# 2.4_V2.0 Software Boot Modes: Warm & Cold

*Last Revised: June 27,1999*
**Filename: swbootmode**

**BRIEF FUNCTIONAL DESCRIPTION:**
ACIS flight software can be booted in either cold or warm. The cold boot means that ACIS will be booted from EEPROM; and, the warm boot reloads the flight code, applys patches and bad pixel/column lists, and cleans up memory buffers.

The sequence of actions will be:

1. reconfigure to turn off and disable both DPAs
2. cold BEP A, load standard patches, warm boot BEP A, cold boot BEP A
3. warm BEP B, load standard patches, warm boot BEP B, cold boot BEP B
4. switch back to BEP A

**ASSUMED INSTRUMENT STATE:**
Assumes DPA A & B and DEA A are on.
Assumes instrument starts out in thermal standby state and will return instrument to that state.

**SPECIAL INITIAL CONDITIONS:**
Spacecraft telemetry Format must be 1 or 2.
**OPERATIONAL CONSTRAINTS/CAUTIONS:**
Patches are deleted in both BEPs by this procedure.

**REFERENCES:**
ACIS Long Form Functional Test Procedure (36-01301.01)
ACIS Short Form Functional Test Procedure (36-01301.02)
ACIS Science Instrument SW User's Guide (36-54003)

**CHANGE HISTORY:**

**V1.2**

- deleted commands in step 1 which power down the DEA A
- deleted commands in step 3 which powered down the DPA B
- added commands in step 4 to switch back to BEP A and power up DPA A

**V1.3**

- changed HW TLM verfiers in steps 1.1 and 1.3
- added new steps 2.3, 2.4, 2.5 to verify BEP A boot
- added step 2.8 and 2.9 to load the standard patches and sump them instead of the *houseread* patch
- changed HW TLM verifiers in steo 2.16 to verify that DPA A is off
- added new steps 3.7, 3.8, 3.9 to verify BEP B boot

- added step 3.10 and 3.11 to load the standard patches and sump them instead of the *houseread* patch
- edited step 4 to Halt the Bep in 4.1, Select BEP A in 4.2, Enable DPA A in step 4.3 and Turn On DPA A in step 4.4
- added steps 4.5, 4.6, and 4.7

**V1.4**

- added verifier to check the warmbootFlag = 1 in steps 2.12 and 3.14

**V2.0**

- ACIS Team signed-off version
- changed expected value of "1STAT7ST" in steps 2.4,3.8, and 4.6

Table 1: **Software Boot Modes: Cold & Warm**

| Step # | Title (Revision 2.4_V2.0) | Time Req (m) | Command Description | Command Mnemonic | Telemetry Description | Telemetry Mnemonic | Expected Value | Units |
|---|---|---|---|---|---|---|---|---|
| 1.0 | Turn off DPAs | | | | | | | |
| 1.1 | DPA Power B off | 1 | DPA PS Off B | 1DPPSBOF | DPA B ON/OFF | 1DPPSB | OFF | |
| | | | | | DPA +5V Voltage | 1DPP0BVO | $0.0 \pm 0.2$ | V |
| | | | | | DPA Input Current | 1DPICBCU | $< 0.2$ | A |
| 1.2 | Disable DPA Power B | 0.1 | DPA PS Disable B | 1DPPSBDS | DPA B ENB/DIS | 1DPPSBX | DIS | |
| 1.3 | DPA Power A off | 1 | DPA PS Off A | 1DPPSAOF | DPA A ON/OFF | | | |
| | | | | | DPA Input V A | 1DPP0AVO | $0.0 \pm 0.2$ | V |
| | | | | | DPA Input I A | 1DPICACU | $< 0.2$ | A |
| 1.4 | Disable DPA Power A | 0.1 | DPA PS Disable A | 1DPPSADS | DPA A ENB/DIS | | | |
| 2.0 | BEP A on, BEP B Off | | | | | | | |
| 2.1 | Enable DPA PS A | 0.1 | DPA PS A En | 1DPPSAEN | | | | |
| 2.2 | Turn on DPA PS A | 1 | DPA PS A On | 1DPPSAON | DPA A ON/OFF | 1DPPSA | ON | |
| | | | | | DPA A ENB/DIS | 1DPPSAX | ENB | |
| | | | | | DPA +5V | 1DPP0AVO | 4.9–5.5 | V |
| | | | | | DPA Input V | 1DP28AVO | 28.0–34.0 | V |
| | | | | | DPA Input I | 1DPICACU | 0.35–0.43 | A |
| 2.3 | Check BEP A Boot | 2.0 | | | | | | |
| 2.4 | Check HW LEDs | 2.0 | | | BEP Select | 1STAT4ST | 0 | |
| | | | | | BEP FIFO Not Full | 1STAT6ST | 1 | |
| | | | | | BEP FIFO Not Empty | 1STAT7ST | 0 | |
| 2.5 | Check SW LEDs | 2.0 | | | BEP initialization | 1STAT3ST | 0 | |
| | | | | | Watchdog boot | 1STAT2ST | 1 | |
| | | | | | Science run status | 1STAT1ST | 1 | |
| | | | | | | 1STAT0ST | 0or1 | |

Table 2: (CONT) **Software Boot Modes: Cold & Warm**

| Step # | Telemetry EGSE | Other Verifier | Crit | Description | Notes | RT Con | Tlm Fmt | Min Alt | SIM Pos |
|---|---|---|---|---|---|---|---|---|---|
| 1.0 | | | | | | | | | |
| 1.1 | | | | | | Y | 1or2 | | |
| | | | 2 | | | | | | |
| | | | 2 | | | | | | |
| 1.2 | | | 2 | | SF 4.9 | Y | 1or2 | | |
| 1.3 | | | | | SF 4.9 | Y | 1or2 | | |
| | | | 2 | | | | | | |
| | | | 2 | | | | | | |
| 1.4 | | | | | SF 4.9 | Y | 1or2 | | |
| 2.0 | | | | | | | | | |
| 2.1 | | | | No verifier before power is on | SF 4.4.1 | Y | 1or2 | | |
| 2.2 | | | 2 | | SF 4.4.1 | Y | 1or2 | | |
| | | | 2 | | | | | | |
| | | | 2 | | | | | | |
| | | | 2 | Expect 12 W for side A, power consumption | | | | | |
| | | | 2 | should be more stable than I or V. | | | | | |
| 2.3 | Check bepStartupMessage: | | A | | | Y | 1or2 | | |
| | bepTickCounter < 10; version =11; | | A | | | | | | |
| | watchdogFlag = 0, patchValidFlag =1 | | A | | | | | | |
| | warmbootFlag = 0 | | A | | | | | | |
| | Check swHousekeeping messages: | | | | | | | | |
| | startingBepTickCounter < 10; | | B | | | | | | |
| | endingBepTickCounter= | | B | | | | | | |
| | =startingBepTickCounter+640 | | | | | | | | |
| | version =11 | | A | | | | | | |
| 2.4 | | | 2 | 0 indicates BEP A is selected | | Y | 1or2 | | |
| | | | 2 | 1 means FIFO not full | | | | | |
| | | | 2 | 1 means FIFO not empty | | | | | |
| 2.5 | | | 2 | 0 means BEP SW is running | | Y | 1or2 | | |
| | | | 2 | 1 means no watchdog boot | | | | | |
| | | | 2 | 1 means science idle | | | | | |
| | | | 2 | this bit toggles to indicate BEP is running | | | | | |

Table 1: **Software Boot Modes: Cold & Warm(Page 2)**

| Step # | Title (Revision 2.4_V2.0) | Time Req (m) | Command Description | Command Mnemonic | Telemetry Description | Telemetry Mnemonic | Expected Value | Units |
|---|---|---|---|---|---|---|---|---|
| 2.5 | Set warm boot flag | 1 | DPA Warm Boot | 1WRMBTSB(1) | | | | |
| 2.6 | Halt BEP | 1 | DPA Command Reset | 1RSETIRT(1) | | | | |
| 2.7 | Restart BEP | 1 | | 1RSETIRT(0) | | | | |
| 2.8 | Load "standard-release-01" patches. | 1 | addPatch | WUSTD01001 | | | | |
| | | | | WUSTD01002 | | | | |
| | | | | WUSTD01003 | | | | |
| | | | | WUSTD01004 | | | | |
| | | | | WUSTD01005 | | | | |
| | | | | WUSTD01006 | | | | |
| | | | | WUFSV00017 | | | | |
| 2.9 | Dump Patchlist | 1 | dumpPatchlist | RU_0000001 | | | | |
| 2.10 | Set warm boot flag on | 1 | DPA Warm Boot | 1WRMBTSB(1) | | | | |
| 2.11 | Halt BEP | 1 | DPA Command Reset | 1RSETIRT(1) | | | | |
| 2.12 | Restart BEP A | 1 | | 1RSETIRT(0) | | | | |

Table 2: (CONT) **Software Boot Modes: Cold & Warm(Page 2)**

| Step # | Telemetry EGSE | Other Verifier | Crit | Description | Notes | RT Con | Tlm Fmt | Min Alt | SIM Pos |
|---|---|---|---|---|---|---|---|---|---|
| 2.5 | | | | Warm boot active BEP | LF 4.4.1 | Y | 1or2 | | |
| 2.6 | | | | Hold active BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| 2.7 | bepStartupMessage | | A | Release BEP reset line<br>Check startup messages<br>bepTickCounter $<$ 10; version =11<br>watchdogFlag = 0, patchvalidFlag = 1<br>warmbootFlag = 1<br>Check swHousekeeping messages<br>startingBepTickCounter $<$ 10;<br>endingBepTickCounter =<br>(startingBepTickCounter +640) | LF 4.4.1 | Y | 1or2 | | |
| 2.8 | Check cmdResult == OK<br>commandEcho = 368<br>Check cmdResult == OK<br>commandEcho = 371<br>Check cmdResult == OK<br>commandEcho = 373<br>Check cmdResult == OK<br>commandEcho = 374<br>Check cmdResult == OK<br>commandEcho = 377<br>Check cmdResult == OK<br>commandEcho = 378<br>Check cmdResult == OK<br>commandEcho = 380 | | A | Expect to send 7 packets. Total load size $\sim$ 264 bytes. | | Y | 1or2 | | |
| 2.9 | Check cmdResult == OK<br>commandEcho = 65 | | A | ACIS EGSE verifies 1 packet reply | | Y | 1or2 | | |
| 2.10 | | | | Warm boot active BEP | LF 4.4.1 | Y | 1or2 | | |
| 2.11 | | | | Hold active BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| 2.12 | bepStartupMessage | | A | Release BEP reset line<br>check startup messages; version = 23<br>warmbootFlag = 1 | LF 4.4.1 | Y | 1or2 | | |

Table 1: **Software Boot Modes: Cold & Warm(Page 3)**

| Step # | Title (Revision 2.4_V2.0) | Time Req (m) | Command Description | Command Mnemonic | Telemetry Description | Telemetry Mnemonic | Expected Value | Units |
|---|---|---|---|---|---|---|---|---|
| 2.13 | Set warm boot flag off | 1 | DPA Cold Boot | 1WRMBTSB(0) | | | | |
| 2.14 | Halt BEP | 1 | DPA Command Reset | 1RSETIRT(1) | | | | |
| 2.15 | Restart BEP | 1 | | 1RSETIRT(0) | | | | |
| 2.16 | DPA Power A off | 1 | DPA PS Off A | 1DPPSAOF | | | | |
| | | | | | DPA Input V A | 1DPP0AVO | $0.0 \pm 0.2$ | V |
| | | | | | DPA Input I A | 1DPICACU | $< 0.2$ | A |
| 2.17 | Disable DPA Power A | 0.1 | DPA PS Disable A | 1DPPSADS | DPA A ENB/DIS | | | |
| 3.0 | BEP B on, BEP A Off | | | | | | | |
| 3.1 | Enable DPA Power B | 0.1 | DPA PS Enable B | 1DPPSBEN | | | | |
| 3.2 | DPA Power B On | 1 | DPA PS On B | 1DPPSBON | DPA B ON/OFF | 1DPPSB | ON | |
| | | | | | DPA +5V | 1DPP0BVO | 4.9–5.5 | V |
| | | | | | DPA Input V | 1DP28BVO | 28.0–34.0 | V |
| | | | | | DPA Input I | 1DPICBCU | 0.26–0.32 | A |
| 3.3 | Select BEP B | 1 | | 1BSELICL(1) | | | | |
| 3.4 | Set warm boot flag on | 1 | DPA Warm Boot | 1WRMBTSB(1) | | | | |
| 3.5 | Halt BEP | 1 | DPA Command Reset | 1RSETIRT(1) | | | | |
| 3.6 | Restart BEP | 1 | | 1RSETIRT(0) | | | | |
| 3.7 | Check BEP B Boot | | | | | | | |
| 3.8 | Check HW LEDs | 2.0 | | | BEP Select | 1STAT4ST | 1 | |
| | | | | | BEP FIFO Not Full | 1STAT6ST | 1 | |
| | | | | | BEP FIFO Not Empty | 1STAT7ST | 0 | |
| 3.9 | Check SW LEDs | 2.0 | | | BEP initialization | 1STAT3ST | 0 | |
| | | | | | Watchdog boot | 1STAT2ST | 1 | |

Table 2: (CONT) **Software Boot Modes: Cold & Warm(Page 3)**

| Step # | Telemetry EGSE | Other Verifier | Crit | Description | Notes | RT Con | Tlm Fmt | Min Alt | SIM Pos |
|---|---|---|---|---|---|---|---|---|---|
| 2.13 | | | | disable Warm boot | LF 4.4.1 | Y | 1or2 | | |
| 2.14 | | | | Hold active BEP reset line | LF 4.4.1 | | 1or2 | | |
| 2.15 | bepStartupMessage | | A | Release BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| | | | | check startup messages; version = 11 | | | | | |
| | | | | warmbootFlag = 0 | | | | | |
| 2.16 | | | 2 | | | Y | 1or2 | | |
| | | | 2 | | | | | | |
| | | | 2 | | | | | | |
| 2.17 | | | | | SF 4.9 | Y | 1or2 | | |
| 3.0 | | | | | | | | | |
| 3.1 | | | | | | | 1or2 | | |
| 3.2 | | | 2 | | | Y | 1or2 | | |
| | | | 2 | | | | | | |
| | | | 2 | Expect 9 W for side B, power consumption | | | | | |
| | | | 2 | should be more stable than I or V. | | | | | |
| 3.3 | | | | 1BSELICL=1 selects BEP B | | Y | 1or2 | | |
| 3.4 | | | | Warm boot active BEP | LF 4.4.1 | Y | 1or2 | | |
| 3.5 | | | | Hold active BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| 3.6 | | | | Release BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| 3.7 | bepStartupMessage | | A | Check startup messages | | | | | |
| | | | | bepTickCounter $<$ 10; version =11 | | | | | |
| | | | | watchdogFlag = 0, patchvalidFlag = 1 | | | | | |
| | | | | warmbootFlag = 1 | | | | | |
| | | | | Check swHousekeeping messages | | | | | |
| | | | | startingBepTickCounter $<$ 10; | | | | | |
| | | | | endingBepTickCounter = | | | | | |
| | | | | (startingBepTickCounter +640) | | | | | |
| 3.8 | | | 2 | 1 indicates BEP B is selected | | Y | 1or2 | | |
| | | | 2 | 1 means FIFO not full | | | | | |
| | | | 2 | 1 means FIFO not empty | | | | | |
| 3.9 | | | 2 | 0 means BEP SW is running | | Y | 1or2 | | |
| | | | 2 | 1 means no watchdog boot | | | | | |

Table 1: **Software Boot Modes: Cold & Warm(Page 4)**

| Step # | Title (Revision 2.4_V2.0) | Time Req (m) | Command Description | Command Mnemonic | Telemetry Description | Telemetry Mnemonic | Expected Value | Units |
|---|---|---|---|---|---|---|---|---|
| | | | | | Science run status | 1STAT1ST | 1 | |
| | | | | | | 1STAT0ST | 0or1 | |
| 3.10 | Load "standard-release-01" patches. | 1 | addPatch | WUSTD01001 | | | | |
| | | | | WUSTD01002 | | | | |
| | | | | WUSTD01003 | | | | |
| | | | | WUSTD01004 | | | | |
| | | | | WUSTD01005 | | | | |
| | | | | WUSTD01006 | | | | |
| | | | | WUFSV00017 | | | | |
| 3.11 | Dump Patchlist | 1 | dumpPatchlist | RU_0000001 | | | | |
| 3.12 | Set warm boot flag on | 1 | DPA Warm Boot | 1WRMBTSB(1) | | | | |
| 3.13 | Halt BEP | 1 | DPA Command Reset | 1RSETIRT(1) | | | | |
| 3.14 | Restart BEP | 1 | | 1RSETIRT(0) | | | | |
| 3.15 | Set warm boot flag off | 1 | DPA Cold Boot | 1WRMBTSB(0) | | | | |
| 3.16 | Halt BEP | 1 | DPA Command Reset | 1RSETIRT(1) | | | | |
| 3.17 | Restart BEP | 1 | | 1RSETIRT(0) | | | | |
| 4.0 | Switch back to BEP A | | | | | | | |
| 4.1 | Halt BEP | 1 | DPA Command Reset | 1RSETIRT(1) | | | | |
| 4.2 | Select BEP A | 1 | | 1BSELICL(0) | | | | |
| 4.3 | Enable DPA PS A | 0.1 | DPA PS A En | 1DPPSAEN | DPA A ENB/DIS | 1DPPSAX | ENB | |

Table 2: (CONT) **Software Boot Modes: Cold & Warm(Page 4)**

| Step # | Telemetry EGSE | Other Verifier | Crit | Description | Notes | RT Con | Tlm Fmt | Min Alt | SIM Pos |
|---|---|---|---|---|---|---|---|---|---|
| | | | 2 | 1 means science idle | | | | | |
| | | | 2 | this bit toggles to indicate BEP is running | | | | | |
| 3.10 | Check cmdResult == OK<br>commandEcho = 368<br>Check cmdResult == OK<br>commandEcho = 371<br>Check cmdResult == OK<br>commandEcho = 373<br>Check cmdResult == OK<br>commandEcho = 374<br>Check cmdResult == OK<br>commandEcho = 377<br>Check cmdResult == OK<br>commandEcho = 378<br>Check cmdResult == OK<br>commandEcho = 380 | | | Expect to send 7 packets. Total load size $\sim$ 264 bytes. | | Y | 1or2 | | |
| 3.11 | Check cmdResult == OK<br>commandEcho = 65 | | | ACIS EGSE verifies 1 packet reply | | Y | 1or2 | | |
| 3.12 | | | | Warm boot active BEP | LF 4.4.1 | Y | 1or2 | | |
| 3.13 | | | | Hold active BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| 3.14 | bepStartupMessage | | A | Release BEP reset line<br>check startup messages; version = 21<br>warmbootFlag = 1 | LF 4.4.1 | Y | 1or2 | | |
| 3.15 | | | | disable Warm boot | LF 4.4.1 | Y | 1or2 | | |
| 3.16 | | | | Hold active BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| 3.17 | bepStartupMessage | | A | Release BEP reset line<br>check startup messages; version = 11<br>warmbootFlag = 0 | LF 4.4.1 | Y | 1or2 | | |
| 4.0 | | | | | | | | | |
| 4.1 | | | | Hold active BEP reset line | LF 4.4.1 | Y | 1or2 | | |
| 4.2 | | | | 1BSELICL=0 selects BEP A | | Y | 1or2 | | |
| 4.3 | | | 2 | | SF 4.4.1 | Y | 1or2 | | |

Table 1: **Software Boot Modes: Cold & Warm(Page 5)**

| Step # | Title (Revision 2.4_V2.0) | Time Req (m) | Command Description | Command Mnemonic | Telemetry Description | Telemetry Mnemonic | Expected Value | Units |
|---|---|---|---|---|---|---|---|---|
| 4.4 | Turn on DPA PS A | 1 | DPA PS A On | 1DPPSAON | DPA A ON/OFF | 1DPPSA | ON | |
| | | | | | DPA A ENB/DIS | 1DPPSAX | ENB | |
| | | | | | DPA Input V A | 1DP28AVO | 28.0–34.0 | V |
| | | | | | DPA Input I A | 1DPICACU | 0.35–0.43 | A |
| | | | | | DPA +5V | 1DPP0AVO | 4.9–5.5 | V |
| 4.5 | Check BEP A Boot | 2.0 | | | | | | |
| 4.6 | Check HW LEDs | 2.0 | | | BEP Select | 1STAT4ST | 0 | |
| | | | | | BEP FIFO Not Full | 1STAT6ST | 1 | |
| | | | | | BEP FIFO Not Empty | 1STAT7ST | 0 | |
| 4.7 | Check SW LEDs | 2.0 | | | BEP initialization | 1STAT3ST | 0 | |
| | | | | | Watchdog boot | 1STAT2ST | 1 | |
| | | | | | Science run status | 1STAT1ST | 1 | |
| | | | | | | 1STAT0ST | 0or1 | |
| | Total Time | 47.6 | | | | | | |

Table 2: (CONT) **Software Boot Modes: Cold & Warm(Page 5)**

| Step # | Telemetry EGSE | Other Verifier | Crit | Description | Notes | RT Con | Tlm Fmt | Min Alt | SIM Pos |
|---|---|---|---|---|---|---|---|---|---|
| 4.4 | | | 2 | | SF 4.4.1 | Y | 1or2 | | |
| | | | 1 | | | | | | |
| | | | 2 | Expect 12 W for side A, power | | | | | |
| | | | 2 | consumption should be more | | | | | |
| | | | 2 | stable than I or V. | | | | | |
| 4.5 | Check bepStartupMessage: | | A | | | Y | 1or2 | | |
| | bepTickCounter < 10; version =11; | | A | | | | | | |
| | watchdogFlag = 0, patchValidFlag =1 | | A | | | | | | |
| | warmbootFlag = 0 | | A | | | | | | |
| | Check swHousekeeping messages: | | | | | | | | |
| | startingBepTickCounter < 10; | | B | | | | | | |
| | endingBepTickCounter= | | B | | | | | | |
| | =startingBepTickCounter+640 | | | | | | | | |
| | version =11 | | A | | | | | | |
| 4.6 | | | 2 | 0 indicates BEP A is selected | | Y | 1or2 | | |
| | | | 2 | 1 means FIFO not full | | | | | |
| | | | 2 | 1 means FIFO not empty | | | | | |
| 4.7 | | | 2 | 0 means BEP SW is running | | Y | 1or2 | | |
| | | | 2 | 1 means no watchdog boot | | | | | |
| | | | 2 | 1 means science idle | | | | | |
| | | | 2 | this bit toggles to indicate BEP is running | | | | | |
| | | | | | | | | | |