3057                NIH & WCACHE        ;THEN SET OCPNEW TO -1                  ;201
0044E B2XX0021 3058                CON OCPFNC & WCAR                                           ;201
0044F 13XXD854 3059                RH CDCFNC & WCACHE                                          ;201
               3060    ; DETERMINE DIAG FUNCTION
00450 XXXX9514 3061                TORIY EXOR,CDCFNC                                           ;201
00451 XXXX0FFF 3062                IDAT H#0FFF         ;FFF = TERMINATE
00452 BX23047E 3063                CJMP Z,OD.TERM
00453 XXXXD91F 3064                ZR ERR.CD
00454 XXXX84D4 3065                TORIA AND,CDCFNC
00455 XXXX001F 3066                IDAT H#01F          ;FOR OTHERS, DRIVE NUMBER IS IN LSBS
               3067                CON C.UNIT
00456 B2XX0024 3068                / & WCAR
00457 13XXF800 3069                AH & WCACHE                                                 ;201
00458 XXXX9CD4 3070                TORIR AND,CDCFNC
00459 XXXX0FE0 3071                IDAT H#0FE0
0045A XXXX9514 3072                TORIY EXOR,CDCFNC
0045B XXXX04E0 3073                IDAT H#4E0          ;4EX = WRITE MFG DATA
0045C BX230482 3074                CJMP Z,OD.MFG                                               ;201
0045D XXXX9514 3075                TORIY EXOR,CDCFNC
0045E XXXX02E0 3076                IDAT H#2E0          ;2EX = READ TEST
0045F BX230500 3077                CJMP Z,OD.READ                                              ;201
00460 XXXX84D4 3078                TORIA AND,CDCFNC    ;ISOLATE FIRST DIGIT                    ;201
00461 XXXX0F00 3079                IDAT H#F00                                                  ;201
00462 XXXXE500 3080                TOAI EXOR,NRY                                               ;201
00463 XXXX0800 3081                IDAT H#800          ;8XX = SHARED MEMORY WRITE TEST         ;201
00464 BX230597 3082                CJMP Z,OD.SHWRT                                             ;201
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 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGNOSTICS - DIAGNOSTIC FUNCTIONS

00465 XXXXE500  3083              TOAI EXOR,NRY                                          ;201
00466 XXXX0900  3084              IDAT H#900          ;9XX = SHARED MEMORY READ TEST     ;201
00467 BX2305A5  3085              CJMP Z,OD.SHRD                                         ;201
                3086    ; TEST FOR X2X CODES: LARGE SECTOR
00468 XXXXEBF4  3087              TSTNR BIT5,CDCFNC
00469 BX23046D  3088              CJMP Z,OD.STAR1                                        ;201
0046A XXXXD8EA  3089              IR WRDCNT
0046B XXXX0157  3090              IDAT LSWRDMAX                                          ;18
0046C BXF3046F  3091              JMP $+3
                3092    OD.STAR1: EQU $                                                  ;201
0046D XXXXD8EA  3093              IR WRDCNT
0046E XXXX0141  3094              IDAT SSWRDMAX                                          ;18
                3095    ;
0046F XXXXEBD4  3096              RSTNR BIT5,CDCFNC
00470 XXXX9514  3097              TORIY EXOR,CDCFNC
00471 XXXX0300  3098              IDAT H#0300         ;30X,32X = WRT,RD,COMPARE, SHORT IOS
00472 BX2304EB  3099              CJMP Z,OD.WRCS                                         ;201
00473 XXXX9514  3100              TORIY EXOR,CDCFNC
00474 XXXX0400  3101              IDAT H#0400         ;40X,42X = WRT,RD,COMPARE, LONG IOS
00475 BX2304ED  3102              CJMP Z,OD.WRCL                                         ;201
00476 XXXX9514  3103              TORIY EXOR,CDCFNC
00477 XXXX0500  3104              IDAT H#0500         ;50X,52X = WRT,RD,COMPARE, WORST CASE
00478 BX23051F  3105              CJMP Z,OD.WRST                                         ;201
00479 BXF30610  3106              JMP OD.ERRID        ;ILLEGAL CODE, TERMINATE AND RESET ;201
                3107    ;
```

```
                3108                EJECT
                3109                TITLE2 OFFLINE DIAGS - EXIT ROUTINES
                3110    ;
                3111    ; OFFLINE DIAG TEST COMPLETE
                3112    ;
                3113    OD.CMPL:    EQU $                                                   ;201
0047A XXXXF8E1  3114                IA                  ;SEND COMPLETE CODE FFA             ;201
0047B XXXX0FFA  3115                IDAT H#FFA                                              ;201
0047C BXF10409  3116                JSB ISUMSG                                              ;201
0047D BXF30633  3117                JMP OD.IDLE         ;GOTO DIAG IDLE, WAIT FOR ANOTHER FUNC  ;201
                3118    ;
                3119    ; OFFLINE DIAG TESTING TERMINATED
                3120    ;
                3121    OD.TERM:    EQU $
0047E XXXXF8E1  3122                IA                  ;SEND TERMINATION CODE FF9          ;201
0047F XXXX0FF9  3123                IDAT H#FF9                                              ;201
00480 BXF10409  3124                JSB ISUMSG                                              ;201
00481 BXF30633  3125                JMP OD.IDLE         ;GOTO DIAG IDLE, WAIT FOR ANOTHER FUNC  ;203
                3126    ;
                3127                TITLE2 OFFLINE DIAGS - WRITE MFG DATA
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 Addr      Line - AMPERIF 7155/805 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGS - WRITE MFG DATA

           3128              EJECT
           3129    ;
           3130    ; OFFLINE DIAG - WRITE MANFUFACTURING DATA.
           3131    ;
           3132    ; WRITE INFORMATION THAT DUPLICATES 885'S MANUFACTORY DATA
           3133    ; AT THE PROPER LOCATION ON THE UNIT IN MEM LOC C.UNIT.
           3134    ;
           3135    ; THIS DOES NOT USE SHARED MEMORY.
           3136    ;
           3137    OD.MFG:     EQU $
00482 XXXXF1D9 3138            RSTMR F.LNGRW,FLAGS ;SELECT WRTBUFFX TO WRITE 1 CDC SECTOR
00483 XXXXD8EA 3139            IR WRDCNT           ;SELECT SMALL SECTOR MODE
00484 XXXX0141 3140            IDAT SSWRDMAX                                       ;18
           3141                CON CDC.CYL
00485 B2XX000A 3142            / & WCAR
00486 XXXXF8E0 3143            IH
           3144                IDAT CYLMAX-1
00487 13XX0349 3145            / & ALU & WCACHE    ;SET CDC CYLINDER TO 841
           3146                CON CDC.TK          ;TRACK TO 0
00488 B2XX000D 3147            / & WCAR
00489 13XXF900 3148            ZH & WCACHE
           3149                CON CDC.SEC         ;SECTOR TO 0
0048A B2XX000C 3150            / & WCAR
0048B 13XXF900 3151            ZH & WCACHE
           3152    ;
0048C BXF1070C 3153    OD.MFG1:    JSB CLRBUFF         ;CLEAR THE WRITE BUFFER
0048D BXF10713 3154                JSB WRTBUFFX
0048E BXF10A44 3155                JSB INCSECTX        ;INCREMENT SECTOR
           3156                CON CDC.SEC
0048F B2XX000C 3157            / & WCAR
00490 3XXXF8C1 3158            HA & RCACHE         ;CHECK FOR SECTOR 13 HEX (19)
00491 XXXXE500 3159            TOAI EXOR,NRY
00492 XXXX0013 3160            IDAT 19
00493 BX230495 3161            CJMP Z,$+2
00494 BXF3048C 3162            JMP OD.MFG1         ;LOOP UNTIL SEC 19 IS REACHED
00495 BXF1078F 3163    OD.MFG2:    JSB RDBUFX          ;READ AND CHECKSUM GARBAGE
00496 BXF106FF 3164                JSB MOVEBUF         ;MOVE READ BUFFER TO WRITE BUFFER
00497 BXF10713 3165                JSB WRTBUFFX        ;REWRITE IT
00498 BXF10A44 3166                JSB INCSECTX
           3167                CON CDC.TK          ;IF TRACK = 2 GO WRITE NEW DATA
00499 B2XX000B 3168            / & WCAR
0049A 3XXXF8C1 3169            HA & RCACHE
0049B XXXXE500 3170            TOAI EXOR,NRY
0049C XXXX0002 3171            IDAT 2
0049D BX2304A2 3172            CJMP Z,OD.MFG3
           3173                CON CDC.SEC         ;IF SECTOR = ZERO GO TO CLR BUFFER
0049E B2XX000C 3174            / & WCAR
0049F 3XXXF8C1 3175            HA & RCACHE
004A0 BX23048C 3176            CJMP Z,OD.MFG1
004A1 BXF30495 3177            JMP OD.MFG2         ;IF NOT DO NEXT
           3178    ;
004A2 BXF104E3 3179    OD.MFG3:    JSB SETUTIL1
           3180                CON CDC.TK                                          ;201
004A3 B2XX000B 3181            / & WCAR                                            ;201
           3182                ZH
```

```
 Addr     Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -  OFFLINE DIAGS - WRITE MFG DATA

004A4 13XXF980  3183            / & WCACHE          ;SET TRACK TO 0
              3184              CON CDC.SEC                                       ;201
004A5 B2XX000C  3185            / & WCAR                                          ;201
              3186              CON 1                                             ;201
004A6 B3XX0001  3187            / & WCACHE          ;SET SECTOR TO 1              ;201
004A7 BXF10713  3188            JSB WRTBUFFX        ;WRITE BUFFER TO CYL 841 TK 0 SECT 1
              3189              CON CDC.TK
004A8 B2XX000B  3190            / & WCAR
004A9 3XXXF8C1  3191            HA & RCACHE
004AA 13XXFC81  3192            INCA & ALU & WCACHE ;SET TRACK TO 1
004AB BXF10713  3193            JSB WRTBUFFX        ;WRITE BUFFER TO CYL 841 TK 1 SECT 1
004AC BXF104E6  3194            JSB SETUTIL2
              3195              CON CDC.TK                                        ;201
004AD B2XX000B  3196            / & WCAR            ;SET TK TO 0                  ;201
004AE 13XXF980  3197            ZH & WCACHE
              3198              CON CDC.SEC                                       ;201
004AF B2XX000C  3199            / & WCAR                                          ;201
              3200              CON 2               ;SET SECT TO 2                ;201
004B0 B3XX0002  3201            / & WCACHE                                        ;201
004B1 BXF10713  3202            JSB WRTBUFFX        ;WRITE BUFFER TO CYL 841 TK 0 SECT 2
              3203              CON CDC.TK          ;TRACK TO 1
004B2 B2XX000B  3204            / & WCAR
004B3 3XXXF8C1  3205            HA & RCACHE
004B4 13XXFC81  3206            INCA & ALU & WCACHE
004B5 BXF10713  3207            JSB WRTBUFFX        ;WRITE BUFFER TO CYL 841 TK 1 SECT 2
004B6 BXF1070C  3208            JSB CLRBUFF
004B7 B2XX0000  3209            CON ID & WCAR       ;SHOW SIDE, A OR B, BY WRITING 0 OR 1  ;201
004B8 3XXXF8C1  3210            HA & RCACHE         ;LS BIT OF ID NUMBER          ;201
004B9 XXXXE4C1  3211            TOAI AND,NRA        ;IS ONE FOR B, ZERO FOR A     ;201
004BA XXXX0001  3212            IDAT H#01           ;                             ;201
004BB XXXXE541  3213            TOAI OR,NRA
004BC XXXX0900  3214            IDAT H#0900
004BD XXXXD8E0  3215            LR TEMP0
004BE 12XX003B  3216            IDAT BUF0ADR & ALU & WCAR
004BF 13XXF880  3217            AH & WCACHE
              3218              CON C.UNIT
004C0 B2XX0024  3219            / & WCAR
004C1 3XXXF8C1  3220            HA & RCACHE
004C2 XXXXE440  3221            TOAI SUBS,NRY                                     ;201
004C3 XXXX000A  3222            IDAT 10
004C4 BX5304C6  3223            CJMP C,$+2
004C5 BXF304CA  3224            JMP OD.MFG4
004C6 XXXXE441  3225            TOAI SUBS,NRA
004C7 XXXX000A  3226            IDAT 10
004C8 XXXXE541  3227            TOAI OR,NRA
004C9 XXXX0010  3228            IDAT H#010
004CA XXXXE541  3229  OD.MFG4: TOAI OR,NRA
004CB XXXX0900  3230            IDAT H#0900
004CC 12XXDD60  3231            INCR TEMP0 & ALU & WCAR
004CD 13XXF880  3232            AH & WCACHE
004CE 12XXDD60  3233            INCR TEMP0 & ALU & WCAR
004CF XXXXF8E0  3234            IH
004D0 13XX0240  3235            IDAT H#0240 & ALU & WCACHE
004D1 12XXDD60  3236            INCR TEMP0 & ALU & WCAR
004D2 XXXXF8E0  3237            IH
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - WRITE MFG DATA

```
004D3 13XX0C86  3238            )DAT H#0C86 & ALU & WCACHE
004D4 XXXXF8E1  3239            IA
                3240            CON CDC.TK
004D5 B2XX000B  3241            / & WCAR          ;SET TRACK TO 0                    ;201
004D6 13XXF900  3242            ZH & WCACHE
                3243            CON CDC.SEC
004D7 B2XX000C  3244            / & WCAR          ;SET SECT TO 0                     ;201
004D8 13XXF900  3245            ZH & WCACHE
004D9 BXF10713  3246            JSB WRTBUFFX      ;WRITE BUFFER TO CYL 841 TK 0 SECT 0
                3247            CON CDC.TK
004DA B2XX000B  3248            / & WCAR
004DB 3XXXF8C1  3249            HA & RCACHE
004DC 13XXFC81  3250            INCA & ALU & WCACHE
004DD BXF10713  3251            JSB WRTBUFFX      ;WRITE BUFFER TO CYL 841 TK 1 SECT 0
                3252            CON ERRCODE       ;CLEAR CYL, TK, SECT, AND CHECKSUM ERROR
004DE B2XX0023  3253            / & WCAR
004DF 3XXXF8C1  3254            HA & RCACHE
004E0 XXXXE4C0  3255            TOAI AND,NRY
004E1 13XX01FF  3256            IDAT H#01FF & ALU & WCACHE
004E2 BXF3047A  3257            JMP OD.CMPL       ;SEND COMPLETE CODE                ;201
                3258    ;
                3259    SETUTIL1:  EQU $          ;DEFAULT FACTORY TRACK FLAW MAP
004E3 BXF1070C  3260            JSB CLRBUFF
                3261            CON BUF0ADR
004E4 B2XX003B  3262            / & WCAR
                3263            CON H#0B49                                           ;201
                3264            / & WCACHE                                           ;201
004E5 B3FA0B49  3265            / & RTN                                              ;201
                3266    ;
                3267    SETUTIL2:  EQU $          ;FACTORY DEFECTIVE SECTORS MAP
004E6 BXF1070C  3268            JSB CLRBUFF
                3269            CON BUF0ADR
004E7 B2XX003B  3270            / & WCAR
                3271            CON H#0B49                                           ;201
004E8 B3XX0849  3272            / & WCACHE                                           ;201
                3273            CON BUF0ADR+1
004E9 B2XX003C  3274            / & WCAR
                3275            CON H#0040                                           ;201
                3276            / & WCACHE                                           ;201
004EA B3FA0040  3277            / & RTN                                              ;201
                3278    ;
                3279            TITLE2 OFFLINE DIAGS - WRITE/READ/COMPARE
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - WRITE/READ/COMPARE

               3280              EJECT
               3281    ;
               3282    ; OFFLINE DIAG - WRITE, READ AND COMPARE TEST
               3283    ;
               3284    ; WRITES A DATA PATTERN, READS IT BACK, AND COMPARES.
               3285    ;
               3286    OD.WRCS:    EQU $               ;WRT/RD/CMP, SHORT IO'S                ;201
004EB XXXXF1D9 3287                RSTNR F.LNGRW,FLAGS                                        ;201
004EC BXF304EF 3288                JMP OD.WRC
               3289    OD.WRCL:    EQU $               ;WRT/RD/CMP, LONG IO'S                 ;201
004ED XXXXF1B9 3290                SETNR F.LNGRW,FLAGS                                        ;201
004EE BXF304EF 3291                JMP OD.WRC
               3292    ;
               3293    OD.WRC:     EQU $                                                      ;201
004EF BXF10668 3294                JSB INITUNIT
004F0 XXXXE3D9 3295                SETNR F.RWAPAT,FLAGS                                       ;201
004F1 BXF1094A 3296    OD.WRC1:    JSB PTRNGEN         ;GENERATE PATTERN IN BUFFER
004F2 BXF106D4 3297                JSB RANDSEEK
004F3 BXF10713 3298                JSB WRTBUFFX        ;WRITE BUFFER
004F4 BXF106D4 3299                JSB RANDSEEK
004F5 BXF1078F 3300                JSB RDBUFX
004F6 BXF10930 3301                JSB CMPBUF          ;COMPARE THE WRITE AND READ BUFFERS
004F7 BXF10671 3302                JSB CKERROR         ;CHECK FOR ERRORS
004F8 BXF10A44 3303                JSB INCSECTX        ;INCREMENT SECTOR
004F9 BXF10676 3304                JSB CK.TERM
004FA BXF1067D 3305                JSB NODEND          ;CHECK FOR END OF STORAGE MODULE
004FB BX2304FD 3306                CJMP Z,$+2          ;                                      ;201
004FC BXF304F1 3307                JMP OD.WRC1
               3308    ; CONTINUE TESTS AT RANDOM LOCATIONS
               3309    OD.WRC2:    EQU $
004FD BXF106F5 3310                JSB RANDADDR        ;GET A CDC RANDOM ADDRESS
004FE BXF106D4 3311                JSB RANDSEEK        ;ISSUE A SEEK TO AMPERIF
004FF BXF10713 3312                JSB WRTBUFFX        ;DO A RANDOM WRITE
00500 BXF106F5 3313                JSB RANDADDR        ;GET A NEW RANDOM ADDRESS
00501 BXF106D4 3314                JSB RANDSEEK        ;ISSUE A SEEK TO AMPERIF
00502 BXF1094A 3315                JSB PTRNGEN         ;GENERATE THE PATTERN FOR THIS ADDRESS
00503 BXF1078F 3316                JSB RDBUFX          ;READ AND COMPARE TO BUFFER
00504 BXF10930 3317                JSB CMPBUF
00505 BXF10671 3318                JSB CKERROR         ;CHECK FOR ERRORS STOP ON ERROR ELSE RETURN
00506 BXF10676 3319                JSB CK.TERM
00507 BXF304FD 3320                JMP OD.WRC2         ;LOOP FOREVER UNTIL ERRORS OCCUR
               3321    ;
               3322                TITLE2 OFFLINE DIAGS - READ TEST
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - READ TEST

               3323              EJECT
               3324    ;
               3325    ; OFFLINE DIAG - READ TEST
               3326    ;
               3327    ; READ DISK, CHECKING POSITION AND CHECKSUM DATA.
               3328    ;
               3329    ; RUNS IN LARGE SECTOR MODE SINCE THAT WILL WORK
               3330    ; FOR BOTH LARGE AND NORMAL SECTOR DATA.
               3331    ;
               3332    OD.READ:    EQU $
00508 BXF10668 3333              JSB INITUNIT
00509 XXXXD8EA 3334              IR WRDCNT
0050A XXXX0157 3335              IDAT LSWRDMAX                                  ;18
00508 XXXXF1D9 3336              RSTMR F.LNGRW,FLAGS                            ;201
0050C XXXXF8E1 3337    OD.RD1:   IA
0050D XXXX0233 3338              IDAT HSSECCNT-1
0050E XXXXD892 3339              AR RDSECLN
0050F XXXXD88E 3340              AR TEMPLNG
00510 BXF1089D 3341              JSB RDBUFY
00511 BXF10A44 3342              JSB INCSECTX
00512 B2XX000A 3343              CON CDC.CYL & WCAR
00513 3XXXF8C1 3344              HA & RCACHE
00514 XXXXE500 3345              TOA1 EXOR,NKY
00515 XXXX0349 3346              IDAT CYLMAX-1                                  ;20301
00516 BX23051C 3347              CJMP Z,OD.RD2
00517 XXXXF8E1 3348              IA                ;DELAY
00518 XXXX0080 3349              IDAT H#80
00519 BXF10C26 3350              JSB DELAY
0051A BXF10676 3351              JSB CK.TERM
0051B BXF3050C 3352              JMP OD.RD1
0051C B2XX0023 3353    OD.RD2:   CON ERRCODE & WCAR
0051D 13XXD91F 3354              ZR ERR.CD & ALU & WCACHE
0051E BXF3047A 3355              JMP OD.CMPL       ;SEND COMPLETE CODE          ;201
               3356    ;
               3357              TITLE2 OFFLINE DIAGS - WORST CASE TEST
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGS - WORST CASE TEST

           3358              EJECT
           3359   ;
           3360   ; OFFLINE DIAG - WORST CASE TEST
           3361   ;
           3362   ; WRITES A DATA PATTERN, READS IT BACK, AND COMPARES.
           3363   ; DOES SEQUENTIAL WRT/RD/CMP AT VARIOUS TRUNCATION LENGTHS,
           3364   ; THEN RANDOM LOCATION WRT/RD/CMP WITH RANDOM TRUNCATION LENGTHS.
           3365   ;
           3366   OD.WRST:    EQU $
           3367   ; TRUCTATION LENGTH OF 500
0051F BXF10668 3368              JSB INITUNIT
00520 XXXXF1B9 3369              SETNR F.LNGRW,FLAGS                                    ;201
00521 XXXXE3B9 3370              SETNR F.RWAPAT,FLAGS                                   ;201
00522 XXXXE5D9 3371              RSTNR F.SAVPAT,FLAGS                                   ;201
00523 XXXXF8E1 3372   OD.WRST1:  IA
00524 XXXX01F4 3373              IDAT 500
00525 XXXXD891 3374              AR WRTSECLN         ;STORE IN WRITE SECTOR LENGTH
00526 XXXXD892 3375              AR RDSECLN          ;STORE IN READ SECTOR LENGTH
00527 XXXXD88E 3376              AR TEMPLNG          ;STORE IN COUNTER
00528 BXF10650 3377              JSB SAVE.OLD        ;SAVE CURRENT CDC CYL, TK, AND SECT.
00529 BXF106D4 3378              JSB RANDSEEK
0052A BXF10822 3379              JSB WRTBUFFY        ;WRITE DATA
0052B XXXXD812 3380              RA RDSECLN          ;RESET SECTOR LENGTH TO READ
0052C XXXXD88E 3381              AR TEMPLNG
0052D BXF1065C 3382              JSB GET.OLD         ;RESET CDC CYL, TK, AND SECT
0052E BXF106D4 3383              JSB RANDSEEK
0052F BXF1089D 3384              JSB RDBUFY
00530 BXF10A44 3385              JSB INCSECTX        ;INCREMENT SECTOR
00531 BXF10676 3386              JSB CK.TERM
00532 BXF10681 3387              JSB MODEND1         ;CHECK FOR END OF STORAGE MODULE
00533 BX230535 3388              CJMP Z,$+2
00534 BXF30523 3389              JMP OD.WRST1
           3390   ; TRUCTATION LENGTH OF 375
00535 BXF10668 3391              JSB INITUNIT
00536 XXXXE3D9 3392              RSTNR F.RWAPAT,FLAGS                                   ;201
00537 BXF1094A 3393              JSB PTRNGEN
00538 XXXXE5B9 3394              SETNR F.SAVPAT,FLAGS                                   ;201
00539 XXXXF8E1 3395   OD.WRST3:  IA
0053A XXXX0177 3396              IDAT 375
0053B XXXXD891 3397              AR WRTSECLN         ;STORE IN WRITE SECTOR LENGTH
0053C XXXXD892 3398              AR RDSECLN          ;STORE IN READ SECTOR LENGTH
0053D XXXXD88E 3399              AR TEMPLNG          ;STORE IN COUNTER
0053E BXF10650 3400              JSB SAVE.OLD        ;SAVE CURRENT CDC CYL, TK, AND SECT.
0053F BXF106D4 3401              JSB RANDSEEK
00540 BXF10822 3402              JSB WRTBUFFY        ;WRITE DATA
00541 XXXXD812 3403              RA RDSECLN          ;RESET SECTOR LENGTH TO READ
00542 XXXXD88E 3404              AR TEMPLNG
00543 BXF1065C 3405              JSB GET.OLD         ;RESET CDC CYL, TK, AND SECT
00544 BXF106D4 3406              JSB RANDSEEK
00545 BXF1089D 3407              JSB RDBUFY
00546 BXF10A44 3408              JSB INCSECTX        ;INCREMENT SECTOR
00547 BXF10676 3409              JSB CK.TERM
00548 BXF10681 3410              JSB MODEND1         ;CHECK FOR END OF STORAGE MODULE
00549 BX23054B 3411              CJMP Z,$+2
0054A BXF30539 3412              JMP OD.WRST3
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - WORST CASE TEST

               3413    ; TRUCTATION LENGTH OF 125
0054B BXF10668 3414              JSB INITUNIT
0054C XXXXF8E1 3415    OD.WRST5: IA
0054D XXXX007D 3416              IDAT 125           ;SETLENGTH TO 125
0054E XXXXD891 3417              AR WRTSECLN        ;STORE IN WRITE SECTOR LENGTH
0054F XXXXD892 3418              AR RDSECLN         ;STORE IN READ SECTOR LENGTH
00550 XXXXD88E 3419              AR TEMPLNG         ;STORE IN COUNTER
00551 BXF10650 3420              JSB SAVE.OLD       ;SAVE CURRENT CDC CYL, TK, AND SECT.
00552 BXF106D4 3421              JSB RANDSEEK
00553 BXF10822 3422              JSB WRTBUFFY       ;WRITE DATA
00554 XXXXD812 3423              RA RDSECLN         ;RESET SECTOR LENGTH TO READ
00555 XXXXD88E 3424              AR TEMPLNG
00556 BXF1065C 3425              JSB GET.OLD        ;RESET CDC CYL, TK, AND SECT
00557 BXF106D4 3426              JSB RANDSEEK
00558 BXF1089D 3427              JSB RDBUFY
00559 BXF10A44 3428              JSB INCSECTX
0055A BXF10650 3429              JSB SAVE.OLD
0055B XXXXD812 3430              RA RDSECLN
0055C XXXXD88E 3431              AR TEMPLNG
0055D BXF1089D 3432              JSB RDBUFY
0055E BXF1065C 3433              JSB GET.OLD
0055F BXF10676 3434              JSB CK.TERM
00560 BXF10681 3435              JSB MODEND1        ;CHECK FOR END OF STORAGE MODULE
00561 BX230563 3436              CJMP Z,$+2
00562 BXF3054C 3437              JMP OD.WRST5
               3438    ; RANDOM LOCATION, RANDOM LENGTH
00563 BXF10668 3439              JSB INITUNIT
00564 BXF106A7 3440    OD.WRST7: JSB RAND.LNG       ;GET A RANDOM NUMBER BETWEEN 1-233 HEX
00565 XXXXD891 3441              AR WRTSECLN        ;STORE IN WRITE SECTOR LENGTH
00566 XXXXD892 3442              AR RDSECLN         ;STORE IN READ SECTOR LENGTH
00567 XXXXD88E 3443              AR TEMPLNG         ;STORE IN COUNTER
00568 BXF10650 3444              JSB SAVE.OLD       ;SAVE CURRENT CDC CYL, TK, AND SECT.
00569 BXF106D4 3445              JSB RANDSEEK
0056A BXF10822 3446              JSB WRTBUFFY       ;WRITE DATA
0056B XXXXD812 3447              RA RDSECLN         ;RESET SECTOR LENGTH TO READ
0056C XXXXD88E 3448              AR TEMPLNG
0056D BXF1065C 3449              JSB GET.OLD        ;RESET CDC CYL, TK, AND SECT
0056E BXF106D4 3450              JSB RANDSEEK
0056F BXF1089D 3451              JSB RDBUFY
00570 BXF10A44 3452              JSB INCSECTX
00571 BXF10676 3453              JSB CK.TERM
00572 BXF1067D 3454              JSB MODEND         ;CHECK FOR END OF STORAGE MODULE
00573 BX230575 3455              CJMP Z,$+2                                          ;201
00574 BXF30564 3456              JMP OD.WRST7
               3457    ; RANDOM LOCATION, RANDOM LENGTH, BOTH WITH AND WITHOUT TRUNCATION
               3458    OD.WRST8: EQU $                                             ;201
00575 BXF106F5 3459              JSB RANDADDR       ;GET A CDC RANDOM ADDRESS
00576 BXF106D4 3460              JSB RANDSEEK       ;ISSUE A SEEK TO AMPERIF
00577 BXF106A7 3461              JSB RAND.LNG       ;GET A RANDOM LENGTH
00578 XXXXD891 3462              AR WRTSECLN
00579 XXXXD88E 3463              AR TEMPLNG
0057A BXF10822 3464              JSB WRTBUFFY       ;DO A RANDOM WRITE
0057B BXF106F5 3465              JSB RANDADDR       ;GET A NEW RANDOM ADDRESS
0057C BXF106D4 3466              JSB RANDSEEK       ;ISSUE A SEEK TO AMPERIF
0057D BXF106A7 3467              JSB RAND.LNG       ;GET A RANDOM LENGTH
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGS - WORST CASE TEST

0057E XXXXD892  3468            AR RDSECLN
0057F XXXXD88E  3469            AR TEMPLNG
00580 BXF1089D  3470            JSB RDBUFY          ;READ AND COMPARE TO BUFFER
00581 XXXXF1B9  3471            SETNR F.LNGRW,FLAGS ;SET LONG READ WRITE MODE              ;201
00582 BXF106F5  3472            JSB RANDADDR        ;GET A CDC RANDOM ADDRESS
00583 BXF106D4  3473            JSB RANDSEEK        ;ISSUE A SEEK TO AMPERIF
00584 BXF10713  3474            JSB WRTBUFFX        ;DO A RANDOM WRITE
00585 BXF106F5  3475            JSB RANDADDR        ;GET A NEW RANDOM ADDRESS
00586 BXF106D4  3476            JSB RANDSEEK        ;ISSUE A SEEK TO AMPERIF
00587 BXF1094A  3477            JSB PTRNGEN         ;GENERATE THE PATTERN FOR THIS ADDRESS
00588 BXF1078F  3478            JSB RDBUFX          ;READ AND COMPARE TO BUFFER
00589 BXF10930  3479            JSB CMPBUF
0058A BXF10671  3480            JSB CKERROR         ;CHECK FOR ERRORS STOP ON ERROR ELSE RETURN
0058B XXXXF1D9  3481            RSTNR F.LNGRW,FLAGS ;CLEAR LONG READ WRITE MODE            ;201
0058C BXF106F5  3482            JSB RANDADDR        ;GET A CDC RANDOM ADDRESS
0058D BXF106D4  3483            JSB RANDSEEK        ;ISSUE A SEEK TO AMPERIF
0058E BXF10713  3484            JSB WRTBUFFX        ;DO A RANDOM WRITE
0058F BXF106F5  3485            JSB RANDADDR        ;GET A NEW RANDOM ADDRESS
00590 BXF106D4  3486            JSB RANDSEEK        ;ISSUE A SEEK TO AMPERIF
00591 BXF1094A  3487            JSB PTRNGEN         ;GENERATE THE PATTERN FOR THIS ADDRESS
00592 BXF1078F  3488            JSB RDBUFX          ;READ AND COMPARE TO BUFFER
00593 BXF10930  3489            JSB CMPBUF
00594 BXF10671  3490            JSB CKERROR         ;CHECK FOR ERRORS STOP ON ERROR ELSE RETURN
00595 BXF10676  3491            JSB CK.TERM
00596 BXF30575  3492            JMP OD.WRST8        ;LOOP FOREVER UNTIL ERRORS OCCUR       ;201
                3493    ;
                3494            TITLE2 OFFLINE DIAGS - SHARED MEMORY
```

Addr Line - AMPERIF 7155/865 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - SHARED MEMORY

```
3495                EJECT
3496    ;
3497    ; SHARED MEMORY OFFLINE DIAGNOSTICS
3498    ;
3499    ; This is the only current method to insure that a shared memory
3500    ; write works.  Have one side do a shared memory write offline
3501    ; diagnostic, and then the other do the coresponding shared
3502    ; memory read offline diagnostic.
3503    ;
3504    ; Test Codes:
3505    ; 8xx Writes all addresses
3506    ; 9xx Reads all addresses
3507    ; x1x Complement data pattern flag (bit 4)
3508    ; x2x Continuous flag (bit 5), else one pass
3509    ; x4x Ignore errors flag (bit 6), else stop on error
3510    ; x8x Random addresses flag (bit 7), else sequential addresses
3511    ; xx0 Data pattern of all zeros
3512    ; xx1 Data pattern of repeating 0001
3513    ; xx2 Data pattern of repeating 0010
3514    ; xx3 Data pattern of repeating 011 (odd parity)
3515    ; xx4 Data pattern of repeating 0100
3516    ; xx5 Data pattern of repeating 01
3517    ; xx6 Data pattern of repeating 110
3518    ; xx7 Data pattern of repeating 000111 (odd parity)
3519    ; xx8 Data pattern of repeating 1000
3520    ; xx9 Data pattern of 9999 hex
3521    ; xxA Data pattern equal to address
3522    ; xxF Data pattern of 00FF hex (alternating 0 and 1 each byte)
3523    ;
3524    ; The writes wait between passes long enough for the other
3525    ; controller to do three read passes.
3526    ;
3527    ; WARNING: The write tests DESTROY SHARED MEMORY DATA ON BOTH
3528    ; CONTROLLERS!  The entire subsystem must be offline in order to
3529    ; run these diagnostics.
3530    ;
```

```
              3531                EJECT
              3532    ;
              3533    ; OFFLINE DIAGNOSTIC SHARED MEMORY WRITE
              3534    ;
              3535    OD.SHWRT:   EQU $                                           ;201
00597 BXF105B2 3536               JSB OD.SHINI        ;INITIALIZE               ;201
              3537    OD.SHWR1:   EQU $                                           ;201
00598 BXF10603 3538               JSB OD.SHADR        ;SET THE ADDRESS          ;201
00599 BXF105CE 3539               JSB OD.SHDAT        ;SET ACC BASED ON ADDRESS AND TEST ;201
0059A XXXXD88B 3540               AR SHMDATA          ;USE AS DATA TO WRITE     ;201
0059B BXF10B0D 3541               JSB SHMWRT          ;WRITE ONE ADDRESS        ;201
0059C BX7105C7 3542               CJSB N,OD.SHERR     ;IF ERROR, STOP TEST, PROCESS ERROR ;201
0059D XXXXC1FE 3543               DECR LOOPCNT        ;DECREMENT AND CHECK LOOP COUNT ;201
0059E BX2305A0 3544               CJMP Z,$+2                                  ;201
0059F BXF30598 3545               JMP OD.SHWR1        ;DO NEXT ADDRESS          ;201
              3546    ;
005A0 XXXXD8E0 3547               IR TEMP0            ;WAIT FOR 100MS           ;201
005A1 XXXX0064 3548               IDAT 100                                    ;201
005A2 BXF10C30 3549               JSB DELAYMS                                 ;201
005A3 BXF105BC 3550               JSB OD.SHEND        ;DONE WITH A PASS         ;201
005A4 BXF30597 3551               JMP OD.SHWRT        ;IF RETURNS, THEN CONTINUOUS PASSES ;201
              3552    ;
              3553    ; OFFLINE DIAGNOSTIC SHARED MEMORY READ
              3554    ;
              3555    OD.SHRD:    EQU $                                           ;201
005A5 BXF105B2 3556               JSB OD.SHINI        ;INITIALIZE               ;201
              3557    OD.SHRD1:   EQU $                                           ;201
005A6 BXF10603 3558               JSB OD.SHADR        ;SET THE ADDRESS          ;201
005A7 BXF10B80 3559               JSB SHMRD           ;READ ONE ADDRESS         ;201
005A8 BX7105C7 3560               CJSB N,OD.SHERR     ;IF PARITY ERR, CHECK TEST STOP ;201
005A9 BXF105CE 3561               JSB OD.SHDAT        ;SET ACC BASED ON ADDRESS AND TEST ;201
005AA XXXX9100 3562               TORAY EXOR,SHMDATA  ;COMPARE WITH DATA READ   ;201
005AB BX2305AD 3563               CJMP Z,$+2                                  ;201
005AC BXF105C7 3564               JSB OD.SHERR        ;IF UNEQUAL, CHECK FOR TEST STOP ;201
005AD XXXXC1FE 3565               DECR LOOPCNT        ;DECREMENT AND CHECK LOOP COUNT ;201
005AE BX2305B0 3566               CJMP Z,$+2                                  ;201
005AF BXF305A6 3567               JMP OD.SHRD1        ;DO NEXT ADDRESS          ;201
              3568    ;
005B0 BXF105BC 3569               JSB OD.SHEND        ;DONE WITH A PASS         ;201
005B1 BXF305A5 3570               JMP OD.SHRD         ;IF RETURNS, THEN CONTINUOUS PASSES ;201
              3571    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGS - SHARED MEMORY

               3572              EJECT
               3573    ;
               3574    ; OFFLINE DIAGNOSTIC SHARED MEMORY INIT
               3575    ;
               3576    OD.SHINI:   EQU $                                                   ;201
0058Z BXF10C0A 3577               JSB INITAMP         ;(INITIALIZE AMPERIF SO CAN GET FFF TERM ;203
0058B B2XX0002 3578               CON SHERR & WCAR    ;CLEAR SHMEMORY ERROR STATUS WORD       ;201
0058Y 13XXF900 3579               ZM & WCACHE                                             ;201
0058S XXXXD90C 3580               ZR SHMADDR          ;SET SHARED MEMORY ADDRESS TO ZERO      ;201
0058G XXXXD8FE 3581               IR LOOPCNT          ;SET LOOP COUNT TO 7FF                  ;201
0058Z XXXX07FF 3582               IMAT M=07FF         ;(ONCE PER ADDRESS -1 FOR DOUPDATE ADDR);201
0058B B2XX0021 3583               CON OCPFNC & WCAR   ;GET ORIGINAL FUNCTION CODE             ;201
0058Y 3XXXEF90 3584               TSTND BIT7 & RCACHE ;X8X MEANS RANDOM ADDRESSES             ;201
0058A XX2AXXXX 3585               CRTN Z              ;IF NOT, RETURN                         ;201
               3586               RTRR 4,LOOPCNT      ;IF RANDOM, 16 TIMES PER ADDRESS        ;201
0058B XXFA89FE 3587               / & RTN                                                 ;201
               3588    ;
               3589    ; OFFLINE DIAGNOSTIC SHARED MEMORY END OF A PASS
               3590    ;
               3591    ; Check for terminate from OCP/XMC (ILD-B FFF), and go to
               3592    ; OD.TERM if so.  If x2x in function code (bit 5), then return
               3593    ; and continue test, else goto OD.CMPL to note test complete.
               3594    ;
               3595    OD.SHEND:   EQU $                                                   ;201
               3596              SRC.AMP             ;CHECK FOR TERMINATE FROM AMP           ;201
               3596 +  IF BANK_EQ_0
0058C 00XX000F 3596 +             CON AMP.PORT & SRCSEL
               3596 +  ELSE
               3596 +  ENDIF
               3596 +            ENDM
               3597              TSTND ST.BK2        ;IF EI                                  ;201
0058D 5XXXE390 3598               / & SRCSTAT                                             ;201
0058E BX2305C1 3599               CJMP Z,$+3                                              ;201
0058F BXF10A80 3600               JSB CKAMPSTX        ;PROCESS IT                             ;201
0059C0 BXF10676 3601              JSB CK.TERM         ;CHECK FOR TERMINATE ILD-B FUNCTION     ;201
0059C1 B2XX0021 3602              CON OCPFNC & WCAR   ;GET ORIGINAL FUNCTION CODE             ;201
0059C2 3XXXF8C1 3603              MA & RCACHE                                             ;201
0059C3 XXXXEB80 3604              TSTNA BIT5          ;X2X MEANS CONTINUOUS PASSES            ;201
0059C4 BX2305C6 3605              CJMP Z,$+2                                              ;201
0059C5 XXFAXXXX 3606              RTN                 ;SET, GO DO MORE PASSES                 ;201
0059C6 BXFB047A 3607              POPJMP OD.CMPL      ;NOT SET, CLR RTN ADDR AND GOTO COMPLETE;201
               3608    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - SHARED MEMORY

               3609              EJECT
               3610    ;
               3611    ; OFFLINE DIAGNOSTIC SHARED MEMORY ERROR
               3612    ;
               3613    ; Set ERR.CD register dependant on error.  Values will be the
               3614    ; same as powerup diagnostic shared memory error.  If x4x in
               3615    ; function code (bit 6), then return and continue test, else
               3616    ; stop diagnostic, goto offline diagnostic error handler.
               3617    ;
               3618    OD.SHERR:   EQU $                                                ;201
005C7 BXF102A2 3619                JSB SHERR.CD        ;CALCULATE ERROR CODE FOR ERROR   ;201
005C8 B2XX0921 3620                CUN OCPFNC & UCAR   ;GET ORIGINAL FUNCTION CODE       ;201
005C9 3XXXF8C1 3621                HA & RCACHE                                           ;201
005CA XXXXED80 3622                TSTNA BIT6          ;X4X MEANS DON'T STOP ON ERROR    ;201
005CB BX2305CD 3623                CJMP Z,$+2                                            ;201
005CC XXFAXXXX 3624                RTN                 ;SET, CONTINUE                    ;201
005CD BXFB062D 3625                POPJMP OD.ERR00     ;NOT SET, CLR RTN ADDR, GO SEND ERR MSG ;201
               3626    ;
```

```
 Addr          Line - AMPERIF 7155/865 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - SHARED MEMORY

               3627              EJECT
               3628    ;
               3629    ; OFFLINE DIAGNOSTIC SHARED MEMORY DATA
               3630    ;
               3631    ; Return data pattern to test with in accumulator dependant on
               3632    ; test selected and current address.  If x1x test is selected,
               3633    ; complement the data pattern.
               3634    ;
               3635    OD.SHDAT:   EQU $                                              ;201
005CE BXF105D3 3636                JSB OD.SHPAT        ;GET BASE PATTERN           ;201
005CF B2XX0021 3637                CON OCPFNC & WCAR   ;GET ORIGINAL FUNCTION CODE ;201
005D0 3XXXE990 3638                TSTWD BIT4 & RCACHE ;X1X MEANS COMPLEMENT       ;201
005D1 XX2AXXXX 3639                CRTN Z              ;DON'T COMPLEMENT           ;201
005D2 XXFAFA81 3640                SOA COMP,NRA & RTN  ;COMPLEMENT                 ;201
               3641    ;
               3642    OD.SHPAT:   EQU $                                              ;201
005D3 B2XX0021 3643                CON OCPFNC & WCAR   ;GET ORIGINAL FUNCTION CODE ;201
005D4 3XXXF8C1 3644                HA & RCACHE                                     ;201
005D5 XXXXE4C1 3645                TOAI AND,NRA        ;BITS 4-0 DETERMINE TEST    ;201
005D6 XXXXC00F 3646                IDAT H#00F                                      ;201
005D7 BX2305ED 3647                CJMP Z,OD.SHPA0     ;VALUE OF HEX 0             ;201
005D8 XXXXE185 3648                DECA                                            ;201
005D9 BX2305EE 3649                CJMP Z,OD.SHPA1     ;1                          ;201
005DA XXXXE185 3650                DECA                                            ;201
005DB BX2305F0 3651                CJMP Z,OD.SHPA2     ;2                          ;201
005DC XXXXE185 3652                DECA                                            ;201
005DD BX2305F2 3653                CJMP Z,OD.SHPA3     ;3                          ;201
005DE XXXXE185 3654                DECA                                            ;201
005DF BX2305F4 3655                CJMP Z,OD.SHPA4     ;4                          ;201
005E0 XXXXE185 3656                DECA                                            ;201
005E1 BX2305F6 3657                CJMP Z,OD.SHPA5     ;5                          ;201
005E2 XXXXE185 3658                DECA                                            ;201
005E3 BX2305F8 3659                CJMP Z,OD.SHPA6     ;6                          ;201
005E4 XXXXE185 3660                DECA                                            ;201
005E5 BX2305FA 3661                CJMP Z,OD.SHPA7     ;7                          ;201
005E6 XXXXE185 3662                DECA                                            ;201
005E7 BX2305FC 3663                CJMP Z,OD.SHPA8     ;8                          ;201
005E8 XXXXE185 3664                DECA                                            ;201
005E9 BX2305FE 3665                CJMP Z,OD.SHPA9     ;9                          ;201
005EA XXXXE185 3666                DECA                                            ;201
005EB BX230600 3667                CJMP Z,OD.SHPAA     ;A                          ;201
005EC BXF30601 3668                JMP OD.SHPAF        ;ELSE, TREAT AS F           ;201
               3669    ;
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGS - SHARED MEMORY

           3670            EJECT
           3671    ;
           3672    OD.SHPA0:  EQU $            ;ALL ZEROS AS DATA                    ;201
005ED XXFAF901 3673            ZA & RTN                                              ;201
005EE XXXXF8E1 3674    OD.SHPA1:  IA            ;REPEATING BIT PATTERN 0001 AS DATA   ;201
005EF XXFA1111 3675            IDAT H#1111 & RTN                                     ;201
005F0 XXXXF8E1 3676    OD.SHPA2:  IA            ;REPEATING BIT PATTERN 0010 AS DATA   ;201
005F1 XXFA2222 3677            IDAT H#2222 & RTN                                     ;201
005F2 XXXXF8E1 3678    OD.SHPA3:  IA            ;REPEATING BIT PATTERN 011 AS DATA    ;201
005F3 XXFA36DB 3679            IDAT B#10110110110110110 & RTN                        ;201
005F4 XXXXF8E1 3680    OD.SHPA4:  IA            ;REPEATING BIT PATTERN 0100 AS DATA   ;201
005F5 XXFA4444 3681            IDAT H#4444 & RTN                                     ;201
005F6 XXXXF8E1 3682    OD.SHPA5:  IA            ;REPEATING BIT PATTERN 0101 AS DATA   ;201
005F7 XXFA5555 3683            IDAT H#5555 & RTN                                     ;201
005F8 XXXXF8E1 3684    OD.SHPA6:  IA            ;REPEATING BIT PATTERN 110 AS DATA    ;201
005F9 XXFA6DB6 3685            IDAT B#01101101101101110 & RTN                        ;201
005FA XXXXF8E1 3686    OD.SHPA7:  IA            ;REPEATING BIT PATTERN 000111 AS DATA ;201
005FB XXFA71C7 3687            IDAT B#01110001110001111 & RTN                        ;201
005FC XXXXF8E1 3688    OD.SHPA8:  IA            ;REPEATING BIT PATTERN 1000 AS DATA   ;201
005FD XXFA8888 3689            IDAT H#8888 & RTN                                     ;201
005FE XXXXF8E1 3690    OD.SHPA9:  IA            ;REPEATING BIT PATTERN 1001 AS DATA   ;201
005FF XXFA9999 3691            IDAT H#9999 & RTN                                     ;201
           3692    OD.SHPAA:  EQU $            ;ADDRESS AS DATA                      ;201
00600 XXFAD80C 3693            RA SHMADDR & RTN                                      ;201
00601 XXXXF8E1 3694    OD.SHPAF:  IA            ;ALTERNATING PATTERN ALL 0'S, ALL 1'S ;201
00602 XXFA00FF 3695            IDAT H#00FF & RTN                                     ;201
           3696    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGS - SHARED MEMORY

               3697              EJECT
               3698    ;
               3699    ; OFFLINE DIAGNOSTIC SHARED MEMORY ADDRESS
               3700    ;
               3701    ; Generate next shared memory address in SHMADDR.  For most
               3702    ; tests, this means incrementing to next address; if test has
               3703    ; x8x set, then generate a random address.  If address would be
               3704    ; the same as DOUPDATE, then skip it and go to next address.
               3705    ;
               3706    OD.SHADR:   EQU $                                              ;201
00603 B2XX0021 3707                CON OCPFNC & WCAR   ;GET ORIGINAL FUNCTION CODE  ;201
00604 3XXXEF90 3708                TSTND BIT7 & RCACHE ;X8X MEANS RANDOM ADDRESSES  ;201
00605 BX230609 3709                CJMP Z,OD.SHAD1                                 ;201
00606 BXF10685 3710                JSB RANDNUM         ;USE A RANDOM NUMBER        ;201
00607 XXXXD88C 3711                AR SHMADDR          ;AS ADDRESS                 ;201
00608 BXF3060A 3712                JMP $+2                                         ;201
               3713    OD.SHAD1:   EQU $                                          ;201
00609 XXXXDD6C 3714                INCR SHMADDR        ;INCREMENT ADDRESS          ;201
0060A XXXX9CCC 3715                TORIR AND,SHMADDR   ;USE LOWER 11 BITS          ;201
0060B XXXX07FF 3716                IDAT H#7FF                                      ;201
0060C XXXX950C 3717                TORIY EXOR,SHMADDR  ;IS IT EQUAL TO DOUPDATE ADDRESS?  ;201
0060D XXXX003F 3718                IDAT DOUPDATE                                   ;201
0060E BX230603 3719                CJMP Z,OD.SHADR     ;THEN SKIP THIS ADDRESS AND GO TO NEXT  ;201
0060F XXFAXXXX 3720                RTN                 ;DONE                       ;201
               3721    ;
               3722              TITLE2 OFFLINE DIAGS - ERROR CODES
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - ERROR CODES

```
              3723              EJECT
              3724    ;
00610 XXXXDD7F 3725   OD.ERR1D:  INCR ERR.CD        ;ILLEGAL OFFLINE DIAG TEST NUMBER      ;20)
00611 XXXXDD7F 3726   OD.ERR1C:  INCR ERR.CD        ;(NOT USED)
00612 XXXXDD7F 3727   OD.ERR1B:  INCR ERR.CD        ;AMP OUTPUT READY AFTER TRUNCATION
00613 XXXXDD7F 3728   OD.ERR1A:  INCR ERR.CD        ;(NOT USED)
00614 XXXXDD7F 3729   OD.ERR19:  INCR ERR.CD        ;UNEXPECTED AMP INTERRUPT DURING READ
00615 XXXXDD7F 3730   OD.ERR18:  INCR ERR.CD        ;NO AMP STATUS AFTER READ
00616 XXXXDD7F 3731   OD.ERR17:  INCR ERR.CD        ;NO AMP SRCRDY DURING READ
00617 XXXXDD7F 3732   OD.ERR16:  INCR ERR.CD        ;UNEXPECTED AMP INTERRUPT AT START OF READ
00618 XXXXDD7F 3733   OD.ERR15:  INCR ERR.CD        ;NO AMP SRCRDY AT START OF READ
00619 XXXXDD7F 3734   OD.ERR14:  INCR ERR.CD        ;NO AMP ENTAGS AFTER ISSUE READ
0061A XXXXDD7F 3735   OD.ERR13:  INCR ERR.CD        ;UNEXPECTED AMP INTERRUPT AFTER ISSUE READ
0061B XXXXDD7F 3736   OD.ERR12:  INCR ERR.CD        ;UNEXPECTED AMP INTERRUPT BEFORE READ
0061C XXXXDD7F 3737   OD.ERR11:  INCR ERR.CD        ;UNEXPECTED AMP INTERRUPT ON READ OR WRITE
0061D XXXXDD7F 3738   OD.ERR10:  INCR ERR.CD        ;NO AMP STATUS AFTER WRITE
0061E XXXXDD7F 3739   OD.ERR0F:  INCR ERR.CD        ;NO AMP DSTRDY ON WRITE
0061F XXXXDD7F 3740   OD.ERR0E:  INCR ERR.CD        ;NO AMP ODREQ ON WRITE
00620 XXXXDD7F 3741   OD.ERR0D:  INCR ERR.CD        ;UNEXPECTED AMP INTERRUPT ON WRITE
00621 XXXXDD7F 3742   OD.ERR0C:  INCR ERR.CD        ;NO AMP ADDTRDY AFTER ISSUE ADDRESS
00622 XXXXDD7F 3743   OD.ERR0B:  INCR ERR.CD        ;BAD AMP SRC STATUS BEFORE ISSUE ADDRESS
00623 XXXXDD7F 3744   OD.ERR0A:  INCR ERR.CD        ;NO AMP ADDTRDY AFTER ISSUE COMMAND
00624 XXXXDD7F 3745   OD.ERR09:  INCR ERR.CD        ;BAD AMP DST STATUS BEFORE ISSUE COMMAND
00625 XXXXDD7F 3746   OD.ERR08:  INCR ERR.CD        ;BAD AMP SRC STATUS BEFORE ISSUE COMMAND
00626 XXXXDD7F 3747   OD.ERR07:  INCR ERR.CD        ;NO AMP PAR(1-3).RDY
00627 XXXXDD7F 3748   OD.ERR06:  INCR ERR.CD        ;ISUCMDX RETURNED NEG (NOT POSSIBLE)
00628 XXXXDD7F 3749   OD.ERR05:  INCR ERR.CD        ;AMP EF TERMINATE
00629 XXXXDD7F 3750   OD.ERR04:  INCR ERR.CD        ;AMP RECOVERY ACTION OF COMMAND REJECT
0062A XXXXDD7F 3751   OD.ERR03:  INCR ERR.CD        ;NO AMP STATUS AFTER SEEK
0062B XXXXDD7F 3752   OD.ERR02:  INCR ERR.CD        ;AMPERIF PARITY ERROR
0062C XXXXDD7F 3753   OD.ERR01:  INCR ERR.CD        ;NO DEVICE END BEFORE SENDING SFEK
              3754    OD.ERR00:  EQU $                                               ;20)
0062D B2XX0023 3755              CON ERRCODE & WCAR  ;OR LOCAL MEMORY SAVED ERROR CODE
0062E 3XXXF8C1 3756              HA & RCACHE
0062F XXXX995F 3757              TORAR OR,ERR.CD     ;WITH REGISTER SAVED ERROR CODE
00630 13XXD85F 3758              RH ERR.CD & WCACHE
00631 BXF13C0A 3759              JSB INITAMP         ;RESET AMPERIF INTERFACE           ;20)
00632 BXF30633 3760              JMP OD.IDLE         ;GO TO IDLE, WHICH WILL PRINT ERROR MSG
              3761    ;
              3762              TITLE2 OFFLINE DIAGS - ERROR HANDLER
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - ERROR HANDLER

               3763                EJECT
               3764    ;
               3765    ; OFFLINE DIAGNOSTIC IDLE LOOP
               3766    ;
               3767    ; Called after an offline diagnostic completes or gets an
               3768    ; error.  It displays any error message to OCP via the XMC, and
               3769    ; then waits for a new diag command from OCP, and then jumps to
               3770    ; OD.START.
               3771    ;
               3772    OD.IDLE:    EQU $
               3773                CLR.STK             ;CLEAR THE STACK
               3773 +              DUP 9                                          ;201
00633 BXFB0634 3773 +              POPJMP $+1
00634 BXFB0635 3773 +              POPJMP $+1
00635 BXFB0636 3773 +              POPJMP $+1
00636 BXFB0637 3773 +              POPJMP $+1
00637 BXFB0638 3773 +              POPJMP $+1
00638 BXFB0639 3773 +              POPJMP $+1
00639 BXFB063A 3773 +              POPJMP $+1
0063A BXFB063B 3773 +              POPJMP $+1
0063B BXFB063C 3773 +              POPJMP $+1
               3773 +              ENDM
0063C BXF10C0A 3774                JSB INITAMP         ;CLEAR AMPERIF INTERFACE       ;201
               3775    ; GET AMP STATUS IF ANY
               3776    OD.IDL.1:   EQU $
               3777                TSTND ST.BK2        ;IF STATUS, READ IT            ;201
0063D 5XXXE390 3778                / & SRCSTAT                                        ;201
0063E BX230640 3779                CJMP Z,$+2                                         ;201
0063F BXF10A80 3780                JSB CKAMPSTX                                       ;201
               3781    ; CHECK FOR ERROR
00640 B2XX0023 3782                CON ERRCODE & WCAR
00641 3XXXF8C1 3783                HA & RCACHE
00642 BX23064C 3784                CJMP Z,OD.IDL.2     ;ERROR REPORTED, WAIT FOR OCP CMD      ;201
               3785    ; SEND ERROR CODE TO OCP
00643 13XXF900 3786                ZN & WCACHE                                        ;201
00644 XXXXD898 3787                AR AMPWLEN
00645 XXXXD8F7 3788                IR AMPCMD
00646 XXXX0003 3789                IDAT AF.NOOP
00647 BXF10AED 3790                JSB ISUCMDX
00648 1XXXD858 3791                RH AMPWLEN          ;OUTPUT ERRCODE TO BUS FOR DEBUG       ;201
               3792                TSTND ST.BK2        ;WAIT FOR EI
00649 5XXXE390 3793                / & SRCSTAT
0064A BX230648 3794                CJMP Z,$-2                                         ;201
0064B BXF10A80 3795                JSB CKAMPSTX                                       ;201
               3796    ; CHECK FOR NEW COMMAND
               3797    OD.IDL.2:   EQU $
0064C B2XX0022 3798                CON OCPNEW & WCAR                                  ;201
0064D 3XXXF8C1 3799                HA & RCACHE                                        ;201
0064E BX73063D 3800                CJMP N,OD.IDL.1     ;NONE YET                      ;201
0064F BXF30442 3801                JMP OD.START        ;NEW COMMAND, GO PROCESS IT    ;201
               3802    ;
               3803                TITLE2 OFFLINE DIAGS - DIAGNOSTIC SUBROUTINES
```

```
                3804                EJECT
                3805    ;
                3806    SAVE.OLD:   EQU $
00650 B2XX000A  3807                CON CDC.CYL & WCAR                                  ;201
00651 3XXXD8C0  3808                HR TEMP0 & RCACHE                                   ;201
00652 B2XX0025  3809                CON OLDCYL & WCAR                                   ;201
00653 13XXD840  3810                RH TEMP0 & WCACHE                                   ;201
00654 B2XX000B  3811                CON CDC.TK & WCAR                                   ;201
00655 3XXXD8C0  3812                HR TEMP0 & RCACHE                                   ;201
00656 B2XX0026  3813                CON OLDTK & WCAR                                    ;201
00657 13XXD840  3814                RH TEMP0 & WCACHE                                   ;201
00658 B2XX000C  3815                CON CDC.SEC & WCAR                                  ;201
00659 3XXXD8C0  3816                HR TEMP0 & RCACHE                                   ;201
0065A B2XX0027  3817                CON OLDSECT & WCAR                                  ;201
                3818                RH TEMP0 & WCACHE                                   ;201
0065B 13FAD840  3819                / & RTN                                             ;201
                3820    ;
                3821    GET.OLD:    EQU $
0065C B2XX0025  3822                CON OLDCYL & WCAR                                   ;201
0065D 3XXXD8C0  3823                HR TEMP0 & RCACHE                                   ;201
0065E B2XX000A  3824                CON CDC.CYL & WCAR                                  ;201
0065F 13XXD840  3825                RH TEMP0 & WCACHE                                   ;201
00660 B2XX0026  3826                CON OLDTK & WCAR                                    ;201
00661 3XXXD8C0  3827                HR TEMP0 & RCACHE                                   ;201
00662 B2XX000B  3828                CON CDC.TK & WCAR                                   ;201
00663 13XXD840  3829                RH TEMP0 & WCACHE                                   ;201
00664 B2XX0027  3830                CON OLDSECT & WCAR                                  ;201
00665 3XXXD8C0  3831                HR TEMP0 & RCACHE                                   ;201
00666 B2XX000C  3832                CON CDC.SEC & WCAR                                  ;201
                3833                RH TEMP0 & WCACHE                                   ;201
00667 13FAD840  3834                / & RTN                                             ;201
                3835    ;
                3836    ; SET CDC CYLINDER, TRACK, AND SECTOR TO ZERO. ALSO SETS
                3837    ; DEVICE END TO AMPERIF STATUS WORD 3
                3838    INITUNIT:   EQU $
00668 B2XX000A  3839                CON CDC.CYL & WCAR                                  ;201
00669 13XXF900  3840                ZH & WCACHE                                         ;201
0066A B2XX000B  3841                CON CDC.TK & WCAR                                   ;201
0066B 13XXF900  3842                ZH & WCACHE                                         ;201
0066C B2XX000C  3843                CON CDC.SEC & WCAR                                  ;201
0066D 13XXF900  3844                ZH & WCACHE                                         ;201
0066E B2XX0008  3845                CON AMP.ST3 & WCAR
0066F 3XXXD8C0  3846                HR TEMP0 & RCACHE
                3847                SETNR EI.DE,TEMP0                                   ;201
                3848                / & ALU & WCACHE                                    ;201
00670 13FAF5A0  3849                / & RTN                                             ;201
                3850    ;
```

```
              3851                EJECT
              3852    ;
              3853    ; CHECK FOR OFFLINE DIAGNOSTIC ERROR
              3854    ;
              3855    ; IF ERROR CODE IS NON-ZERO, ABORT AND GO TO OD.IDLE TO SEND ERROR
              3856    ;
              3857    CKERROR:    EQU $
00671 B2XX0023 3858               CON ERRCODE & WCAR                                    ;203
00672 3XXXF8C1 3859               HA & RCACHE         ;CHECK FOR ANY BITS IN ERRCODE    ;203
00673 XX2AXXXX 3860               CRTN Z                                                ;203
00674 BXF10C0A 3861               JSB INITARP                                           ;201
00675 BXF30633 3862               JMP OD.IDLE
              3863    ;
              3864    ; SUBROUTINE TO CHECK FOR COMMAND FROM OCP DURING OFFLINE DIAG.
              3865    ; IF SO, TERMINATE THE CURRENT OFFLINE DIAG.
              3866    ;
              3867    CK.TERM:    EQU $
00676 XXXXF8E1 3868               IA
00677 XXXX0064 3869               IDAT 100            ;DELAY 100 U-SEC
00678 BXF10C26 3870               JSB DELAY                                             ;201
00679 B2XX0022 3871               CON OCPNEW & WCAR   ;CHECK FOR A REQUEST FROM AMPERIF OCP  ;201
0067A 3XXXF8C1 3872               HA & RCACHE                                           ;201
0067B XX7AXXXX 3873               CRTN N              ;IF NONE, RETURN                  ;201
0067C BXF3047E 3874               JMP OD.TERM         ;IF ANY NEW COMMAND, TERMINATE CURRENT  ;201
              3875    ;
              3876    ; CHECK TO SEE IF REACHED END OF TEST, EITHER CYLMAX OR 40
              3877    ;
              3878    MODEND:     EQU $
              3879               CON CDC.CYL                                           ;201
0067D B2XX000A 3880               / & WCAR                                              ;201
0067E 3XXXF8C1 3881               HA & RCACHE                                           ;201
0067F XXXXC500 3882               TOAIR EXOR,TEMP0                                      ;201
              3883               IDAT CYLMAX                                           ;201
00680 XXFA034A 3884               / & RTN                                               ;201
              3885    ;
              3886    MODEND1:    EQU $
              3887               CON CDC.CYL                                           ;201
00681 B2XX000A 3888               / & WCAR                                              ;201
00682 3XXXF8C1 3889               HA & RCACHE                                           ;201
00683 XXXXC500 3890               TOAIR EXOR,TEMP0                                      ;201
              3891               IDAT 40                                               ;201
00684 XXFA0028 3892               / & RTN                                               ;201
              3893    ;
              3894               TITLE2 OFFLINE DIAGS - RANDOM NUMBER SUBROUTINES
```

```
              3895                EJECT
              3896    ;
              3897    ; RANDOM NUMBER SUBROUTINES
              3898    ;
              3899    ; This routine generates a 16-bit "random" number using an
              3900    ; alogrithm known as the additive congruential method.  The
              3901    ; method, on average, produces 65,536 psuedo-random numbers
              3902    ; before cycling.  The idea behind this alogrithm is to start
              3903    ; with a 16-bit register filled with an arbitrary bit pattern,
              3904    ; then shift it right one bit, filling the vacated position on
              3905    ; the left with a bit whose value is determined by the result
              3906    ; of an EXCLUSIVE OR operation on bits 0, 2, 3 and 5 of the
              3907    ; current value.
              3908    ;
              3909    ; OUTPUTS: Random number in ACC
              3910    ;
              3911    RANDNUM:    EQU $
              3912                CON LASTRAND        ;GET LAST RANDOM NUMBER GENERATED
00685 B2XX0037  3913                / & WCAR
00686 BXF3068D  3914                JMP RAND.N1
              3915    RANDNUM1:   CON LASTRAN1
00687 B2XX0038  3916                / & WCAR
00688 BXF3068D  3917                JMP RAND.N1
              3918    RANDNUM2:   CON LASTRAN2
00689 B2XX0039  3919                / & WCAR
0068A BXF3068D  3920                JMP RAND.N1
              3921    RANDNUM3:   CON LASTRAN3
0068B B2XX003A  3922                / & WCAR
0068C BXF3068D  3923                JMP RAND.N1
0068D 3XXXD8C1  3924    RAND.N1:    HR TEMP1 & RCACHE   ; INTO TEMP1  REGISTER.
0068E BX230690  3925                CJMP Z,$+2
0068F BXF30692  3926                JMP $+3
00690 XXXXD8E1  3927                IR TEMP1            ;IF ZERO SET TO BASE (4B5F)
00691 13XX4B5F  3928                )DAT H#4B5F & ALU & WCACHE
00692 XXXX84C1  3929                TORIA AND,TEMP1     ;ISOLATE BIT 0 FIRST IN ACC, THEN STORE
00693 XXXX0001  3930                )DAT H#0001         ; RESULT IN TEMP2.
00694 XXXXD882  3931                AR TEMP2
00695 XXXX84C1  3932                TORIA AND,TEMP1     ;ISOLATE BIT 2 IN ACC.
00696 XXXX0004  3933                )DAT H#0004
00697 XXXXFD9D  3934                RTAA 16-2           ;SHIFT INTO POSITION FOR EXOR,OPERATION.
00698 XXXX9902  3935                TORAR EXOR,TEMP2    ;EXOR BIT 0 AND BIT 1, PUT RESULT IN TEMP2
00699 XXXX84C1  3936                TORIA AND,TEMP1     ;ISOLATE BIT 3 IN ACC.
0069A XXXX0008  3937                )DAT H#0008
0069B XXXXFB9D  3938                RTAA 16-3           ;SHIFT INTO POSITION FOR EXOR,OPERATION.
0069C XXXX9902  3939                TORAR EXOR,TEMP2    ;EXOR AND,TEMP2  BIT 3 , RES TO TEMP2
0069D XXXX84C1  3940                TORIA AND,TEMP1     ;ISOLATE BIT 5 IN ACC.
0069E XXXX0020  3941                )DAT H#0020
0069F XXXXF79D  3942                RTAA 16-5           ;SHIFT INTO POSITION FOR EXOR,OPERATION
006A0 XXXX9102  3943                TORAY EXOR,TEMP2    ;EXOR AND,TEMP2  BIT 5, PUT RESULT ON Y-BUS
006A1 BX2306A4  3944                CJMP Z,INSERT.0     ;JUMP IF RESULT IS 0.
006A2 XXXXCCA1  3945    INSERT.1:   SHRR DN1,TEMP1      ;SHIFT NUMBER DOWN, INSERTING 1 IN THE
006A3 BXF306A5  3946                JMP $+2             ; VACATED POSITION, THEN CLEAN UP.
006A4 XXXXCC81  3947    INSERT.0:   SHRR DNZ,TEMP1      ;SHIFT NUMBER DOWN, INSERTING 0 IN THE
006A5 XXXXD801  3948                RA TEMP1            ; VACATED POSITION. PUT TEMP1 IN ACC,
006A6 13FAF880  3949                AH & WCACHE & RTN   ; THEN STORE IN LASTRAND AND RETURN     ;201
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - RANDOM NUMBER SUBROUTINES

3950 ;

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 Addr        Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - RANDOM NUMBER SUBROUTINES

             3951                EJECT
             3952    ;
             3953    ; SUBROUTINES TO RETURN RANDOM CYLINDER, TRACK, SECTOR AND LENGTH
             3954    ; RANDOM VALUE BETWEEN 0 AND MAX RETURNED IN ACC AND TEMP1.
             3955    ;
             3956    ; RANDOM WORD LENGTH
             3957    ;
             3958    RAND.LNG:   EQU $
006A7 BXF10608 3959              JSB RANDNUM3        ;GO GET A RANDOM NUMBER.
             3960    RANDL8:     EQU $                                          ;201
006A8 XXXXE4C1 3961              TOAI AND,NRA        ;MASK VALID PORTION OF RANDOM # IN ACC.
006A9 XXXX03FF 3962              IDAT H#03FF
006AA XXXXE440 3963              TOAI SUBS,NRY       ;IS THE NUMBER WITHIN BOUNDS?
006AB XXXX0233 3964              IDAT HSSECCNT-1
006AC BX7306B0 3965              CJMP N,RANDL9       ;YES - CLEAN UP AND RETURN     ;201
006AD XXXXE441 3966              TOAI SUBS,NRA
006AE XXXX0233 3967              IDAT HSSECCNT-1
006AF BXF306A8 3968              JMP RANDL8                                     ;201
             3969    RANDL9:     EQU $                                          ;201
006B0 XXXXD881 3970              AR TEMP1            ;PUT LENGTH INTO TEMP1 AND RETURN.
006B1 BX2306A7 3971              CJMP Z,RAND.LNG
006B2 XXFAXXXX 3972              RTN
             3973    ;
             3974    ; RANDOM CYLINDER
             3975    ;
             3976    RAND.CYL:   EQU $
006B3 BXF10685 3977              JSB RANDNUM         ;GO GET A RANDOM NUMBER.
             3978    RANDC8:     EQU $                                          ;201
006B4 XXXXE4C1 3979              TOAI AND,NRA        ;MASK VALID PORTION OF RANDOM # IN ACC.
006B5 XXXX03FF 3980              IDAT H#03FF
006B6 XXXXE440 3981              TOAI SUBS,NRY       ;IS THE NUMBER WITHIN BOUNDS?
006B7 XXXX0347 3982              IDAT CYLMAX-3
006B8 BX7306BC 3983              CJMP N,RANDC9       ;YES - CLEAN UP AND RETURN     ;201
006B9 XXXXE441 3984              TOAI SUBS,NRA
006BA XXXX0347 3985              IDAT CYLMAX-3
006BB BXF306B4 3986              JMP RANDC8                                     ;201
             3987    RANDC9:     EQU $                                          ;201
006BC XXXXD881 3988              AR TEMP1            ;PUT CYLINDER # INTO TEMP1 AND RETURN.
006BD XXFAXXXX 3989              RTN
             3990    ;
             3991    ; RANDOM TRACK
             3992    ;
             3993    RAND.TK:    EQU $
006BE BXF10687 3994              JSB RANDNUM1        ;GO GET A RANDOM NUMBER.
             3995    RANDT8:     EQU $                                          ;201
006BF XXXXE4C1 3996              TOAI AND,NRA        ;MASK VALID PORTION OF RANDOM # IN ACC.
006C0 XXXX003F 3997              IDAT H#03F
006C1 XXXXE440 3998              TOAI SUBS,NRY       ;IS THE NUMBER WITHIN BOUNDS?
006C2 XXXX0028 3999              IDAT H#028
006C3 BX7306C7 4000              CJMP N,RANDT9       ;YES - CLEAN UP AND RETURN     ;201
006C4 XXXXE441 4001              TOAI SUBS,NRA
006C5 XXXX0028 4002              IDAT H#028
006C6 BXF306BF 4003              JMP RANDT8                                     ;201
             4004    RANDT9:     EQU $                                          ;201
006C7 XXXXD8B1 4005              AR TEMP1            ;PUT TRACK # INTO TEMP1 AND RETURN.
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - RANDOM NUMBER SUBROUTINES

006C8 XXFAXXXX  4006              RTN
                4007    ;
                4008    ; RANDOM SECTOR
                4009    ;
                4010    RAND.SEC:   EQU $
006C9 BXF70689  4011              JSB RANDNUM2        ;GO GET A RANDOM NUMBER.
                4012    RANDS8:     EQU $                                       ;201
006CA XXXXE4C1  4013              TOAJ AND,NRA        ;MASK VALID PORTION OF RANDOM # IN ACC.
006CB XXXX003F  4014              IDAT H#03F
006CC XXXXE440  4015              TOAJ SUBS,NRY       ;IS THE NUMBER WITHIN BOUNDS?
006CD XXXX0020  4016              IDAT H#020
006CE BX7306D2  4017              CJNP N,RANDS9       ;YES - CLEAN UP AND RETURN          ;201
006CF XXXXE441  4018              TOAI SUBS,NRA
006D0 XXXX0020  4019              IDAT H#020
006D1 BXF306CA  4020              JMP RANDS8                                      ;201
                4021    RANDS9:     EQU $                                       ;201
006D2 XXXXD881  4022              AR TEMP1            ;PUT SECTOR # INTO TEMP1 AND RETURN.
006D3 XXFAXXXX  4023              RTN
                4024    ;
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - RANDOM NUMBER SUBROUTINES

               4025              EJECT
               4026    ;
               4027    RANDSEEK: EQU $
               4028              CON AMP.ST3                                          ;201
006D4 B2XX0008 4029              / & WCAR                                             ;201
006D5 3XXXD8C0 4030              HR TEMP0 & RCACHE
006D6 XXXXF5E0 4031              TSTNR EI.DE,TEMP0                                    ;201
006D7 BX23062C 4032              CJMP Z,OD.ERR01
006D8 BXF10A5A 4033              JSB GET.RWAX        ;CONVERT CYL, TK, AND SEC TO RELATIVE WORD ADDRESS
006D9 XXXXD8F7 4034    RSEEK3X:  IR AMPCMD           ;SET SEEK COMMAND
006DA XXXX000B 4035              IDAT AF.SEEK
006DB XXXXD918 4036              ZR AMPWLEN
               4037              CON C.UNIT
006DC B2XX0024 4038              / & WCAR
006DD 3XXXF8C1 4039              HA & RCACHE         ;GET THE UNIT
006DE XXXXD896 4040              AR AMPUNIT                                           ;201
006DF BXF10AED 4041              JSB ISUCMDX         ;ISSUE THE SEEK COMMAND
006E0 BXF10B1B 4042              JSB ISUADRX         ;ISSUE REL WORD ADDRESS
006E1 XXXXD909 4043              ZR TIMEOUT                                           ;201
006E2 XXXXF8E1 4044    RSEEK4X:  IA                                                   ;201
006E3 XXXX0009 4045              IDAT 9
006E4 BXF10C26 4046              JSB DELAY
006E5 5XXXF8C1 4047              HA & SRCSTAT        ;WAIT FOR EXT INTERRUPT
006E6 XXXXF780 4048              TSTNA AMP.P.ER      ;TEST FOR U-BUS PARITY ERROR
006E7 BX2306E9 4049              CJMP Z,$+2
006E8 BXF3062B 4050              JMP OD.ERR02
006E9 XXXXDD69 4051              INCR TIMEOUT                                         ;201
006EA XXXX9509 4052              TORIY EXOR,TIMEOUT                                   ;201
006EB XXXXFFFF 4053              IDAT H#FFFF
006EC BX23062A 4054              CJMP Z,OD.ERR03
006ED XXXXE380 4055              TSTNA ST.BK2
006EE BX2306E2 4056              CJMP Z,RSEEK4X
006EF BXF10A80 4057              JSB CKAMPSTX        ;PROCESS INTERRUPT               ;201
006F0 BXF10A29 4058              JSB CKDVEND         ;CHECK FOR DEVICE END IN STATUS
006F1 BX2306F3 4059              CJMP Z,RSEEK2X
006F2 XXFAXXXX 4060              RTN
               4061    RSEEK2X:  EQU $
006F3 XXXXD909 4062              ZR TIMEOUT                                           ;201
006F4 BXF306E2 4063              JMP RSEEK4X
               4064    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - RANDOM NUMBER SUBROUTINES

               4065                EJECT
               4066    ;
               4067    RANDADDR:   EQU $
0006F5 BXF106B3 4068                JSB RAND.CYL        ;GET RANDOM CYLINDER
0006F6 B2XX000A 4069                CON CDC.CYL & WCAR
0006F7 13XXD841 4070                RH TEMP1 & WCACHE   ;SET CDC CYLINDER TO RANDOM VALUE
0006F8 BXF1068E 4071                JSB RAND.TK         ;GET RANDOM TRACK
0006F9 B2XX000B 4072                CON CDC.TK & WCAR
0006FA 13XXD841 4073                RH TEMP1 & WCACHE   ;SET CDC TRACK TO RANDOM VALUE
0006FB BXF106C9 4074                JSB RAND.SEC        ;GET RANDOM SECTOR
0006FC B2XX000C 4075                CON CDC.SEC & WCAR
0006FD 13XXD841 4076                RH TEMP1 & WCACHE   ;SET CDC SECTOR TO RANDOM NUMBER
0006FE XXFAXXXX 4077                RTN
               4078    ;
               4079                TITLE2 OFFLINE DIAGS - BUFFER SUBROUTINES
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - BUFFER SUBROUTINES

               4080                EJECT
               4081    ;
               4082    ; BUFFER ROUTINES
               4083    ;
               4084    ; MOVE BUFFER
               4085    ; COPYIES THE READ BUFFER (BUF1) TO THE WRITE BUFFER (BUF0)
               4086    ;
               4087    MOVEBUF:    EQU $
006FF XXXXD8E0 4088                IR TEMP0
00700 XXXX023B 4089                IDAT BUF1ADR
00701 XXXXD8E1 4090                IR TEMP1
00702 XXXX003B 4091                IDAT BUF0ADR
00703 B8F4015B 4092                CON SECLEN & PUSHLDCT
00704 XXXX7140 4093                NOOP
00705 12XXD840 4094                RH TEMP0 & WCAR
00706 3XXXF8C1 4095                HA & RCACHE
00707 12XXD841 4096                RH TEMP1 & WCAR
00708 13XXF880 4097                AH & WCACHE
00709 XXXXDD60 4098                INCR TEMP0
0070A XXX8DD61 4099                INCR TEMP1 & RFCT
0070B XXFAXXXX 4100                RTN
               4101    ;
               4102    ; CLEAR BUFFER
               4103    ;
               4104    ; WRITES ZEROS TO WRITE BUFFER (BUF0)
               4105    ;
               4106    CLRBUFF:    EQU $
0070C XXXXF8E1 4107                IA
0070D 12XX003B 4108                IDAT BUF0ADR & ALU & WCAR
0070E B8F4015B 4109                CON SECLEN & PUSHLDCT
0070F XXXX7140 4110                NOOP
00710 13XXF900 4111                ZH & WCACHE
00711 12X8FC81 4112                INCA & ALU & WCAR & RFCT
00712 XXFAXXXX 4113                RTN
               4114    ;
```

Addr Line - AMPERIF 7155/865 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
                4115                EJECT
                4116    ;
                4117    ; WRTBUFFX
                4118    ; THIS SUBROUTINE WILL BE USED FOR DEVELOPMENT ONLY AND WILL
                4119    ; WRITE THE DATA IN THE DATA BUFFER (344 PARCELS), TO THE ADDRESS
                4120    ; SPECIFIED BY THE CDC CYLINDER, TRACK AND SECTOR DATA IN THE
                4121    ; CURRENT UNITS CONTROL AREA. THE CYLINDER, TRACK AND SECTOR DATA
                4122    ; WILL ALSO BE WRITTEN, AS WILL THE CHECKSUM OF THE RECORD.
                4123    ;
                4124    ; THE UNIT TO USE MUST BE IN LOC C.UNIT AND THE DESIRED DATA IN
                4125    ; THE DATA BUFFER BEFORE ENTRY TO THE SUBROUTINE.
                4126    ;
                4127    WRTBUFFX:   EQU $
00713 BXF10A5A  4128                JSB GET.RWAX        ;CONVERT TO RELATIVE WORD ADDRESS
                4129                SRC.AMP
                4129 +  IF BANK_EQ_0
00714 BBXX000F  4129 +              CON AMP.PORT & SRCSEL
                4129 +  ELSE
                4129 +  ENDIF
                4129 +              ENDM
                4130                DST.AMP             ;SELECT AMP AS SOURCE AND DEST
                4130 +  IF BANK_EQ_0
00715 BCXX000F  4130 +              CON AMP.PORT & DSTSEL
                4130 +  ELSE
                4130 +  ENDIF
                4130 +              ENDM
00716 5XXXF0C1  4131                HA & SRCSTAT
00717 XXXXE380  4132                TSTHA ST.BK2        ;IS INTERRUPT PRESENT
00718 BX23071B  4133                CJNP Z,$+3
00719 BXF10A80  4134                JSB CKAMPSTX        ;PROCESS INTERRUPT
0071A BXF30620  4135                JNP OD.ERR0D
                4136    WRTBUF1X:   EQU $
0071B XXXXD8F7  4137                IR AMPCMD
0071C XXXX000D  4138                IDAT AF.WRT         ;ISSUE WRITE DATA COMMAND
                4139    ;
0071D XXXXF1F9  4140                TSTNR F.LNGRW,FLAGS                             ;201
0071E BX230722  4141                CJNP Z,WRTBUF9X                                 ;201
0071F XXXXD8F6  4142                IR AMPWLEN
00720 XXXXFF90  4143                IDAT HSWDCNT
00721 BXF30724  4144                JNP $+3
                4145    WRTBUF9X:   EQU $                                           ;201
00722 XXXXD8F8  4146                IR AMPWLEN
00723 XXXX0074  4147                IDAT 116
                4148    ;
                4149                CON C.UNIT
00724 B2XX0024  4150                / & WCAR
00725 3XXXD8D6  4151                HR AMPUNIT & RCACHE
00726 BXF10AED  4152                JSB ISUCMDX                                     ;201
00727 BXF10B1B  4153                JSB ISUADRX         ;ISSUE ADDRESS WORD
00728 XXXXD903  4154                ZR TEMP3            ;CLEAR CHECKSUM REG
00729 XXXXD8E0  4155                IR TEMP0
                4156                IDAT BUF0ADR
0072A 12XX003B  4157                / & ALU & WCAR      ;SET TEMP0  TO BUFFER ADDRESS
0072B XXXXD909  4158                ZR TIMEOUT                                      ;201
                4159    WRTB9X:     EQU $
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
0072C 6XXXF8C1  4160              HA & DSTSTAT
0072D XXXXE780  4161              TSTNA ODREQ
0072E BX230730  4162              CJMP Z,$+2
0072F BXF30738  4163              JMP WRTBUF8X                                    ;201
00730 XXXXDD69  4164              INCR TIMEOUT                                    ;201
00731 XXXX9589  4165              TORIY EXOR,TIMEOUT                              ;201
00732 XXXXFFFF  4166              IDAT H'FFFF
00733 BX23561F  4167              CJMP Z,OD.ERR0E
00734 XXXXF8E1  4168              IA
00735 XXXX0009  4169              IDAT 9
00736 BXF10C26  4170              JSB DELAY
00737 BXF3072C  4171              JMP WRTB9X
              4172   WRTBUF8X:    EQU $                                           ;201
              4173              SETNR DATAOUT,AMPCTRL                           ;201
00738 16XXEFB5  4174              / & ALU & DSTCTRL
              4175              RH WRDCNT          ;SET LOOP COUNTER TO 344     ;201
00739 18F4D84A  4176              / & PUSHLDCT
              4177   WRTBUF2X:    EQU $
0073A XXXXD909  4178              ZR TIMEOUT                                      ;201
0073B BXC30743  4179              CJMP DSTRDY,WRTBUF3X
0073C BXC30743  4180              CJMP DSTRDY,WRTBUF3X
0073D BXC30743  4181              CJMP DSTRDY,WRTBUF3X
0073E BXC30743  4182              CJMP DSTRDY,WRTBUF3X
0073F BXC30743  4183              CJMP DSTRDY,WRTBUF3X
00740 BXC30743  4184              CJMP DSTRDY,WRTBUF3X
00741 BXC30743  4185              CJMP DSTRDY,WRTBUF3X
00742 BXF30771  4186              JMP WRTBUF4X       ;CHECK FOR WRITE ERROR
00743 12XXD840  4187   WRTBUF3X:  RH TEMP3 & WCAR
              4188              TODRR ADD,TEMP3
00744 34XX9E83  4189              / & RCACHE & WDATA  ;OUTPUT AND ADD TO CHECKSUM
00745 XXX8DD60  4190              INCR TEMP3 & RFCT   ;INCREMENT DATA BUFFER AND LOOP
00746 BXF1097B  4191              JSB SENDADR
00747 XXXX950A  4192              TORIY EXOR,WRDCNT
00748 XXXX0157  4193              IDAT LSWRDMAX                                   ;18
00749 BX23075D  4194              CJMP Z,NOPADX
              4195              CON TEMPCKS
0074A B2XX0004  4196              / & WCAR
0074B 3XXXF8C1  4197              HA & RCACHE
0074C XXXX9883  4198              TORAR ADD,TEMP3
              4199              CON TEMPCKS+1
0074D B2XX0005  4200              / & WCAR
0074E 3XXXF8C1  4201              HA & RCACHE
0074F XXXX9883  4202              TORAR ADD,TEMP3
00750 B8F40011  4203              CON 17 & PUSHLDCT
00751 BXC30758  4204   WRTB3X:    CJMP DSTRDY,WRTZROX
00752 BXC30758  4205              CJMP DSTRDY,WRTZROX
00753 BXC30758  4206              CJMP DSTRDY,WRTZROX
00754 BXC30758  4207              CJMP DSTRDY,WRTZROX
00755 BXC30758  4208              CJMP DSTRDY,WRTZROX
00756 BXC30758  4209              CJMP DSTRDY,WRTZROX
00757 BXF30780  4210              JMP WRTB4X
              4211   WRTZROX:   ZH
00758 14XXF900  4212              / & WDATA
00759 XXXX7140  4213              NOOP
0075A XXXX7140  4214              NOOP
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
0075B XXX8XXXX  4215            RFCT
0075C BXF1097B  4216            JSB SENDADR
0075D XXXXD909  4217  NOPADX:   ZR TIMEOUT
0075E XXXXF1F9  4218            TSTNR F.LNGRW,FLAGS                     ;201
0075F BX230761  4219            CJMP Z,$+2
00760 BXF10A05  4220            JSB TERMLRWX                            ;201
              4221  WRTBUF7X:  EQU $
00761 XXXXF8E1  4222            1A
00762 XXXX0009  4223            IDAT 9
00763 BXF10C26  4224            JSB DELAY
00764 5XXXF8C1  4225            HA & SRCSTAT
00765 XXXXF780  4226            TSTNA AMP.P.ER      ;CHECK FOR U-BUS PARITY ERROR
00766 BX230768  4227            CJMP Z,$+2
00767 BXF3062B  4228            JMP OD.ERR02
00768 XXXXDD69  4229            INCR TIMEOUT                            ;201
00769 XXXX9509  4230            TORIY EXOR,TIMEOUT                      ;201
0076A XXXXFFFF  4231            IDAT H#FFFF
0076B BX23061D  4232            CJMP Z,OD.ERR10
0076C XXXXE380  4233            TSTNA ST.BK2
0076D BX230761  4234            CJMP Z,WRTBUF7X                         ;201
              4235  WRTBUF5X:  EQU $
              4236            RSTNR DATAOUT,AMPCTRL
0076E 16XXEFD5  4237            / & ALU & DSTCTRL
0076F BXF10A80  4238            JSB CKAMPSTX
00770 XXFAXXXX  4239            RTN
              4240  ;
              4241  WRTBUF4X:  EQU $
00771 XXXXDD69  4242            INCR TIMEOUT                            ;201
00772 BXC3077F  4243            CJMP DSTRDY,WRT3TIM
00773 XXXX9509  4244            TORIY EXOR,TIMEOUT                      ;201
00774 XXXXFFFF  4245            IDAT H#FFFF
00775 BX23061E  4246            CJMP Z,OD.ERR0F
00776 5XXXF8C1  4247            HA & SRCSTAT
00777 XXXXE380  4248            TSTNA ST.BK2
00778 BX230771  4249            CJMP Z,WRTBUF4X
00779 BXFB077A  4250            POPJMP $+1                              ;201
              4251            RSTNR DATAOUT,AMPCTRL
0077A 16XXEFD5  4252            / & ALU & DSTCTRL
              4253            SETNR FIFOCLR,AMPCTRL
0077B 16XXF7B5  4254            / & ALU & DSTCTRL
              4255            RSTNR FIFOCLR,AMPCTRL
0077C 16XXF7D5  4256            / & ALU & DSTCTRL
0077D BXF10A80  4257            JSB CKAMPSTX
0077E BXF3061C  4258            JMP OD.ERR11
              4259  WRT3TIM:   EQU $                                    ;201
0077F BXF30743  4260            JMP WRTBUF3X
              4261  WRTB4X:    EQU $
00780 XXXXDD69  4262            INCR TIMEOUT                            ;201
00781 BXC3078E  4263            CJMP DSTRDY,WRTB4AX
00782 XXXX9509  4264            TORIY EXOR,TIMEOUT                      ;201
00783 XXXXFFFF  4265            IDAT H#FFFF
00784 BX23061E  4266            CJMP Z,OD.ERR0F
00785 5XXXF8C1  4267            HA & SRCSTAT
00786 XXXXE380  4268            TSTNA ST.BK2
00787 BX230780  4269            CJMP Z,WRTB4X
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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - BUFFER SUBROUTINES

00788 BXFB0789  4270              POPJNP $+1                                        ;201
                4271              RSTNR DATAOUT,AMPCTRL
00789 16XXEFD5  4272              / & ALU & DSTCTRL
                4273              SETNR FIFOCLR,AMPCTRL
0078A 16XXF7B5  4274              / & ALU & DSTCTRL
                4275              RSTNR FIFOCLR,AMPCTRL
0078B 16XXF7D5  4276              / & ALU & DSTCTRL
0078C BXF10A80  4277              JSB CKAMPSTX
0078D BXF3061C  4278              JNP 0D.ERR11
                4279    WRTB4AX:  EQU $                                             ;201
0078E BXF30751  4280              JNP WRTB3X
                4281    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
              4282                EJECT
              4283    ;
              4284    RDBUFX:     EQU $
0078F XXXXF8E1 4285               1A                ;ZERO OUT BUFFER
              4286                IDAT BUF1ADR
00790 12XX023B 4287               / & ALU & WCAR
00791 B8F40160 4288               CON 352 & PUSHLDCT
00792 13XXF900 4289               ZH & WCACHE
              4290                INCA & ALU & WCAR
00793 12X8FC01 4291               / & RFCT
00794 BXF10A5A 4292               JSB GET.RWAX      ;CONVERT TO RELATIVE WORD ADDRESS
              4293                SRC.AMP
              4293 +  IF BANK_EQ_0
00795 BBXX000F 4293 +             CON AMP.PORT & SRCSEL
              4293 +  ELSE
              4293 +  ENDIF
              4293 +              ENDM
              4294                DST.AMP           ;SELECT AMP AS SOURCE AND DEST
              4294 +  IF BANK_EQ_0
00796 BCXX000F 4294 +             CON AMP.PORT & DSTSEL
              4294 +  ELSE
              4294 +  ENDIF
              4294 +              ENDM
00797 5XXXF8C1 4295               HA & SRCSTAT
00798 XXXXE380 4296               TSTNA ST.BK2      ;IS INTERRUPT PRESENT
00799 BX23079C 4297               CJMP Z,$+3
0079A BXF10A80 4298               JSB CKAMPSTX      ;PROCESS INTERRUPT
0079B BXF3061B 4299               JMP OD.ERR12
              4300    RDB1X:      EQU $
0079C XXXXD8F7 4301               IR AMPCMD
0079D XXXX000E 4302               IDAT AF.RD        ;ISSUE READ DATA COMMAND
              4303    ;
0079E XXXXF1F9 4304               TSTNR F.LNGRW,FLAGS                         ;201
0079F BX2307A3 4305               CJMP Z,RDBUF9X                              ;201
007A0 XXXXD8F8 4306               IR AMPWLEN
007A1 XXXXFF90 4307               IDAT HSWDCNT
007A2 BXF307A5 4308               JMP $+3
              4309    RDBUF9X:    EQU $                                       ;201
007A3 XXXXD8F8 4310               IR AMPWLEN
007A4 XXXX0074 4311               IDAT 116
              4312    ;
              4313                CON C.UNIT
007A5 B2XX0024 4314               / & WCAR
007A6 3XXXD8D6 4315               HR AMPUNIT & RCACHE
007A7 BXF10AED 4316               JSB ISUCMDX                                 ;201
007A8 BXF10B1B 4317               JSB ISUADRX       ;ISSUE ADDRESS WORD
007A9 XXXXD903 4318               ZR TEMP3          ;CLEAR CHECKSUM REG
007AA 5XXXF8C1 4319               HA & SRCSTAT
007AB XXXXE380 4320               TSTNA ST.BK2
007AC BX2307AF 4321               CJMP Z,$+3
007AD BXF10A80 4322               JSB CKAMPSTX
007AE BXF3061A 4323               JMP OD.ERR13
007AF XXXXD909 4324               ZR TIMEOUT                                  ;201
              4325    RDBUF8X:    EQU $                                       ;201
007B0 5XXXF8C1 4326               HA & SRCSTAT
```

```
007B1 XXXXF780  4327            TSTNA AMP.P.ER      ;TEST FOR U-BUS PARITY ERROR
007B2 BX2307B4  4328            CJMP Z,$+2
007B3 BXF3062B  4329            JMP OD.ERR02
007B4 XXXXDD69  4330            INCR TIMEOUT                                    ;201
007B5 XXXX9509  4331            TORIY EXOR,TIMEOUT                              ;201
007B6 XXXXFFFF  4332            IDAT H#FFFF
007B7 BX230619  4333            CJMP Z,OD.ERR14
007B8 XXXXF980  4334            TSTNA ENTAGS
007B9 BX2307B0  4335            CJMP Z,RDBUFBX                                  ;201
007BA XXXXD909  4336            ZR TIMEOUT                                      ;201
                4337  RDBY8:    EQU $
007BB BXD307CB  4338            CJMP SRCRDY,RDBY9
007BC XXXXF8E1  4339            IA
007BD XXXX0009  4340            IDAT 9
007BE BXF10C26  4341            JSB DELAY
007BF 5XXXF8C1  4342            HA & SRCSTAT
007C0 XXXXF780  4343            TSTNA AMP.P.ER      ;TEST FOR U-BUS PARITY
007C1 BX2307C3  4344            CJMP Z,$+2
007C2 BXF3062B  4345            JMP OD.ERR02
007C3 XXXXDD69  4346            INCR TIMEOUT                                    ;201
007C4 XXXX9509  4347            TORIY EXOR,TIMEOUT                              ;201
007C5 XXXXFFFF  4348            IDAT H#FFFF
007C6 BX230618  4349            CJMP Z,OD.ERR15
007C7 XXXXE380  4350            TSTNA ST.BK2
007C8 BX2307BB  4351            CJMP Z,RDBY8
007C9 BXF10A80  4352            JSB CKAMPSTX
007CA BXF30617  4353            JMP OD.ERR16
                4354  RDBY9:    EQU $
007CB XXXXD8E7  4355            IR TEMP7                                        ;201
007CC XXXX003B  4356            IDAT BUF0ADR
007CD XXXXD8E0  4357            IR TEMP0
                4358            IDAT BUF1ADR
007CE 12XX023B  4359            / & ALU & WCAR      ;SET TEMP0  TO BUFFER ADDRESS
                4360            RH WRDCNT           ;SET LOOP COUNTER TO WRDCNT  ;201
007CF 18F4D84A  4361            / & PUSHLDCT
007D0 XXXXD909  4362  RDB2X:    ZR TIMEOUT                                      ;201
007D1 BXD307D9  4363            CJMP SRCRDY,RDB3X
007D2 BXD307D9  4364            CJMP SRCRDY,RDB3X
007D3 BXD307D9  4365            CJMP SRCRDY,RDB3X   ;WAIT FOR READY
007D4 BXD307D9  4366            CJMP SRCRDY,RDB3X
007D5 BXD307D9  4367            CJMP SRCRDY,RDB3X
007D6 BXD307D9  4368            CJMP SRCRDY,RDB3X
007D7 BXD307D9  4369            CJMP SRCRDY,RDB3X
007D8 BXF30804  4370            JMP RDB4X
                4371  RDB3X:    EQU $
007D9 12XXD840  4372            RH TEMP0 & WCAR
007DA 43XXF8C1  4373            HA & RDATA & WCACHE
007DB XXXX9883  4374            TORAR ADD,TEMP3     ;INPUT AND ADD TO CHECKSUM
007DC 12X8DD60  4375            INCR TEMP0 & ALU & WCAR & RFCT
007DD BXF109A1  4376            JSB GETADR
007DE XXXX950A  4377            TORIY EXOR,WRDCNT
007DF XXXX0157  4378            IDAT LSWRDMAX                                   ;18
007E0 BX2307F4  4379            CJMP Z,NORDX
                4380            CON TEMPCKS
007E1 B2XX0004  4381            / & WCAR
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
007E2 3XXXF8C1  4382              HA & RCACHE
007E3 XXXX9883  4383              TORAR ADD,TEMP3
                4384              CON TEMPCKS+1
007E4 B2XX0005  4385              / & WCAR
007E5 3XXXF8C1  4386              HA & RCACHE
007E6 XXXX9883  4387              TORAR ADD,TEMP3
007E7 88F40011  4388              CON H#11 & PUSHLDCT
007E8 BXD307F8  4389   RDBZ3X:    CJMP SRCRDY,RDZEOX
007E9 BXD307F0  4390              CJMP SRCRDY,RDZEOX
007EA BXD307F8  4391              CJMP SRCRDY,RDZEOX
007EB BXD307F0  4392              CJMP SRCRDY,RDZEOX
007EC BXD307F8  4393              CJMP SRCRDY,RDZEOX
007ED BXD307F0  4394              CJMP SRCRDY,RDZEOX
007EE BXD307F8  4395              CJMP SRCRDY,RDZEOX
007EF BXF30813  4396              JMP RDBZ4X
007F0 4XXXF8C1  4397   RDZEOX:    HA & RDATA
007F1 XXXX7140  4398              NOOP
007F2 XXX8XXXX  4399              RFCT
007F3 BXF1090D  4400              JSB GETADR1
                4401   NORDX:     SRC.AMP
                4401 +  IF BANK_EQ_0
007F4 BBXX000F  4401 +            CON AMP.PORT & SRCSEL
                4401 +  ELSE
                4401 +  ENDIF
                4401 +            ENDM
007F5 XXXXF1F9  4402              TSTNR F.LNGRW,FLAGS                    ;201
007F6 BX2307F8  4403              CJMP Z,RDB5X
007F7 BXF10AC5  4404              JSB TERMLRWX
                4405   RDB5X:     EQU $
007F8 5XXXF8C1  4406              HA & SRCSTAT
007F9 XXXXF780  4407              TSTNA AMP.P.ER
007FA BX2307FC  4408              CJMP Z,$+2
007FB BXF30628  4409              JMP OD.ERR02
007FC XXXXDD69  4410              INCR TIMEOUT                           ;201
007FD XXXX9509  4411              TORIY EXOR,TIMEOUT                     ;201
007FE XXXXFFFF  4412              IDAT H#FFFF
007FF BX230615  4413              CJMP Z,OD.ERR18
00800 XXXXE380  4414              TSTNA ST.BK2
00801 BX2307F8  4415              CJMP Z,RDB5X        ;WAIT FOR STATUS
00802 BXF10A80  4416              JSB CKAMPSTX
00803 XXFAXXXX  4417              RTN
                4418   ;
                4419   RDB4X:     EQU $
00804 XXXXDD69  4420              INCR TIMEOUT                           ;201
00805 BXD30812  4421              CJMP SRCRDY,RD3FIN
00806 5XXXF8C1  4422              HA & SRCSTAT
00807 XXXXF780  4423              TSTNA AMP.P.ER
00808 BX23080A  4424              CJMP Z,$+2
00809 BXF30628  4425              JMP OD.ERR02
0080A XXXX9509  4426              TORIY EXOR,TIMEOUT                     ;201
0080B XXXXFFFF  4427              IDAT H#FFFF
0080C BX230616  4428              CJMP Z,OD.ERR17
0080D XXXXE380  4429              TSTNA ST.BK2
0080E BX230804  4430              CJMP Z,RDB4X
0080F BXF80810  4431              POPJMP $+1                             ;201
```

```
00810 BXF10A80  4432              JSB CKAMPSTX
00811 BXF30614  4433              JMP OD.ERR19
                4434    RD3TIM:   EQU $                                   ;201
00812 BXF307D9  4435              JMP RDB3X
                4436    RDBZ4X:   EQU $
00813 XXXXDD69  4437              INCR TIMEOUT                            ;201
00814 BXD30821  4438              CJMP SRCRDY,RD3ZTIM
00815 5XXXF8C1  4439              HA & SRCSTAT
00816 XXXXF780  4440              TSTNA AMP.P.ER
00817 BX230819  4441              CJMP Z,$+2
00818 BXF3062B  4442              JMP OD.ERR02
00819 XXXX9509  4443              TORIY EXOR,TIMEOUT                      ;201
0081A XXXXFFFF  4444              IDAT H#FFFF
0081B BX230616  4445              CJMP Z,OD.ERR17
0081C XXXXE300  4446              TSTNA ST.BK2
0081D BX230813  4447              CJMP Z,RDBZ4X
0081E BXFB081F  4448              POPJMP $+1                              ;201
0081F BXF10A80  4449              JSB CKAMPSTX
00820 BXF30614  4450              JMP OD.ERR19
                4451    RD3ZTIM:  EQU $                                   ;201
00821 BXF307E8  4452              JMP RDBZ3X
                4453    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
                4454                EJECT
                4455    ;
                4456    ; WRTBUFFY
                4457    ; THIS SUBROUTINE WILL BE USED FOR DEVELOPMENT ONLY AND WILL
                4458    ; WRITE THE DATA IN THE DATA BUFFER (344 PARCELS), TO THE ADDRESS
                4459    ; SPECIFIED BY THE CDC CYLINDER, TRACK AND SECTOR DATA IN THE
                4460    ; CURRENT UNITS CONTROL AREA. THE CYLINDER, TRACK AND SECTOR DATA
                4461    ; WILL ALSO BE WRITTEN, AS WILL THE CHECKSUM OF THE RECORD.
                4462    ;
                4463    ; THE UNIT TO USE MUST BE IN LOC C.UNIT AND THE DESIRED DATA IN
                4464    ; THE DATA BUFFER BEFORE ENTRY TO THE SUBROUTINE.
                4465    ;
                4466    WRTBUFFY:   EQU $
00822 BXF10A5A  4467                JSB GET.RWAX
                4468                SRC.AMP
                4468 +  IF BANK_EQ_0
00823 B8XX000F  4468 +              CON AMP.PORT & SRCSEL
                4468 +  ELSE
                4468 +  ENDIF
                4468 +              ENDM
                4469                DST.AMP             ;SELECT AMP AS SOURCE AND DEST
                4469 +  IF BANK_EQ_0
00824 BCXX000F  4469 +              CON AMP.PORT & DSTSEL
                4469 +  ELSE
                4469 +  ENDIF
                4469 +              ENDM
00825 5XXXF8C1  4470                HA & SRCSTAT
00826 XXXXE380  4471                TSTNA ST.BK2        ;IS INTERRUPT PRESENT
00827 BX23082A  4472                CJMP Z,$+3
00828 BXF10A80  4473                JSB CKAMPSTX        ;PROCESS INTERRUPT
00829 BXF30620  4474                JMP OD.ERR0D
                4475    WRTBUF1Y:   EQU $
0082A XXXXD0F7  4476                IR AMPCMD
0082B XXXX000D  4477                IDAT AF.WRT         ;ISSUE WRITE DATA COMMAND
0082C XXXXD0F8  4478                IR AMPWLEN
0082D XXXXFF90  4479                IDAT HSWDCNT
                4480                CON C.UNIT
0082E B2XX0024  4481                / & WCAR
0082F 3XXXD0D6  4482                HR AMPUNIT & RCACHE
00830 BXF10AED  4483                JSB ISUCMDX                                         ;201
00831 BXF10B1B  4484                JSB ISUADRX         ;ISSUE ADDRESS WORD
                4485    WRTYLOOP:   EQU $
00832 BXF10A5A  4486                JSB GET.RWAX
00833 BXF1094A  4487                JSB PTRNGEN         ;GENERATE DATA FOR THIS PASS
00834 XXXXD903  4488                ZR TEMP3            ;CLEAR CHECKSUM REG
00835 XXXXD8E0  4489                IR TEMP0
                4490                IDAT BUF0ADR
00836 12XX003B  4491                / & ALU & WCAR      ;SET TEMP0  TO BUFFER ADDRESS
00837 XXXXD909  4492                ZR TIMEOUT                                          ;201
00838 5XXXE390  4493                TSTND ST.BK2 & SRCSTAT
00839 BX23083B  4494                CJMP Z,$+2
0083A BXF30620  4495                JMP OD.ERR0D
                4496    WRTYLP9:    EQU $
0083B 6XXXF8C1  4497                HA & DSTSTAT
0083C XXXXE780  4498                TSTNA ODREQ
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
00838 BX23083F  4499            CJNP Z,$+2
00839 BXF30847  4500            JNP WRTYLP8                                     ;201
0083F XXXXDD69  4501            INCR TIMEOUT                                    ;201
00840 XXXX9509  4502            TORIY EXOR,TIMEOUT                              ;201
00841 XXXXFFFF  4503            IDAT H#FFFF
00842 BX23061F  4504            CJNP Z,OD.ERROE
00843 XXXXF8E1  4505            IA
00844 XXXX0009  4506            IDAT 9
00845 BXF10C26  4507            JSB DELAY
00846 BXF3083B  4508            JNP WRTYLP9
              4509  WRTYLP8:    EQU $                                           ;201
              4510              SETNR DATAOUT,AMPCTRL                           ;201
00847 16XXEFB5  4511            / & ALU & DSTCTRL
              4512              RH WRDCNT          ;SET LOOP COUNTER TO 344     ;201
00848 18F4D84A  4513            / & PUSHLDCT
              4514  WRTBUF2Y:   EQU $
00849 XXXXD909  4515            ZR TIMEOUT                                      ;201
0084A BXC30850  4516            CJNP DSTRDY,WRTBUF3Y
0084B BXC30850  4517            CJNP DSTRDY,WRTBUF3Y
0084C BXC30850  4518            CJNP DSTRDY,WRTBUF3Y
0084D BXC30850  4519            CJNP DSTRDY,WRTBUF3Y
0084E BXC30850  4520            CJNP DSTRDY,WRTBUF3Y
0084F BXF30880  4521            JNP WRTBUF4Y       ;CHECK FOR WRITE ERROR
00850 12XXD849  4522  WRTBUF3Y:  RH TEMP0 & WCAR
              4523              TODRR ADD,TEMP3    ; OUTPUT AND ADD TO CHECKSUM
00851 34XX9E83  4524            / & RCACHE & WDATA
00852 XXX8DD60  4525            INCR TEMP0 & RFCT  ; INCREMENT DATA BUFFER AND LOOP
00853 BXF1097B  4526            JSB SENDADR
00854 XXXX950A  4527            TORIY EXOR,WRDCNT
00855 XXXX0157  4528            IDAT LSWRDMAX                                   ;18
00856 BX23086A  4529            CJNP Z,NOPADY
              4530              CON TEMPCKS
00857 B2XX0004  4531            / & WCAR
00858 3XXXF8C1  4532            HA & RCACHE
00859 XXXX9883  4533            TORAR ADD,TEMP3
              4534              CON TEMPCKS+1
0085A B2XX0005  4535            / & WCAR
00858 3XXXF8C1  4536            HA & RCACHE
0085C XXXX9883  4537            TORAR ADD,TEMP3
0085D B8F40011  4538            CON 17 & PUSHLDCT
0085E BXC30865  4539  WRTB3Y:   CJNP DSTRDY,WRTZROY
0085F BXC30865  4540            CJNP DSTRDY,WRTZROY
00860 BXC30865  4541            CJNP DSTRDY,WRTZROY
00861 BXC30865  4542            CJNP DSTRDY,WRTZROY
00862 BXC30865  4543            CJNP DSTRDY,WRTZROY
00863 BXC30865  4544            CJNP DSTRDY,WRTZROY
00864 BXF3088F  4545            JNP WRTB4Y
              4546  WRTZROY:    ZH
00865 14XXF900  4547            / & WDATA
00866 XXXX7140  4548            NOOP
00867 XXXX7140  4549            NOOP
00868 XXX8XXXX  4550            RFCT
00869 BXF1097B  4551            JSB SENDADR
0086A XXXXC1EE  4552  NOPADY:   DECR TEMPLNG       ;CHECK FOR TERMINATION
0086B BX230871  4553            CJNP Z,WRTYTERM
```

```
 Addr      Line - AMPERIF 7155/865 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGS - BUFFER SUBROUTINES

00086C BXF10A44  4554             JSB INCSECTX        ;INCREMENT SECTOR
00086D 5XXXE390  4555             TSTND ST.BK2 & SRCSTAT
00086E BX230870  4556             CJMP Z,$+2
00086F BXF3061C  4557             JMP OD.ERR11
000870 BXF30832  4558             JMP WRTYLOOP        ;RETURN TO WRITE LOOP
                 4559  WRTYTERM:  EQU $
000871 XXXXD909  4560             ZR TIMEOUT                                    ;201
000872 BXF10A05  4561             JSB TERMLRWX                                  ;201
                 4562  WRTYTR9:   EQU $                                         ;201
000873 5XXXF8C1  4563             MA & SRCSTAT
000874 XXXXF780  4564             TSTMA AMP.P.ER      ;CHECK FOR U-BUS PARITY ERROR
000875 BX230877  4565             CJMP Z,$+2
000876 BXF30628  4566             JMP OD.ERR02
000877 XXXXDD69  4567             INCR TIMEOUT                                  ;201
000878 XXXX9509  4568             TORIY EXOR,TIMEOUT                            ;201
000879 XXXXFFFF  4569             IDAT M#FFFF
00087A BX23061D  4570             CJMP Z,OD.ERR10
00087B XXXXE380  4571             TSTMA ST.BK2
00087C BX230873  4572             CJMP Z,WRTYTR9                                ;201
                 4573  WRTBUF5Y:  EQU $
                 4574             RSTMR DATAOUT,AMPCTRL
00087D 16XXEFD5  4575             / & ALU & DSTCTRL
00087E BXF10A80  4576             JSB CKAMPSTX
00087F XXFAXXXX  4577             RTN
                 4578  ;
                 4579  ;
                 4580  WRTBUF4Y:  EQU $
000880 XXXXDD69  4581             INCR TIMEOUT                                  ;201
000881 BXC3088E  4582             CJMP DSTRDY,WRT3TIMY
000882 XXXX9509  4583             TORIY EXOR,TIMEOUT                            ;201
000883 XXXXFFFF  4584             IDAT M#FFFF
000884 BX23061E  4585             CJMP Z,OD.ERR0F
000885 5XXXF8C1  4586             MA & SRCSTAT
000886 XXXXE380  4587             TSTMA ST.BK2
000887 BX230880  4588             CJMP Z,WRTBUF4Y
000888 BXFB0889  4589             POPJMP $+1                                    ;201
                 4590             RSTMR DATAOUT,AMPCTRL
000889 16XXEFD5  4591             / & ALU & DSTCTRL
                 4592             SETMR FIFOCLR,AMPCTRL
00088A 16XXF7B5  4593             / & ALU & DSTCTRL
                 4594             RSTMR FIFOCLR,AMPCTRL
00088B 16XXF7D5  4595             / & ALU & DSTCTRL
00088C BXF10A80  4596             JSB CKAMPSTX
00088D BXF3061C  4597             JMP OD.ERR11
                 4598  ;
                 4599  WRT3TIMY:  EQU $                                         ;201
00088E BXF30850  4600             JMP WRTBUF3Y
                 4601  ;
                 4602  WRTB4Y:    EQU $
00088F XXXXDD69  4603             INCR TIMEOUT                                  ;201
000890 BXC3089C  4604             CJMP DSTRDY,WRTB4AY
000891 XXXX9509  4605             TORIY EXOR,TIMEOUT                            ;201
000892 XXXXFFFF  4606             IDAT M#FFFF
000893 BX23061E  4607             CJMP Z,OD.ERR0F
000894 5XXXF8C1  4608             MA & SRCSTAT
```

```
00895 XXXXE380  4608              TSTNA ST.BK2
00896 BX23088F  4610              CJMP Z,WRTB4Y
00897 BXFB0898  4611              POPJMP $+1                                    ;201
              4612              RSTNR DATAOUT,AMPCTRL
00898 16XXEFD5  4613              / & ALU & DSTCTRL
              4614              SETNR FIFOCLR,AMPCTRL
00899 16XXF7B5  4615              / & ALU & DSTCTRL
              4616              RSTNR FIFOCLR,AMPCTRL
0089A 16XXF7D5  4617              / & ALU & DSTCTRL
0089B BXF3861C  4618              JMP OD.ERR11
              4619  WRTB4AY:    EQU $                                         ;201
0089C BXF3085E  4620              JMP WRTB3Y
              4621  ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
              4622                EJECT
              4623    ;
              4624    RDBUFY:     EQU $
0089D BXF10A5A 4625               JSB GET.RWAX        ;CONVERT TO RELATIVE WORD ADDRESS
              4626                SRC.AMP
              4626 +  IF BANK_EQ_0
0089E BBXX000F 4626 +             CON AMP.PORT & SRCSEL
              4626 +  ELSE
              4626 +  ENDIF
              4626 +              ENDM
              4627                DST.AMP             ;SELECT AMP AS SOURCE AND DEST
              4627 +  IF BANK_EQ_0
0089F BCXX000F 4627 +             CON AMP.PORT & DSTSEL
              4627 +  ELSE
              4627 +  ENDIF
              4627 +              ENDM
008A0 5XXXF8C1 4628               RA & SRCSTAT
008A1 XXXXE380 4629               TSTNA ST.BK2        ;IS INTERRUPT PRESENT
008A2 BX2308A5 4630               CJNP Z,$+3
008A3 BXF10A80 4631               JSB CKAMPSTX        ;PROCESS INTERRUPT
008A4 BXF3061C 4632               JNP OD.ERR11
              4633    RDBIY:      EQU $
008A5 XXXXD8F7 4634               IR AMPCMD
008A6 XXXX000E 4635               IDAT AF.RD          ;ISSUE READ DATA COMMAND
008A7 XXXXD8F8 4636               IR AMPWLEN
008A8 XXXXFF90 4637               IDAT RSWDCNT
              4638                CON C.UNIT
008A9 82XX0024 4639               / & WCAR
008AA 3XXXD8D6 4640               RR AMPUNIT & RCACHE
008AB BXF10AED 4641               JSB ISUCMDX                                       ;201
008AC BXF10B1B 4642               JSB ISUADRX         ;ISSUE ADDRESS WORD
              4643    RDBYLOOP:   EQU $
008AD BXF10A5A 4644               JSB GET.RWAX
008AE BXF1094A 4645               JSB PTRNGEN
008AF XXXXF8E1 4646               IA                  ;ZERO OUT BUFFER
              4647                IDAT BUF1ADR
008B0 12XX023B 4648               / & ALU & WCAR
008B1 B8F40160 4649               CON 352 & PUSHLDCT
008B2 13XXF900 4650               ZR & WCACHE
              4651                INCA & ALU & WCAR
008B3 12X8FC81 4652               / & RFCT
008B4 XXXXD903 4653               ZR TEMP3            ;CLEAR CHECKSUM REG
008B5 5XXXF8C1 4654               RA & SRCSTAT
008B6 XXXXE380 4655               TSTNA ST.BK2
008B7 BX2308BA 4656               CJNP Z,$+3
008B8 BXF10A80 4657               JSB CKAMPSTX
008B9 BXF3051A 4658               JNP OD.ERR13
008BA XXXXD909 4659               ZR TIMEOUT                                        ;201
              4660    RDBYLP9:    EQU $                                             ;201
008BB 5XXXF8C1 4661               RA & SRCSTAT
008BC XXXXF780 4662               TSTNA AMP.P.ER      ;TEST FOR U-BUS PARITY ERROR
008BD BX2308BF 4663               CJNP Z,$+2
008BE BXF3062B 4664               JNP OD.ERR02
008BF XXXXDD69 4665               INCR TIMEOUT                                      ;201
008C0 XXXX9509 4666               TORIY EXOR,TIMEOUT                                ;201
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGS - BUFFER SUBROUTINES

```
008C1 XXXXFFFF  4667            IDAT H#FFFF
008C2 BX230619  4668            CJMP Z,OD.ERR14
008C3 XXXXF980  4669            TSTMA ENTAGS
008C4 BX2308DD  4670            CJMP Z,RDBYLP9                          ;201
              4671    RDBY.2:   EQU $                                   ;201
008C5 XXXXD909  4672            ZR TIMEOUT                              ;201
008C6 BXD308D6  4673            CJMP SRCRDY,RDBY.1
008C7 XXXXF8E1  4674            1A
008C8 XXXX0009  4675            IDAT 9
008C9 BXF16C26  4676            JSB DELAY
008CA 5XXXF8C1  4677            MA & SRCSTAT
008CB XXXXF780  4678            TSTMA AMP.P.ER      ;TEST FOR U-BUS PARITY
008CC BX2308CE  4679            CJMP Z,$+2
008CD BXF3062B  4680            JMP OD.ERR02
008CE XXXXDD69  4681            INCR TIMEOUT                            ;201
008CF XXXX9509  4682            TORIY EXOR,TIMEOUT                      ;201
008D0 XXXXFFFF  4683            IDAT H#FFFF
008D1 BX230618  4684            CJMP Z,OD.ERR15
008D2 XXXXE380  4685            TSTMA ST.8K2
008D3 BX2308C5  4686            CJMP Z,RDBY.2
008D4 BXF10A80  4687            JSB CKAMPSTX
008D5 BXF30617  4688            JMP OD.ERR16
              4689    RDBY.1:   EQU $
008D6 XXXXD8E7  4690            IR TEMP7                                ;201
008D7 XXXX003B  4691            IDAT BUF0ADR
008D8 XXXXD8E0  4692            IR TEMP0
              4693            IDAT BUF1ADR
008D9 12XX023B  4694            / & ALU & WCAR      ;SET TEMP0  TO BUFFER ADDRESS
              4695            RH WRDCNT           ;SET LOOP COUNTER TO TEMP B ;201
008DA 10F4D84A  4696            / & PUSHLDCT
008DB XXXXD909  4697    RDB2Y:  ZR TIMEOUT                              ;201
008DC BXD308E2  4698            CJMP SRCRDY,RDB3Y
008DD BXD308E2  4699            CJMP SRCRDY,RDB3Y
008DE BXD308E2  4700            CJMP SRCRDY,RDB3Y   ;WAIT FOR READY
008DF BXD308E2  4701            CJMP SRCRDY,RDB3Y
008E0 BXD308E2  4702            CJMP SRCRDY,RDB3Y
008E1 BXF30914  4703            JMP RDB4Y
              4704    RDB3Y:  EQU $
008E2 12XXD840  4705            RH TEMP0 & WCAR
008E3 43XXF8C1  4706            MA & RDATA & WCACHE
008E4 XXXX9883  4707            TORAR ADD,TEMP3     ;INPUT AND ADD TO CHECKSUM
008E5 12X8DD60  4708            INCR TEMP0 & ALU & WCAR & RFCT
008E6 BXF109A1  4709            JSB GETADR
008E7 XXXX950A  4710            TORIY EXOR,WRDCNT
008E8 XXXX0157  4711            IDAT LSWRDMAX                           ;18
008E9 BX2308FC  4712            CJMP Z,NORDY
              4713            CON TEMPCKS
008EA B2XX0004  4714            / & WCAR
008EB 3XXXF8C1  4715            MA & RCACHE
008EC XXXX9883  4716            TORAR ADD,TEMP3
              4717            CON TEMPCKS+1
008ED B2XX0005  4718            / & WCAR
008EE 3XXXF8C1  4719            MA & RCACHE
008EF XXXX9883  4720            TORAR ADD,TEMP3
008F0 B8F40011  4721            CON H#11 & PUSHLDCT
```

```
008F1 BXD308F8  4722    RDBZ3Y:     CJNP SRCRDY,RDZEOY
008F2 BXD308F8  4723                CJNP SRCRDY,RDZEOY
008F3 BXD308F8  4724                CJNP SRCRDY,RDZEOY
008F4 BXD308F8  4725                CJNP SRCRDY,RDZEOY
008F5 BXD308F8  4726                CJNP SRCRDY,RDZEOY
008F6 BXD308F8  4727                CJNP SRCRDY,RDZEOY
008F7 BXF30922  4728                JNP RDBZ4Y
008F8 4XXXF8C1  4729    RDZEOY:     HA & RDATA
008F9 XXXX7140  4730                NOOP
008FA XXX8XXXX  4731                RFCT
008FB BXF109D3  4732                JSB GETADR1
                4733    NORDY:      EQU $
008FC XXXXF1F9  4734                TSTNR F.LNGRN,FLAGS                         ;201
008FD BX2308FF  4735                CJNP Z,$+2
008FE BXF10930  4736                JSB CNPBUF
008FF BXF10671  4737                JSB CKERROR
                4738                SRC.AMP
                4738 +  IF BANK_EQ_0
00900 BBXX000F  4738 +              CON AMP.PORT & SRCSEL
                4738 +  ELSE
                4738 +  ENDIF
                4738 +              ENDM
00901 XXXXD909  4739                ZR TIMEOUT                                  ;201
00902 XXXXC1EE  4740                DECR TEMPLNG
00903 BX230906  4741                CJNP Z,RDBYTERM
00904 BXF10A44  4742                JSB INCSECTX
00905 BXF309AD  4743                JNP RDBYLOOP
                4744    RDBYTERM:   EQU $
00906 BXF10A05  4745                JSB TERMLRWX                                ;201
                4746    RDB5Y:      EQU $
00907 5XXXF8C1  4747                HA & SRCSTAT
00908 XXXXF780  4748                TSTNA AMP.P.ER
00909 BX23090B  4749                CJNP Z,$+2
0090A BXF3062B  4750                JNP OD.ERR02
0090B BXD3090B  4751                CJNP SRCRDY,$
0090C XXXXDD69  4752                INCR TIMEOUT                                ;201
0090D XXXX9509  4753                TORIY EXOR,TIMEOUT                          ;201
0090E XXXXFFFF  4754                IDAT H#FFFF
0090F BX230615  4755                CJNP Z,OD.ERR18
00910 XXXXE380  4756                TSTNA ST.BK2
00911 BX230907  4757                CJNP Z,RDB5Y        ;WAIT FOR STATUS
00912 BXF10A80  4758                JSB CKAMPSTX                                ;201
00913 XXFAXXXX  4759                RTN
                4760    ;
                4761    RDB4Y:      EQU $
00914 XXXXDD69  4762                INCR TIMEOUT                                ;201
00915 BXD30921  4763                CJNP SRCRDY,RD3TIMY
00916 5XXXF8C1  4764                HA & SRCSTAT
00917 XXXXF780  4765                TSTNA AMP.P.ER
00918 BX23091A  4766                CJNP Z,$+2
00919 BXF3062B  4767                JNP OD.ERR02
0091A XXXX9509  4768                TORIY EXOR,TIMEOUT                          ;201
0091B XXXXFFFF  4769                IDAT H#FFFF
0091C BX230616  4770                CJNP Z,OD.ERR17
0091D XXXXE380  4771                TSTNA ST.BK2
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - BUFFER SUBROUTINES

0091E BX230914  4772              CJMP Z,RDB4Y
0091F BXFB0920  4773              POPJMP $+1                                ;201
00920 BXF30614  4774              JMP OD.ERR19
                4775   RD3TIMY:   EQU $                                     ;201
00921 BXF308E2  4776              JMP RDB3Y
                4777   ;
                4778   RDBZ4Y:    EQU $
00922 XXXXDD69  4779              INCR TIMEOUT                              ;201
00923 BXD3092F  4780              CJMP SRCRDY,RD3ZTIY
00924 5XXXF8C1  4781              HA & SRCSTAT
00925 XXXXF780  4782              TSTNA AMP.P.ER
00926 BX230928  4783              CJMP Z,$+2
00927 BXF30628  4784              JMP OD.ERR02
00928 XXXX9509  4785              TOR1Y EXOR,TIMEOUT                        ;201
00929 XXXXFFFF  4786              IDAT H#FFFF
0092A BX230616  4787              CJMP Z,OD.ERR17
0092B XXXXE380  4788              TSTNA ST.BK2
0092C BX230922  4789              CJMP Z,RDBZ4Y
                4790   ;
0092D BXFB092E  4791              POPJMP $+1                                ;201
0092E BXF30614  4792              JMP OD.ERR19
                4793   RD3ZTIY:   EQU $                                     ;201
0092F BXF308F1  4794              JMP RDBZ3Y
                4795   ;
```

```
 Addr          Line - AMPERIF 7155/865 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - BUFFER SUBROUTINES

               4796                EJECT
               4797    ;
               4798    ; CMPBUF -
               4799    ; COMPARE THE WRITE BUFFER WITH THE READ BUFFER AND SET
               4800    ; ERROR IN GENERAL STATUS IF ERROR. ALSO COMPARE ADDRESS READ IN
               4801    ; READ BUFFER WITH CDC CYL,TK, AND SECT.
               4802    ;
               4803    CMPBUF:     EQU $
00930 XXXXD907 4804                ZR TEMP7
00931 XXXXD8E1 4805                IR TEMP1
00932 XXXX003B 4806                IDAT BUF0ADR
00933 XXXXD8E2 4807                IR TEMP2
               4808                IDAT BUF1ADR
00934 12XX023D 4809                / & ALU & WCAR
               4810                RH WRDCNT           ;SET LOOP COUNTER TO REG B
00935 18F4D84A 4811                / & PUSHLDCT
               4812    CMPB2:      EQU $
00936 3XXXF8C1 4813                HA & RCACHE
00937 12XXD841 4814                RH TEMP1 & WCAR
00938 3XXXD8C5 4815                HR TEMP5 & RCACHE   ;READ BUFFER DATA
00939 XXXX3105 4816                TORAY EXOR,TEMP5
0093A BX23093D 4817                CJNP Z,CMPB4
0093B XXXXDD67 4818                INCR TEMP7          ;INCREMENT ERROR COUNTER
0093C XXXXD884 4819                AR TEMP4
0093D XXXXDD61 4820    CMPB4:      INCR TEMP1
               4821                INCR TEMP2
               4822                / & ALU & WCAR
0093E 12X8DD62 4823                / & RFCT            ; INCREMENT DATA BUFFER AND LOOP
0093F 1XXXD847 4824                RH TEMP7
00940 XX2AXXXX 4825                CRTN Z
               4826                CON ERRCODE
00941 B2XX0023 4827                / & WCAR
00942 3XXXF8C1 4828                HA & RCACHE
00943 13XXED82 4829                SETNA BIT6 & ALU & WCACHE
               4830                CON EXPDAT          ;RECORD EXPECTED DATA
00944 B2XX0035 4831                / & WCAR
00945 13XXD845 4832                RH TEMP5 & WCACHE
               4833                CON RECDAT          ;RECORD RECEIVED DATA
00946 B2XX0036 4834                / & WCAR
00947 13XXD844 4835                RH TEMP4 & WCACHE
00948 8XF10A2D 4836                JSB SETALERT
00949 XXFAXXXX 4837                RTN
               4838    ;
```

```
              4839              EJECT
              4840    ;
              4841    ; PTRNGEN
              4842    ; THIS SUBROUTINE WILL REGENERATE A PATTERN IN THE BUFFER USING
              4843    ; REL.WD2 AS A BASE NUMBER.
              4844    ;
              4845    PTRNGEN:    EQU $
0094A XXXXE5F9 4846               TSTNR F.SAVPAT,FLAGS                                  ;201
0094B BX23094D 4847               CJMP Z,$+2
0094C XXFAXXXX 4848               RTN               ;USE THE SAME PATTERN AS LAST TIME
0094D XXXXE3F9 4849               TSTNR F.RWAPAT,FLAGS                                  ;201
0094E BX230950 4850               CJMP Z,$+2
0094F BXF30956 4851               JMP PTRNGEN1
              4852    ; USE INCREMENTING DATA PATTERN
00950 XXXXD8E0 4853               IR TEMP0
              4854                IDAT BUF0ADR
00951 12XX003B 4855               / & ALU & WCAR
              4856                RH WRDCNT
00952 18F4D84A 4857               / & PUSHLOCT
00953 13XXD040 4858               RH TEMP0 & WCACHE
00954 12X8DD60 4859               INCR TEMP0 & ALU & WCAR & RFCT
00955 XXFAXXXX 4860               RTN
              4861    ; USE RELATIVE WORD ADDRESS AS PATTERN
00956 BXF10A5A 4862    PTRNGEN1:   JSB GET.RWAX        ;GET RELATIVE WORD ADDRESS
              4863                CON REL.WD1                                           ;201
00957 B2XX000D 4864               / & WCAR                                              ;201
00958 3XXXF8C1 4865               HA & RCACHE
00959 XXXXE99D 4866               RTAA 4            ;PLACE RWA BITS 15-12
0095A XXXXC4C1 4867               TOAIR AND,TEMP1   ;IN TEMP1
0095B XXXX000F 4868               IDAT H#0F
              4869                HR TEMP2
0095C 3XXXD8C2 4870               / & RCACHE
0095D XXXX9CC2 4871               TORIR AND,TEMP2   ;PLACE RWA BITS 11-0
0095E XXXX0FFF 4872               IDAT H#0FFF       ;IN TEMP2
0095F B2XX000E 4873               CON REL.WD2 & WCAR                                    ;201
00960 3XXXF8C1 4874               HA & RCACHE
00961 XXXXE99D 4875               RTAA 4            ;PLACE RWA BITS 31-28
00962 XXXXC4C3 4876               TOAIR AND,TEMP3   ;IN TEMP3
00963 XXXX000F 4877               IDAT H#0F
              4878                HR TEMP4
00964 3XXXD8C4 4879               / & RCACHE
00965 XXXX9CC4 4880               TORIR AND,TEMP4   ;PLACE RWA BITS 27-16
00966 XXXX0FFF 4881               IDAT H#0FFF       ;IN TEMP4
00967 XXXXD8E0 4882               IR TEMP0
              4883                IDAT BUF0ADR
00968 12XX003B 4884               / & ALU & WCAR
00969 XXXXD80A 4885               RA WRDCNT
              4886    PTRNLOP:    EQU $
0096A 13XXD841 4887               RH TEMP1 & WCACHE
0096B 12XXDD60 4888               INCR TEMP0 & ALU & WCAR
0096C XXXXE185 4889               DECA
0096D XX2AXXXX 4890               CRTN Z
0096E 13XXD842 4891               RH TEMP2 & WCACHE
0096F 12XXDD60 4892               INCR TEMP0 & ALU & WCAR
00970 XXXXE185 4893               DECA
```

```
 Addr          Line - AMPERIF /155/80S EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - BUFFER SUBROUTINES

00971 XX2AXXXX  4894              CRTN Z
00972 13XXD843  4895              RH TEMP3 & WCACHE
00973 12XXDD60  4896              INCR TEMP0 & ALU & WCAR
00974 XXXXE185  4897              DECA
00975 XX2AXXXX  4898              CRTN Z
00976 13XXD844  4899              RH TEMP4 & WCACHE
00977 12XXDD60  4900              INCR TEMP0 & ALU & WCAR
00978 XXXXE185  4901              DECA
00979 XX2AXXXX  4902              CRTN Z
0097A BXF3096A  4903              JMP PTRNLOP
                4904    ;
                4905              TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE SENDADR
```

```
                4906                EJECT
                4907    ;
                4908    ; SENDADR WILL PICK UP THE CURRENT CDC ADDRESS
                4909    ; AND SEND IT TO AMPERIF IN THE DATA FOR THIS RECORD
                4910    ; AND CHECK SUM AND SEND THE CHECK SUM IN THE DATA
                4911    ;
                4912    SENDADR:    EQU $
00978 XXXXD8E0  4913                IR TEMP0
                4914                IDAT CDC.CYL
0097C 12XX000A  4915                / & ALU & WCAR
0097D BXC3097F  4916                CJMP DSTRDY,$+2
0097E BXF3061E  4917                JMP OD.ERR0F
                4918                HA & RCACHE
0097F 34XXF8C1  4919                / & WDATA           ;OUTPUT 12 BITS OF CYLINDER
00980 XXXX9883  4920                TORAR ADD,TEMP3
00981 2XXXF8C1  4921                HA & RCAR
                4922                INCA
00982 12XXFC81  4923                / & ALU & WCAR
00983 3XXXD8C0  4924                HR TEMP0 & RCACHE
                4925                INCA
00984 12XXFC81  4926                / & ALU & WCAR
00985 3XXXF8C1  4927                HA & RCACHE
00986 XXXXED9D  4928                RTAA 6
00987 BXC30989  4929                CJMP DSTRDY,$+2
00988 BXF3061E  4930                JMP OD.ERR0F
                4931                TORAR OR,TEMP0      ;OUTPUT 12 BITS OF SECTOR/TRACK
00989 14XX9940  4932                / & ALU & WDATA
0098A XXXXD800  4933                RA TEMP0
0098B XXXX9883  4934                TORAR ADD,TEMP3
0098C XXXXD803  4935                RA TEMP3
0098D XXXXE99D  4936                RTAA 4
0098E XXXXE4C1  4937                TOAI AND,NRA
0098F XXXX000F  4938                IDAT H#0F
00990 BXC30992  4939                CJMP DSTRDY,$+2
00991 BXF3061E  4940                JMP OD.ERR0F
00992 14XXF880  4941                AH & WDATA          ;OUTPUT UPPER 4 BITS OF CHECKSUM
                4942                CON TEMPCKS
00993 B2XX0004  4943                / & WCAR
00994 13XXF880  4944                AH & WCACHE
00995 BXC30997  4945                CJMP DSTRDY,$+2
00996 BXF3061E  4946                JMP OD.ERR0F
00997 14XXD843  4947                RH TEMP3 & WDATA    ;OUTPUT LOWER 12 BITS OF CHECKSUM
                4948                CON TEMPCKS+1
00998 B2XX0005  4949                / & WCAR
00999 XXXXD803  4950                RA TEMP3
0099A XXXXE4C1  4951                TOAI AND,NRA
0099B 13XX0FFF  4952                IDAT H#0FFF & ALU & WCACHE
                4953    SENDAD9:    EQU $                                       ;201
0099C 6XXXF8C1  4954                HA & DSTSTAT
0099D XXXXE4C1  4955                TOAI AND,NRA
0099E XXXX0085  4956                IDAT H#085
0099F XX2AXXXX  4957                CRTN Z
009A0 BXF3099C  4958                JMP SENDAD9                                 ;201
                4959    ;
                4960                TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE GETADR
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE GETADR

```
              4961              EJECT
              4962   ;
              4963   GETADR:    EQU $
              4964              CON CDC.CYL
009A1 B2XX000A 4965              / & WCAR
009A2 BXD309A4 4966              CJNP SRCRDY,$+2
009A3 BXF30616 4967              JNP OD.ERR17
009A4 4XXXF8C1 4968              HA & RDATA          ;GET CYLINDER
009A5 XXXX9883 4969              TORAR ADD,TEMP3
               4970              HR TEMP1
009A6 3XXXD8C1 4971              / & RCACHE
               4972              CON EXPCY
009A7 B2XX0029 4973              / & WCAR
009A8 13XXD841 4974              RH TEMP1 & WCACHE   ;RECORD EXPECTED CYLINDER
               4975              CON RECCY
009A9 B2XX002A 4976              / & WCAR
009AA 13XXF880 4977              AH & WCACHE         ;RECORD REC CYLINDER
009AB XXXX9101 4978              TORAY EXOR,TEMP1
009AC BX2309AE 4979              CJNP Z,$+2
009AD BXF10A30 4980              JSB RDERRCY
               4981              CON CDC.TK
009AE B2XX000B 4982              / & WCAR
               4983              HR TEMP1            ;GET TRACK
009AF 3XXXD8C1 4984              / & RCACHE
               4985              CON CDC.SEC
009B0 B2XX000C 4986              / & WCAR
009B1 3XXXF8C1 4987              HA & RCACHE         ;GET SECTOR
009B2 XXXXED9D 4988              RTAA 6
009B3 XXXX9941 4989              TORAR OR,TEMP1
               4990              CON EXPSTK
009B4 B2XX002B 4991              / & WCAR
009B5 13XXD841 4992              RH TEMP1 & WCACHE   ;RECORD EXP SECT/TRACK
009B6 BXD309B8 4993              CJNP SRCRDY,$+2
009B7 BXF30616 4994              JNP OD.ERR17
009B8 4XXXF8C1 4995              HA & RDATA          ;GET SEC/TK
               4996              CON RECSTK          ;RECORD REC SECT/TRACK
009B9 B2XX002C 4997              / & WCAR
009BA 13XXF880 4998              AH & WCACHE
009BB XXXX9883 4999              TORAR ADD,TEMP3
009BC XXXX9101 5000              TORAY EXOR,TEMP1
009BD BX2309BF 5001              CJNP Z,$+2
009BE BXF10A35 5002              JSB RDERRSTK
009BF BXD309C1 5003              CJNP SRCRDY,$+2
009C0 BXF30616 5004              JNP OD.ERR17
               5005              CON TEMPCKS
009C1 B2XX0004 5006              / & WCAR
009C2 43XXF8C1 5007              HA & RDATA & WCACHE
009C3 XXXXF99D 5008              RTAA 12
009C4 XXXXD881 5009              AR TEMP1
009C5 BXD309C7 5010              CJNP SRCRDY,$+2
009C6 BXF30616 5011              JNP OD.ERR17
               5012              CON TEMPCKS+1
009C7 B2XX0005 5013              / & WCAR
009C8 43XXF8C1 5014              HA & RDATA & WCACHE
009C9 XXXX9941 5015              TORAR OR,TEMP1
```

Addr Line - AMPERIF /155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE GETADR

```
              5016              CON RECCKS          ;RECORD REC CHECKSUM
009CA B2XX002E 5017             / & WCAR
009CB 13XXD841 5018             RH TEMP1 & WCACHE
              5019              CON EXPCKS          ;RECORD EXPECTED CHECKSUM
009CC B2XX002D 5020             / & WCAR
009CD 13XXD843 5021             RH TEMP3 & WCACHE
009CE XXXXD831 5022             RA TEMP1
009CF XXXX9103 5023             TORAY EXOR,TEMP3
009D0 XX2AXXXX 5024             CRTN Z
009D1 BXF10A3A 5025             JSB RDERRCKS
009D2 XXFAXXXX 5026             RTN
              5027    ;
              5028    GETADR1:  EQU $
              5029              CON CDC.CYL
009D3 B2XX000A 5030             / & WCAR
009D4 BXD309D6 5031             CJMP SRCRDY,$+2
009D5 BXF30616 5032             JMP OD.ERR17
009D6 4XXXF8C1 5033             HA & RDATA          ;GET CYLINDER
009D7 XXXX9883 5034             TORAR ADD,TEMP3
              5035              HR TEMP1
009D8 3XXXD8C1 5036             / & RCACHE
              5037              CON EXPCY1
009D9 B2XX002F 5038             / & WCAR
009DA 13XXD841 5039             RH TEMP1 & WCACHE   ;RECORD EXPECTED CYLINDER
              5040              CON RECCY1
009DB B2XX0030 5041             / & WCAR
009DC 13XXF880 5042             AH & WCACHE         ;RECORD REC CYLINDER
009DD XXXX9101 5043             TORAY EXOR,TEMP1
009DE BX2309E0 5044             CJMP Z,$+2
009DF BXF10A30 5045             JSB RDERRCY
              5046              CON CDC.TK
009E0 B2XX0008 5047             / & WCAR
              5048              HR TEMP1            ;GET TRACK
009E1 3XXXD8C1 5049             / & RCACHE
              5050              CON CDC.SEC
009E2 B2XX000C 5051             / & WCAR
009E3 3XXXF8C1 5052             HA & RCACHE         ;GET SECTOR
009E4 XXXXED9D 5053             RTAA 6
009E5 XXXX9941 5054             TORAR OR,TEMP1
              5055              CON EXPSTK1
009E6 B2XX0031 5056             / & WCAR
009E7 13XXD841 5057             RH TEMP1 & WCACHE   ;RECORD EXP SECT/TRACK
009E8 BXD309EA 5058             CJMP SRCRDY,$+2
009E9 BXF30616 5059             JMP OD.ERR17
009EA 4XXXF8C1 5060             HA & RDATA          ;GET SEC/TK
              5061              CON RECSTK1         ;RECORD REC SECT/TRACK
009EB B2XX0032 5062             / & WCAR
009EC 13XXF880 5063             AH & WCACHE
009ED XXXX9883 5064             TORAR ADD,TEMP3
009EE XXXX9101 5065             TORAY EXOR,TEMP1
009EF BX2309F1 5066             CJMP Z,$+2
009F0 BXF10A35 5067             JSB RDERRSTK
009F1 BXD309F3 5068             CJMP SRCRDY,$+2
009F2 BXF30616 5069             JMP OD.ERR17
              5070              CON TEMPCKS
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE GETADR

```
009F3 B2XX0004  5071            / & WCAR
009F4 43XXF8C1  5072            MA & RDATA & WCACHE
009F5 XXXXF99D  5073            RTAA 12
009F6 XXXXD881  5074            AR TEMP1
009F7 BXD309F9  5075            CJMP SRCRDY,$+2
009F8 BXF30616  5076            JMP OD.ERR17
                5077            CON TEMPCKS+1
009F9 B2XX0005  5078            / & WCAR
009FA 43XXF8C1  5079            MA & RDATA & WCACHE
009FB XXXX9941  5080            TORAR OR,TEMP1
                5081            CON RECCKS1         ;RECORD REC CHECKSUM
009FC B2XX0034  5082            / & WCAR
009FD 13XXD841  5083            RH TEMP1 & WCACHE
                5084            CON EXPCKS1         ;RECORD EXPECTED CHECKSUM
009FE B2XX0033  5085            / & WCAR
009FF 13XXD843  5086            RH TEMP3 & WCACHE
00A00 XXXXD801  5087            RA TEMP1
00A01 XXXX9103  5088            TORAY EXOR,TEMP3
00A02 XX2AXXXX  5089            CRTN Z
00A03 BXF10A3A  5090            JSB RDERRCKS
00A04 XXFAXXXX  5091            RTN
                5092    ;
                5093            TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE TERMLRWX
```

```
                5094                EJECT
                5095    ;
                5096    ;SUBROUTINE TO SEND UNIT RESPONSE TIME-OUT TO TERMINATE LONG WRITE/READ
                5097    ;
                5098    TERMLRWX:   EQU $
00A05 XXXXD909  5099                ZR TIMEOUT                                      ;201
                5100    TERMLR9X:   EQU $                                           ;201
00A06 6XXXF8C1  5101                MA & DSTSTAT
00A07 XXXXE4C0  5102                TOAI AND,NRY
00A08 XXXX0087  5103                IDAT AD.OUT.M       ;MASK FOR ANY AMP OUTPUT READY STATUS
00A09 BX230A0F  5104                CJMP Z,TERMLRX
00A0A XXXXDD69  5105                INCR TIMEOUT                                    ;201
00A0B XXXX9509  5106                TORIY EXOR,TIMEOUT                              ;201
00A0C XXXXFFFF  5107                IDAT H#FFFF
00A0D BX230512  5108                CJMP Z,OD.ERR1B
00A0E BXF30A06  5109                JMP TERMLR9X                                    ;201
                5110    TERMLRX:    EQU $
00A0F XXXXF8E1  5111                IA
00A10 XXXX0064  5112                IDAT 100
00A11 BXF10C26  5113                JSB DELAY
                5114    URSTIM9:    EQU $
                5115                SETMR URSPTO,AMPCTRL
00A12 16XXF5B5  5116                / & ALU & DSTCTRL
00A13 XXXX7140  5117                NOOP
00A14 XXXX7140  5118                NOOP
                5119                RSTMR URSPTO,AMPCTRL
00A15 16XXF5D5  5120                / & ALU & DSTCTRL
                5121                TSTND ST.BK2
00A16 5XXXE390  5122                / & SRCSTAT         ;TOTAL LOOP TIME 40 U-SEC
00A17 BX230A19  5123                CJMP Z,$+2
00A18 XXFAXXXX  5124                RTN
00A19 XXXX7140  5125                NOOP
00A1A XXXXF8E1  5126                IA
00A1B XXXX0025  5127                IDAT 37             ;39 U-SEC DELAY
00A1C BXF10C26  5128                JSB DELAY
00A1D BXF30A12  5129                JMP URSTIM9
                5130    URSTIME:    EQU $
00A1E 5XXXF8C1  5131                MA & SRCSTAT                                    ;201
00A1F XXXXE4C1  5132                TOAI AND,NRA        ;CHECK FOR DAT.BK1 OR DAT.BK2
00A20 XXXX0018  5133                IDAT H#018          ;#### USE EQUATES FOR THIS VALUE
00A21 BX230A28  5134                CJMP Z,URSTIM3
00A22 4XXXF8C1  5135                MA & RDATA
00A23 XXXX7140  5136                NOOP
00A24 4XXXF8C1  5137                MA & RDATA
00A25 XXXX7140  5138                NOOP
00A26 4XXXF8C1  5139                MA & RDATA
00A27 BXF30A1E  5140                JMP URSTIME                                     ;201
                5141    URSTIM3:    EQU $
00A28 XXFAXXXX  5142                RTN                 ;RETURN                     ;201
                5143    ;
                5144                TITLE2 OFFLINE DIAGS - DIAGNOSTIC CODE SUBROUTINES
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGS - DIAGNOSTIC CODE SUBROUTINES

               5145              EJECT
               5146    ;
               5147    ; THE FOLLOWING SUBROUTINES MIMIC ONLINE ONES BY THE SAME NAMES,
               5148    ; BUT USE CACHE/LOCAL MEMORY
               5149    ; INSTEAD OF THE STATUS BUFFER/SHARED MEMORY.
               5150    ;
               5151    CKDVEND:    EQU $
00A29 B2XX0008 5152               CON AMP.ST3 & WCAR
               5153               HR TEMP0
00A2A 3XXXD8C0 5154               / & RCACHE
00A2B XXXXF5E0 5155               TSTNR E1.DE,TEMP0   ;TEST FOR DEVICE END IN STATUS          ;201
00A2C XXFAXXXX 5156               RTN
               5157    ;
               5158    SETALERT:   EQU $
00A2D B2XX0023 5159               CON ERRCODE & WCAR                                        ;203
00A2E 3XXXF8C1 5160               HA & RCACHE         ;SET ERROR CODE H#080                 ;203
               5161               SETNA BIT7 & ALU & WCACHE                                 ;203
00A2F 13FAEF82 5162               / & RTN                                                   ;203
               5163    ;
               5164    RDERRCY:    EQU $
00A30 BXF100A2D 5165              JSB SETALERT
00A31 B2XX0023 5166               CON ERRCODE & WCAR
00A32 3XXXF8C1 5167               HA & RCACHE         ;SET ERROR CODE H#400
00A33 13XXF582 5168               SETNA BIT10 & ALU & WCACHE
00A34 XXFAXXXX 5169               RTN
               5170    ;
               5171    RDERRSTK:   EQU $
00A35 BXF100A2D 5172              JSB SETALERT
00A36 B2XX0023 5173               CON ERRCODE & WCAR
00A37 3XXXF8C1 5174               HA & RCACHE         ;SET ERROR CODE H#200
00A38 13XXF382 5175               SETNA BIT9 & ALU & WCACHE
00A39 XXFAXXXX 5176               RTN
               5177    ;
               5178    RDERRCKS:   EQU $
00A3A BXF100A2D 5179              JSB SETALERT
00A3B B2XX0023 5180               CON ERRCODE & WCAR
00A3C 3XXXF8C1 5181               HA & RCACHE         ;SET ERROR CODE H#800
00A3D 13XXF782 5182               SETNA BIT11 & ALU & WCACHE
00A3E XXFAXXXX 5183               RTN
               5184    ;
               5185    WRTADRCW:   EQU $
00A3F BXF100A2D 5186              JSB SETALERT
00A40 B2XX0023 5187               CON ERRCODE & WCAR
00A41 3XXXF8C1 5188               HA & RCACHE         ;SET ERROR CODE H#100
00A42 13XXF182 5189               SETNA BIT8 & ALU & WCACHE
00A43 XXFAXXXX 5190               RTN
               5191    ;
               5192              TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE INCSECT
```

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 Addr          Line - AMPERIF 7155/805 EMULATION - HSP DIAGNOSTICS -     OFFLINE DIAGNOSTICS - SUBROUTINE INCSECT

               5193                EJECT
               5194    ;
               5195    ; INCSECT
               5196    ; STATUS AND CONTROL AREA
               5197    ;
               5198    INCSECTX:   EQU $
00A44 82XX000C 5199                CON CDC.SEC & WCAR                                  ;201
00A45 3XXXF8C1 5200                MA & RCACHE
00A46 13XXFC81 5201                INCA & ALU & WCACHE
00A47 XXXXD0E0 5202                IR TEMP0
00A48 XXXX0020 5203                IDAT SECTMAX
00A49 XXXX9900 5204                TORAR EXOR,TEMP0
00A4A 8X230A4C 5205                CJMP Z,INCTK        ;INCREMENT TRACK
00A4B XXFAXXXX 5206                RTN
               5207    INCTK:      EQU $
               5208                CON 0               ;ZERO SECTOR                    ;201
00A4C 83XX0000 5209                / & WCACHE                                          ;201
00A4D 82XX000B 5210                CON CDC.TK & WCAR                                   ;201
00A4E 3XXXF8C1 5211                MA & RCACHE
00A4F 13XXFC81 5212                INCA & ALU & WCACHE ;INCREMENT TRACK
00A50 XXXXD0E0 5213                IR TEMP0
00A51 XXXX0028 5214                IDAT TKMAX          ;CHECK FOR MAX+1 TRACK
00A52 XXXX9900 5215                TORAR EXOR,TEMP0
00A53 8X230A55 5216                CJMP Z,INCCYL       ;INCREMENT CYLINDER
00A54 XXFAXXXX 5217                RTN
               5218    INCCYL:     EQU $
               5219                CON 0               ;ZERO TRACK                     ;201
00A55 83XX0000 5220                / & WCACHE                                          ;201
00A56 82XX000A 5221                CON CDC.CYL & WCAR                                  ;201
00A57 3XXXF8C1 5222                MA & RCACHE
00A58 13XXFC81 5223                INCA & ALU & WCACHE
00A59 XXFAXXXX 5224                RTN
               5225    ;
               5226                TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE GET REL WD ADR
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE GET REL WD ADR

```
              5227              EJECT
              5228    ;
              5229    ; GET.RWAX
              5230    ; THIS SUBROUTINE WILL CONVERT THE CURRENT UNITS CYL, TK AND SEC TO
              5231    ; THE AMPERIF RELATIVE WORD ADDRESS AND UPDATE THE CURRENT RWA IN MEM
              5232    ;
              5233    ; INPUTS: NONE
              5234    ;
              5235    ; OUTPUT: RWA UPDATED
              5236    ;
              5237    GET.RWAX:   EQU $
00A5A XXXXD8E0 5238               IR TEMP0
               5239               IDAT CDC.CYL
00A5B 12XX000A 5240               / & ALU & WCAR
00A5C 3XXXD8C0 5241               HR TEMP0 & RCACHE   ;GET THE CYLINDER INTO R0
00A5D BXF10BBA 5242               JSB MULTCYL         ;CONVERT;
00A5E XXXXD8E0 5243               IR TEMP0
               5244               IDAT REL.WD1
00A5F 12XX000D 5245               / & ALU & WCAR
00A60 13XXD843 5246               RH TEMP3 & WCACHE   ;STORE UPPER BITS
00A61 12XXDD60 5247               INCR TEMP0 & ALU & WCAR
00A62 13XXD844 5248               RH TEMP4 & WCACHE   ;STORE LOWER BITS
00A63 B2XX0003 5249               CON CDC.TK & WCAR
00A64 3XXXD8C0 5250               HR TEMP0 & RCACHE   ;GET THE TRACK INTO REG R0
00A65 BXF10BCC 5251               JSB MULTTRK         ;CONVERT
00A66 XXXXD8E0 5252               IR TEMP0
               5253               IDAT REL.WD1
00A67 12XX000D 5254               / & ALU & WCAR
00A68 3XXXD8C1 5255               HR TEMP1 & RCACHE   ;GET UPPER BITS OF A 31 BIT VALUE
00A69 12XXDD60 5256               INCR TEMP0 & ALU & WCAR
00A6A 3XXXD8C2 5257               HR TEMP2 & RCACHE   ;GET LOWER BITS
00A6B BXF10C03 5258               JSB ADDC1234        ;ADD REG PAIR 1&2 TO 3&4 RESULTS IN 3&4
00A6C XXXXD8E0 5259               IR TEMP0
               5260               IDAT REL.WD1
00A6D 12XX000D 5261               / & ALU & WCAR
00A6E 13XXD843 5262               RH TEMP3 & WCACHE
00A6F 12XXDD60 5263               INCR TEMP0 & ALU & WCAR
00A70 13XXD844 5264               RH TEMP4 & WCACHE
00A71 B2XX000C 5265               CON CDC.SEC & WCAR  ;GET THE SECTOR
00A72 3XXXD8C0 5266               HR TEMP0 & RCACHE
00A73 BXF10BEA 5267               JSB MULTSECT        ;CONVERT
00A74 XXXXD8E0 5268               IR TEMP0
               5269               IDAT REL.WD1
00A75 12XX000D 5270               / & ALU & WCAR
00A76 3XXXD8C1 5271               HR TEMP1 & RCACHE
00A77 12XXDD60 5272               INCR TEMP0 & ALU & WCAR
00A78 3XXXD8C2 5273               HR TEMP2 & RCACHE
00A79 BXF10C03 5274               JSB ADDC1234
00A7A XXXXD8E0 5275               IR TEMP0
               5276               IDAT REL.WD1
00A7B 12XX000D 5277               / & ALU & WCAR
00A7C 13XXD843 5278               RH TEMP3 & WCACHE   ;STORE FINAL RESULTS
00A7D 12XXDD60 5279               INCR TEMP0 & ALU & WCAR
00A7E 13XXD844 5280               RH TEMP4 & WCACHE   ;IN REL.WD1 AND REL.WD2
00A7F XXFAXXXX 5281               RTN
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE GET REL WD ADR

```
5282    ;
5283                TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE CKAMPSTX
```

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 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGNOSTICS - SUBROUTINE CKAMPSTX

           5284              EJECT
           5285    ;
           5286    ; CHECK AMPERIF STATUS - DIAG VERSION
           5287    ;
           5288    ; This reads and stores the 36 bit status word (E1) in local
           5289    ; memory (cache) in AMP.ST1 to 3.  If the word has unit check
           5290    ; set, then a sense io command is issued to get the sense
           5291    ; bytes, which are stored in AMP.SENS.
           5292    ;
           5293    ; CALLS: RD3AMPX, ISUCMDX
           5294    ;
           5295    ; INPUTS: Status must be ready at AMP (source status ST.DK2).
           5296    ;
           5297    ; OUTPUTS: Status stored in AMP.ST1 to AMP.ST3, new diag
           5298    ; function stored in OCPNEW if the recovery action was RA.OCPD,
           5299    ; and sense bytes stored in AMP.SENS to AMP.SENS+17 if the
           5300    ; status has unit check set.
           5301    ;
           5302    ; REGISTERS: TEMP1, TEMP2, TEMP3, ACC
           5303    ;
           5304    CKAMPSTX:   EQU $
00A80 XXXXFFD9 5305            RSTNR F.CMDREJ,FLAGS
           5306            SRC.AMP          ;SELECT THE AMPERIF INTERFACE
           5306 +  IF BANK_EQ_0
00A81 BBXX800F 5306 +          CON AMP.PORT & SRCSEL
           5306 +  ELSE
           5306 +  ENDIF
           5306 +          ENDM
00A82 BXF10AC8 5307            JSB RD3AMPX      ;READ 3 AMP WORDS RETURN IN TEMP1,2,3
00A83 XXXX84C3 5308            TORIA AND,TEMP3  ;MASK UNIT FROM TEMP3 TO ACC
00A84 XXXX001F 5309            IDAT EIN.UNIT                                    ;201
00A85 XXXXD896 5310            AR AMPUNIT       ;SAVE THE ADDRESS FOR S/IO COMMAND IF NEEDED
           5311    ; CHECK THE RECOVERY ACTION FIELD OF THE STATUS WORD
00A86 XXXX84C2 5312            TORIA AND,TEMP2  ;MASK THE RECOVERY ACTION FIELD
00A87 XXXX03C0 5313            IDAT EIN.RA                                      ;201
00A88 XXXXE500 5314            TOAI EXOR,NRY    ;CHECK FOR OCP COMMAND
00A89 XXXX03C0 5315            IDAT RA.OCPD                                     ;201
00A8A BX230A8C 5316            CJMP Z,$+2
00A8B BXF30A8E 5317            JMP $+3                                          ;201
00A8C B2XX0022 5318            CON OCPNEW & WCAR  ;STORE DIAG FUNCTION IN OCPCODE   ;201
00A8D 13XXD843 5319            RH TEMP3 & WCACHE
00A8E XXXXE500 5320            TOAI EXOR,NRY
00A8F XXXX0100 5321            IDAT RA.CMDRJ                                    ;201
00A90 BX230629 5322            CJMP Z,OD.ERR04  ;IF RC =4 COMMAND REJECTED
00A91 XXXXD801 5323            RA TEMP1
00A92 XXXXE4C1 5324            TOAI AND,NRA     ;IF STATUS ACTION OF 'F', STOP
00A93 XXXX003C 5325            IDAT EIN.SA                                      ;201
00A94 XXXXE500 5326            TOAI EXOR,NRY
00A95 XXXX503C 5327            IDAT SA.EFTRN                                    ;201
00A96 BX230628 5328            CJMP Z,OD.ERR05
           5329    GETS1OX:    EQU $                                            ;201
00A97 B2XX0006 5330            CON AMP.ST1 & WCAR                               ;201
00A98 13XXD841 5331            RH TEMP1 & WCACHE  ;STORE TEMP 1 IN UNIT S/C AREA OF CACHE
00A99 B2XX0007 5332            CON AMP.ST2 & WCAR                               ;201
00A9A 13XXD842 5333            RH TEMP2 & WCACHE  ;STORE TEMP 2 IN UNIT S/C AREA OF CACHE
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE CKAMPSTX

```
00A9B B2XX0008  5334            CON AMP.ST3 & WCAR                              ;201
00A9C 13XXD843  5335            RH TEMP3 & WCACHE   ;STORE TEMP 3 IN UNIT S/C AREA OF CACHE
00A9D XXXX84C2  5336            TOR(A AND,TEMP2     ;MASK THE RECOVERY ACTION FIELD
00A9E XXXX03C0  5337            IDAT E1M.RA                                     ;201
00A9F XXXXE500  5338            (OAI EXOR,NRY
00AA0 XXXX02C0  5339            IDAT RA.ENV                                     ;201
00AA1 BX230AA4  5340            CJMP Z,$+3          ;IF RC =8 PROCESS AMP DIAG COMMAND
00AA2 XXXXF3E3  5341            TSTNR E1.UCK,TEMP3  ;TEST FOR UNIT CHECK FROM AMPERIF   ;201
00AA3 XX2AXXXX  5342            CRTN Z
                5343    ; UNIT CHECK SO ISSUE SENSE IO TO AMPERIF
00AA4 XXXXD8F7  5344            IR AMPCMD           ;LOAD COMMAND REG
00AA5 XXXX0004  5345            IDAT AF.SENSE       ;WITH THE SENSE IO COMMAND
00AA6 XXXXD918  5346            ZR AMPWLEN          ;ZERO WORD LENGTH FIELD
00AA7 BXF10AED  5347            JSB ISUCMDX         ;ISSUE COMMAND TO AMPERIF
00AA8 BX730627  5348            CJMP N,OD.ERR06     ;COMMAND REJECT
00AA9 XXXXD8E0  5349            IR TEMP0            ;SET COUNT FOR 6 CALLS TO RD3AMPX
00AAA XXXX0006  5350            (DAT 6
00AAB XXXXD8E4  5351            IR TEMP4            ;SET START OF SENSE BYTE AREA   ;201
00AAC XXXX400F  5352            IDAT AMP.SENS                                   ;201
                5353    SIOLOP1X:  EQU $            ;READ SIX AMPERIF WORD OF SENSE DATA
00AAD BXF10AC0  5354            JSB RD3AMPX         ;AND STORE IN AMP.SENS
00AAE 12XXD844  5355            RH TEMP4 & WCAR                                 ;201
00AAF 13XXD841  5356            RH TEMP1 & WCACHE
                5357            INCR TEMP4                                      ;201
00AB0 12XXDD64  5358            / & ALU & WCAR
00AB1 13XXD842  5359            RH TEMP2 & WCACHE
                5360            (NCR TEMP4                                      ;201
00AB2 12XXDD64  5361            / & ALU & WCAR
00AB3 13XXD843  5362            RH TEMP3 & WCACHE
00AB4 XXXXC1E0  5363            DECR TEMP0          ;DECREMENT LOOP COUNTER         ;201
00AB5 BX230AB8  5364            CJMP Z,$+3                                      ;201
00AB6 XXXXDD64  5365            INCR TEMP4          ;POINT TO NEXT              ;201
00AB7 BXF30AAD  5366            JMP SIOLOP1X        ;AND CONTINUE
                5367    ; NOW TAKE ENDING STATUS
                5368    SIOLOP2X:  EQU $                                        ;201
00AB8 5XXXF0C1  5369            HA & SRCSTAT        ;TEST FOR STATUS IN BANK 2
00AB9 XXXXF780  5370            TSTNA AMP.P.ER      ;TEST FOR U-BUS PARITY ERROR
00ABA BX230ABC  5371            CJMP Z,$+2
00ABB BXF3062B  5372            JMP OD.ERR02        ;ERROR STOP U-BUS PARITY ERROR
00ABC XXXX7140  5373            NOOP                                            ;201
00ABD XXXX7140  5374            NOOP
00ABE XXXX7140  5375            NOOP
00ABF XXXX7140  5376            NOOP
00AC0 XXXXE300  5377            TSTNA ST.BK2
00AC1 BX230AB8  5378            CJMP Z,SIOLOP2X     ;WAIT FOR STATUS
00AC2 BXF10AC8  5379            JSB RD3AMPX         ;READ STATUS                ;201
                5380    CKAMPS2X:  EQU $
00AC3 B2XX0008  5381            CON AMP.ST3 & WCAR                              ;201
00AC4 3XXXF8C1  5382            HA & RCACHE
00AC5 XXXX9943  5383            TORAR OR,TEMP3
00AC6 13XXD843  5384            RH TEMP3 & WCACHE
00AC7 XXFAXXXX  5385            RTN
                5386    ;
                5387            TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE RD3AMPX
```

```
              5388              EJECT
              5389    ;
              5390    ; RD3AMPX
              5391    ; THIS SUBROUTINE WILL READ 3 AMP PARCELS INTO TEMP1, TEMP2,
              5392    ; AND TEMP3.
              5393    ;
              5394    ; INPUTS: AMPERIF INTERFACE MUST BE SELECTED AS SOURCE
              5395    ;
              5396    ; OUTPUTS: AMPERIF PARCELS IN R1, R2, AND R3
              5397    ;
              5398    ; CALLS: NONE
              5399    ;
              5400    RD3AMPX:    EQU $
00AC8 XXXXD909 5401               ZR TIMEOUT                                    ;201
              5402    RD3AMP1X:   EQU $                                         ;201
00AC9 5XXXF8C1 5403               HA & SRCSTAT        ;WAIT FOR PARCEL 1 READY  ;201
00ACA XXXXF780 5404               TSTNA AMP.P.ER      ;CHECK FOR U.BUS PARITY ERROR
00ACB BX230ACD 5405               CJNP Z,$+2
00ACC BXF3062B 5406               JNP OD.ERR02
00ACD XXXXDD69 5407               INCR TIMEOUT                                  ;201
00ACE XXXX9509 5408               TORIY EXOR,TIMEOUT                            ;201
00ACF XXXXFFFF 5409               IDAT H#FFFF
00AD0 BX230626 5410               CJNP Z,OD.ERR07
00AD1 XXXXF180 5411               TSTNA PAR1.RDY
00AD2 BX230AC9 5412               CJNP Z,RD3AMP1X                               ;201
              5413               HR TEMP1            ;READ PARCEL 1            ;201
00AD3 4XXXD8C1 5414               / & RDATA
00AD4 XXXXD909 5415               ZR TIMEOUT                                    ;201
              5416    RD3AMP2X:   EQU $                                         ;201
00AD5 5XXXF8C1 5417               HA & SRCSTAT        ;WAIT FOR PARCEL 2 READY  ;201
00AD6 XXXXF780 5418               TSTNA AMP.P.ER      ;CHECK FOR U.BUS PARITY ERROR
00AD7 BX230AD9 5419               CJNP Z,$+2
00AD8 BXF3062B 5420               JNP OD.ERR02
00AD9 XXXXDD69 5421               INCR TIMEOUT                                  ;201
00ADA XXXX9509 5422               TORIY EXOR,TIMEOUT                            ;201
00ADB XXXXFFFF 5423               IDAT H#FFFF
00ADC BX230626 5424               CJNP Z,OD.ERR07
00ADD XXXXF380 5425               TSTNA PAR2.RDY
00ADE BX230AD5 5426               CJNP Z,RD3AMP2X                               ;201
              5427               HR TEMP2            ;READ PARCEL 2            ;201
00ADF 4XXXD8C2 5428               / & RDATA
00AE0 XXXXD909 5429               ZR TIMEOUT                                    ;201
              5430    RD3AMP3X:   EQU $                                         ;201
00AE1 5XXXF8C1 5431               HA & SRCSTAT        ;WAIT FOR PARCEL 3 READY  ;201
00AE2 XXXXF780 5432               TSTNA AMP.P.ER      ;CHECK FOR U.BUS PARITY ERROR
00AE3 BX230AE5 5433               CJNP Z,$+2
00AE4 BXF3062B 5434               JNP OD.ERR02
00AE5 XXXXDD69 5435               INCR TIMEOUT                                  ;201
00AE6 XXXX9509 5436               TORIY EXOR,TIMEOUT                            ;201
00AE7 XXXXFFFF 5437               IDAT H#FFFF
00AE8 BX230626 5438               CJNP Z,OD.ERR07
00AE9 XXXXF580 5439               TSTNA PAR3.RDY
00AEA BX230AE1 5440               CJNP Z,RD3AMP3X                               ;201
              5441               HR TEMP3            ;READ PARCEL 3            ;201
00AEB 4XXXD8C3 5442               / & RDATA
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE RDSAMPX

```
00AEC XXFAXXXX  5443                RTN                 ;RETURN
                5444    ;
                5445                TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE ISUCMDX
```

```
Addr      Line - AMPERIF 7155/805 EMULATION - HSP DIAGNOSTICS -  OFFLINE DIAGNOSTICS - SUBROUTINE ISUCMDX

          5446              EJECT
          5447    ;
          5448    ; ISUCMDX
          5449    ; ISSUE AMPERIF COMMAND WORD IN R15 (AMPCMD ). IF THE COMMAND
          5450    ; CANNOT BE ISSUED BECAUSE OF INPUT FROM AMPERIF THE ROUTINE
          5451    ; RETURN TO CALLER WITH THE NEG FLAG SET. THE CALLER MUST
          5452    ; INSURE THE COMMAND WAS NOT REJECTED AFTER ISSUE.
          5453    ;
          5454    ; INPUTS:
          5455    ; R14 (AMPUNIT) CONTAINS THE STORAGE MODULE UNIT ADDRESS
          5456    ; R15 (AMPCMD)  CONTAINS THE COMMAND TO BE ISSUED.
          5457    ; R16 (AMPWLEN) CONTAINS THE WORD LENGTH FIELD OF THE CMD
          5458    ;
          5459    ; OUTPUTS:
          5460    ; POS FLAG SET IF ISSUED.
          5461    ;
          5462    ISUCMDX:    EQU $
          5463              SRC.AMP
          5463 +  IF BANK_EQ_0
00AED BBXX000F  5463 +            CON AMP.PORT & SRCSEL
          5463 +  ELSE
          5463 +  ENDIF
          5463 +            ENDM
          5464              DST.AMP           ;SELECT AMPERIF AS SOURCE AND DEST.
          5464 +  IF BANK_EQ_0
00AEE BCXX000F  5464 +            CON AMP.PORT & DSTSEL
          5464 +  ELSE
          5464 +  ENDIF
          5464 +            ENDM
00AEF 5XXXF8C1  5465              HA & SRCSTAT      ;CHECK FOR INTERRUPT BEFORE ISSUE
00AF0 BX230AF2  5466              CJMP Z,ISUCMDX1   ;CONTINUE IF AMP RELEASED
00AF1 BXF30625  5467              JMP OD.ERR08
00AF2 6XXXF8C1  5468    ISUCMDX1:  HA & DSTSTAT
00AF3 XXXXE4C1  5469              TOA1 AND,NRA      ;CKECK FOR OUTPUT DATA PRESENT
00AF4 XXXX0087  5470              IDAT AD.OUT.A
00AF5 BX230AF7  5471              CJMP Z,$+2        ;CONTINUE IF NO DATA PRESENT
00AF6 BXF30624  5472              JMP OD.ERR09      ;"ERROR STOP"
          5473    ; NOW FORM PARCEL 1 OF THE COMMAND WORD AND OUTPUT
00AF7 XXXX9556  5474              TORIY OR,AMPUNIT
          5475              IDAT H#800        ;800 SET BIT 35 OF AMP WORD
00AF8 14XX0800  5476              / & ALU & WDATA
          5477    ; NOW FORM PARCEL 2 AND OUTPUT
00AF9 XXXX8D97  5478              RTRA 6,AMPCMD     ;ROTATE COMMAND BY 6 TO ACC
00AFA XXXXA9D8  5479              NRAI 4,AMPWLEN    ;ROTATE AMPERIF WORD LENGTH AND MERGE TO ACC
00AFB XXXX000F  5480              IDAT H#0F
00AFC XXXX7140  5481              NOOP
00AFD XXXX7140  5482              NOOP
00AFE 14XXF880  5483              AH & WDATA
          5484    ; NOW FORM PARCEL 3 AND OUTPUT
00AFF XXXX7140  5485              NOOP
00B00 XXXX7140  5486              NOOP
00B01 XXXX7140  5487              NOOP
00B02 XXXX7140  5488              NOOP
00B03 14XXD858  5489              RH AMPWLEN & WDATA
          5490    ; WAIT FOR OUTPUT READY ON INTERFACE
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGNOSTICS - SUBROUTINE ISUCMDX

00B04 XXXXDB09  5491            NIR TIMEOUT                                    ;20304
                5492  ISUCMDX2: EQU $                                          ;20304
00B05 6XXXF8C1  5493            HA & DSTSTAT
00B06 XXXXE580  5494            TSTNA AOUTRDY
00B07 BX230B09  5495            CJMP Z,$+2                                     ;20304
00B08 BXF30B0C  5496            JMP ISUCMDX3                                   ;20304
00B09 XXXXC1E9  5497            DECR TIMEOUT                                   ;20304
00B0A BX230B19  5498            CJMP Z,ISUCMDX9     ;NEVER GOT OUTPUT READY    ;20304
00B0B BXF30B05  5499            JMP ISUCMDX2                                   ;20304
                5500  ; ISSUE COMMAND, WAIT FOR AMP TO TAKE IT
                5501  ISUCMDX3: EQU $                                          ;20304
00B0C XXXXC795  5502            LD2NR EFINT,AMPCTRL
                5503            SETNR FNCOUT,AMPCTRL
00B0D 16XXEDB5  5504            / & ALU & DSTCTRL   ;SEND TAG EFINT TO AMPERIF
00B0E XXXXDB09  5505            NIR TIMEOUT                                    ;20304
                5506  ISUCMDX4: EQU $                                          ;20304
00B0F 6XXXF8C1  5507            HA & DSTSTAT        ;WAIT FOR OUTPUT READY TO DROP
00B10 XXXXE580  5508            TSTNA AOUTRDY
00B11 BX230B15  5509            CJMP Z,ISUCMDX5                                ;20304
00B12 XXXXC1E9  5510            DECR TIMEOUT                                   ;20304
00B13 BX230B19  5511            CJMP Z,ISUCMDX9     ;AMP DIDN'T TAKE COMMAND   ;20304
00B14 BXF30B0F  5512            JMP ISUCMDX4                                   ;20304
                5513  ISUCMDX5: EQU $                                          ;201
00B15 XXXXEDD5  5514            RSTNR FNCOUT,AMPCTRL                           ;201
                5515            RSTNR EFINT,AMPCTRL
00B16 16XXE7D5  5516            / & ALU & DSTCTRL
00B17 XXXXF901  5517            ZA                  ;SET POS FLAG
00B18 XXFAXXXX  5518            RTN
                5519  ; ISUCMD AMP ERROR, RE-INIT AMP AND RETRY
                5520  ISUCMDX9: EQU $                                          ;20304
00B19 BXF10CDA  5521            JSB INITAMP         ;REINIT AMP                ;20304
00B1A BXF30AED  5522            JMP ISUCMDX         ;START AGAIN               ;20304
                5523  ;
                5524            TITLE2 OFFLINE DIAGNOSTICS - SUBROUTINE ISUADRX
```

```
 Addr      Line - AMPERIF 7155/805 EMULATION - HSP DIAGNOSTICS -    OFFLINE DIAGNOSTICS - SUBROUTINE ISUADRX

           5525              EJECT
           5526    ;
           5527    ; ISUADRX
           5528    ; THIS SUBROUTINE WILL ISSUE THE RELATIVE WORD ADDRESS TO THE
           5529    ; CURRENT UNIT
           5530    ;
           5531    ; INPUTS: VALID DATA IN C.UNIT, REL.WD1 AND REL.WD2
           5532    ;
           5533    ; OUTPUTS: POS FLAG IF ISSUED, NEG FLAG IF REJECTED
           5534    ;
           5535    ISUADRX:    EQU $
00B1B B2XX000D  5536              CON REL.WD1 & WCAR                                    ;201
00B1C 3XXXD8C4  5537              HR TEMP4 & RCACHE   ;READ THE UPPER 16 BITS OF THE 31 BIT VALUE
00B1D B2XX000E  5538              CON REL.WD2 & WCAR                                    ;201
00B1E 3XXXD8C3  5539              HR TEMP3 & RCACHE   ;READ THE LOWER 16 BITS
00B1F XXXXD803  5540              RA TEMP3
00B20 XXXXE99D  5541              RTAA 4              ;POSITION UPPER 4 BITS
00B21 XXXXC4C2  5542              TOAIR AND,TEMP2
00B22 XXXX000F  5543              IDAT H#0F
00B23 XXXXD804  5544              RA TEMP4
00B24 XXXXE99D  5545              RTAA 4
00B25 XXXXC4C1  5546              TOAIR AND,TEMP1
00B26 XXXX0FF0  5547              IDAT H#0FF0
00B27 XXXXD801  5548              RA TEMP1
00B28 XXXX9942  5549              TORAR OR,TEMP2
00B29 XXXXD804  5550              RA TEMP4
00B2A XXXXF19D  5551              RTAA 8
00B2B XXXXC4C1  5552              TOAIR AND,TEMP1
00B2C XXXX00FF  5553              IDAT H#0FF
                5554              SRC.AMP
                5554 +  IF BANK_EQ_0
00B2D BBXX000F  5554 +            CON AMP.PORT & SRCSEL
                5554 +  ELSE
                5554 +  ENDIF
                5554 +            ENDM
                5555              DST.AMP
                5555 +  IF BANK_EQ_0
00B2E BCXX000F  5555 +            CON AMP.PORT & DSTSEL
                5555 +  ELSE
                5555 +  ENDIF
                5555 +            ENDM
                5556    ISUADR1X:   EQU $
00B2F 5XXXF8C1  5557              HA & SRCSTAT
00B30 XXXXC500  5558              TOAIR EXOR,TEMP0    ;CHECK FOR AMPERIF READY FOR ADDRESS WORD
00B31 XXXX1000  5559              IDAT H#1000         ;ENTAGS (BIT 12) ONLY, NO OTHER STATUS
00B32 BX230B34  5560              CJMP Z,$+2
00B33 BXF30622  5561              JMP UD.ERR0B        ;"ERROR STOP"
00B34 BXC30B36  5562              CJMP DSTRDY,$+2
00B35 BXF30B34  5563              JMP $-1
00B36 14XXD841  5564              RH TEMP1 & WDATA
00B37 XXXX7140  5565              NOOP
00B38 XXXX7140  5566              NOOP
00B39 BXC30B3B  5567              CJMP DSTRDY,$+2
00B3A BXF30B39  5568              JMP $-1
00B3B 14XXD842  5569              RH TEMP2 & WDATA
```

Addr Line - AMPEXIF 7155/885 EMULATION - HSP DIAGNOSTICS - OFFLINE DIAGNOSTICS - SUBROUTINE ISUADRX

```
00B3C XXXX7140  5570            NOOP
00B3D XXXX7140  5571            NOOP
00B3E 8XC30B40  5572            CJNP DSTRDY,$+2
00B3F 8XF30B3E  5573            JNP $-1
00B40 14XXD843  5574            RH TEMP3 & WDATA
00B41 6XXXF8C1  5575            HA & DSTSTAT
00B42 XXXXE580  5576            TSTNA AOUTRDY       ;IS OUTPUT READY AT U-BUS
00B43 8X230B41  5577            CJNP Z,$-2
00B44 XXXXED85  5578            SETNR FNCOUT,AMPCTRL
                5579            SETNR SIDFLG,AMPCTRL
00B45 16XXEB85  5580            / & ALU & DSTCTRL
00B46 XXXXD909  5581            ZR TIMEOUT                                      ;201
                5582    ISUADR8X:  EQU $                                        ;201
00B47 6XXXF8C1  5583            HA & DSTSTAT        ;WAIT FOR OUTPUT READY TO DROP
00B48 XXXXE580  5584            TSTNA AOUTRDY
00B49 8X230B4F  5585            CJNP Z,ISUADR9X                                 ;201
00B4A XXXXDD69  5586            INCR TIMEOUT                                    ;201
00B4B XXXX9509  5587            TORIY EXOR,TIMEOUT                              ;201
00B4C XXXXFFFF  5588            IDAT H#FFFF
00B4D 8X230621  5589            CJNP Z,OD.ERR0C
00B4E 8XF30B47  5590            JNP ISUADR8X                                    ;201
                5591    ISUADR9X:  EQU $                                        ;201
00B4F XXXXEBD5  5592            RSTNR SIDFLG,AMPCTRL                            ;201
                5593            RSTNR FNCOUT,AMPCTRL
00B50 16XXEDD5  5594            / & ALU & DSTCTRL
00B51 XXFAXXXX  5595            RTN
                5596    ;
                5597            INCLUDE HSPCNN.SRC
                5598            TITLE2 HSPCNN - COMMON ROUTINES
```

```
Addr    Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCMN - COMMON ROUTINES

        5599              EJECT
        5600    ;*****************************************************************************
        5601    ;*                                                                           *
        5602    ;*      HH    HH   SSSSSS   PPPPPPP       CCCCCC   MM    MM  NN    NN     *
        5603    ;*      HH    HH  SS    SS  PP    PP     CC    CC  MMM  MMM  NNN   NN     *
        5604    ;*      HH    HH  SS        PP    PP     CC        MMMMMMMM  NNNN  NN     *
        5605    ;*      HHHHHHHH   SSSSSS   PPPPPPP      CC        MM MM MM  NN NN NN     *
        5606    ;*      HH    HH        SS  PP           CC        MM    MM  NN  NNNN     *
        5607    ;*      HH    HH  SS    SS  PP           CC    CC  MM    MM  NN   NNN     *
        5608    ;*      HH    HH   SSSSSS   PP            CCCCCC   MM    MM  NN    NN     *
        5609    ;*                                                                           *
        5610    ;*    HSPCMN - AMPERIF 7155/885 EMULATION HSP CODE COMMON TO BOTH BANKS     *
        5611    ;*                                                                           *
        5612    ;*****************************************************************************
        5613    ;
        5614    ; This file has routines and subroutines that are used in both
        5615    ; the bank 0 (diagnostic) code, and the bank 1 (online) code.
        5616    ; This file is included in both HSPDGN and HSPONL code, via the
        5617    ; INCLUDE assembler directive.
        5618    ;
        5619    ; When the code is close, but not exactly the same in both banks,
        5620    ; the code in this file has conditional assembly statements to
        5621    ; incorperate the differences.  Both HSPDGN and HSPONL have BANK
        5622    ; defined; HSPDGN has BANK equated to 0, HSPONL to 1.  Thus the
        5623    ; conditional assembly statements are of the form "IF BANK_EQ_0
        5624    ; (or 1)".
        5625    ;
00080   5626              ALIGN H#40
        5627    ;
        5628              TITLE2 HSPCMN - STATUS BUFFER/SHARED MEMORY
```

Addr Line - ANPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPCMN - STATUS BUFFER/SHARED MEMORY

```
5629                EJECT
5630    ;
5631    ; SUBROUTINES SHMWRTCU, SHMWRT, SHMRDCU, AND SHMRD
5632    ;
5633    ; These subroutines will read/write 16 bit values to/from the
5634    ; status buffer/shared memory.  The register SHMADDR is the
5635    ; address in the Shared Memory to write to/read from.  The
5636    ; register SHMDATA is the Shared Memory data to be written on
5637    ; entry/data read on exit.
5638    ;
5639    ; The Shared Memory hardware is 8 bits, or 1 byte wide, but these
5640    ; subroutines treat it as 16 bits, or 2 bytes wide, by doubling
5641    ; the given address, doing one byte, incrementing the address,
5642    ; and doing a second byte, and combining the two bytes.  As an
5643    ; attempt to help processing by the calling routine, the register
5644    ; SHMADDR is incremented to the next 16 bit address on exit.
5645    ;
5646    ; The status buffer/shared memory is used to hold drive statuses.
5647    ; As such, the common practice is to want to access a particular
5648    ; status for the current drive.  To handle this, there are two
5649    ; versions of the write subroutines, and two of the read
5650    ; subroutines.  The "-CU" versions will offset SHMADDR by the
5651    ; current drive in register CURUNIT.  SHMADDR will be left
5652    ; modified on exit.  The basic versions will treat SHMADDR as an
5653    ; absolute address, and will not offset it.
5654    ;
5655    ; Parameters for each subroutine are as follows:
5656    ;
5657    ; SHMRD
5658    ; Entry SHMADDR: Absolute address.
5659    ; Exit  SHMDATA: Data read from the address.
5660    ;
5661    ; SHMWRT
5662    ; Entry SHMADDR: Absolute address.
5663    ;       SHMDATA: Data to be written.
5664    ;
5665    ; SHMRDCU
5666    ; Entry SHMADDR: Relative address within CURUNIT's status area.
5667    ;       CURUNIT: Drive unit number of status area to be accessed.
5668    ; Exit  SHMDATA: Data read from the address.
5669    ;       SHMADDR: Absolute address.
5670    ;
5671    ; SHMWRTCU
5672    ; Entry SHMADDR: Relative address within CURUNIT's status area.
5673    ;       SHMDATA: Data to be written.
5674    ;       CURUNIT: Drive unit number of status area to be accessed.
5675    ; Exit  SHMADDR: Absolute address.
5676    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPCMN - STATUS BUFFER/SHARED MEMORY

```
                5677                EJECT
                5678    ;
                5679    ; SHARED MEMORY READ
                5680    ;
                5681    IF BANK_EQ_0
                5682    SHMRD:      EQU $
                5683    ELSE
                5692    ENDIF
00B80 BBXX0003  5693                CON SHMPORT & SRCSEL
00B81 BCXX0003  5694                CON SHMPORT & DSTSEL
00B82 BXF10B9E  5695                JSB CKSHERR         ;CHECK FOR ERRORS BEFORE READ          ;201
                5696    IF BANK_EQ_0
00B83 XX7AXXXX  5697                CRTN N              ;IF ERROR, RETURN WITH NEG SET         ;201
                5698    ELSE
                5700    ENDIF
                5701                RTRA 1,SHMADDR                                             ;201
00B84 14XX838C  5702                / & ALU & WDATA     ;WAIT ONE INSTRUCTION BETWEEN ADDRESS  ;201
00B85 XXXX7140  5703                NOOP                ;                                      ;201
00B86 4XXXD8CB  5704                MR SHMDATA & RDATA  ;AND DATA                              ;201
00B87 XXXX7140  5705                NOOP                ;HAVE MS BYTE, NOW GET LS BYTE         ;201
00B88 14XXFC81  5706                INCA & ALU & WDATA                                         ;201
00B89 XXXX91EB  5707                RTRR B,SHMDATA                                             ;201
00B8A 4XXX9F48  5708                TODRR OR,SHMDATA & RDATA                                   ;201
00B8B BXF10B9E  5709                JSB CKSHERR         ;CHECK FOR ERRORS AFTER READ           ;201
                5710    IF BANK_EQ_0
00B8C XXFAXXXX  5711                RTN                 ;RETURN, WITH NEG SET IF ERROR         ;201
                5712    ELSE
                5719    ENDIF
                5720    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCMN - STATUS BUFFER/SHARED MEMORY

               5721                EJECT
               5722    ;
               5723    ; SHARED MEMORY WRITE
               5724    ;
               5725    IF BANK_EQ_1
               5729    ENDIF
               5730    SHMWRT:     EQU $
00B8D BBXX0003 5731                CON SHMPORT & SRCSEL
00B8E BCXX0003 5732                CON SHMPORT & DSTSEL
00B8F BXF10B9E 5733                JSB CKSHERR         ;CHECK FOR ERRORS BEFORE WRITE          ;201
               5734    IF BANK_EQ_0
00B90 XX7AXXXX 5735                CRTN N              ;IF ERROR, RETURN WITH NEG SET          ;201
               5736    ELSE
               5742    ENDIF
00B91 BXF10B94 5743                JSB SHMWRTNC        ;DO THE WRITE                           ;201
00B92 BXF10B9E 5744                JSB CKSHERR         ;CHECK FOR ERRORS AFTER WRITE           ;201
               5745    IF BANK_EQ_0
00B93 XXFAXXXX 5746                RTN                 ;RETURN, WITH NEG SET IF ERROR          ;201
               5747    ELSE
               5752    ENDIF
               5753    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCMN - STATUS BUFFER/SHARED MEMORY

               5754                EJECT
               5755    ;
               5756    ; SHARED MEMORY WRITE WITH NO ERROR CHECKING
               5757    ; USED BY SHAWRT AND SHACLERR
               5758    ;
               5759    SHMWRINC:   EQU $                                                   ;201
00B94 XXXX91EB 5760                RTRR 8,SHMDATA      ;DO MS BYTE FIRST               ;201
               5761                RTRA 1,SHMADDR      ;MULTIPLY BY TWO FOR BYTE ADDRESS ;201
00B95 14XX838C 5762                / & ALU & WDATA                                     ;201
00B96 XXXX94CB 5763                TORIY AND,SHMDATA                                   ;201
00B97 X4XX00FF 5764                IDAT H#00FF & WDATA                                 ;201
00B98 XXXX7140 5765                NOOP                ;WAIT FOR REMOTE WRITE TO COMPLETE
00B99 XXXX7140 5766                NOOP
00B9A XXXX91EB 5767                RTRR 8,SHMDATA      ;DO LS BYTE, RESTORE SHMDATA REGISTER ;201
00B9B 14XXFC81 5768                INCA & ALU & WDATA  ;INCREMENT TO NEXT BYTE ADDRESS ;201
00B9C XXXX94CB 5769                TORIY AND,SHMDATA                                   ;201
               5770                IDAT H#00FF & WDATA                                 ;201
00B9D X4FA80FF 5771                / & RTN                                             ;201
               5772    ;
               5773    IF BANK_EQ_1
               5784    ENDIF
               5785    ;
               5786    IF BANK_EQ_1
               5973    ENDIF                           ;IF BANK_EQ_1
               5974    ;
```

```
 Addr        Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCMN - STATUS BUFFER/SHARED MEMORY

             5975                EJECT
             5976    ;
             5977    ; Subroutine to check the Shared Memory source status for errors.
             5978    ; Returns with zero flag set if ok.  Shared Memory must be
             5979    ; selected as bus source.
             5980    ;
             5981    ; If errors, writes error bits in cache location SHERR, and
             5982    ; returns with neg flag set.
             5983    ;
             5984    ; In bank 0, SYSPORT is also checked for bus parity errors.
             5985    ;
             5986    CKSHERR:    EQU $                                                   ;201
00B9E 5XXXF8C1 5987                MA & SRCSTAT        ;GET SHMEM STATUS               ;201
00B9F XXXXE4C1 5988                TUA1 AND,MRA        ;TEST FOR ANY ERROR BITS        ;201
00BA0 XXXX001F 5989                IDAT SHS.ER.M                                       ;201
             5990    IF BANK_EQ_0
00BA1 BX230BA4 5991                CJNP Z,$+3          ;NO SHMEM ERRORS,               ;201
             5992    ELSE
             5994    ENDIF
00BA2 BXF10DA9 5995                JSB SETSHERR        ;NOTE ERROR                     ;201
00BA3 1XFAF800 5996                M1M & RTN           ;RETURN WITH NEG SET            ;201
             5997    IF BANK_EQ_0
00BA4 BXF10BAE 5998                JSB CKSYSERR        ;NOW CHECK FOR BUS PARITY       ;201
             5999                CON SHMPORT         ;RESELECT SHARED MEMORY         ;201
00BA5 BBXX0003 6000                / & SRCSEL                                          ;201
00BA6 1XXXF880 6001                AH                  ;ACC WILL HAVE ERROR BITS, IF ANY ;201
00BA7 XX2AXXXX 6002                CRTN Z              ;NO ERRORS                      ;201
00BA8 1XFAF800 6003                M1M & RTN           ;ERRORS, RETURN WITH NEG SET    ;201
             6004    ENDIF
             6005    ;
             6006    ; SET SHARED MEMORY ERROR
             6007    ;
             6008    ; Subroutine to set error status in local memory and flags.
             6009    ; Error status from shared memory source status is in ACC.
             6010    ;
             6011    SETSHERR:   EQU $                                                   ;201
00BA9 B2XX0002 6012                CON SHERR & WCAR    ;COPY BAD STATUS TO CACHE       ;201
00BAA 13XXF880 6013                AH & WCACHE                                         ;201
00BAB BBXX0003 6014                CON SHMPORT & SRCSEL;RESET SHARED MEMORY, CLEAR ERRORS ;201
             6015                CON SHC.RST                                         ;201
00BAC B5XX0000 6016                / & SRCCTRL                                         ;201
             6017    IF BANK_EQ_)
             6019    ENDIF
00BAD XXFAXXXX 6020                RTN                 ;AND RETURN                     ;201
             6021    ;
             6022                TITLE2 HSPCMN - SYSPORT SUPPORT
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCMN - SYSPORT SUPPORT

               6023              EJECT
               6024    ;
               6025    ; Subroutine to check the SYSPORT source status for errors.
               6026    ; Returns with zero flag set if ok.
               6027    ;
               6028    ; If errors, writes error bits in cache location SYSERR, and, if
               6029    ; in bank 0, returns with neg flag set, or if in bank 1, aborts.
               6030    ;
               6031    CKSYSERR:   EQU $                                              ;201
00BAE B0XX0000 6032                CON SYSPORT & SRCSEL;SELECT AS SOURCE            ;201
00BAF 5XXXF8C1 6033                MA & SRCSTAT        ;GET STATUS                 ;201
00BB0 XXXXE4C1 6034                TOAI AND,NRA        ;TEST FOR ANY ERROR BITS    ;201
00BB1 XXXX0007 6035                IDAT SS.ERR.M                                  ;201
00BB2 XX2AXXXX 6036                CRTN Z              ;NO ERRORS                  ;201
               6037    ; SYSPORT STATUS ERROR
00BB3 B2XX0001 6038                CON SYSERR & WCAR   ;COPY BAD STATUS TO CACHE    ;201
00BB4 13XXF800 6039                AM & WCACHE                                    ;201
               6040    IF BANK_EQ_0
00BB5 1XFAFB00 6041                NIM & RTN           ;AND RETURN WITH NEG SET    ;201
               6042    ELSE
               6047    ENDIF
               6048    IF BANK_EQ_1
               6074    ENDIF
               6075    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCNN - SYSPORT SUPPORT

               6076                EJECT
               6077    ;
               6078    ; Subroutine to reset any SYSPORT errors.
               6079    ;
               6080    CLRSYS:     EQU $                                                   ;201
               6081                CON SYSPORT         ;CLEAR SYSPORT ERRORS               ;201
00BB6 BBXX0000 6082                / & SRCSEL                                              ;201
00BB7 5XXXF8C1 6083                HA & SRCSTAT        ;BY READING THEM                    ;201
00BB8 B2XX0001 6084                CON SYSERR & WCAR   ;CLEAR SAVED SYSPORT ERROR STATUS   ;201
               6085                ZH & WCACHE                                             ;201
00BB9 13FAF900 6086                / & RTN                                                 ;201
               6087    ;
               6088                TITLE2 HSPCNN - SUBROUTINE MULTCYL
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPCMN - SUBROUTINE MULTCYL

```
              6089              EJECT
              6090    ;
              6091    ; MULTCYL
              6092    ;
              6093    ; Derive relative Sperry mass storage word # from CDC cylinder #
              6094    ; This entails taking the input cylinder number and multiplying
              6095    ; it by the number of 36-bit words that would fit in a cylinder,
              6096    ; 24400 hex, or 148,480 dec.  The operation is performed by bit
              6097    ; rotations and successive additions of the results for every bit
              6098    ; set in the multiplier (which, for the value 24400 hex, includes
              6099    ; upward rotations of 10, 14, and 17 bits).  Two register
              6100    ; precision is maintained throughout the operation by rotating
              6101    ; the low order register up "n" bits and rotating the high order
              6102    ; register down "16-n" bits.
              6103    ;
              6104    ; INPUTS: cylinder # to multiply in TEMP0 implied constant
              6105    ; 24400 hex.
              6106    ;
              6107    ; OUTPUTS: 32-bit relative word number in register pair TEMP3,
              6108    ; TEMP4.
              6109    ;
              6110    ;EXE TIME 2.5 U-SEC
              6111    MULTCYL:    EQU $
00BBA XXXX9CC0  6112              TORIR AND,TEMP0     ;ISOLATE VALID BITS OF CYL#
00BBB XXXX03FF  6113              IDAT H#03FF         ; (MAX CYL = 842 = 34A HEX)
              6114    ;
              6115    ; SHIFT CYL# UP BY 10, PUT LOW ORDER RESULT IN TEMP4,
              6116    ; HIGH ORDER RESULT IN TEMP3
00BBC XXXXD800  6117              RA TEMP0            ;PUT CYL# IN ACC
00BBD XXXXF59D  6118              RTAA 16-6           ;ROTATE UP 10
00BBE XXXXC4C4  6119              TOAIR AND,TEMP4     ;INSERT ZEROS INTO LOW BITS OF RESULT
00BBF XXXXFC00  6120              IDAT H#FC00         ; AND SAVE RESULT AS LOW ORDER REG
00BC0 XXXXC4C3  6121              TOAIR AND,TEMP3     ;INSERT ZEROS INTO HIGH BITS OF RESULT
00BC1 XXXX03FF  6122              IDAT H#03FF         ; AND SAVE RESULT AS HIGH ORDER REG
              6123    ;
              6124    ; SHIFT CYL# UP BY 14 AND ADD (WITH CARRY) TO PREVIOUS RESULTS
              6125    ; IN TEMP3, TEMP4
00BC2 XXXXD800  6126              RA TEMP0            ;PUT CYL# IN ACC AGAIN
00BC3 XXXXFD9D  6127              RTAA 16-2           ;ROTATE UP 14
00BC4 XXXXC4C2  6128              TOAIR AND,TEMP2     ;INSERT ZEROS INTO LOW ORDER BITS
00BC5 XXXXC000  6129              IDAT H#C000         ; AND SAVE FOR LATER
00BC6 XXXXC4C1  6130              TOAIR AND,TEMP1     ;INSERT ZEROS INTO HIGH ORDER BITS
00BC7 XXXX3FFF  6131              IDAT H#3FFF         ; AND SAVE FOR LATER
00BC8 BXF10C03  6132              JSB ADDC1234        ;GO DO DOUBLE REG PRECISION ADD OPERATION
              6133    ;
              6134    ; SHIFT CYL# UP 17 (EFFECTIVELY SHIFT UP 1)
              6135    ; AND ADD TO PREVIOUS HIGH ORDER REG
00BC9 XXXXD000  6136              RA TEMP0
00BCA XXXXE39D  6137              RTAA 1
              6138              TORAR ADD,TEMP3
00BCB XXFA9883  6139              / & RTN             ;RETURN TO CALLER
              6140    ;
              6141              TITLE2 HSPCMN - SUBROUTINE MULTTRK
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPCMN - SUBROUTINE MULTTRK

```
                6142                EJECT
                6143    ;
                6144    ; MULTTRK
                6145    ;
                6146    ; Derive relative Sperry mass storage word # from CDC track #.
                6147    ; This entails taking the input track number and multiplying it
                6148    ; by the number of 36-bit words that would fit on a track, E80
                6149    ; hex, or 3712 dec.  The operation is performed by bit rotations
                6150    ; and successive additions of the results for every bit set in
                6151    ; the multiplier (which, for the value E80 hex, includes upward
                6152    ; rotations of 7, 9, 10, and 11 bits).  Two register precision is
                6153    ; maintained throughout the operation by rotating the low order
                6154    ; register up "n" bits and rotating the high order register down
                6155    ; "16-n" bits.
                6156    ;
                6157    ; INPUTS: track # to multiply in TEMP0 implied constant E80 hex.
                6158    ;
                6159    ; OUTPUTS: 32-bit relative word number in register pair TEMP3,
                6160    ; TEMP4
                6161    ;
                6162    ;EXE TIME 6.1 U.SEC
                6163    MULTTRK:    EQU $
00BCC XXXX9CC0  6164                TORIR AND,TEMP0     ;ISOLATE VALID BITS OF TRK#
00BCD XXXX003F  6165                IDAT H#003F         ; (MAX TRK# = 28 HEX)
                6166    ;
                6167    ; SHIFT TRK# UP BY 7, PUT LOW ORDER RESULT IN TEMP4,
                6168    ; HIGH ORDER RESULT IN TEMP3
00BCE XXXXD800  6169                RA TEMP0            ;PUT TRK# IN ACC
00BCF XXXXEF9D  6170                RTAA 7              ;ROTATE UP 7
00BD0 XXXXC4C4  6171                TOAIR AND,TEMP4     ;INSERT ZEROS INTO LOW BITS OF RESULT
00BD1 XXXXFF80  6172                IDAT H#FF80         ; AND SAVE RESULT AS LOW ORDER REG
00BD2 XXXXC4C3  6173                TOAIR AND,TEMP3     ;INSERT ZEROS INTO HIGH BITS OF RESULT
00BD3 XXXX007F  6174                IDAT H#007F         ; AND SAVE RESULT AS HIGH ORDER REG
                6175    ;
                6176    ; SHIFT TRK# UP BY 9 AND ADD TO PREVIOUS RESULTS IN TEMP3, TEMP4
00BD4 XXXXD800  6177                RA TEMP0            ;PUT TRK# IN ACC AGAIN
00BD5 XXXXF39D  6178                RTAA 9              ;ROTATE UP 9
00BD6 XXXXC4C2  6179                TOAIR AND,TEMP2     ;INSERT ZEROS INTO LOW ORDER BITS
00BD7 XXXXFE00  6180                IDAT H#FE00         ; AND SAVE FOR LATER
00BD8 XXXXC4C1  6181                TOAIR AND,TEMP1     ;INSERT ZEROS INTO HIGH ORDER BITS
00BD9 XXXX01FF  6182                IDAT H#01FF         ; AND SAVE FOR LATER
00BDA BXF10C03  6183                JSB ADDC1234        ;GO DO DOUBLE REG PRECISION ADD OPERATION
                6184    ;
                6185    ; SHIFT TRK# UP 10 AND ADD (WITH CARRY) TO PREVIOUS RESULTS
                6186    ; IN TEMP3, TEMP4
00BDB XXXXD800  6187                RA TEMP0            ;PUT TRK# IN ACC AGAIN
00BDC XXXXF59D  6188                RTAA 16-6           ;ROTATE UP 10
00BDD XXXXC4C2  6189                TOAIR AND,TEMP2     ;INSERT ZEROS INTO LOW ORDER BITS
00BDE XXXXFC00  6190                IDAT H#FC00         ; AND SAVE FOR LATER
00BDF XXXXC4C1  6191                TOAIR AND,TEMP1     ;INSERT ZEROS INTO HIGH ORDER BITS
00BE0 XXXX03FF  6192                IDAT H#03FF         ; AND SAVE FOR LATER
00BE1 BXF10C03  6193                JSB ADDC1234        ;GO DO DOUBLE REG PRECISION ADD OPERATION
                6194    ;
                6195    ; SHIFT TRK# UP 11 AND ADD (WITH CARRY) TO PREVIOUS RESULTS
                6196    ; IN TEMP3, TEMP4
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCMN - SUBROUTINE MULTTRK

00BE2 XXXXD800  6197              RA TEMP0            ;PUT TRK# IN ACC AGAIN
00BE3 XXXXF79D  6198              RTAA 11             ;ROTATE UP 11
00BE4 XXXXC4C2  6199              TOA1R AND,TEMP2     ;INSERT ZEROS INTO LOW ORDER BITS
00BE5 XXXXF800  6200              IDAT H#F800         ; AND SAVE FOR LATER
00BE6 XXXXC4C1  6201              TOA1R AND,TEMP1     ;INSERT ZEROS INTO HIGH ORDER BITS
00BE7 XXXX07FF  6202              IDAT H#07FF         ; AND SAVE FOR LATER
00BE8 BXF18C03  6203              JSB ADDC1234        ;GO DO DOUBLE REG PRECISION ADD OPERATION
00BE9 XXFAXXXX  6204              RTN                 ;  AND RETURN TO CALLER
                6205    ;
                6206              TITLE2 HSPCMN - SUBROUTINE MULTSECT
```

```
                6207                EJECT
                6208    ;
                6209    ; MULTSECT
                6210    ;
                6211    ; Derive relative Sperry mass storage word # from CDC sector #.
                6212    ; This entails taking the input sector number and multiplying it
                6213    ; by the number of 36-bit words that would fit in a sector, 74
                6214    ; hex, or 116 dec.  The operation is performed by bit rotations
                6215    ; and successive additions of the results for every every bit set
                6216    ; in the multiplier (which, for the value 74 hex, includes upward
                6217    ; rotations of 2, 4, 5, and 6 bits).  The bit precision for this
                6218    ; operation requires only one register.
                6219    ;
                6220    ; INPUTS: sector # to multiply in TEMP0
                6221    ; implied constant 74 hex
                6222    ;
                6223    ; OUTPUTS: 16-bit relative word number in TEMP4
                6224    ;
                6225    ;EXE TIME 2.5 U-SEC
                6226    MULTSECT:   EQU $
00BEA XXXX9CC0  6227                TOR1R AND,TEMP0     ;ISOLATE VALID BITS OF SECTOR#
00BEB XXXX003F  6228                IDAT H#003F         ; (MAX SECTOR# = 20 HEX)
                6229    ;
                6230    ; SHIFT SECTOR# UP BY 2, PUT LOW ORDER RESULT IN TEMP4,
                6231    ; HIGH ORDER RESULT IN TEMP3
00BEC XXXXD800  6232                RA TEMP0            ;PUT SECTOR# IN ACC
00BED XXXXE59D  6233                RTAA 2              ;ROTATE UP 2
00BEE XXXXC4C4  6234                TOA1R AND,TEMP4     ;INSERT ZEROS INTO LOW BITS OF RESULT
00BEF XXXXFFFC  6235                IDAT H#FFFC         ; AND SAVE RESULT
00BF0 XXXXD903  6236                ZR TEMP3            ;CLEAR HIGH ORDER WORD
                6237    ;
                6238    ; SHIFT SECTOR# UP BY 4 AND ADD TO PREVIOUS RESULT IN TEMP4
00BF1 XXXXD800  6239                RA TEMP0            ;PUT SECTOR# IN ACC AGAIN
00BF2 XXXXE99D  6240                RTAA 4              ;ROTATE UP 4
00BF3 XXXXC4C2  6241                TOA1R AND,TEMP2     ;INSERT ZEROS INTO LOW ORDER
00BF4 XXXXFFF0  6242                IDAT H#FFF0         ; BITS AND SAVE
00BF5 XXXXD802  6243                RA TEMP2            ;ADD THE SAVED RESULT TO THE
00BF6 XXXX9884  6244                TORAR ADD,TEMP4     ; PREVIOUS RESULT IN TEMP4
                6245    ;
                6246    ; SHIFT SECTOR# UP BY 5 AND ADD TO PREVIOUS RESULT IN TEMP4
00BF7 XXXXD800  6247                RA TEMP0            ;PUT SECTOR# IN ACC AGAIN
00BF8 XXXXEB9D  6248                RTAA 5              ;ROTATE UP 5
00BF9 XXXXC4C2  6249                TOA1R AND,TEMP2     ;INSERT ZEROS INTO LOW ORDER
00BFA XXXXFFE0  6250                IDAT H#FFE0         ; BITS AND SAVE
00BFB XXXXD802  6251                RA TEMP2            ;ADD THE SAVED RESULT TO THE
00BFC XXXX9884  6252                TORAR ADD,TEMP4     ; PREVIOUS RESULT IN TEMP4
                6253    ;
                6254    ; SHIFT SECTOR# UP BY 6 AND ADD TO PREVIOUS RESULT IN TEMP4
00BFD XXXXD800  6255                RA TEMP0            ;PUT SECTOR# IN ACC AGAIN
00BFE XXXXED9D  6256                RTAA 6              ;ROTATE UP 6
00BFF XXXXC4C2  6257                TOA1R AND,TEMP2     ;INSERT ZEROS INTO LOW ORDER
00C00 XXXXFFC0  6258                IDAT H#FFC0         ; BITS AND SAVE
00C01 XXXXD802  6259                RA TEMP2            ;ADD THE SAVED RESULT TO THE
                6260                TORAR ADD,TEMP4     ; PREVIOUS RESULT IN TEMP4,
00C02 XXFA9884  6261                / & RTN             ; RETURN TO CALLER
```

Addr Line - AMPERIF /155/885 EMULATION - HSP DIAGNOSTICS - HSPCMN - SUBROUTINE MULTSECT

```
6262    ;
6263                TITLE2 HSPCMN - SUBROUTINE ABDC1234
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPCMN - SUBROUTINE ADDC1234

```
              6264                EJECT
              6265    ;
              6266    ; ADDC1234
              6267    ;
              6268    ; This routine performs a double register precision add with
              6269    ; carry operation on register pairs TEMP1, TEMP2 and TEMP3,
              6270    ; TEMP4, which in effect, is a 32-bit add with carry.  The result
              6271    ; is maintained in register pair TEMP3, TEMP4.
              6272    ;
              6273    ; INPUTS:
              6274    ; Valid 31-bit values in register pairs TEMP1, TEMP2 and TEMP3,
              6275    ; TEMP4 (it is assumed that neither value exceeds 7FFFFFFF,
              6276    ; because addition of two greater values may result in a value
              6277    ; larger than 32 bits, or two registers worth of precision).
              6278    ;
              6279    ; OUTPUTS: 32-bit result in register pair TEMP3, TEMP4
              6280    ;
              6281    ;EXE TIME .6 U-SEC
              6282    ADDC1234:   EQU $
00C03 XXXXD802  6283                RA TEMP2            ;ADD THE SAVED LOW ORDER REG TO THE
00C04 XXXX9884  6284                TORAR ADD,TEMP4     ; PREVIOUS LOW ORDER RESULT
00C05 BX530C07  6285                CJMP C,$+2
00C06 BXF30C08  6286                JMP $+2             ;IF NO CARRY, CONTINUE NORMALLY
00C07 XXXXDD63  6287                INCR TEMP3          ;OTHERWISE INCREMENT THE HIGH ORDER REG
00C08 XXXXD801  6288                RA TEMP1            ;THEN ADD THE SAVED HIGH ORDER REG TO
              6289                TORAR ADD,TEMP3     ; PREVIOUS HIGH ORDER RESULT
00C09 XXFA9883  6290                / & RTN             ;RETURN TO CALLER                       ;1E
              6291    ;
              6292                TITLE2 HSPCMN - SUBROUTINE INITAMP
```

```
                6293                EJECT
                6294    ;
                6295    ; INITAMP WILL CLEAR THE UBI BOARD AND CLEAR THE XRC INTERFACE
                6296    ;
                6297    INITAMP:    EQU $
                6298                SRC.AMP                                         ;201
                6298 +  IF BANK_EQ_0
03C0A BBXX000F  6298 +              CON AMP.PORT & SRCSEL
                6298 +  ELSE
                6298 +  ENDIF
                6298 +              ENDM
                6299                DST.AMP                                         ;201
                6299 +  IF BANK_EQ_0
00C0B BCXX000F  6299 +              CON AMP.PORT & DSTSEL
                6299 +  ELSE
                6299 +  ENDIF
                6299 +              ENDM
00C0C 15XXC995  6300                LD2NR CLREFINT,AMPCTRL & ALU & SRCCTRL          ;201
00C0D 15XXE9D5  6301                RSTNR CLREFINT,AMPCTRL & ALU & SRCCTRL
00C0E 15XXF7B5  6302                SETNR FIFOCLR,AMPCTRL & ALU & SRCCTRL
00C0F 15XXF7D5  6303                RSTNR FIFOCLR,AMPCTRL & ALU & SRCCTRL
00C10 5XXXF990  6304                TSTND ENTAGS & SRCSTAT                          ;201
00C11 BX230C1E  6305                CJMP Z,INITAMP3                                 ;20305
00C12 16XXF5B5  6306                SETNR URSPTO,AMPCTRL & ALU & DSTCTRL
                6307    INITAMP1:   EQU $               ;CLEAR OUTSTANDING READ DATA    ;201
00C13 5XXXF8C1  6308                HA & SRCSTAT
00C14 XXXXE4C1  6309                IDAT AND,NRA
00C15 XXXX0718  6310                IDAT AS.INP.N                                   ;201
00C16 BX230C19  6311                CJMP Z,INITAMP2
00C17 4XXXF8C1  6312                HA & RDATA
00C18 BXF30C13  6313                JMP INITAMP1                                    ;201
                6314    INITAMP2:   EQU $
00C19 XXXXF7D9  6315                RSTNR F.STPEND,FLAGS;CLEAR STATUS PENDING FLAG  ;201
00C1A 16XXF5D5  6316                RSTNR URSPTO,AMPCTRL & ALU & DSTCTRL
00C1B 5XXXF990  6317                TSTND ENTAGS & SRCSTAT
00C1C BX230C1E  6318                CJMP Z,$+2
00C1D BXF30C1B  6319                JMP $-2             ;#### SHOULD HAVE TIMEOUT
                6320    INITAMP3:   EQU $                                           ;20305
00C1E XXXXDB09  6321                NIR TIMEOUT                                     ;201
                6322    INITAMP4:   EQU $                                           ;201
                6323                TSTND ST.BK2
00C1F 5XXXE390  6324                / & SRCSTAT         ;WAIT 32 MIL SEC FOR STATUS
00C20 BX230C23  6325                CJMP Z,$+3
                6326    IF BANK_EQ_0
00C21 BXF10A80  6327                JSB CKAMPSTX
                6328    ELSE
                6330    ENDIF
00C22 XXFAXXXX  6331                RTN
00C23 XXXXC1E9  6332                DECR TIMEOUT                                    ;201
00C24 XX2AXXXX  6333                CRTN Z
00C25 BXF30C1F  6334                JMP INITAMP4                                    ;201
                6335    ;
                6336                TITLE2 HSPCMN - DELAY TIMERS
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     HSPCMN - DELAY TIMERS

               6337              EJECT
               6338   ;
               6339   ; SUBROUTINE TO DELAY X MICROSECONDS, X IN ACC
               6340   ;
               6341   DELAY:     EQU $               ;TEN INSTRUCTIONS = 10S PER LOOP
00C26 1XXXF880 6342              AM                  ;1                                  ;201
00C27 XX2AXXXX 6343              CRTN Z              ;2
00C28 XXXXE185 6344              DECA                ;3
00C29 XXXX7140 6345              NOOP                ;4
00C2A XXXX7140 6346              NOOP                ;5
00C2B XXXX7140 6347              NOOP                ;6
00C2C XXXX7140 6348              NOOP                ;7
00C2D XXXX7140 6349              NOOP                ;8
00C2E XXXX7140 6350              NOOP                ;9
00C2F BXF30C26 6351              JMP DELAY           ;10
               6352   ;
               6353   ; SUBROUTINE TO DELAY X MILLISECONDS, X IN TEMP0
               6354   ; USES DELAY, WHICH USES ACC.
               6355   ;
               6356   DELAYMS:   EQU $                                               ;201
00C30 XXXXF8E1 6357              IA                  ;CALL DELAY FOR 1000 US (1 MS)  ;201
00C31 XXXX03E8 6358              IDAT 1000                                           ;201
00C32 BXF10C26 6359              JSB DELAY                                           ;201
00C33 XXXXC1E0 6360              DECR TEMP0          ;PER TEMP0                      ;201
00C34 XX2AXXXX 6361              CRTN Z                                              ;201
00C35 BXF30C30 6362              JMP DELAYMS                                         ;201
               6363   ;
               6364              TITLE2 HSPCMN - CHECK CDC INSTALLED - GET ID
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS - HSPCRN - CHECK CDC INSTALLED - GET ID

```
              6365              EJECT
              6366    ;
              6367    ; SUBROUTINE TO SEE IF A CDC1 PORT IS INSTALLED.
              6368    ; TEMP4 HAS THE PORT TO BE TESTED.  RTN WITH NEG MEANS NO.
              6369    ;
              6370    CKCDC:    ENU $                                                ;201
00C36 1BXXD844 6371             RH TEMP4 & SRCSEL  ;SELECT CDC1 AS SOURCE           ;1E
00C37 1XXXF900 6372             ZH                 ;SET BUS TO ZERO                 ;201
00C38 5XXXF8C1 6373             HA & SRCSTAT       ;READ THE CDC STATUS             ;1E
00C39 XXXXE4C1 6374             TOA1 AND,NRA       ;ISOLATE FIRST 3 MSBIT SWITCH SETTINGS ;1E
00C3A XXXXDE00 6375             IDAT H#0E00        ;                                ;1E
00C3B XXXXE501 6376             TOA1 EXOR,NRA      ;CHECK FOR SWITCH SETTING = H#101X ;1E
00C3C XXXX9A00 6377             IDAT H#0A00        ;                                ;1E
00C3D XX2AXXXX 6378             CRTN Z             ;YES, RTN WITH Z AND NOT N       ;1E
              6379              NTH                ;NO, SET NEG FLAG                ;201
00C3E 1XFAFB00 6380             / & RTN                                             ;201
              6381    ;
              6382    ; END OF COMMON ROUTINES
              6383    ;
              6384              END
              6385    ;
              6386              TITLE2 INTERBANK JUMP LOCATIONS
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP DIAGNOSTICS -     INTERBANK JUMP LOCATIONS

               6387              EJECT
00FF7          6388              ORG H'0FF7                                              ;201
               6389    ; BARRIER, HANG IF TRYING TO EXECUTING CODE HERE
00FF7 BXF30FF7 6390              JMP $                                                   ;201
               6391    ;
               6392    ; ENTRY INTO BANK 0 FOR DIAG FNC FROM THE AMPERIF OCP
               6393    ;
00FF8 XXXX7140 6394              NOOP
00FF9 XXXX7140 6395              NOOP
00FFA XXXX7140 6396              NOOP
00FFB XXXX7140 6397              NOOP
00FFC XXXX7140 6398              NOOP
00FFD XXXX7140 6399              NOOP
00FFE BXF30440 6400              JMP OD.INIT                                             ;201
               6401    ;
               6402    ; END OF BANK 0 - DIAGNOSTIC CODE
               6403    ;
               6404              END
```

Symbol	Type	Value	References
.A2NA	S	00000004	
.A2NDY	S	00000014	
.A2NR	S	0000000E	
.ALU	S	00000001	
.BUNR.2	S	0000000C	
.BUNR.Q	S	00000003	
.BUR1.Q	S	00000003	
.BUR2.Q	S	00000002	
.CDAI	S	00000002	
.CDXA	S	00000004	
.CDXI	S	00000003	
.CJP	S	00000003	
.CJPP	S	0000000B	
.CJSB	S	00000001	
.CUN	S	0000000B	
.CUNT	S	0000000E	
.CXAI	S	00000005	
.CXTN	S	0000000A	
.DEFAULT	D		
.DSTCTRL	S	00000006	
.DSTSEL	S	0000000C	
.DSTSTAT	S	00000006	
.JRP	S	00000007	
.JSRP	S	00000005	
.JZ	S	00000000	
.LD2NA	S	00000006	
.LD2NR	S	0000000C	
.LD2NY	S	00000016	
.LDC2NA	S	00000007	
.LDC2NR	S	0000000D	
.LDC2NY	S	00000017	
.LDCT	S	0000000C	
.LOOP	S	0000000D	
.N	S	00000001	
.NARI	S	0000000C	
.NDA1	S	00000007	
.NDAR	S	00000008	
.NDRA	S	0000000A	
.NDRI	S	00000009	
.NRA1	S	0000000E	
.NOOP	D		
.PUSH	S	00000004	
.R86	S	00000007	
.RCACHE	S	00000003	
.RCAR	S	00000002	
.RDATA	S	00000004	
.RFCT	S	00000008	
.ROTC.Q	S	00000001	
.ROTN.Q	S	00000001	
.ROTNR.2	S	0000000C	
.ROTNR.Q	S	00000003	
.ROTR1.Q	S	00000000	
.ROTR2.Q	S	00000001	
.RPCT	S	00000009	
.RSTNA	S	00000001	

Symbol	Type	Value	References
.RSTND	S	00000011	
.RSTNR	S	0000000E	
.RTAA	S	0000001D	
.RTAR	S	00000000	
.RTAY	S	0000001C	
.RTDA	S	00000019	
.RTDR	S	00000001	
.RTDY	S	00000018	
.RTRA	S	0000000C	
.RTRR	S	0000000F	
.RTRY	S	0000000E	
.S2NA	S	00000005	
.S2NDY	S	00000015	
.S2NR	S	0000000F	
.S86	S	00000008	
.SEQ	S	00000008	
.SETNA	S	00000002	
.SETND	S	00000012	
.SETNR	S	0000000D	
.SHA	S	00000006	
.SHD	S	00000007	
.SHDR	S	00000007	
.SHFTNR.	S	00000003	
.SHFTR.Q	S	00000002	
.SHRR	S	00000006	
.SOA	S	00000004	
.SOAR	S	00000004	
.SOD	S	00000006	
.SODR	S	00000006	
.SOI	S	00000007	
.SOIR	S	00000007	
.SONR.Q	S	00000003	
.SOR.Q	S	00000002	
.SORA	S	00000000	
.SORR	S	0000000B	
.SORS	S	00000003	
.SORY	S	00000002	
.SOSE	S	0000000A	
.SOSER	S	0000000A	
.SOZ	S	00000008	
.SOZE	S	00000009	
.SOZER	S	00000009	
.SOZR	S	00000008	
.SRCCTRL	S	00000005	
.SRCSEL	S	0000000B	
.SRCSTAT	S	00000005	
.TC	S	0000000A	
.TF1	S	00000012	
.TF2	S	00000014	
.TF3	S	00000016	
.TL	S	00000010	
.TLOW	S	00000008	
.TN	S	0000000E	
.TNO	S	00000002	
.TNOZ	S	00000000	

Symbol	Type	Value	References														
.TOAI	S	00000002															
.TOAIR	S	00000002															
.TODA	S	00000001															
.TODAR	S	00000001															
.TODI	S	00000005															
.TODIR	S	00000005															
.TODRA	S	00000003															
.TODRR	S	0000000F															
.TODRY	S	0000000B															
.TONR.Q	S	00000003															
.TOR1.Q	S	00000000															
.TOR2.Q	S	00000002															
.TORAA	S	00000000															
.TORAR	S	0000000C															
.TORAY	S	00000008															
.TORIA	S	00000002															
.TORIR	S	0000000E															
.TORIY	S	0000000A															
.TOVR	S	00000006															
.TSTNA	S	00000000															
.TSTND	S	00000010															
.TSTNR	S	0000000F															
.TWB	S	0000000F															
.TZ	S	00000004															
.TZC	S	0000000C															
.W86	S	00000007															
.WCACHE	S	00000003															
.WCAR	S	00000002															
.WCARLOW	S	0000000D															
.WDATA	S	00000004															
.WORD	D																
A2NA	D																
A2NDY	D																
A2NR	D																
AC.DABLE	A	0000000D	*1192														
AC.DACK	A	00000008	*1187														
AC.DIDR	A	00000002	*1181	2667													
AC.DODR	A	00000001	*1180	2663	2666												
AC.DWRAP	A	00000000	*1179	2593	2664												
AC.RESET	A	0000000C	*1191														
AD.OUT.M	A	00000007	*1174	5103	5470												
ADD	A	00000004	2358	4188	4198	4202	4374	4383	4387	4523	4533	4537	4707	4716	4720	4920	4934
			4969	4999	5034	5064	6138	6244	6252	6260	6284	6289					
ADDC	A	00000005															
ADDC1234	A	00000C03	5258	5274	6132	6183	6193	6203	*6282								
ADDR	A	0000001B	*1014	1913	2126	2128	2132	2133	2138	2140	2144	2145	2159	2181	2182	2193	2282
			2306	2309	2314	2315	2320	2323	2328	2329	2339	2344	2345	2358	2360	2363	2411
			2425														
AF.NOOP	A	00000003	*1200	3019	3789												
AF.RD	A	0000000E	*1204	4302	4635												
AF.SEEK	A	0000000B	*1202	4035													
AF.SENSE	A	00000004	*1201	5345													
AF.WRT	A	0000000D	*1203	4138	4477												
AH	D		2665	2668	2991	3069	3217	3232	3949	4097	4941	4944	4977	4998	5042	5063	5403
			6001	6013	6039	6342											

Symbol	Type	Value	References
ALU	D		2594 2778 2783 3145 3192 3206 3216 3231 3233 3235 3236 3238 3250 3256 3354 3848 3928 4108 4112 4157 4174 4237 4252 4254 4256 4272 4274 4276 4287 4290 4359 4375 4491 4511 4575 4591 4593 4595 4613 4615 4617 4648 4651 4694 4708 4809 4822 4829 4855 4859 4884 4888 4892 4896 4900 4915 4923 4926 4932 4952 5116 5120 5161 5168 5175 5182 5189 5201 5212 5223 5240 5245 5247 5254 5256 5261 5263 5270 5272 5277 5279 5358 5361 5476 5504 5516 5580 5594 5702 5706 5762 5768 6300 6301 6302 6303 6306 6316
AMP.P.ER	A	0000000B	*1154 4048 4226 4327 4343 4407 4423 4440 4564 4662 4678 4748 4765 4782 5370 5404 5418 5432
AMP.PORT	A	0000000F	*1054 2586 2591 2592 2616 2629 2643 2657 2685 2702 2719 3596 4129 4130 4293 4294 4401 4468 4469 4626 4627 4738 5306 5463 5464 5554 5555 6298 6299
AMP.SENS	A	0000000F	*1574 1575 5352
AMP.ST1	A	00000006	*1565 1566 5330
AMP.ST2	A	00000007	*1566 1567 5332
AMP.ST3	A	00000008	*1567 1568 3845 4028 5152 5334 5381
AMPCMD	A	00000017	*0965 3018 3788 4034 4137 4301 4476 4634 5344 5478
AMPCTRL	A	00000015	*0963 4173 4236 4251 4253 4255 4271 4273 4275 4510 4574 4590 4592 4594 4612 4614 4616 5115 5119 5502 5503 5514 5515 5578 5579 5592 5593 6300 6301 6302 6303 6306 6316
AMPSECSZ	A	00000074	*1321 1324
AMPUNIT	A	00000016	*0964 3020 4040 4151 4315 4482 4640 5310 5474
AMPWLEN	A	00000018	*0966 3017 3787 3791 4036 4142 4146 4306 4310 4478 4636 5346 5479 5489
AND	A	00000006	2133 2310 2315 2324 2329 2345 2598 2606 2619 2632 2651 2677 2694 2711 2971 3065 3070 3078 3211 3255 3645 3715 3929 3932 3936 3940 3961 3979 3996 4013 4867 4871 4876 4880 4937 4951 4955 5102 5132 5308 5312 5324 5336 5469 5542 5546 5552 5763 5769 5988 6034 6112 6119 6121 6128 6130 6164 6171 6173 6179 6181 6183 6191 6199 6201 6227 6234 6241 6249 6257 6309 6374
AOUTRDY	A	00000002	*1167 2595 2639 5494 5508 5576 5584
AR	D		1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 2129 2141 2278 2863 3017 3339 3340 3374 3375 3376 3381 3397 3398 3399 3404 3417 3418 3419 3424 3431 3441 3442 3443 3448 3462 3463 3468 3469 3540 3711 3787 3931 3970 3988 4005 4022 4040 4819 5009 5074 5310
AREG.1	A	00000138	*1935 1939
AREG.9	A	0000013D	1936 *1941
AREG.X	A	0000013F	1938 *1944
AREGT	A	00000137	1884 *1933
AS.INP.M	A	00000718	*1158 6310
BANK	A	00000000	*0048 0927 1001 1013 1466 1489 1560 2586 2591 2592 2616 2629 2643 2657 2685 2702 2719 3596 4129 4130 4293 4294 4401 4468 4469 4626 4627 4738 5306 5463 5464 5554 5555 5681 5696 5710 5725 5734 5745 5773 5786 5990 5997 6017 6040 6048 6298 6299 6326
BIT0	A	00000000	1062 1081 1107 1142 1163 1179 1390
BIT1	A	00000001	1003 1063 1082 1108 1143 1165 1180 1391 1934
BIT10	A	0000000A	0990 1153 1189 1388 5168
BIT11	A	0000000B	0986 1154 1190 1389 5182
BIT12	A	0000000C	0982 1155 1191
BIT13	A	0000000D	0978 1156 1192
BIT14	A	0000000E	0973
BIT15	A	0000000F	0968
BIT2	A	00000002	1002 1064 1083 1109 1144 1167 1181 1392
BIT3	A	00000003	1000 1065 1085 1110 1146 1168 1182 1393
BIT4	A	00000004	0999 1086 1111 1147 1169 1183 3638
BIT5	A	00000005	0998 1087 1112 1124 1148 1170 1184 1907 3087 3096 3604
BIT6	A	00000006	0997 1171 1185 3622 4829

Symbol	Type	Value	References
BIT7	A	00000007	0996 1114 1172 1196 1396 3584 3708 5161
BIT8	A	00000008	0995 1151 1187 1386 5189
BIT9	A	00000009	1152 1188 1387 5175
BUFOADR	A	0000003B	*1601 1602 3216 3261 3269 3273 4091 4108 4156 4356 4490 4691 4806 4854 4883
BUF1ADR	A	0000023B	*1602 4089 4206 4358 4647 4693 4908
BYTEMODE	D		
C	A	00000005	3223 6285
C.ACT	A	00000008	*1131
C.DDS	A	00000000	*1132
C.FIFO	A	00000001	*1130
C.INACT	A	00000000	*1133
C.UNIT	A	00000024	*1578 1579 3067 3218 4037 4149 4313 4480 4636
CACHETS9	A	000001CA	2112 2114 *2116
CACHETST	A	000001C2	1889 *2106
CADRTST	A	000001CC	2111 *2124
CADRTST1	A	000001CD	*2127 2136
CADRTST2	A	000001D7	*2139 2148
CDA1	D		
CDC.CYL	A	0000000A	*1569 1570 3141 3343 3807 3824 3839 3879 3887 4069 4914 4964 5029 5221 5239
CDC.SEC	A	0000000C	*1571 1572 3149 3156 3173 3184 3199 3243 3815 3832 3843 4075 4985 5050 5199 5265
CDC.ST	A	00000009	*1568 1569
CDC.TK	A	0000000B	*1570 1571 3146 3167 3180 3189 3195 3203 3240 3247 3811 3828 3841 4072 4981 5046 5210 5249
CDCCHAN	A	00000028	*1582 1583
CDCFNC	A	00000014	*0962 3056 3059 3061 3065 3070 3072 3075 3078 3087 3096 3097 3100 3103
CDCP.A	A	00000001	*1050 2965
CDCP.B	A	00000002	*1051
CDCP.C	A	00000004	*1052
CDCP.D	A	00000008	*1053 2978
CDDATE.D	A	00000011	*1800 1829 1829 1829 1829
CDDATE.M	A	00000002	*1799 1828 1828 1828 1828
CDDATE.Y	A	00000093	*1801 1827 1827 1827 1827
CDRA	D		
CDREV.B	A	00000002	*1804 1820 1820 1820 1820
CDREV.P	A	00000007	*1806 1822 1822 1822 1822
CDREV.R	A	00000003	*1805 1821 1821 1821 1821
CDRI	D		
CF.ALDD	A	00000040	*1270
CF.ALDPP	A	0000010C	*1274
CF.BRD	A	00000023	*1245
CF.BWRT	A	00000024	*1246
CF.BXRD	A	0000001A	*1236
CF.BXWRT	A	0000001B	*1237
CF.CCNCT	A	00000022	*1244
CF.CNCT	A	00000000	*1210
CF.DDRES	A	00000009	*1219
CF.DDST	A	000000C0	*1271
CF.DREL	A	00000010	*1226
CF.DSKS	A	0000000D	*1223
CF.DSTAT	A	0000000B	*1221
CF.ECHO1	A	0000002F	*1257
CF.ECHO2	A	000001D0	*1276
CF.GSTAT	A	0000000A	*1220
CF.IALD	A	00000037	*1265

Symbol	Type	Value	References
CF.INDD	A	00000033	*1261
CF.NANP	A	00000032	*1260
CF.OPC	A	00000008	*1218
CF.RCADR	A	00000011	*1227
CF.RD	A	00000004	*1214
CF.RDADR	A	0000003F	*1225
CF.RDCW	A	00000007	*1217
CF.RDCWG	A	00000017	*1233
CF.RDFAC	A	00000018	*1234
CF.RDG	A	00000014	*1230
CF.RDP	A	0000001C	*1238
CF.RDUR	A	00000019	*1235
CF.SEEK1	A	00000001	*1211
CF.SEEK2	A	00000002	*1212
CF.WRT	A	00000005	*1215
CF.WRTG	A	00000015	*1231
CF.WRTL	A	0000001D	*1239
CF.WRTP	A	0000001F	*1241
CF.WRTV	A	00000006	*1216
CF.WRTVG	A	00000016	*1232
CF.WRTVL	A	0000001E	*1240
CF.XSTAT	A	00000013	*1229
CFDSK.M	A	0000001F	*1272
CFSPC.M	A	00000FC0	*1269
CFTABMAX	A	00000037	*1267
CHEWRC	A	00000208	2163 2166 2170 2173 2176 2179 *2210
CHRD	A	000001FF	2142 *2201 2221
CHRD9	A	00000206	2207 *2211
CHWRT	A	000001FB	2130 *2192 2219
CJNP	D		1878 1886 1891 1896 1901 1910 1936 1938 1985 1988 1991 1994 1997 2000 2003
			2006 2009 2012 2015 2018 2021 2024 2027 2030 2033 2036 2039 2042 2045 2048
			2051 2054 2057 2060 2063 2066 2069 2072 2075 2078 2112 2114 2135 2147 2206
			2281 2284 2286 2288 2291 2317 2430 2463 2467 2470 2514 2517 2520 2527 2533
			2553 2600 2603 2613 2615 2626 2628 2640 2642 2647 2648 2656 2674 2681 2684
			2689 2690 2698 2701 2706 2707 2715 2718 2724 2767 2845 2870 2879 2885 2890
			2892 2895 2898 2901 2907 2968 2973 2979 3027 3030 3063 3074 3077 3082 3085
			3088 3099 3102 3105 3161 3172 3176 3223 3306 3347 3388 3411 3436 3455 3544
			3563 3566 3599 3605 3623 3647 3649 3651 3653 3655 3657 3659 3661 3663 3665
			3667 3709 3719 3779 3784 3794 3800 3925 3944 3965 3971 3983 4000 4017 4032
			4049 4054 4056 4059 4133 4141 4162 4167 4179 4180 4181 4182 4183 4184 4185
			4194 4204 4205 4206 4207 4208 4209 4219 4227 4232 4234 4243 4246 4249 4263
			4266 4269 4297 4305 4321 4328 4333 4335 4338 4344 4349 4351 4363 4364 4365
			4366 4367 4368 4369 4379 4389 4390 4391 4392 4393 4394 4395 4403 4408 4413
			4415 4421 4424 4428 4430 4438 4441 4445 4447 4472 4494 4499 4504 4516 4517
			4518 4519 4520 4529 4539 4540 4541 4542 4543 4544 4553 4556 4565 4570 4572
			4582 4585 4588 4604 4607 4610 4630 4656 4663 4668 4670 4673 4679 4684 4686
			4698 4699 4700 4701 4702 4712 4722 4723 4724 4725 4726 4727 4735 4741 4749
			4751 4755 4757 4763 4766 4770 4772 4780 4783 4787 4789 4817 4847 4850 4916
			4929 4939 4945 4966 4979 4993 5001 5003 5010 5031 5044 5050 5056 5068 5075
			5104 5108 5123 5134 5205 5216 5316 5322 5328 5340 5348 5364 5371 5378 5405
			5410 5412 5419 5424 5426 5433 5438 5440 5466 5471 5495 5498 5509 5511 5560
			5562 5567 5572 5577 5585 5589 5991 6205 6305 6311 6318 6325
CJP	D		
CJPP	D		
CJS	D		

Symbol	Type	Value	References
CJSB	D		3542 3560
CK.TERM	A	00000676	3304 3319 3351 3386 3400 3434 3453 3491 3601 *3867
CKAMPS2X	A	00000AC3	*5380
CKAMPSTX	A	00000A80	3032 3600 3780 3795 4057 4134 4230 4257 4277 4298 4322 4352 4416 4432 4449 4473 4576 4596 4631 4657 4687 4758 *5304 6327
CKCDC	A	00000C36	2967 *6370
CKDVEND	A	00000A29	4058 *5151
CKERROR	A	00000671	3302 3318 3480 3490 *3857 4737
CKSHERR	A	00000B9E	2409 2416 2423 2432 2436 5695 5709 5733 5744 *5986
CKSYSERR	A	00000BAE	2195 2208 2212 2614 2627 2641 2655 2683 2700 2717 5998 *6031
CLR.STK	M		*1702 1881 2758 3054 3773
CLRBUFF	A	00000780	3153 3208 3260 3268 *4106
CLREFINT	A	00000004	*1183 6300 6301
CLRREG	A	0C00083D4	2788 *2914
CLRSYS	A	00000886	2266 *6080
CMPB2	A	00000936	*4812
CMPB4	A	00000930	4817 *4820
CMPBUF	A	00000930	3301 3317 3479 3489 4736 *4803
COLDBOOT	A	00000000	*1760
COLDINIT	A	00000380	1910 *2757
COMP	A	00000000	2165 2172 3640
CON	D		1843 1845 1851 2108 2267 2269 2271 2274 2472 2508 2551 2586 2591 2592 2616 2629 2643 2657 2685 2702 2719 2765 2779 2819 2850 2874 2990 3051 3055 3058 3067 3141 3146 3149 3156 3167 3173 3180 3184 3186 3189 3195 3198 3200 3203 3209 3218 3240 3243 3247 3252 3261 3263 3269 3271 3273 3275 3343 3353 3578 3503 3596 3602 3620 3637 3643 3707 3755 3782 3798 3807 3809 3811 3813 3815 3817 3822 3824 3826 3828 3830 3832 3839 3841 3843 3845 3858 3871 3879 3887 3912 3915 3918 3921 4028 4037 4069 4072 4075 4092 4109 4129 4130 4149 4195 4199 4203 4208 4293 4294 4313 4380 4384 4388 4401 4468 4469 4480 4530 4534 4538 4625 4627 4638 4649 4713 4717 4721 4738 4826 4830 4833 4863 4873 4942 4948 4964 4972 4975 4981 4985 4990 4996 5005 5012 5016 5019 5029 5037 5040 5046 5050 5055 5061 5070 5077 5081 5084 5152 5159 5166 5173 5180 5187 5199 5208 5210 5219 5221 5249 5265 5306 5318 5330 5332 5334 5381 5463 5464 5536 5530 5554 5555 5693 5694 5731 5732 5999 6012 6014 6015 6032 6038 6081 6084 6298 6299
CONT	D		
CPARERR	A	00000007	*1114
CPATTST	A	000001E1	2113 *2158
CPATTST1	A	000001E2	*2160 2165
CRAI	D		
CRCF	D		
CRCR	D		
CRTN	D		2131 2143 2164 2167 2171 2174 2177 2180 2184 2220 2313 2327 2331 2343 2347 2362 2365 2369 2381 2385 2389 2393 2397 2410 2424 2444 2477 2927 2887 3585 3639 3860 3873 4825 4890 4894 4898 4902 4957 5024 5089 5342 5697 5735 6002 6036 6333 6343 6361 6378
CURUNIT	A	0000001A	*1012 3021
CYLMAX	A	0000034A	*1316 3144 3346 3883 3982 3985
DAT.BK1	A	00000803	*1146
DAT.BK2	A	00000004	*1147
DATAOUT	A	00000007	*1186 2662 4173 4236 4251 4271 4510 4574 4590 4612
DECA	D		2891 3648 3650 3652 3654 3656 3658 3660 3662 3664 3666 4889 4893 4897 4901 6344
DECR	D		1877 2462 2869 3026 3543 3565 4552 4740 5363 5497 5510 6332 6360
DELAY	A	00000C26	2461 2839 2873 3350 3870 4046 4170 4224 4341 4507 4676 5113 5128 *6341 6351 6359

Symbol	Type	Value	References
DELAYMS	A	00000C30	1876 2279 2480 3549 *6356 6362
DNRINIT	N		*1035
DNTIME1	A	00001000	*1029
DNTIME2	A	00000640	*1030
DN1	A	00000005	3945
DNC	A	00000007	
DNL	A	00000006	
DNOVR	A	00000008	
DNZ	A	00000004	3947
DOUPDATE	A	0000003F	*1488 2465 2489 2841 2855 3718
DST.AMP	M		*1671 2591 4130 4294 4469 4627 5464 5555 6299
DST.CDC	M		*1690
DSTCTRL	D		2594 4174 4237 4252 4254 4256 4272 4274 4276 4511 4575 4591 4593 4595 4613
			4615 4617 5116 5120 5504 5516 5580 5594 6306 6316
DSTRDY	A	0000000C	2603 2648 4179 4180 4181 4182 4183 4184 4185 4204 4205 4206 4207 4208 4209
			4243 4263 4516 4517 4518 4519 4520 4539 4540 4541 4542 4543 4544 4582 4604
			4916 4929 4939 4945 5562 5567 5572
DSTSEL	D		2270 2591 4130 4294 4469 4627 5464 5555 5694 5732 6299
DSTSRC	A	0000000E	
DSTSTAT	D		2599 2611 2624 2638 4160 4497 4954 5101 5468 5493 5507 5575 5583
EACHPRUN	M		*1812 1820 1821 1822 1827 1828 1829 1832 1835 1835 1835 1835 1835 1835 1835
EFINT	A	00000003	*1182 5502 5515
EFREQ	A	00000004	*1169
EI.ATTN	A	00000003	*1393
EI.BUSY	A	00000000	*1390
EI.CE	A	0000000B	*1389
EI.CT	A	00000007	*1396
EI.CUE	A	00000001	*1391
EI.DE	A	0000000A	*1388 3847 4031 5155
EI.STROD	A	00000002	*1392
EI.UCK	A	00000009	*1387 5341
EI.UEX	A	00000008	*1386
EIM.RA	A	000003C0	*1394 5313 5337
EIM.SA	A	0000003C	*1395 5325
EIM.UNIT	A	0000001F	*1385 5309
EISENT	A	00000009	*1188
ENTAGS	A	0000000C	*1155 2721 4334 4669 6304 6317
ERR.CD	A	0000001F	*1018 1882 1885 1890 1895 1900 1906 1909 1917 1942 1945 2107 2117 2273 2511
			2524 2530 2549 2556 2737 2744 3064 3354 3725 3726 3727 3728 3729 3730 3731
			3732 3733 3734 3735 3736 3737 3738 3739 3740 3741 3742 3743 3744 3745 3746
			3747 3748 3749 3750 3751 3752 3753 3757 3758
ERRCODE	A	00000023	*1577 1578 3252 3353 3755 3782 3858 4826 5159 5166 5173 5180 5187
EXNOR	A	0000000B	
EXOR	A	00000008	1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020 2023 2026
			2029 2032 2035 2038 2041 2044 2047 2050 2053 2056 2059 2062 2065 2068 2071
			2074 2077 2145 2182 2205 2367 2429 2468 2680 2697 2714 2722 2843 2852 2889
			2893 2896 2977 3061 3072 3075 3080 3083 3097 3100 3103 3159 3170 3345 3562
			3717 3882 3890 3935 3939 3943 4052 4165 4192 4230 4244 4264 4331 4347 4377
			4411 4426 4443 4502 4527 4569 4583 4605 4666 4682 4710 4753 4768 4785 4816
			4978 5000 5023 5043 5065 5088 5106 5204 5215 5314 5320 5326 5338 5408 5422
			5436 5558 5587 6376
EXPCKS	A	0000002D	*1587 1588 5019
EXPCKS1	A	00000033	*1593 1594 5084
EXPCY	A	00000029	*1583 1584 4972
EXPCY1	A	0000002F	*1589 1590 5037

Symbol	Type	Value	References														
EXPDAT	A	00000035	*1595	1596	4830												
EXPSTK	A	0000032B	*1585	1586	4990												
EXPSTK1	A	00000331	*1591	1592	5055												
F.2TO1	A	00000005	*0998														
F.CMDREJ	A	0000000F	*0968	5305													
F.FIFO	A	0000000E	*0973														
F.GAPSEC	A	00000006	*0997														
F.INTVRQ	A	0000000C	*0982														
F.LNGRW	A	00000008	*0995	3138	3287	3290	3336	3369	3471	3481	4140	4218	4304	4402	4734		
F.LRGSEC	A	00000004	*0999														
F.NSHREN	A	0000000A	*0990														
F.RDERR	A	00000003	*1000														
F.RWAPAT	A	00000001	*1003	3295	3370	3392	4849										
F.SAVPAT	A	00000002	*1002	3371	3394	4846											
F.SHFAIL	A	00000007	*0996														
F.STCMCT	A	0000000D	*0978														
F.STPEND	A	0000000B	*0986	6315													
FAIL	A	00000004															
FI.NEMP	A	00000007	*1172														
FIFOCLR	A	0000000B	*1190	4253	4255	4273	4275	4592	4594	4614	4616	6302	6303				
FIFONEMP	A	00000005	*1112														
FLAG1	A	00000009															
FLAG2	A	0000000A															
FLAG3	A	0000000B															
FLAGS	A	00000019	*0967	3138	3287	3290	3295	3336	3369	3370	3371	3392	3394	3471	3481	4140	4218
			4304	4402	4734	4846	4849	5305	6315								
FNCOUT	A	00000006	*1185	5503	5514	5578	5593										
GD.DATA	A	0000001C	*1015	1914	2129	2141	2161	2165	2168	2172	2175	2178	2194	2205	2310	2324	2378
			2382	2386	2390	2394	2398	2413	2429	2508	2605	2606	2608	2618	2619	2621	2631
			2632	2634	2650	2651	2653	2863	2889								
GE	A	00000006															
GET.OLD	A	0000065C	3382	3405	3425	3433	3449	*3821									
GET.RWAX	A	00000A5A	4033	4128	4292	4467	4486	4625	4644	4862	*5237						
GETADR	A	000009A1	4376	4709	*4963												
GETADR1	A	000009D3	4400	4732	*5028												
GETSIOX	A	00000A97	*5329														
GOTO.OWL	A	00000100	*1842	2797													
HA	D		2110	2203	2427	2509	2552	2611	2624	2638	2672	2679	2687	2696	2704	2713	2970
			3158	3169	3175	3191	3205	3210	3220	3249	3254	3344	3603	3621	3644	3756	3783
			3799	3859	3872	3881	3889	4039	4047	4095	4131	4160	4197	4201	4225	4247	4267
			4295	4319	4326	4342	4373	4382	4386	4397	4406	4422	4439	4470	4497	4532	4536
			4563	4586	4608	4628	4654	4661	4677	4706	4715	4719	4729	4747	4764	4781	4813
			4820	4865	4874	4918	4921	4927	4954	4968	4987	4995	5007	5014	5033	5052	5060
			5072	5079	5101	5131	5135	5137	5139	5160	5167	5174	5181	5188	5200	5211	5222
			5369	5382	5403	5417	5431	5465	5468	5493	5507	5557	5575	5583	5987	6033	6083
			6308	6312	6373												
HIOLD	A	00000006	*1171														
HR	D		2851	3056	3808	3812	3816	3823	3827	3831	3846	3924	4030	4151	4315	4482	4640
			4815	4869	4878	4924	4970	4983	5035	5048	5153	5241	5250	5255	5257	5266	5271
			5273	5413	5427	5441	5537	5539	5704								
HSSECCNT	A	00000234	*1322	1324	3338	3964	3967										
HSWDCNT	A	0000FF90	*1324	4143	4307	4479	4637										
IA	D		2459	2837	2871	2983	2987	3114	3122	3239	3337	3348	3372	3395	3415	3674	3676
			3678	3680	3682	3684	3686	3688	3690	3694	3868	4044	4107	4168	4222	4285	4339
			4505	4646	4674	5111	5126	6357									

Symbol	Type	Value	References
ID	A	00000000	*1553 1554 2850 2990 3209
IDAT	D		1873 1875 1943 2113 2134 2146 2162 2169 2183 2307 2311 2316 2321 2325 2330
			2340 2346 2359 2368 2379 2383 2387 2391 2395 2399 2457 2460 2465 2469 2475
			2479 2489 2512 2525 2531 2550 2557 2607 2620 2633 2652 2678 2695 2712 2738
			2745 2763 2791 2838 2841 2844 2853 2855 2867 2872 2894 2897 2965 2972 2978
			2984 2988 3019 3062 3066 3071 3073 3076 3079 3081 3084 3090 3094 3098 3101
			3104 3115 3123 3140 3144 3160 3171 3212 3214 3216 3222 3226 3228 3230 3235
			3238 3256 3335 3338 3346 3349 3373 3396 3416 3540 3582 3646 3675 3677 3679
			3681 3683 3685 3687 3689 3691 3695 3716 3718 3789 3869 3883 3891 3928 3930
			3933 3937 3941 3962 3964 3967 3980 3982 3985 3997 3999 4002 4014 4016 4019
			4035 4045 4053 4089 4091 4108 4138 4143 4147 4156 4166 4169 4193 4223 4231
			4245 4265 4286 4302 4307 4311 4332 4340 4348 4356 4358 4378 4412 4427 4444
			4477 4479 4490 4503 4506 4528 4569 4584 4606 4635 4637 4647 4667 4675 4683
			4691 4693 4711 4754 4769 4786 4806 4808 4854 4868 4872 4877 4881 4883 4914
			4938 4952 4956 5103 5107 5112 5127 5133 5203 5214 5239 5244 5253 5260 5269
			5276 5309 5313 5315 5321 5325 5327 5337 5339 5345 5350 5352 5409 5423 5437
			5470 5475 5480 5543 5547 5553 5559 5588 5764 5770 5989 6035 6113 6120 6122
			6129 6131 6165 6172 6174 6180 6182 6190 6192 6200 6202 6220 6235 6242 6250
			6258 6310 6358 6375 6377
IH	D		3143 3234 3237
INC	A	0000000E	
INCA	D		2782 3192 3286 3250 4112 4290 4651 4922 4925 5201 5212 5223 5706 5768
INCCYL	A	00000A55	5216 *5218
INCR	D		2132 2144 2181 2314 2328 2344 2363 2366 2605 2618 2631 2646 2650 2676 2693
			2710 2768 3231 3233 3236 3714 3725 3726 3727 3728 3729 3730 3731 3732 3733
			3734 3735 3736 3737 3738 3739 3740 3741 3742 3743 3744 3745 3746 3747 3748
			3749 3750 3751 3752 3753 4051 4098 4099 4164 4190 4229 4242 4262 4330 4346
			4375 4410 4420 4437 4501 4525 4567 4581 4603 4665 4681 4708 4752 4762 4779
			4818 4820 4821 4859 4888 4892 4896 4900 5105 5247 5256 5263 5272 5279 5357
			5360 5365 5407 5421 5435 5586 6287
INCSECTX	A	00000A44	3155 3166 3303 3342 3385 3408 3428 3452 4554 4742 *5198
INCTK	A	00000A4C	5205 *5207
INITAMP	A	00000CDA	1985 2587 2730 2736 2743 3035 3577 3759 3774 3861 5521 *6297
INITAMP1	A	00000C13	*6307 6313
INITAMP2	A	00000C19	6311 *6314
INITAMP3	A	00000C1E	6305 *6320
INITAMP4	A	00000C1F	*6322 6334
INITUNIT	A	00000668	3294 3333 3368 3391 3414 3439 *3838
INSERT.0	A	000006A4	3944 *3947
INSERT.1	A	000006A2	*3945
IR	D		1872 1874 1942 2117 2161 2168 2306 2320 2339 2378 2382 2386 2390 2394 2398
			2456 2464 2474 2478 2488 2511 2524 2530 2549 2556 2737 2744 2762 2790 2849
			2854 2866 2964 3018 3089 3093 3139 3215 3334 3547 3581 3788 3927 4034 4088
			4090 4137 4142 4146 4155 4301 4306 4310 4355 4357 4476 4478 4489 4634 4636
			4690 4692 4805 4807 4853 4882 4913 5202 5213 5238 5243 5252 5259 5268 5275
			5344 5349 5351
ISUADR1X	A	00000B2F	*5556
ISUADR8X	A	00000B47	*5582 5590
ISUADR9X	A	00000B4F	5585 *5591
ISUADRX	A	00000B1B	4042 4153 4317 4484 4642 *5535
ISUCMDX	A	00000AED	3023 3790 4041 4152 4316 4483 4641 5347 *5462 5522
ISUCMDX1	A	00000AF2	5466 *5468
ISUCMDX2	A	00000B05	*5492 5499
ISUCMDX3	A	00000B0C	5496 *5501
ISUCMDX4	A	00000B0F	*5506 5512

Symbol	Type	Value	References														
ISUCADX5	A	00000B15	5509	*5513													
ISUCADX9	A	00000B19	5498	5511	*5520												
ISUMSG	A	00000409	1908	2796	*3016	3116	3124										
ISUMSG1	A	0000040E	*3022	3036													
ISUMSG2	A	00000410	*3025	3030													
ISUMSG3	A	00000414	*3031														
ISUMSG9	A	00000416	3027	*3034													
JMP	D		1760	1818	1853	1879	1887	1892	1897	1902	1919	1939	1986	1989	1992	1995	1998
			2001	2004	2007	2010	2013	2016	2019	2022	2025	2028	2031	2034	2037	2040	2043
			2046	2049	2052	2055	2058	2061	2064	2067	2070	2073	2076	2079	2136	2140	2185
			2207	2318	2332	2348	2370	2431	2601	2604	2649	2658	2682	2691	2699	2708	2716
			2725	2797	2899	2903	2974	2981	2985	3036	3091	3106	3117	3125	3162	3177	3224
			3257	3288	3291	3307	3320	3352	3355	3389	3412	3437	3456	3492	3545	3551	3567
			3570	3668	3712	3760	3801	3862	3974	3914	3917	3920	3923	3926	3946	3960	3986
			4003	4020	4050	4063	4135	4144	4163	4171	4186	4210	4228	4258	4260	4278	4280
			4299	4300	4323	4329	4345	4353	4370	4396	4409	4425	4433	4435	4442	4450	4452
			4474	4495	4500	4508	4521	4545	4557	4558	4566	4597	4600	4618	4620	4632	4658
			4664	4680	4688	4703	4720	4743	4750	4767	4774	4776	4784	4792	4794	4851	4903
			4917	4930	4940	4946	4950	4967	4994	5004	5011	5032	5059	5069	5076	5109	5129
			5140	5317	5366	5372	5406	5420	5434	5467	5472	5496	5499	5512	5572	5561	5563
			5568	5573	5590	6286	6313	6319	6334	6351	6362	6390	6400				
JMPX	D																
JRP	D																
JSB	D		1876	1884	1889	1894	1899	1905	1908	1935	2111	2113	2130	2142	2163	2166	2170
			2173	2176	2179	2195	2209	2212	2219	2221	2266	2277	2279	2280	2283	2285	2287
			2290	2296	2297	2312	2326	2342	2361	2364	2380	2384	2388	2392	2396	2400	2409
			2416	2423	2432	2436	2443	2445	2461	2466	2476	2480	2490	2587	2614	2627	2641
			2655	2683	2700	2717	2730	2736	2743	2766	2773	2784	2788	2796	2839	2842	2856
			2873	2884	2906	2967	3023	3032	3035	3116	3124	3153	3154	3155	3163	3164	3165
			3166	3179	3188	3193	3194	3202	3207	3208	3246	3251	3260	3268	3294	3296	3297
			3298	3299	3300	3301	3302	3303	3304	3305	3310	3311	3312	3313	3314	3315	3316
			3317	3318	3319	3333	3341	3342	3350	3351	3368	3377	3378	3379	3382	3383	3384
			3385	3386	3387	3391	3393	3400	3401	3402	3405	3406	3407	3408	3409	3410	3414
			3420	3421	3422	3425	3426	3427	3428	3429	3432	3433	3434	3435	3439	3440	3444
			3445	3446	3449	3450	3451	3452	3453	3454	3459	3460	3461	3464	3465	3466	3467
			3470	3472	3473	3474	3475	3476	3477	3478	3479	3480	3482	3483	3484	3485	3486
			3487	3488	3489	3490	3491	3536	3538	3539	3541	3549	3550	3556	3558	3559	3561
			3564	3569	3577	3600	3601	3619	3636	3710	3759	3774	3780	3790	3795	3861	3870
			3959	3977	3994	4011	4033	4041	4042	4046	4057	4058	4068	4071	4074	4128	4134
			4152	4153	4170	4191	4216	4220	4224	4238	4257	4277	4292	4298	4316	4317	4322
			4341	4352	4376	4400	4404	4416	4432	4449	4467	4473	4483	4484	4486	4487	4507
			4526	4551	4554	4561	4576	4596	4625	4631	4641	4642	4644	4645	4657	4676	4687
			4709	4732	4736	4737	4742	4745	4758	4836	4862	4980	5002	5025	5045	5067	5090
			5113	5128	5165	5172	5179	5186	5242	5251	5258	5267	5274	5307	5347	5354	5379
			5521	5695	5709	5733	5743	5744	5995	5998	6132	6183	6193	6203	6327	6359	
JSBR	D																
JSRP	D																
JZ	D																
LADRTST	A	00000224	2283	*2304													
LADRTST1	A	00000226	*2309	2318													
LADRTST2	A	00000232	*2372	2332													
LASTRAN1	A	00000038	*1598	1599	3915												
LASTRAN2	A	00000039	*1599	1600	3918												
LASTRAN3	A	0000003A	*1600	1601	3921												
LASTRAND	A	00000037	*1597	1598	3912												

Symbol	Type	Value	References
LD2RA	D		1934 2595 2662 2721
LD2RR	D		5502 6300
LD2RY	D		2593
LDC2RA	D		
LDC2RR	D		
LDC2RY	D		
LDCI	D		
LE	A	00000000	
LINK	A	00000008	1938
LOOP	D		
LOOPCNT	A	0000001E	*1017 1916 2355 2357 2366 2367 2590 2646 3543 3565 3581 3586
LPATTST	A	0000023C	2285 *2338
LPATTST1	A	0000023E	*2341 2348
LSHRDMAX	A	00000157	*1319 3090 3335 4193 4378 4528 4711
LT	A	00000001	
MAR1	D		
MDA1	D		
MDAR	D		
MDRA	D		
MDR1	D		
MODEND	A	0000057D	3385 3454 *3878
MODEND1	A	00000681	3387 3410 3435 *3886
MOVE	A	0000000C	
MOVEBUF	A	000006FF	3164 *4087
MRAI	D		5479
MULTCYL	A	00000BBA	5242 *6111
MULTSECT	A	00000BEA	5267 *6226
MULTTRK	A	00000BCC	5251 *6163
N	A	00000007	1936 2112 2114 2131 2143 2164 2167 2171 2174 2177 2180 2220 2281 2284 2286
			2288 2291 2313 2327 2343 2362 2365 2381 2385 2389 2393 2397 2410 2424 2444
			2467 2477 2615 2628 2642 2656 2684 2701 2718 2767 2085 7907 2968 3542 3560
			3800 3873 3965 3983 4000 4017 5348 5697 5735
N1A	D		
N1R	D		2083 2213 2298 2437 3057 5996 6003 6041 6379
N1R	D		2175 2864 3024 5491 5505 6321
NAND	A	00000007	
NARG	A	00000000	*0000
NEG	A	0000000F	
NOOP	D		1847 1848 1849 1850 1918 2412 2414 2415 2426 2610 2623 2636 2637 2669 2670
			2671 4093 4110 4213 4214 4398 4548 4549 4730 5117 5118 5125 5136 5138 5373
			5374 5375 5376 5401 5402 5405 5406 5407 5408 5565 5566 5570 5571 5703 5705
			5765 5766 6345 6346 6347 6348 6349 6350 6394 6395 6396 6397 6398 6399
NOPADX	A	0000075D	4194 *4217
NOPADY	A	0000086A	4529 *4552
NOR	A	00000009	
NORDX	A	000007F4	4379 *4401
NORDY	A	000008FC	4712 *4733
NRA	A	00000001	1937 3211 3213 3225 3227 3229 3640 3645 3961 3966 3979 3984 3996 4001 4013
			4018 4937 4951 4955 5132 5324 5469 5988 6034 6309 6374 6376
NRAS	A	00000005	
NRS	A	00000004	
NRY	A	00000000	2598 2722 2971 3080 3083 3159 3170 3221 3255 3345 3963 3981 3998 4015 5102
			5314 5320 5326 5338
OCPFNC	A	00000021	*1575 1576 3058 3583 3602 3620 3637 3643 3707
OCPNEW	A	00000022	*1576 1577 3051 3055 3798 3871 5318

Symbol	Type	Value	References														
OD.CMPL	A	0000047A	*3113	3257	3355	3607											
OD.ERR00	A	0000062D	3625	*3754													
OD.ERR01	A	0000062C	*3753	4032													
OD.ERR02	A	0000062B	*3752	4050	4228	4329	4345	4409	4425	4442	4566	4664	4680	4750	4767	4784	5372
			5406	5420	5434												
OD.ERR03	A	0000062A	*3751	4054													
OD.ERR04	A	00000629	*3750	5322													
OD.ERR05	A	00000628	*3749	5328													
OD.ERR06	A	00000627	*3748	5348													
OD.ERR07	A	00000626	*3747	5410	5424	5438											
OD.ERR08	A	00000625	*3746	5467													
OD.ERR09	A	00000624	*3745	5472													
OD.ERR0A	A	00000623	*3744														
OD.ERR0B	A	00000622	*3743	5561													
OD.ERR0C	A	00000621	*3742	5589													
OD.ERR0D	A	00000620	*3741	4135	4474	4495											
OD.ERR0E	A	0000061F	*3740	4167	4504												
OD.ERR0F	A	0000061E	*3739	4246	4266	4585	4607	4917	4930	4940	4946						
OD.ERR10	A	0000061D	*3738	4232	4570												
OD.ERR11	A	0000061C	*3737	4258	4278	4557	4597	4618	4632								
OD.ERR12	A	0000061B	*3736	4299													
OD.ERR13	A	0000061A	*3735	4323	4658												
OD.ERR14	A	00000619	*3734	4333	4668												
OD.ERR15	A	00000618	*3733	4349	4684												
OD.ERR16	A	00000617	*3732	4353	4689												
OD.ERR17	A	00000616	*3731	4428	4445	4770	4787	4967	4994	5004	5011	5032	5059	5069	5076		
OD.ERR18	A	00000615	*3730	4413	4755												
OD.ERR19	A	00000614	*3729	4433	4450	4774	4792										
OD.ERR1A	A	00000613	*3728														
OD.ERR1B	A	00000612	*3727	5108													
OD.ERR1C	A	00000611	*3726														
OD.ERR1D	A	00000610	3106	*3725													
OD.IDL.1	A	0000063D	*3776	3800													
OD.IDL.2	A	0000064C	3704	*3797													
OD.IDLE	A	00000633	3117	3125	3760	*3772	3862										
OD.INIT	A	00000440	*3050	6400													
OD.MFG	A	00000482	3074	*3137													
OD.MFG1	A	0000048C	*3153	3162	3176												
OD.MFG2	A	00000495	*3163	3177													
OD.MFG3	A	000004A2	3172	*3179													
OD.MFG4	A	000004CA	3224	*3229													
OD.RD1	A	0000050C	*3337	3352													
OD.RD2	A	0000051C	3347	*3353													
OD.READ	A	00000508	3077	*3332													
OD.SHAD1	A	00000609	3709	*3713													
OD.SHADR	A	00000603	3538	3558	*3706	3719											
OD.SHDAT	A	000005CE	3539	3561	*3635												
OD.SHEND	A	000005BC	3550	3569	*3595												
OD.SHERR	A	000005C7	3542	3560	3564	*3618											
OD.SHINI	A	000005B2	3536	3556	*3576												
OD.SHPA0	A	000005ED	3647	*3672													
OD.SHPA1	A	000005EE	3649	*3674													
OD.SHPA2	A	000005F0	3651	*3676													
OD.SHPA3	A	000005F2	3653	*3678													
OD.SHPA4	A	000005F4	3655	*3680													

Symbol	Type	Value	References													
OD.SHPA5	A	000005F6	3657	*3682												
OD.SHPA6	A	000005F8	3659	*3684												
OD.SHPA7	A	000005FA	3661	*3686												
OD.SHPA8	A	000005FC	3663	*3688												
OD.SHPA9	A	000005FE	3665	*3690												
OD.SHPAA	A	00000600	3667	*3692												
OD.SHPAF	A	00000601	3668	*3694												
OD.SHPAT	A	000005D3	3636	*3642												
OD.SHRD	A	000005A5	3085	*3555	3570											
OD.SHRD1	A	000005A6	*3557	3567												
OD.SHUR1	A	00000598	*3537	3545												
OD.SHURT	A	00000597	3082	*3535	3551											
OD.STAR1	A	0000046D	3088	*3092												
OD.START	A	00000442	*3053	3801												
OD.TERM	A	0000047E	3063	*3121	3874											
OD.WRC	A	000004EF	3288	3291	*3293											
OD.WRC1	A	000004F1	*3296	3307												
OD.WRC2	A	000004FD	*3309	3320												
OD.WRCL	A	000004ED	3102	*3289												
OD.WRCS	A	000004EB	3099	*3286												
OD.WRST	A	0000051F	3105	*3366												
OD.WRST1	A	00000523	*3372	3389												
OD.WRST3	A	00000539	*3395	3412												
OD.WRST5	A	0000054C	*3415	3437												
OD.WRST7	A	00000564	*3440	3456												
OD.WRST8	A	000H0575	*3458	3492												
ODREQ	A	00000003	*1168	4161	4498											
OLDCYL	A	00000025	*1579	1580	3809	3822										
OLDSECT	A	00000027	*1581	1582	3817	3830										
OLDTK	A	00000026	*1580	1581	3813	3826										
OR	A	0000000A	3213	3227	3229	3757	4931	4989	5015	5054	5080	5383	5474	5549	5708	
ORVR	A	00000003														
P1A	D															
P1H	D															
P1R	D															
PAR1.RDY	A	00000008	*1151	2673	5411											
PAR2.RDY	A	00000009	*1152	2680	5425											
PAR3.RDY	A	0000000A	*1153	2705	5439											
PASS	A	0000000F														
PATTST	A	00000254	2342	2361	2364	*2377										
POPJMP	D		1881	1881	1881	1881	1881	1881	1881	1881	1881	2758	2758	2758	2758	2758	2758
			2758	2758	2758	3054	3054	3054	3054	3054	3054	3054	3054	3054	3607	3625	3773
			3773	3773	3773	3773	3773	3773	3773	3773	4250	4270	4431	4448	4589	4611	4773
			4791														
PR1A	D															
PR1D	A	00000009														
PR1R	D															
PR1Y	D															
PR2A	D															
PR2Y	D															
PR3A	D															
PR3D	D															
PR3R	D															
PRA	A	00000000														
PRI	A	00000000														

Symbol	Type	Value	References
PRT1A	A	00000007	
PRTA	D		
PRTD	D		
PRZ	A	0000000A	
PTRNGEN	A	0000094A	3296 3315 3393 3477 3487 4487 4645 *4845
PTRNGEN1	A	00000956	4851 *4862
PTRNLOP	A	0000096A	*4886 4903
PUP.BUS	A	00000003	*1863 2550 2730
PUP.CHE	A	00000002	*1862 2118
PUP.OK	A	00000000	*1860
PUP.REG	A	00000001	*1861 1943
PUP.SHL	A	00000005	*1865 2512
PUP.SHR	A	00000004	*1864 2557
PUP.SHU	A	00000006	*1866 2525
PUP.SHR	A	00003007	*1867 2531
PUP.UBI	A	00000008	*1868 2745
PUPDIAG8	A	00000130	*1912 1919
PUPDIAG9	A	0000012A	1887 1892 1897 1902 *1904
PUPDIAGS	A	00000110	1878 *1880 2767 2885 2899 2907
PUSH	D		
PUSHLDCT	D		2765 2779 4092 4109 4176 4203 4208 4361 4388 4513 4530 4649 4696 4721 4811 4857
PWRUP	A	03003100	1760 *1870
PURUP1	A	0000010A	*1874 1879
R0	A	00000000	0913 1949 1984 2915
R1	A	00000001	0914 1950 1987 2916
R10	A	0000000A	0923 1959 2014 2925
R11	A	0000000B	0925 1960 2017 2926
R12	A	0000000C	0926 1961 2020 2927
R13	A	0000000D	1962 2023 2928
R14	A	0000000E	0929 1963 2026 2929
R15	A	0000000F	1964 2029 2930
R16	A	00000010	1965 2032 2931
R17	A	00000011	0932 1966 2035 2932
R18	A	00000012	0933 1967 2038 2933
R19	A	00000013	0961 1968 2041 2934
R2	A	00000002	0915 1951 1990 2917
R20	A	00000014	0962 1969 2044 2935
R21	A	00000015	0963 1970 2047 2936
R22	A	00000016	0964 1971 2050 2937
R23	A	00000017	0965 1972 2053 2938
R24	A	00000018	0966 1973 2056 2939
R25	A	00000019	0967 1974 2059 2940
R26	A	0000001A	1012 1975 2062 2941
R27	A	0000001B	1014 1976 2065 2942
R28	A	0000001C	1015 1977 2068 2943
R29	A	0000001D	1016 1978 2071 2944
R3	A	00000003	0916 1952 1993 2918
R30	A	0000001E	1017 1979 2074 2945
R31	A	0000001F	1018 1980 2077 2946
R4	A	00000004	0917 1953 1996 2919
R5	A	00000005	0918 1954 1999 2920
R6	A	00000006	0919 1955 2002 2921
R7	A	00000007	0920 1956 2005 2922
R8	A	00000008	0921 1957 2008 2923

Symbol	Type	Value	References
R86	D		
R9	A	00000009	0922 1958 2011 2924
RA	D		1906 2128 2140 2309 2323 2062 2888 3300 3403 3423 3430 3447 3693 3948 4005 4933 4935 4950 5022 5087 5329 5540 5544 5548 5550 6117 6126 6136 6169 6177 6187 6197 6232 6239 6243 6247 6251 6255 6259 6283 6288
RA.BOPAR	A	000001C0	*1407
RA.BTKPT	A	000000C0	*1403
RA.CMDRJ	A	00000100	*1404 5321
RA.DATCK	A	00000080	*1402
RA.ENV	A	000002C0	*1411 5339
RA.EOCK	A	00000200	*1408
RA.INTRQ	A	00000180	*1406
RA.NONE	A	00000000	*1400
RA.NOREC	A	00000280	*1410
RA.OCPD	A	000003C0	*1415 5315
RA.OVCF	A	00000300	*1412
RA.OVCL	A	00000340	*1413
RA.PDCK	A	00000240	*1409
RA.RDLRQ	A	00000140	*1405
RA.WRTIN	A	00000040	*1401
RAND.CYL	A	000006B3	*3976 4068
RAND.LNG	A	000006A7	3440 3461 3467 *3958 3971
RAND.N1	A	0000068D	3914 3917 3920 3923 *3924
RAND.SEC	A	000006C9	*4010 4074
RAND.TK	A	000006BE	*3993 4071
RANDADDR	A	000006F5	3310 3313 3459 3465 3472 3475 3482 3485 *4067
RANDC8	A	000006B4	*3978 3986
RANDC9	A	000006BC	3983 *3987
RANDL8	A	000006A8	*3960 3968
RANDL9	A	000006B0	3965 *3969
RANDNUM	A	00000685	3710 *3911 3977
RANDNUM1	A	00000687	*3915 3994
RANDNUM2	A	00000689	*3918 4011
RANDNUM3	A	0000068B	*3921 3959
RANDS8	A	000006CA	*4012 4020
RANDS9	A	000006D2	4017 *4021
RANDSEEK	A	000006D4	3297 3299 3311 3314 3378 3383 3401 3406 3421 3426 3445 3450 3460 3466 3473 3476 3483 3486 *4027
RANDT8	A	000006BF	*3995 4003
RANDT9	A	000006C7	4000 *4004
RANK1EMP	A	00000005	*1124
RCACHE	D		2203 2509 2552 2851 3056 3158 3169 3175 3191 3205 3210 3220 3249 3254 3344 3584 3603 3621 3638 3644 3708 3756 3783 3799 3808 3812 3816 3823 3827 3831 3846 3859 3872 3881 3889 3924 4030 4039 4095 4151 4189 4197 4201 4315 4382 4386 4482 4524 4532 4536 4640 4715 4719 4813 4815 4828 4865 4870 4874 4879 4918 4924 4927 4971 4984 4987 5036 5049 5052 5154 5160 5167 5174 5181 5188 5200 5211 5222 5241 5250 5255 5257 5266 5271 5273 5382 5537 5539
RCAR	D		4921
RD.DATA	A	00000D1D	*1016 1915 2589 2676 2677 2680 2693 2694 2697 2710 2711 2714 2864 2900 2902
RD3AMP1X	A	00000AC9	*5402 5412
RD3AMP2X	A	00000AD5	*5416 5426
RD3AMP3X	A	00000AE1	*5430 5440
RD3AMPX	A	00000AC8	5307 5354 5379 *5400
RD3TIM	A	00000812	4421 *4434
RD3TIMY	A	00000921	4763 *4775

Symbol	Type	Value	References
RD3ZTIM	A	00000821	4438 *4451
RD3Z11Y	A	0000092F	4780 *4793
RDATA	D		2427 2679 2696 2713 4373 4397 4706 4729 4960 4995 5007 5014 5033 5060 5072 5079 5135 5137 5139 5414 5428 5442 5704 5708 6312
RDB1X	A	0000079C	*4300
RDB1Y	A	000008A5	*4633
RDB2X	A	00000700	*4362
RDB2Y	A	000008DB	*4697
RDD3X	A	000007D9	4363 4364 4365 4366 4367 4368 4369 *4371 4435
RDB3Y	A	000008E2	4698 4699 4700 4701 4702 *4704 4776
RDB4X	A	00000804	4370 *4419 4430
RDB4Y	A	00000914	4783 *4761 4772
RDB5X	A	000007F8	4403 *4405 4415
RDB5Y	A	00000907	*4746 4757
RDBUF8X	A	000007B0	*4325 4335
RDBUF9X	A	000007A3	4305 *4309
RDBUFX	A	0000078F	3163 3300 3316 3478 3488 *4284
RDBUFY	A	00000890	3341 3384 3407 3427 3432 3451 3470 *4624
RDBY.1	A	000008D6	4673 *4609
RDBY.2	A	000008C5	*4671 4686
RDBY8	A	000007BB	*4337 4351
RDBY9	A	000007C8	4338 *4354
RDBYLOOP	A	000008AD	*4643 4743
RDBYLP9	A	00000883	*4660 4670
RDBYTERM	A	00000906	4741 *4744
RDBZ3X	A	000007E0	*4389 4452
RDBZ3Y	A	000008F1	*4722 4794
RD3Z4X	A	00000813	4396 *4436 4447
RDBZ4Y	A	00000922	4728 *4778 4789
RDERRCKS	A	00000A3A	5025 5090 *5178
RDERRCY	A	00000A30	4980 5045 *5164
RDERRSTK	A	00000A35	5002 5067 *5171
RDSECLN	A	00000012	*0933 3339 3375 3380 3398 3403 3418 3423 3430 3442 3447 3468
RDZEOX	A	000000F0	4389 4390 4391 4392 4393 4394 4395 *4397
RDZEOY	A	000008F8	4722 4723 4724 4725 4726 4727 *4729
RECCKS	A	0000002E	*1588 1589 5016
RECCKS1	A	00000034	*1594 1595 5081
RECCY	A	0000002A	*1584 1585 4975
RECCY1	A	00000030	*1590 1591 5040
RECDAT	A	00000036	*1596 1597 4833
RECSTK	A	0000002C	*1586 1587 4996
RECSTK1	A	00000032	*1592 1593 5061
REG.A	A	00000000	*1163 2596 2612
REG.B	A	00000001	*1165 2597 2625
REGTST	A	00000140	1935 *1948
REGTST9	A	000001C1	1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076 2079 *2083
REL.WD1	A	0000000D	*1572 1573 4863 5244 5253 5260 5269 5276 5536
REL.WD2	A	0000000E	*1573 1574 4873 5538
RF1	D		
RF2	D		
RF3	D		
RFCT	D		2769 2783 4099 4112 4190 4215 4291 4375 4399 4525 4550 4652 4708 4731 4873 4859

Symbol	Type	Value	References
RR	D		1885 1890 1895 1900 1909 1913 1914 1915 1916 1917 2193 2194 2202 2411 2413 2425 2608 2621 2634 2653 2886 2900 3052 3059 3758 3791 3810 3814 3818 3825 3829 3833 4070 4073 4076 4094 4096 4175 4187 4360 4372 4512 4522 4695 4705 4810 4814 4824 4832 4835 4856 4858 4887 4891 4895 4899 4947 4974 4992 5010 5021 5039 5057 5083 5086 5246 5248 5262 5264 5278 5280 5319 5331 5333 5335 5355 5356 5359 5362 5384 5489 5564 5569 5574 6371
RL	D		
RUNCZ	D		
RPATTST	A	00000245	2287 *2354
RPATTSTJ	A	00000246	*2356 2370
RPCT	D		
RSEEK2X	A	000006F3	4059 *4061
RSEEK3X	A	000006D9	*4034
RSEEK4X	A	000006E2	*4044 4056 4063
RSTET	A	00000002	*1144
RSTNA	D		2666
RSTND	D		
RSTNR	D		3096 3138 3287 3336 3371 3392 3401 4236 4251 4255 4271 4275 4574 4590 4594 4612 4616 5119 5305 5514 5515 5592 5593 6301 6303 6315 6316
RSTUDIO	A	00000005	*1148
RTAA	D		3934 3938 3942 4866 4875 4928 4936 4980 5008 5053 5073 5541 5545 5551 6110 6127 6137 6170 6178 6188 6198 6233 6240 6248 6256
RTAR	D		
RTAY	D		
RTDA	D		
RTDR	D		
RTDY	D		
RTN	D		1943 1946 2082 2084 2115 2118 2150 2196 2209 2213 2222 2292 2298 2401 2417 2433 2437 2446 2481 2491 2515 2518 2521 2528 2534 2554 2558 2731 2738 2745 2908 2947 2992 3033 3265 3277 3587 3606 3624 3640 3673 3675 3677 3679 3681 3683 3685 3687 3689 3691 3693 3695 3720 3819 3834 3849 3884 3892 3949 3972 3989 4006 4023 4060 4077 4100 4113 4239 4417 4577 4759 4837 4848 4860 5026 5091 5124 5142 5156 5162 5169 5176 5183 5190 5206 5217 5224 5281 5385 5443 5518 5595 5711 5746 5771 5996 6003 6020 6041 6086 6139 6204 6261 6298 6331 6380
RTRA	D		2357 5478 5701 5761
RTRR	D		2980 3586 5707 5760 5767
RTRY	D		
S2NA	D		
S2NDY	D		
S2NR	D		
S86	D		
SA.BOPAR	A	00000034	*1432
SA.CDCK	A	00000038	*1433
SA.COLL	A	0000000C	*1422
SA.CT	A	0000G028	*1429
SA.CTS	A	00000024	*1428
SA.EFTRN	A	0000003C	*1434 5327
SA.INV	A	00000000	*1419
SA.PCHG	A	00000004	*1420
SA.RDLAB	A	00000008	*1421
SA.RUC	A	00000018	*1425
SA.SB	A	0000002C	*1430
SA.SC	A	0000001C	*1426
SA.SIOC	A	00000020	*1427

Symbol	Type	Value	References														
SA.SK	A	00000010	*1423														
SA.SKC	A	00000014	*1424														
SACTIVE	A	00000001	*1100														
SAVE.OLD	A	00000650	3377	3400	3420	3429	3444	*3806									
SB0.M	A	000007F8	*1445														
SB1H.M	A	00000003	*1444														
SB1L.M	A	00000FC0	*1443														
SB2H.M	A	0000001F	*1442														
SB2L.M	A	00000E00	*1441														
SB3.M	A	000000FF	*1440														
SC.BANK0	A	00000000	*1071	1851													
SC.BANK1	A	00000002	*1072	1845													
SECLEN	A	0000015B	*1327	4092	4169												
SECTMAX	A	00000020	*1318	5203													
SEMPTY	A	00000004	*1111														
SENDAD9	A	0000099C	*4953	4958													
SENDADR	A	0000097B	4191	4216	4526	4551	*4912										
SEQ	D																
SET.ID	A	000003F4	2277	2784	*2963												
SET.ID1	A	000003F6	*2966	2981													
SET.ID2	A	000003FD	2968	*2976													
SET.ID3	A	00000407	2985	*2989													
SET.IDA	A	00000402	2973	2979	*2982												
SET.IDB	A	00000405	2974	*2986													
SETALERT	A	00000A2D	4836	*5158	5165	5172	5179	5186									
SETAUT	A	0000000D	*1156														
SETNA	D		1907	2596	2597	2663	2664	2667	4829	5161	5168	5175	5182	5189			
SETND	D																
SETNR	D		3290	3295	3369	3370	3394	3471	3847	4173	4253	4273	4510	4592	4614	5115	5503
			5578	5579	6302	6306											
SETODR	A	00000005	*1170														
SETSHERR	A	00000DA9	5995	*6011													
SETUTIL1	A	000004E3	3179	*3259													
SETUTIL2	A	000004E6	3194	*3267													
SF1	D																
SF2	D																
SF3	D																
SFULL	A	00000003	*1110														
SFUNC	A	00000000	*1107														
SHA	D		1937														
SHC.RST	A	00000000	*1098	2271	6015												
SHD	D																
SHDR	D																
SHERR	A	00000002	*1555	1556	2274	2472	2508	3578	6012								
SHERR.CD	A	000002A2	2297	*2507	3619												
SHN.TEST	A	0000003E	*1481	2359													
SHNADDR	A	0000003C	*0926	2464	2488	2762	2768	2840	2854	3580	3693	3711	3714	3715	3717	5701	5761
SHNDATA	A	00000008	*0925	2468	2474	2487	2764	2843	2851	2852	2862	2886	2888	2893	2896	2905	3540
			3562	5704	5707	5708	5760	5763	5767	5769							
SHNENTS9	A	00000221	2281	2284	2286	2288	2291	*2295									
SHNENTST	A	0000020C	1894	*2265													
SHNERRHW	A	00000001	*0905	1084	1832	1832	1832	1832	2523	2821	2876						
SHNPORT	A	00000003	*1049	2267	2269	2819	2874	5693	5694	5731	5732	5999	6014				
SHNRD	A	00000080	2466	2842	2884	3559	*5682										
SHNWRT	A	00000D0D	2476	2490	2766	2856	2906	3541	*5730								

Symbol	Type	Value	References														
SHGWRTNC	A	00000B94	5743	*5759													
SHOFFLN	A	00000205	2280	*2455													
SHOFFLN1	A	00000287	*2458	2470													
SHOFFLN2	A	00000293	2463	2467	*2471												
SHONLN	A	0000029D	2290	2296	*2486												
SHRD	A	00000275	2326	*2422	2445												
SHRD9	A	0000027F	2431	*2435													
SHRR	D		2360	3945	3947												
SHS.ADRH	A	00000001	*1082	2516													
SHS.ADRL	A	00000000	*1081	2513													
SHS.DATA	A	00000002	*1083	2519													
SHS.ER.M	A	0000001F	*1088	5989													
SHS.OPEN	A	00000004	*1086	2526													
SHS.RPAR	A	00000003	*1085	2532													
SHS.RPWR	A	00000005	*1087	2825	2877												
SHWAIT	A	00000003	*1556	1557													
SHWRC	A	00000281	2380	2384	2388	2392	2396	2400	*2442								
SHURT	A	0000026C	2312	*2408	2443												
SIDFLG	A	00000005	*1194	5579	5592												
SINACT	A	00000002	*1109														
SIOLOP1X	A	00000AAD	*5353	5366													
SIOLOP2X	A	00000AB8	*5368	5378													
SL	D																
SOA	D		3640														
SOAR	D																
SOD	D																
SODR	D																
SOI	D																
SOIR	D																
SONCZ	D																
SORA	D																
SORR	D		2165	2172													
SORS	D																
SORY	D																
SOSE	D																
SOSER	D																
SOZ	D																
SOZE	D																
SOZER	D																
SOZR	D																
SRC.AMP	N		*1662	2586	2592	2616	2629	2643	2657	2685	2702	2719	3596	4129	4293	4401	4468
			4626	4738	5306	5463	5554	6298									
SRC.CDC	N		*1685														
SRCCTRL	D		1846	1852	2272	2665	2668	6016	6300	6301	6302	6303					
SRCRDY	A	00000000	2690	2707	4338	4363	4364	4365	4366	4367	4368	4369	4389	4390	4391	4392	4393
			4394	4395	4421	4438	4673	4698	4699	4700	4701	4702	4722	4723	4724	4725	4726
			4727	4751	4763	4780	4966	4993	5003	5010	5031	5058	5068	5075			
SRCSEL	D		1844	2109	2268	2586	2592	2616	2629	2643	2657	2685	2702	2719	2870	2875	3596
			4129	4293	4401	4468	4626	4738	5306	5463	5554	5693	5731	6000	6014	6032	6092
			6298	6371													
SRCSTAT	D		2110	2672	2687	2704	2723	2826	2878	2970	3029	3598	3778	3793	4047	4131	4225
			4247	4267	4295	4319	4326	4342	4406	4422	4439	4470	4493	4555	4563	4586	4600
			4628	4654	4661	4677	4747	4764	4781	5122	5131	5369	5403	5417	5431	5465	5557
			5987	6033	6083	6304	6308	6317	6324	6373							
SS.ADRH	A	00000002	*1064														

Symbol	Type	Value	References
SS.ADRL	A	00000001	*1063
SS.DATA	A	00000000	*1062
SS.DSTRT	A	00000003	*1065
SS.ERR.M	A	00000007	*1066 6035
SSWKDMAX	A	00000141	*1320 3094 3140
ST.BK1	A	00000000	*1142
ST.BK2	A	00000001	*1143 3020 3597 3777 3792 4055 4132 4233 4248 4268 4296 4320 4350 4414 4429 4446 4471 4493 4555 4571 4587 4609 4629 4655 4685 4756 4771 4788 5121 5377 6323
SUBR	A	00000000	
SUBRC	A	00000001	
SUBS	A	00000002	3221 3225 3963 3966 3981 3984 3998 4001 4015 4018
SUBSC	A	00000003	
SVSTMR	D		
SVSTR	D		
SYSERR	A	00000001	*1554 1555 2551 6038 6084
SYSPORT	A	00000000	*1048 1843 2108 6032 6081
TC	D		
TEMP0	A	00000000	*0913 1874 2278 2476 3215 3231 3233 3236 3547 3808 3810 3812 3814 3816 3818 3823 3825 3827 3829 3831 3833 3846 3847 3882 3890 4030 4031 4088 4094 4098 4155 4187 4190 4357 4372 4375 4489 4522 4525 4692 4705 4708 4853 4858 4859 4882 4889 4892 4896 4900 4913 4924 4931 4933 5153 5155 5202 5204 5213 5215 5238 5241 5243 5247 5250 5252 5256 5259 5263 5266 5268 5272 5275 5279 5349 5363 5558 6112 6117 6126 6136 6164 6169 6177 6187 6197 6227 6232 6239 6247 6255 6360
TEMP1	A	00000001	*0914 3924 3927 3929 3932 3936 3940 3945 3947 3948 3970 3988 4005 4022 4070 4073 4076 4090 4096 4099 4805 4814 4820 4867 4887 4970 4974 4978 4983 4989 4992 5000 5009 5015 5018 5022 5035 5039 5043 5048 5054 5057 5065 5074 5080 5083 5087 5255 5271 5323 5331 5356 5413 5546 5548 5552 5564 6130 6181 6191 6201 6288
TEMP2	A	00000002	*0915 3931 3935 3939 3943 4807 4821 4869 4871 4891 5257 5273 5312 5333 5336 5359 5427 5542 5549 5569 6120 6179 6189 6199 6241 6243 6249 6251 6257 6259 6283
TEMP3	A	00000003	*0916 3052 4154 4188 4198 4202 4318 4374 4383 4387 4488 4523 4533 4537 4653 4707 4716 4720 4876 4895 4920 4934 4935 4947 4950 4969 4999 5021 5023 5034 5064 5086 5088 5246 5262 5278 5308 5319 5335 5341 5362 5383 5384 5441 5539 5540 5574 6121 6138 6173 6236 6287 6289
TEMP4	A	00000004	*0917 2964 2977 2980 4819 4835 4878 4880 4899 5248 5264 5280 5351 5355 5357 5360 5365 5537 5544 5550 6119 6171 6234 6244 6252 6260 6284 6371
TEMP5	A	00000005	*0918 4815 4816 4832
TEMP6	A	00000006	*0919
TEMP7	A	00000007	*0920 4355 4690 4804 4818 4824
TEMP8	A	00000008	*0921
TEMPCKS	A	00000004	*1557 1558 4195 4199 4380 4384 4530 4534 4713 4717 4942 4948 5005 5012 5070 5077
TEMPCKS2	A	00000005	*1558 1565
TEMPLNG	A	0000000E	*0929 3340 3376 3381 3399 3404 3419 3424 3431 3443 3448 3463 3469 4552 4740
TERMLR9X	A	00000A06	*5100 5109
TERMLRWX	A	00000A05	4220 4404 4561 4745 *5098
TERMLRX	A	00000A0F	5104 *5110
TF1	D		
TF2	D		
TF3	D		
TIMEOUT	A	00000009	*0922 1872 1877 2456 2462 2866 2869 3024 3026 4043 4051 4052 4062 4158 4164 4165 4170 4217 4229 4230 4242 4244 4262 4264 4324 4330 4331 4336 4346 4347 4362 4410 4411 4420 4426 4437 4443 4492 4501 4502 4515 4560 4567 4568 4581

Symbol	Type	Value	References
			4583 4603 4605 4659 4665 4666 4672 4681 4682 4697 4739 4752 4753 4762 4768
			4779 4785 5099 5105 5106 5401 5407 5408 5415 5421 5422 5429 5435 5436 5491
			5497 5505 5510 5581 5586 5587 6321 6332
TKMAX	A	00000020	*1317 5214
TL	D		
TLOW	D		
TN	D		
TNO	D		
TNOZ	D		
TOAT	D		2971 3080 3083 3159 3178 3211 3213 3221 3225 3227 3229 3255 3345 3645 3961
			3963 3966 3979 3981 3984 3996 3998 4001 4013 4015 4018 4937 4951 4955 5102
			5132 5314 5320 5324 5326 5330 5469 5988 6034 6309 6374 6376
TOATR	D		2310 2324 2358 3882 3890 4867 4876 5542 5546 5552 5558 6119 6121 6128 6130
			6171 6173 6179 6181 6189 6191 6199 6201 6234 6241 6249 6257
TODA	D		2598 2722
TODAR	D		
TODI	D		
TODIR	D		
TODRA	D		
TODRR	D		4188 4523 5700
TODRY	D		
TORAA	D		2889
TORAR	D		3757 3935 3939 4198 4202 4374 4383 4387 4533 4537 4707 4716 4720 4920 4931
			4934 4969 4989 4999 5015 5034 5054 5064 5080 5204 5215 5383 5549 6138 6244
			6252 6260 6284 6289
TORAY	D		1984 1987 1990 1993 1996 1999 2002 2005 2008 2011 2014 2017 2020 2023 2026
			2029 2032 2035 2039 2041 2044 2047 2050 2053 2056 2059 2062 2065 2068 2071
			2074 2077 2205 2429 2680 2697 2714 3562 3943 4816 4978 5000 5023 5043 5065
			5088
TORIA	D		3065 3078 3929 3932 3936 3940 5308 5312 5336
TORIR	D		2606 2619 2632 2651 2677 2694 2711 2852 3070 3715 4871 4880 6112 6164 6227
TORIY	D		2133 2145 2182 2315 2329 2345 2367 2468 2843 2893 2896 2977 3061 3072 3075
			3097 3100 3103 3717 4052 4165 4192 4230 4244 4264 4331 4347 4377 4411 4426
			4443 4502 4527 4568 4583 4605 4666 4682 4710 4753 4768 4785 5106 5408 5422
			5436 5474 5587 5763 5769
TOVR	D		
TRACEBEG	A	00000400	*1647 2791
TRACEEND	A	00000F7F	*1648
TRACEPTR	A	00000013	*0961 2790
TSTNA	D		2513 2516 2519 2526 2532 2612 2625 2639 2673 2698 2705 3604 3622 4048 4055
			4132 4161 4226 4233 4248 4268 4296 4320 4327 4334 4343 4350 4407 4414 4423
			4429 4440 4446 4471 4498 4564 4571 4587 4609 4629 4655 4662 4669 4678 4685
			4748 4756 4765 4771 4782 4788 5370 5377 5404 5411 5418 5425 5432 5439 5494
			5508 5576 5584
TSTND	D		2825 2877 3028 3584 3597 3638 3708 3777 3792 4493 4555 5121 6304 6317 6323
TSTNR	D		3087 4031 4140 4210 4304 4402 4734 4846 4849 5135 5341
TUB	D		
TZ	D		
TZC	D		
UBIFT	A	000002C2	1899 *2585
UBIFT4	A	00000300	2604 2649 *2661
UBIFT5	A	000002F4	*2645 2658 2724
UBIFT6	A	00000339	2647 *2729
UBIFT8	A	00000338	2615 2628 2642 2656 2684 2701 2718 *2735

Symbol	Type	Value	References														
UBIFT9	A	0000033E	2601	2613	2626	2640	2674	2682	2689	2691	2699	2706	2708	2716	2725	*2742	
UP1	A	00000001															
UPL	A	00000002															
UPZ	A	00000000	1937	2360													
URSPT0	A	0000000A	*1189	5115	5119	6306	6316										
URST(M3	A	00000A28	5134	*5141													
URSTIN9	A	00000A12	*5114	5129													
URSTIME	A	00000A1E	*5130	5140													
W86	D																
WCACHE	D		2194	2275	2473	2781	2991	3052	3057	3059	3069	3145	3148	3151	3183	3187	3192
			3197	3201	3206	3217	3232	3235	3238	3242	3245	3250	3256	3264	3272	3276	3354
			3579	3758	3786	3810	3814	3818	3825	3829	3833	3840	3842	3844	3848	3928	3949
			4070	4073	4076	4097	4111	4289	4373	4650	4706	4829	4832	4835	4858	4887	4891
			4895	4899	4944	4952	4974	4977	4992	4998	5007	5014	5018	5021	5039	5042	5057
			5063	5072	5079	5083	5086	5161	5169	5175	5182	5189	5201	5209	5212	5220	5223
			5246	5248	5262	5264	5278	5280	5319	5331	5333	5335	5356	5359	5362	5384	6013
			6039	6085													
WCAR	D		2193	2202	2274	2472	2508	2551	2778	2783	2850	2990	3051	3055	3058	3068	3142
			3147	3150	3157	3168	3174	3181	3185	3190	3196	3199	3204	3209	3216	3219	3231
			3233	3236	3241	3244	3248	3253	3262	3270	3274	3343	3353	3578	3583	3602	3620
			3637	3643	3707	3755	3782	3798	3807	3809	3811	3813	3815	3817	3822	3824	3826
			3828	3830	3832	3839	3841	3843	3845	3858	3871	3880	3888	3913	3916	3919	3922
			4029	4038	4069	4072	4075	4094	4096	4108	4112	4150	4157	4187	4196	4200	4287
			4290	4314	4359	4372	4375	4381	4385	4481	4491	4522	4531	4535	4639	4648	4651
			4694	4705	4708	4714	4718	4809	4814	4822	4827	4831	4834	4855	4859	4864	4873
			4884	4888	4892	4896	4900	4915	4923	4926	4943	4949	4965	4973	4976	4982	4986
			4991	4997	5006	5013	5017	5020	5030	5038	5041	5047	5051	5056	5062	5071	5078
			5082	5085	5152	5159	5166	5173	5180	5187	5199	5210	5221	5240	5245	5247	5249
			5254	5256	5261	5263	5265	5270	5272	5277	5279	5318	5330	5332	5334	5355	5358
			5361	5381	5536	5539	6012	6038	6084								
WCARLOW	D																
WDATA	D		2411	2413	2425	2609	2622	2635	2654	4189	4212	4524	4547	4919	4932	4941	4947
			5476	5483	5489	5564	5569	5574	5702	5706	5762	5764	5768	5770			
WFUPDAT1	A	000003B2	*2865	2903													
WFUPDAT2	A	000003B4	*2868	2890	2901												
WFUPDAT9	A	000003D0	2845	2870	2879	2892	2895	*2904									
WFUPDATE	A	0000039C	2773	*2818													
WRDCNT	A	0000500A	*0923	3089	3093	3139	3334	4175	4197	4360	4377	4512	4527	4695	4710	4810	4856
			4895														
WRT3TIN	A	0000077F	4243	*4259													
WRT3T(MY	A	0000088E	4582	*4599													
WRTADRCW	A	00000A3F	*5185														
WRTB3X	A	00000751	*4204	4280													
WRTB3Y	A	0000085E	*4539	4620													
WRTB4AX	A	0000078E	4263	*4279													
WRTB4AY	A	0000089C	4604	*4619													
WRTB4X	A	00000780	4210	*4261	4269												
WRTB4Y	A	0000088F	4545	*4602	4610												
WRTB9X	A	0000072C	*4159	4171													
WRTBUF1X	A	0000071B	*4136														
WRTBUF1Y	A	0000082A	*4475														
WRTBUF2X	A	0000073A	*4177														
WRTBUF2Y	A	00000849	*4514														
WRTBUF3X	A	00000743	4179	4180	4181	4182	4183	4184	4185	*4187	4260						
WRTBUF3Y	A	00000850	4516	4517	4518	4519	4520	*4522	4600								

Symbol	Type	Value	References														
WRTBUF4X	A	00000771	4186	*4241	4249												
WRTBUF4Y	A	00000883	4521	*4580	4588												
WRTBUF5X	A	0000076E	*4235														
WRTBUF5Y	A	00000870	*4573														
WRTBUF7X	A	00000761	*4221	4234													
WRTBUF8X	A	00000738	4163	*4172													
WRTBUF9X	A	00000722	4141	*4145													
WRTBUFFX	A	00000713	3154	3165	3188	3193	3202	3207	3246	3251	3298	3312	3474	3484	*4127		
WRTBUFFY	A	00000822	3379	3402	3422	3446	3464	*4466									
WRTSECLN	A	00000011	*0932	3374	3397	3417	3441	3462									
WRTYLOOP	A	00000832	*4485	4558													
WRTYLP8	A	00000847	4500	*4509													
WRTYLP9	A	00000838	*4496	4508													
WRTYTERM	A	00000871	4553	*4559													
WRTYTR9	A	00000873	*4562	4572													
WRTZROX	A	00000758	4204	4205	4206	4207	4208	4209	*4211								
WRTZROY	A	00000865	4539	4540	4541	4542	4543	4544	*4546								
Z	A	00000002	1878	1886	1891	1896	1901	1910	1985	1988	1991	1994	1997	2000	2003	2006	2009
			2012	2015	2018	2021	2024	2027	2030	2033	2036	2039	2042	2045	2048	2051	2054
			2057	2060	2063	2066	2069	2072	2075	2078	2135	2147	2184	2206	2317	2331	2347
			2369	2430	2463	2470	2514	2517	2520	2527	2533	2553	2600	2613	2626	2640	2647
			2674	2681	2689	2698	2705	2715	2724	2827	2845	2870	2879	2887	2890	2892	2895
			2898	2901	2973	2979	3027	3030	3063	3074	3077	3082	3085	3088	3099	3102	3105
			3161	3172	3176	3306	3347	3388	3411	3436	3455	3544	3563	3566	3585	3599	3605
			3623	3639	3647	3649	3651	3653	3655	3657	3659	3661	3663	3665	3667	3709	3719
			3779	3784	3794	3860	3925	3944	3971	4032	4049	4054	4056	4059	4133	4141	4162
			4167	4194	4219	4227	4232	4234	4246	4249	4266	4269	4297	4305	4321	4329	4333
			4335	4344	4349	4351	4379	4403	4408	4413	4415	4424	4428	4430	4441	4445	4447
			4472	4494	4499	4504	4529	4553	4556	4565	4570	4572	4585	4589	4607	4610	4630
			4656	4663	4668	4670	4679	4684	4686	4712	4735	4741	4749	4755	4757	4766	4770
			4772	4783	4787	4789	4817	4825	4847	4850	4890	4894	4898	4902	4957	4979	5001
			5024	5044	5066	5089	5104	5108	5123	5134	5205	5216	5316	5322	5328	5340	5342
			5364	5371	5378	5405	5410	5412	5419	5424	5426	5433	5438	5440	5466	5471	5495
			5498	5509	5511	5560	5577	5585	5589	5991	6002	6036	6305	6311	6318	6325	6333
			6343	6361	6378												
ZA	D		2150	2777	2795	3673	5517										
ZH	D		2081	2275	2292	2473	2481	2780	3148	3151	3182	3197	3242	3245	3579	3786	3840
			3842	3844	4111	4211	4289	4546	4650	6085	6372						
ZR	D		1882	1945	2107	2126	2138	2159	2178	2273	2355	2487	2588	2589	2590	2764	2902
			2905	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928
			2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943
			2944	2945	2946	3020	3021	3064	3354	3580	4036	4043	4062	4154	4158	4178	4217
			4318	4324	4336	4362	4408	4492	4515	4560	4653	4659	4672	4697	4739	4804	5099
			5346	5401	5415	5429	5581	6236									

Assembly Phase complete.
0 error(s) detected.

```
                TITLE - AMPERIF 7155/885 EMULATION - HSP ONLINE -
;
;***************************************************************************
;*                                                                        *
;*      HH    HH   SSSSSS   PPPPPPP       OOOOOO   NN    NN  LL           *
;*      HH    HH  SS    SS  PP    PP     OO    OO  NNN   NN  LL           *
;*      HH    HH  SS        PP    PP     OO    OO  NNNN  NN  LL           *
;*      HHHHHHHH   SSSSSS   PPPPPPP      OO    OO  NN NN NN  LL           *
;*      HH    HH        SS  PP           OO    OO  NN  NNNN  LL           *
;*      HH    HH  SS    SS  PP           OO    OO  NN   NNN  LL           *
;*      HH    HH   SSSSSS   PP            OOOOOO   NN    NN  LLLLLLLL     *
;*                                                                        *
;*           BANK 1 - MAIN ONLINE CODE - ADDRESSES 1000 TO 1FFF           *
;*                                                                        *
;***************************************************************************
;
;
;       ****  ****
;     *** **  ******
;   ***   **  ********
;  **     **  *********
; **      **  **********
;**       **  ***********                                                __   ___
;***********  ***********                                               /  \  /   |
;                                                                       \__/  |  _|
;***********    ___ __  __  ___  ___  __ ___    _____   __  __  __  _|  /_
;***********   /   ' || |/  |/  || '   \  /     \ | |/ ||  ||      |
; **********  |   __  ||  _   _  ||  __  ||  ==  ||   __|| ||__ __|
;  *********  | (__|  || | | | | || |__) || _____||  /  | | | | |
;   ********  |       || | | | | ||      || \____ | |    | | | | |
;     ******   \____,__||__| |__| |__|| ,____/ \_____/ |__|   |__| |__|
;       ****                          | |
;                                     |__| c o r p o r a t i o n
;
;
;     ####################################################################
;     ####################################################################
;     ####                                                            ####
;     ####                  CONFIDENTIAL DOCUMENT                     ####
;     ####               ---------------------------                  ####
;     ####   REPRODUCTION AND/OR DISCLOSURE  OF THE INFORMATION       ####
;     ####   CONTAINED  HEREIN  IS STRICTLY PROHIBITED  WITHOUT       ####
;     ####   PRIOR WRITTEN AUTHORIZATION BY AMPERIF CORPORATION       ####
;     ####                                                            ####
;     ####################################################################
;     ####################################################################
;
BANK:       EQU 1               ;RESIDES IN BANK 1, 1000 TO 1FFF
;
```

```
Addr      Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -

            50              EJECT
            51              INCLUDE HSPEQU.SRC
            52              TITLE2 HSPEQU - EQUATES AND DEFINITIONS
            53              WIDTH 132
            54    ;
            55    ;*************************************************************************
            56    ;*                                                                       *
            57    ;*      HH    HH   SSSSSS   PPPPPPP      EEEEEEEE   QQQQQQQ   UU    UU      *
            58    ;*      HH    HH  SS    SS  PP    PP     EE        QQ    QQ  UU    UU      *
            59    ;*      HH    HH  SS        PP    PP     EE        QQ    QQ  UU    UU      *
            60    ;*      HHHHHHHH   SSSSSS   PPPPPPP      EEEEEE    QQ QQ QQ  UU    UU      *
            61    ;*      HH    HH        SS  PP           EE        QQ  QQQQ  UU    UU      *
            62    ;*      HH    HH  SS    SS  PP           EE        QQ   QQQ  UU    UU      *
            63    ;*      HH    HH   SSSSSS   PP           EEEEEEEE   QQQQQQQ   UUUUUU       *
            64    ;*                                                      QQ               *
            65    ;*      HSP - HIGH SPEED PROCESSOR MICROCODE EQUATES AND DEFINITIONS      *
            66    ;*                                                                       *
            67    ;*************************************************************************
            68    ;
            69    ; This file contains all the equates, definitions, and macros
            70    ; used in both banks of the HSP code.  It also contains some
            71    ; documention on code usage and design.
            72    ;
```

```
                73              EJECT
                74  ;
                75  ; CONDITIONAL ASSEMBLY FLAGS
                76  ; ========================================
                77  ;
                78  ; SHARED MEMORY ERROR DETECTION H/W
                79  ; ECO's 3505 and 3506 on the HSP board are installed.  This
                80  ; enables the SHS.RPAR, SHS.OPEN and SHS.RPWR signals on shared
                81  ; memory source status.
                82  ;
                83  SHMERRHW:   EQU 1               ;INSTALLED                          ;201
                84  ;
                85              TITLE2 HSPEQU - REGISTER DEFINITIONS
```

```
                86              EJECT
                87  ;
                88  ; REGISTER EQUATES
                89  ; ======================================
                90  ;
                91  TEMP0:      EQU R0          ;TEMP SCRATCH STORAGE
                92  TEMP1:      EQU R1          ;TEMP
                93  TEMP2:      EQU R2          ;TEMP
                94  TEMP3:      EQU R3          ;TEMP
                95  TEMP4:      EQU R4          ;TEMP
                96  TEMP5:      EQU R5          ;USED IN WRITE AS SECTOR COUNTER
                97  TEMP6:      EQU R6          ;ABOVE TWO ARE TEMP STORE IN GET.KWA    ;202
                98  TEMP7:      EQU R7
                99  TEMP8:      EQU R8          ;TEMP REG USED IN GETSTAT
               100  TIMEOUT:    EQU R9          ;COUNTER FOR TIMEOUT ON LOOPS           ;201
               101  WRDCNT:     EQU R10         ;USED FOR THE LENGTH OF THE DATA IN A SECTOR
               102  ;                            (LARGE SECTOR OR NORMAL)
               103  SHMDATA:    EQU R11         ;THE DATA TO READ WRITE IN SHARED MEMORY
               104  SHMADDR:    EQU R12         ;THE ADDRESS TO ACCESS IN THE SHARED MEMORY
               105  IF BANK_EQ_0
               112  ELSE
               113  CDCSTATE:   EQU R13         ;REG USED FOR HIGH SPEED READ/WRITE TO
               114  ;                            INDICATE THE STATE OF CDC CHANNEL DURING
               115  ;                            REPLY TO ENDING STATUS.
               116  ;                            2 = WAITING FOR STATUS FUNCTION
               117  ;                            1 = WAITING FOR EMPTY TO SEND STATUS WORD
               118  ;                            0 = SEQUENCE COMPLETE
               119  CKCYL:      EQU R14         ;USED IN HIGH SPEED READ/WRITE TO HOLD THE
               120  ;                            CYLINDER TO WRITE IN THE SECTOR DATA
               121  CKSECTRK:   EQU R15         ;USED TO HOLD THE PACKED SECTOR/TRACK TO
               122  ;                            WRITE IN THE SECTOR DATA.
               123  ;           EQU R16         ;(NOT USED)
               124  GENSTAT:    EQU R17         ;THE GENERAL STATUS REG FOR CDC
               125  ;                            BIT11 ABNORMAL TERMINATION
               126  ;                            BIT10 MULTIPLE-ACCESS CONTROLLER RESERVED
               127  ;                            BIT9  NONRECOVERABLE ERROR
               128  ;                            BIT8  RECOVERY IN PROCESS (N/A)
               129  ;                            BIT7  CHECKWORD ERROR (N/A)
               130  ;                            BIT6  CORRECTABLE ADDRESS ERROR (N/A)
               131  ;                            BIT5  (UNDEFINED)
               132  ;                            BIT4  DRIVE MALFUNCTION
               133  ;                            BIT3  DRIVE RESERVED
               134  ;                            BIT2  AUTOLOAD ERROR (N/A)
               135  ;                            BIT1  BUSY
               136  ;                            BIT0  (UNDEFINED)
               137  CNTR2:      EQU R18         ;COUNTER FOR THE NUMBER OF CONSECTIVE READ/WRITES
               138  ENDIF
               139  TRACEPTR:   EQU R19         ;POINTER TO THE TRACE BUFFER
               140  CDCFNC:     EQU R20         ;THE CDC FUNCTION CODE
               141  AMPCTRL:    EQU R21         ;THE AMPERIF CONTROL REGISTER
               142  AMPUNIT:    EQU R22         ;HOLDS THE AMPERIF MODULE ADDRESS FOR COMMANDS, ETC
               143  AMPCMD:     EQU R23         ;HOLDS THE AMPERIF COMMAND
               144  AMPWLEN:    EQU R24         ;THE AMPERIF WORD LENGTH FIELD FOR COMMANDS
               145  FLAGS:      EQU R25         ;HSP STATUS FLAG BITS:
               146  F.CMDREJ:   EQU BIT15       ;COMMAND REJECT, AMP DIDN'T LIKE COMMAND
```

Addr Line - AMPERIF /155/885 EMULATION - NSP ONLINE - NSPEQU - REGISTER DEFINITIONS

```
147   ;                                 CLEARED ON ENTRY TO CKAMPST
148   ;                                 SET IN CKAMPST IF STATUS CONTAINED ATTENTION
149   ;                                 STATUS MODIFIER, C.U.E., OR BUSY. ALSO IF
150   ;                                 STATUS ACTION WAS = F, OR RECOVERY ACTION = 4.
151   F.FIFO:     EQU BIT14             ;USE THE CDC1 FIFO
152   ;                                 SET IN WRITES BEFORE CALL TO FNCREPLY TO
153   ;                                 ENABLE THE CDC FIFO WHEN A REPLY TO A WRITE
154   ;                                 FUNCTION IS ISSUED TO CDC.
155   ;                                 CLEARED IN WRITE AFTER RETURN FROM FNCREPLY.
156   F.STCNCT:   EQU BIT13             ;STATUS FOR CONNECTED UNIT
157   ;                                 CLEARED ON ENTRY TO CKAMPST
158   ;                                 SET IN CKAMPST TO INDICATE THE STATUS WAS
159   ;                                 FROM THE CONNECTED UNIT.
160   F.INTVRQ:   EQU BIT12             ;INTERVENTION REQUIRED DRIVE STATUS
161   ;                                 CLEARED ON ENTRY TO CKAMPST
162   ;                                 SET IN CKAMPST TO INDICATE THE STATUS
163   ;                                 HAD A RECOVERY ACTION OF 6 (INTV REQ)
164   F.STPEND:   EQU BIT11             ;STATUS PENDING FROM AMPERIF
165   ;                                 SET IN SEEK, READ, WRITE ROUTINES WHEN
166   ;                                 COMMAND (EF) ISSUED TO AMP.  CLEARED
167   ;                                 IN CKAMPST WHEN STATUS (E1) RECEIVED.
168   F.NSHMEM:   EQU BIT10             ;DON'T SHARE SHARED MEMORY.  ALL WRITES ;201
169   ;                                 TO SHMEM WILL GO ONLY TO OUR OWN COPY,
170   ;                                 NOT TO THE OTHER CNTRLR'S MEMORY.  FLAG
171   ;                                 BASED ON REQUEST FROM THE OTHER CTRLR.
172   ;           EQU BIT9              ;(NOT USED)                              ;203
173   F.LNGRW:    EQU BIT8              ;LONG READ/WRITE MODE                    ;201
174   F.SHFAIL:   EQU BIT7              ;SHARED MEMORY GOT AN ERROR              ;201
175   F.GAPSEC:   EQU BIT6              ;GAP SECTOR MODE
176   F.2TO1:     EQU BIT5              ;2:1 INTERLACE MODE
177   F.LRGSEC:   EQU BIT4              ;LARGE SECTOR (NOS/VE) MODE, 0=NORMAL MODE
178   F.RDERR:    EQU BIT3              ;ERROR ON READ
179   IF BANK_EQ_0
182   ELSE
183   ;           EQU BIT2              ;(NOT USED)                              ;203
184   F.CNCTD:    EQU BIT1              ;UNIT IN CURUNIT IS CONNECTED            ;201
185   ENDIF                                                                      ;201
186   ;           EQU BIT0              ;(NOT USED)                              ;201
187   ;
188   ; REGISTERS, CONTINUED
189   ;
190   CURUNIT:    EQU R26               ;THE UNIT CONNECTED FLAG
191   IF BANK_EQ_0
197   ELSE
198   CPPOLL:     EQU R27               ;CDC1 PORT CURRENTLY BEING POLLED        ;1E
199   CPCNCT:     EQU R28               ;CDC1 PORT CONNECTED (RESERVED) IF ANY   ;1E
200   SVSRC:      EQU R29               ;HOLDS THE CONNECTED SOURCE PORT
201   SVDST:      EQU R30               ;HOLDS THE CONNECTED DEST PORT #
202   DEADMAN:    EQU R31               ;COUNTER FOR DEADMAN TIMEOUT
203   ENDIF
204   ;
205   ; VALUES FOR DEADMAN TIMER
206   ;
207   DNTIME1:    EQU H#1000            ;LOW ORDER DEADMAN VALUE (REGISTER)      ;201
208   DNTIME2:    EQU D#1600            ;HIGH ORDER DEADMAN VALUE (LOCAL MEM)    ;201
```

```
                209    ;
                210    ; MACRO TO INITIALIZE DEADMAN REGISTER
                211    ; MUST BE QUICK, AND MUST SET DEADMAN TO SAME VALUE AS DMT(ME1 ABOVE.
                212    ;
                213    DMRINIT:    MACRO                                              ;201
                214                LD2WR BIT12,DEADMAN
                215                ENDM
                216    ;
                217                TITLE2 HSPEQU - HIGH SPEED BUS PROCESSING EQUATES
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - HSPFQU - HIGH SPEED BUS PROCESSING EQUATES

```
                218             EJECT
                219     ;
                220     ; HIGH SPEED BUS PORT PROCESSING EQUATES
                221     ; ========================================
                222     ;
                223     ; PORT SOURCE AND DESTINATION SELECTION
                224     ; --------------------------------------
                225     ;
                226     SYSPORT:    EQU H#0             ;SYSTEM PORT
                227     SHMPORT:    EQU H#3             ;SHARED MEMORY / STATUS BUFFER
                228     CDCP.A:     EQU H#1             ;1ST CDCI BOARD                 ;1E
                229     CDCP.B:     EQU H#2             ;2ND CDCI BOARD                 ;1E
                230     CDCP.C:     EQU H#4             ;3RD CDCI BOARD                 ;1E
                231     CDCP.D:     EQU H#8             ;4TH CDCI BOARD                 ;1E
                232     AMP.PORT:   EQU H#F             ;AMPERIF U-BUS INTERFACE
                233     ;
                234     ;
                235     ; SYSPORT
                236     ; -------
                237     ;
                238     ; SOURCE STATUS
                239     ;
                240     SS.DATA:    EQU BIT0            ;"BPARERR", BUS PARITY ERROR, CACHE DATA ERR
                241     SS.ADRL:    EQU BIT1            ;CACHE/LOCAL MEMORY LOW BYTE
                242     SS.ADRH:    EQU BIT2            ;CACHE/LOCAL MEMORY HIGH BYTE
                243     SS.DSTRT:   EQU BIT3            ;CDC DEADSTART FLAG
                244     SS.ERR.M:   EQU B#0111          ;CACHE/LOCAL MEM ERR MASK, BITS 0-2     ;20J
                245     ; BITS 8-15 CONTAIN HSP SWITCH 1 SETTING
                246     ;
                247     ; CONTROL
                248     ;
                249     SC.BANK0:   EQU H#0             ;BANK SWITCH LOWER HALF
                250     SC.BANK1:   EQU H#2             ;BANK SWITCH UPPER HALF
                251     ;
```

```
252                 EJECT
253     ;
254     ; SHARED MEMORY / STATUS BUFFER
255     ; ----------------------------
256     ;
257     ; SOURCE STATUS
258     ;
259     SHS.ADRL:   EQU BIT0            ;LOCAL MEMORY LOW ADDRESS PARITY ERROR
260     SHS.ADRH:   EQU BIT1            ;LOCAL MEMORY HIGH ADDRESS PARITY ERROR
261     SHS.DATA:   EQU BIT2            ;LOCAL MEMORY DATA PARITY ERROR
262     IF SHMERRHW_EQ_1
263     SHS.RPAR:   EQU BIT3            ;REMOTE PARITY ERROR
264     SHS.OPEN:   EQU BIT4            ;OPEN CABLE
265     SHS.RPWR:   EQU BIT5            ;REMOTE POWERED UP
266     SHS.ER.M:   EQU B#011111        ;ERROR MASK, BITS 0,1,2,3,4             ;201
267     ELSE
272     ENDIF
273     ;
274     ; CONTROL
275     ;
276     SHC.RST:    EQU 0               ;ANY CONTROL RESETS ERRORS              ;201
277     ;
```

```
                278                 EJECT
                279     ;
                280     ; CDCI's
                281     ; ------
                282     ;
                283     ; SOURCE STATUS
                284     ;
                285     SFUNC:      EQU BIT0            ;CDC FUNCTION PRESENT
                286     SACTIVE:    EQU BIT1            ;CDC CHANNEL ACTIVE
                287     SINACT:     EQU BIT2            ;CDC CHANNEL INACTIVE
                288     SFULL:      EQU BIT3            ;CDC CHANNEL FULL
                289     SEMPTY:     EQU BIT4            ;CDC CHANNEL EMPTY
                290     FIFONEMP:   EQU BIT5            ;FIFO IS NOT EMPTY
                291     ;           EQU BIT6            ;(NOT USED)
                292     CPARERR:    EQU BIT7            ;CHANNEL PARITY ERROR ON CDC CHANNEL (N
                293     ; BITS 8-11 CONTAIN CDCI LOWER SWITCH 1 SETTING
                294     ;
                295     ; DESTINATION STATUS
                296     ;
                297     ;SFUNC:      EQU BIT0            ;CDC FUNCTION PRESENT
                298     ;SACTIVE:    EQU BIT1            ;CDC CHANNEL ACTIVE
                299     ;SINACT:     EQU BIT2            ;CDC CHANNEL INACTIVE
                300     ;SFULL:      EQU BIT3            ;CDC CHANNEL FULL
                301     ;SEMPTY:     EQU BIT4            ;CDC CHANNEL EMPTY
                302     RANK1EMP:   EQU BIT5            ;BUFFER RANK 1 EMPTY
                303     ;           EQU BIT6            ;(NOT USED)
                304     ;           EQU BIT7            ;(NOT USED)
                305     ;
                306     ; CONTROL
                307     ;
                308     C.FIFO:     EQU H#0001          ;ENABLE THE FIFO                        ;1E
                309     C.ACT:      EQU H#0008          ;SET ACTIVE, DON'T SET INACTIVE         ;1E
                310     C.DDS:      EQU H#8000          ;DISABLE DEADSTART FROM THIS PORT       ;1F
                311     C.INACT:    EQU H#0000          ;NONE OF THE ABOVE                      ;1E
                312     ;
```

```
                313             EJECT
                314     ;
                315     ; AMPERIF / UBI
                316     ; -------------
                317     ;
                318     ; SOURCE STATUS
                319     ;
                320     ST.BK1:     EQU BIT0            ;STATUS WORD IN BANK 1 OF AMP INTERF
                321     ST.BK2:     EQU BIT1            ;STATUS WORD IN BANK 2 OF AMP INTERF
                322     RSTE1:      EQU BIT2            ;RESET THE INTERRUPT CONDITION
                323     ;                               AND IGNORE THE STATUS WORD SENT
                324     DAT.BK1:    EQU BIT3            ;DATA WORD IN BANK 1
                325     DAT.BK2:    EQU BIT4            ;DATA WORD IN BANK 2
                326     RSTOD1D:    EQU BIT5            ;RESET I/O CONDITIONS AND DATA PATHS
                327     ;           EQU BIT6            ;(NOT USED)
                328     ;           EQU BIT7            ;(NOT USED)
                329     PAR1.RDY:   EQU BIT8            ;DATA PARCEL 1 READY TO READ
                330     PAR2.RDY:   EQU BIT9            ;DATA PARCEL 2 READY TO READ
                331     PAR3.RDY:   EQU BIT10           ;DATA PARCEL 3 READY TO READ
                332     AMP.P.ER:   EQU BIT11           ;PARITY ERROR ON AMPERIF WORD
                333     ENTAGS:     EQU BIT12           ;AMPERIF HAS NOT DISABLED THE U-BUS
                334     SETAUT:     EQU BIT13           ;AMPERIF WRAP IS IN PROGRESS (UDREQ)UDACK)
                335     ;
                336     AS.INP.M:   EQU H#0718          ;ANY INPUT READY STATUS MASK:          ;201
                337     ;                               DAT.BK1 OR BK2, PAR1, PAR2, OR PAR3.RDY
                338     ;
                339     ; DESTINATION STATUS
                340     ;
                341     REG.A:      EQU BIT0            ;DATA TO AMPERIF IS IN THE LOWER 12 BITS
                342     ;                               OF THE 36 BIT WORD (REG A)
                343     REG.B:      EQU BIT1            ;DATA TO AMPERIF IS IN THE LOWER 24 BITS
                344     ;                               OF THE 36 BIT WORD (REG A AND REG B)
                345     AOUTRDY:    EQU BIT2            ;DATA TO AMPERIF IS READY FOR OUTPUT
                346     UDREQ:      EQU BIT3            ;AMPERIF REQUEST OUTPUT DATA
                347     EFREQ:      EQU BIT4            ;AMPERIF REQUEST FUNCTION WORD
                348     SETODR:     EQU BIT5            ;AMPERIF REQUEST ADDRESS WORD
                349     HIOLD:      EQU BIT6            ;AMPERIF REQUEST BLOCK I/O
                350     FI.NEMP:    EQU BIT7            ;OUTPUT FIFO NOT EMPTY
                351     ;
                352     AD.OUT.M:   EQU H#0047          ;ANY OUTPUT WAITING STATUS MASK:       ;201
                353     ;                               REG.A OR B, AOUTRDY, OR FI.NEMP
                354     ;
                355     ; CONTROL
                356     ;
                357     AC.UWRAP:   EQU BIT0            ;WRAPS THE U-BUS FOR DIAG
                358     AC.DODR:    EQU BIT1            ;FORCES OUTPUT DATA REQUEST FOR DIAG
                359     AC.DIDR:    EQU BIT2            ;FORCES INPUT DATA REQUEST FOR DIAG
                360     EFINT:      EQU BIT3            ;REQUESTS AMP TO CONNECT FOR FUNCTION
                361     CLREFINT:   EQU BIT4            ;CLEAR EFINT TAG LINE
                362     SIDFLG:     EQU BIT5            ;INFORMS AMP THAT AN ADDRESS WORD IS AVAIL
                363     FNCOUT:     EQU BIT6            ;INFORMS AMP THAT A FUNCTION WORD IS AVAIL
                364     DATAOUT:    EQU BIT7            ;INFORMS AMP THAT DATA IS AVAIL
                365     AC.DACK:    EQU BIT8            ;DISABLES THE AUTOMATIC SENDING OF IDA
                366     EISENT:     EQU BIT9            ;INFORMS AMP THAT THE EI WAS RECEIVED
                367     URSPTO:     EQU BIT10           ;INFORMS AMP THAT DATA TRANSFER HAS STOPPED
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - HSPEQU - HIGH SPEED BUS PROCESSING EQUATES

```
368    FIFOCLR:    EQU BIT11          ;CLEARS FIFO AND REG A,B, AND C OF VALID DATA
369    AC.RESET:   EQU BIT12          ;INFORMS AMP TO RESET ITS CONTROLLER
370    AC.DABLE:   EQU BIT13          ;INFORMS AMP THAT THE HSP IS DISABLED
371    ;
372                TITLE2 HSPEQU - COMMANDS / FUNCTIONS
```

```
                373             EJECT
                374 ;
                375 ; AMPERIF / SPERRY FUNCTION EQUATES
                376 ; ======================================
                377 ;
                378 AF.NOOP:    EQU H#03            ;NO OPERATION COMMAND
                379 AF.SENSE:   EQU H#04            ;SENSE I/O COMMAND
                380 AF.SEEK:    EQU H#0B            ;TRACK POSITION RELATIVE SEEK
                381 AF.WRT:     EQU H#0D            ;WRITE DATA COMMAND
                382 AF.RD:      EQU H#0E            ;READ DATA COMMAND
                383 ;
                384 ;
                385 ; CDC FUNCTION EQUATES
                386 ; ======================================
                387 ;
                388 CF.CNCT:    EQU Q#000           ; CONNECT
                389 CF.SEEK1:   EQU Q#001           ; SEEK 1:1
                390 CF.SEEK2:   EQU Q#002           ; SEEK 2:1
                391 ;           EQU Q#003           ; --
                392 CF.RD:      EQU Q#004           ; READ
                393 CF.WRT:     EQU Q#005           ; WRITE
                394 CF.WRTV:    EQU Q#006           ; WRITE VERIFY
                395 CF.RDCW:    EQU Q#007           ; READ CHECKWORD
                396 CF.OPC:     EQU Q#010           ; OPERATION COMPLETE
                397 CF.DDRES:   EQU Q#011           ; DISABLE DRIVE RESERVE (844)
                398 CF.GSTAT:   EQU Q#012           ; GENERAL STATUS
                399 CF.DSTAT:   EQU Q#013           ; DETAILED STATUS
                400 ;  CONT     EQU Q#014           ;(CONTINUE)
                401 CF.DSKS:    EQU Q#015           ; DROP SEEKS
                402 ;  FMT      EQU Q#016           ;(FORMAT PACK)
                403 CF.RDADR:   EQU Q#017           ; RETURN DRIVE ADDR
                404 CF.DREL:    EQU Q#020           ; DRIVE RELEASE
                405 CF.RCADR:   EQU Q#021           ; RETURN CYLINDER ADDR
                406 ;  FLAW     EQU Q#022           ;(CLEAR/SET FLAW)
                407 CF.XSTAT:   EQU Q#023           ; EXTENDED DETAILED STATUS
                408 CF.RDG:     EQU Q#024           ; READ GAP SEC
                409 CF.WRTG:    EQU Q#025           ; WRITE GAP SEC
                410 CF.WRTVG:   EQU Q#026           ; WRITE VERIFY GAP SEC
                411 CF.RDCWG:   EQU Q#027           ; READ CHECKWORD GAP SEC
                412 CF.RDFAC:   EQU Q#030           ; READ FACTORY DATA
                413 CF.RDUM:    EQU Q#031           ; READ UTILITY MAP (844)
                414 CF.BXRD:    EQU Q#032           ; BLOCK XFER BUFFER READ
                415 CF.BXWRT:   EQU Q#033           ; BLOCK XFER BUFFER WRITE
                416 CF.RDP:     EQU Q#034           ; READ PROTECTED SEC
                417 CF.WRTL:    EQU Q#035           ; WRITE LAST SEC
                418 CF.WRTVL:   EQU Q#036           ; WRITE VERIFY LAST SEC
                419 CF.WRTP:    EQU Q#037           ; WRITE PROTECTED SEC
                420 ;  RDSH     EQU Q#040           ;(READ SHORT)
                421 ;  SSTRB    EQU Q#041           ;(SELECT STROBE AND OFFSET)
                422 CF.CCNCT:   EQU Q#042           ; CLEAR CONNECTED ACCESS
                423 CF.BRD:     EQU Q#043           ; BUFFER READ
                424 CF.BWRT:    EQU Q#044           ; BUFFER WRITE
                425 ;           EQU Q#045           ; --
                426 ;  WRTBD    EQU Q#046           ;(WRITE BUFFER TO DISK)
                427 ;  SCADR    EQU Q#047           ;(SCAN CYLINDER ADDRS)
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - HSPEQU - COMMANDS / FUNCTIONS

```
428   ;  OUTCH    EQU Q#050          ;(OUTPUT ON PROCSR CHNL)
429   ;  XCNSQ    EQU Q#051          ;(EXECUTE CNTRL WORD SEQ)
430   ;  ICHST    EQU Q#052          ;(INPUT PROCSR CHNL STATUS)
431   ;  ECHOC    EQU Q#053          ;(ECHO OUTPUT CHNLS)
432   ;  ISFLG    EQU Q#054          ;(ISSUE PROCSR FLAG PULSE)
433   ;  ETIM     EQU Q#055          ;(ENABLE INPUT CHNL TIMING)
434   ;  INTIM    EQU Q#056          ;(INPUT TIMING DATA)
435   CF.ECHO1:  EQU Q#057          ; ECHO ONE WORD
436   ;          EQU Q#060          ; --
437   ;  ADMP     EQU Q#061          ;(AUTODUMP)
438   CF.MANP:   EQU Q#062          ; MANIPULATE PROCSR
439   CF.INDD:   EQU Q#063          ; INPUT DISPLAY DATA
440   ;  TIMDF    EQU Q#064          ;(TIME DIFFERENCE COUNTER)
441   ;          EQU Q#065          ; --
442   ;  FERR     EQU Q#066          ;(FORCE ERROR)
443   CF.IALD:   EQU Q#067          ; INTERLOCK AUTOLOAD
444   ;
445   CFTABMAX:  EQU Q#067          ;MAXIMUM FUNCTION ON JUMP TABLE        ;201
446   ;
447   CFSPC.M:   EQU Q#7700         ;SPECIAL FUNCTION MASK, Q#7XX, SEE NEXT TWO
448   CF.ALDD:   EQU Q#100          ; AUTOLOAD FROM DISK, Q#1XX
449   CF.DDST:   EQU Q#300          ; DISK DEADSTART, Q#3XX
450   CFDSK.M:   EQU Q#037          ;DISK MASK FOR ABOVE
451   ;
452   CF.ALDPP:  EQU Q#414          ; AUTOLOAD FROM PP
453   ;
454   CF.ECHO2:  EQU Q#720          ; ECHO ONE WORD, 2ND DEFINITION
455   ;
456             TITLE2 HSPEQU - DRIVE CONSTANTS
```

```
                457             EJECT
                458 ;
                459 ; DRIVE RELATED CONSTANTS
                460 ; ========================================
                461 ;
                462 ; CDC 7155 read/write lengths:
                463 ;
                464 ;   small sector (NOS, NOS/BE):
                465 ;   322 x 12 bit ppu words = 483 x 8 bit bytes
                466 ;
                467 ;   large sector (NOS/VE):
                468 ;   1376 x 12 bit ppu words = 2064 x 8 bit bytes
                469 ;   large sector divided into
                470 ;   four 344 x 12 bit ppu words = four 516 x 8 bit bytes
                471 ;
                472 ;
                473 ; XMC / HSSM sector length:
                474 ;
                475 ;   on Challenger III was
                476 ;   112 x 36 bit words = 504 x 8 bit bytes, not enough
                477 ;
                478 ;   changed on 7000 to
                479 ;   116 x 36 bit words = 522 x 8 bit bytes
                480 ;
                481 ; High Speed Read and Write processing:
                482 ; The HSP concatinates consequitive CDC read or write functions
                483 ; into a single XMC read or write function, whenever possible.
                484 ; A very large i/o word count is passed to the XMC on the first
                485 ; read or write, and then the HSP waits and concatinates all the
                486 ; following read or write functions as part of the first XMC
                487 ; read or write.  When a non-read or write CDC function is
                488 ; received, the XMC read or write is truncated.  The word count
                489 ; issued to the XMC is the largest value that will fit in the
                490 ; 16 bits allowed for that field, that is a multiple of the XMC
                491 ; sector length of 116, which is 564 x 116, or 65424, or FF90
                492 ; hex.
                493 ;
0342            494 CYLMAX:     EQU 842             ;MAX CYLINDER ADDRESS
0028            495 TKMAX:      EQU 40              ;MAX TRACK ADDRESS
0020            496 SECTMAX:    EQU 32              ;MAX SECTOR ADDRESS
0157            497 LSWRDMAX:   EQU 344-1           ;MAX LARGE SECTOR WORD, 344 12-BIT WRDS ;1E
0141            498 SSWRDMAX:   EQU 322-1           ;MAX SMALL SECTOR WORD, 322 12-BIT WRDS ;1E
0074            499 AMPSECSZ:   EQU 116             ;AMPERIF SECTOR SIZE, 116 36-BIT WORDS  ;1E
0234            500 HSSECCNT:   EQU 564             ;MAX NUMBER OF SECTORS THAT MAKE WORD
                501                                 ;COUNT <= FFFF.
FF90            502 HSWDCNT:    EQU HSSECCNT*AMPSECSZ;AMPERIF WORD COUNT FOR HIGH SPEED XFER;1E
                503                                 ;LARGEST MULT OF 116 <= FFFF            ;1E
                504 ; FOR BUFFER ROUTINES
0347            505 SECLEN:     EQU 347             ;0 .. 347 CDC WORDS (12 BITS), 116*3-1
                506 ;
                507             TITLE2 HSPEQU - AMPERIF/HSP TRANSLATION
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - HSPEQU - AMPERIF/HSP TRANSLATION

```
                EJECT
;
; AMPERIF/HSP TRANSLATION EQUATES
; ===============================
;
; The 36 bit Amperif word to/from Amperif is broken down into 3
; parcels by the HSP.  Each of the parcels will contain 12 bits
; of the Amperif word in the low order bit positions.  When
; reading from Amperif or writing to Amperif, registers TEMP1,
; TEMP2 and TEMP3 contain parcel 1, 2 and 3, respectively.
;
;
;         Amperif bits 35 - 24    Amperif bits 23 - 12    Amperif bits 11 - 00
;       3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0
;       5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
;      ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;      ! ! ! ! !-! !-------! ! ! !-------! ! !---------------!---------------!
;Status ! ! ! ! ! !Status ! ! ! !Recovery ! ! Status Byte  !   Disk Unit   !
;Word   ! ! ! ! !C! !Action ! ! ! !Action ! ! !A S C B C D U U!              !
;(EI)   ! ! ! ! !T! !E(M.SA ! ! ! !E(M.RA ! ! !T R U S E E C E!   E(M.UNIT   !
;      ! ! ! ! !-! !-------! ! ! !-------! ! !---------------!---------------!
;      ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;      ! !---------------! !---------------! !---------------! !---------------!
;Sense  ! ! Sense bytes # ! ! Sense bytes # ! ! Sense bytes # ! ! Sense bytes # !
;Byte   ! !  0,  4,  8,   ! !  1,  5,  9,   ! !  2,  6, 10,   ! !  3,  7, 11,   !
;Format ! ! 12, 16, 20    ! ! 13, 17, 21    ! ! 14, 18, 22    ! ! 15, 19, 23    !
;      ! !---------------! !---------------! !---------------! !---------------!
;      ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;      !-! ! ! !---------------!-----------! ! !-------------------------------!
;Command! ! ! !   Disk Unit   !  Command  ! ! ! Transfer Length in words      !
;Word   ! ! ! !               !   Code    ! ! !              or               !
;(EF)   !1! ! !               !           ! ! ! Backing Factor                !
;      !-! ! !---------------!-----------! ! !-------------------------------!
;      ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;      ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;   HSP parcel 1 (in TEMP1)    ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;                              ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;                              ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
;                     1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0! ! ! ! ! ! ! ! ! ! ! !
;                     5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0! ! ! ! ! ! ! ! ! ! ! !
;                        HSP parcel 2 (in TEMP2)    ! ! ! ! ! ! ! ! ! ! ! !
;                                                   ! ! ! ! ! ! ! ! ! ! ! !
;                                                   ! ! ! ! ! ! ! ! ! ! ! !
;                                          1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0
;                                          5 4 3 2 1 0 9 8 7 6 5 4 3 2 1 0
;                                             HSP parcel 3 (in TEMP3)
;
;
```

Addr Line - AMPERIF /155/80S EMULATION - HSP ONLINE - HSPEQU - AMPERIF/HSP TRANSLATION

```
                    EJECT
                ;
                ;           AMPERIF EI / STATUS WORD EQUATES
                ;
                ;               MASK OR BIT     PARCEL, DESC,          AMP BITS
                EI.UNIT:    EQU H#001F          ;P3, UNIT NUMBER        0 -  7
                EI.UEX:     EQU BIT8            ;P3, UNIT EXCEPTION       8
                EI.UCK:     EQU BIT9            ;P3, UNIT CHECK           9
                EI.DE:      EQU BIT10           ;P3, DEVICE END          10
                EI.CE:      EQU BIT11           ;P3, CHANNEL END         11
                EI.BUSY:    EQU BIT0            ;P2, BUSY                12
                EI.CUE:     EQU BIT1            ;P2, CONTROL UNIT END    13
                EI.STMOD:   EQU BIT2            ;P2, STATUS MODIFIER     14
                EI.ATTN:    EQU BIT3            ;P2, ATTENTION           15
                EIM.RA:     EQU H#03C0          ;P2, RECOVERY ACTION    18 - 21
                EIM.SA:     EQU H#003C          ;P1, STATUS ACTION      26 - 29
                EI.CT:      EQU BIT7            ;P1, CHANNEL TRUNCATION   35
                ;
                ;           RECOVERY ACTION EQUATES
                ;
                RA.NONE:    EQU H#000_SHL_6     ;NO ERROR
                RA.WRTIN:   EQU H#001_SHL_6     ;WRITE INHIBITED
                RA.DATCK:   EQU H#002_SHL_6     ;DATA CHECK, CORRECTIBLE
                RA.BTKPT:   EQU H#003_SHL_6     ;BAD TRACK POINTER
                RA.CMDRJ:   EQU H#004_SHL_6     ;COMMAND REJECT
                RA.RDLRQ:   EQU H#005_SHL_6     ;READ LABEL REQUIRED
                RA.INTRQ:   EQU H#006_SHL_6     ;INTERVENTION REQUIRED
                RA.BUPAR:   EQU H#007_SHL_6     ;BUS OUT PARITY ERROR
                RA.EQCK:    EQU H#008_SHL_6     ;EQUIPMENT CHECK
                RA.PDCK:    EQU H#009_SHL_6     ;PERMANENT DATA CHECK
                RA.NOREC:   EQU H#00A_SHL_6     ;NO RECORD FOUND
                RA.ENV:     EQU H#00B_SHL_6     ;ENVIRONMENTAL DATA PRESENT
                RA.OVCF:    EQU H#00C_SHL_6     ;ONLY VALID COPY FIRST
                RA.OVCL:    EQU H#00D_SHL_6     ;ONLY VALID COPY LAST
                ;           EQU H#00E_SHL_6     ;(NOT USED)
                RA.UCPD:    EQU H#00F_SHL_6     ;UCP LD-B DIAGNOSTIC REQUEST
                ;
                ;           STATUS ACTION EQUATES
                ;
                SA.INV:     EQU H#000_SHL_2     ;INVALID
                SA.PCHG:    EQU H#001_SHL_2     ;PACK CHANGE
                SA.RDLAB:   EQU H#002_SHL_2     ;READ LABEL COMMAND
                SA.COLL:    EQU H#003_SHL_2     ;EF/EI COLLISION
                SA.SK:      EQU H#004_SHL_2     ;SEEK INITIATED
                SA.SKC:     EQU H#005_SHL_2     ;SEEK COMPLETED
                SA.RWC:     EQU H#006_SHL_2     ;READ OR WRITE COMPLETED
                SA.SC:      EQU H#007_SHL_2     ;SENSE COMPLETED
                SA.SIOC:    EQU H#008_SHL_2     ;SENSE I/O COMPLETED
                SA.CTS:     EQU H#009_SHL_2     ;CHANNEL TRUNCATION ON SENSE COMMAND
                SA.CT:      EQU H#00A_SHL_2     ;CHANNEL TRUNCATION
                SA.SB:      EQU H#00B_SHL_2     ;ACQUIRE SENSE BYTES FOR UNIT CHECK
                ;           EQU H#00C_SHL_2     ;(NOT USED)
                SA.BUPAR:   EQU H#00D_SHL_2     ;BUS OUT PARITY ERROR
                SA.CDCK:    EQU H#00E_SHL_2     ;CORRECTIBLE DATA CHECK
                SA.EFTRM:   EQU H#00F_SHL_2     ;FORCED EF TERMINATION
```

```
                613   ;
                614   ;
                615   ;           AMPERIF SENSE BYTE EQUATES
                616   ;
                617   ;               MASK            PARCEL, SENSE BYTE #    AMP BITS
                618   SB3.M:      EQU H#00FF          ;P3,  3, 7,11,15,19,23   0 -  7
                619   SB2L.M:     EQU H#0E00          ;P3,  2, 6,10,14,18,22   9 - 11
                620   SB2H.M:     EQU H#001F          ;P2,  2, 6,10,14,18,22  12 - 16
                621   SB1L.M:     EQU H#0FC0          ;P2,  1, 5, 9,13,17,21  18 - 22
                622   SB1H.M:     EQU H#0003          ;P1,  1, 5, 9,13,17,21  23 - 25
                623   SB0.M:      EQU H#07F8          ;P1,  0, 4, 8,12,16,20  27 - 34
                624   ;
                625               TITLE2 HSPEQU - MEMORY USAGE
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - HSPEQU - MEMORY USAGE

```
                626             EJECT
                627     ;
                628     ; STATUS BUFFER / SHARED MEMORY USAGE
                629     ; ====================================
                630     ;
                631     ; The Shared Memory is addressed as if it were a 16 bit memory.
                632     ;
                633     ; H#000-7ff status and control area for 32 units.
                634     ;          each unit has 64 locations.
                635     ; H#000-03F unit 0 area
                636     ; H#040-07F unit 1 area
                637     ; H#080-0BF unit 2 area
                638     ; H#0C0-0FF unit 3 area
                639     ; H#100-13F unit 4 area
                640     ;          etc.
                641     ;
                642     ; Storage offset equates from unit base address:
                643     ;
                644     IF BANK_EQ_1
                645     AMP.ST1:    EQU 0               ;LAST AMPERIF STATUS, 3 HSP WORDS
                646     AMP.ST2:    EQU AMP.ST1+1
                647     AMP.ST3:    EQU AMP.ST2+1
                648     CDC.ST:     EQU AMP.ST3+1       ;CURRENT CDC GENERAL STATUS WORD FOR THIS UNIT
                649     CDC.CYL:    EQU CDC.ST+1        ;CURRENT CDC CYLINDER
                650     CDC.TK:     EQU CDC.CYL+1       ;CURRENT CDC TRACK
                651     CDC.SEC:    EQU CDC.TK+1        ;CURRENT CDC SECTOR
                652     ;           EQU CDC.SEC+1       ;(NOT USED)                             ;202
                653     ;           EQU CDC.SEC+2       ;(NOT USED)                             ;202
                654     AMP.SENS:   EQU CDC.SEC+3       ;START OF AMP SENSE DATA (18 HSP WORDS)
                655     RESEEK:     EQU AMP.SENS+18     ;ISSUE NEW SEEK FOR THIS UNIT           ;201
                656     UNIT.RES:   EQU RESEEK+1        ;ID OF CONTROLLER THAT HAS UNIT RESERVED;201
                657     BUSY.CNT:   EQU UNIT.RES+1      ;NUMBER OF TIMES BUSY HAS BEEN SENT     ;201
                658     ENDIF
                659     SHM.TEST:   EQU H#03E           ;LOCATION FOR POWERUP DIAG TEST         ;201
                660     ;           EQU H#03F           ;RESERVED, SEE BELOW
                661     ;
                662     ; Locations used for interlocking and initialization of shared
                663     ; memory between the two HSP's.  Uses last location (3F) for
                664     ; each drive.
                665     ;
                666     DOUPDATE:   EQU H#03F           ;SHARED MEM UPDATE REQUEST              ;201
                667     IF BANK_EQ_1
                668     LOCKA:      EQU H#07F           ;CONTROLLER A HAS SHARED MEMORY LOCK    ;201
                669     LOCKB:      EQU H#0BF           ;CONTROLLER B HAS SHARED MEMORY LOCK    ;201
                670     ENDIF
                671     ;
```

```
                        EJECT
                ;
                ; SENSE BYTES MAPPING IN SHARED MEMORY
                ; ====================================
                ;
                ; Sense bytes from Amperif (XMC) are stored in the shared
                ; memory for the drive that the sense bytes are for.  Although
                ; sense bytes are normal 8 bit bytes, the XMC interface uses 12
                ; bit bytes, 36 bit words.  Shared memory uses 16 bit words.
                ; To make matters more confusing, sense bytes are an IBM
                ; invention, and so use IBM's distasteful habit of numbering
                ; bits backwards; the MSB is bit 0, not bit 7.
                ;
                ;            HSP BIT POSITION IN SHARED MEMORY WORD
                ;             15 14 13 12 11 10  9  8  /  6  5  4  3  2  1  0
                ;             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
                ;             |__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|
                ; SHARED   +0                 0  0  0  0  0  0  0  0     1  1  SENSE BYTE
                ; MEMORY      _______________0__1__2__3__4__5__6__7_____0__1_ BIT
                ; ADDRESS  +1              1  1  1  1  1  1     2  2  2  2  2  SENSE BYTE
                ; --          _____________2__3__4__5__6__7_____0__1__2__3__4_ BIT
                ; OFFSET   +2              2  2  2     3  3  3  3  3  3  3  3  SENSE BYTE
                ; FROM        _____________5__6__7_____0__1__2__3__4__5__6__7_ BIT
                ; AMP.SENS +3                 4  4  4  4  4  4  4  4     5  5  SENSE BYTE
                ;             _______________0__1__2__3__4__5__6__7_____0__1_ BIT
                ;          +4              5  5  5  5  5  5     6  6  6  6  6  SENSE BYTE
                ;             _____________2__3__4__5__6__7_____0__1__2__3__4_ BIT
                ;          +5              6  6  6     7  7  7  7  7  7  7  7  SENSE BYTE
                ;             _____________5__6__7_____0__1__2__3__4__5__6__7_ BIT
                ;          +6                 8  8  8  8  8  8  8  8     9  9  SENSE BYTE
                ;             _______________0__1__2__3__4__5__6__7_____0__1_ BIT
                ;          +7              9  9  9  9  9  9    10 10 10 10 10  SENSE BYTE
                ;             _____________2__3__4__5__6__7_____0__1__2__3__4_ BIT
                ;          +8             10 10 10    11 11 11 11 11 11 11 11  SENSE BYTE
                ;             _____________5__6__7_____0__1__2__3__4__5__6__7_ BIT
                ;          +9                12 12 12 12 12 12 12 12    13 13  SENSE BYTE
                ;             _______________0__1__2__3__4__5__6__7_____0__1_ BIT
                ;         +10             13 13 13 13 13 13    14 14 14 14 14  SENSE BYTE
                ;             _____________2__3__4__5__6__7_____0__1__2__3__4_ BIT
                ;         +11             14 14 14    15 15 15 15 15 15 15 15  SENSE BYTE
                ;             _____________5__6__7_____0__1__2__3__4__5__6__7_ BIT
                ;         +12                16 16 16 16 16 16 16 16    17 17  SENSE BYTE
                ;             _______________0__1__2__3__4__5__6__7_____0__1_ BIT
                ;         +13             17 17 17 17 17 17    18 18 18 18 18  SENSE BYTE
                ;             _____________2__3__4__5__6__7_____0__1__2__3__4_ BIT
                ;         +14             18 18 18    19 19 19 19 19 19 19 19  SENSE BYTE
                ;             _____________5__6__7_____0__1__2__3__4__5__6__7_ BIT
                ;         +15                20 20 20 20 20 20 20 20    21 21  SENSE BYTE
                ;             _______________0__1__2__3__4__5__6__7_____0__1_ BIT
                ;         +16             21 21 21 21 21 21    22 22 22 22 22  SENSE BYTE
                ;             _____________2__3__4__5__6__7_____0__1__2__3__4_ BIT
                ;         +17             22 22 22    23 23 23 23 23 23 23 23  SENSE BYTE
                ;               _____________5__6__7_____0__1__2__3__4__5__6__7_ BIT
                ;
```

```
                726                 EJECT
                727     ;
                728     ; CACHE / LOCAL MEMORY LOCATION USAGE
                729     ; =====================================
                730     ;
                731     ID:         EQU 0               ;ID FOR THIS CONTROLLER, HEX A OR B     ;201
                732     SYSERR:     EQU ID+1            ;LAST SYSPORT ERROR STATUS              ;201
                733     SHERR:      EQU SYSERR+1        ;LAST SHARED MEMORY ERROR STATUS        ;201
                734     SHWAIT:     EQU SHERR+1         ;NUMBER OF WAITS FOR LOCK OF SHMEMORY   ;201
                735     TEMPCKS:    EQU SHWAIT+1        ;PARTIAL CHECK SUM FOR LS MODE, 2 WORDS ;201
                736     TEMPCKS2:   EQU TEMPCKS+1
                737     ;
                738     IF BANK_EQ_0
                782     ELSE
                783     ;
                784     SYSER2:     EQU TEMPCKS2+1      ;SYSPORT ERROR HAS OCCURED BEFORE       ;201
                785     RES.FAIL:   EQU SYSER2+1        ;ATTEMPT TO RESERVE A UNIT FAILED,      ;201
                786     ;                                UNIT WAS RESERVED TO OTHER CONTROLLER.
                787     ;                                ONE LOCATION PER UNIT
                788     SEEKED:     EQU RES.FAIL+32     ;UNIT SEEKED FLAG.  NON-ZERO MEANS SEEK ;201
                789     ;                                RECEIVED FOR THIS UNIT.  SET BY SEEK,
                790     ;                                CLEARED BY COLDSTART INITIALIZATION.
                791     ;                                ONE LOCATION PER UNIT.
                792     ST.PEND:    EQU SEEKED+32       ;CMD SENT TO THIS UNIT, WAITING FOR     ;201
                793     ;                                STATUS FROM AMPERIF
                794     DR.PAR:     EQU ST.PEND+32      ;CDC DRIVE PARAMETER                    ;202
                795     CYL.PAR:    EQU DR.PAR+1        ;CDC SEEK PARAMS, 3 PER DRIVE           ;202
                796     TRK.PAR:    EQU CYL.PAR+32                                              ;202
                797     SEC.PAR:    EQU TRK.PAR+32                                              ;202
                798     CWAREREV:   EQU SEC.PAR+32      ;CONTROLWARE REV # FROM AUTOLOAD        ;1C
                799     DTIME:      EQU CWAREREV+1      ;USED FOR DEADMAN TIMER
                800     DOUPUNIT:   EQU DTIME+1         ;SHARED MEM UPDATE DRIVE                ;201
                801     CDC.DETS:   EQU DOUPUNIT+1      ;CURRENT CDC EXTENDED DETAILED STATUS   ;201
                802     WD1:        EQU CDC.DETS+0
                803     WD2:        EQU CDC.DETS+1
                804     WD3:        EQU CDC.DETS+2
                805     WD4:        EQU CDC.DETS+3
                806     WD5:        EQU CDC.DETS+4
                807     WD6:        EQU CDC.DETS+5
                808     WD7:        EQU CDC.DETS+6
                809     WD8:        EQU CDC.DETS+7
                810     WD9:        EQU CDC.DETS+8
                811     WD10:       EQU CDC.DETS+9
                812     WD11:       EQU CDC.DETS+10
                813     WD12:       EQU CDC.DETS+11
                814     WD13:       EQU CDC.DETS+12
                815     WD14:       EQU CDC.DETS+13
                816     WD15:       EQU CDC.DETS+14
                817     WD16:       EQU CDC.DETS+15
                818     WD17:       EQU CDC.DETS+16
                819     WD18:       EQU CDC.DETS+17
                820     WD19:       EQU CDC.DETS+18
                821     WD20:       EQU CDC.DETS+19
                822     BUFFADR:    EQU WD20+1          ;DATA BUFFER AREA
                823     ;           EQU BUFFADR+H#200
```

```
ENDIF
TRACEBEG:   EQU H#400          ;START OF TRACE BUFFER
TRACEEND:   EQU H#F7F          ;END OF TRACE BUFFER
;
;
            TITLE2 HSPEQU - MACROS
```

```
                EJECT
;
; MACROS
; ========================================
;
; SELECT AMPERIF PORT MACROS
;
; SELECTS AMPERIF AS SRC/DST, AND REMEMBERS PORT IN SVSRC/DST
; REGISTER, IF IN BANK 1 CODE.
;
SRC.AMP:        MACRO                                               ;201
IF BANK_EQ_0
                CON AMP.PORT & SRCSEL
ELSE
                IR SVSRC
                IDAT AMP.PORT & ALU & SRCSEL
ENDIF
                ENDM
;
DST.AMP:        MACRO                                               ;201
IF BANK_EQ_0
                CON AMP.PORT & DSTSEL
ELSE
                IR SVDST
                IDAT AMP.PORT & ALU & DSTSEL
ENDIF
                ENDM
;
; SELECT CDCI PORT MACROS
;
; SELECT THE CURRENTLY POLLED CDCI PORT, AND SAVED IN
; SVSRC/SVDST.  ONLY USED IN BANK 1.
;
SRC.CDC:        MACRO                                               ;201
                RA CPPOLL
                AR SVSRC & ALU & SRCSEL
                ENDM
;
DST.CDC:        MACRO                                               ;201
                RA CPPOLL
                AR SVDST & ALU & DSTSEL
                ENDM
;
```

```
                873                 EJECT
                874     ;
                875     ; CLEAR STACK MACRO
                876     ;
                877     ; POP THE STACK AND CONTINUE WITH THE NEXT INSTRUCTION NINE
                878     ; TIMES, SINCE THE SEQUENCER STACK IS A MAXIMUM OF NINE DEEP.
                879     ;
                880     CLR.STK:    MACRO
                881                 DUP 9                                           ;201
                882                 POPJMP $+1
                883                 ENDM
                884     ;
                885     ; END OF EQUATES
                886     ;
                887                 END
                888     ;
                889                 TITLE2 DEADSTART INITIALIZATION
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - DEADSTART INITIALIZATION

```
              890                 EJECT
              891     ;
              892     ; DEADSTART INITIALIZATION
              893     ;
              894     ; A jump to zero is forced by the CDC1 deadstart pulse, if its
              895     ; enabled, caused by a channel clear from the CDC, which occurs
              896     ; during deadstart.
              897     ;
              898     ; deadstart just jumps to WARMINIT.  WARMINIT is placed at
              899     ; address 1100 to leave room for ASP inter-process code between
              900     ; address X001 AND X0FF.
              901     ;
00000         902                 ORG H#0000
00000 0XF30100  903               JMP WARMINIT
              904                 INCLUDE HSPMRK.SRC
              905                 TITLE2 HSPMRK - CODE REVISION LEVEL, DATE
```

Addr Line - ANPERIF 7155/885 EMULATION - HSP ONLINE - HSPMRK - CODE REVISION LEVEL, DATE

```
                EJECT
;*************************************************************************
;*                                                                       *
;*      HH    HH   SSSSSS   PPPPPPP      MM    MM  RRRRRRR   KK    KK    *
;*      HH    HH  SS    SS  PP    PP     MMM  MMM  RR    RR  KK   KK     *
;*      HH    HH  SS        PP    PP     MMMMMMMM  RR    RR  KK KKK      *
;*      HHHHHHHH   SSSSSS   PPPPPPP      MM MM MM  RRRRRRR   KKKKK       *
;*      HH    HH        SS  PP           MM    MM  RR  RR    KKK KK      *
;*      HH    HH  SS    SS  PP           MM    MM  RR   RR   KK   KK     *
;*      HH    HH   SSSSSS   PP           MM    MM  RR    RR  KK    KK    *
;*                                                                       *
;*  HSPCDL - ANPERIF 7155/885 EMULATION HSP MICROCODE DATE/REV LEVEL MARK  *
;*                                                                       *
;*************************************************************************
;
;
; CODE DATE AND REVISION LEVEL MARK.
;
; The code has constant values in the code to indicate what the
; code is.  This allows the HSP proms to be verified that they
; have the right code.  The data, which is never used as either
; instructions or data, is stored at addresses 0010 hex for bank
; 0 code, and 1010 hex for bank 1 code.  Each prom has the
; revision level in the form of the base level, release level,
; and pre release level , and then the prom number, 1 to 4, and
; the prom patch level (always zero for assemblies), and then
; the date the code was written, in the form of the last two
; digits of the year, the month, day.  This information is in in
; bcd format, one byte for each, in consectutive addresses.  Each
; prom has the same information, except for the prom number.
;
;
; CURRENT CODE DATE AND REVISION LEVEL
; ====================================
;
; Date: Febuary 11, 1993
CDDATE.M:   EQU H#02            ;Month
CDDATE.D:   EQU H#11            ;Day
CDDATE.Y:   EQU H#93            ;Year
;
; Revision Level: 2.3.6
CDREV.B:    EQU H#02            ;Base level
CDREV.R:    EQU H#03            ;Release level
CDREV.P:    EQU H#07            ;Pre-release level
;
```

```
 Addr          Line - AMPERIF /155/885 EMULATION - HSP ONLINE -     HSPMRK - CODE REVISION LEVEL, DATE

                951              EJECT
                952    ;
                953    ; MACRO TO DUPLICATE 8 BIT VALUE IN EACH PROM
                954    ;
                955    EACHPROM:  MACRO B            ;B = BYTE VALUE TO PUT IN EACH PROM     ;201
                956              FF 8(B),8(B),8(B),8(B)
                957              ENDM
                958    ;
0000F           959              ORG H#000F                                                   ;201
                960    ; BARRIER, HANG IF TRYING TO EXECUTING CODE HERE
0000F BXF30000F 961              JMP $                                                        ;201
                962    ; REVISION
                963              EACHPROM CDREV.B    ;BASE LEVEL                          ;201
00010 02020202  963 +            FF 8(CDREV.B),8(CDREV.B),8(CDREV.B),8(CDREV.B)
                963 +            ENDM
                964              EACHPROM CDREV.R    ;RELEASE LEVEL                       ;201
00011 03030303  964 +            FF 8(CDREV.R),8(CDREV.R),8(CDREV.R),8(CDREV.R)
                964 +            ENDM
                965              EACHPROM CDREV.P    ;PRE-RELEASE LEVEL                   ;201
00012 07070707  965 +            FF 8(CDREV.P),8(CDREV.P),8(CDREV.P),8(CDREV.P)
                965 +            ENDM
                966    ; PROM NUMBER, PATCHES
00013 01020304  967              FF H#01,H#02,H#03,H#04 ;PROM NUMBER IN EACH PROM         ;201
00014 00000000  968              FF H#00,H#00,H#00,H#00 ;PATCHES, ALWAYS ZERO FOR ASSEMBLIES ;201
                969    ; DATE
                970              EACHPROM CDDATE.Y   ;YEAR                                ;201
00015 93939393  970 +            FF 8(CDDATE.Y),8(CDDATE.Y),8(CDDATE.Y),8(CDDATE.Y)
                970 +            ENDM
                971              EACHPROM CDDATE.M   ;MONTH                               ;201
00016 02020202  971 +            FF 8(CDDATE.M),8(CDDATE.M),8(CDDATE.M),8(CDDATE.M)
                971 +            ENDM
                972              EACHPROM CDDATE.D   ;DAY                                 ;201
00017 11111111  972 +            FF 8(CDDATE.D),8(CDDATE.D),8(CDDATE.D),8(CDDATE.D)
                972 +            ENDM
                973    ; CONDITIONAL ASSEMBLY FLAGS
                974    ;         BIT0 = SHMERRHW
                975              EACHPROM SHMERRHW                                        ;201
00018 01010101  975 +            FF 8(SHMERRHW),8(SHMERRHW),8(SHMERRHW),8(SHMERRHW)
                975 +            ENDM
                976    ; FILLER
                977              DUP 7                                                    ;201
                978              EACHPROM 0          ;ZEROS                               ;201
                978 +            EACHPROM 0          ;ZEROS                               ;201
                978 +            EACHPROM 0          ;ZEROS                               ;201
                978 +            EACHPROM 0          ;ZEROS                               ;201
                978 +            EACHPROM 0          ;ZEROS                               ;201
                978 +            EACHPROM 0          ;ZEROS                               ;201
                978 +            EACHPROM 0          ;ZEROS                               ;201
00019 00000000  978 +            FF 8(0),8(0),8(0),8(0)
                978 +            ENDM
0001A 00000000  978 +            FF 8(0),8(0),8(0),8(0)
                978 +            ENDM
0001B 00000000  978 +            FF 8(0),8(0),8(0),8(0)
                978 +            ENDM
0001C 00000000  978 +            FF 8(0),8(0),8(0),8(0)
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     HSPMRK - CODE REVISION LEVEL, DATE

                976 +             ENDM
0091D 00000000  976 +             FF 0(0),0(0),0(0),0(0)
                976 +             ENDM
0091E 00000000  976 +             FF 0(0),0(0),0(0),0(0)
                976 +             ENDM
0091F 00000000  976 +             FF 0(0),0(0),0(0),0(0)
                976 +             ENDM
                977   ;
                978               END
                979   ;
                980               TITLE2 WARMSTART INITIALIZATION
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WARMSTART INITIALIZATION

                983              EJECT
                984    ;
                985    ; WARMSTART INITIALIZATION
                986    ;
                987    ; CDC deadstart (channel clear) will force a jump to zero,
                988    ; which then jumps to WARMINIT.
                989    ;
                990    ; When bank 0 code (powerup initialization) completes, it jumps
                991    ; to address 1102 hex.  WARMINIT is at 1100 hex, so it does
                992    ; four NOOPS before processing.
                993    ;
                994    ; This routine will clear the sequencer stack, initialize
                995    ; the Amperif interface (UBI), initialize shared memory access,
                996    ; release all reserved drives, clear connected access, clear
                997    ; all state flags, and initialize the controlware rev level.
                998    ;
00100           999              ORG H#0100
                1000   WARMINIT:  EQU $
00100 XXXX7140  1001             NOOP
00101 XXXX7140  1002             NOOP
00102 XXXX7140  1003             NOOP
                1004   ; THIS IS THE ENTRY POINT FROM BANK 0
00103 XXXX7140  1005             NOOP
                1006             CLR.STK          ;CLEAR THE STACK                    ;201
                1006 +           DUP 9                                                ;201
00104 BXFB0105  1006 +           POPJMP $+1
00105 BXFB0106  1006 +           POPJMP $+1
00106 BXFB0107  1006 +           POPJMP $+1
00107 BXFB0108  1006 +           POPJMP $+1
00108 BXFB0109  1006 +           POPJMP $+1
00109 BXFB010A  1006 +           POPJMP $+1
0010A BXFB010B  1006 +           POPJMP $+1
0010B BXFB010C  1006 +           POPJMP $+1
0010C BXFB010D  1006 +           POPJMP $+1
                1006 +           ENDM
0010D BBXX0003  1007             CON SHMPORT & SRCSEL;PUT SHARED MEMORY INTO ADDRESS MODE  ;201
                1008             CON SHC.RST      ;RESET SHARED MEMORY, CLEAR ERRORS  ;201
0010E B5XX0000  1009             / & SRCCTRL                                          ;201
                1010   ; UNLOCK SHARED MEMORY AND CLEAR UNITS RESERVED, REL.ALL DOES BOTH
0010F BXF10BBC  1011             JSB REL.ALL      ;RELEASE ALL RESERVED DRIVE UNITS   ;201
00110 BXF10EF1  1012             JSB INITAMP      ;CLEAR THE AMPERIF INTERFACE
00111 XXXXD91C  1013             ZR CPCNCT        ;CLEAR ACCESS CONNECTED             ;201
00112 XXXXD8FB  1014             IR CPPOLL        ;INIT CDCI PORT SCANNER             ;1E
00113 XXXX0001  1015             IDAT CDCP.A      ;TO FIRST CDCI PORT                 ;1E
00114 XXXXD919  1016             ZR FLAGS         ;CLEAR ALL FLAGS                    ;202
00115 XXXXF5B9  1017             SETNR F.NSHMEM,FLAGS;TURN OFF SHARED MEMORY          ;201
                1018                              ;UNTIL WE GET AN OK FROM OTHER CTRLR
                1019   ; THIS INITIALIZES THE CONTROLWARE REV LEVEL.
00116 B2XX00C8  1020             CON CWAREREV & WCAR ;SET CNTRLWARE REV LEVEL TO "1110"  ;201
00117 XXXXF8E0  1021             IH                                                   ;1E
00118 13XX000E  1022             IDAT B#1110 & ALU & WCACHE                           ;1E
                1023   ; DONE
00119 BXF30140  1024             JMP IDLE                                             ;201
                1025   ;
                1026             TITLE2 IDLE LOOP
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     IDLE LOOP

               1027                EJECT
               1028    ;
               1029    ; IDLE LOOP
               1030    ;
               1031    ; Checks for interrupts from Amperif (XMC) or each CDCI (CDC),
               1032    ; or shared memory update request from other HSP.
               1033    ;
00140          1034                ALIGN H#40
               1035    IDLE:       EQU $
00140 BXF10A2D 1036                JSB DMINIT          ;INIT DEADMAN TIMER                     ;10
00141 BXF10E84 1037                JSB CKSYSERR        ;CHECK FOR PARITY ERRORS                ;201
00142 BXF10CEA 1038                JSB CKAMPSTS        ;CHECK FOR AMPERIF INTERRUPT
               1039    ;                               AND PROCESS THE INTERRUPT IF PRESENT
00143 XXXX83FB 1040                RTRR 1,CPPOLL       ;ROTATE UP TO NEXT CDCI PORT TO POLL    ;203
00144 XXXXE9FB 1041                TSTNR BIT4,CPPOLL   ;CHECK FOR PAST MAXIMUM PORT VALUE      ;201
00145 BX230149 1042                CJNP Z,IDLE1        ;                                       ;201
00146 XXXXD8FB 1043                IR CPPOLL           ;IF SO, SET PORT SCANNER                ;201
00147 XXXX0001 1044                IDAT CDCP.A         ;TO FIRST CDCI PORT                     ;201
00148 BXF10A79 1045                JSB CKUPDATE        ;CHECK FOR SHARED MEM UPDATE REQUEST    ;201
               1046    IDLE1:      EQU $                                                       ;201
00149 XXXXD81B 1047                RA CPPOLL           ;GET CDCI PORT VALUE                    ;1E
0014A XXXXD804 1048                AR TEMP4            ;CHECK TO SEE IF PORT INSTALLED         ;1E
0014B BXF10F1F 1049                JSB CKCDC           ;                                       ;1E
0014C BX730149 1050                CJNP N,IDLE         ;NOT INSTALLED, TRY NEXT                ;1E
               1051                SRC.CDC             ;SELECT CDCI AS SOURCE                  ;201
0014D XXXXD81B 1051 +              RA CPPOLL
0014E 1BXXD89D 1051 +              AR SVSRC & ALU & SRCSEL
               1051 +              ENDM
               1052                DST.CDC             ;AND DESTINATION                        ;203
0014F XXXXD81B 1052 +              RA CPPOLL
00150 1CXXD89E 1052 +              AR SVDST & ALU & DSTSEL
               1052 +              ENDM
               1053                TSTND SFUNC         ;CHECK FOR FUNCTION FROM CDC            ;203
00151 5XXXE190 1054                / & SRCSTAT                                                 ;201
00152 BX230140 1055                CJNP Z,IDLE         ;NO FNC, DONE                           ;201
00153 BXF30154 1056                JNP PROCFNC         ;YES, GO GET THE FUNCTION               ;1E
               1057    ;
               1058                TITLE2 PROCESS CDC FUNCTION
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - PROCESS CDC FUNCTION

```
              1059              EJECT
              1060   ;
              1061   ; PROCESS CDC FUNCTION
              1062   ;
              1063   ; This handles the initial processing for functions from a CDC channel.
              1064   ; It keeps track of which channel is connected (CPCNCT), and handles
              1065   ; the special processing for general status and clear connected access
              1066   ; functions from other than the connected channel.  It also handles
              1067   ; detailed status bit of access connected before general staus.  If
              1068   ; a function is allowed on this access, it jumps to FNCDCODE.
              1069   ;
              1070   PROCFNC:   EQU $                                                    ;1E
00154 4XXXD8D4 1071              HR CDCFNC & RDATA  ;READ THE FUNCTION WORD              ;201
00155 BXF10A38 1072              JSB CKCERR2        ;CHECK FOR CHANNEL PARITY ERROR      ;201
00156 BX730140 1073              CJNP N,IDLE        ;IF ERROR, DON'T PROCESS FNC, GOTO IDLE ;201
00157 XXXXD814 1074              RA CDCFNC          ;WRITE CDC FUNCTION TO TRACE BUFFER
00158 BXF10A18 1075              JSB TRACE.S                                            ;202
00159 1XXXD85C 1076              RH CPCNCT          ;CHECK FOR CONNECTING A NEW ACCESS   ;201
0015A BX23015F 1077              CJNP Z,PROCF.1     ;IF NONE NOW, THEN THIS CONNECTS IT  ;201
              1078   ; AN ACCESS IS ALREADY CONNECTED
0015B XXXXD81C 1079              RA CPCNCT          ;CHECK FOR THE SAME ACCESS AS CONNECTED ;201
0015C XXXX911B 1080              TORAY EXOR,CPPOLL                                      ;1E
0015D BX2301/1 1081              CJNP Z,PROCF.2     ;SAME ACCESS                        ;201
0015E BXF30179 1082              JNP PROCF.3        ;DIFFERENT ACCESS                   ;201
              1083   ;
              1084   ; NEW CONNECTED CHANNEL ACCESS.  SELECT THE ACCESS, SET UP DET STATUS,
              1085   ; DISABLE DEADSTARTS ON ALL OTHER ACCESSES, AND GO PROCESS THE FUNCTION
              1086   PROCF.1:   EQU $                                                    ;201
0015F XXXXD81B 1087              RA CPPOLL                                              ;1E
00160 XXXXD89C 1088              AR CPCNCT          ;SET ACCESS CONNECTED               ;1E
00161 BXF10B33 1089              JSB INHIBDS        ;INHIBIT DEADSTART CLEAR ON OTHERS
00162 XXXX9514 1090              TORIY EXOR,CDCFNC  ;IF GENERAL STATUS,                 ;201
00163 XXXX000A 1091              IDAT CF.GSTAT                                          ;1E
00164 BX230166 1092              CJNP Z,$+2
00165 BXF30169 1093              JNP PROCF.1A                                           ;201
00166 B2XX00D7 1094              CON WD13 & WCAR    ;CLEAR BIT 10 OF WD 13
00167 3XXXF8C1 1095              HA & RCACHE        ;MEANING ACCESS WAS NOT CONNECTED
              1096              RSTNA BIT10        ;BEFORE THE GENERAL STATUS
00168 13XXF581 1097              / & ALU & WCACHE
              1098   PROCF.1A:  EQU $                                                    ;201
00169 B2XX00DC 1099              CON WD18 & WCAR    ;SET ACCESS CONNECTED IN WD18       ;1E
              1100              HR TEMP2           ;LOAD WD 18                         ;1F
0016A 3XXXD8C2 1101              / & RCACHE
0016B XXXX9CC2 1102              TORIR AND,TEMP2    ;AND CLEAR BITS 11 THRU 8
0016C XXXX00FF 1103              IDAT H#00FF
0016D XXXXD81C 1104              RA CPCNCT          ;SHIFT PORT CONNECTED VALUE         ;1E
0016E XXXXF19D 1105              RTAA 8             ;UP TO BITS 8 TO 11                 ;1E
              1106              TORAY OR,TEMP2     ;OR TOGETHER AND WRITE BACK         ;1E
0016F 13XX9142 1107              / & ALU & WCACHE
              1108   ;
00170 BXF30189 1109              JNP FNCDCODE                                           ;201
              1110   ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - PROCESS CDC FUNCTION

```
              1111              EJECT
              1112    ;
              1113    ; FUNCTION FROM THE CONNECTED ACCESS
              1114    ;
              1115    PROCF.2:  EQU $                                          ;201
00171 XXXX9514 1116             TORIY EXOR,CDCFNC   ;IF GENERAL STATUS FUNCTION,
00172 XXXX000A 1117             IDAT CF.GSTAT                                ;1F
00173 BX230175 1118             CJMP Z,$+2
00174 BXF30178 1119             JMP PROCF.2A                                 ;201
00175 B2XX00D7 1120             CON WD13 & WCAR     ;SET DET STAT WORD 13 BIT 10
00176 3XXXF8C1 1121             HA & RCACHE         ;MEANING ACCESS WAS CONNECTED
              1122              SETHA BIT10         ;BEFORE THE GENERAL STATUS
00177 13XXF582 1123             / & ALU & WCACHE
              1124    PROCF.2A: EQU $                                          ;201
00178 BXF30189 1125             JMP FNCDCODE                                 ;201
              1126    ;
              1127    ; FUNCTION FROM ANOTHER ACCESS
              1128    ; ONLY GEN STAT OR CLEAR CONTECTED ACCESS ALLOWED
              1129    ; UNLESS CONNECTED ACCESS HAD COMMUNICATION FAILURE,
              1130    ; IN WHICH CASE FORGET THE OLD ACCESS, AND ALLOW THIS ONE
              1131    ;
              1132    PROCF.3:  EQU $                                          ;201
00179 B2XX00D8 1133             CON WD17 & WCAR     ;CHK BIT 3 OF WORD 17 IN DETAIL STATUS ;203
0017A 3XXXE790 1134             TSTND BIT3 & RCACHE ;INDICATES DEADMAN TIMEOUT           ;203
0017B BX23017D 1135             CJMP Z,$+2                                   ;203
0017C BXF3015F 1136             JMP PROCF.1         ;IF SET, CLEAR OLD ACCESS AND START NEW ;203
0017D XXXX9514 1137             TORIY EXOR,CDCFNC   ;IF GEN STAT, RESPOND WITH A BUSY
0017E XXXX000A 1138             IDAT CF.GSTAT                                ;1F
0017F BX230181 1139             CJMP Z,$+2
00180 BXF30185 1140             JMP PROCF.3A                                 ;202
              1141              DST.CDC                                      ;201
00181 XXXXD81B 1141 +           RA CPPOLL
00182 1CXXD89E 1141 +           AR SVDST & ALU & DSTSEL
              1141 +            ENDM
00183 BXF10A68 1142             JSB RSP.RSRV        ;SEND CONTROLLER RESERVED STATUS
00184 BXF30140 1143             JMP IDLE
              1144    PROCF.3A: EQU $
00185 XXXX9514 1145             TORIY EXOR,CDCFNC   ;IF CLEAR CONNECTED ACCESS,
00186 XXXX0022 1146             IDAT CF.CCNCT       ;THEN OK TO PROCESS          ;1E
00187 BX230189 1147             CJMP Z,FNCDCODE                              ;201
              1148    ;
00188 BXF30140 1149             JMP IDLE            ;OTHERWISE, WE'RE BUSY, DON'T RESPOND
              1150    ;
              1151              TITLE2 CDC FUNCTION DECODE
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     CDC FUNCTION DECODE

           1152              EJECT
           1153   ;
           1154   ; FUNCTION DECODE
           1155   ; WE HAVE A CDC FUNCTION, GO TO THE SPECIFIC ROUTINE THAT HANDLES IT
           1156   ;
           1157   FNCDCODE:  EQU $
00189 XXXX9414  1158              TORIY SUBR,CDCFNC   ;IF FUNCTION BEYOND THE FUNCTION TABLE  ;201
0018A XXXX0037  1159              IDAT CFTABMAX       ;                                      ;201
0018B BX730193  1160              CJMP N,FNCDCOD1     ;THEN TEST FOR INDIVIDUAL FNC VALUES   ;201
0018C XXXXD814  1161              RA CDCFNC
0018D XXXXD8E0  1162              IR TEMP0
0018E XXXX01A3  1163              IDAT CFNC.TAB       ;LOAD ADDRESS OF THE FUNCTION JMP TABLE
0018F XXXX9880  1164              TORAR ADD,TEMP0     ;ADD THE FUNCTION IN ACC
00190 12XXD840  1165              RH TEMP0 & MCAR     ;MOVE IT FROM ALU TO SEQ THROUGH
                1166              RCAR                ;THE CACHE ADDRESS REGISTER
00191 28XCXXXX  1167              / & SEQ & LDCT      ;MOVE INTO THE SEQ'S CNTR/REGISTER
00192 XX4/XXXX  1168              JMPR                ;AND JUMP VIA THE SEQ'S REGISTER
                1169   ;
                1170   FNCDCOD1:  EQU $
00193 XXXX9514  1171              TORIY EXOR,CDCFNC                                          ;201
00194 XXXX010C  1172              IDAT CF.ALDPP       ;AUTOLOAD FROM PPU                     ;1E
00195 BX2301E1  1173              CJMP Z,AUTOLD
00196 XXXX9514  1174              TORIY EXOR,CDCFNC
00197 XXXX01D0  1175              IDAT CF.ECHO2       ;ECHO ONE WORD - 0720                  ;201
00198 BX230989  1176              CJMP Z,ECHO1WD                                             ;201
                1177   ; DISK FUNCTION, CLEAR DISK BITS AND TEST FOR FUNCTION
00199 XXXXD814  1178              RA CDCFNC
0019A XXXXC4C0  1179              TOA1R AND,TEMP0
0019B XXXX0FC0  1180              IDAT CFSPC.M                                               ;1E
0019C XXXX9500  1181              TORIY EXOR,TEMP0
0019D XXXX0040  1182              IDAT CF.ALDD                                               ;1E
0019E BX230208  1183              CJMP Z,AUTOLDSK     ;AUTOLOAD FROM DISK
0019F XXXX9500  1184              TORIY EXOR,TEMP0
001A0 XXXX00C0  1185              IDAT CF.DDST        ;DISK DEADSTART                        ;1E
001A1 BX230208  1186              CJMP Z,DSKDSTRT
001A2 BXF30140  1187              JMP IDLE            ;ILLEGAL FUNCTION - GOTO IDLE          ;201
                1188   ;
                1189              TITLE2 CDC FUNCTION JUMP TABLE
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     CDC FUNCTION JUMP TABLE

               1190              EJECT
               1191    ;
               1192    CFNC.TAB:   EQU $
001A3 BXF30280 1193               JMP CONNECT        ;000  CONNECT
001A4 BXF302C0 1194               JMP SEEK.1         ;001  SEEK 1:1
001A5 BXF302C2 1195               JMP SEEK.2         ;002  SEEK 2:1
001A6 BXF30140 1196               JMP IDLE           ;003  --
001A7 BXF30557 1197               JMP READ           ;004  READ
001A8 BXF30340 1198               JMP WRITE          ;005  WRITE
001A9 BXF3074D 1199               JMP WRT.VRFY       ;006  WRITE VERIFY
001AA BXF30740 1200               JMP READ.CKW       ;007  READ CHECKWORD
001AB BXF30321 1201               JMP OP.COMP        ;010  OPERATION COMPLETE
001AC BXF3031F 1202               JMP DIS.RES        ;011  DISABLE DRIVE RESERVE (844)
001AD BXF30220 1203               JMP STAT.GEN       ;012  GENERAL STATUS
001AE BXF307CA 1204               JMP STAT.DET       ;013  DETAILED STATUS
001AF BXF30140 1205               JMP IDLE           ;014 (CONTINUE)
001B0 BXF30322 1206               JMP DRP.SKS        ;015  DROP SEEKS
001B1 BXF30140 1207               JMP IDLE           ;016 (FORMAT PACK)
001B2 BXF30711 1208               JMP RTN.ADDR       ;017  RETURN DRIVE ADDR
001B3 BXF30322 1209               JMP DRV.REL        ;020  DRIVE RELEASE
001B4 BXF30735 1210               JMP RTN.CYL        ;021  RETURN CYLINDER ADDR
001B5 BXF30140 1211               JMP IDLE           ;022 (CLEAR/SET FLAW)
001B6 BXF307CA 1212               JMP STAT.EXT       ;023  EXTENDED DETAILED STATUS
001B7 BXF3054B 1213               JMP READ.GAP       ;024  READ GAP SEC
001B8 BXF30353 1214               JMP WRT.GAP        ;025  WRITE GAP SEC
001B9 BXF3074F 1215               JMP WRT.VGAP       ;026  WRITE VERIFY GAP SEC
001BA BXF3074F 1216               JMP RD.CKGAP       ;027  READ CHECKWORD GAP SEC
001BB BXF30540 1217               JMP RD.FACT        ;030  READ FACTORY DATA
001BC BXF30557 1218               JMP RD.UTMAP       ;031  READ UTILITY MAP (844)
001BD BXF307A2 1219               JMP XBUFRD         ;032  BLOCK XFER BUFFER READ
001BE BXF30780 1220               JMP X.BUFWRT       ;033  BLOCK XFER BUFFER WRITE
001BF BXF30557 1221               JMP RD.PROTS       ;034  READ PROTECTED SEC
001C0 BXF30340 1222               JMP WRT.LST        ;035  WRITE LAST SEC
001C1 BXF3074D 1223               JMP WRT.VLST       ;036  WRITE VERIFY LAST SEC
001C2 BXF30340 1224               JMP WR.PROTS       ;037  WRITE PROTECTED SEC
001C3 BXF30140 1225               JMP IDLE           ;040 (READ SHORT)
001C4 BXF30140 1226               JMP IDLE           ;041 (SELECT STROBE AND OFFSET)
001C5 BXF301DB 1227               JMP CLRCNCT        ;042  CLEAR CONNECTED ACCESS          ;701
001C6 BXF307A2 1228               JMP XBUFRD         ;043  BUFFER READ
001C7 BXF30780 1229               JMP X.BUFWRT       ;044  BUFFER WRITE
001C8 BXF30140 1230               JMP IDLE           ;045  --
001C9 BXF30140 1231               JMP IDLE           ;046 (WRITE BUFFER TO DISK)
001CA BXF30140 1232               JMP IDLE           ;047 (SCAN CYLINDER ADDRS)
001CB BXF30140 1233               JMP IDLE           ;050 (OUTPUT ON PROCSR CHNL)
001CC BXF30140 1234               JMP IDLE           ;051 (EXECUTE CNTRL WORD SEQ)
001CD BXF309A1 1235               JMP INPPROC        ;052  INPUT PROCSR CHNL STATUS
001CE BXF30140 1236               JMP IDLE           ;053 (ECHO OUTPUT CHNLS)
001CF BXF30140 1237               JMP IDLE           ;054 (ISSUE PROCSR FLAG PULSE)
001D0 BXF30140 1238               JMP IDLE           ;055 (ENABLE INPUT CHNL TIMING)
001D1 BXF30140 1239               JMP IDLE           ;056 (INPUT TIMING DATA)
001D2 BXF309B9 1240               JMP ECHO1WD        ;057  ECHO ONE WORD
001D3 BXF30140 1241               JMP IDLE           ;060  --
001D4 BXF30140 1242               JMP IDLE           ;061 (AUTODUMP)
001D5 BXF3096E 1243               JMP MANPROC        ;062  MANIPULATE PROCSR
001D6 BXF30980 1244               JMP INPDISP        ;063  INPUT DISPLAY DATA
```

```
 Addr          Line - AMPERIF /155/885 EMULATION - HSP ONLINE -     CDC FUNCTION JUMP TABLE

0D1D7 BXF30140  1245              JMP IDLE          ;064 (TIME DIFFERENCE COUNTER)
0D1D8 BXF30140  1246              JMP IDLE          ;065  --
0D1D9 BXF30140  1247              JMP IDLE          ;066 (FORCE ERROR)
0D1DA BXF301E1  1248              JMP AUTOLD        ;067  INTERLOCK AUTOLOAD              ;201
                1249    ;
                1250              TITLE2 CLEAR CONNECTED ACCESS FUNCTION
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     CLEAR CONNECTED ACCESS FUNCTION

               1251              EJECT
               1252   ;
               1253   ; CLEAR CONNECTED ACCESSS FUNCTION
               1254   ;
               1255   CLRCNCT:   EQU $                                                    ;201
001DB BXF101DE 1256               JSB RELCNCT        ;RELEASE THE CURRENT CONNECTED ACCESS  ;201
001DC BXF10B49 1257               JSB FNCREPLY                                           ;201
001DD BXF30140 1258               JMP IDLE           ;THAT'S IT.                         ;201
               1259   ;
               1260   ; SUBROUTINE TO RELEASE THE CONNECTED ACCESS
               1261   ; USED BY CLEAR CONNECT AND OPERATION COMPLETE FUNCTIONS
               1262   ;
               1263   RELCNCT:   EQU $                                                    ;201
001DE XXXXD91C 1264               ZR CPCNCT          ;CLEAR ACCESS CONNECTED             ;201
001DF BXF10B40 1265               JSB ENABDS         ;ENABLE ALL ACCESS TO DEADSTART US  ;201
001E0 XXFAXXXX 1266               RTN                                                    ;203
               1267   ;
               1268              TITLE2 AUTOLOAD FUNCTIONS
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     AUTOLOAD FUNCTIONS

               1269                EJECT
               1270    ;
               1271    ; AUTOLOAD FUNCTIONS
               1272    ;
               1273    ; This routine handles INTERLOCK AUTOLOAD (0067), AUTOLOAD FROM
               1274    ; PPU (0414), and AUTOLOAD FROM DISK (01XX) CDC functions.
               1275    ;
               1276    ; First, clear any error status and conditions for the host,
               1277    ; and release all drive if a AUTOLOAD FROM PPU function.  Then,
               1278    ; wait for active, and read data until inactive.  Nothing is
               1279    ; done with the data; it is simply discarded.  With the
               1280    ; AUTOLOAD FROM DISK function, no data is sent from the host.
               1281    ; Note that there are "zero word" INTERLOCK AUTOLOAD functions,
               1282    ; that trasfer no data, and are simply used to initialize the
               1283    ; controller.  If there is data, the only word of significance
               1284    ; is the revision level of the autoload program, which is
               1285    ; returned to the host with all detailed status functions; this
               1286    ; is in word number 41E0 hex of the autoload data.
               1287    ;
               1288    AUTOLD:     EQU $
001E1 XXXXD911 1289                ZR GENSTAT          ;CLEAR GENERAL STATUS                ;201
001E2 BXF106FA 1290                JSB CLRSTAT         ;CLEAR OLD STATUS                    ;201
001E3 XXXXE3D9 1291                RSTAR F.CNCTD,FLAGS ;AND RESET CONNECTED                 ;201
               1292                SRC.CDC                                                  ;201
001E4 XXXXD818 1292 +              RA CPPOLL
001E5 1BXXD89D 1292 +              AR SVSRC & ALU & SRCSEL
               1292 +              ENDR
001E6 XXXXD911 1293                ZR GENSTAT          ;CLEAR GENERAL STATUS REG
001E7 XXXX9514 1294                TORIY EXOR,CDCFNC   ;IS THIS AN 0414 AUTOLOAD?           ;1D
001E8 XXXX010C 1295                IDAT CF.ALDPP                                            ;1E
001E9 BX2108BC 1296                CJSB Z,REL.ALL      ;THEN RELEASE ALL DRIVE UNITS        ;201
001EA BXF10B49 1297                JSB FNCREPLY                                             ;1D
               1298    AUTOLD1:    EQU $
               1299                TSTND SINACT                                             ;1C
001EB 5XXXE590 1300                / & SRCSTAT         ;WAIT FOR ACTIVE
001EC BX2301F0 1301                CJMP Z,AUTOLD7                                           ;1C
001ED XXXXC1FF 1302                DECR DEADMAN        ;INACTIVE TOO LONG?                  ;1D
001EE BX210A24 1303                CJSB Z,DEADCK       ;TIME OUT                            ;1D
001EF BXF3D1E8 1304                JMP AUTOLD1                                              ;1C
               1305    AUTOLD7:    EQU $                                                    ;1C
               1306                DMRINIT                                                  ;201
001F0 XXXXD99F 1306 +              LD2NR BIT12,DEADMAN
               1306 +              ENDR
001F1 XXXXD8E0 1307                IR TEMP0
001F2 XXXX41E0 1308                IDAT H#41E0
               1309    AUTOLD2:    EQU $                                                    ;1D
001F3 BXF10A38 1310                JSB CKCERR2         ;CHECK FOR CHANNEL ERRORS            ;1D
001F4 BX730140 1311                CJMP N,IDLE         ;IF ERROR, EXIT                      ;1D
               1312                TSTND SFUNC         ;CHECK FOR FUNCTION INSTEAD OF DATA  ;1D
001F5 5XXXE190 1313                / & SRCSTAT
001F6 BX2301F8 1314                CJMP Z,$+2                                               ;1D
001F7 BXF30140 1315                JMP IDLE            ;ABORT AUTOLOAD, GO TO IDLE          ;1D
               1316                TSTND SFULL
001F8 5XXXE790 1317                / & SRCSTAT
001F9 BX2301FB 1318                CJMP Z,$+2
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - AUTOLOAD FUNCTIONS

```
001FA BXF30200  1319              JMP AUTOLD3
001FB XXXXC1FF  1320              DECR DEADMAN        ;EMPTY AND ACTIVE FOR TOO LONG?        ;1D
001FC BX210A24  1321              CJSB Z,DEADCK       ;TIME OUT                              ;1D
                1322              TSTND SINACT
001FD 5XXXE590  1323              / & SRCSTAT
001FE BX2301F3  1324              CJMP Z,AUTOLD2      ;WAIT FOR READY
001FF BXF30140  1325              JMP IDLE            ;END OF DATA
00200 4XXXF8C1  1326   AUTOLD3:  HA & RDATA
00201 XXXXC1E0  1327              DECR TEMP0
00202 BX230205  1328              CJMP Z,AUTOLD4
                1329              DMRINIT             ;INITIALIZE DEADMAN TIMER              ;20I
00203 XXXXD99F  1329 +            LD2MR BIT12,DEADMAN
                1329 +            ENDM
00204 BXF301F3  1330              JMP AUTOLD2
                1331   AUTOLD4:  CON CWAREREV        ;STORE IN CNTRLWARE REV                ;1C
00205 82XX00C0  1332              / & WCAR
00206 13XXF880  1333              AH & WCACHE                                                ;1C
00207 BXF301F0  1334              JMP AUTOLD7         ;RESET COUNTER TO BIG AND CONTINUE     ;1C
                1335   ;
                1336   ; AUTOLOAD FROM DISK
                1337   ;
                1338   AUTOLDSK: EQU $
00208 XXXXD911  1339              ZR GENSTAT          ;CLEAR GENERAL STATUS                  ;20I
00209 BXF10B49  1340              JSB FWCREPLY
0020A BXF30140  1341              JMP IDLE
                1342   ;
                1343              TITLE2 DISK DEADSTART FUNCTION
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     DISK DFADSTART FUNCTION

               1344              EJECT
               1345    ;
               1346    DSKDSTRT: EQU $
0020B XXXXD911 1347              ZR GENSTAT          ;CLEAR GENERAL STATUS                ;201
0020C XXXXD81B 1348              RA CPPOLL                                                ;1E
0020D XXXXD89C 1349              AR CPCNCT           ;SET ACCESS CONNECTED                ;1E
0020E XXXXD814 1350              RA CDCFNC
0020F XXXXC4DA 1351              TOAIR AND,CURUNIT   ;SET CURRENT UNIT FROM FUNCTION      ;201
00210 XXXX001F 1352              IDAT CFDSK.M                                             ;1E
00211 XXXXE3B9 1353              SETMR F.CNCTD,FLAGS ;SET UNIT CONNECTED FLAG             ;201
00212 BXF106FA 1354              JSB CLRSTAT
00213 XXXX949A 1355              TORIY ADD,CURUNIT   ;SET CYLINDER TO 841                 ;202
00214 12XX0068 1356              IDAT CYL.PAR & ALU & WCAR                                ;202
00215 B3XX0349 1357              CON CYLMAX-1 & WCACHE                                    ;202
00216 XXXX949A 1358              TORIY ADD,CURUNIT   ;SET TRACK TO 1                      ;202
00217 12XX0088 1359              IDAT TRK.PAR & ALU & WCAR                                ;202
00218 B3XX0001 1360              CON 1 & WCACHE                                           ;202
00219 XXXX949A 1361              TORIY ADD,CURUNIT   ;SET SECTOR TO 30                    ;202
0021A 12XX00A8 1362              IDAT SEC.PAR & ALU & WCAR                                ;202
0021B B3XX001E 1363              CON 30 & WCACHE                                          ;202
0021C BXF10A48 1364              JSB SETSEEK         ;SET SEEKED FLAG                     ;201
0021D XXXXD8F4 1365              IR CDCFNC                                                ;201
0021E XXXX001C 1366              IDAT CF.RDP         ;SET FNC TO READ PROTECTED SECTOR    ;1E
0021F BXF30557 1367              JMP RD.PROTS
               1368    ;
               1369              TITLE2 STATUS FUNCTION
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     STATUS FUNCTION

               1370                EJECT
               1371    ;
               1372    ; STAT.GEN - ROUTINE FOR GENERAL STATUS FUNCTIONS
               1373    ;
               1374    STAT.GEN:   EQU $
00220 BXF1022C 1375                JSB STATGEN          ;CALCULATE GENERAL STATUS
               1376    ; SEND GENSTAT TO CDC
00221 14XXD851 1377                RH GENSTAT & WDATA
               1378                DMRINIT                                          ;201
00222 XXXXD99F 1378 +              LD2NR BIT12,DEADMAN
               1378 +              ENDM
00223 XXXXC1FF 1379                DECR DEADMAN
00224 BX210A24 1380                CJSB Z,DEADCK
               1381                TSTND SEMPTY         ;WAIT FOR EMPTY
00225 6XXXE990 1382                / & DSTSTAT
00226 BX230223 1383                CJMP Z,$-3                                       ;201
               1384                CON C.INACT          ;DEACTIVATE CHANNEL, AND WE'RE DONE     ;1F
00227 86XX0000 1385                / & DSTCTRL
               1386    ; WRITE STATUS SENT IN TRACE BUFFER
00228 XXXXD811 1387                RA GENSTAT                                       ;201
00229 BXF10A1B 1388                JSB TRACE.0                                      ;202
0022A XXXXD911 1389                ZR GENSTAT           ;CLEAR GENERAL STATUS
0022B BXF30140 1390                JMP IDLE
               1391    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     STATUS FUNCTION

               1392              EJECT
               1393    ;
               1394    ; STATGEN - SUBROUTINE FOR DETERMINING CURRENT GENERAL STATUS
               1395    ;
               1396    ; USED BY GENERAL STATUS AND RETURN DRIVE ADDRESS FUNCTIONS
               1397    ;
               1398    STATGEN:    EQU $                                              ;201
               1399    ; IF SHARED MEMORY HAS FAILED, JUST SET 5020 AND GO TO STAT5
00022C XXXXEFF9 1400              TSTNR F.SHFAIL,FLAGS;SEE IF SHARED MEMORY STILL WORKS  ;201
00022D BX230231 1401              CJMP Z,STAT1                                       ;201
00022E XXXXD8F1 1402              IR GENSTAT          ;SHARED MEM FAILED,            ;201
00022F XXXX5A10 1403              IDAT Q#5020         ;SET DRIVE ERROR STATUS        ;201
000230 BXF30274 1404              JMP STAT5           ;AND FORGET EVERYTHING ELSE    ;201
               1405    ; IF SYSPORT ERROR, JUST SET 5000 AND GO TO STAT5
               1406    STAT1:      EQU $                                              ;201
000231 B2XX0001 1407              CON SYSERR & WCAR   ;CHECK FOR PARITY ERRORS       ;201
000232 3XXXF8C1 1408              HA & RCACHE         ;THAT WERE SAVED IN SYSERR     ;201
000233 BX230237 1409              CJMP Z,STAT2        ;NONE, CONTINUE                ;201
000234 XXXXD8F1 1410              IR GENSTAT          ;PARITY ERROR DETECTED,        ;201
000235 XXXX0A00 1411              IDAT Q#5000         ;SET ERROR STATUS              ;201
000236 BXF30274 1412              JMP STAT5           ;AND FORGET EVERYTHING ELSE    ;201
               1413    ; IF OTHER PARITY ERROR (FROM CDCI), SET 5000
               1414    STAT2:      EQU $                                              ;201
000237 B2XX000A 1415              CON WD16 & WCAR     ;CHECK FOR PARITY ERRORS       ;201
000238 3XXXF8C1 1416              HA & RCACHE         ;THAT WERE SAVED IN DET STAT WD16  ;201
000239 XXXXED80 1417              TSTNA BIT6          ;...BIT 6                      ;201
00023A BX23023C 1418              CJMP Z,$+2                                         ;201
00023B BXF3023E 1419              JMP $+3                                            ;201
00023C XXXXE380 1420              TSTNA BIT1          ;...OR BIT 1                   ;201
00023D BX230240 1421              CJMP Z,$+3          ;NEITHER, CONTINUE             ;201
00023E XXXXD8F1 1422              IR GENSTAT          ;PARITY ERROR DETECTED,        ;201
00023F XXXX0A00 1423              IDAT Q#5000         ;SET ERROR STATUS              ;201
               1424    ; IF A UNIT IS NOT CONNECTED, GO TO STAT9
000240 XXXXE3F9 1425              TSTNR F.CNCTD,FLAGS                                ;201
000241 BX230253 1426              CJMP Z,STAT9        ;NO UNIT CONCTD, JUMP
               1427    ; CHECK CONNECTED DRIVE STATUS FOR BUSY OR ERRORS
000242 XXXXE7D1 1428              RSTNR BIT3,GENSTAT  ;CLEAR ANY OLD DRIVE RESERVE ERROR ;201
000243 XXXXD81A 1429              RA CURUNIT
000244 XXXXE480 1430              TOAI ADD,NRY                                       ;201
               1431              IDAT RES.FAIL       ;CHECK IF DRIVE COULD'NT BE RESERVED ;201
000245 12XX0007 1432              / & ALU & WCAR
000246 3XXXF8C1 1433              HA & RCACHE
000247 BX23024A 1434              CJMP Z,$+3                                         ;201
               1435    ; SET DRIVE RESERVED ERROR, GOTO STAT5
000248 XXXXE7B1 1436              SETNR BIT3,GENSTAT                                 ;201
000249 BXF30274 1437              JMP STAT5                                          ;201
               1438    ; WAIT FOR STATUS FROM AMP IF PENDING
00024A BXF10864 1439              JSB WTAMPST         ;IF STATUS IS PENDING, WAIT FOR IT ;201
               1440    ; SET BIT1 IN GENSTAT IF DEVICE END IS IN UNIT STATUS
00024B BXF10AAF 1441              JSB CKDVEND         ;CHECK FOR DEVICE END IN STATUS    ;201
00024C BX230256 1442              CJMP Z,STAT6                                       ;201
               1443    STAT8:      EQU $                                              ;201
00024D XXXXE3D1 1444              RSTNR BIT1,GENSTAT  ;CLEAR BUSY
00024E XXXXD8EC 1445              IR SHMADDR          ;CLEAR BUSY COUNT              ;201
00024F XXXX0001 1446              IDAT BUSY.CNT                                      ;201
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     STATUS FUNCTION

00250 XXXXD90B  1447              ZR SHMDATA                                    ;201
00251 BXF10E16  1448              JSB SHMCRTCU                                  ;201
00252 BXF3025F  1449              JMP STAT7                                     ;201
                1450    ; NOT CONNECTED, CLEAR DRIVE STATUS BITS, SKIP DRIVE CHECKING
                1451    STAT9:    EQU $                                         ;203
00253 XXXX9CD1  1452              TORIR AND,GENSTAT   ;CLEAR ALL BITS EXCEPT BIT11 AND 9 ;203
00254 XXXX0A00  1453              IDAT Q#5000                                   ;203
00255 BXF30274  1454              JMP STAT5           ;THATS ALL THE STATUS WE NEED TO CHECK ;203
                1455    ; DRIVE BUSY
                1456    STAT6:    EQU $                                         ;201
00256 XXXXE3B1  1457              SETNR BIT1,GENSTAT  ;SET BUSY
00257 XXXXDCEC  1458              IR SHMADDR          ;READ BUSY COUNT          ;201
00258 XXXX0001  1459              IDAT BUSY.CNT                                 ;201
00259 BXF10E00  1460              JSB SHMRDCU                                   ;201
0025A XXXXF1EB  1461              TSTNR BIT8,SHMDATA  ;IF 256                   ;201
0025B BX23025D  1462              CJMP Z,$+2                                    ;201
0025C BXF3024D  1463              JMP STAT8           ;THEN ASSUME DEV END WAS LOST, CLR BUSY ;201
0025D XXXXDD6B  1464              INCR SHMDATA        ;ELSE INCREMENT BUSY COUNT ;201
0025E BXF10E18  1465              JSB SHMWRT          ;                         ;201
                1466    ; CHECK FOR ERROR STATUS
                1467    STAT7:    EQU $                                         ;201
0025F XXXXD8EC  1468              IR SHMADDR          ;CHECK FOR UNIT CHECK     ;201
00260 XXXX0002  1469              IDAT AMP.ST3                                  ;201
00261 BXF10E00  1470              JSB SHMRDCU                                   ;201
00262 XXXXF3E8  1471              TSTNR EI.UCK,SHMDATA                          ;201
00263 BX23026F  1472              CJMP Z,STAT4
00264 XXXXF3B1  1473              SETNR BIT9,GENSTAT  ;UNIT CHECK, SET 5000 STATUS
00265 XXXXF7B1  1474              SETNR BIT11,GENSTAT
                1475    ; CHECK FOR DRIVE ERROR STATUS
00266 XXXXC1EC  1476              DECR SHMADDR        ;POINT TO AMP.ST2         ;201
00267 BXF10E02  1477              JSB SHMRD                                     ;201
00268 XXXX04CB  1478              TORIA AND,SHMDATA
00269 XXXX03C0  1479              IDAT EIM.RA         ;CHECK FOR RECOVERY ACTION ;201
0026A XXXXE500  1480              TOAI EXOR,MRY
0026B XXXX0100  1481              IDAT RA.INTRQ       ;OF INTERVENTION REQUIRED ;201
0026C BX23026E  1482              CJMP Z,$+2
0026D BXF3026F  1483              JMP $+2
0026E XXXXE9B1  1484              SETNR BIT4,GENSTAT  ;IF INTERV SET DRIVE MALFUNCTION
                1485    ; READ GENERAL STATUS FROM SHARED MEMORY FOR DRIVE
                1486    ; AND OR WITH GENERAL STATUS REGISTER
0026F XXXXD8EC  1487    STAT4:    IR SHMADDR
00270 XXXX0003  1488              IDAT CDC.ST
00271 BXF10E00  1489              JSB SHMRDCU
00272 XXXXD80B  1490              RA SHMDATA
00273 XXXX9951  1491              TORAR OR,GENSTAT
                1492    STAT5:    EQU $                                         ;201
00274 XXXXF7F1  1493              TSTNR BIT11,GENSTAT ;IF SXXX STATUS           ;201
00275 BX230277  1494              CJMP Z,$+2                                    ;201
                1495    ; SXXX GENERAL STATUS: UNRECOVERABLE ERROR
00276 XXXXE3D1  1496              RSTNR BIT1,GENSTAT  ;CLEAR BUSY               ;201
                1497    ; STATUS READY, REPLY TO FUNCTION
00277 BXF10B49  1498              JSB FNCREPLY                                  ;201
                1499              DST.CDC                                       ;201
00278 XXXXD81B  1499 +            RA CPPOLL
00279 1CXXD89E  1499 +            AR SVDST & ALU & DSTSEL
```

```
 Addr        Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -    STATUS FUNCTION

             1499 +          ENDM
             1500            DMRINIT                                          ;201
0027A XXXXD99F 1500 +        LD2NR BIT12,DEADMAN
             1500 +          ENDM
0027B XXXXC1FF 1501          DECR DEADMAN       ;ACTIVATE THE DEADMAN TIMER   ;1C
0027C BX219A24 1502          CJSB Z,DEADCK      ;DEADMAN TIMEOUT              ;1C
             1503            TSTRD SACTIVE
0027D 6XXXE390 1504          / & DSTSTAT
0027E BX2B027B 1505          CJMP Z,$-3         ;WAIT FOR ACTIVE              ;1C
             1506    ; RETURN
0027F XXFAXXXX 1507          RTN
             1508    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     STATUS FUNCTION

               1509              EJECT
               1510    ;
               1511    ; CONNECT FUNCTION
               1512    ;
               1513    CONNECT:  EQU $
00280 BXF10B49 1514              JSB FNCREPLY        ;SEND INACTIVE TO THE FUNCTION CODE
               1515              SRC.CDC                                          ;201
00281 XXXXD81B 1515 +            RA CPPULL
00282 18XXD89D 1515 +            AR SVSRC & ALU & SRCSEL
               1515 +            ENDM
00283 BXF108C9 1516              JSB GETPARS         ;GET THE CDC PARM WORDS
00284 BX730140 1517              CJNP N,IDLE         ;CHANNEL PARITY ERROR IN PARM WORD
00285 BXF10B80 1518              JSB RES.UNIT        ;RESERVE THE UNIT
00286 BX730140 1519              CJNP N,IDLE
00287 BXF106FA 1520              JSB CLRSTAT         ;CLEAR ERROR CONDITIONS
00288 BXF30140 1521              JNP IDLE
               1522    ;
               1523              TITLE2 SEEK FUNCTION
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     SEEK FUNCTION

               1524                EJECT
               1525    ;
002C0          1526                ALIGN H#40
               1527    ;
               1528    ; SEEK 1TO1 INTERLACE AND SEEK 2TO1 INTERLACE FUNCTIONS.
               1529    ;
               1530    ; THE FIRST SEEK SENT BY CDC TO A NEW POSITION IS SENT TO AMPERIF.
               1531    ; THE OTHER SEEKS JUST SET BUSY OR NOT.  EVEN THE FIRST SEEK WILL NOT
               1532    ; BE SENT IF IT IS CLOSE TO THE LAST POSITION (WITHIN ONE CDC
               1533    ; CYLINDER), AS SEEKS ARE NOT REQUIRED BY AMPERIF, EXCEPT AS AN
               1534    ; OVERLAPPED PROCCESSING TECHNIQUE.
               1535    ;
               1536    SEEK.1:     EQU $
002C0 XXXXE8D9 1537                RSTNR F.2TO1,FLAGS  ;CLEAR 2:1 INTERLACE MODE              ;1E
002C1 BXF302C3 1538                JMP SEEK1
               1539    SEEK.2:     EQU $
002C2 XXXXE8B9 1540                SETNR F.2TO1,FLAGS  ;SET 2:1 INTERLACE MODE                ;1F
               1541    SEEK1:      EQU $
002C3 BXF10B49 1542                JSB FNCREPLY        ;SEND INACTIVE TO THE FUNCTION
               1543                SRC.CDC                                                    ;201
002C4 XXXXD81B 1543 +              RA CPPULL
002C5 18XXD89D 1543 +              AR SVSRC & ALU & SRCSEL
               1543 +              ENDM
               1544    ; GET THE SEEK PARAMETERS. STORE CYLINDER, TRACK AND SECTOR
               1545    ; TO LOCAL MEMORY CYL.PAR, TRK.PAR, AND SEC.PAR FOR THE DRIVE
002C6 BXF10BC9 1546                JSB GETPARS         ;GET THE PARAMETER WORDS
002C7 BX730140 1547                CJMP N,IDLE         ;CHANNEL PARITY ERRORS IN PARMS
               1548    ; CALL RES.UNIT TO CHECK/RESERVE THE UNIT
002C8 BXF10B80 1549                JSB RES.UNIT        ;RESERVE THE UNIT                      ;201
002C9 BX730140 1550                CJMP N,IDLE         ;IF UNIT CANNOT BE RESERVED
               1551    ; CHECK THIS UNITS LAST STATUS TO SEE IF DEVICE END WAS PRESENT
               1552    ; IF NOT SET BUSY IN GENERAL STATUS AND GOTO IDLE
002CA XXXXF7F9 1553                TSTNR F.STPEND,FLAGS;IF STATUS PENDING FOR THIS CTRLR      ;201
002CB BX2302CD 1554                CJMP Z,$+2                                                 ;201
002CC BXF3031D 1555                JMP SEEK6           ;SET BUSY AND RETURN                   ;201
002CD XXXX949A 1556                TORIY ADD,CURUNIT   ;IF STATUS PENDING FOR THIS UNIT       ;201
               1557                IDAT ST.PEND                                               ;201
002CE 12XX0047 1558                / & ALU & WCAR                                             ;201
002CF 3XXXF8C1 1559                HA & RCACHE                                                ;201
002D0 BX2302D2 1560                CJMP Z,$+2                                                 ;201
002D1 BXF3031D 1561                JMP SEEK6           ;SET BUSY AND RETURN                   ;201
002D2 XXXXD90C 1562                ZR SHMADDR
002D3 BXF10E00 1563                JSB SHMRDCU         ;GET AMP.ST1
002D4 XXXX84CB 1564                TORIA AND,SHMDATA                                          ;201
002D5 XXXX003C 1565                IDAT EIN.SA         ;CHECK STATUS ACTION FOR 4
002D6 XXXXE500 1566                TOAI EXOR,NRY
002D7 XXXX0010 1567                IDAT SA.SK          ;FOR SEEK IN PROGRESS
002D8 BX23031D 1568                CJMP Z,SEEK6
               1569    ; IF DEVICE END IS NOT IN SHARED UNIT STATUS, SET BUSY AND RETURN
002D9 BXF10A45 1570                JSB CKSEEK          ;REQUIRE SEEK ON THIS UNIT?            ;201
002DA BX2302F0 1571                CJMP Z,SEEK3        ;FORCE ISSUE OF SEEK TO AMPERIF        ;203
002DB XXXXD8EC 1572                IR SHMADDR          ;CHECK FOR RESEEK FLAG SET FOR THIS UNIT
002DC XXXX0018 1573                IDAT RESEEK
002DD BXF10E00 1574                JSB SHMRDCU
002DE 1XXXD84B 1575                RH SHMDATA
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     SEEK FUNCTION

002DF BX2302E3  1576              CJMP Z,SEEK1B       ;NO RESEEK                          ;201
002E0 XXXXD90B  1577              ZR SHMDATA          ;RESEEK SET, CLEAR FOR NEXT TIME    ;201
002E1 BXF10E18  1578              JSB SHMWRT
002E2 BXF302F8  1579              JMP SEEK3           ;AND FORCE A SEEK                   ;203
                1580    ; DON'T ISSUE SEEK TO AMPERIF
                1581    ; IF CDC CYLINDER WITHIN ONE OF LAST SEEK ISSUED
                1582    SEEK1B:   EQU $
002E3 XXXXD8EC  1583              IR SHMADDR          ;GET LAST CYLINDER                  ;201
002E4 XXXX0004  1584              IDAT CDC.CYL                                            ;201
002E5 BXF10E00  1585              JSB SHMRDCU                                             ;201
002E6 XXXX949A  1586              TORIY ADD,CURUNIT   ;GET CYLINDER PARAMETER              ;202
002E7 12XX0068  1587              IDAT CYL.PAR & ALU & WCAR                               ;202
002E8 3XXXF8C1  1588              HA & RCACHE                                             ;202
002E9 XXXX800B  1589              TORAA SUBR,SHMDATA  ;GET DIFFERENCE                     ;201
002EA BX230308  1590              CJMP Z,SEEK4        ;DON'T SEEK IF EQUAL,               ;203
002EB XXXXFC81  1591              INCA                                                    ;201
002EC BX230308  1592              CJMP Z,SEEK4        ;ONE LESS,                          ;203
002ED XXXXE385  1593              S2NA BIT1                                               ;201
002EE BX230308  1594              CJMP Z,SEEK4        ;OR ONE GREATER.                    ;203
002EF BXF302F8  1595              JMP SEEK3           ;TOO DIFFERENT, ISSUE THE SEEK      ;203
                1596    ; ISSUE A SEEK TO AMPERIF
                1597    SEEK3:    EQU $                                                   ;203
002F0 XXXXD8F7  1598              IR AMPCMD           ;SET SEEK REL TRACK COMMAND         ;202
002F1 XXXX000B  1599              IDAT AF.SEEK
002F2 XXXXD918  1600              ZR AMPWLEN
002F3 XXXXD81A  1601              RA CURUNIT
002F4 XXXXD896  1602              AR AMPUNIT          ;SET UNIT IN COMMAND WORD           ;201
002F5 XXXXC38D  1603              LD2NR BIT1,CDCSTATE ;INIT STATE REG FOR STATUS TRANSFER ;203
002F6 XXXXE3B1  1604              SETNR BIT1,GENSTAT  ;SET BUSY                           ;203
002F7 BXF10D3A  1605              JSB ISUCMD          ;ISSUE THE SEEK COMMAND
002F8 BX7302FA  1606              CJMP N,$+2
002F9 BXF302FC  1607              JMP $+3
002FA BXF10CEA  1608              JSB CKAMPSTS
002FB BXF3031D  1609              JMP SEEK6                                               ;203
002FC BXF10D7E  1610              JSB ISUADR          ;ISSUE REL WORD ADDRESS
002FD BX230300  1611              CJMP Z,$+3          ;COMMAND ACCEPTED
002FE BX73031D  1612              CJMP N,SEEK6        ;COMMAND REJECTED-RETRY COMMAND     ;203
002FF BXF3031D  1613              JMP SEEK6           ;NON RECOVERABLE ERROR ABORT        ;203
                1614    ; SEEK ISSUED
00300 XXXXD8EC  1615              IR SHMADDR          ;CLEAR DEVICE END IN STATUS
00301 XXXX0002  1616              IDAT AMP.ST3
00302 XXXXD90B  1617              ZR SHMDATA
00303 BXF10E16  1618              JSB SHMWRTCU
00304 BXF10A48  1619              JSB SETSEEK         ;SET SEEKED FLAG                    ;203
00305 BXF106FA  1620              JSB CLRSTAT         ;CLEAR OLD ERROR CONDITIONS IN STATUS
                1621    ; SET FLAG REG TO INDICATE TO COMMAND ISSUE THAT A STATUS
                1622    ; IS PENDING FOR THIS CONTROLLER
00306 XXXXF7B9  1623              SETNR F.STPEND,FLAGS                                    ;1E
00307 BXF3031D  1624              JMP SEEK6                                               ;201
                1625    ; IF LAST STATUS WAS NOT FROM A SEEK COMMAND GOTO SEEK5
                1626    SEEK4:    EQU $
00308 XXXXD8EC  1627              IR SHMADDR          ;NOW CHECK THE LAST STATUS TO SEE IF THE
00309 XXXX0000  1628              IDAT AMP.ST1        ;TO SEE IF THE LAST SEEK COMMAND WAS A SEEK
0030A BXF10E00  1629              JSB SHMRDCU
00308 XXXX84C8  1630              TORIA AND,SHMDATA
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - SEEK FUNCTION

```
0030C XXXX003C  1631            IDAT EIN.SA                                     ;201
0030D XXXXE500  1632            TOAI EXOR,ORY       ;WAS THE LAST STATUS A SEEK COMPLETE
0030E XXXX0014  1633            IDAT SA.SKC                                     ;201
0030F BX230311  1634            CJNP Z,$+2
00310 BXF30317  1635            JNP SEEK5
00311 XXXXDD6C  1636            INCR SHNADDR        ;POINT TO AMP.ST2           ;201
00312 BXF10E02  1637            JSB SHNRD
00313 XXXX84CB  1638            TORIA AND,SHNDATA
00314 XXXX03C0  1639            IDAT EIN.RA         ;IF THE RECOVERY ACTION IS NOT ZERO,  ;201
00315 BX230317  1640            CJNP Z,$+2          ;THE COMMAND WAS ABORTED.
00316 BXF30140  1641            JNP IDLE            ;GOTO IDLE IF IT WAS NOT ZERO
                1642    ;
                1643    ; SET NOT BUSY (ON CYLINDER) AND GO TO IDLE
                1644    SEEK5:      EQU $
00317 XXXXE3D1  1645            RSTNR BIT1,GENSTAT  ;CLEAR BUSY IN GENERAL STATUS
00318 XXXXD0EC  1646            IR SHNADDR
00319 XXXX0003  1647            IDAT CDC.ST
0031A XXXXD90B  1648            ZR SHNDATA
0031B BXF10E16  1649            JSB SHNWRTCU        ;CLEAR STATUS IN UNIT AREA
0031C BXF30140  1650            JNP IDLE                                        ;203
                1651    ;
                1652    ; SET BUSY AND GO TO IDLE
                1653    SEEK6:      EQU $
0031D XXXXE3B1  1654            SETNR BIT1,GENSTAT
0031E BXF30140  1655            JNP IDLE            ;SET BUSY AND GOTO IDLE
                1656    ;
                1657            TITLE2 RELEASE DRIVE/UP-COMPLETE FUNCTION
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     RELEASE DRIVE/OP-COMPLETE FUNCTION

               1658                EJECT
               1659    ;
               1660    ; DISABLE DRIVE RESERVE,
               1661    ; OPERATION COMPLETE,
               1662    ; DROP SEEKS, AND
               1663    ; DRIVE RELEASE FUNCTIONS
               1664    ;
               1665    DIS.RES:    EQU $                                                   ;201
00321F BXF10B49 1666                JSB FNCREPLY        ;DISABLE DRIVE RESERVE 844 ONLY     ;201
003220 BXF30140 1667                JMP IDLE                                                ;201
               1668    OP.COMP:    EQU $
003221 BXF101DE 1669                JSB RELCNCT         ;RELEASE CONNECTED ACCESS           ;201
               1670    DRP.SKS:    EQU $
               1671    DRV.REL:    EQU $
003222 BXF10B49 1672                JSB FNCREPLY
003223 XXXXE3F9 1673                TSTNR F.CNCTD,FLAGS ;IF NO UNIT CONNECTED, NOTHING TO DO ;201
003224 BX230140 1674                CJMP Z,IDLE
               1675    ; GET LOCK OF SHARED MEMORY
003225 BXF10E33 1676                JSB SHMLK           ;TRY AND GET LOCK
003226 BX230228 1677                CJMP Z,$+2
003227 BXF30225 1678                JMP $-2             ;TRY AGAIN
               1679    ; TEST FOR DROP SEEKS FUNCTION
003228 XXXX9514 1680                TORIY EXOR,CDCFNC
003229 XXXX000D 1681                IDAI CF.DSKS                                            ;1F
00322A BX230333 1682                CJMP Z,DRP.SKS1     ;DROP SEEKS                         ;201
               1683    ; OP COMPLETE OR DRIVE RELEASE FUNCTIONS
00322B XXXXE3D9 1684                RSTNR F.CNCTD,FLAGS ;CLEAR CONNECTED UNIT               ;201
00322C XXXXE7D9 1685                RSTNR F.RDERR,FLAGS ;CLEAR READ ERROR STATUS            ;1E
00322D XXXXD81A 1686                RA CURUNIT          ;CLEAR RESERVE FAIL STATUS          ;201
00322E XXXXE480 1687                IOAI ADD,NRY                                            ;201
               1688                IDAT RES.FAIL                                           ;201
00322F 12XX0007 1689                / & ALU & WCAR                                          ;201
               1690                ZH                                                      ;201
003230 13XXF900 1691                / & WCACHE                                              ;201
003231 BXF10B7A 1692                JSB REL.UNIT        ;RELEASE UNIT RESERVE (ACC HAS UNIT) ;201
003232 BXF3033C 1693                JMP DRP.SKS9                                            ;201
               1694    ; DROP SEEKS FUNCTION
               1695    DRP.SKS1:   EQU $                                                   ;201
003233 XXXXD900 1696                ZR TEMP0            ;TEMP0 HAS DRIVE UNIT NUMBER        ;201
               1697    DRP.SKS3:   EQU $                                                   ;201
003234 XXXXD81A 1698                RA CURUNIT          ;RELEASE ALL DRIVE RESERVES WE HAVE ;201
003235 XXXX9100 1699                TORAY EXOR,TEMP0    ;EXCEPT FOR THE ONE WE HAVE RESERVED ;201
003236 BX230339 1700                CJMP Z,DRP.SKS4                                         ;201
003237 XXXXD800 1701                RA TEMP0                                                ;201
003238 BXF10B7A 1702                JSB REL.UNIT                                            ;201
               1703    DRP.SKS4:   EQU $                                                   ;201
003239 XXXXDD60 1704                INCR TEMP0                                              ;201
00323A XXXXE6E0 1705                TSTNR BIT5,TEMP0                                        ;201
00323B BX230334 1706                CJMP Z,DRP.SKS3                                         ;201
               1707    DRP.SKS9:   EQU $                                                   ;201
00323C BXF10E65 1708                JSB SHMUNLK
00323D BXF30140 1709                JMP IDLE
               1710    ;
               1711                TITLE2 WRITE FUNCTIONS
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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WRITE FUNCTIONS

               1712                EJECT
               1713    ;
00340          1714                ALIGN H#40
               1715    ;
               1716    ; ROUTINE WRTITE WILL PROCESS WRITE (0005), WRITE LAST SECTOR (0035),
               1717    ; WRITE GAP SECTOR (0025), OR WRITE PROTECTED SECTOR (0037).
               1718    ;
               1719    WR.PROTS:   EQU $
               1720    WRITE:      EQU $
               1721    WRT.LST:    EQU $
00340 XXXXEDD9 1722                RSTNR F.GAPSEC,FLAGS;SET NORMAL WRITE MODE                  ;1E
00341 BXF30354 1723                JMP WRITE0
               1724    ; WRITE ERROR, DISCONNECT CDC, EMPTY CDC1 FIFO, NOTE ERROR AND GOTO IDLE
               1725    FWRTERR:    EQU $
               1726                SRC.CDC                                                     ;201
00342 XXXXD81B 1726 +              RA CPPOLL
00343 1BXXD89D 1726 +              AR SVSRC & ALU & SRCSEL
               1726 +              ENDM
               1727                DNKINIT                                                     ;201
00344 XXXXD99F 1727 +              LD2NR BIT12,DEADMAN
               1727 +              ENDM
00345 XXXXC1FF 1728                DECR DEADMAN                                                ;1C
00346 BX210A24 1729                CJSB Z,DEADCK                                               ;1C
               1730                TSTND SACTIVE       ;WAIT FOR ACTIVE
00347 5XXXE390 1731                / & SRCSTAT
00348 BX230345 1732                CJMP Z,$-3                                                  ;1C
               1733                CON C.INACT         ;DISCONN CDC IF ACTIVE                  ;1E
00349 85XX0000 1734                / & SRCCTRL
               1735    FWRTER8:    EQU $                                                       ;201
0034A BXD3034C 1736                CJMP SRCRDY,$+2     ;REMOVE DATA FROM FIFO
0034B BXF30350 1737                JMP FWRTER9                                                 ;201
0034C 4XXXF8C1 1738                RA & RDATA
0034D XXXX7140 1739                NOOP
0034E XXXX7140 1740                NOOP
0034F BXF3034A 1741                JMP FWRTER8         ;#### SHOULD HAVE TIMEOUT              ;201
               1742    FWRTER9:    EQU $                                                       ;201
00350 BXF106F5 1743                JSB ADR.ERR         ;SET ADDRESS ERROR                      ;201
00351 BXF10A36 1744                JSB CKCERR                                                  ;201
00352 BXF30140 1745                JMP IDLE
               1746    WRT.GAP:    EQU $
00353 XXXXEDB9 1747                SETNR F.GAPSEC,FLAGS;SET GAP WRITE MODE                     ;1E
               1748    WRITE0:     EQU $
00354 XXXXFDB9 1749                SETNR F.FIFO,FLAGS  ;THIS CAUSES FNCREPLY TO ENABLE THE FIFO;1E
               1750                SRC.CDC             ;SELECT CDC AS SOURCE                   ;201
00355 XXXXD81B 1750 +              RA CPPOLL
00356 1BXXD89D 1750 +              AR SVSRC & ALU & SRCSEL
               1750 +              ENDM
00357 BXF10B49 1751                JSB FNCREPLY        ;REPLY TO FUNCTION AND ENABLE THE FIFO
00358 XXXXFDD9 1752                RSTNR F.FIFO,FLAGS  ;CLEAR ENABLE FIFO FLAG                 ;1E
00359 XXXXE3F9 1753                TSTNR F.CNCTD,FLAGS                                         ;201
0035A BX230342 1754                CJMP Z,FWRTERR
0035B BXF10A45 1755                JSB CKSEEK          ;CHECK FOR WRITE WITHOUT SEEK           ;201
0035C BX230342 1756                CJMP Z,FWRTERR      ;FORCE ERROR                            ;201
0035D BXF106FA 1757                JSB CLRSTAT         ;CLEAR OLD ERROR CONDITIONS IN STATUS
0035E BXF10B2A 1758                JSB SETWDCNT        ;SET WRDCNT WITH LARGE OR SMALL WRD CNT ;202
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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WRITE FUNCTIONS

0035F XXXXD905  1759              ZR TEMP5            ;CLEAR SECT COUNTER
00360 XXXXD912  1760              ZR CNTR2            ;CLEAR LONG WRITE SECTOR COUNTER
00361 XXXXEDF9  1761              TSTNR F.GAPSEC,FLAGS;(TEST FOR GAP SECTOR MODE)          ;1E
00362 BX230364  1762              CJNP Z,$+2
00363 BXF30365  1763              JNP WRITE1
                1764   WRITE2:    EQU $
00364 XXXXF1B9  1765              SETNR F.LNGRW,FLAGS ;SET LONG WRITE MODE                 ;1E
                1766   WRITE1:    EQU $
00365 BXF10864  1767              JSB WTAMPST         ;IF STATUS PENDING, WAIT FOR IT      ;202
00366 XXXXD8F7  1768              IR AMPCMD           ;SET WRITE COMMAND
00367 XXXX000D  1769              IDAT AF.URF
00369 XXXXF1F9  1770              TSTNR F.LNGRW,FLAGS ;SET WORD LENGTH                     ;1E
00369 BX230368  1771              CJNP Z,$+2
0036A BXF3036E  1772              JNP WRITE9                                               ;201
0036B XXXXD8F8  1773              IR AMPWLEN
0036C XXXX0074  1774              IDAT AMPSEC5Z       ;WORD LENGTH OF 116 AMP WORDS        ;1E
0036D BXF30370  1775              JNP $+3
                1776   WRITE9:    EQU $                                                    ;201
0036E XXXXD8F8  1777              IR AMPWLEN
0036F XXXXFF90  1778              IDAT HSWDCNT        ;WORD LENGTH OF 564 CDC SECTORS      ;1E
00370 XXXXD81A  1779              RA CURUNIT
00371 XXXXD896  1780              AR AMPUNIT          ;SET UNIT FOR COMMAND WORD           ;201
00372 XXXXD90D  1781              ZR CDCSTATE         ;CLEAR STATE REG FOR STATUS TRANSFER ;203
00373 BXF10D3A  1782              JSB ISUCMD
00374 BX730376  1783              CJNP N,$+2
00375 BXF30378  1784              JNP $+3
00376 BXF10CEA  1785              JSB CKAMPSTS
00377 BXF30365  1786              JNP WRITE1          ;COMMAND REJECTED
00378 BXF10D7E  1787              JSB ISUADR          ;ISSUE ADDRESS WORD
00379 BX2303TC  1788              CJNP Z,$+3          ;COMMAND ACCEPTED
0037A BX730365  1789              CJNP N,WRITE1       ;COMMAND REJECTED-RETRY COMMAND
0037B BXF30391  1790              JNP AMPERRA         ;NON RECOVERABLE ERROR ABORT
                1791   ; COMMAND ISSUED, NOW WAIT FOR AMP READY OR ERRORS
0037C XXXXF7B9  1792              SETNR F.STPEND,FLAGS;SET STATUS PENDING                  ;1F
0037D XXXXD911  1793              ZR GENSTAT          ;CLEAR GENERAL STATUS REG            ;201
                1794              DST.AMP                                                  ;201
                1794 +  IF BANK_EQ_0
                1794 +  ELSE
0037E XXXXD8FE  1794 +            IR SVDST
0037F 1CXX000F  1794 +            IDAT AMP.PORT & ALU & DSTSEL
                1794 +  ENDIF
                1794 +            ENDM
                1795              SETNR DATAOUT,AMPCTRL
00380 16XXEFB5  1796              / & ALU & DSTCTRL
                1797   ; WAIT FOR AMP READY, MAYBE RESPOND TO OTHERS WHILE WAITING
                1798   WRIT1.JA:  EQU $
                1799              SRC.AMP             ;SELECT AMPERIF TO CHECK READY       ;201
                1799 +  IF BANK_EQ_0
                1799 +  ELSE
00381 XXXXD8FD  1799 +            IR SVSRC
00382 1BXX000F  1799 +            IDAT AMP.PORT & ALU & SRCSEL
                1799 +  ENDIF
                1799 +            ENDM
                1800              DST.AMP                                                  ;201
                1800 +  IF BANK_EQ_0
```

Addr Line - AMPERIF /155/885 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
              1809 +  ELSE
00383 XXXXD8FE  1810 +              IR SVDST
00384 1CXX000F  1811 +              IDAT AMP.PORT & ALU & DSTSEL
              1812 +  ENDIF
              1813 +              ENDR
00385 XXXXD8E9  1814                IR TIMEOUT                                      ;201
00386 XXXX0100  1815                IDAT H#0100         ;WHEN TIMEOUT, RESPOND TO OTHER CHANNLS
              1816    WRIT1.1B:   EQU $                                           ;201
              1817                TSTND ODREQ
00387 6XXXE790  1818                / & DSTSTAT
00389 BX230388  1819                CJMP Z,$+2
00389 BXF303A5  1820                JMP WRIT1.2         ;READY, GO TO HIGH SPEED WRITE LOOP
0038A XXXXC1E9  1821                DECR TIMEOUT                                    ;201
0038B BX230388  1822                CJMP Z,$+2
0038C BXF3038F  1823                JMP $+3
0038D BXF10A48  1824                JSB RSP.20TH        ;RESPOND TO OTHER ACCESSES
0038E BXF30381  1825                JMP WRIT1.1A        ;RESET TIMEOUT AND WAIT
0038F 5XXXE390  1826                TSTND ST.BK2 & SRCSTAT
00390 BX230387  1827                CJMP Z,WRIT1.1B     ;#### SHOULD HAVE TIMEOUT    ;201
              1828    ; AMPERIF HAS ABORTED WITHOUT TAKING DATA
              1829    AMPERRA:    SRC.AMP                                         ;201
              1829 +  IF BANK_EQ_0
              1829 +  ELSE
00391 XXXXD8FD  1829 +              IR SVSRC
00392 1BXX06BF  1829 +              IDAT AMP.PORT & ALU & SRCSEL
              1829 +  ENDIF
              1829 +              ENDR
              1830                RSTNR DATAOUT,AMPCTRL
00393 15XXEFD5  1831                / & ALU & SRCCTRL
00394 BXF10C93  1832                JSB CKAMPST                                     ;201
              1833                SRC.CDC                                         ;201
00395 XXXXD81B  1833 +              RA CPPOLL
00396 1BXXD89D  1833 +              AR SVSRC & ALU & SRCSEL
              1833 +              ENDR
00397 5XXXE390  1834                TSTND SACTIVE & SRCSTAT
00398 BX23039A  1835                CJMP Z,$+2          ;DISCONN CDC IF ACTIVE
              1836                CON C.INACT                                     ;1E
00399 B5XX0000  1837                / & SRCCTRL
              1838    AMPERA8:    EQU $                                           ;201
0039A BXD3039C  1839                CJMP SRCRDY,$+2     ;REMOVE DATA FROM CDC FIFO
0039B BXF303A0  1840                JMP AMPERA9                                     ;201
0039C 4XXXF8C1  1841                NA & RDATA
0039D XXXX7140  1842                NOOP
0039E XXXX7140  1843                NOOP
0039F BXF3039A  1844                JMP AMPERA8         ;#### SHOULD HAVE TIMEOUT   ;201
              1845    AMPERA9:    EQU $                                           ;201
03A0 BXF106F0  1846                 JSB DATA.ERR        ;SET DATA ERROR            ;201
03A1 XXXXF1D9  1847                 RSTNR F.LNGRW,FLAGS                            ;1E
03A2 BXF10C50  1848                 JSB UPDSECT
03A3 BXF10A36  1849                 JSB CKCERR                                     ;201
03A4 BXF30140  1850                 JMP IDLE
              1851    ;
              1852    ; HERE AMPERIF AND CDC ARE READY
              1853    WRIT1.2:    EQU $
03A5 BXF10A2D  1854                 JSB DMINIT          ;INIT DEADMAN TIMMER       ;1D
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WRITE FUNCTIONS

003A6 XXXXD90D  1842              ZR CDCSTATE         ;CLEAR STATE REG FOR STATUS TRANSFER
                1843              SRC.CDC             ;SELECT CDC AS SOURCE                  ;201
003A7 XXXXD81B  1843 +            RA CPPULL
003A8 1BXXD89D  1843 +            AR SVSRC & ALU & SRCSEL
                1843 +            ENDA
003A9 BXF1045F  1844              JSB WRTXMT          ;TRANSMIT DATA BLOCK
003AA BX2303AC  1845              CJMP Z,$+2          ;GOOD TRANSMIT
003AB BX730391  1846              CJMP N,AMPERRA      ;AMPERIF ABORTED WRITE
003AC BXF1048E  1847              JSB SEN.ADDR        ;SEND THE ADDRESS DATA
003AD BX2303AF  1848              CJMP Z,$+2          ;GOOD WRITE (NO AMPERIF ERRORS)
003AE BX730391  1849              CJMP N,AMPERRA      ;AMPERIF ABORTED WRITE
003AF XXXXE9F9  1850              TSTNR F.LRGSEC,FLAGS                               ;1F
003B0 BX230382  1851              CJMP Z,$+2
003B1 BXF3042D  1852              JMP WRIT3.1         ;JUMP IF LARGE SECTOR MODE
003B2 BXF104C5  1853              JSB WRTPAD          ;PAD TO LARGE SECTOR SIZE
003B3 BX2303B5  1854              CJMP Z,$+2
003B4 BX730391  1855              CJMP N,AMPERRA      ;AMPERIF ABORTED WRITE
                1856              CON TEMPCKS         ;DOUBLE CHECKSUM IF WRITE IS NORMAL SECTOR
003B5 B2XX0004  1857              / & WCAR
003B6 3XXXF8C1  1858              HA & RCACHE
003B7 XXXX9883  1859              TORAR ADD,TEMP3
                1860              CON TEMPCKS+1
003B8 B2XX0005  1861              / & WCAR
003B9 3XXXF8C1  1862              HA & RCACHE
003BA XXXX9883  1863              TORAR ADD,TEMP3
003BB BXF1048E  1864              JSB SEN.ADDR        ;SENDTHE ADDRESS DATA
003BC BX23038E  1865              CJMP Z,$+2          ;GOOD WRITE (NO AMPERIF ERRORS)
003BD BX730391  1866              CJMP N,AMPERRA      ;AMPERIF ABORTED WRITE
003BE BXF10C50  1867              JSB UPDSECT         ;UPDATE TO NEXT SECTOR
003BF XXXXDD72  1868              INCR CNTR2          ;INCREMENT LONG WRITE COUNTER
003C0 XXXX9514  1869              TORIY EXOR,CDCFNC   ;CHECK FOR WRITE LAST SECTOR
003C1 XXXX001D  1870              IDAT CF.WRTL                                       ;1E
003C2 BX230444  1871              CJMP Z,WRIT4.1      ;TERMINATE WRITE AND WAIT FOR STATUS
003C3 BXF10A36  1872              JSB CKCERR          ;CHECK FOR CDC DATA CHANNEL PARITY ERRORS
003C4 BX730444  1873              CJMP N,WRIT4.1      ;TERMINATE WRITE AND WAIT FOR STATUS IF SO
003C5 XXXXC38D  1874              LD2NR BIT1,CDCSTATE ;SET STATE TO 2 TO SEND STATUS
003C6 XXXXD9E9  1875              IR TIMEOUT          ;SET TIMER TO APROX 100 U SEC          ;201
003C7 XXXX0070  1876              IDAT H#070          ;OF TIME WAITING FOR STATUS FNC
                1877  WRITE7:     EQU $                                              ;201
003C8 1XXXD84D  1878              RA CDCSTATE
003C9 BX2303D2  1879              CJMP Z,WRIT1.2X     ;EXIT LOOP IF STATUS RESPONSE IS COMPLETE
003CA XXXX950D  1880              TORIY EXOR,CDCSTATE ;TEST STATE REG
003CB XXXX0002  1881              IDAT 2
003CC BX2303CE  1882              CJMP Z,$+2
003CD BXF303D0  1883              JMP $+3
003CE XXXXC1E9  1884              DECR TIMEOUT                                       ;201
003CF BX23040F  1885              CJMP Z,WRIT2.6      ;EXIT IF TIMEOUT WAITING FOR STATUS FNC
003D0 BXF104E0  1886              JSB PROCSST
003D1 BXF303C8  1887              JMP WRITE7          ;WAIT FOR STATUS TO BE SENT            ;201
                1888  WRIT1.2X:   EQU $
003D2 XXXXF1F9  1889              TSTNR F.LNGRW,FLAGS ;CHECK FOR LONG WRITE MODE             ;1E
003D3 BX2303D5  1890              CJMP Z,$+2
003D4 BXF303FB  1891              JMP WRIT2.1X
                1892  ; THIS IS A ENTRY FOR WRITE LAST SECTOR AFTER SEND TRUNC
                1893  WRIT4.2:    SRC.AMP             ;AMP AS SOURCE                         ;201
```

Addr Line - AMPERIF /155/805 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
              1893 +  IF BANK_EQ_0
              1893 +  ELSE
003D5 XXXXD8FD 1893 +           IR SVSRC
003D6 18XX000F 1893 +           IDAT AMP.PORT & ALU & SRCSEL
              1893 +  ENDIF
              1893 +          ENDM
              1894            DST.AMP                                          ;201
              1894 +  IF BANK_EQ_0
              1894 +  ELSE
003D7 XXXXD8FE 1894 +           IR SVDST
003D8 1CXX000F 1894 +           IDAT AMP.PORT & ALU & DSTSEL
              1894 +  ENDIF
              1894 +          ENDM
003D9 BXF1044E 1895             JSB WAITAMP
003DA BX730391 1896             CJMP N,AMPERRA                                   ;201
               1897             RSTNR DATAOUT,AMPCTRL
003DB 15XXEFD5 1898             / & ALU & SRCCTRL
003DC XXXXF1D9 1899             RSTNR F.LNGRM,FLAGS                              ;1E
               1900   WRIT4.2A: EQU $           ;SET AMP TIME-OUT               ;1D
003DD XXXXD8E0 1901             IR TEMP0        ;WAIT TOO LONG VALUE            ;1D
003DE XXXX0400 1902             IDAT H#0400     ;ABOUT 100MS                    ;1D
               1903   WRIT4.2B: EQU $           ;SET RESP TO OTHER TIME-OUT     ;1D
               1904             SRC.AMP                                          ;201
               1904 +  IF BANK_EQ_0
               1904 +  ELSE
003DF XXXXD8FD 1904 +           IR SVSRC
003E0 1BXX000F 1904 +           IDAT AMP.PORT & ALU & SRCSEL
               1904 +  ENDIF
               1904 +          ENDM
003E1 XXXXD8E9 1905             IR TIMEOUT                                       ;201
003E2 XXXX0100 1906             IDAT H#0100     ;RESPOND TO OTHER CHANNELS
               1907   WRIT4.2C: EQU $           ;WAIT FOR STATUS (EC) FROM AMP  ;1D
003E3 XXXXC1E9 1908             DECR TIMEOUT    ;CHECK IF TIME TO RESPOND TO OTHERS ;201
003E4 BX2303E8 1909             CJMP Z,WRIT4.2D ;                               ;1D
               1910             TSTND ST.BK2
003E5 5XXXE390 1911             / & SRCSTAT     ;
003E6 BX2303E3 1912             CJMP Z,WRIT4.2C ;#### SHOULD HAVE TIMEOUT       ;1D
003E7 BXF303FB 1913             JMP WRIT4.2E    ;GOT STATUS                     ;1D
               1914   WRIT4.2D: EQU $           ;RESPONDING TO OTHER CHANNELS   ;1D
003E8 BXF10A48 1915             JSB RSP.2DTH
003E9 XXXXC1E0 1916             DECR TEMP0      ;CHECK IF TOO LONG WITHOUT THE AMP STAT ;1D
003EA BX2303EC 1917             CJMP Z,$+2      ;                               ;1D
003EB BXF303DF 1918             JMP WRIT4.2B    ;RESELECT AND WAIT              ;1D
               1919             SETNR URSPTO,AMPCTRL
003EC 15XXF5B5 1920             / & ALU & SRCCTRL  ;SET U-TIME OUT TO WAKE UP AMP ;1D
003ED XXXX7140 1921             NOOP                                             ;1D
               1922             RSTNR URSPTO,AMPCTRL
003EE 15XXF5D5 1923             / & ALU & SRCCTRL                                ;1D
003EF BXF303DD 1924             JMP WRIT4.2A    ;AND START WAIT AGAIN           ;1D
               1925   WRIT4.2E: EQU $           ;READ AMP STATUS                ;1D
003F0 BXF10C93 1926             JSB CKAMPST                                      ;201
003F1 BXF30140 1927             JMP IDLE
               1928   ;
003F2 XXXX950D 1929   AMPERRB:  TORIY EXOR,CDCSTATE ;CHECK STATE TO SEE IF STATUS HAS BEEN SENT
003F3 XXXX0002 1930             IDAT 2
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
003F4 BX2303F9  1931              CJMP Z,AMPER3.1
003F5 1XXXD84D  1932              RH CDCSTATE         ;MAKE SURE STATE = ZERO
003F6 BX230391  1933              CJMP Z,AMPERRA
003F7 BXF104E9  1934              JSB PROCGST
003F8 BXF303F2  1935              JMP AMPERRB         ;WAIT FOR ZERO
003F9 BXF106D3  1936   AMPER3.1: JSB SETALERT        ;SET ERROR TO CDC
003FA BXF30391  1937              JMP AMPERRA
                1938   ;
                1939   WRIT2.1X: EQU $
003FB XXXXF8E1  1940              CA                  ;SET TO 564 SECTOR CHECK          ;201
003FC XXXX0234  1941              IDAT HSSECCNT
003FD XXXX9112  1942              TORAY EXOR,CNTR2    ;CHECK FOR MAX CDC SECTOR EQUAL 564
                1943   ;                               IF IT IS CLEAR LONG WRITE FLAG
003FE BX2303D5  1944              CJMP Z,WRIT4.2      ;GO WAIT FOR STATUS
                1945   WRIT2.4:  EQU $
003FF BXF10A4B  1946              JSB RSP.20TH        ;REPLY TO OTHER CDC CHANNELS
00400 XXXXD8E9  1947              IR TIMEOUT                                            ;201
00401 XXXX0EA6  1948              IDAT H#0EA6         ;SET MAX WAIT FOR 3 MIL SEC
                1949   WRIT2.5:  SRC.CDC             ;SELECT CDC                       ;201
00402 XXXXD81B  1949 +            RA CPPOLL
00403 1BXXD89D  1949 +            AR SVSRC & ALU & SRCSEL
                1949 +            ENDM
                1950              TSTND SFUNC         ;TEST FOR FUNCTION
00404 5XXXE190  1951              / & SRCSTAT
00405 BX23041B  1952              CJMP Z,WRIT2.7
00406 4XXXF0C1  1953              RA & RDATA
00407 BXF10A38  1954              JSB CKCERR2                                           ;201
00408 BX73040F  1955              CJMP N,WRIT2.6      ;IF PARITY ERROR, EXIT            ;201
00409 XXXXE500  1956              TOAI EXOR,MRY       ;TEST FOR WRITE
0040A XXXX0005  1957              IDAT CF.WRT                                           ;1E
0040B BX230424  1958              CJMP Z,WRIT2.8
0040C XXXXE500  1959              TOAI EXOR,MRY       ;TEST FOR WRITE LAST SECTOR
0040D XXXX001D  1960              IDAT CF.WRTL                                          ;1F
0040E BX230424  1961              CJMP Z,WRIT2.8
                1962   WRIT2.6:   SRC.AMP             ;IF NOT WRITE SELECT AMPERIF      ;201
                1962 +  IF BANK_EQ_0
                1962 +  ELSE
0040F XXXXD8FD  1962 +            OR SVSRC
00410 1BXX000F  1962 +            IDAT AMP.PORT & ALU & SRCSEL
                1962 +  ENDIF
                1962 +            ENDM
                1963              DST.AMP             ;WAIT FOR FIFO TO EMPTY           ;201
                1963 +  IF BANK_EQ_0
                1963 +  ELSE
00411 XXXXD8FE  1963 +            OR SVDST
00412 1CXX000F  1963 +            IDAT AMP.PORT & ALU & DSTSEL
                1963 +  ENDIF
                1963 +            ENDM
00413 BXF1044E  1964              JSB WAITAMP
00414 BX730391  1965              CJMP N,AMPERRA                                        ;201
                1966              SETNR URSPTO,AMPCTRL
00415 15XXF5B5  1967              / & ALU & SRCCTRL
00416 XXXXF1D9  1968              RSTNR F.LNGRW,FLAGS ;AND TERMINATE LONG WRITE         ;1E
                1969              RSTNR URSPTO,AMPCTRL
00417 15XXF5D5  1970              / & ALU & SRCCTRL
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
00418 XXXXF7B9  1971              SETNR F.STPEND,FLAGS;SET STATUS PENDING                ;1F
                1972              RSTNR DATAOUT,AMPCTRL                                 ;201
00419 15XXEFD5  1973              / & ALU & SRCCTRL
0041A BXF303D5  1974              JMP WRIT4.2       ;WAIT FOR STATUS GO TO IDLE
                1975  WRIT2.7:    EQU $
0041B XXXXC1E9  1976              DECR TIMEOUT                                          ;201
0041C BX23040F  1977              CJMP Z,WRIT2.6    ;TIME OUT
                1978              SRC.AMP           ;SELECT AMP AND CHECK FOR STATUS    ;201
                1978 +  IF BANK_EQ_0
                1978 +  ELSE
0041D XXXXD8FD  1978 +            IR SVSRC
0041E 18XX000F  1978 +            IDAT AMP.PORT & ALU & SRCSEL
                1978 +  ENDIF
                1978 +            ENDM
0041F 5XXXE398  1979              TSTND ST.BK2 & SRCSTAT
00420 BX230402  1980              CJMP Z,WRIT2.5
00421 XXXXF1D9  1981              RSTNR F.LNGRW,FLAGS ;RESET LONG WRITE FLAG            ;1E
00422 BXF10C93  1982              JSB CKAMPST       ;AMPERIF ERROR GET STATUS           ;201
00423 BXF30140  1983              JMP IDLE                                              ;201
                1984  WRIT2.8:    EQU $
00424 XXXXD694  1985              AR CDCFNC         ;SAVE FUNCTION
00425 BXF10A18  1986              JSB TRACE.S       ;COPY TO TRACE BUFFER               ;203
                1987              CON C.INACT+C.FIFO ;REPLY TO FUNCTION                 ;1E
00426 B5XX0001  1988              / & SRCCTRL
                1989              DMRINIT                                               ;201
00427 XXXXD99F  1989 +            LD2NR BIT12,DEADMAN
                1989 +            ENDM
00428 XXXXC1FF  1990              DECR DEADMAN                                          ;1C
00429 BX210A24  1991              CJSB Z,DEADCK                                         ;1C
                1992              TSTND SACTIVE     ;WAIT FOR ACTIVE
0042A 5XXXE390  1993              / & SRCSTAT
0042B BX230428  1994              CJMP Z,$-3                                            ;1C
0042C BXF303A5  1995              JMP WRIT1.2
                1996  ;
                1997  WRIT3.1:    EQU $
0042D BXF10C50  1998              JSB UPDSECT       ;UPDATE TO NEXT SECTOR
0042E XXXXDD72  1999              INCR CNTR2        ;INCREMENT LONG WRITE COUNTER
0042F XXXXDD65  2000              INCR TEMP5        ;INCREMENT SECTOR COUNTER FOR LARGE SEC MODE
00430 XXXX9505  2001              TORIY EXOR,TEMP5  ;CHECK FOR LAST SECTOR DONE
00431 XXXX0004  2002              IDAT 4
00432 BX230434  2003              CJMP Z,$+2        ;WAIT FOR STATUS IF LAST
00433 BXF303A5  2004              JMP WRIT1.2
00434 XXXXD985  2005              ZR TEMP5          ;CLEAR FOUR SECTOR COUNTER
00435 BXF10A36  2006              JSB CKCERR        ;CHECK FOR CDC DATA CHANNEL PARITY ERRORS
00436 BX730444  2007              CJMP N,WRIT4.1    ;TERMINATE WRITE AND WAIT FOR STATUS IF SO
00437 XXXXC38D  2008              LD2NR BIT1,CDCSTATE ;SET STATE TO SEND STATUS
00438 XXXXDBE9  2009              IR TIMEOUT        ;SET TIMER TO APROX 100 U SEC       ;201
00439 XXXXFF70  2010              IDAT H#FF70       ;OF TIME WAITING FOR STATUS FNC     ;201
                2011  WRITE5:     EQU $                                                 ;201
0043A 1XXXD84D  2012              RH CDCSTATE
0043B BX2303FB  2013              CJMP Z,WRIT2.1X   ;EXIT LOOP IF STATUS RESPONSE IS COMPLETE
0043C XXXX950D  2014              TORIY EXOR,CDCSTATE ;TEST STATE REG
0043D XXXX0002  2015              IDAT 2
0043E BX230440  2016              CJMP Z,$+2
0043F BXF30442  2017              JMP $+3
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WRITE FUNCTIONS

00440 XXXXC1E9  2018              DECR TIMEOUT                                          ;201
00441 BX23040F  2019              CJNP Z,WRIT2.6      ;EXIT IF TIMEOUT WAITING FOR STATUS FNC
00442 BXF104E0  2020              JSB PROCGST
00443 BXF3043A  2021              JNP WRITE5          ;WAIT FOR STATUS TO BE SENT       ;201
                2022    ;
                2023    ; THE LAST FUNCTION WAS A WRITE LAST SECTOR, SO TERMINATE AMPERIF AND WAIT
                2024    ; FOR STATUS
                2025    WRIT4.1:    EQU $
                2026              SRC.AMP           ;IF NOT WRITE SELECT AMPERIF      ;201
                2026 +  IF BANK_EQ_0
                2026 +  ELSE
00444 XXXXD8FD  2026 +              IR SVSRC
00445 1BXX800F  2026 +              IDAT AMP.PORT & ALU & SRCSEL
                2026 +  ENDIF
                2026 +              ENDM
                2027              DST.AMP                                           ;201
                2027 +  IF BANK_EQ_0
                2027 +  ELSE
00446 XXXXD8FE  2027 +              IR SVDST
00447 1CXX800F  2027 +              IDAT AMP.PORT & ALU & DSTSEL
                2027 +  ENDIF
                2027 +              ENDM
00448 BXF1044E  2028              JSB WAITAMP
00449 BX730391  2029              CJNP N,AMPERRA                                    ;201
                2030              SETNR URSPTO,AMPCTRL
0044A 15XXF5B5  2031              / & ALU & SRCCTRL
0044B XXXXF1D9  2032              RSTNR F.LNGRW,FLAGS ;AND TERMINATE LONG WRITE     ;1E
                2033              RSTNR URSPTO,AMPCTRL
0044C 15XXF5D5  2034              / & ALU & SRCCTRL
0044D BXF303D5  2035              JNP WRIT4.Z         ;IN NORMAL WRITE EXIT
                2036    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WRITE FUNCTIONS

               2037                EJECT
               2038    ;
               2039    ; WAIT FOR AMPERIF WRITE TO COMPLETE
               2040    ;
               2041    ; CHECK UBI DESTINATION STATUS FOR ANY DATA READY FOR THE XMC
               2042    ; BUT NOT YET READ.
               2043    ;
               2044    WAITAMP:    EQU $                                                   ;201
0044E XXXXD8E9 2045                IR TIMEOUT          ;WAIT FOR MAXIMUM OF 46 MS          ;201
0044F XXXXFFFF 2046                IDAT H#FFFF                                             ;201
               2047    WAITAMP1:   EQU $                                                   ;201
00450 6XXXF8C1 2048                HA & DSTSTAT
00451 XXXXE4C0 2049                TOAC AND,NRY
00452 XXXX0067 2050                IDAT AD.OUT.M       ;ANY OUTPUT WAITING STATUS MASK     ;201
00453 8X230457 2051                CJMP Z,WAITAMP2                                         ;201
00454 XXXXC1E9 2052                DECR TIMEOUT                                            ;201
00455 8X230458 2053                CJMP Z,WAITAMP9     ;SOMETHING'S GONE WRONG, ERROR      ;201
00456 8XF30450 2054                JMP WAITAMP1                                            ;201
               2055    WAITAMP2:   EQU $                                                   ;201
00457 XXXXF8E1 2056                IA
00458 XXXX006E 2057                IDAT 110            ;DELAY 110 U-SEC                    ;201
00459 8XF10F0F 2058                JSB DELAY
0045A 1XFAF900 2059                ZH & RTN            ;SET ZERO FLAG AND RETURN           ;201
               2060    WAITAMP9:   EQU $                                                   ;201
0045B 15XXF5B5 2061                SETNR URSPTO,AMPCTRL & ALU & SRCCTRL                    ;201
0045C XXXX7140 2062                NOOP                ;SET U-BUS RESPONSE TIMEOUT         ;201
0045D 15XXF5D5 2063                RSTNR URSPTO,AMPCTRL & ALU & SRCCTRL                    ;201
0045E 1XFAF800 2064                N1H & RTN           ;SET NEG FLAG AND RETURN            ;201
               2065    ;
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WRITE FUNCTIONS

               2066                EJECT
               2067    ;
               2068    ; WRITE TRANSMIT
               2069    ;
               2070    ; TRANSFER A SECTOR OF DATA FROM HOST CHANNEL (CDCI) TO AMPERIF (UB1).
               2071    ;
               2072    WRTXMT:     EQU $
               2073    ; START HIGH SPEED TRANSFER
               2074                SRC.CDC                                          ;201
0045F XXXXD81B 2074 +              RA CPPOLL
00460 1BXXD89D 2074 +              AR SVSRC & ALU & SRCSEL
               2074 +              ENDM
               2075                DST.AMP                                          ;201
               2075 +  IF BANK_EQ_0
               2075 +  ELSE
00461 XXXXD8FE 2075 +              IR SVDST
00462 1CXX00FF 2075 +              IDAT AMP.PORT & ALU & DSTSEL
               2075 +  ENDIF
               2075 +              ENDM
00463 XXXXD903 2076                ZR TEMP3            ;CLEAR CHECKSUM REG
               2077                RH WRDCNT           ;SET COUNT OF WORDS TO TRANSFER
00464 18F4D84A 2078                / & PUSHLOCT
               2079    ; TOP OF LOOP FOR TRANSFERING ONE 12-BIT WORD, RFCT JUMPS HERE
00465 BXE3046F 2080                CJMP DSTSRC,WRTXMT.1
00466 BXE3046F 2081                CJMP DSTSRC,WRTXMT.1
00467 BXE3046F 2082                CJMP DSTSRC,WRTXMT.1;WAIT FOR READY
00468 BXE3046F 2083                CJMP DSTSRC,WRTXMT.1
00469 BXE3046F 2084                CJMP DSTSRC,WRTXMT.1
0046A BXE3046F 2085                CJMP DSTSRC,WRTXMT.1
0046B BXE3046F 2086                CJMP DSTSRC,WRTXMT.1
0046C BXE3046F 2087                CJMP DSTSRC,WRTXMT.1
0046D BXE3046F 2088                CJMP DSTSRC,WRTXMT.1
0046E BXF30474 2089                JMP WRTXMT.2        ;CDC/AMP NOT BOTH READY, GO CHK WHY
               2090    ; TRANSFER A WORD
0046F 44XXF8C1 2091    WRTXMT.1:   RA & RDATA & WDATA  ;INPUT CDC PARCEL AND SEND TO AMP
00470 XXXX7140 2092                NOOP
00471 XXXX7140 2093                NOOP
               2094                TORAR ADD,TEMP3     ;ADD TO CHECKSUM AND GOTO TOP OF LOOP
00472 XXX89883 2095                / & RFCT            ;UNTIL CNT = 0
               2096    ; ALL WORDS TRANSFERED, RETURN WITH ZERO FLAG
00473 1XFAF900 2097                ZH & RTN            ;SET ZERO FLAG AND RETURN
               2098    ; NOT READY TO TRANSFER A WORD, FIND OUT WHY
               2099    WRTXMT.2:   EQU $
               2100                DMRINIT             ;RESET LOW-ORDER DEADMAN TIME    ;201
00474 XXXXD99F 2100 +              LD2MR BIT12,DEADMAN
               2100 +              ENDM
               2101    WRTXMT.3:   EQU $                                            ;201
00475 XXXXD8E9 2102                IR TIMEOUT          ;SET UP TIMEOUT COUNT        ;201
00476 XXXX1000 2103                IDAT H#1000         ;OF ABOUT 4.5MS TO RESPOND TO OTHERS
00477 BXE3046F 2104    WRTXMT.4:   CJMP DSTSRC,WRTXMT.1;BOTH READY, GO BACK TO TRANSFERING
00478 BXC30466 2105                CJMP DSTRDY,WRTXMT.5;AMPERIF IS READY SO CHECK CDC
               2106    ; AMPERIF ISN'T READY, IF NO INTERRUPT, WAIT AND MAYBE RESP TO OTHERS
               2107                SRC.AMP             ;IF EI FROM AMP...           ;201
               2107 +  IF BANK_EQ_0
               2107 +  ELSE
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
0047A XXXXD8FD  2107 +              IR SVSRC
0047A 1DXX000F  2107 +              IDAT AMP.PORT & ALU & SRCSEL
                2107 +  ENDIF
                2107 +              ENDM
                2108                TSTND ST.BK2
0047B 5XXXE390  2109                / & SRCSTAT
0047C 0X2304/F  2110                CJMP Z,$+3
0047D 0XFB047E  2111                POPJMP $+1          ;POP THE TOP OF LOOP FROM THE STACK     ;201
0047E 1XFAF800  2112                NUL & RTN           ;SET NEG FLAG AND RETURN
                2113                SRC.CDC             ;RESET SOURCE                           ;201
0047F XXXXD818  2113 +              RA CPPOLL
00480 1BXXD89D  2113 +              AR SVSRC & ALU & SRCSEL
                2113 +              ENDM
00481 XXXXC1E9  2114                DECR TIMEOUT                                                ;201
00482 0X230484  2115                CJMP Z,$+2          ;TIME-OUT,
00483 0XF30477  2116                JMP WRTXMT.4
00484 0XF10A4B  2117                JSB RSP.20TH        ;RESPOND TO OTHER CHANNELS
00485 0XF30475  2118                JMP WRTXMT.3        ;#### SHOULD HAVE TIMEOUT               ;201
                2119    ; CDC ISN'T READY, IF NOT INACTIVE, WAIT AND DO TIMEOUT CHECK
                2120    WRTXMT.5:   EQU $
00486 XXXXC1FF  2121                DECR DEADMAN        ;ACTIVATE DEADMAN TIMER
00487 0X210A24  2122                CJSB Z,DEADCK       ;DEADMAN TIME-OUT (5.1 SEC)
00488 5XXXE590  2123                TSTND SINACT & SRCSTAT
00489 0X230475  2124                CJMP Z,WRTXMT.3     ;IF CDC IS ACTIVE RESET TIMER AND WAIT  ;201
                2125    ; CDC HAS GONE INACTIVE, IF AMP IS READY, JUST WRITE ZEROS
0048A 0XC3048C  2126                CJMP DSTRDY,$+2
0048B 0XF30477  2127                JMP WRTXMT.4
                2128                ZH                  ;CDC HAS GONE INACTIVE, WRITE ZEROS
0048C 14X8F900  2129                / & WDATA & RFCT
0048D 1XFAF909  2130                ZH & RTN            ;IF ALL WRITTEN, RETURN WITH Z FLAG
                2131    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
              2132                EJECT
              2133    ;
              2134    ; SEND RELATIVE WORD ADDRESS TO AMPERIF
              2135    ;
              2136    SEN.ADDR:   EQU $
              2137                DST.AMP                                          ;201
              2137 +  IF BANK_EQ_0
              2137 +  ELSE
0048E XXXXD8FE 2137 +             IR SVDST
0048F 1CXX800F 2137 +             IDAT AMP.PORT & ALU & DSTSEL
              2137 +  ENDIF
              2137 +              ENDM
00490 XXXXD80E 2138               RA CKCYL
00491 XXXX9883 2139               TORAR ADD,TEMP3
00492 BXF104AC 2140               JSB SEN.ONE          ;OUTPUT 12 OF CDC CYLINDER
00493 BX230495 2141               CJMP Z,$+2
00494 XX7AXXXX 2142               CRTN N               ; (AMP ERROR)
00495 XXXXD80F 2143               RA CKSECTRK
00496 XXXX9883 2144               TORAR ADD,TEMP3
00497 BXF104AC 2145               JSB SEN.ONE          ;OUTPUT 12 BITS OF CDC SECTOR/TRACK
00498 BX23049A 2146               CJMP Z,$+2
00499 XX7AXXXX 2147               CRTN N               ; (AMP ERROR)
0049A XXXXD803 2148               RA TEMP3
0049B XXXXE4C1 2149               TOA1 AND,NRA
0049C XXXXF000 2150               IDAT H#F000
0049D XXXXE99D 2151               RTAA 4
0049E BXF104AC 2152               JSB SEN.ONE          ;OUTPUT UPPER 4 BITS OF CHECK SUM
0049F BX2304A1 2153               CJMP Z,$+2
004A0 XX7AXXXX 2154               CRTN N               ; (AMP ERROR)
              2155                CON TEMPCKS
004A1 82XX0004 2156               / & WCAR
004A2 13XXF860 2157               AH & WCACHE
004A3 XXXXD803 2158               RA TEMP3
004A4 XXXXE4C1 2159               TOA1 AND,NRA
004A5 XXXX0FFF 2160               IDAT H#0FFF
004A6 BXF104AC 2161               JSB SEN.ONE          ;OUTPUT LOWER 12 BITS OF CHECK SUM
004A7 BX2304A9 2162               CJMP Z,$+2
004A8 XX7AXXXX 2163               CRTN N               ; (AMP ERROR)
              2164                CON TEMPCKS+1
004A9 82XX0005 2165               / & WCAR
004AA 13XXF080 2166               AH & WCACHE
004AB 1XFAF900 2167               ZH & RTN             ;RETURN WITH ZERO FLAG SET
              2168    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
              2169                EJECT
              2170    ;
              2171    SEN.ONE:    EQU $
004AC XXXXD8E9 2172               IR TIMEOUT                                    ;201
004AD XXXX1000 2173               IDAT H#1000
004AE BXC304B4 2174    SEN.ON.5:  CJMP DSTRDY,SEN.ON.1                          ;201
              2175                SRC.AMP                                       ;201
              2175 +  IF BANK_EQ_0
              2175 +  ELSE
004AF XXXXD8FD 2175 +             IR SVSRC
004B0 18XX000F 2175 +             IDAT AMP.PORT & ALU & SRCSEL
              2175 +  ENDIF
              2175 +              ENDM
004B1 5XXXE390 2176               TSTND ST.BK2 & SRCSTAT
004B2 8X2304B7 2177               CJMP Z,SEN.ON.2
004B3 BXF304C2 2178               JMP SEN.ON.3
              2179    SEN.ON.1:   EQU $                                         ;201
004B4 14XXF880 2180               AH & WDATA          ;OUTPUT 12 BITS OF DATA
004B5 1XXXF900 2181               ZH                  ;SET ZERO FLAG AND RETURN
004B6 XXFAXXXX 2182               RTN
              2183    ; WAIT FOR AMP TO BE READY, MAYBE RESPOND TO OTHERS WHILE WAITING
              2184    SEN.ON.2:   EQU $
              2185                DST.AMP                                       ;201
              2185 +  IF BANK_EQ_0
              2185 +  ELSE
004B7 XXXXD8FE 2185 +             IR SVDST
004B8 1CXX000F 2185 +             IDAT AMP.PORT & ALU & DSTSEL
              2185 +  ENDIF
              2185 +              ENDM
004B9 XXXXC1E9 2186               DECR TIMEOUT                                  ;201
004BA BX2304BC 2187               CJMP Z,SEN.ON.4
004BB BXF304AE 2188               JMP SEN.ON.5
004BC BXF10A4B 2189    SEN.ON.4:  JSB RSP.20TH        ;REPLY WHILE WAITING
              2190                SRC.CDC                                       ;201
004BD XXXXD81B 2190 +             RA CPPOLL
004BE 18XXD89D 2190 +             AR SVSRC & ALU & SRCSEL
              2190 +              ENDM
              2191                DST.AMP                                       ;201
              2191 +  IF BANK_EQ_0
              2191 +  ELSE
004BF XXXXD8FE 2191 +             IR SVDST
004C0 1CXX000F 2191 +             IDAT AMP.PORT & ALU & DSTSEL
              2191 +  ENDIF
              2191 +              ENDM
004C1 BXF304AC 2192               JMP SEN.ONE         ;#### SHOULD HAVE TIMEOUT
              2193    ;
004C2 XXXXF8E0 2194    SEN.ON.3:  IH
004C3 XXXX8000 2195               IDAT H#8000
004C4 XXFAXXXX 2196               RTN
              2197    ;
```

```
 Addr      Line - AMPERIF /155/885 EMULATION - HSP ONLINE -    WRITE FUNCTIONS

           2198              EJECT
           2199    ;
           2200    ; WRITE PAD
           2201    ;
           2202    ; WRITE ZEROS TO AMP TO PAD SECTOR TO LARGE SECTOR LENGTH
           2203    ;
           2204    WRTPAD:     EQU $
004C5 XXXXD8E9  2205              CR T(MEOUT                                    ;201
004C6 XXXX1000  2206              IDAT H#1000         ;#### VALUES DIFFER (SEE BELOW)
004C7 88F40011  2207              CON 17 & PUSHLDCT
           2208    ; START OF LOOP
           2209    WRTPAD1:    EQU $
004C8 BXF104E0  2210              JSB PROCGST         ;PROCESS GENERAL STATUS IF PRESENT
           2211              DST.AMP                                       ;201
           2211 +  IF BANK_EQ_0
           2211 +  ELSE
004C9 XXXXD8FE  2211 +            CR SVDST
004CA 1CXX000F  2211 +            IDAT AMP.PORT & ALU & DSTSEL
           2211 +  ENDIF
           2211 +            ENDM
004CB XXXX7140  2212              NOOP
004CC BXC304DE  2213              CJMP DSTRDY,WRTPAD6
           2214              SRC.AMP                                       ;201
           2214 +  IF BANK_EQ_0
           2214 +  ELSE
004CD XXXXD8FD  2214 +            CR SVSRC
004CE 1BXX000F  2214 +            IDAT AMP.PORT & ALU & SRCSEL
           2214 +  ENDIF
           2214 +            ENDM
           2215              TSTND ST.BK2
004CF 5XXXE390  2216              / & SRCSTAT         ;CHECK FOR ERRORS
004D0 BX2304D3  2217              CJMP Z,$+3                                    ;201
004D1 BXFB04D2  2218              POPJMP $+1          ;POP THE STACK            ;201
004D2 1XFAF800  2219              NIH & RTN           ;SET NEG AND RTN          ;201
           2220    ; WAIT FOR AMP READY, MAYBE RESPOND TO OTHERS WHILE WAITING
004D3 XXXXC1E9  2221              DECR T(MEOUT                                  ;201
004D4 BX2304D6  2222              CJMP Z,$+2
004D5 BXF304C8  2223              JMP WRTPAD1
004D6 BXF10A4B  2224              JSB RSP.ZOTH
           2225              SRC.CDC                                       ;201
004D7 XXXXD81B  2225 +            RA CPPULL
004D8 1BXXD89D  2225 +            AR SVSRC & ALU & SRCSEL
           2225 +            ENDM
           2226              DST.AMP                                       ;201
           2226 +  IF BANK_EQ_0
           2226 +  ELSE
004D9 XXXXD8FE  2226 +            CR SVDST
004DA 1CXX000F  2226 +            IDAT AMP.PORT & ALU & DSTSEL
           2226 +  ENDIF
           2226 +            ENDM
004DB XXXXD8E9  2227              CR T(MEOUT
004DC XXXX0100  2228              IDAT H#0100         ;#### VALUES DIFFER (SEE ABOVE)
004DD BXF304C8  2229              JMP WRTPAD1         ;#### SHOULD HAVE T(MEOUT
           2230    ; WRITE A WORD OF ZEROS TO AMPERIF
           2231    WRTPAD6:    EQU $
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - WRITE FUNCTIONS

```
              2232              ZH & WDATA
0084DE 14X8F900  2233           / & RFCT          ;RETURN TO START OF LOOP
0084DF 1XFAF900  2234           ZH & RTN          ;SET ZERO AND RETURN
              2235    ;
```

```
 Addr      Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -    WRITE FUNCTIONS

           2236                EJECT
           2237    ;
           2238    ; PROCESS GENERAL STATUS FUNCTION
           2239    ;
           2240    ; Quickly handle a general status function from CDC while doing
           2241    ; other processing.  This subroutine can be called several
           2242    ; times in a loop that has other processing in it.  The
           2243    ; general status function is processed in steps.  The register
           2244    ; CDCSTATE keeps track of what step this subroutine is at.
           2245    ; Set it to 2 to start.  When it gets to zero, all steps are
           2246    ; done.
           2247    ;
           2248    ;  CDCSTATE    Meaning
           2249    ;  2           Set before first call to PROCGST to request
           2250    ;              general status processing.  On exit, means no
           2251    ;              general status function has been seen yet.
           2252    ;  1           Set by PROCGST.  Means that a general status
           2253    ;              function has been seen and replied, to, and
           2254    ;              PROCGST is now waiting for active signal from
           2255    ;              host.
           2256    ;  0           Set before first call to PROCGST to disable
           2257    ;              general status processing, or by PROCGST to
           2258    ;              indicate that a general status function has
           2259    ;              been processed to completion.
           2260    ;
           2261    PROCGST:    EQU $
004E0 XXXX950D  2262                TORIY EXOR,CDCSTATE ;CHECK FOR STATE 2: WAITING FOR FUNCTION
004E1 XXXX0002  2263                IDAT 2
004E2 BX2304FB  2264                CJMP Z,PROCGST2
004E3 XXXX950D  2265                TORIY EXOR,CDCSTATE ;CHECK FOR STATE 1: WAITING FOR ACTIVE
004E4 XXXX0001  2266                IDAT 1
004E5 BX2304E7  2267                CJMP Z,PROCGST1
004E6 XXFAXXXX  2268                RTN
           2269    PROCGST1:   SRC.CDC                                             ;201
004E7 XXXXD81B  2269 +              RA CPPOLL
004E8 1BXXD89D  2269 +              AR SVSRC & ALU & SRCSEL
           2269 +              ENDM
           2270                TSTND SFUNC         ;IF FUNCTION PRESENT
004E9 5XXXE190  2271                / & SRCSTAT
004EA BX2304ED  2272                CJMP Z,$+3                                  ;201
004EB XXXXD8ED  2273                IR CDCSTATE         ;SET STATE BACK TO 2
004EC XXFA0002  2274                IDAT 2 & RTN        ;AND RETURN             ;201
           2275                TSTND SACTIVE       ;IS CHANNEL ACTIVE
004ED 5XXXE390  2276                / & SRCSTAT
004EE XX2AXXXX  2277                CRTN Z              ;NO SO RETURN
           2278                DST.CDC                                         ;201
004EF XXXXD81B  2278 +              RA CPPOLL
004F0 1CXXD89E  2278 +              AR SVDST & ALU & DSTSEL
           2278 +              ENDM
004F1 X4XXD811  2279                RA GENSTAT & WDATA  ;SEND STATUS            ;203
004F2 BXF10A1B  2280                JSB TRACE.U         ;COPY TO TRACE BUFFER   ;203
           2281                DNRINIT             ;RESET LOW-ORDER DEADMAN TIME ;201
004F3 XXXXD99F  2281 +              LD2NR BIT12,DEADMAN
           2281 +              ENDM
004F4 XXXXC1FF  2282                DECR DEADMAN        ;ACTIVATE DEADMAN TIMER
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     WRITE FUNCTIONS

0004F5 BX210A24  2283              CJSB Z,DEADCK       ;DEADMAN TIMEOUT (1.9 SEC)
                 2284              TSTND SEMPTY
0004F6 6XXXE990  2285              / & DSTSTAT
0004F7 BX2004F4  2286              CJMP Z,$-3
0004F8 XXXXD93D  2287              ZR CDCSTATE         ;SET STATE TO 0
                 2288              CON C.INACT         ;DONE                                   ;1E
0004F9 B6XX0000  2289              / & DSTCTRL
0004FA XXFAXXXX  2290              RTN
                 2291    PROCGST2: EQU $                                                       ;201
0004FB BXF10E84  2292              JSB CKSYSERR        ;CHECK FOR PARITY ERRORS ON TRANSFER    ;201
                 2293              SRC.CDC             ;SELECT CDC                             ;201
0004FC XXXXD81B  2293 +            RA CPPOLL
0004FD 1BXXD89D  2293 +            AR SVSRC & ALU & SRCSEL
                 2293 +            ENDA
                 2294              TSTND SFUNC         ;IS FUNCTION PRESENT
0004FE 5XXXE190  2295              / & SRCSTAT
0004FF XX2AXXXX  2296              CRTN Z              ;NO RETURN
                 2297              RR CDCFNC           ;READ FUNCTION
000500 4XXXD8D4  2298              / & RDATA
000501 BXF10A38  2299              JSB CKCERR2                                               ;201
000502 XX7AXXXX  2300              CRTN N                                                    ;201
000503 XXXX9514  2301              TORIY EXOR,CDCFNC
000504 XXXX000A  2302              IDAT CF.GSTAT       ;IS FUNCTION GENERAL STATUS?          ;1E
000505 BX230507  2303              CJMP Z,$+2
000506 XXFAXXXX  2304              RTN                 ;NO, RETURN
                 2305              CON C.INACT         ;REPLY TO FUNCTION                    ;1E
000507 B5XX0000  2306              / & SRCCTRL
000508 XXXXD814  2307              RA CDCFNC           ;WRITE TO TRACE BUFFER                ;203
000509 BXF10A18  2308              JSB TRACE.S                                               ;203
                 2309              PIR CDCSTATE        ;SET STATE TO 1 AND RETURN            ;203
00050A XXFADD0D  2310              / & RTN                                                   ;203
                 2311    ;
                 2312              TITLE2 READ FUNCTIONS
```

```
 Addr          Line - AMPERIF 7155/865 EMULATION - HSP ONLINE -     READ FUNCTIONS

               2313                EJECT
               2314    ;
00540          2315                ALIGN H#40
               2316    ;
               2317    ; ROUTINE READ WILL PROCESS READ (0004), READ FACTORY DATA (0036),
               2318    ; READ GAP SECTOR (0024), READ UTILITY MAP (0031), OR
               2319    ; READ PROTECTED SECTOR (0034).
               2320    ;
               2321    RD.FACT:    EQU $
00540 XXXX949A 2322                TORIY ADD,CURUNIT   ;SET CYLINDER TO 841                    ;202
00541 12XX0068 2323                IDAT CYL.PAR & ALU & WCAR                                   ;202
00542 B3XX0349 2324                CON CYLMAX-1 & WCACHE                                       ;202
00543 XXXX949A 2325                TORIY ADD,CURUNIT   ;SET TRACK TO 0                         ;202
00544 12XX0000 2326                IDAT TRK.PAR & ALU & WCAR                                   ;202
00545 B3XX0000 2327                CON 0 & WCACHE                                              ;202
00546 XXXX949A 2328                TORIY ADD,CURUNIT   ;SET SECTOR TO 0                        ;202
00547 12XX00A8 2329                IDAT SEC.PAR & ALU & WCAR                                   ;202
00548 B3XX0000 2330                CON 0 & WCACHE                                              ;202
00549 BXF10A48 2331                JSB SETSEEK         ;SET SEEKED FLAG                        ;201
0054A BXF30557 2332                JMP RD.PROTS
               2333    ;
               2334    READ.GAP:   EQU $
0054B XXXXED89 2335                SETNR F.GAPSEC,FLAGS                                        ;1E
0054C BXF30558 2336                JMP READ0
               2337    ; READ ERROR, DISCONNECT CDC, NOTE ERROR AND GOTO IDLE
               2338    FRDERR:     EQU $
               2339                DST.CDC                                                     ;201
0054D XXXXD81B 2339 +              RA CPPULL
0054E 1CXXD89E 2339 +              AR SVDST & ALU & DSTSEL
               2339 +              ENDM
               2340                DNRINIT                                                     ;201
0054F XXXXD99F 2340 +              LD2NR BIT12,DEADMAN
               2340 +              ENDM
00550 XXXXC1FF 2341                DECR DEADMAN                                                ;1C
00551 BX210A24 2342                CJSB Z,DEADCK                                               ;1C
               2343                TSTND SACTIVE       ;WAIT FOR ACTIVE
00552 6XXXE390 2344                / & DSTSTAT
00553 BX230550 2345                CJMP Z,$-3                                                  ;1C
               2346                CON C.INACT                                                 ;1E
00554 B6XX0000 2347                / & DSTCTRL
00555 BXF106F5 2348                JSB ADR.ERR         ;SET ADDRESS ERROR                      ;201
00556 BXF30140 2349                JMP IDLE
               2350    READ:       EQU $
               2351    RD.PROTS:   EQU $
               2352    RD.UTMAP:   EQU $
00557 XXXXED09 2353                RSTNR F.GAPSEC,FLAGS                                        ;1E
               2354    READ0:      EQU $
00558 BXF10B49 2355                JSB FNCREPLY
               2356                DST.CDC                                                     ;201
00559 XXXXD81B 2356 +              RA CPPULL
0055A 1CXXD89E 2356 +              AR SVDST & ALU & DSTSEL
               2356 +              ENDM
0055B XXXXE3F9 2357                TSTNR F.CNCTD,FLAGS                                         ;201
0055C BX23054D 2358                CJMP Z,FRDERR
0055D BXF10A45 2359                JSB CKSEEK                                                  ;201
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - READ FUNCTIONS

```
00558 BX230540  2368              CJMP Z,FRDERR                                   ;201
00559 BXF106FA  2361              JSB CLRSTAT       ;CLEAR OLD ERROR STATUS
0055A BXF1082A  2362              JSB SETWDCNT      ;SET WRDCNT FOR WORD COUNTER  ;202
0055B XXXXD905  2363              ZR TEMP5          ;CLEAR SECT COUNTER FOR LARGE SECTOR MODE
0055C XXXXD912  2364              ZR CNTR2          ;CLEAR LONG READ SECTOR COUNTER
0055D XXXXE9F9  2365              TSTNR F.LRGSEC,FLAGS;(BRANCH HERE FOR LARGE SECTOR MODE)  ;1E
0055E BX230566  2366              CJMP Z,$+2
0055F BXF30570  2367              JMP READ2
00560 XXXXE7F9  2368              TSTNR F.RDERR,FLAGS ;(TEST FOR READ ERROR STATE)  ;1E
00561 BX230569  2369              CJMP Z,$+2
00562 BXF30571  2370              JMP READ1
00563 XXXXEDF9  2371              TSTNR F.GAPSEC,FLAGS;(TEST FOR GAP SECTOR MODE)  ;1E
00564 BX23056C  2372              CJMP Z,$+2
00565 BXF30571  2373              JMP READ1
00566 XXXX9514  2374              FORIY EXOR,CDCFNC
00567 XXXX0004  2375              IDAT CF.RD        ;IS FUNCTION = READ           ;1E
00568 BX230570  2376              CJMP Z,READ2
00569 BXF30571  2377              JMP READ1
                2378  READ2:     EQU $
0056A XXXXF1B9  2379              SETNR F.LNGRW,FLAGS ;SET LONG READ MODE       ;1F
                2380  READ1:     EQU $
0056B BXF10B64  2381              JSB WTAMPST       ;IF STATUS PENDING, WAIT FOR IT  ;207
0056C XXXXD8F7  2382              IR AMPCMD         ;SET READ COMMAND
0056D XXXX000E  2383              IDAT AF.RD
0056E XXXXF1F9  2384              TSTNR F.LNGRW,FLAGS ;SET WORD LENGTH          ;1E
0056F BX230577  2385              CJMP Z,$+2
00570 BXF3057A  2386              JMP READ9                                       ;201
00571 XXXXD8F8  2387              IR AMPWLEN
00572 XXXX0074  2388              IDAT AMPSECSZ     ;WORD LENGTH OF 116 AMP WORDS  ;1E
00573 BXF3057C  2389              JMP $+3
                2390  READ9:     EQU $                                           ;201
00574 XXXXD8F8  2391              IR AMPWLEN
00575 XXXXFF90  2392              IDAT HSWDCNT      ;WORD LENGTH OF 564 CDC SECTORS  ;1E
00576 XXXXD81A  2393              RA CURUNIT
00577 XXXXD896  2394              AR AMPUNIT        ;SET UNIT FOR COMMAND WORD    ;201
00578 XXXXD90D  2395              ZR CDCSTATE       ;CLEAR STATE REG FOR STATUS TRANSFER  ;203
00579 BXF10D3A  2396              JSB ISUCMD
0057A BX730582  2397              CJMP N,$+2
0057B BXF30584  2398              JMP $+3
0057C BXF10CEA  2399              JSB CKAMPSTS
0057D BXF30571  2400              JMP READ1         ;COMMAND REJECTED
0057E BXF10D7E  2401              JSB ISUADR        ;ISSUE ADDRESS WORD
0057F BX230588  2402              CJMP Z,$+3        ;COMMAND ACCEPTED
00580 BX7305/1  2403              CJMP N,READ1      ;COMMAND REJECTED-RETRY COMMAND
00581 BXF305A0  2404              JMP AMPERR1       ;NON RECOVERABLE ERROR ABORT
                2405  ; COMMAND ISSUED, NOW WAIT FOR AMP READY OR ERRORS
                2406  READ1.1:   EQU $
00582 BXF1MA2D  2407              JSB DMINIT                                      ;1D
                2408              DST.CDC                                         ;201
00583 XXXXD81B  2408 +            RA CPPULL
00584 1CXXD89E  2408 +            AR SVDST & ALU & DSTSEL
                2408 +            ENDM
                2409              DMRINIT                                         ;201
00585 XXXXD99F  2409 +            LD2NR BIT12,DEADMAN
                2409 +            ENDM
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

00588 XXXXC1FF  2410              DECR DEADMAN                                    ;1C
00589 BX219A24  2411              CJSB Z,DEADCK                                   ;1C
                2412              TSTND SACTIVE       ;WAIT FOR ACTIVE
0058E 6XXXE390  2413              / & DSTSTAT
0058F BX23058C  2414              CJMP Z,$-3                                      ;1C
00590 XXXXF7B9  2415              SETNR F.STPEND,FLAGS                            ;1E
00591 XXXXD911  2416              ZR GENSTAT          ;CLEAR GENERAL STATUS REG
                2417    ; WAIT FOR AMP READY, MAYBE RESPOND TO OTHERS WHILE WAITING
                2419    READ1.1A: EQU $                                           ;201
                2419              DST.CDC                                         ;201
00592 XXXXD81B  2419 +            RA CPPOLL
00593 1CXXD89E  2419 +            AR SVDST & ALU & DSTSEL
                2419 +            ENDM
                2420              SRC.AMP                                         ;201
                2420 +  IF BANK_EQ_0
                2420 +  ELSE
00594 XXXXD8FD  2420 +            IR SVSRC
00595 1BXX030F  2420 +            IDAT AMP.PORT & ALU & SRCSEL
                2420 +  ENDIF
                2420 +            ENDM
00596 XXXXD8E9  2421              IR TIMEOUT                                      ;201
00597 XXXX0180  2422              IDAT H#0180         ;WHEN TIMEOUT, RESPOND TO OTHER CHNNLS
                2423    READ1.1B: EQU $                                           ;201
00598 BXD385AB  2424              CJMP SRCRDY,READ1.2 ;READY, GO TO HIGH SPEED READ LOOP
00599 XXXXC1E9  2425              DECR TIMEOUT                                    ;201
0059A BX23059C  2426              CJMP Z,$+2
0059B BXF3059E  2427              JMP $+3
0059C BXF10A4B  2428              JSB RSP.20TH
0059D BXF30592  2429              JMP READ1.1A                                    ;201
0059E 5XXXE390  2430              TSTND ST.HK2 & SRCSTAT
0059F BX230598  2431              CJMP Z,READ1.1B     ;#### SHOULD HAVE TIMEOUT   ;201
                2432    ; IF STATUS IS HERE AMPERIF HAS ABORTED THE READ TRANSFER
005A0 BXF10C93  2433    AMPERR1:  JSB CKAMPST                                     ;201
                2434              DST.CDC             ;GET STATUS DICONNECT CDC AND GOTO IDLE ;201
005A1 XXXXD81B  2434 +            RA CPPOLL
005A2 1CXXD89E  2434 +            AR SVDST & ALU & DSTSEL
                2434 +            ENDM
                2435              TSTND SACTIVE
005A3 6XXXE390  2436              / & DSTSTAT
005A4 BX2305A6  2437              CJMP Z,$+2
                2438              CON C.INACT                                     ;1E
005A5 B6XX0000  2439              / & DSTCTRL
005A6 BXF106D3  2440              JSB SETALERT        ;FORCE ERROR
005A7 XXXXF1D9  2441              RSTNR F.LNGRW,FLAGS ;CLEAR LONG READ FLAG       ;1E
005A8 XXXXE7B9  2442              SETNR F.RDERR,FLAGS ;SET READ ERROR STATE       ;201
005A9 BXF10C50  2443              JSB UPDSECT
005AA BXF30140  2444              JMP IDLE
                2445    ; HERE AMPERIF IS READY ASSUME CDC IS READY, IF NOT RDXMT WILL PROCESS
                2446    READ1.2:  EQU $
005AB XXXXD90D  2447              ZR CDCSTATE         ;ZERO CDCSTAT TO TURN OFF PROCGST   ;201
                2449              DST.CDC             ;SELECT CDC AS DEST             ;201
005AC XXXXD81B  2448 +            RA CPPOLL
005AD 1CXXD89E  2448 +            AR SVDST & ALU & DSTSEL
                2448 +            ENDM
005AE BXF10657  2449              JSB RDXMT           ;TRANSMIT DATA BLOCK
```

Addr Line - AMPERIF /155/885 EMULATION - HSP ONLINE - READ FUNCTIONS

```
005AF BX2305B1  2450              CJMP Z,$+2          ;GOOD TRANSMIT
005B0 BX7305A0  2451              CJMP N,AMPERR1      ;AMPERIF ABORTED READ
005B1 XXXXE9F9  2452              TSTNR F.LR65EC,FLAGS                          ;1E
005B2 BX2305D1  2453              CJMP Z,READ3.2D
005B3 XXXXDD72  2454              INCR CNTR2
005B4 XXXXDD65  2455              INCR TEMP5
005B5 XXXX9505  2456              TORTY EXOR,TEMP5
005B6 XXXX0004  2457              IDAT 4
005B7 BX2305B9  2458              CJMP Z,$+2
005B8 BXF305CD  2459              JMP READ3.2A        ;JUMP IF NOT LAST SECTOR
                2460              DST.CDC             ;SELECT CDC AS DEST           ;201
005B9 XXXXD81B  2460 +            RA CPPOLL
005BA 1CXXD89E  2460 +            AR SVDST & ALU & DSTSEL
                2460 +            ENDM
005BB XXXXD905  2461              ZR TEMP5
                2462              DMRINIT                                       ;201
005BC XXXXD99F  2462 +            LD2NR BIT12,DEADMAN
                2462 +            ENDM
005BD XXXXC1FF  2463              DECR DEADMAN                                  ;201
005BE BX210A24  2464              CJSB Z,DEADCK                                 ;201
                2465              TSTND RANK1EMP
005BF 6XXXEB90  2466              / & DSTSTAT
005C0 BX2305BD  2467              CJMP Z,$-3          ;WAIT FOR DATA SENT       ;201
                2468              DMRINIT                                       ;201
005C1 XXXXD99F  2468 +            LD2NR BIT12,DEADMAN
                2468 +            ENDM
005C2 XXXXC1FF  2469              DECR DEADMAN                                  ;201
005C3 BX210A24  2470              CJSB Z,DEADCK                                 ;201
                2471              TSTND SEMPTY        ;WAIT FOR EMPTY
005C4 6XXXE990  2472              / & DSTSTAT
005C5 BX2305C2  2473              CJMP Z,$-3                                    ;201
                2474              TSTND SACTIVE       ;IF ACTIVE...
005C6 6XXXE390  2475              / & DSTSTAT
005C7 BX2305C9  2476              CJMP Z,$+2
                2477              CON C.INACT         ;DEACTIVATE CDC           ;1E
005C8 86XX0000  2478              / & DSTCTRL
005C9 BXF10681  2479              JSB CK.ADDR         ;READ THE ADDRESS DATA
005CA BX2305CC  2480              CJMP Z,$+2          ;GOOD READ (NO AMPERIF ERRORS)
005CB BX7305A0  2481              CJMP N,AMPERR1      ;AMPERIF ABORTED READ
005CC BXF3063D  2482              JMP READ3.1
                2483    READ3.2A: EQU $
005CD BXF10681  2484              JSB CK.ADDR         ;READ THE ADDRESS DATA
005CE BX2305D0  2485              CJMP Z,$+2          ;GOOD READ (NO AMPERIF ERRORS)
005CF BX7305A0  2486              CJMP N,AMPERR1      ;AMPERIF ABORTED READ
005D0 BXF3064C  2487              JMP READ3.2
                2488    READ3.2D: EQU $
                2489              DST.CDC                                       ;201
005D1 XXXXD81B  2489 +            RA CPPOLL
005D2 1CXXD89E  2489 +            AR SVDST & ALU & DSTSEL
                2489 +            ENDM
                2490              DMRINIT                                       ;201
005D3 XXXXD99F  2490 +            LD2NR BIT12,DEADMAN
                2490 +            ENDM
005D4 XXXXC1FF  2491              DECR DEADMAN                                  ;1C
005D5 BX210A24  2492              CJSB Z,DEADCK                                 ;1C
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

               2493              TSTAD RANK1EMP      ;WAIT FOR CDC RANK 1 TO EMPTY
005D6 6XXXEB90 2494              / & DSTSTAT
005D7 BX2305D4 2495              CJMP Z,$-3                                        ;1C
               2496              DNR1NIT                                           ;2N1
005D8 XXXXD99F 2496 +            LD2NR BIT12,DEADMAN
               2496 +            ENDN
005D9 XXXXC1FF 2497              DECR DEADMAN                                      ;1C
005DA BX210A24 2498              CJSB Z,DEADCK                                     ;1C
               2499              TSTAD SEMPTY        ;WAIT FOR EMPTY
005DB 6XXXE990 2500              / & DSTSTAT
005DC BX2305D9 2501              CJMP Z,$-3                                        ;1C
               2502              TSTAD SACTIVE       ;IF ACTIVE...
005DD 6XXXE390 2503              / & DSTSTAT
005DE BX2305E0 2504              CJMP Z,$+2
               2505              CON C.INACT         ;DEACTIVATE CDC               ;1E
005DF 86XX0000 2506              / & DSTCTRL
005E0 BXF106B1 2507              JSB CK.ADDR         ;READ THE ADDRESS DATA
005E1 BX2305E3 2508              CJMP Z,$+2          ;GOOD READ (NO AMPERIF ERRORS)
005E2 BX7305A0 2509              CJMP N,AMPERR1      ;AMPERIF ABORTED READ
005E3 XXXXC38D 2510              LD2NR BIT1,CDCSTATE ;INITIALIZE CDCSTAT REG FOR PROCGST
005E4 BXF106BA 2511              JSB RDPAD           ;READ TO LARGE SECTOR SIZE
005E5 BX2305E7 2512              CJMP Z,$+2
005E6 BX7306AE 2513              CJMP N,AMPERR2      ;AMPERIF ABORTED READ
005E7 BXF10C50 2514              JSB UPDSECT
005E8 XXXXDD72 2515              INCR CNTR2
005E9 XXXXD8E9 2516              IR TIMEOUT          ;SET TIMER WAITING FOR CDC STATUS ;2N1
005EA XXXXFF70 2517              IDAT H#FF70                                       ;2N1
               2518 READ3.2C:    EQU $                                             ;2N1
005EB 1XXXD84D 2519              RH CDCSTATE         ;CHECK TO SEE IF GENERAL STATUS IS SENT
005EC BX2305F6 2520              CJMP Z,READ3.2B     ;STATUS SENT
005ED XXXX950D 2521              TORIY EXOR,CDCSTATE
005EE XXXX0002 2522              IDAT 2
005EF BX2305F1 2523              CJMP Z,$+2          ;NO STATUS REQUEST
005F0 BXF305F3 2524              JMP $+3
005F1 XXXXC1E9 2525              DECR TIMEOUT        ;DECREMENT TIMER              ;2N1
005F2 BX2305F5 2526              CJMP Z,$+3
005F3 BXF104E0 2527              JSB PROCGST
005F4 BXF305EB 2528              JMP READ3.2C                                      ;2N1
005F5 XXXXD90D 2529              ZR CDCSTATE
               2530 READ3.2B:    EQU $
               2531              CON WDS             ;SET PROT BIT IN EXT STATUS
005F6 B2XX00CF 2532              / & WCAR
005F7 3XXXF8C1 2533              HA & RCACHE
005F8 XXXX9514 2534              TORIY EXOR,CDCFNC   ;CHECK FOR READ PROT SECTOR
005F9 XXXX001C 2535              IDAT CF.RDP                                       ;1E
005FA BX2305FC 2536              CJMP Z,$+2
005FB BXF305FE 2537              JMP $+3
005FC 13XXF782 2538              SETNA BIT11 & ALU & WCACHE
005FD BXF305FF 2539              JMP $+2
005FE 13XXF781 2540              RSTNA BIT11 & ALU & WCACHE
005FF XXXXF1F9 2541              TSTNR F.LNGRW,FLAGS ;CHECK FOR LONG READ MODE     ;1E
00600 BX2306B2 2542              CJMP Z,$+2
00601 BXF30611 2543              JMP READ2.1X
               2544 ; THIS IS A ENTRY FOR TIMEOUT WAITING FOR NEXT FUNCTION AND NOT READ FNC
               2545 READ4.1:     EQU $
```

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 Addr      Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

00602 XXXXF1D9  2546              RSTNR F.LNGRW,FLAGS                                ;1E
                2547              DST.CDC                                            ;201
00603 XXXXD81B  2547 +            RA CPPULL
00604 1CXXD89E  2547 +            AR SVDST & ALU & DSTSEL
                2547 +            ENDM
                2548    ; WAIT FOR AMP STATUS, MAYBE RESPOND TO OTHERS WHILE WAITING
                2549    READ8:    EQU $                                              ;201
                2550              SRC.AMP           ;AMP AS SOURCE                   ;201
                2550 +  IF BANK_EQ_0
                2550 +  ELSE
00605 XXXXD8FD  2550 +            IR SVSRC
00606 1BXX080F  2550 +            IDAT AMP.PORT & ALU & SRCSEL
                2550 +  ENDIF
                2550 +            ENDM
00607 XXXXD8E9  2551              IR TIMEOUT                                         ;201
00608 XXXX0100  2552              IDAT H#0100       ;RESPOND TO OTHER CHANNELS
                2553    READ7:    EQU $                                              ;201
00609 XXXXC1E9  2554              DECR TIMEOUT                                       ;201
0060A BX23060C  2555              CJMP Z,$+2
0060B BXF3060E  2556              JMP $+3
0060C BXF10A4B  2557              JSB RSP.2OTH
0060D BXF30605  2558              JMP READ8                                          ;201
0060E 5XXXE390  2559              TSTND ST.BK2 & SRCSTAT
0060F BX230609  2560              CJMP Z,READ7      ;#### SHOULD HAVE TIMEOUT        ;201
00610 BXF30140  2561              JMP IDLE                                           ;201
                2562    ;
                2563    READ2.1X: EQU $
00611 XXXXF8E1  2564              IA                ;SET TO 564 SECTOR CHECK         ;201
00612 XXXX0234  2565              IDAT HSSECCNT
00613 XXXX9112  2566              TORAY EXOR,CNTR2  ;CHECK FOR MAX CDC SECTOR EQUAL 564
00614 BX230602  2567              CJMP Z,READ4.1    ;IF IT IS CLEAR LONG READ FLAG
00615 BXF10A4B  2568              JSB RSP.2OTH      ;REPLY TO OTHER CDC CHANNELS
00616 XXXXD8E9  2569              IR TIMEOUT                                         ;201
00617 XXXX0EA6  2570              IDAT H#0EA6       ;SET MAX WAIT FOR 3 MIL SEC
                2571    READ2.5:  SRC.CDC           ;SELECT CDC                      ;201
00618 XXXXD81B  2571 +            RA CPPULL
00619 1BXXD89D  2571 +            AR SVSRC & ALU & SRCSEL
                2571 +            ENDM
                2572              TSTND SFUNC       ;TEST FOR FUNCTION
0061A 5XXXE190  2573              / & SRCSTAT
0061B BX230628  2574              CJMP Z,READ2.7
0061C 4XXXF8C1  2575              HA & RDATA        ;GET FUNCTION
0061D BXF10A38  2576              JSB CKCERR2                                        ;201
0061E BX730622  2577              CJMP N,READ2.6    ;IF PARITY ERROR, EXIT           ;201
0061F XXXXE500  2578              TOAI EXOR,NRY     ;TEST FOR READ
00620 XXXX0004  2579              IDAT CF.RD                                         ;1E
00621 BX230632  2580              CJMP Z,READ2.8
                2581    READ2.6:  SRC.AMP           ;IF NOT READ SELECT AMPERIF      ;201
                2581 +  IF BANK_EQ_0
                2581 +  ELSE
00622 XXXXD8FD  2581 +            IR SVSRC
00623 1BXX080F  2581 +            IDAT AMP.PORT & ALU & SRCSEL
                2581 +  ENDIF
                2581 +            ENDM
                2582              SETNR URSPTO,AMPCTRL
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

00624 15XXF5B5  2583              / & ALU & SRCCTRL
00625 XXXXF1D9  2584              RSTNR F.LNGRW,FLAGS ;AND TERMINATE LONG READ              ;1E
                2585              RSTNR URSPTO,AMPCTRL
00626 15XXF5D5  2586              / & ALU & SRCCTRL
00627 BXF30602  2587              JMP READ4.1         ;GO TO IDLE
                2588    READ2.7:  EQU $
00628 XXXXC1E9  2589              DECR TIMEOUT                                            ;2H1
00629 BX230622  2590              CJMP Z,READ2.6      ;TIME OUT
                2591              SRC.AMP             ;SELECT AMP AND CHECK FOR STATUS    ;2H1
                2591 +  IF BANK_EQ_0
                2591 +  ELSE
0062A XXXXD8FD  2591 +            IR SVSRC
0062B 1BXX000F  2591 +            IDAT AMP.PORT & ALU & SRCSEL
                2591 +  ENDIF
                2591 +            ENDM
0062C 5XXXE390  2592              TSTND ST.BK2 & SRCSTAT
0062D BX230618  2593              CJMP Z,RFAD2.5
0062E XXXXF1D9  2594              RSTNR F.LNGRW,FLAGS ;RESET LONG READ FLAG               ;1E
0062F XXXXE7B9  2595              SETNR F.RDERR,FLAGS ;SET READ ERROR STATE               ;1E
00630 BXF10C93  2596              JSB CKAMPST         ;AMPERIF ERROR GET STATUS           ;2H1
00631 BXF30140  2597              JMP IDLE                                                ;2H1
00632 XXXXD894  2598    READ2.8:  AR CDCFNC
00633 BXF10A18  2599              JSB TRACE.S         ;COPY TO TRACE BUFFER               ;2H3
                2600              CON C.INACT         ;REPLY TO FUNCTION                  ;1E
00634 B5XX0000  2601              / & SRCCTRL
                2602              DST.CDC             ;SELECT CDC AS DEST AND WAIT FOR ACTIVE ;2H1
00635 XXXXD81B  2602 +            RA CPPOLL
00636 1CXXD89E  2602 +            AR SVDST & ALU & DSTSEL
                2602 +            ENDM
                2603              DNRINIT                                                 ;2H1
00637 XXXXD99F  2603 +            LD2NR BIT12,DEADMAN
                2603 +            ENDM
00638 XXXXC1FF  2604              DECR DEADMAN                                            ;2H1
00639 BX210A24  2605              CJSB Z,DEADCK                                           ;2H1
                2606              TSTND SACTIVE       ;WAIT FOR ACTIVE
0063A 5XXXE390  2607              / & SRCSTAT
0063B BX230638  2608              CJMP Z,$-3                                              ;2H1
0063C BXF305AB  2609              JMP READ1.2
                2610    ;
                2611    READ3.1:  EQU $
0063D BXF10C50  2612              JSB UPDSECT
0063E XXXXD8ED  2613              IR CDCSTATE         ;SET STATE TO SEND STATUS
0063F XXXX0002  2614              IDAT 2
00640 XXXXD8E9  2615              IR TIMEOUT          ;SET TIMER TO APROX 100 U SEC       ;2H1
00641 XXXX0070  2616              IDAT H#070          ;OF TIME WAITING FOR STATUS FNC
                2617    READ6:    EQU $                                                   ;2H1
00642 1XXXD84D  2618              RH CDCSTATE
00643 BX230611  2619              CJMP Z,READ2.1X     ;EXIT LOOP IF STATUS RESPONSE IS COMPLETE
00644 XXXX950D  2620              TORIY EXOR,CDCSTATE ;TEST STATE REG
00645 XXXX0002  2621              IDAT 2
00646 BX230648  2622              CJMP Z,$+2
00647 BXF3064A  2623              JMP $+3
00648 XXXXC1E9  2624              DECR TIMEOUT                                            ;2H1
00649 BX230622  2625              CJMP Z,READ2.6      ;EXIT IF TIMEOUT WAITING FOR STATUS FNC
0064A BXF104E0  2626              JSB PROCGST
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

00648 BXF30642  2627              JMP READ6           ;WAIT FOR STATUS TO BE SENT          ;240
                2628    ;
0064C BXF10C50  2629    READ3.2:  JSB UPDSECT
0064D BXF305A0  2630              JMP READ1.2
                2631    ;
0064E XXXX950D  2632    AMPERR2:  TORIY EXOR,CDCSTATE ;CHECK STATE TO SEE IF STATUS HAS BEEN SENT
0064F XXXX0002  2633              IDAT 2
00650 BX230655  2634              CJMP Z,AMPER2.1
00651 1XXXD84D  2635              RH CDCSTATE         ;MAKE SURE STATE = ZERO
00652 BX2305A0  2636              CJMP Z,AMPERR1
00653 BXF104E0  2637              JSB PROCGST
00654 BXF3064E  2638              JMP AMPERR2         ;WAIT FOR ZERO
00655 BXF106D3  2639    AMPER2.1: JSB SETALERT        ;SET ERROR TO CDC
00656 BXF305A0  2640              JMP AMPERR1
                2641    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - READ FUNCTIONS

```
              2642                EJECT
              2643    ;
              2644    ; READ TRANSMIT
              2645    ;
              2646    ; TRANSFER A SECTOR OF DATA FROM AMPERIF (UBI) TO HOST CHANNEL (CDC1).
              2647    ;
              2648    RDXMT:      EQU $
              2649    ; START HIGH SPEED TRANSFER
              2650                DST.CDC                                          ;201
00657 XXXXD81B 2650 +             RA CPPULL
00658 1CXXD89E 2650 +             AR SVDST & ALU & DSTSEL
              2650 +              ENDM
              2651                SRC.AMP                                          ;201
              2651 +  IF BANK_EQ_0
              2651 +  ELSE
00659 XXXXD8FD 2651 +             IR SVSRC
0065A 19XX000F 2651 +             IDAT AMP.PORT & ALU & SRCSEL
              2651 +  ENDIF
              2651 +              ENDM
0065B XXXXD903 2652               ZR TEMP3            ;CLEAR CHECKSUM REG
              2653                RH WRDCNT           ;SET COUNT OF WORDS TO TRANSFER
0065C 18F4D84A 2654               / & PUSHLOCT
0065D BXE30667 2655               CJMP DSTSRC,RDXMT.1
0065E BXE30667 2656               CJMP DSTSRC,RDXMT.1
0065F BXE30667 2657               CJMP DSTSRC,RDXMT.1 ;WAIT FOR READY
00660 BXE30667 2658               CJMP DSTSRC,RDXMT.1
00661 BXE30667 2659               CJMP DSTSRC,RDXMT.1
00662 BXE30667 2660               CJMP DSTSRC,RDXMT.1
00663 BXE30667 2661               CJMP DSTSRC,RDXMT.1
00664 BXE30667 2662               CJMP DSTSRC,RDXMT.1
00665 BXE30667 2663               CJMP DSTSRC,RDXMT.1
00666 BXF30668 2664               JMP RDXMT.2         ;CDC/AMP NOT BOTH READY, GO CHK WHY
              2665    ; TRANSFER A WORD
00667 44XXF8C1 2666    RDXMT.1:   RA & RDATA & WDATA  ;INPUT AMP PARCEL AND SEND TO CDC
00668 XXXX7140 2667               NOOP
              2668                TORAR ADD,TEMP3     ;ADD TO CHECKSUM AND GOTO XMTRD.1
00669 XXX89883 2669               / & RFCT            ;UNTIL CNT = 0
              2670    ; ALL WORDS TRANSFERED, RETURN WITH ZERO FLAG
0066A 1XFAF900 2671               ZR & RTN            ;SET ZERO FLAG AND RETURN
              2672    ; NOT READY TO TRANSFER A WORD, FIND OUT WHY
              2673    RDXMT.2:   EQU $
              2674                DWRINIT             ;RESET LOW-ORDER DEADMAN TIME    ;201
0066B XXXXD99F 2674 +             LD2WR BIT12,DEADMAN
              2674 +              ENDM
              2675    RDXMT.3:   EQU $                                            ;201
0066C XXXXD8E9 2676               IR TIMEOUT          ;SET UP TIMEOUT COUNT        ;201
0066D XXXX1000 2677               IDAT H#1000         ;OF ABOUT 4.5MS TO RESPOND TO OTHERS
0066E BXE30667 2678    RDXMT.4:   CJMP DSTSRC,RDXMT.1 ;BOTH READY, GO BACK TO TRANSFERING
0066F BXD30679 2679               CJMP SRCRDY,RDXMT.5 ;AMPERIF IS READY SO CHECK CDC
              2680    ; AMPERIF ISN'T READY, IF NO INTERRUPT, WAIT AND MAYBE RESP TO OTHERS
              2681                TSTND ST.BK2
00670 5XXXE390 2682               / & SRCSTAT         ;IF EI FROM AMP...
00671 BX230674 2683               CJMP Z,$+3
00672 BXFB0673 2684               POPJMP $+1          ;POP THE TOP OF LOOP FROM THE STACK  ;201
00673 1XFAFB00 2685               NIH & RTN           ;SET NEG FLAG AND RETURN
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

00674 XXXXC1E9 2686              DECR TIMEOUT                                        ;201
00675 BX230677 2687              CJNP Z,$+2          ;TIME-OUT...
00676 BXF3066E 2688              JNP RDXNT.4
00677 BXF10A4B 2689              JSB RSP.2DTH        ;RESPOND TO OTHER CHANNELS
00678 BXF3066C 2690              JNP RDXNT.3         ;#### SHOULD HAVE TIMEOUT       ;201
               2691    ; CDC ISN'T READY, IF NOT INACTIVE, WAIT AND DO TIMEOUT CHECK
               2692    RDXNT.5:  EQU $
00679 XXXXC1FF 2693              DECR DEADMAN        ;ACTIVATE DEADMAN TIMER
0067A BX210A24 2694              CJSB Z,DEADCK       ;DEADMAN TIME-OUT (5.1 SEC)
0067B 6XXXE590 2695              TSTND SINACT & DSTSTAT
0067C BX230660 2696              CJNP Z,RDXNT.3      ;IF CDC IS ACTIVE RESET TIMER AND WAIT  ;201
               2697    ; CDC HAS GONE INACTIVE, IF ANP IS READY, JUST READ AND IGNORE DATA
0067D BXD3067F 2698              CJNP SRCRDY,$+2
0067E BXF3066E 2699              JNP RDXNT.4
               2700              TODRR ADD,TEMP3     ;CDC HAS GONE INACTIVE, READ DATA
0067F 4XX89E83 2701              / & RDATA & RFCT    ;AND IGNORE IT
00680 1XFAF900 2702              ZR & RTN            ;IF ALL READ, RETURN WITH Z FLAG
               2703    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

               2704                EJECT
               2705    ;
               2706    CK.ADDR:    EQU $
               2707                SRC.AMP                                          ;201
               2707 +  IF BANK_EQ_0
               2707 +  ELSE
00681 XXXXD8FD 2707 +              IR SVSRC
00682 1BXX080F 2707 +              IDAT AMP.PORT & ALU & SRCSEL
               2707 +  ENDIF
               2707 +              ENDM
00683 BXF106A5 2708                JSB GET.ONE          ;INPUT 12 OF CDC CYLINDER
00684 BX230686 2709                CJMP Z,$+2
00685 XX7AXXXX 2710                CRTN N               ;(AMP ERROR)
00686 XXXX9883 2711                TORAR ADD,TEMP3
00687 XXXX910E 2712                TORAY EXOR,CKCYL     ;CHECK IF CORRECT CYLINDER
00688 BX23068A 2713                CJMP Z,$+2
00689 BXF106E5 2714                JSB RDERRCY          ;SET SEEK ERROR IF NOT
0068A BXF106A5 2715                JSB GET.ONE          ;INPUT 12 BITS OF CDC SECTOR/TRACK
0068B BX23068D 2716                CJMP Z,$+2
0068C XX7AXXXX 2717                CRTN N               ;(AMP ERROR)
0068D XXXX9883 2718                TORAR ADD),TEMP3
0068E XXXX910F 2719                TORAY EXOR,CKSECTRK ;CHECK FOR CORRECT SECTOR AND TRACK
0068F BX230691 2720                CJMP Z,$+2
00690 BXF106EA 2721                JSB RDERRSTK         ;SET ADDRESS ERROR IF NOT
00691 BXF106A5 2722                JSB GET.ONE          ;INPUT UPPER 4 BITS OF CHECK SUM
00692 BX230694 2723                CJMP Z,$+2
00693 XX7AXXXX 2724                CRTN N               ;(AMP ERROR)
00694 XXXXD880 2725                AR TEMP0
00695 XXXX84C3 2726                TORIA AND),TEMP3     ;LOAD CHECKSUM
00696 XXXXF000 2727                IDAT H#F000
00697 XXXXE990 2728                RTAA 4
00698 XXXX9980 2729                TORAR EXOR,TEMP0     ;CHECK FOR CHECKSUM COMPARE
00699 BX230698 2730                CJMP Z,$+2
0069A BXF106F0 2731                JSB DATA.ERR         ;SET CHECK SUM ERROR IF NOT
0069B BXF106A5 2732                JSB GET.ONE          ;INPUT LOWER 12 BITS OF CHECK SUM
0069C BX23069E 2733                CJMP Z,$+2
0069D XX7AXXXX 2734                CRTN N               ;(AMP ERROR)
0069E XXXX9CC3 2735                TORIR AND,TEMP3      ;GET LOWER 12 BITS OF CHECKSUM
0069F XXXX0FFF 2736                IDAT H#0FFF
006A0 XXXX9983 2737                TORAR EXOR,TEMP3     ;CHECK FOR CHECKSUM COMPARE
006A1 BX2306A3 2738                CJMP Z,$+2
006A2 BXF106F0 2739                JSB DATA.ERR         ;SET CHECK SUM ERROR IF NOT
006A3 1XXXF900 2740                ZR
006A4 XXFAXXXX 2741                RTN
               2742    ;
```

```
                2743                EJECT
                2744    ;
                2745    GET.ONE:    EQU $
0006A5 XXXXD8E9 2746                IR TIMEOUT                                  ;201
0006A6 XXXX1000 2747                IDAT H#1000
0006A7 BXD306AB 2748    GET.ON.5:   CJMP SRCRDY,GET.ON.1                        ;201
0006A8 5XXXE390 2749                TSTND ST.BK2 & SRCSTAT
0006A9 BX2306AE 2750                CJMP Z,GET.ON.2
0006AA BXF306B7 2751                JMP GET.ON.3
                2752    GET.ON.1:   EQU $                                       ;201
0006AB 4XXXF8C1 2753                HA & RDATA          ;INPUT 12 BITS OF DATA
0006AC 1XXXF900 2754                ZR                  ;SET ZERO FLAG AND RETURN
0006AD XXFAXXXX 2755                RTN
                2756    ;
                2757    GET.ON.2:   EQU $
                2758    ; THE FOLLOWING IS A TIMEOUT CHECK. (TIMES OUT IN CACHE MODE)
0006AE XXXXC1E9 2759                DECR TIMEOUT                                ;201
0006AF BX2306B1 2760                CJMP Z,GET.ON.4
0006B0 BXF306A7 2761                JMP GET.ON.5
                2762    ;
0006B1 BXF10A4B 2763    GET.ON.4:   JSB RSP.20TH
                2764                SRC.AMP                                     ;201
                2764 +  IF BANK_EQ_0
                2764 +  ELSE
0006B2 XXXXD8FD 2764 +              IR SVSRC
0006B3 18XX000F 2764 +              IDAT AMP.PORT & ALU & SRCSEL
                2764 +  ENDIF
                2764 +              ENDM
                2765                DST.CDC                                     ;201
0006B4 XXXXD81D 2765 +              RA CPPOLL
0006B5 1CXXD89E 2765 +              AR SVDST & ALU & DSTSEL
                2765 +              ENDM
0006B6 BXF306A5 2766                JMP GET.ONE         ;#### SHOULD HAVE TIMEOUT
                2767    ;
0006B7 XXXXF8E0 2769    GET.ON.3:   IN
0006B8 XXXX8000 2769                IDAT H#8000
0006B9 XXFAXXXX 2770                RTN
                2771    ;
```

```
 Addr          Line - AMPERIF 7155/865 EMULATION - HSP ONLINE -     READ FUNCTIONS

               2772                EJECT
               2773    ;
               2774    ; READ PAD
               2775    ;
               2776    ; READ AND IGNORE DATA FROM AMP THAT IS PAD TO LARGE SECTOR SIZE
               2777    ;
               2778    RDPAD:      EQU $
0086A XXXXD8E9 2779                IR TIMEOUT                                          ;201
0086B XXXX1000 2780                IDAT H#1000          ;#### VALUES DIFFER (SEE BELOW)
0086C B8F40015 2781                CON 21 & PUSHLDCT
               2782    ; START OF LOOP
               2783    RDPAD1:     EQU $
0086D BXF104E0 2784                JSB PROCGST          ;PROCESS GENERAL STATUS IF PRESENT
               2785                SRC.AMP                                             ;201
               2785 +  IF BANK_EQ_0
               2785 +  ELSE
0086E XXXXD8FD 2785 +              IR SVSRC
0086F 1BXX000F 2785 +              IDAT AMP.PORT & ALU & SRCSEL
               2785 +  ENDIF
               2785 +             ENDM
00870 XXXX7140 2786                NOOP
00871 BXD3068D1 2787               CJMP SRCRDY,RDPAD6
               2788                TSTND ST.BK2
00872 5XXXE390 2789                / & SRCSTAT          ;CHECK FOR ERRORS
00873 BX2305C6 2790                CJMP Z,$+3                                          ;201
00874 BXFB06C5 2791                POPJMP $+1           ;POP THE STACK                 ;201
00875 1XFAFB00 2792                NIH & RTN            ;SET NEG AND RTN               ;201
               2793    ; WAIT FOR AMP READY, MAYBE RESPOND TO OTHERS WHILE WAITING
00876 XXXXC1E9 2794                DECR TIMEOUT                                        ;201
00877 BX2306C9 2795                CJMP Z,$+2
00878 BXF306BD 2796                JMP RDPAD1
00879 BXF10A4B 2797                JSB RSP.2DTH
               2798                SRC.AMP                                             ;201
               2798 +  IF BANK_EQ_0
               2798 +  ELSE
0087A XXXXD8FD 2798 +              IR SVSRC
0087B 1BXX000F 2798 +              IDAT AMP.PORT & ALU & SRCSEL
               2798 +  ENDIF
               2798 +             ENDM
               2799                DST.CDC                                             ;201
0087C XXXXD81B 2799 +              RA CPPOLL
0087D 1CXXD89E 2799 +              AR SVDST & ALU & DSTSEL
               2799 +             ENDM
0087E XXXXD8E9 2800                IR TIMEOUT                                          ;201
0087F XXXX0100 2801                IDAT H#0100          ;#### VALUES DIFFER (SEE ABOVE)
00880 BXF306BD 2802                JMP RDPAD1
               2803    ; READ A WORD OF FROM AMPERIF AND IGNORE
               2804    RDPAD6:     EQU $
               2805                RA & RDATA           ;RETURN TO START OF LOOP
00881 4XX8F8C1 2806                / & RFCT
00882 1XFAF900 2807                ZH & RTN             ;SET ZERO AND
               2808    ;
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ FUNCTIONS

               2809              EJECT
               2810    ;
               2811    ; SET ALERT.
               2812    ; CALLED IF READ/WRITE ERROR.
               2813    ; SET 5000 GENERAL STATUS
               2814    ; AND HSP DETECTED ERROR IN DETAILED STATUS.
               2815    ;
               2816    SETALERT:   EQU $
0006D3 XXXXD8F1 2817              IR GENSTAT          ;SET 5000 GENERAL STATUS              ;201
0006D4 XXXX0A00 2818              IDAT 0#5000                                               ;201
               2819    ; OUTPUT VALUES TO BUS FOR DEBUG
0006D5 1XXXD84E 2820              RH CKCYL            ;CYLINDER CHECKWORD                   ;1C
0006D6 1XXXD84F 2821              RH CKSECTRK         ;TRACK AND SECTOR CHECKWORD           ;1C
0006D7 XXXX949A 2822              TORIY ADD,CURUNIT   ;CYLINDER PARAMETER                   ;202
0006D8 12XX0068 2823              IDAT CYL.PAR & ALU & WCAR                                 ;202
0006D9 3XXXF8C1 2824              HA & RCACHE                                               ;202
0006DA XXXX949A 2825              TORIY ADD,CURUNIT   ;TRACK PARAMETER                      ;202
0006DB 12XX0088 2826              IDAT TRK.PAR & ALU & WCAR                                 ;202
0006DC 3XXXF8C1 2827              HA & RCACHE                                               ;202
0006DD XXXX949A 2828              TORIY ADD,CURUNIT   ;SECTOR PARAMETER                     ;202
0006DE 12XX00A8 2829              IDAT SEC.PAR & ALU & WCAR                                 ;202
0006DF 3XXXF8C1 2830              HA & RCACHE                                               ;202
0006E0 BXF106E2 2831              JSB HSPDTECT        ;SET HSP DETECTED ERROR BIT           ;201
0006E1 XXFAXXXX 2832              RTN                                                       ;201
               2833    ;
               2834    ; SET HSP DETECTED ERROR.
               2835    ; SET BIT IN DETAILED STATUS
               2836    ; SO THAT XMC AND HSP DETECTED ERRORS
               2837    ; CAN BE DISTINGUISHED.
               2838    ;
               2839    HSPDTECT:   EQU $               ;SET BIT IN DETAILED STATUS
0006E2 B2XX00D7 2840              CON WD13 & WCAR
0006E3 3XXXF8C1 2841              HA & RCACHE
               2842              SETNA BIT8 & ALU & WCACHE
0006E4 13FAF102 2843              / & RTN
               2844    ;
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - READ FUNCTIONS

```
              2845              EJECT
              2846    ;
              2847    RDERRCY:  EQU $
0006E5 BXF106D3 2848            JSB SETALERT
0006E6 B2XX00CB 2849            CON WD1 & WCAR
0006E7 3XXXF8C1 2850            HA & RCACHE         ;SET BIT 2 OF WORD 1 (CYL # ERROR)
0006E8 XXXXE582 2851            SETNA BIT2
              2852              AH & WCACHE
0006E9 13FAF880 2853            / & RTN                                          ;201
              2854    ;
              2855    RDERRSTK: EQU $
0006EA BXF106D3 2856            JSB SETALERT
0006EB B2XX00CB 2857            CON WD1 & WCAR
0006EC 3XXXF8C1 2858            HA & RCACHE         ;SET BITS 0,1,AND 3
0006ED XXXXE182 2859            SETNA BIT0                                       ;201
0006EE XXXXE382 2860            SETNA BIT1                                       ;201
              2861              SETNA BIT3 & ALU & WCACHE                        ;201
0006EF 13FAE782 2862            / & RTN                                          ;201
              2863    ;
              2864    DATA.ERR: EQU $
0006F0 BXF106D3 2865            JSB SETALERT
0006F1 B2XX00CC 2866            CON WD2 & WCAR      ;SET BITS 8, 9 OF WORD 2
0006F2 3XXXF8C1 2867            HA & RCACHE
0006F3 XXXXF182 2868            SETNA BIT8                                       ;201
              2869              SETNA BIT9 & ALU & WCACHE                        ;201
0006F4 13FAF382 2870            / & RTN                                          ;201
              2871    ;
              2872    ADR.ERR:  EQU $
0006F5 BXF106D3 2873            JSB SETALERT
0006F6 B2XX00CC 2874            CON WD2 & WCAR      ;SET BITS 11, 10 OF WORD 2
0006F7 3XXXF8C1 2875            HA & RCACHE
0006F8 XXXXF782 2876            SETNA BIT11                                      ;201
              2877              SETNA BIT10 & ALU & WCACHE                       ;201
0006F9 13FAF582 2878            / & RTN                                          ;201
              2879    ;
```

```
 Addr          Line - AMPERIF 7155/805 EMULATION - HSP ONLINE -     READ FUNCTIONS

               2880              EJECT
               2881    ;
               2882    ; CLEAR STATUSES, GENERAL, DETAILED, AND AMPERIF E) AND SENSE BYTES
               2883    ;
               2884    CLRSTAT:    EQU $
               2885    ; CLEAR GENERAL STATUS
0006FA XXXX9CD1 2886              TORIR AND,GENSTAT
0006FB XXXX01FF 2887              IDAT Q#0777
               2888    ; IF NOT UNIT CONNECTED, DONE
0006FC XXXXE3F9 2889              TSTNR F.CNCTD,FLAGS                                    ;201
0006FD XX2AXXXX 2890              CRTN Z
               2891    ; CLEAR DETAILED STATUS
0006FE BXF107F5 2892              JSB CLRDSTAT                                           ;201
               2893    ; CLEAR AMPERIF STATUS
0006FF XXXXEFF9 2894              TSTNR F.SHFAIL,FLAGS;IF SHARED MEMORY FAILED,          ;201
000700 BX2307D2 2895              CJMP Z,$+2                                             ;201
000701 XXFAXXXX 2896              RTN               ;DON'T CONTINUE                      ;201
000702 BXF10AAF 2897              JSB CKDVEND
000703 XXXXF3CB 2898              RSTNR E1.UCK,SHMDATA                                   ;201
000704 BXF10E18 2899              JSB SHMWRT        ;CLEAR AMPERIF UNIT CHECK
000705 XXXXDD6C 2900              INCR SHMADDR      ;POINT TO CDC.ST                     ;201
000706 XXXXD90B 2901              ZR SHMDATA                                             ;201
000707 BXF10E18 2902              JSB SHMWRT        ;CLEAR CDC STATUS                    ;201
               2903    ; CLEAR SENSE BYTES
000708 XXXXD8EC 2904              IR SHMADDR
000709 XXXX0009 2905              IDAT AMP.SENS
00070A BXF10E00 2906              JSB SHMRDCU       ;READ TO SET ADDRESS IN SHMADDR
00070B XXXXC1EC 2907              DECR SHMADDR
00070C XXXXD90B 2908              ZR SHMDATA
00070D B8F40011 2909              CON 17 & PUSHLOCT
00070E BXF10E18 2910              JSB SHMWRT        ;CLEAR EIGHTEEN WORDS OF AMP SENSE DATA
               2911              INCR SHMADDR                                           ;201
00070F XXX8DD6C 2912              / & RFCT                                               ;201
               2913    ; DONE
000710 XXFAXXXX 2914              RTN                                                    ;201
               2915    ;
               2916              TITLE2 RETURN ADDRESS FUNCTIONS
```

```
 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     RETURN ADDRESS FUNCTIONS

               2917                EJECT
               2918    ;
               2919    ; RETURN DRIVE ADDRESS FUNCTION (0017)
               2920    ;
               2921    RTN.ADDR:   EQU $
00711 BXF1022C 2922                JSB STATGEN         ;STATGEN CALCS STATUS, WAITS FOR ACTIVE
               2923                RA GENSTAT          ;SEND STATUS                          ;202
00712 14XXD811 2924                / & ALU & WDATA                                           ;202
00713 XXXXD811 2925                RA GENSTAT          ;WRITE TO TRACE BUFFER                ;202
00714 BXF10A1B 2926                JSB TRACE.0                                               ;202
00715 XXXXD911 2927                ZR GENSTAT          ;STATUS SENT, CLEAR STATUS            ;202
               2928                DMRINIT                                                   ;201
00716 XXXXD99F 2928 +              LD2NR BIT12,DEADMAN
               2928 +              ENDM
00717 XXXXC1FF 2929                DECR DEADMAN
00718 BX210A24 2930                CJSB Z,DEADCK
               2931                TSTND SEMPTY        ;WAIT FOR DESTINATION EMPTY
00719 6XXXE990 2932                / & DSTSTAT
0071A BX230717 2933                CJNP Z,$-3
0071B XXXX949A 2934                FORIY ADD,CURUNIT   ;SEND CYLINDER PARAM               ;202
0071C 12XX0068 2935                IDAT CYL.PAR & ALU & WCAR                              ;202
0071D 34XXF8C1 2936                HA & RCACHE & WDATA                                    ;202
0071E BXF10A1B 2937                JSB TRACE.0         ;WRITE TO TRACE BUFFER             ;202
               2938                DMRINIT                                                ;202
0071F XXXXD99F 2938 +              LD2NR BIT12,DEADMAN
               2938 +              ENDM
00720 XXXXC1FF 2939                DECR DEADMAN                                           ;202
00721 BX210A24 2940                CJSB Z,DEADCK                                          ;202
               2941                TSTND SEMPTY        ;WAIT FOR DESTINATION EMPTY        ;202
00722 6XXXC990 2942                / & DSTSTAT                                            ;202
00723 BX230720 2943                CJNP Z,$-3                                             ;202
               2944    ; RETURN TWO LESS THAN REQUESTED SECTOR (MEANING ALMOST THERE)
               2945    ; IF SECTOR 0 OR 1, RETURN 30 OR 31
00724 XXXX949A 2946                FORIY ADD,CURUNIT   ;GET SECTOR PARAM                  ;202
00725 12XX0068 2947                IDAT CYL.PAR & ALU & WCAR                              ;202
00726 3XXXF8C1 2948                HA & RCACHE                                            ;202
00727 XXXXE385 2949                SZNA BIT1           ;SUBTRACT 2                        ;202
00728 BX73072A 2950                CJNP N,$+2          ;IF NOW NEGATIVE,                  ;202
00729 BXF3072C 2951                JNP $+3                                                ;202
0072A XXXXE481 2952                TOAI ADD,NRA        ;ADD 32                            ;202
0072B XXXX6020 2953                IDAT SECTMAX        ;TO MAKE IT BETWEEN 0 AND MAX SECTOR ;202
0072C 14XXF880 2954                AH & WDATA          ;SEND SECTOR (LESS TWO)            ;202
0072D BXF10A1B 2955                JSB TRACE.0         ;WRITE TO TRACE BUFFER             ;202
               2956                DMRINIT                                                ;201
0072E XXXXD99F 2956 +              LD2NR BIT12,DEADMAN
               2956 +              ENDM
0072F XXXXC1FF 2957                DECR DEADMAN
00730 BX210A24 2958                CJSB Z,DEADCK
               2959                TSTND SEMPTY        ;WAIT FOR EMPTY
00731 6XXXE990 2960                / & DSTSTAT
00732 BX23072F 2961                CJNP Z,$-3
               2962                CON C.INACT         ;SEND INACTIVE                     ;IF
00733 86XX0009 2963                / & DSTCTRL
00734 BXF30140 2964                JNP IDLE
               2965    ;
```

```
 Addr          Line - AMPERIF /155/885 EMULATION - HSP ONLINE -     RETURN ADDRESS FUNCTIONS

               2966                EJECT
               2967    ;
               2968    ; RETURN CYLINDER ADDRESS FUNCTION (002)
               2969    ;
               2970    RTN.CYL:    EQU $
00735 BXF10849 2971                JSB FNCREPLY
               2972                DST.CDC                                          ;201
00736 XXXXD81B 2972 +              RA CPPULL
00737 1CXXD89E 2972 +              AR SVDST & ALU & DSTSEL
               2972 +              ENDM
               2973                DMRINIT                                          ;202
00738 XXXXD99F 2973 +              LD2NR BIT12,DEADMAN
               2973 +              ENDM
00739 XXXXC1FF 2974                DECR DEADMAN                                     ;202
0073A BX210A24 2975                CJSB Z,DEADCK                                    ;202
               2976                TSTND SACTIVE       ;WAIT FOR DESTINATION ACTIVE ;202
0073B 6XXXE390 2977                / & DSTSTAT                                      ;202
0073C BX230739 2978                CJMP Z,$-3                                       ;202
               2979                DMRINIT                                          ;202
0073D XXXXD99F 2979 +              LD2NR BIT12,DEADMAN
               2979 +              ENDM
0073E XXXXC1FF 2980                DECR DEADMAN                                     ;202
0073F BX210A24 2981                CJSB Z,DEADCK                                    ;202
               2982                TSTND SEMPTY        ;WAIT FOR DESTINATION EMPTY  ;202
00740 6XXXE990 2983                / & DSTSTAT                                      ;202
00741 BX23073E 2984                CJMP Z,$-3                                       ;202
00742 XXXX949A 2985                TORIY ADD,CURUNIT   ;SEND CYLINDER PARAM         ;202
00743 12XX0068 2986                IDAT CYL.PAR & ALU & WCAR                        ;202
00744 34XXF8C1 2987                HA & RCACHE & WDATA                              ;202
00745 BXF10A1B 2988                JSB TRACE.U         ;WRITE TO TRACE BUFFER       ;202
               2989                DMRINIT                                          ;202
00746 XXXXD99F 2989 +              LD2NR BIT12,DEADMAN
               2989 +              ENDM
00747 XXXXC1FF 2990                DECR DEADMAN                                     ;202
00748 BX210A24 2991                CJSB Z,DEADCK                                    ;202
               2992                TSTND SEMPTY        ;WAIT FOR EMPTY              ;202
00749 6XXXE990 2993                / & DSTSTAT                                      ;202
0074A BX230747 2994                CJMP Z,$-3                                       ;202
               2995                CON C.INACT         ;SEND INACTIVE               ;202
0074B B6XX0000 2996                / & DSTCTRL                                      ;202
0074C BXF30140 2997                JMP IDLE                                         ;202
               2998    ;
               2999                TITLE2 READ CHECKWORD/WRITE VERIFY FUNCTIONS
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ CHECKWORD/WRITE VERIFY FUNCTIONS

               3000              EJECT
               3001    ;
               3002    ; ROUTINE WRT.VRFY WILL PROCESS ALL WRITE VERIFY FUNCTIONS AND ALL
               3003    ; READ CHECKWORD FUNCTIONS.
               3004    ;
               3005    WRT.VRFY:   EQU $
               3006    READ.CKW:   EQU $
               3007    WRT.VLST:   EQU $
0074D XXXXED09 3008              RSTNR F.GAPSEC,FLAGS;CLEAR THE GAP SECTOR FLAG          ;201
0074E BXF30750 3009              JMP VERFY
               3010    WRT.VGAP:   EQU $
               3011    RD.CKGAP:   EQU $
0074F XXXXED89 3012              SETNR F.GAPSEC,FLAGS;SET THE GAP SECTOR FLAG            ;201
               3013    VERFY:      EQU $
00750 BXF10B49 3014              JSB FNCREPLY
00751 XXXXD905 3015              ZR TEMP5            ;CLEAR SECT COUNTER
               3016    VERIFY6:    EQU $                                               ;201
               3017                SRC.AMP                                             ;201
               3017 +  IF BANK_EQ_0
               3017 +  ELSE
00752 XXXXD8FD 3017 +            IR SVSRC
00753 1BXX800F 3017 +            (DAT AMP.PORT & ALU & SRCSEL
               3017 +  ENDIF
               3017 +           ENDM
               3018             TSTND ST.BK2        ;CHECK FOR STATUS PENDING
00754 5XXXE390 3019              / & SRCSTAT
00755 BX230757 3020              CJMP Z,$+2
00756 BXF10CEA 3021              JSB CKAMPSTS
00757 BXF10B2A 3022              JSB SETWDCNT        ;CHECK FOR LARGE SECTOR MODE        ;1E
00758 BXF10A83 3023              JSB RD2BUF
00759 XXXXD814 3024              RA CDCFNC
0075A XXXXC500 3025              !DA!R EXOR,TEMP0
0075B XXXX0007 3026              !DAT CF.RDCW                                        ;1E
0075C BX230778 3027              CJMP Z,VERIFY5
0075D XXXXC500 3028              !DA!R EXOR,TEMP0
0075E BX230778 3029              CJMP Z,VERIFY5
               3030              SRC.CDC             ;SELECT CDC AS SOURCE           ;201
0075F XXXXD81B 3030 +            RA CPPOLL
00760 1BXXD89D 3030 +            AR SVSRC & ALU & SRCSEL
               3030 +            ENDM
00761 XXXXD8E2 3031              IR TEMP2
               3032              !DAT BUFFADR
00762 12XX80DF 3033              / & ALU & WCAR
00763 XXXXD903 3034              ZR TEMP3            ;FLAG FOR COMPARE ERROR
               3035              DNRIN)T             ;RESET LOW-ORDER DEADMAN TIME   ;201
00764 XXXXD99F 3035 +            LD2NR BIT12,DEADMAN
               3035 +            ENDM
               3036    VERFY1:     EQU $
               3037              TSTND SINACT        ;IF INACTIVE, DONE
00765 5XXXE590 3038              / & SRCSTAT
00766 BX230768 3039              CJMP Z,$+2
00767 BXF30774 3040              JMP VERIFY2
00768 XXXXC1FF 3041              DECR DEADMAN
00769 BX210A24 3042              CJSB Z,DEADCK
               3043              TSTND SFULL         ;WAIT FOR FULL
```

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 Addr        Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ CHECKWORD/WRITE VERIFY FUNCTIONS

0076A 5XXXE790  3044              / & SRCSTAT
0076B BX230765  3045              CJMP Z,VERFY1
                3046              NR TEMP0
0076C 4XXXD8C0  3047              / & RDATA
0076D 3XXXF8C1  3048              NA & RCACHE
0076E 12XXDD62  3049              INCR TEMP2 & ALU & WCAR
0076F XXXX9900  3050              TORAR EXOR,TEMP0    ;COMPARE DATA READ TO DATA IN BUFFER
00770 BX230765  3051              CJMP Z,VERFY1       ;SET ERROR FLAG IN TEMP3  IF NON-COMPARE
00771 XXXXD8E3  3052              IR TEMP3
00772 XXXX8000  3053              IDAT H#8000
00773 BXF30765  3054              JMP VERFY1
                3055    VERIFY2:  EQU $
00774 XXXXFFE3  3056              TSTNR BIT15,TEMP3
00775 BX230777  3057              CJMP Z,$+2
00776 BXF106F0  3058              JSB DATA.ERR
00777 BXF10A36  3059              JSB CKCERR          ;CHECK FOR CDC CHANNEL PARITY ERRORS
                3060    VERIFY5:  EQU $
00778 BXF10C50  3061              JSB UPDSECT         ;UPDATE TO NEXT CDC SECTOR
00779 XXXXE9F9  3062              TSTNR F.LRGSEC,FLAGS;CHECK FOR LARGE SECTOR MODE           ;1E
0077A BX230140  3063              CJMP Z,IDLE
                3064    VERIFY7:  EQU $
0077B XXXXDD65  3065              INCR TEMP5
0077C XXXX9505  3066              TORIY EXOR,TEMP5
0077D XXXX0004  3067              IDAT 4
0077E BX230140  3068              CJMP Z,IDLE
0077F BXF30752  3069              JMP VERIFY6
                3070    ;
                3071              TITLE2 WRITE BUFFER FUNCTIONS
```

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 Addr      Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -    WRITE BUFFER FUNCTIONS

           3072              EJECT
           3073    ;
           3074    X.BUFWRT: EQU $
00780 BXF10B49  3075              JSB FNCREPLY
           3076              SRC.CDC                                          ;201
00781 XXXXD81B  3076 +            RA CPPULL
00782 10XXD89D  3076 +            AR SVSRC & ALU & SRCSEL
           3076 +            ENDM
           3077              CON C.ACT+C.FIFO                                 ;1F
00783 B5XX0009  3078              / & SRCCTRL
00784 XXXXD8E2  3079              IR TEMP2
           3080              IDAT BUFFADR
00785 12XX00DF  3081              / & ALU & WCAR
           3082              DMRINIT                                          ;201
00786 XXXXD99F  3082 +            LD2NR BIT12,DEADMAN
           3082 +            ENDM
00787 XXXXC1FF  3083              DECR DEADMAN                                     ;201
00788 BX210A24  3084              CJSB Z,DEADCK                                    ;201
           3085              TSTND SACTIVE
00789 5XXXE390  3086              / & SRCSTAT
0078A BX230787  3087              CJNP Z,$-3          ;WAIT FOR ACTIVE
           3088              DMRINIT                                          ;201
0078B XXXXD99F  3088 +            LD2NR BIT12,DEADMAN
           3088 +            ENDM
0078C BXD30792  3089    XBUFW2:   CJNP SRCRDY,XBUFW3  ;WAIT FOR SOURCE READY
0078D XXXXC1FF  3090              DECR DEADMAN
0078E BX210A24  3091              CJSB Z,DEADCK
           3092              TSTND SINACT        ;IF INACTIVE, DONE
0078F 5XXXE590  3093              / & SRCSTAT
00790 BX23078C  3094              CJNP Z,XBUFW2
00791 BXF30795  3095              JNP XBUFW4
           3096    XBUFW3:   EQU $
00792 43XXXXXX  3097              RDATA & WCACHE
00793 12XXDD62  3098              INCR TEMP2 & ALU & WCAR
00794 BXF3078C  3099              JNP XBUFW2
           3100    XBUFW4:   TSTND FIFONEMP
00795 5XXXEB90  3101              / & SRCSTAT
00796 BX230798  3102              CJNP Z,XBUFW5
00797 BXF3078C  3103              JNP XBUFW2
           3104    XBUFW5:   EQU $
00798 BXF10A36  3105              JSB CKCERR          ;TEST FOR CHANNEL PARITY ERRORS
           3106              CON C.ACT           ;DISABLE THE FIFO                ;1E
00799 B5XX0008  3107              / & SRCCTRL
0079A XXXXE3F9  3108              TSTNR F.CNCTD,FLAGS                              ;201
0079B BX2307A0  3109              CJNP Z,XBUFW6                                    ;201
0079C XXXXD8EC  3110              IR SHMADDR
0079D XXXX0003  3111              IDAT CDC.ST
0079E XXXXD90B  3112              ZR SHMDATA
0079F BXF10E16  3113              JSB SHMWRTCU
           3114    XBUFW6:   EQU $                                            ;201
007A0 XXXXD911  3115              ZR GENSTAT
007A1 BXF30140  3116              JNP IDLE
           3117    ;
           3118              TITLE2 READ BUFFER FUNCTIONS
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -     READ BUFFER FUNCTIONS

               3119                EJECT
               3120    ;
               3121    XBUFRD:     EQU $
007A2 BXF1B949 3122                JSB FNCREPLY
               3123                DST.CDC                                          ;201
007A3 XXXXD81B 3123 +              RA CPPULL
007A4 1CXXD89E 3123 +              AR SVDST & ALU & DSTSEL
               3123 +              ENDM
007A5 XXXXD8E2 3124                CR TEMP2            ;CINITIALIZE BUFFER POINTER
007A6 XXXX00DF 3125                IDAT BUFFADR                                     ;201
               3126                DMRINIT                                          ;201
007A7 XXXXD99F 3126 +              LD2NR BIT12,DEADMAN
               3126 +              ENDM
007A8 XXXXC1FF 3127                DECR DEADMAN                                     ;201
007A9 BX210A24 3128                CJSB Z,DEADCK                                    ;201
               3129                TSTND SACTIVE
007AA 6XXXE390 3130                / & DSTSTAT
007AB BX2307A8 3131                CJMP Z,$-3          ;WAIT FOR ACTIVE             ;201
               3132                CON SSWRDMAX        ;REPEAT FOR SML SECTOR SIZE  ;1E
007AC B6F40141 3133                / & PUSHLDCT
               3134    ; TOP OF LOOP FOR SENDING A WORD
               3135                DMRINIT                                          ;201
007AD XXXXD99F 3135 +              LD2NR BIT12,DEADMAN
               3135 +              ENDM
007AE XXXX7140 3136    XBUFRD2:    NOOP
007AF BXC307B5 3137                CJMP DSTRDY,XBUFRD3
007B0 XXXXC1FF 3138                DECR DEADMAN
007B1 BX210A24 3139                CJSB Z,DEADCK
               3140                TSTND SINACT        ;WAIT FOR DSTRDY OR INACTIVE
007B2 6XXXE590 3141                / & DSTSTAT
007B3 BX2307AE 3142                CJMP Z,XBUFRD2
007B4 BXF307C2 3143                JMP XBUFRD4
               3144    XBUFRD3:    EQU $
007B5 12XXD842 3145                RH TEMP2 & WCAR                                  ;201
               3146                INCR TEMP2          ;INCREMENT POINTER FOR NEXT  ;201
               3147                / & RCACHE & WDATA  ;READ FROM BUFF, SEND TO CHANNEL ;201
007B6 34X8DD62 3148                / & RFCT            ;AND DO NEXT WORD UNTIL DONE ;201
               3149    ; ALL WORDS SENT
               3150                DMRINIT                                          ;201
007B7 XXXXD99F 3150 +              LD2NR BIT12,DEADMAN
               3150 +              ENDM
007B8 XXXXC1FF 3151                DECR DEADMAN                                     ;201
007B9 BX210A24 3152                CJSB Z,DEADCK                                    ;201
               3153                TSTND RANK1EMP
007BA 6XXXE890 3154                / & DSTSTAT
007BB BX2307B8 3155                CJMP Z,$-3          ;WAIT FOR DATA SENT          ;201
               3156                DMRINIT                                          ;201
007BC XXXXD99F 3156 +              LD2NR BIT12,DEADMAN
               3156 +              ENDM
007BD XXXXC1FF 3157                DECR DEADMAN                                     ;201
007BE BX210A24 3158                CJSB Z,DEADCK                                    ;201
               3159                TSTND SEMPTY
007BF 6XXXE990 3160                / & DSTSTAT
007C0 BX2307BD 3161                CJMP Z,$-3          ;WAIT FOR EMPTY              ;201
               3162                CON C.INACT                                      ;1F
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - READ BUFFER FUNCTIONS

```
007C1 B6XX0000  3163              / & DSTCTRL
                3164    XBUFRD4:  EQU $
007C2 XXXXE3F9  3165              FSTNR F.CNCTD,FLAGS                          ;201
007C3 BX2307C0  3166              CJNP Z,XBUFRD9                               ;201
007C4 XXXXD9EC  3167              IR SHMADDR        ;ZERO GEN STAT FOR THIS UNIT
007C5 XXXX0003  3168              IDAT CDC.ST
007C6 XXXXD90B  3169              ZR SHMDATA
007C7 BXF19E16  3170              JSR SHMWRTCU
                3171    XBUFRD9:  EQU $                                        ;201
007C8 XXXXD911  3172              ZR GENSTAT        ;AND REGISTER GEN STAT
007C9 BXF30140  3173              JMP IDLE
                3174    ;
                3175              TITLE2 DETAILED STATUS AND EXTENDED STATUS ROUTINES
```

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 Addr      Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -    DETAILED STATUS AND EXTENDED STATUS ROUTINES

           3176              EJECT
           3177    ;
           3178    ; DETAILED AND EXTENDED DETAILED STATUS ROUTINES
           3179    ;
           3180    STAT.DET:   EQU $                                              ;201
           3181    STAT.EXT:   EQU $                                              ;201
007CA BXF10912 3182            JSB DFLTXST        ;SET DEFAULT STATUS WORDS        ;201
007CB XXXXEFF9 3183            TSTNR F.SHFAIL,FLAGS;SEE IF SHARED MEMORY WORKS     ;201
007CC BX2307CF 3184            CJMP Z,STATD2                                       ;201
007CD BXF10952 3185            JSB SHMGXST        ;SET SHMEMORY FAIL STATUS        ;201
007CE BXF307D1 3186            JMP STATD3         ;AND SKIP OTHER PROCESSING       ;201
           3187    STATD2:     EQU $              ;                                ;201
007CF BXF10823 3188            JSB UPDTXST        ;SET FOR CURRENT STATUS          ;201
007D0 BXF1032B 3189            JSB CTSXST         ;SET CYLINDER, TRACK, SECTOR     ;201
           3190    STATD3:     EQU $              ;REPLY TO FUNCTION AND SEND STATUS;201
007D1 BXF10B49 3191            JSB FNCREPLY
           3192                DST.CDC                                             ;201
007D2 XXXXD81B 3192 +          RA CPPOLL
007D3 1CXXD59E 3192 +          AR SVDST & ALU & DSTSEL
           3192 +              ENDM
007D4 XXXXD8E0 3193            IR TEMP0           ;START OF DETAILED STATUS WORDS
007D5 XXXX08CB 3194            IDAT CDC.DEFS                                       ;201
007D6 XXXX9514 3195            TORIY EXOR,CDCFNC  ;DETAILED OR EXTENDED?           ;201
007D7 XXXX0013 3196            IDAT CF.XSTAT                                       ;201
007D8 BX2307DC 3197            CJMP Z,STATD4                                       ;201
007D9 XXXXF8E1 3198            IA                                                  ;201
007DA XXXX000B 3199            IDAT 12-1          ;DETAILED STATUS, 12 WORDS       ;201
007DB BXF307DE 3200            JMP STATD5                                          ;201
           3201    STATD4:     EQU $                                               ;201
007DC XXXXF8E1 3202            IA                                                  ;201
007DD XXXX0013 3203            IDAT 20-1          ;EXTENDED DETAILED STATUS, 20 WORDS;201
           3204    ; TRANSFER THE STATUS WORDS
           3205    STATD5:     EQU $                                               ;201
           3206                DMRINIT                                             ;201
007DE XXXXD99F 3206 +          LD2NR BIT12,DEADMAN
           3206 +              ENDM
007DF 18F4F800 3207            AH & PUSHLDCT      ;LENGTH OF TRANSFER              ;201
           3208    ; START OF SEQUENCER LOOP
007E0 BXC307E4 3209            CJMP DSTRDY,STATD9 ;WAIT FOR CDC READY              ;201
007E1 XXXXC1FF 3210            DECR DEADMAN
007E2 BX210A24 3211            CJSB Z,DEADCK
007E3 BXF307E0 3212            JMP $-3
           3213    STATD9:     EQU $                                               ;201
007E4 12XXD840 3214            RH TEMP0 & WCAR    ;GET STATUS WORD                 ;201
007E5 3XXXF8C1 3215            RA & RCACHE                                         ;201
007E6 14XXF880 3216            AH & WDATA         ;SEND WORD TO CDC
           3217                DMRINIT                                             ;201
007E7 XXXXD99F 3217 +          LD2NR BIT12,DEADMAN
           3217 +              ENDM
           3218                INCR TEMP0         ;POINT TO NEXT STATUS WORD       ;201
007E8 XXX8DD60 3219            / & RFCT           ;AND REPEAT UNTIL ALL TRANSFERED ;201
           3220    ; END OF EXTENDED AND DETAILED STATUS PROCESSING
007E9 XXXXC1FF 3221            DECR DEADMAN                                        ;201
007EA BX210A24 3222            CJSB Z,DEADCK                                       ;1C
           3223                TSTND RANK1EMP     ;WAIT FOR RANK 1 EMPTY
```

Addr Line - AMPERIF 7155/885 EMULATION - HSP ONLINE - DETAILED STATUS AND EXTENDED STATUS ROUTINES

```
007EB 6XXXED90  3224              / & DSTSTAT
007EC BX2307E9  3225              CJNP Z,$-3                                    ;1C
                3226              DNKINIT                                       ;201
007ED XXXXD99F  3226 +            LD2NR BIT12,DEADMAN
                3226 +            ENDM
007EE XXXXC1FF  3227              DECR DEADMAN                                  ;1C
007EF BX210A24  3228              CJSB Z,DEADCK                                 ;1C
                3229              TSTND SEMPTY        ;WAIT FOR EMPTY
007F0 6XXXE990  3230              / & DSTSTAT
007F1 BX2307EE  3231              CJNP Z,$-3                                    ;1C
                3232              CON C.INACT         ;DEACTIVATE CDC           ;1E
007F2 B6XX0000  3233              / & DSTCTRL
                3234    ; STATUS SENT, ERASE OLD STATUS
007F3 0XF107F5  3235              JSB CLRDSTAT
007F4 BXF30140  3236              JNP IDLE
                3237    ;
```

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 Addr        Line - AMPEX1F 7155/885 EMULATION - HSP ONLINE -    DETAILED STATUS AND EXTENDED STATUS ROUTINES

             3238              EJECT
             3239    ;
             3240    ; CLEAR DETAILED STATUS
             3241    ;
             3242    CLRDSTAT:   EQU $
007F5 B2XX00CB  3243              CON WD1 & WCAR      ;CLEAR WD1
007F6 13XXF900  3244              ZH & WCACHE
007F7 B2XX00CC  3245              CON WD2 & WCAR      ;CLEAR WD2
007F8 13XXF900  3246              ZH & WCACHE
007F9 B2XX00CD  3247              CON WD3 & WCAR      ;CLEAR WD3 EXCEPT FOR CURRENT FUNCTION
007FA 3XXXF8C1  3248              HA & RCACHE
             3249    ;                                  WD4 IS OK
007F8 XXXXE4C0  3250              TOAI AND,NRY
007FC 13XX0FF0  3251              IDAT 0#7760 & ALU & WCACHE
007FD B2XX00CF  3252              CON WD5 & WCAR      ;CLEAR WD5 EXCEPT FOR CURRENT CYLINDER
007FE 3XXXF8C1  3253              HA & RCACHE
007FF XXXXE4C0  3254              TOAI AND,NRY
00800 13XX003F  3255              IDAT 0#0077 & ALU & WCACHE
             3256    ;                                  WD6 AND WD7 ARE OK
00801 B2XX00D2  3257              CON WD8 & WCAR      ;CLEAR WD8 EXCEPT FOR DRIVE NUMBER      ;201
00802 3XXXF8C1  3258              HA & RCACHE                                                 ;201
00803 XXXXE4C0  3259              TOAI AND,NRY                                                ;201
00804 13XX0FC0  3260              IDAT 0#7700 & ALU & WCACHE                                  ;201
00805 B2XX00D3  3261              CON WD9 & WCAR      ;CLEAR WD9 ERROR STATUS BITS
00806 3XXXF8C1  3262              HA & RCACHE
00807 XXXXE4C0  3263              TOAI AND,NRY
00808 13XX0FE0  3264              IDAT 0#7740 & ALU & WCACHE                                  ;201
00809 B2XX00D4  3265              CON WD10 & WCAR     ;CLEAR WD10
0080A 13XXF900  3266              ZH & WCACHE                                                 ;201
0080B B2XX00D5  3267              CON WD11 & WCAR     ;CLEAR WD11
0080C 13XXF900  3268              ZH & WCACHE
0080D B2XX00D6  3269              CON WD12 & WCAR     ;CLEAR WD12
0080E 13XXF900  3270              ZH & WCACHE
0080F B2XX00D7  3271              CON WD13 & WCAR     ;CLEAR WD13 EXCEPT
00810 3XXXF8C1  3272              HA & RCACHE         ;ACCESS CONNECTED BEFORE GEN STATUS BIT
00811 XXXXE4C0  3273              TOAI AND,NRY        ;AND DRIVE RESERVED BEFORE CONNECT BIT
00812 13XX0600  3274              IDAT 0#3000 & ALU & WCACHE                                  ;201
00813 B2XX00D8  3275              CON WD14 & WCAR     ;CLEAR WD14
00814 13XXF900  3276              ZH & WCACHE
00815 B2XX00D9  3277              CON WD15 & WCAR     ;CLEAR WD15
00816 13XXF900  3278              ZH & WCACHE
00817 B2XX00DA  3279              CON WD16 & WCAR     ;CLEAR WD16
00818 13XXF900  3280              ZH & WCACHE
00819 B2XX00DB  3281              CON WD17 & WCAR     ;CLEAR WD17
0081A 13XXF900  3282              ZH & WCACHE
0081B B2XX00DC  3283              CON WD18 & WCAR     ;CLEAR WD18 EXCEPT PORT CONNECTED
0081C 3XXXF8C1  3284              HA & RCACHE         ;AND LARGE SECTOR MODE BITS
0081D XXXXE4C0  3285              TOAI AND,NRY
0081E 13XX0F00  3286              IDAT 0#7410 & ALU & WCACHE
0081F B2XX00DD  3287              CON WD19 & WCAR     ;CLEAR WD19
00820 13XXF900  3288              ZH & WCACHE
00821 B2XX00DE  3289              CON WD20 & WCAR     ;CLEAR WD20
             3290              ZH & WCACHE
00822 13FAF900  3291              / & RTN
             3292    ;
```

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 Addr          Line - AMPERIF 7155/885 EMULATION - HSP ONLINE -    DETAILED STATUS AND EXTENDED STATUS ROUTINES

               3293              EJECT
               3294    ;
               3295    ; UPDTXST - UPDATE THE EXTENDED STATUS AREA IN CACHE
               3296    ; WITH CURRENT UNIT STATUS IN HSP FLAGS AND AMPERIF STATUS.
               3297    ;
00823 BXF10AAF 3298    UPDTXST:    JSB CKDVEND         ;CHECK FOR DEVICE END IN STATUS
00824 BX230B2E 3299                CJNP Z,UPDTXST1
00825 B2XX00D3 3300                CON WD9 & WCAR      ;SET CDC WD9.10, SECTOR MARK,
00826 3XXXD8C0 3301                NR TEMP0 & RCACHE   ;AND CDC WD9.9, ON CYLINDER,
00827 XXXXF5A0 3302                SETNR BIT10,TEMP0   ;AND CDC WD9.6, ON SECTOR
00828 XXXXF3A0 3303                SETNR BIT9,TEMP0
00829 13XXEDA0 3304                SETNR BIT6,TEMP0 & ALU & WCACHE
0082A B2XX00D4 3305                CON WD10 & WCAR     ;AND CDC WD10.0, ON CYLINDER (2ND)
0082B 3XXXD8C0 3306                NR TEMP0 & RCACHE
0082C 13XXE1A0 3307                SETNR BIT0,TEMP0 & ALU & WCACHE
0082D BXF30836 3308                JNP UPDTXST2
               3309    UPDTXST1:   EQU $
0082E B2XX00D3 3310                CON WD9 & WCAR      ;RESET CDC WD9.10, SECTOR MARK,
0082F 3XXXD8C0 3311                NR TEMP0 & RCACHE   ;AND CDC WD9.9, ON CYLINDER
00830 XXXXF5C0 3312                RSTNR BIT10,TEMP0   ;AND CDC WD9.6, ON SECTOR
00831 XXXXF3C0 3313                RSTNR BIT9,TEMP0
00832 13XXEDC0 3314                RSTNR BIT6,TEMP0 & ALU & WCACHE
00833 B2XX00D4 3315                CON WD10 & WCAR     ;AND CDC WD10.0, ON CYLINDER (2ND)
00834 3XXXD8C0 3316                NR TEMP0 & RCACHE
00835 13XXE1C0 3317                RSTNR BIT0,TEMP0 & ALU & WCACHE
               3318    UPDTXST2:   EQU $
00836 B2XX00C8 3319                CON CWAREREV & WCAR ;SET CONTROLWARE REVISION LEVEL        ;1C
00837 3XXXF8C1 3320                HA & RCACHE                                               ;1C
00838 XXXXED9D 3321                RTAA 6              ;SHIFT TO BITS 9-6                    ;1C
00839 B2XX00CE 3322                CON WD4 & WCAR      ;GET WD4                              ;1C
0083A 3XXXD8C0 3323                NR TEMP0 & RCACHE                                         ;1C
0083B XXXX9CC0 3324                TOR1R AND,TEMP0     ;CLEAR OLD REV LEV                    ;1C
0083C XXXXFC3F 3325                IDAT H#03C0#                                              ;1C
               3326                TORAY OR,TEMP0                                            ;1C
0083D 13XX9140 3327                / & ALU & WCACHE    ;OR IN NEW AND WRITE BACK             ;1C
               3328    ; AMP UNIT CHECK MAPS TO CDC WD12.2 (UNUSED)
0083E XXXXD8EC 3329                IR SHMADDR          ;READ AMP STATUS WORD 3               ;2D1
0083F XXXX0002 3330                IDAT AMP.ST3        ;                                     ;2D1
00840 BXF10E00 3331                JSB SHMRDCU         ;                                     ;2D1
00841 B2XX00D6 3332                CON WD12 & WCAR     ;CLEAR OLD WD12.2
00842 3XXXF8C1 3333                HA & RCACHE
00843 XXXXE581 3334                RSTNA BIT2
00844 XXXXF3EB 3335                TSTNR EI.UCK,SHMDATA;IF UNIT CHECK,                       ;2D1
00845 BX230847 3336                CJNP Z,$+2          ;
               3337                SETNA BIT2          ;SET WD12.2
00846 13XXE582 3338                / & ALU & WCACHE
               3339    ; CHECK AMP SENSE BYTES
00847 XXXXD8EC 3340                IR SHMADDR
00848 XXXX0009 3341                IDAT AMP.SENS
00849 BXF10E00 3342                JSB SHMRDCU         ;READ CURRENT UNIT'S SENSE WORD 0
0084A XXXXE9EB 3343                TSTNR BIT4,SHMDATA  ;AMP SB0.6, TRACK CONDITION CHECK SET?
0084B BX23084D 3344                CJNP Z,$+2          ;MAPS TO
0084C BXF30852 3345                JNP UPDTXST3        ;CDC WD1.1, TRACK NUMBER ERROR
0084D XXXXE1EB 3346                TSTNR BIT0,SHMDATA  ;AMP SB1.1, INVALID TRACK FORMAT ?
0084E BX230855 3347                CJNP Z,UPDTXST4
```