

X3J11/88-081

22 Apr 88
Project 381-DX3J11 Meeting No. 20
18-22 Apr 88Sheraton Tara Hotel
Tara Blvd.
Nashua NH 03062
(603) 888-9970

1. Opening Activities (Brodie)

1.1 Opening Comments

The meeting convened at 9:00 a.m. on Monday, 18 Apr 88, by Chairman Jim Brodie, who welcomed participants new and old to the twentieth meeting of X3J11, Programming Language C (X3 Project 381D). Host for the meeting was Honeywell (Osten). Tom Plum served as as Vice Chairman. P.J. Plauger served as Secretary.

Brodie emphasized that the goals for this meeting is to deal with the comments from the second public review. Thirty-six letters were received by CBEMA, all of which must be processed this week if the Committee is to make effective use of the four month interval before the next meeting.

1.2 Housekeeping

Brodie informed the Committee that Honeywell was serving as host for this meeting, so any requests for copies of documents should be funneled through Osten.

1.3 Approval of Previous Minutes

Plauger submitted the minutes of the previous meeting (87-249) for amendment or correction.

MacDonald observed (p. 3) that Kotikian now works for Kendall Square. He also observed (p. 9) that "A+B" should read "A-B".

Prosser submitted (p. 12-13) alternate wording for the discussion of a point by Brader:

"Prosser reported (87-222 #4) a possibility for misinterpretation was discovered by Brader in the understanding of braces in data initializers. He cited the example

```
"int a[2][2] = {{1}, {2}};
```

"Is {1} the entire initializer for the integer a[0][0], with

redundant braces around the scalar, or is it the entire initializer for the integer array `a[0]` (such that `a[0][0]` is 1 and `a[0][1]` is implicitly 0)? He proposed that we disallow redundant braces within an aggregate initializer.

"Plauser objected to disallowing a widespread practice. He also repeated his plea (87-200 #4) that we make anything except full bracketing or no bracketing undefined behavior.

"Khushf observed that such a response would not eliminate the possibility for misinterpretation.

"Straw vote:

21 status quo

2 make embedded redundant {} undefined

10 make partial bracketing undefined

"It was agreed that braces would be taken to be significant if at all possible, and only otherwise are they redundant. Hence {1} in the example is the entire initializer for the array `a[0]` and {2} is the entire initializer for the array `a[1]`."

Prosser observed (p. 18) that the rule for checking escapes such as `\377` also applies to initializing `wchar_t` arrays. He also reported (p. 21) that the word "successful" should be "unsuccessful".

With these changes, the minutes were accepted.

1.4 Approval of Agenda

Brodie submitted a Preliminary Agenda (88-073) for approval. With small changes, the Agenda was approved. The revised Agenda (88-073R) is Attachment II to these minutes.

1.5 Introduction of New Participants

All attendees introduced themselves to the Committee.

1.6 Next Meeting

The next meeting will be held in Cupertino CA, at the Sunnyvale Hilton, 15-19 Aug 88, hosted by Borland/Tandem/H-P.

1.7 Procedures for this Meeting

Brodie discussed the difference between substantive and editorial changes, as best he understood it from conversations with several people at ANSI. He reported that a 30-day review is possible, provided that the Committee makes only a couple of well localized changes in the Draft. Otherwise, a full 2-month third public review is required. In either case, the Committee is obliged to respond to all public commentary before sending the Draft to X3. If the Committee makes substantive changes, as seems inevitable, an

Aug 88 meeting is necessary.

Brodie urged the subcommittees that review public comments to exercise considerable discretion. We should not lightly consider new features, nor rehash old arguments unless new information is provided. Changes should be championed before the whole Committee only if the subcommittee feels that they fix something broken in the Draft.

There was some discussion of how best to strike a proper balance between giving due consideration to each public comment and getting the job done.

1.8 Distribution of New Documents

Plum reported that 88-026 through 88-030, and 88-067 through 88-069 are unused document numbers. Public comments #1 through #36 are 88-031 through 88-066. Documents 88-070 through 88-080 are mostly Monday papers.

1.9 Review of Action Items

Brodie scanned the previous minutes (87-249) for action items noted. All were satisfied.

1.10 X3 Notices (Brodie)

Brodie had no news to pass on from X3.

1.11 Roll Call

An attendance sheet was circulated and all attendees were asked to verify or write down their names and addresses. Those in attendance are listed in Attachment I. Forty-eight attendees were deemed eligible to vote, having attended at least one of the preceding two meetings and having expressed the intention of becoming voting members. These were:

Don Bixler, Unisys
Craig Bordelon, Bell Communications Research
Oliver Bradley, SAS Institute, Inc.
Mike Branstetter, Lawrence Livermore National Labs
Jim Brodie, Jim Brodie & Associates
Kevin Brosnan, Alliant Computer Systems
Terry Colligan, Rational Systems
Elizabeth Crockett, Apple Computer
Peter Darnell, Stellar
Steve Davies, Concurrent Computer
Shawn Elliott, IBM
Don Fosbury, Control Data
Douglas Gwyn, U.S. Army Ballistic Research Lab.
Mitch Harter, Microsoft
Randy Hudson, Intermetrics Inc.
Paul Jackson, HCR Corp.
Rex Jaeschke, DEC Professional
Patricia Jenkins, Masscomp

Bob Jervis, Borland International
Gary Jeter, Harris Computer Systems Div.
Andrew Johnson, Prime Computer, Inc.
Larry Jones, SDRC
Tom MacDonald, Cray Research, Inc.
Colin McPhail, Edinburgh Portable Compilers
Michael Meissner, Data General
Sue Meloy, Hewlett-Packard
Randy Meyers, Digital Equipment Corp.
Daniel Mickey, Chemical Abstracts
Joseph Musacchia, Wang
Clark Nelson, Intel
Leonard Ohmes, Datapoint
Thomas Osten, Honeywell Bull
John Peyton, Apollo Computer Inc.
P.J. Plauser, Whitesmiths, Ltd.
Tom Plum, Plum Hall
Courtney Prodehl, Mark Williams Co.
David Prosser, AT&T
Kenneth Pugh, Pugh Kileen
Chuch Rasbold, Super Computer Systems, Inc.
Richard Relph, RARE Inc.
Henry Richardson, Tandem Computers
Elizabeth Sanville, Gould Inc.
Honey Schrecker, International Computers Ltd.
Rick Schubert, NCR
Carl Sutton, Tektronix
Vincent Tang, Modcomp
Neil Weidenhofer, Amdahl Corp.
Jim Williams, Naval Research Lab

2. Liaison Activities

2.1 ISO Report

Plauser reported that ISO WG14 received a number of negative votes on accepting the more recent X3J11 Draft as the ISO draft standard for C. All negative votes, including that of the USA, were to ensure that the final standard adopted by ISO exactly matches the final ANSI standard. He warned, however, that Canada had some serious concerns (88-056) that could cause them to vote No at the ISO level.

Plauser submitted comments (88-009) from T. Inose of ITSCJ, the Japanese representatives to WG14. While making a number of useful suggestions, ITSCJ expressed satisfaction with the current facilities for Kanji support in C. Plauser also reported that he met in person with Inose and M. Noda of ITSCJ in Tokyo, on a visit there in March, and went over their comments in detail. He also met with representatives of the ad hoc Japan C Language Committee. All parties expressed their gratitude to WG14 and X3J11 for their attention to the problem of supporting Kanji in C.

The next meeting of WG14 will occur in London, 13-14 Jun 89.

2.2 P1003 Report

Gwyn reported that P1003 had received the necessary 3/4 approval of Draft 12 of POSIX, after making enough changes in response to public commentary. P1003 is now required, however, to circulate the amended Draft for additional public review.

To meet X3J11 compatibility requirements, P1003 agreed to introduce a manifest constant called `_POSIX_SOURCE` that determines whether the environment has POSIX extensions to Standard C. P1003 has also suggested that we add `__STDH__`, to indicate whether the headers are standard.

Plauser reported that the current POSIX Draft had also received some No votes at the ISO level.

2.3 Other Groups

Crockett reported that she met with a representative of X3H2 to review their C binding for accessing data bases. She suggested several changes in notation to bring their description in line with the vocabulary favored by X3J11.

Crockett also reported that she will not be able to continue as X3J11 liaison to X3H2. Adamski, the current alternate from AT&T, has agreed to assume this duty.

Schrecker observed that X/OPEN (88-079) has submitted comments for review.

3. Report of the Redactors

Prosser submitted a Redactor's report (88-010). He thanked the subcommittee that met in Summit NJ last January to review the Draft before it was sent to CBEMA. Brodie thanked Prosser, on behalf of the Committee, for giving up much of his Christmas vacation to preparing the Draft in time.

Prosser reported that he changed the names of two macros, as authorized, to meet P1003 halfway in resolving conflicts between the C and POSIX standards. `OPEN_MAX` is now `FOPEN_MAX`, `PATH_MAX` is now `FILENAME_MAX`.

Hudson thanked all those who contributed words to the Rationale.

4. Current Status and Schedules

Brodie reported that the Committee must produce an edited Draft, plus a Response Document, by 9 May if we are to have a third public review spanning 3 Jun to 3 Aug. If we can get

Bob Jervis, Borland International
Gary Jeter, Harris Computer Systems Div.
Andrew Johnson, Prime Computer, Inc.
Larry Jones, SDRC
Tom MacDonald, Cray Research, Inc.
Colin McPhail, Edinburgh Portable Compilers
Michael Meissner, Data General
Sue Meloy, Hewlett-Packard
Randy Meyers, Digital Equipment Corp.
Daniel Mickey, Chemical Abstracts
Joseph Musacchia, Wang
Clark Nelson, Intel
Leonard Ohmes, Datapoint
Thomas Osten, Honeywell Bull
John Peyton, Apollo Computer Inc.
P.J. Plauser, Whitesmiths, Ltd.
Tom Plum, Plum Hall
Courtney Prodehl, Mark Williams Co.
David Prosser, AT&T
Kenneth Pugh, Pugh Kileen
Chuch Rasbold, Super Computer Systems, Inc.
Richard Relph, RARE Inc.
Henry Richardson, Tandem Computers
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7 non-overlap of parameters sufficient
2 no

Straw vote:

27 remove noalias
5 keep it

There was further discussion of what to choose for const semantics, given that noalias was not available to distinguish multiple choices. Plum urged that the Committee not try to fix const, but to leave status quo. Plauger asserted that Commandment #11 was well thought out, and a definite boon to optimizers, but that it was now politically unsafe to attempt any change in this area, given the noalias debacle. He urged the Committee to retain status quo with const semantics.

Straw vote:

8 adopt Commandment #11
30 no

Plauger insisted that some form of Commandment #12 was still required. (Commandment #12 says that an object cannot be accessed by both volatile and non-volatile lvalues within the same function.) He agreed that 3.3.4 on Casts was probably sufficient to enforce this requirement.

Elliott/Darnell

"Move we take 25 minutes from the Tuesday 4:15 session to discuss alternates to noalias."

Motion carried, 20/7.

7. Organization of Subgroups

Plum and Brodie divided the public commentary among a number of subgroups, and explained the procedures for developing responses.

8. Subgroups

The Committee broke into subgroups to process public comments.

9. Subgroups

More of the same.

10. Subgroup Presentations

Meissner (33-052 #1) presented a request that signals be

deferrable to the end of a statement, to aid interpreters. The Committee felt that this is currently permitted by the as if rule.

Meissner (88-052 #2) presented a request that we remove the requirement that a function image not be modified. Accepted as editorial.

Meissner (88-052 #7-#8) requested clarification of the behavior when multibyte strings do not end in the initial shift state. It was agreed that this is undefined behavior, which need not be diagnosed.

Meissner (88-053 #10) presented a request that we disallow pointers as operands to unary plus. This was added when unary plus was given extra semantics, and overlooked when unary plus was reverted to its earlier meaning. Accepted as editorial.

Meissner (88-053 #2) presented wording to correct the semantics of assigning pointer to const back to pointer to non-const. It was agreed that this was the intent of the Committee all along, but Meissner insisted that it is a substantive change, not just editorial.

Meissner (88-053 #4) presented a request that strcmp be required to compare "a" strictly less than "ax" regardless of whether type char is signed and regardless of whether 'X' is negative. The Draft fails to specify the behavior when one string is a prefix of the other. There was much discussion.

Straw vote:

- 24 specify semantics of strcmp for prefixes
- 6 say it's unspecified

Meissner agreed to provide wording for various semantics later in the meeting.

Jackson (88-054 #2) presented a request that we change printf to say the argument type for %[ouxX] is unsigned int, not signed int. There was much discussion about the effect this would have on implementations with integer representations other than twos-complement. (It has no effect for twos-complement with no overflow checking.)

Straw vote:

- 2 spend more time discussing this
- lots no

Straw vote:

- 6 say %[ouxX] takes unsigned int
- 22 leave it alone

Jackson (88-054 #3) reported that the current tokenizing rules for the preprocessor require that 0XABCDE+1 be treated as a single token, which is required to be invalid when

converted to a normal C token. He acknowledged that the alternate grammar that was proposed had flaws. There was much discussion.

Straw vote:

- 14 need to alter grammar to permit 0XABCDE+1
- 14 leave it alone

Since there was not 2/3 support for change, the issue died.

Jackson (88-054 p. 4) presented a request that we require sizeof (char) to be less than sizeof (int). This avoids problems such as EOF punning with values representable as unsigned char. Plauger objected heatedly, saying that implementations exist that represent char the same as int, that these are admittedly on the fringes of C and have portability surprises, but they should not be disallowed.

** Plum will provide rationale on why char can be as big as int.

Jackson (88-054 p. 5) presented a request that we make implementation defined which of two ways that signs propagate on signed right shift. Plauger objected, saying that there are more than just two ways. The Committee explicitly agreed to allow greater latitude in the semantics of signed right shift. After much discussion, there was no support for changing the Draft.

Jackson (88-054 p. 5) reported that the draft fails to make clear that unions must be padded just like structs to enforce boundary alignment within arrays. Accepted as editorial.

Jackson (88-054 p. 6) requested several clarifications of how enum types interact with other integer types. There was much discussion of whether clarification was needed.

Straw vote:

- 7 enums need to be clarified
- 16 leave alone

11. Subgroup Presentations

Plum encouraged the Committee to make changes to the Draft only when it is clearly broken and/or unsafe. There was some discussion of how responsive the Committee should be to changes requested by the public commentary.

Straw vote:

- 16 change Draft only when it's broken
- 15 change for other reasons as well

Jackson (88-054 p. 9) presented a request that VT and FF also be permitted in preprocessor directives, not just HT and space. There was some discussion of the historical reasons for status quo. In the end, there was no support for a change.

Jackson (88-054 p. 10) presented some concerns about the use of volatile to clarify the semantics of dynamic variables affected by setjmp calls. There was no support for any change.

Jackson (88-054 p. 11) presented a request that we clarify the meaning of FILENAME_MAX. The Committee agreed to add a footnote, plus words to the Rationale.

Jackson (88-054 p. 11) presented a request that we add a function snprintf, a safer version of sprintf. There was some discussion.

Straw vote:

7 add snprintf
23 no

Straw vote:

19 say snprintf is a common extension/future direction
10 no

There was not 2/3 support for a change.

** Bartels agreed to provide Rationale words on snprintf.

Colligan (88-057 #1) observed that E2BIG is disallowed as an error code. Prosser (88-074 #3) suggested we add E[0-9]* to the space of error code extensions. Accepted as (possibly) editorial.

Colligan (88-057 #2) suggested wording changes to clarify that the error indicator is cleared on fopen. Prosser (88-074 #9, #10) provided additional wording changes to clarify the use of the error indicator. Accepted as editorial.

Colligan (88-057 #3) presented a request that we strike the requirement that fclose return EOF if the file already closed. Prosser (88-074 #3) addressed the same issue. In the discussion, it became apparent that the Draft fails to reflect the understanding of the Committee. That is, fclose renders its FILE argument undefined and unusable. There is no sense in talking about a FILE argument designating a closed file, either in fclose or freopen.

Colligan agreed to provide wording changes for later in the meeting.

Colligan (88-057 #6) presented a request from X/OPEN that we resolve any conflicts with the POSIX standard. Gwyn (88-024) asserted that we have already endorsed this goal, but that we may need to make additional changes. Potential changes will be discussed later in the meeting.

Colligan (88-059 p. 2) observed that assigning to an

incomplete type lvalue is undefined behavior, and probably should be a constraint violation. Prosser and Plauger agreed, but despaired of finding a way to express this as a constraint violation. There was no support for change.

Colligan (88-059 p. 5) presented a request that we require file positions (from getpos or ftell) to be valid across different executions of a program. Elliott objected strongly, since there are implementations (which shall remain nameless) where this is extremely difficult to enforce for other than binary files. There was no support for change.

Colligan (88-059 p. 5) observed that we forgot to say that -3 should cause 3 to be negated by strtoul. Accepted as editorial.

Colligan (88-059 p. 5) presented a request that we permit "x = setjmp(buf)". More than one member objected. There was no support for change.

Goldberg (88-062 p. 4) presented a request that we define the default locale for strftime. He suggested that we model the C locale parameters for strftime after asctime.

Prosser objected that the Committee intentionally avoided giving a U.S. bias to the Draft wherever possible.

Straw vote:

- 5 specify strftime like asctime in C locale
- 10 leave unspecified

Crockett (88-009) presented a request that we permit multi-byte characters in header names, as well as comments, string literals, and character literals.

Straw vote:

- 14 headers should be multibyte strings
- 2 leave as is

The change was accepted, as substantive.

Crockett (88-009) presented a request that we clarify the meaning of "common initial sequence" in 3.3.2.3 on structs and unions.

Straw vote:

- 15 need to clarify "common initial sequence"
- 6 no

Crockett agreed to provide wording later in the meeting.

Crockett (88-009) presented a request that we clarify or delete the requirement that the "properties" of floating point arithmetic be implementation defined. (This is listed in the appendix only.)

Straw vote:

20 properties of floating not implementation defined
7 leave it

Accepted as editorial.

Crockett (88-009) presented a request that we delete the requirement that the byte order of integers be implementation defined. (This is listed in the appendix only.) The Committee agreed to accept this as editorial, and to move the accompanying caveat to a note in the Draft.

Meloy (88-009, 88-014) observed that the use of the term "character" is misleading, given the choice among single and multibyte characters, etc. Prosser agreed to check all occurrences and make them less ambiguous. The Committee agreed that he could add a definition for plain "character," if that helps.

Meloy (88-009, 88-070) presented a request that we clarify the return value of mbtowc when there are shift codes right before a null character. Deferred until later in the meeting.

Meloy (88-009) presented a request that we delete the length argument "n" from mblen and mbtowc. There was some discussion.

Straw vote:

3 drop n argument from mblen, mbtowc
18 leave it

There was no support for the change.

Darnell (Brader paper) presented a request that we provide names for the array offsets of the various sign positions in struct lconv. There was no support for this change.

Darnell (Brader paper) presented a request that we alter the description of pointer subtraction to clarify that either operand can point anywhere within an array or just off the end. There was some discussion of whether this was necessary.

Straw vote:

15 change wording on pointer subtraction
8 leave it

There was not 2/3 support for a change.

Darnell (Brader paper) presented a request that we clarify whether it is permissible to terminate prematurely for unspecified or implementation defined behavior. The Committee agreed that it is not permissible, and that the Rationale should clarify this.

** Jackson will add Rationale words on premature termination.

Gwyn (88-024 p. 136) asked that we clarify that scanf permits only the conversion specifier %% (and not %.17%, for example), just like printf. Accepted as (possibly) editorial.

Gwyn (88-024 p. 120) presented a request that we extend the range of the seconds field in struct tm to [0, 60], to accommodate leap seconds. Accepted as (possibly) editorial.

12. Subgroup Presentations

** Wang agreed to do the next mailing.

Jeter (88-033) presented a request that we remove the restriction on assigning pointer to const to pointer to non-const, do the same for pointer to volatile, and that we say string literals are array of const char. There was some discussion.

Straw vote:

3 remove pointer to const assignment restriction
26 leave it alone

Osten (88-034 p. 9) presented a request that we clarify that only the standard library headers are reserved. Accepted as editorial.

Osten (88-034 p. 10) presented a request that we correct the return type of strchr. The Committee agreed that this was not necessary, given the correction to the pointer to const conversion constraint.

Relph (88-048 #4) presented a request that we declare obsolescent declarations that assume type int by default, such as "extern i".

Straw vote:

16 implicit int should be obsolescent
12 no

There was some discussion. Some members observed that the more general case is whether declarations should have at least one type specifier.

Straw vote:

16 need at least one type specifier in future
17 don't make this obsolescent

Relph (88-048 #11) asked whether we should list the C++ language description as a base document. The Committee felt that it should not be. He also asked whether the Rationale should make clear in each case which base document was being referred to. The Committee felt that no change was necessary.

Relph (88-050 #1) presented a request that we reserve the keyword "inline" for future implementations. There was no support.

Relph (88-050 #2) presented a request that we add reference parameters for communication with other languages. There was no support.

Relph (88-050 #3) presented a request that we add the notation [int, ...] for optional arguments. There was no support.

Relph (88-050) presented a request that we label as a quiet change the change in typing of integers shifted by long counts. It is.

MacDonald (88-036 #6) requested a footnote clarifying that the floating point model is a signed magnitude model. Accepted as editorial.

MacDonald (88-036 #15) presented a request that we require printf to print -0.0 with a minus sign, by some portable method. There was no support.

MacDonald (88-036 #19) presented a request that we eliminate the use of errno in atof and strtod. There was much discussion.

Straw vote:

8 remove errno from strtod functions
12 leave alone

MacDonald (88-036 #19) presented a request that atof and atol be labelled as obsolescent.

Straw vote:

0 make atof, atol obsolescent
lots no

Bradley (88-034 p. 21) presented a request that we make assignment compatible all combinations of char *, signed char *, and unsigned char *.

Straw vote:

7 make all char pointers assignment compatible
17 no

Bradley (88-034 p. 24) presented a request that we require equal pointers to compare equal after conversion to void *. That's how it is.

Bradley (88-034 p. 28) presented a request that we allow the same pointer arithmetic on pointers to objects that we allow on pointers within arrays. We do.

Bradley (88-034 p. 28) presented a request that we allow the comparison of `const int **` with `int **` (without a cast). There was some discussion, but no support for the change.

Bradley (88-034 p. 29-30) presented a request that we change the type balancing rules for `?:` so that `void * meeting int *` becomes `int *`, not `void *`. There was much discussion.

Straw vote:

- 18 change `?:` balancing rules for `void *`
- 13 leave alone

There was not 2/3 support for a change.

Pennello (88-034 p. 21) presented a concern that the type compatibility rules for function prototypes are inadequate. Closer inspection of the example found no problems with the Draft.

Gwyn (Olson paper) presented a request that the footnote explaining the `isdst` flag in `struct tm` be moved into the body of the Draft. After some discussion, the Committee decided that this was not necessary.

Gwyn (Olson paper) requested an example in the Rationale of the use of the `offsetof` macro.

** Bradley will provide Rationale words on the use of `offsetof`.

Jervis (88-034 p. 44-45) pointed out an area where macro expansion is not completely specified:

```
#define f h
#define h(a) a+f
f(1)(2)
```

This expands either to `1+h(2)` or to `1+2+h`, depending upon how you interpret the rules for not expanding macros within macros. The problem arises only when you complete a constructed macro invocation by adding text that follows the original macro invocation.

Prosser argued that this ambiguity was intentional, and sufficiently abstruse that it was not worth nailing down. He suggested that we leave it undefined behavior and explain it as such.

Straw vote:

- 0 try to clarify macro expansion rules
- lots leave it alone

Jones (88-034 p. 61) presented a request that `printf` not specify what happens when both the space and `+` conversion qualifiers are present. There was no support for leaving this undefined behavior.

Jones (88-034 p. 63) presented a request that perror not specify its output format. There was no support.

Jones (88-034 p. 66) presented a request that the mb* and wc* functions reset to the initial shift state when the character locale is changed. The Committee agreed to clarify that the behavior is undefined.

Prosser asked that we also clarify that these functions do not call each other (or at least behave as if they don't), so there is no question of altering internal shift states unexpectedly. Accepted as editorial.

13. Subgroup Preparation

The Committee broke into subgroups to process more of the public commentary.

14. Subgroup Presentations

Meissner (88-053 p. 3) presented a request that we remove the special definition of "shall" in the introduction, arguing that it is used inconsistently. There was some discussion.

Straw vote:

1 strike special definition of "shall"
lots no

Jackson (88-054 p. 12) presented alternate wording describing the significance of characters in identifiers. Accepted as editorial.

Jackson (88-054 p.17) presented an observation that barring enums in #if arithmetic is nonsensical during the preprocessor phases of translation. There was much discussion.

Straw vote:

16 need to cleanup #if description
7 no

Straw vote:

15 add as a footnote
10 add in body of text

Jackson agreed to provide words later in the meeting.

Meissner (88-053 p. 6) provided clearer wording for 3.3.2.2 about pointers that don't need casts. Accepted as editorial.

Goldberg (88-064 #20) presented a request that we not require tan to provide the proper sign for HUGE_VAL returns, since this can be difficult for large arguments. There was much discussion of whether the current wording adequately covered this eventuality.

Straw vote:

4 tan needn't get HUGE_VAL sign right
7 leave alone

Colligan provided wording clarifying that FILE pointers are undefined after fclose. Accepted as (possibly) editorial.

Gwyn (83-024) presented a request that we say __STDH__ is defined when headers conform to Standard C. Plum suggested that we instead require an implementation to define how to perform a conforming translation. There was discussion of whether this is within the scope of the Standard.

Straw vote:

4 implementation must define conforming compiles
25 no

Gwyn (83-024) requested several changes to atexit: an atexit handler should be able to longjmp back to some part of the program; an atexit handler should be able to register another handler with atexit when it executes; calling exit during atexit handling should be survivable. After some discussion, he requested only that atexit handlers be popped before called, so exit cannot loop.

Straw vote:

8 unregister atexit handler before calling it
8 no change

Meloy (83-024, 88-013) requested better semantics for unblocking signals. She suggested that signal handlers be required to unblock when they return.

Straw vote:

7 need to reword signal blocking
14 no

Prodehl (83-035) requested that we clarify that one cannot initialize unnamed bitfields. Accepted as editorial.

Prodehl (83-035) requested that we disallow a struct or union with all unnamed members, since one cannot initialize such a creature.

Straw vote:

11 require 1 or more named members
15 no

15. Subgroup Presentations

Osten (83-034 p. 6) observed that actual headers should not use the parameter names shown in the Draft, since a user #define can alter them horribly. There was no support for adding underscores to the names in the Draft, to eliminate a possible source of confusion for implementors.

- ** Jaeschke will add Rationale on how to name parameters in headers.

Prosser observed that a similar problem exists when the user `#define`'s keywords before including standard headers. He agreed to provide words later in the meeting.

Bradley (88-034 p. 32) presented a request that we forbid redundant parentheses in declarations, to avoid the various ambiguities. Instead, the Committee agreed to clarify how one overlooked ambiguity is resolved by fiat (for `typedef`'d names used in function prototype parameter declarations). Accepted as editorial.

Bradley (88-034 p. 34) presented a request that we clarify whether `const char *` and `char *` must have the same representation.

Straw vote:

3 need to clarify whether `const char *` looks like `char *`
17 no

- ** Gwyn and Prosser will edit the Response document.

Jones (88-034 p. 62) presented a request that we clarify that `fscanf` doesn't call `ungetc`. Bradley insisted that changing the description would be substantive. Hudson pointed to the existing discussion in the Rationale. There was some discussion.

Straw vote:

9 need to change `fscanf/ungetc` descriptions
8 no

No change was accepted.

Jones (88-034 p. 62) requested assistance in explaining why we did not add `%r` to `printf`.

- ** Meissner will add Rationale on why we did not put `%r` in `printf`.

Jones (88-034 p. 67, 88-010) pointed out that the equality and assignment operators do not grant the same liberties to a `const void *` as to a `void *`. Accepted as (possibly) editorial.

Jones (88-039 #7) observed that the Draft does not disallow multiple definitions of file level static objects.

Straw vote:

23 undefined/redefined static is constraint error
5 leave it undefined

Jones will provide words later in the meeting.

Jones (88-039 #13) observed that the Draft does not permit multiple declarations to refer to the same structure tag. Accepted as (possibly) editorial.

Hudson (88-046 #11) observed that the strxfrm example in the draft uses a null pointer argument, but no semantics is defined for a null pointer. Accepted as editorial.

MacDonald (88-036 p. 20) requested that we add the function hypot.

Straw vote:
 8 add hypot
 10 no

MacDonald (88-036 p. 21) presented a request that we eliminate the functions ldexp and frexp. There was no support.

Relph (88-055 #2) presented a request that we say FILENAME_MAX equals LONG_MAX on systems that have no limit to filenames.

Straw vote:
 2 FILENAME_MAX should be LONG_MAX if no limit
 lots no

MacDonald (88-064 #11) presented a complaint that the example of IEEE 754 floating parameters is inaccurate.

** Meyers and Relph will check the IEEE 754 parameters.

Johnson (88-041 #51, #55, #59) asked for clarification of several aspects of typedefs. Given.

Johnson (88-041 #84) presented a request that we explicitly state the result of the is* functions for the argument value EOF. There was no support for change.

Johnson (88-041 p. 4) requested clarification of just when () [], etc. must occur in pairs. Accepted as addition to the Rationale.

16. Member Papers

Prosser (88-010 #2) presented alternate wording to the restriction on casting a pointer to volatile to a pointer to non-volatile. There was much discussion of the best way to describe the desired limitations. Resolution deferred until later in the meeting.

Prosser (88-010 #4) observed that the U suffix on UCHAR_MAX and USHRT_MAX was often unnecessary and sometimes dangerous. Removing the U's accepted as editorial.

Meloy (88-012) requested clarification of when representable infinities can be used as arguments to math functions, and what their effects should be.

Straw vote:

17 permit additional domain errors for infinite arguments
5 leave alone

Accepted as substantive.

** Meloy will add Rationale words on when extra domain errors can occur.

Meloy (88-016) observed that localeconv is not completely consistent with IDO 4217. Elliott agreed to provide better words later in the meeting.

Jaeschke (88-005) requested that we reserve FLT_*, DBL_*, and LDBL_* in <float.h> for future use.

Straw vote:

3 reserve FLT_*, etc. in float.h
14 no

17. Subgroup Presentations

Meissner (88-053 #4) presented a request that we require strcmp and strncmp to do unsigned character compares, so that a prefix always compares less, for instance.

Straw vote:

lots strcmp, strncmp should do unsigned compares
0 no

Accepted as substantive.

Crockett (88-009) presented words clarifying "common initial sequence." Accepted as editorial.

Elliott (88-035) requested that we adopt a more tolerant definition of the offsetof macro, so that anything is acceptable that you can write to the right of a . operator and get an address constant, not just a member name.

Straw vote:

24 make offsetof more liberal
2 no

Accepted as substantive.

Hudson (88-034 p. 20) requested clarification of whether the "plainness" of an int is remembered by a typedef, so that the typedef can be used to declare a plain bitfield.

Straw vote:

16 need to fix description of plain bitfields

6 no

Straw vote:

16 plainness should shine through typedef
15 no

Plum and MacDonald will provide proposals on bitfield wording for later in the meeting.

Jaeschke (88-034 p. 55) requested clarification of whether `va_end` must be called in the function with varying argument list, as must `va_start`. There was oodles of discussion.

Straw vote:

27 `va_end` must be in same function as `va_start`
1 no

Accepted as (possibly) editorial. Bradley demurred.

Jervis (88-034 p. 56) observed that `FOPEN_MAX` cannot always be honored on a loaded system.

Straw vote:

6 add footnote to `FOPEN_MAX` on system variability
18 don't bother

Prosser (several papers) presented several complaints that we require `char *` and `void *` to have the same representation, to no apparent purpose.

Straw vote:

7 don't require `void *` to be same as `char *`
9 leave it alone

Prosser (88-034 p. 55) requested clarification of whether you can pass the address of a `va_list` object, to alter the original object by reference in a called function. The Committee agreed that you can. No change was requested.

Prosser (88-034 p. 72) presented a request that we add Roman numeral formatting to `strftime` with `%R`. No support.

Prosser (88-036 p. 13) presented a request that we require the range of long doubles to be greater than the range of doubles, with a decimal exponent range of at least `[-99, +99]`.

Straw vote:

1 want long double range > double range
lots no

Prosser (88-044 #1) presented a request that we add a `\c` or `\z` escape, to suppress the trailing null character on a string constant.

Straw vote:

4 add \c or \z
20 no support

Prosser (88-040, 88-074 #2) requested that we reserve as external identifiers setjmp, errno, and va_end, even though they currently "must be macros."

Straw vote:

26 reserve external names setjmp, errno, va_end
2 no

Accepted.

Prosser (86-054 p. 15) presented editorial clarification of the permissible types for relational operators. Accepted as editorial.

18. Deferred Items

Jones (88-053 #3) presented alternate wording for "top type." There was much discussion. In the end, the Committee agreed to augment the current wording with more examples, and with words in the Rationale.

Jackson (88-054 p. 17) presented alternate wording to exclude enums from #if expressions. Accepted as editorial.

Prosser (88-034 p. 6) presented alternate wording prohibiting the redefinition of keywords before standard headers are included. Accepted as substantive.

Jones (88-039) presented several alternate wordings on static redefinition.

Straw vote:

14 want exactly one static definition
22 want at most one

Straw vote:

18 want at most one static definition as constraint
11 leave it as undefined

Straw vote:

11 only redefinition of static is constraint
10 no

Straw revote:

lots want at most one static definition as constraint
0 no

MacDonald (88-009) presented wording on plain bitfields, calling for plainness to shine through a typedef.

Straw vote:

20 plainness shines through typedef
2 no

Accepted as editorial.

Gwyn (88-080) requested that we say fflush(NULL) flushes all buffers on output streams.

Straw vote:

13 add fflush(NULL)
7 no

Straw revote:

18 add fflush(NULL)
8 no

Accepted as substantive.

Elliott (88-016) presented alternate wording on localeconv. Accepted as editorial.

Elliott further requested that we add the field `int_frac_digits` for those few countries that need it. He assured the Committee that there were no more fields in the pipeline. Accepted as substantive change.

Meloy (88-009) requested clarification of the behavior of `mbtowc` when there are shift codes before the terminating null character. There was some discussion.

Straw vote:

6 need to clarify `mbtowc`
10 no

** Plauger will add Rationale on `mbtowc` with trailing shift codes.

Elliott (noalias) suggested that we label function prototype parameters of array type as obsolescent, so that we can eventually recycle them as notation for non-overlapping parameters. There was much discussion. Brodie insisted that no vote be taken after dinner on a Thursday evening. Deferred until later in the meeting.

Prosser (88-010) presented alternate words on `const` and `volatile` access restrictions.

Straw vote:

lots accept Prosser's words
0 no

Accepted with a clarifying footnote.

Colligan (88-041 #559) presented a `#if` expression that is surprising if the preprocessor represents `int` as smaller than long. Plauger insisted that the intention all along has been to require effectively that `int` be the same as long for preprocessor arithmetic. Accepted as editorial.

19. Monday Papers

Prosser (88-074) presented several small edits to the wording of the Draft and Rationale. Accepted.

Meloy (88-075) asked for clarification of whether you can report 1/0 as an error if it is never executed. The answer is No.

Meloy (88-076) offered clarification that mblen behaves as if it calls mbtowc, except that it doesn't alter its internal state. Accepted as editorial.

Meloy (88-077) requested clarification that declaration initializers are evaluated in order. They are.

Balter ("Tuesday" paper) reported yet another ambiguity:

```
typedef int foo;  
struct {const foo : 5; };
```

Plauser asserted that this is yet another version of the famous "thin ice" ambiguity from K&R days, and should also be resolved by fiat. Accepted as editorial.

20. Deprecation of [] Parameters

Elliott resumed his discussion of array parameters.

Straw vote:

```
23 make [] parameters obsolescent  
13 no
```

Not 2/3 support.

21. Subgroup Preparation

The Committee divided into subgroups to address the last of the public commentary.

22. Subgroup Presentations

Bixler (88-041 #538) asked whether "typedef void a" is permissible. It is.

MacDonald (88-041 #48) presented a request that we disallow declaring register arrays. A clarifying footnote was accepted.

Bradley (88-041 #115) requested clarification of whether exit discards autos before I/O buffers are flushed, as intimated by the description of atexit. They are not.

Colligan agreed to provide better wording for atexit later in the meeting.

Bradley (88-041 #116) presented a request that we clarify that calling exit twice (as from an atexit handler) is undefined. Accepted as editorial.

Bradley (88-041 #117B) presented a request that we clarify that no other library calls affect the internal state of the mb* and wc* functions. Accepted as editorial.

Jones (88-041 #98) presented a request that we clarify that a setvbuf can follow no other I/O operation, such as ungetc. Accepted as editorial.

Colligan (88-041 #115) presented alternate words describing the context of atexit handlers.

Straw vote:

19 accept Colligan's words on atexit
3 no

Accepted as editorial.

Harter requested that we reconsider the vote on branding array parameters obsolescent. There was additional discussion.

Straw vote:

21 label array parameters as obsolescent
16 no

Not a 2/3 majority.

Gwyn/Prosser

"Move we accept all changes that were unopposed or that received at least 2/3 majority straw vote, as positions of the Committee."

Motion carried, lots/0/0.

23. Summary of Decisions Reached

Plaugar read through the minutes and summarized all decisions reached by the Committee during the meeting.

24. Action Items

Plaugar read through the minutes and repeated all action items agreed to by various members. These are indicated in these minutes by a ** in the left margin. All designated stuckees reaffirmed their commitments.

25. Vote on 3rd Public Review

Hudson/Colligan

"Move we send the amended Draft out for a third public review."

Roll call:

Bixler, yes.
Bordelon, yes.
Bradley, yes.
Branstetter, yes.
Brodie, yes.
Brosnan, yes.
Colligan, yes.
Crockett, yes.
Darnell, yes.
Davies, yes.
Elliott, yes.
Fosbury, yes.
Gwyn, no -- not enough time to evaluate responses.
Harter, yes.
Hudson, yes.
Jackson, yes, eh.
Jaeschke, yes.
Jenkins, yes.
Jervis, yes.
Jeter, yes.
Johnson, yes.
Jones, yes.
MacDonald, yes.
McPhail, yes.
Meissner, yes.
Meloy, yes.
Meyers, yes.
Mickey, yes.
Musacchia, yes.
Nelson, yes.
Ohmes, yes.
Osten, yes.
Payton, yes.
Plauger, yes.
Plum, yes.
Prodehl, yes.
Prosser, yes.
Pugh, yes.
Rasbold, yes.
Relph, yes.
Richardson, yes.
Sanville, yes.
Schrecker, yes.
Schubert, yes.
Sutton, yes.
Tang, absent.
Weidenhofer, yes.
Williams, yes.

Motion carried, 46/1/0/1.

Elliott expressed concern about a lack of any vector facility.

Plum/Jaeschke

"Move we request that public comments be confined only to changes."

Motion carried, 24/16.

** Brodie will write the cover letter for the review Draft.

26. Future X3J11 Meetings

15-19 Aug 88	Cupertino CA	Borland/Tandem/H-P
12-16 Dec 88	Seattle WA	Microsoft
10-12 Apr 89	Phoenix AZ	Brodie Assoc.
21-23 Aug 88	Minneapolis MN	Cray

27.1 Miscellaneous

Ohmes request clarification of what uses companies can make of the Draft standard, having received conflicting information from X3 and other sources.

** Brodie agreed to ask X3 for a clear statement of Draft usage rules.

27.2 Mailings

A Draft Review meeting will be held at Summit NJ on 17 May 88. Johnson, Hudson, Elliott, Crockett, Weidenhofer, MacDonald, Plum, Gwyn, and Plauger agreed to assist Prosser in reviewing the Draft.

Prosser and Gwyn will review the Response document themselves.

Material for the final mailing must be at Wang by 15 Jul 88. Musacchia suggested adding his mail stop (MS 014-990) to his address. A separate copy of any papers goes to Plum.

28. Adjournment

Jaeschke/MacDonald

"Move we adjourn."

Motion carried, lots/0.

The meeting adjourned at 12:03 p.m. on Friday, 22 Apr 88.

Attachments:

Modified Agenda

Attendance

1. The first of the three main points of the report is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

2. The second point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

3. The third point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

4. The fourth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

5. The fifth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

6. The sixth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

7. The seventh point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

8. The eighth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

9. The ninth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

10. The tenth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

11. The eleventh point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

12. The twelfth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

13. The thirteenth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

14. The fourteenth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

15. The fifteenth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

16. The sixteenth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

17. The seventeenth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

18. The eighteenth point is that the Commission has found that the Government has failed to provide adequate protection for the rights of the individual.

X3J11/83-073R

22 Apr 88
Project 381-D

REVISED AGENDA
X3J11 Standards Committee Meeting

18-22 Apr 88
Sheraton Tara Hotel
Tara Blvd.
Nashua NH 03062
(603) 888-9970

18 Apr -- 9:00 - 12:00 2:00 - 5:30
19 Apr -- 8:30 - 12:00 2:00 - 5:30
20 Apr -- 8:30 - 12:00 2:00 - 5:30
21 Apr -- 8:30 - 12:00 2:00 - 5:30 7:00 - 9:30
22 Apr -- 8:30 - 12:00 noon

Monday, 18 Apr

1. Opening Activities (Brodie)

- 1.1 Opening Comments -- Goals and Purposes of Twentieth Meeting of X3J11
- 1.2 Housekeeping
- 1.3 Approval of Previous Minutes (87-249)
- 1.4 Approval of Agenda (88-073)
- 1.5 Introduction of New Participants
- 1.6 Distribution of Information on Next X3J11 Meeting
- 1.7 Procedures for this Meeting
- 1.8 Distribution of Any New Documents
- 1.9 Review of Action Items from Previous Meeting
- 1.10 X3 Notices
- 1.11 Roll Call

2. Reports on Liaison Activities

- 2.1 ISO Report (Plauger)
- 2.2 Pl003 Report (Gwyn)
- 2.3 Other Liaison Activities (Brodie)

3. Report of the Redactors (Prosser and Hudson)

4. Report on Current Status and Schedules (Brodie)

5. Noalias Reconsideration (Brodie, Ritchie)

6. Noalias, Part 2

7. Organization of Subgroups

8. Subgroup Review of Public Review Comments

Tuesday, 19 Apr

- 9. Subgroup Review
- 10. Subgroup Presentations
- 11. Subgroup Presentations

Wednesday, 20 Apr

- 12. Subgroup Presentations
- 13. Subgroup Preparation
- 14. Subgroup Presentations

Thursday, 21 Apr

- 15. Subgroup Presentations
- 16. Member Papers
- 17. Subgroup Presentations

18. Deferred Items

19. Monday Papers

Friday, 22 Apr

- 20. Deprecation of [] Parameters
- 21. Subgroup Preparation
- 22. Subgroup Presentations
- 23. Summary of Decisions Reached (Plauger)
- 24. Action Items for Next Meeting (Plauger)
- 25. Vote on Submittal for 3rd Public Review
- 26. Future X3J11 Meeting Schedule (Brodie)
- 27. Other Business (Brodie)
 - 27.1 Miscellaneous
 - 27.2 Mailings
- 28. Adjournment (Brodie)

2188	Robert.....	Bradbury.....					
33	Neil.....	Daniels.....					
995	Stephen.....	Desofi.....					
8194	Michael.....	Duffy.....					
H885	Phillip.....	Escue.....					
5663	Ralph.....	Phraner.....					
M198	Hugh.....	Redelmeier.....					
8247	Arnold.....	Robbins.....					
D384	Roger.....	Wilks.....					
M201	Michael.....	Young.....					
H233	David.....	Prosser.....	AT&T.....	✓	✓	✓	✓
N	Steve.....	Adamski.....	AT&T.....	✓	✓	✓	✓
H382	Jim.....	Baumbach.....	Advanced Computer Techniques.....	✓	✓	✓	✓
H383	J Stephen.....	Adamczyk.....	Advanced Computer Techniques <i>Edison Design Group</i>	✓	✓	✓	✓
9179	Paul.....	Hohensee.....	Alliant Computer Systems.....				
G312	Bob.....	Gottlieb.....	Alliant Computer Systems.....				
B088	Neal.....	Weidenhofer	Amdahl.....	✓	✓	✓	✓
M147	Philip.....	Steel.....	American Cimflex.....				
M148	Eric.....	McGlohon.....	American Cimflex.....				
K504	Stephen.....	Kafka.....	Analog Devices.....				
M151	Kevin.....	Leary.....	Analog Devices.....				
M152	Gordon.....	Sterling.....	Analog Devices.....				
E269	John.....	Peyton.....	Apollo Computer.....	✓			
M149	Elizabeth.....	Crockett.....	Apple Computer.....	✓	✓		
F374	Ed.....	Wells.....	Arinc.....	✓	✓		
F536	Tom.....	Ketterhagen	Arinc.....				
226	Vaughn.....	Vernon.....	Aspen Scientific.....				
20	Craig.....	Bordelon.....	Bell Communications Research.....	✓	✓	✓	✓
898	Steven.....	Carter.....	Bell Communications Research.....				
G840	Bill.....	Puig.....	Bell Communications Research.....				
K	Bob.....	Jervis.....	Borland Software International.....	✓			
M	Yom-Tov.....	Meged.....	Boston Systems Office.....				
H238	Rose.....	Thomson.....	Boston Systems Office.....				
B085	Rex.....	Jaeschke.....	Canon <i>Del. Professional</i>	✓	✓	✓	✓
D527	Maurice.....	Fathi.....	COSMIC.....				
J942	John.....	Wu.....	Charles River Data Systems.....				
H817	Daniel.....	Mickey.....	Chemical Abstracts.....	✓	✓	✓	✓
D857	Thomas.....	Mimlitch.....	Chemical Abstracts.....				
K091	Alan.....	Losoff.....	Chicago Research & Trading.....				
G381	Edward.....	Briggs.....	Citibank.....				
E298	Firmo.....	Freire.....	Cobra S/A.....				
D307	Jim.....	Patterson.....	Cognos.....				
J639	Bruce.....	Tetelman.....	Columbia Univ Ctr for Comput.....				
H361	Terry.....	Moore.....	CompuDAS.....				
N013	Mark.....	Barrenechea.....	Computer Associates.....	✓			
0371	George.....	Eberhardt.....	Computer Innovations.....				
H236	Dave.....	Neathery.....	Computer Innovations.....				
E229	Joseph.....	Bibbo.....	Computrition.....				
G311	Steve.....	Davies.....	Concurrent Computer.....				
M	Don.....	Fosbury.....	Control Data.....	✓	✓	✓	✓
M139	George.....	VandeBunte.....	Control Data.....				
E039	Lloyd.....	Irons.....	Cormorant Communications.....				
16	Tom.....	MacDonald.....	Cray Research.....	✓	✓	✓	✓
85	Lynne.....	Johnson.....	Cray Research.....				
K364	Dave.....	Becker.....	Cray Research.....	✓			
B091	Jean.....	Risley.....	Custom Development Environments.....				

	M	T	W	T	F
M806 Randy.....Meyers.....Digital Equipment Corp.....	✓	✓	✓	✓	✓
382 Art.....Bjork.....Digital Equipment Corp.....	✓	✓	✓	✓	✓
007 Lu Anne....Van de Pas..Digital Equipment Corp.....	✓	✓	✓	✓	✓
4226 Michael....Meissner....Data General.....	✓	✓	✓	✓	✓
J943 Mark.....Harris.....Data General.....	✓	✓	✓	✓	✓
G325 James.....Stanley.....Data Systems Analysts.....	✓	✓	✓	✓	✓
5920 Samuel.....Kendall.....Delft Consulting.....	✓	✓	✓	✓	✓
F444 Ben.....Patel.....EDS.....	✓	✓	✓	✓	✓
H732 Graham.....Andrews.....Edinburgh Portable Compilers...	✓	✓	✓	✓	✓
M510 Colin.....McPhail.....Edinburgh Portable Compilers...	✓	✓	✓	✓	✓
B255 Dmitry.....Lenkov.....Everest Solutions	✓	✓	✓	✓	✓
8195 Frank.....Farance.....Farance Inc.....	✓	✓	✓	✓	✓
J447 Peter.....Hayes.....Farance Inc.....	✓	✓	✓	✓	✓
E237 Florin.....Jordan.....Floradin.....	✓	✓	✓	✓	✓
8208 Michael....Koo.....GE.....	✓	✓	✓	✓	✓
J512 Tom.....Sandlin.....Gould CSD.....	✓	✓	✓	✓	✓
J235 Tina.....Aleksa.....Gould CSD.....	✓	✓	✓	✓	✓
D276 Thomas.....Kelly.....HCR Corporation.....	✓	✓	✓	✓	✓
H230 Sheila.....Crossey.....HCR Corporation.....	✓	✓	✓	✓	✓
4232 Gary.....Jeter.....Harris Computer Sys Div.....	✓	✓	✓	✓	✓
H575 Sally.....Staff.....Harris Computer Sys Div.....	✓	✓	✓	✓	✓
D310 Sue.....Meloy.....Hewlett Packard.....	✓	✓	✓	✓	✓
4783 Larry.....Rosler.....Hewlett Packard.....	✓	✓	✓	✓	✓
D133 Michelle...Ruscetta...Hewlett Packard.....	✓	✓	✓	✓	✓
8238 Thomas.....Osten.....Honeywell Information Systems..	✓	✓	✓	✓	✓
D312 David.....Kayden.....Honeywell Information Systems..	✓	✓	✓	✓	✓
5680 Shawn.....Elliott.....IBM.....	✓	✓	✓	✓	✓
15 Donald.....Kretsch.....IEEE 1003.....	✓	✓	✓	✓	✓
184 Mike.....Banahan.....Instruction Set.....	✓	✓	✓	✓	✓
5714 Dan.....Lau.....Intel.....	✓	✓	✓	✓	✓
M708 Clark.....Nelson.....Intel.....	✓	✓	✓	✓	✓
E989 Randy.....Hudson.....Intermetrics.....	✓	✓	✓	✓	✓
5717 Keith.....Winter.....International Computers Ltd....	✓	✓	✓	✓	✓
8250 Honey.....Schrecker...International Computers.....	✓	✓	✓	✓	✓
4217 Jim.....Brodie.....J Brodie & Assoc.....	✓	✓	✓	✓	✓
H229 Jacklin....Kotikian...Kendall Square Research.....	✓	✓	✓	✓	✓
D856 Svein.....Davidsen...LSI Logic Ltd.....	✓	✓	✓	✓	✓
8480 John.....Kaminski...Language Processors Inc.....	✓	✓	✓	✓	✓
7060 Steve.....Hersee.....Lattice.....	✓	✓	✓	✓	✓
E257 David.....Yost.....Laurel Arts.....	✓	✓	✓	✓	✓
8483 Kelly.....O'Hair.....Lawrence Livermore Natl Lab....	✓	✓	✓	✓	✓
K425 Chuck.....Rasbold.....Lawrence Livermore Natl Lab....	✓	✓	✓	✓	✓
D225 Bob.....Weaver.....Los Alamos National Lab.....	✓	✓	✓	✓	✓
9184 Lidia VINCE...Eberhart TAC...MODCOMP.....	✓	✓	✓	✓	✓
M528 Robert.....Sherry.....Manx Software.....	✓	✓	✓	✓	✓
K375 Courtney...Prodehl...Mark Williams.....	✓	✓	✓	✓	✓
M466 Patricia...Jenkins...Masscomp.....	✓	✓	✓	✓	✓
M707 Dave.....Hinman...Masscomp.....	✓	✓	✓	✓	✓
G368 Michael....Kearns....MetaLink	✓	✓	✓	✓	✓
8240 Tom.....Pennello...MetaWare.....	✓	✓	✓	✓	✓
4792 Dave.....Weil.....Microsoft.....	✓	✓	✓	✓	✓
J782 Mitch.....Harter.....Microsoft.....	✓	✓	✓	✓	✓
636 Kim.....Kempf.....Microware Systems.....	✓	✓	✓	✓	✓
40 Shane.....McCarron...Minnesota Educational Computing	✓	✓	✓	✓	✓
8237 Bruce.....Olsen.....Mosaic Technologies.....	✓	✓	✓	✓	✓
5681 Michael....Paton.....Motorola	✓	✓	✓	✓	✓

Fri Mar 25 18:39:35 1988 Principals and Alternates

M T W T F

D306	Rick.....Schubert....NCR.....	—	X	X	X	X
05	Brian.....Johnson....NCR Comten.....	—	—	—	—	—
236	Joseph.....Mueller....National Semiconductor.....	—	—	—	—	—
H881	Derek.....Godfrey....National Semiconductor.....	—	—	—	—	—
8260	Jim.....Upperman....Natl Bureau of Standards Techno	—	—	—	—	—
E235	Jim.....Williams ...Naval Research Laboratory.....	X	X	X	X	X
F929	Lisa.....Simon.....OCLC.....	—	—	—	—	—
D974	Paul.....Amaranth....Oakland Univ Off of Compt.....	—	—	—	—	—
0726	Augie.....Hansen.....Omniware.....	—	—	—	—	—
H699	Michael.....Rolle.....Oracle	—	—	—	—	—
M061	Carl.....Ellis.....Oregon Software.....	—	—	—	—	—
H171	Barry.....Hedquist....Perennial.....	—	—	—	—	—
D001	Sassan.....Hazeghi....Peritus Intl.....	—	—	—	—	—
J217	James.....Holmlund....Peritus Intl.....	—	—	—	—	—
5049	Thomas.....Plum.....Plum Hall.....	X	X	X	X	X
B141	Chris.....Skelly.....Plum Hall.....	X	X	X	X	X
4224	Andrew.....Johnson....Prime Computer.....	X	X	X	X	X
J944	Fran.....Litterio....Prime Computer.....	—	—	—	—	—
H389	Daniel J...Conrad.....Prismatics Inc.....	—	—	—	—	—
J896	David.....Fritz.....Production Languages.....	—	—	—	—	—
F107	Kenneth....Pugh.....Pugh Killeen.....	X	—	—	—	X
E242	Ed.....Ramsey.....Purdue Univ	—	—	—	—	—
M207	Steve.....Roberts....Purdue Univ	—	—	—	—	—
M468	Kevin.....Nolan.....Quantitative Technology Corp...	—	—	—	—	—
M469	Robert.....Mueller....Quantitative Technology Corp...	—	—	—	—	—
B086	Chris.....DeVoney....Que.....	—	—	—	—	—
J026	Richard....Relph.....RARE Inc. EP	✓	✓	✓	✓	✓
58	Jon.....Tulk.....Rabbit Software.....	✓	✓	✓	✓	✓
156	Terry.....Colligan....Rational Systems.....	✓	✓	✓	✓	✓
E056	Oliver.....Bradley....SAS Institute	✓	✓	✓	✓	✓
D707	Alan.....Beale.....SAS Institute	—	—	—	—	—
103	Larry.....Jones.....SDRC.....	—	—	—	—	—
M805	Donald....Kossman....SEI Information Technology.....	—	—	—	—	—
M511	Kenneth....Harrenstien.SRI International.....	—	—	—	—	—
M344	Daniel.....Saks.....Saks & Associates.....	✓	✓	✓	✓	✓
N084	Nancy.....Saks.....Saks & Associates.....	—	—	—	—	—
6710	Larry.....Rosenthal...Sierra Systems.....	—	—	—	—	—
J683	Philip.....Hempfer....Southern Bell	—	—	—	—	—
F106	Purshotam..Rajani.....Spruce Technology.....	—	—	—	—	—
E227	Savu.....Savulescu...Stagg Systems.....	—	—	—	—	—
4218	Peter.....Darnell....Stellar.....	✓	X	—	—	—
J194	Lee.....Cooprider...Stellar.....	—	—	—	—	—
J245	Paul.....Gilmartin...Storage Technology.....	—	—	—	—	—
8485	Steve.....Muchnick....Sun Microsystems.....	—	—	—	—	—
H237	John M....Hausman....Tandem Computers.....	—	—	—	—	—
J941	Henry.....Richardson..Tandem Computers	✓	—	—	✓	✓
4790	Samuel.....Harbison....Tartan Laboratories.....	—	—	—	—	—
J756	Michael....Ball.....TauMetric.....	—	—	—	—	—
K915	Carl.....Sutton.....Tektronix.....	✓	✓	✓	✓	✓
8185	Jim.....Besemer....Tektronix.....	—	—	—	—	—
806	Reid.....Tatge.....Texas Instruments.....	—	—	—	—	—
H234	Monika....Khushf....Tymlabs.....	—	—	—	—	—
545	Morgan....Jones.....Tymlabs	—	—	—	—	—
47	Glenda....Berkheimer..Unisys (Sperry).....	—	—	—	—	—
H337	Don.....Bixler.....Unisys (Sperry).....	X	X	X	X	X
J769	Steve.....Bartels....Unisys (Burroughs).....	X	X	X	X	X

NAME	LAST NAME	COMPANY	1	2	3	4	5
N086	Annice.....	Jackson.....	Unisys.....	—	—	—	—
021	Fred.....	Blonder.....	Univ of Maryland	—	—	—	—
039	Fred.....	Swartz.....	Univ of Michigan.....	—	—	—	—
G008	R Jordan...	Kreindler...	Univ of Southern Cal (Arlington	—	—	—	—
D479	Mike.....	Carmody.....	Univ of Waterloo	—	—	—	—
1140	Douglas....	Gwyn.....	US Army.....	✓	✓	✓	✓
H733	C Dale.....	Pierce.....	US Army.....	—	—	—	—
J674	John C.....	Black.....	VideoFinancial.....	—	—	—	—
A118	Joseph.....	Musacchia...	Wang.....	✓	✓	✓	✓
8249	Fred.....	Rozakis.....	Wang	✓	✓	✓	✓
3165	PJ.....	Plauger.....	Whitesmiths Ltd.....	—	—	—	—
D309	Kim.....	Leeper.....	Wick Hill Assoc Ltd.....	—	—	—	—
5686	Mark.....	Wittenberg..	Zehntel.....	—	—	—	—
LEONARD	JOHNS	Datapoint		✓	✓	✓	✓
KEVIN	BROSIAN	ALLIANT COMPUTER SYSTEMS		✓	✓	✓	✓
CHUCK	ERBOLD	SUPERCOMPUTER SYSTEMS, INC.		✓	✓	✓	✓
MIKE	BRANSTETER	Lawrence Livermore Nat'l Lab		✓	✓	✓	✓
DENNIS	RITCHIE	AT&T		✓	✓	✓	✓
ELIZABETH	SANVILLE	GOULD INC. CSD		✓	✓	✓	✓
MICHAEL	TERRAZAS	DECUS		✓	✓	✓	✓
ERIC	SCHWARZ	Edison Design Group		✓	✓	✓	✓
PAUL	GILLING	IBM (Atlanta)		✓	✓	✓	✓
MIKE	REDMAN	System House, Inc		✓	✓	✓	✓
JIM	BRODIE	BRODIE & ASSOC.		✓	✓	✓	✓
ROBERT	TUCKER	Software Development Technology		✓	✓	✓	✓