

Specialized Hardware Supplement  
to the  
Software Communications Architecture Specification

**APPENDIX B**  
**SCA APPLICATION ENVIRONMENT PROFILE**  
**FOR DIGITAL SIGNAL PROCESSORS**

Revision Summary

|     |                 |
|-----|-----------------|
| 3.0 | Initial Release |
|-----|-----------------|

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## APPENDIX B EMBEDDED APPLICATION ENVIRONMENT PROFILE

### B.1 SCOPE.

This appendix defines an application environment profile (AEP) for use in SCA-compliant digital signal processors; herein referred to as “DSP AEP”. This work is based on the Standardized Application Environment Profile - POSIX® Realtime Application Support (AEP), IEEE Std 1003.13-1998. Examples of embedded processors include Digital Signal Processors (DSP’s), processor cores within Field Programmable Gate Arrays (FPGA’s) and perhaps micro-controllers. Mandatory application of this DSP AEP shall apply only to DSP’s. Use in an FPGA-based processor core is encouraged but not required.

### B.2 STANDARDS.

The following standards are required in whole or in part by the DSP AEP.

**Table B-1. Required Standards**

| Standard                        | DSP AEP |
|---------------------------------|---------|
| C Standard (ISO/IEC 9899:1990)  | PRT     |
| POSIX.1 (ISO/IEC 9945 -1):1997  | PRT     |
| POSIX.1b (ISO/IEC 9945 -1):1997 | PRT     |
| POSIX.1c (ISO/IEC 9945 -1):1997 | PRT     |
| POSIX.5b (IEEE 1003.5 - 1992)   | OPT     |

NOTE:

PRT — Partial, only the subset or options or Units of Functionality called out in A.3.

MAN — Mandatory, complete with all options.

OPT — Optional, may be included in the environment.

### B.3 CONSTRAINTS.

The real-time profile defined in this standard requires only specific Units of Functionality of the required standards. The absence of particular elements of these standards introduces constraints on the use of some of the features of particular functions.

Key considerations in selection of an AEP for the embedded processor are as follows: 1) Of late, DSP development environments include operating systems that offer a rich and scaleable feature set – pre-emptive multitasking, installable interrupt handlers and inter-process communications. 2) Current DSP technology does not employ Memory Management Units (MMU’s). 3) Different DSP environments sometimes offer extensions or services that target specific market segments – optimizations for video processing, power savings features and kernel support for real-time debugging. 4) Current embedded state-of-the-art does not exploit loadable modules. Entire FPGA and DSP images containing infrastructure and application software are loaded simultaneously as part of waveform instantiation.

Ultimately the presence of a full-featured RTOS in the embedded processor is a relatively new practice and yet one that is recognized as offering life cycle software cost benefit. The state-of-the-art will continue to advance and this Appendix shall not disallow the migration of new design paradigms as they become matured and practiced.

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### B.3.1 POSIX.1.

**Table B-2. POSIX.1 Option Requirements**

| Option                    | DSP AEP |
|---------------------------|---------|
| {NGROUPS_MAX}             | -       |
| {_POSIX_CHOWN_RESTRICTED} | NRQ     |
| {_POSIX_JOB_CONTROL}      | NRQ     |
| {_POSIX_NO_TRUNC}         | NRQ     |
| {_POSIX_SAVED_IDS}        | NRQ     |
| {_POSIX_VDISABLE}         | NRQ     |

NOTE:

NRQ — Not required for this profile.

PRI — The primary file system shall generate an error for pathname components longer than NAME\_MAX. The user is responsible for semantics of other file systems that may be mounted.

Embedded processor C/C++ run-time libraries typically do not support stdio.h or iostream.h.

#### B.3.1.1 Single Process Function Behavior.

The functions in Table B-3 shall behave as described in the referenced clauses.

**Table B-3. POSIX\_SINGLE\_PROCESS Functions**

| Function   | Reference in<br>POSIX.1 | DSP AEP |
|------------|-------------------------|---------|
| sysconf( ) | 4.8.1                   | NRQ     |
| uname( )   | 4.4.1                   | NRQ     |
| time()     | 4.5.1                   | NRQ     |

NRQ — Not required for this profile.

MAN — Mandatory.

### B.3.1.2 Multi-Process Function Behavior.

The functions listed in Table B-4 shall behave as described in the referenced clauses.

**Table B-4. - POSIX\_MULTI\_PROCESS Functions**

| Function    | Reference in<br>POSIX.1 | DSP AEP |
|-------------|-------------------------|---------|
| execl()     | 3.1.2                   | NRQ     |
| execv()     | 3.1.2                   | NRQ     |
| execle()    | 3.1.2                   | NRQ     |
| execve()    | 3.1.2                   | NRQ     |
| execlp()    | 3.1.2                   | NRQ     |
| execvp()    | 3.1.2                   | NRQ     |
| _exit()     | 3.2.2                   | NRQ     |
| fork()      | 3.1.1                   | NRQ     |
| getenv()    | 4.6.1                   | NRQ     |
| getpid()    | 4.1.1                   | NRQ     |
| getppid()   | 4.1.1                   | NRQ     |
| sleep()     | 3.4.3                   | NRQ     |
| times()     | 4.5.2                   | NRQ     |
| wait()      | 3.2.1                   | NRQ     |
| waitpid()   | 3.2.1                   | NRQ     |
| assert()    | 8.1, 8.2, 8.3           | NRQ     |
| exit()      | 8.1, 8.2, 8.3           | NRQ     |
| setlocale() | 8.1, 8.2, 8.3           | NRQ     |

setlocale() is a part of the SCA profile but not part of the embedded profile because embedded processors do not support streaming character oriented output.

NRQ — Not Required for this profile.

### B.3.1.3 Job Control Function Behavior.

The functions listed in Table B-5 shall behave as described in the referenced clauses.

**Table B-5. POSIX\_JOB\_CONTROL Functions**

| Function*   | Reference in<br>POSIX.1 | DSP AEP |
|-------------|-------------------------|---------|
| setpgid()   | 4.3.3                   | NRQ     |
| tcgetpgrp() | 7.2.3                   | NRQ     |
| tcsetpgrp() | 7.2.4                   | NRQ     |
| *           | 7.1.1.4                 | NRQ     |

NOTE:

NRQ — Not required for this profile.

\* — Further functionality is also defined here.

### B.3.1.4 Signals Function Behavior.

The functions listed in Table B-6 shall behave as described in the referenced clauses, except for the following constraints:

- (1) Operating systems on embedded processors typically support neither signaling nor exception handling.
- (2) POSIX does not define behaviors associated with divide by zero or overflow/underflow

- (3) Signaling methods introduced as part of POSIX.1c are more consistent with the multi-threaded, single process model of the DSP environment.

**Table B-6. POSIX\_SIGNALS Functions**

| Function      | Reference in<br>POSIX.1 | DSP AEP |
|---------------|-------------------------|---------|
| alarm()*      | 3.4.1                   | NRQ     |
| kill()        | 3.3.2                   | NRQ     |
| pause()       | 3.4.2                   | NRQ     |
| sigaction()   | 3.3.4                   | NRQ     |
| sigaddset()   | 3.3.3                   | NRQ     |
| sigdelset()   | 3.3.3                   | NRQ     |
| sigemptyset() | 3.3.3                   | NRQ     |
| sigfillset()  | 3.2.3                   | NRQ     |
| sigismember() | 3.3.3                   | NRQ     |
| sigpending()  | 3.3.6                   | NRQ     |
| sigprocmask() | 3.3.5                   | NRQ     |
| sigsuspend()  | 3.3.7                   | NRQ     |
| abort()       | 8.1,8.2,8.3             | MAN     |
| siglongjmp()  | 8.1,8.2,8.3             | NRQ     |
| sigsetjmp()   | 8.1,8.2,8.3             | NRQ     |

NOTE:

MAN — Mandatory for this profile.

abort() is used to support assert() which is widely supported.

NRQ — Not Required for this profile.

### B.3.1.5 User Group Function Behavior.

The functions listed in Table B-7 shall behave as described in the referenced clauses.

**Table B-7. POSIX\_USER\_GROUPS Functions**

| Function    | Reference in<br>POSIX.1 | DSP AEP |
|-------------|-------------------------|---------|
| getegid()   | 4.2.1                   | NRQ     |
| geteuid()   | 4.2.1                   | NRQ     |
| getgid()    | 4.2.1                   | NRQ     |
| getgroups() | 4.2.3                   | NRQ     |
| getlogin()  | 4.2.4                   | NRQ     |
| getpgrp()   | 4.3.1                   | NRQ     |
| getuid()    | 4.2.1                   | NRQ     |
| setuid()    | 4.2.2                   | NRQ     |
| setsid()    | 4.3.2                   | NRQ     |
| setgid()    | 4.2.2                   | NRQ     |

NOTE:

NRQ — Not required for this profile.

### B.3.1.6 File System Function Behavior.

The functions listed in Table B-8 shall behave as described in the referenced clauses.

**Table B-8. POSIX\_FILE\_SYSTEM Functions**

| Function    | Reference in<br>POSIX.1 | DSP AEP |
|-------------|-------------------------|---------|
| access()    | 5.6.3                   | NRQ     |
| chdir()     | 5.2.1                   | NRQ     |
| closedir()  | 5.1.2                   | NRQ     |
| creat()     | 5.3.2                   | NRQ     |
| fpathconf() | 5.7.1                   | NRQ     |
| fstat()     | 5.6.2                   | NRQ     |
| getcwd()    | 5.2.2                   | NRQ     |
| link()      | 5.3.4                   | NRQ     |
| mkdir()     | 5.4.1                   | NRQ     |
| opendir()   | 5.1.2                   | NRQ     |
| pathconf()  | 5.7.1                   | NRQ     |
| readdir()   | 5.1.2                   | NRQ     |
| rename()    | 5.5.3                   | NRQ     |
| rewinddir() | 5.1.2                   | NRQ     |
| rmdir()     | 5.5.2                   | NRQ     |
| stat()      | 5.6.2                   | NRQ     |
| unlink()    | 5.5.1                   | NRQ     |
| utime()     | 5.6.6                   | NRQ     |
| remove()    | 8.1, 8.2, 8.3           | NRQ     |
| rename()    | 8.1, 8.2, 8.3           | NRQ     |
| tmpfile()   | 8.1, 8.2, 8.3           | NRQ     |
| tmpnam()    | 8.1, 8.2, 8.3           | NRQ     |

NOTE:

MAN — Mandatory for this profile.

POSIX file system not generally supported in embedded operating systems.

### B.3.1.7 File Attributes Function Behavior.

The functions listed in Table B-9 shall behave as described in the referenced clauses:

**Table B-9. POSIX\_FILE\_ATTRIBUTES Functions**

| Function | Reference in<br>POSIX.1 | DSP AEP |
|----------|-------------------------|---------|
| chmod()  | 5.6.4                   | NRQ     |
| chown()  | 5.6.5                   | NRQ     |
| umask()  | 5.3.3                   | NRQ     |

NOTE:

NRQ — Not required for this profile.

POSIX file system not generally supported in embedded operating systems.

**B.3.1.8 File and Directory Management Function Behavior.**

The functions listed in Table B-10 shall behave as described in the referenced clauses.

**Table B-10. POSIX\_FD\_MGMT Functions**

| Function | Reference in<br>POSIX.1 | DSP AEP |
|----------|-------------------------|---------|
| dup()    | 6.2.1                   | NRQ     |
| dup2()   | 6.2.1                   | NRQ     |
| fcntl()  | 6.5.2                   | NRQ     |
| lseek()  | 6.5.3                   | NRQ     |
| fseek()  | 8.1, 8.2, 8.3           | NRQ     |
| ftell()  | 8.1, 8.2, 8.3           | NRQ     |
| rewind() | 8.1, 8.2, 8.3           | NRQ     |

NOTE:

NRQ — Not required for this profile.

POSIX file system not generally supported in embedded operating systems.

### B.3.1.9 Device I/O Function Behavior.

The functions listed in Table B-11 shall behave as described in the referenced clauses.

**Table B-11. POSIX\_DEVICE\_IO Functions**

| Function   | Reference in<br>POSIX.1 | DSP AEP |
|------------|-------------------------|---------|
| close()    | 6.3.1                   | NRQ     |
| open()     | 5.3.1                   | NRQ     |
| read()     | 6.4.1                   | NRQ     |
| write()    | 6.4.2                   | NRQ     |
| clearerr() | 8.1, 8.2, 8.3           | NRQ     |
| fclose()   | 8.1, 8.2, 8.3           | NRQ     |
| fdopen()   | 8.1, 8.2, 8.3           | NRQ     |
| feof()     | 8.1, 8.2, 8.3           | NRQ     |
| ferror()   | 8.1, 8.2, 8.3           | NRQ     |
| fflush()   | 8.1, 8.2, 8.3           | NRQ     |
| fgetc()    | 8.1, 8.2, 8.3           | NRQ     |
| fileno()   | 8.1, 8.2, 8.3           | NRQ     |
| fgets()    | 8.1, 8.2, 8.3           | NRQ     |
| fopen()    | 8.1, 8.2, 8.3           | NRQ     |
| fprintf()  | 8.1, 8.2, 8.3           | NRQ     |
| fputc()    | 8.1, 8.2, 8.3           | NRQ     |
| fputs()    | 8.1, 8.2, 8.3           | NRQ     |
| fread()    | 8.1, 8.2, 8.3           | NRQ     |
| freopen()  | 8.1, 8.2, 8.3           | NRQ     |
| fscanf()   | 8.1, 8.2, 8.3           | NRQ     |
| fwrite()   | 8.1, 8.2, 8.3           | NRQ     |
| getc()     | 8.1, 8.2, 8.3           | NRQ     |
| getchar()  | 8.1, 8.2, 8.3           | NRQ     |
| gets()     | 8.1, 8.2, 8.3           | NRQ     |
| perror()   | 8.1, 8.2, 8.3           | NRQ     |
| printf()   | 8.1, 8.2, 8.3           | NRQ     |
| putc()     | 8.1, 8.2, 8.3           | NRQ     |
| putchar()  | 8.1, 8.2, 8.3           | NRQ     |
| puts()     | 8.1, 8.2, 8.3           | NRQ     |
| scanf()    | 8.1, 8.2, 8.3           | NRQ     |
| setbuf()   | 8.1, 8.2, 8.3           | NRQ     |
| sprintf()  | 8.1, 8.2, 8.3           | NRQ     |
| sscanf()   | 8.1, 8.2, 8.3           | NRQ     |
| ungetc()   | 8.1, 8.2, 8.3           | NRQ     |

NOTE:

MAN — Mandatory for this profile.

POSIX streams not generally supported in embedded operating systems.

### B.3.1.10 Device-Specific Function Behavior.

The functions listed in Table B-12 shall behave as described in the referenced clauses.

**Table B-12. POSIX\_DEVICE\_SPECIFIC Functions**

| Function      | Reference in<br>POSIX.1 | DSP AEP |
|---------------|-------------------------|---------|
| cfgetispeed() | 7.1.3                   | NRQ     |
| cfgetospeed() | 7.1.3                   | NRQ     |
| cfsetispeed() | 7.1.3                   | NRQ     |
| cfsetospeed() | 7.1.3                   | NRQ     |
| ctermid()     | 4.7.1                   | NRQ     |
| isatty()      | 4.7.2                   | NRQ     |
| tcdrain()     | 7.2.2                   | NRQ     |
| toflush()     | 7.2.2                   | NRQ     |
| tcflow()      | 7.2.2                   | NRQ     |
| tcgetattr()   | 7.2.1                   | NRQ     |
| tcsendbreak() | 7.2.2                   | NRQ     |
| tcsetattr()   | 7.2.1                   | NRQ     |
| ttynname()    | 4.7.2                   | NRQ     |

NOTE:

NRQ — Not required for this profile.

### B.3.1.11 System Database Function Behavior.

The functions listed in Table B-13 shall behave as described in the referenced clauses.

**Table B-13. POSIX\_SYSTEM\_DATABASE Functions**

| Function   | Reference in<br>POSIX.1 | DSP AEP |
|------------|-------------------------|---------|
| getgrgid() | 9.2.1                   | NRQ     |
| getgrnam() | 9.2.1                   | NRQ     |
| getpwnam() | 9.2.2                   | NRQ     |
| getpwuid() | 9.2.2                   | NRQ     |

NOTE:

NRQ — Not required for this profile.

### B.3.1.12 Pipe Function Behavior.

The function listed in Table B-14 shall behave as described in the referenced clause.

**Table B-14. POSIX\_PIPE\_Function**

| Function | Reference in<br>POSIX.1 | DSP AEP |
|----------|-------------------------|---------|
| pipe()   | 6.1.1                   | NRQ     |

NOTE:

NRQ — Not required for this profile.

### **B.3.1.13 FIFO Function Behavior.**

The function listed in Table B-15 shall behave as described in the referenced clause.

**Table B-15. POSIX\_FIFO Function**

| Function | Reference in POSIX.1 | DSP AEP |
|----------|----------------------|---------|
| mkfifo() | 5.4.2                | NRQ     |

NOTE:

NRQ — Not required for this profile.

### **B.3.1.14 C Language-Specific Services Behavior.**

The functions listed in Table B-16, Table B-17, Table B-18, Table B-19, Table B-20, and Table B-21 shall behave as described in the referenced clauses.

Compared to the SCA AEP, this AEP requires only a small subset of C Language specific functionality. There are many reasons for this consideration, the most of which is recognition of the fact that many DSP's are fixed point and support for a POSIX floating point math library is burdensome and unnecessary.

**Table B-16. POSIX\_C\_LANG\_SUPPORT Character Handling Functions**

| Function   | Reference in the C Standard | DSP AEP |
|------------|-----------------------------|---------|
| isalnum()  | 4.3.1.1                     | MAN     |
| isalpha()  | 4.3.1.2                     | MAN     |
| iscntrl()  | 4.3.1.3                     | MAN     |
| isdigit()  | 4.3.1.4                     | MAN     |
| isgraph()  | 4.3.1.5                     | MAN     |
| islower()  | 4.3.1.6                     | MAN     |
| isprint()  | 4.3.1.7                     | MAN     |
| ispunct()  | 4.3.1.8                     | MAN     |
| isspace()  | 4.3.1.9                     | MAN     |
| isupper()  | 4.3.1.10                    | MAN     |
| isxdigit() | 4.3.1.11                    | MAN     |
| tolower()  | 4.3.2.1                     | MAN     |
| toupper()  | 4.3.2.2                     | MAN     |

NOTE:

MAN — Mandatory for this profile.

**Table B-17. POSIX\_C\_LANG\_SUPPORT Mathematical Functions**

| Function | Reference in the C Standard | DSP AEP |
|----------|-----------------------------|---------|
| acos()   | 4.5.2.1                     | NRQ     |
| asin()   | 4.5.2.2                     | NRQ     |
| atan()   | 4.5.2.3                     | NRQ     |
| atan2()  | 4.5.2.4                     | NRQ     |
| ceil()   | 4.5.6.1                     | NRQ     |
| cos()    | 4.5.2.5                     | NRQ     |
| cosh()   | 4.5.3.1                     | NRQ     |
| exp()    | 4.5.4.1                     | NRQ     |
| fabs()   | 4.5.6.2                     | NRQ     |
| floor()  | 4.5.6.3                     | NRQ     |
| fmod()   | 4.5.6.4                     | NRQ     |
| frexp()  | 4.5.4.2                     | NRQ     |
| ldexp()  | 4.5.4.3                     | NRQ     |
| log()    | 4.5.4.4                     | NRQ     |
| log10()  | 4.5.4.5                     | NRQ     |
| modf()   | 4.5.4.6                     | NRQ     |
| pow()    | 4.5.5.1                     | NRQ     |
| sin()    | 4.5.2.6                     | NRQ     |
| sinh()   | 4.5.3.2                     | NRQ     |
| sqrt()   | 4.5.5.2                     | NRQ     |
| tan()    | 4.5.2.7                     | NRQ     |
| tanh()   | 4.5.3.3                     | NRQ     |

NOTE:

MAN — Mandatory for this profile.

**Table B-18. POSIX\_C\_LANG\_SUPPORT Non-Local Jump Functions**

| Function  | Reference in the C Standard | DSP AEP |
|-----------|-----------------------------|---------|
| longjmp() | 4.6.2.1                     | NRQ     |
| setjmp()  | 4.6.1.1                     | NRQ     |

NOTE:

MAN — Mandatory for this profile.

A form of context switch used to support a non-local exit.

**Table B-19. POSIX\_C\_LANG\_SUPPORT General Functions**

| Function  | Reference in the C Standard | DSP AEP |
|-----------|-----------------------------|---------|
| abs()     | 4.10.6.1                    | MAN     |
| atof()    | 4.10.1.1                    | MAN     |
| atoi()    | 4.10.1.2                    | MAN     |
| atol()    | 4.10.1.3                    | MAN     |
| bsearch() | 4.10.5.1                    | NRQ     |
| calloc()  | 4.10.3.1                    | MAN     |
| free()    | 4.10.3.2                    | MAN     |
| malloc()  | 4.10.3.3                    | MAN     |
| qsort()   | 4.10.5.2                    | NRQ     |
| rand()    | 4.10.2.1                    | MAN     |
| realloc() | 4.10.3.4                    | MAN     |
| srand()   | 4.10.2.2                    | MAN     |

NOTE:

MAN — Mandatory for this profile.

Support for dynamic memory allocation is essential to re-entrant object-oriented design.

**Table B-20. POSIX\_C\_LANG\_SUPPORT String Handling Functions**

| Function  | Reference in the C Standard | DSP AEP |
|-----------|-----------------------------|---------|
| strcat()  | 4.11.3.1                    | NRQ     |
| strchr()  | 4.11.5.2                    | NRQ     |
| strcmp()  | 4.11.4.2                    | NRQ     |
| strcpy()  | 4.11.2.3                    | NRQ     |
| strcspn() | 4.11.5.3                    | NRQ     |
| strlen()  | 4.11.6.3                    | NRQ     |
| strncpy() | 4.11.2.4                    | NRQ     |
| strncat() | 4.11.3.2                    | NRQ     |
| strncmp() | 4.11.4.4                    | NRQ     |
| strpbkr() | 4.11.5.4                    | NRQ     |
| strrchr() | 4.11.5.5                    | NRQ     |
| strspn()  | 4.11.5.6                    | NRQ     |
| strstr()  | 4.11.5.7                    | NRQ     |
| strtok()  | 4.11.5.8                    | NRQ     |

NOTE:

MAN — Mandatory for this profile.

**Table B-21. POSIX\_C\_LANG\_SUPPORT Data and Time Functions**

| Function    | Reference in the C Standard | DSP AEP |
|-------------|-----------------------------|---------|
| asctime()   | 4.12.3.1                    | NRQ     |
| ctime()     | 4.12.3.2                    | NRQ     |
| gmtime()    | 4.12.3.3                    | NRQ     |
| localtime() | 4.12.3.4                    | NRQ     |
| mktyme()    | 4.12.2.3                    | NRQ     |
| strftime()  | 4.12.3.5                    | NRQ     |
| time()      | 4.12.2.4                    | NRQ     |
| tzset()     | 4.12.2.4                    | NRQ     |

NOTE:

NRQ — Mandatory for this profile.

MAN — Mandatory for this profile.

### B.3.2 POSIX.1b.

Table B-22 contains the required options, limits, and any other constraints on POSIX.1b.

**Table B-22. POSIX.1b Option Requirements**

|                                | DSP AEP |
|--------------------------------|---------|
| { POSIX_ASYNCHRONOUS_IO}       | NRQ     |
| { POSIX_MAPPED_FILES}          | NRQ     |
| { POSIX_MEMLOCK}               | NRQ     |
| { POSIX_MEMLOCK_RANGE}         | NRQ     |
| { POSIX_MEMORY_PROTECTION}     | NRQ     |
| { POSIX_MESSAGE_PASSING}       | NRQ     |
| { POSIX_PRIORITIZED_IO}        | NRQ     |
| { POSIX_PRIORITY_SCHEDULING}   | NRQ     |
| { POSIX_REALTIME_SIGNALS}      | NRQ     |
| { POSIX_SEMAPHORES}            | MAN     |
| { POSIX_SHARED_MEMORY_OBJECTS} | NRQ     |
| { POSIX_SYNCHRONIZED_IO}       | NRQ     |
| { POSIX_TIMERS}                | MAN     |
| { POSIX_FSYNC}                 | NRQ     |

NOTE:

NRQ — Not required for this profile.

MAN — Mandatory for this profile.

Heavy weight processes are typically not supported in embedded operating systems. The mandatory POSIX.1b options can be implemented without the use of heavy weight signaling.

#### B.3.2.1 POSIX Semaphores

**Table B-23. POSIX.1b Semaphore Requirements**

| Function       | Page Reference* | DSP AEP |
|----------------|-----------------|---------|
| sem_init()     | 752             | MAN     |
| sem_close()    | 749             | NRQ     |
| sem_destroy()  | 750             | MAN     |
| sem_getvalue() | 751             | MAN     |
| sem_open()     | 753             | NRQ     |
| sem_post()     | 755             | MAN     |
| sem_unlink()   | 756             | NRQ     |
| sem_wait()     | 757             | MAN     |
| sem_trywait()  | 757             | MAN     |

NOTE:

MAN — Mandatory for this profile.

\* The Open Group, System Interfaces and Headers, Issue 5, volume 2

### B.3.2.2 POSIX Timers

**Table B-24. POSIX.1b Timer Requirements**

| Function                     | Page Reference* | DSP AEP |
|------------------------------|-----------------|---------|
| <code>clock_getres()</code>  | 133             | MAN     |
| <code>clock_gettime()</code> | 133             | MAN     |
| <code>clock_settime()</code> | 133             | MAN     |
| <code>timer_create()</code>  | 944             | MAN     |
| <code>timer_delete()</code>  | 946             | MAN     |
| <code>timer_gettime()</code> | 947             | MAN     |
| <code>timer_settime()</code> | 947             | MAN     |
| <code>nanosleep()</code>     | 562             | MAN     |

NOTE:

MAN — Mandatory for this profile.

\* The Open Group, System Interfaces and Headers, Issue 5, volume 2

### B.3.3 POSIX.1c.

Table B-25, Table B-26, Table B-27, and Table B-28 contain the required options, limits, and any other constraints on POSIX.1c.

**Table B-25. POSIX.1c Option Requirements**

| Option                              | DSP AEP |
|-------------------------------------|---------|
| { POSIX_THREADS}                    | MAN     |
| { POSIX_THREAD_ATTR_STACKADDR}      | NRQ     |
| { POSIX_THREAD_ATTR_STACKSIZE}      | MAN     |
| { POSIX_THREAD_PRIO_INHERIT}        | NRQ     |
| { POSIX_THREAD_PRIO_PROTECT}        | NRQ     |
| { POSIX_THREAD_PRIORITY_SCHEDULING} | MAN     |
| { POSIX_THREAD_PROCESS_SHARED}      | NRQ     |
| { POSIX_THREAD_SAFE_FUNCTIONS}      | MAN     |

NOTE:

NRQ — Not required for this profile.

MAN — Mandatory for this profile.

### B.3.3.1 POSIX Threads

**Table B-26. POSIX.1c Thread Requirements**

| Function                              | Page Reference* | DSP AEP |
|---------------------------------------|-----------------|---------|
| <code>pthread_atfork()</code>         | 595             | NRQ     |
| <code>pthread_attr_xxx()</code>       | 598             | MAN     |
| <code>pthread_cancel()</code>         | 607             | MAN     |
| <code>pthread_cleanup_xxx()</code>    | 608             | MAN     |
| <code>pthread_cond_xxx()</code>       | 609             | MAN     |
| <code>pthread_create()</code>         | 619             | MAN     |
| <code>pthread_detach()</code>         | 621             | MAN     |
| <code>pthread_equal()</code>          | 622             | MAN     |
| <code>pthread_exit()</code>           | 623             | MAN     |
| <code>pthread_getschedparam()</code>  | 626             | MAN     |
| <code>pthread_join()</code>           | 628             | MAN     |
| <code>pthread_key_xxx()</code>        | 629             | NRQ     |
| <code>pthread_kill()</code>           | 632             | MAN     |
| <code>pthread_mutex_xxx()</code>      | 633             | MAN     |
| <code>pthread_once()</code>           | 648             | MAN     |
| <code>pthread_self()</code>           | 660             | MAN     |
| <code>pthread_setcancelstate()</code> | 661             | MAN     |
| <code>pthread_setcanceltype()</code>  | 661             | MAN     |
| <code>pthread_setschedparam()</code>  | 626             | MAN     |
| <code>pthread_sigmask()</code>        | 666             | MAN     |
| <code>pthread_testcancel()</code>     | 661             | MAN     |
| <code>sigwait()</code>                | 846             | MAN     |

NOTE:

MAN — Mandatory for this profile.

NRQ — Not required for this profile.

\* The Open Group, System Interfaces and Headers, Issue 5, volume 2

### **B.3.3.2 Re-entrant User Group Function Behavior.**

The functions listed in Tables B-27 and B-28 shall behave as described in the referenced clause.

**Table B-27. POSIX\_USER\_GROUPS\_R Function**

| Function     | Reference in<br>POSIX.1c | DSP AEP |
|--------------|--------------------------|---------|
| getlogin_r() | 4.2.4                    | NRQ     |

NOTE:

NRQ — Not required for this profile.

**Table B-28. POSIX\_DEVICE\_SPECIFIC\_R Function**

| Function    | Reference in<br>POSIX.1c | DSP AEP |
|-------------|--------------------------|---------|
| ttyname_r() | 4.7.4                    | NRQ     |

NOTE:

NRQ — Not required for this profile.

### **B.3.3.3 File Locking Function Behavior.**

The functions listed in Table B-29 shall behave as described in the referenced clauses.

**Table B-29. POSIX\_FILE\_LOCKING Functions**

| Function           | Reference<br>in<br>POSIX.1c | DSP AEP |
|--------------------|-----------------------------|---------|
| getc_unlocked()    | 8.2.7                       | NRQ     |
| getchar_unlocked() | 8.2.7                       | NRQ     |
| flockfile()        | 8.2.6                       | NRQ     |
| ftrylockfile()     | 8.2.6                       | NRQ     |
| funlockfile()      | 8.2.6                       | NRQ     |
| putc_unlocked()    | 8.2.7                       | NRQ     |
| putchar_unlocked() | 8.2.7                       | NRQ     |

NOTE:

NRQ — Not required for this profile.

### **B.3.3.4 Reentrant C Language Support Function Behavior.**

The functions listed in Table B-30 shall behave as described in the referenced clauses.

**Table B-30. POSIX\_C\_LANG\_SUPPORT\_R Functions**

| Function      | Reference in<br>POSIX.1c | DSP AEP |
|---------------|--------------------------|---------|
| asctime_r()   | 8.3.5                    | NRQ     |
| ctime_r()     | 8.3.6                    | NRQ     |
| gmtime_r()    | 8.3.7                    | NRQ     |
| localtime_r() | 8.3.8                    | NRQ     |
| rand_r()      | 8.3.9                    | MAN     |
| strtok_r()    | 8.3.4                    | NRQ     |

NOTE:

MAN — Mandatory for this profile.

NRQ — Not required for this profile.

**B.3.3.5 Reentrant System Database Function Behavior.**

The functions listed in Table B-31 shall behave as described in the referenced clauses.

**Table B-31. POSIX\_SYSTEM\_DATABASE\_R Functions**

| Function     | Reference in<br>POSIX.1c | DSP AEP |
|--------------|--------------------------|---------|
| getgrgid_r() | 9.2.1                    | NRQ     |
| getgrnam_r() | 9.2.1                    | NRQ     |
| getpwnam_r() | 9.2.2                    | NRQ     |
| getwuid_r()  | 9.2.2                    | NRQ     |

NOTE:

NRQ — Not required for this profile.