

# Pascal News

(FORMERLY PASCAL NEWSLETTER)

NUMBER 11

COMMUNICATIONS ABOUT THE PROGRAMMING LANGUAGE PASCAL BY PASCALERS

FEBRUARY, 1978

## TABLE OF CONTENTS

COVER: Paper Fasteners from the mail of international Pascalers

0 POLICY: Pascal News

1 ALL PURPOSE COUPON

3 EDITOR'S CONTRIBUTION

4 HERE AND THERE WITH PASCAL

4 News (Jobs, Help Wanted!, Tidbits from Pascalers)

8 Pascal in the News

10 Conferences

10 Books and Articles

13 Errata to Pascal User Manual and Report, Second Edition

16 Review of Pascal Newsletters 5 - 8

19 Roster Increment

33 ARTICLES

33 "Type Compatibility Checking in Pascal Compilers" Pierre Desjardins

34 "A Novel Approach to Compiler Design" James Q. Arnold

36 "Status of UCSD Pascal Project" Kenneth L. Bowles

40 "Suggestions for Pascal Implementations" Willett Kempton

41 "Suggested Extensions to Pascal" Robert A. Fraley

48 "What to do After a While" David W. Barron and Judy M. Mullins

51 "Adapting Pascal for the PDP 11/45" David D. Miller

54 "Pascal: Standards and Extensions" Chris Bishop

57 OPEN FORUM FOR MEMBERS

64 Special Topic: Pascal Standards

70 IMPLEMENTATION NOTES

70 General Information

70 Applications

70 Portable Pascals

72 Pascal Variants

75 Feature Implementation Notes

80 Machine Dependent Implementations

104 Index to Implementation Notes

105 POLICY: Pascal User's Group

EX LIBRIS: David T. Craig  
736 Edgewater  
[# ] Wichita, Kansas 67230 (USA)

# POLICY: PASCAL NEWS (77/12/30)

- \* Pascal News is the official but informal publication of the User's Group.

Pascal News contains all we (the editors) know about Pascal; we use it as the vehicle to answer all inquiries because our physical energy and resources for answering individual requests are finite. As PUG grows, we unfortunately succumb to the reality of (1) having to insist that people who need to know "about Pascal" join PUG and read Pascal News - that is why we spend time to produce it! and (2) refusing to return phone calls or answer letters full of questions - we will pass the questions on to the readership of Pascal News. Please understand what the collective effect of individual inquiries has at the "concentrators" (our phones and mailboxes). We are trying honestly to say: "we cannot promise more than we can do."

- \* An attempt is made to produce Pascal News 4 times during an academic year from July 1 to June 30; usually September, November, February, and May.
- \* ALL THE NEWS THAT FITS, WE PRINT. Please send written material for Pascal News single spaced and in camera-ready form. Use lines 18.5 cm wide!
- \* Remember: ALL LETTERS TO US WILL BE PRINTED UNLESS THEY CONTAIN A REQUEST TO THE CONTRARY.
- \* Pascal News is divided into flexible sections:

POLICY - tries to explain the way we do things (ALL PURPOSE COUPON, etc.).

EDITOR'S CONTRIBUTION - passes along the opinion and point of view of the editor together with changes in the mechanics of PUG operation, etc.

HERE AND THERE WITH PASCAL - presents news from people, conference announcements and reports, new books and articles (including reviews), notices of Pascal applications, history, membership rosters, etc.

ARTICLES - contains formal, submitted contributions (such as Pascal philosophy, use of Pascal as a teaching tool, use of Pascal at different computer installations, how to promote Pascal, etc.)

OPEN FORUM FOR MEMBERS - contains short, informal correspondence among members which is of interest to the readership of Pascal News.

IMPLEMENTATION NOTES - reports news of Pascal implementations: contacts for maintainers, implementors, distributors, and documentors of various implementations as well as where to send bug reports. Qualitative and quantitative descriptions and comparisons of various implementations are publicized. Sections contain information about Software Writing Tools for a Pascal environment, Portable Pascals, Pascal Variants, Feature Implementation Notes, Machine Dependent Implementations, etc.

- \* Volunteer editors are:

Andy Mickel - editor  
Tim Bonham and Jim Miner - Implementation Notes editors  
Sara Graffunder - Here and There editor  
John Strait and John Easton - Tasks editors  
Rich Stevens - Books and Articles editor  
Rich Cichelli - Software Tools and Applications editor  
George Richmond - past editor (issues 1 through 4)

RECEIVED

FEB 16 1978

CYTROL INC.

Policy

PASCAL USER'S GROUP

USER'S  
GROUP

ALL PURPOSE COUPON

\*\*\*\*\*

(77/12/30)

Pascal User's Group, c/o Andy Mickel  
University Computer Center: 227 EX  
208 SE Union Street  
University of Minnesota  
Minneapolis, MN 55455 USA

+ Clip, photocopy, or  
+  
+ reproduce, etc. and  
+  
+ mail to this address.

// Please enter me as a new member of the PASCAL USER'S GROUP for \_\_\_ Academic year(s) ending June 30 \_\_\_\_\_. I shall receive all 4 issues of Pascal News for each year. Enclosed please find \_\_\_\_\_ (\$4.00 for each year). (\* When joining from overseas, check the Pascal News POLICY section on the reverse side for a PUG "regional representative." \*)

// Please renew my membership in PASCAL USER'S GROUP for \_\_\_ Academic year(s) ending June 30 \_\_\_\_\_. Enclosed please find \_\_\_\_\_ (\$4.00 for each year).

// Please send a copy of Pascal News Number(s) \_\_\_\_\_. (\* See the Pascal News POLICY section on the reverse side for prices and issues available. \*)

// My new <sup>address</sup> <sub>phone</sub> is printed below. Please use it from now on. I'll enclose an old mailing label if I can find one.

// You messed up my <sup>address</sup> <sub>phone</sub>. See below.

// Enclosed please find a contribution (such as what we are doing with Pascal at our computer installation), idea, article, or opinion which I wish to submit for publication in the next issue of Pascal News. (\* Please send bug reports to the maintainer of the appropriate implementation listed in the Pascal News IMPLEMENTATION NOTES section. \*)

// None of the above. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Other comments: From: name \_\_\_\_\_

mailing address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

phone \_\_\_\_\_

computer system(s) \_\_\_\_\_

date \_\_\_\_\_

(\* Your phone number aids communication with other PUG members. \*)

JOINING PASCAL USER'S GROUP?

- membership is open to anyone: particularly the Pascal user, teacher, maintainer, implementor, distributor, or just plain fan. Memberships from libraries are also encouraged.
- please enclose the proper prepayment - we will not bill you.
- please do not send us purchase orders - we cannot endure the paper work! (if you are trying to get your organization to pay for your membership, think of the cost of paperwork involved for such a small sum as a PUG membership).
- when you join PUG anytime within an academic year: July 1 to June 30, you will receive all issues of Pascal News for that year unless you request otherwise. You will receive a membership receipt.
- please remember that PUG is run by volunteers who don't consider themselves in the "publishing business." We consider production of Pascal News as simply a means toward the end of promoting Pascal and communicating news of events surrounding Pascal to persons interested in Pascal. We are simply interested in the news ourselves and prefer to share it through Pascal News (rather than having to answer individually every letter and phone call). We desire to keep paperwork to a minimum because we have other work to do.

JOINING THROUGH "REGIONAL REPRESENTATIVES" ?

- To join through PUG(USA), see address on reverse side. International telephone: 1-612-376-7290. PUG(USA) produces Pascal News and keeps all mailing addresses on a common list. Regional representatives collect memberships from their regions as a service and reprint and distribute Pascal News using mailing labels sent from PUG(USA). Persons in the Australasian Region must join through PUG(AUS).

European Region (Europe, North Africa, Middle and Near East):  
 send £2.50 to: Pascal Users' Group (UK)  
 c/o Computer Studies Group  
 Mathematics Department  
 The University  
 Southampton SO9 5NH  
 United Kingdom  
 telephone: 44-703-559122 x700

Australasian Region (Australia, New Zealand, Indonesia, Malaysia):  
 send \$A10 to: Pascal Users Group (AUS)  
 c/o Arthur Sale  
 Dept. of Information Sci.  
 University of Tasmania  
 GPO Box 252C  
 Hobart, Tasmania 7001  
 Australia  
 telephone: (002) 23 0561

RENEWING?

- please renew early (before August) and please write us a line or two to tell us what you are doing with Pascal, and tell us what you think of PUG and Pascal News to help keep us honest. To save PUG postage, we do not send receipts when you renew.

ORDERING BACKISSUES OR EXTRA ISSUES?

Our unusual policy of automatically sending all issues of Pascal News to anyone who joins within an academic year (July 1 to June 30) means that we eliminate many requests for backissues ahead of time, and we don't have to reprint important information in every issue - especially about Pascal implementations!

- Issues 1, 2, 3, and 4 (January, 1974 - August, 1976) are out of print.
- Issues 5, 6, 7, and 8 (September, 1976 - May, 1977) are out of print.  
 (A few copies of issue 8 remain at PUG(UK) available for £1 each.)
- Extra single copies of new issues (current academic year) are:  
 \$2 each - PUG(USA); £1 each - PUG(UK); and \$A3 each - PUG(AUS).

SENDING MATERIAL FOR PUBLICATION?

(such as ideas, queries, articles, letters, opinions, notices, news, implementation information, conference announcements and reports, etc.) "ALL THE NEWS THAT FITS, WE PRINT." Please send written material for Pascal News single spaced and in camera-ready form. Use lines 18.5 cm wide! Remember: ALL LETTERS TO US WILL BE PRINTED UNLESS THEY CONTAIN A REQUEST TO THE CONTRARY.

MISCELLANEOUS INQUIRIES? Please remember we will use Pascal News as the vehicle to answer all inquiries and regret to be unable to answer individual requests.



UNIVERSITY OF MINNESOTA  
TWIN CITIES

University Computer Center  
227 Experimental Engineering Building  
Minneapolis, Minnesota 55455  
(612) 376-7290

The DEADLINE for written contributions to Pascal News #12 is March 20. Please send DARK copy! New companies committed to Pascal (add to the list in PUGN#9): Ericsson Telephone and ICL in Europe, Interdata and Tektronix in the US. TI continues to be very mysterious about their heavy use of Pascal - they haven't told us a word in a year now! DEC may be finally waking up because of DOD-1 (see Here and There). Thanks to everyone who sent material for this issue. We sent renewal notices to 315 holdouts in November. We may have to stop sending receipts for membership - it is getting too time consuming. We will probably have to combine issues 13&14 next autumn.

Judy sent the letter below to "The Editor, Pascal News":

*- Andy*



UNIVERSITY OF SOUTHAMPTON  
Faculty of Mathematical Studies

Southampton, SO9 5NH. Telex 47661. Tel 0703 559122 Ext 2387

5th December, 1977.

Dear Andy,

PUG (UK) PRINTING and POSTAGE

Now that PUGN 9/10 is out of the way, I thought I would share some statistics on printing costs.

PUGN		USA		UK	
number	pages	per copy	per page	per copy	per page
5	64	\$0.70	1.09c	?	?
6	96	\$1.18	1.23c	\$0.50	.52c
7	48	\$0.69	1.44c	\$0.14	.29c
8	64	\$1.07	1.67c	\$0.40	.62c
9/10	112	?	?	\$0.56	.51c

As you can see, we have managed to keep our costs at well below half yours. After No. 8, we outgrew the Departmental printing service and took 9/10 to the University Printing Unit. They were able to do the job at the same price - in fact slightly cheaper because I did much of the collating myself to hurry it along. However, indications are that there could be a steep rise in costs in the New Year. It may be possible to avoid it, and in order to do so we need to know, accurately,

No. of pages in No. 11  
Date of arrival of Masters.

However, should it not be possible to get preferential rates, we shall have to face a cost of about 90c for a 64 page issue (compared to \$1.07 in the U.S.A. and 40c previously). Are you still relying on our ultra cheap rates or can PUG afford to pay the going rate?

**Editor's Contribution**

Postage for 9/10 was

Country - group	Unit Cost	Previous group	Unit Cost
U.K. 350g	45c	300g	39c
Europe 500g	48c	250g	26c

and came to a total of \$115 (approx.). The mailing included close on 50 renewals received after you ran the labels off. As you can see, it is unlikely that any future issue will hit the lower group for European postage, so that we might have to face 90c + 48c = \$1.38 for getting a copy to a European member. However, with luck we can still do it at under a dollar.

That seems to be all. I have today handed over the files in good order to David who will handle everything after my departure. Following his article in Computing we have had an influx of queries, especially from Industry. Pascal lives!

Thank you very much for all the numerous snippets of information over the past year, and for the most recent ones on South Africa. The personal touch is sincerely appreciated. You will be glad to know that Wits are seriously contemplating switching from Fortran to Pascal for first years (including engineers) in January. It all depends on whether a decent 370 compiler is ready.

I'll keep in touch, of course, and won't forget to send a photo of the wedding.

All the best,

*Judy Mullins*  
Judy Mullins

Professors: H.B. Griffiths, S.A. Robertson (Pure Mathematics); P.T. Landsberg (Applied Mathematics); J.W. Craggs (Engineering Mathematics); D.W. Barron (Computer Studies); T.M.F. Smith (Statistics).

(\* It might help explain to new PUG members a few related facts. Judy Mullins last year (76-77) proposed and implemented a reprinting and distribution service of PUGN for PUG members in Europe. Not only was delivery speeded, but also the rates were kept low. Last March, the University of Southampton Computer Studies Group headed by Prof. David Barron held their third annual computing symposium on "Pascal - the Language and Implementation." Both Judy and David have done PUG many great services. Judy graduated this month and is going home to South Africa where she will marry her fiance. David (who by the way edits the ever-popular journal: SOFTWARE - Practice and Experience) recently wrote an outstanding article for the 77/10/24 issue of Computing Europe (a kind of Computerworld for Europe); please see Here and There.

David continues to man the PUG European region and as a result had to quit as a Books and Articles editor for PUGN.

Regarding the question marks under "USA" for PUGN 9/10 in Judy's letter, the costs were \$1.10 and \$0.96. Ken Robinson (see Open Forum) asks for a public explanation of the high (\$A10) cost of PUGN for Australasian members for the new distribution service provided this year by Arthur Sale. Arthur on 77/09/07 sent this information about his estimated costs: \$2.80 for printing per issue (based on the size of #8); postage within Australia = \$0.70. Arthur says that he thinks the cost is "dubiously low" and that \$10 might leave his operation "out of pocket, and to understand the costing, you have to realize that Australia has a high postal charge, and I also am taking on New Zealand." I think it is unfortunate that Arthur's costs are so high, because it is not in the cheap spirit of PUG. Until Ken wrote I didn't know the \$A10 price was relatively "high". Remember though that last year we had severe distribution problems to Australia. I'm grateful to Arthur for volunteering to do the work, and I'm sure he's watching costs. - Andy \*)

# Here and There With Pascal

## NEWS

### PASCAL JOBS...

People keep calling us at PUG central asking for people to employ who know Pascal. (\*If that isn't evidence of Pascal's viability, I don't know what is!\*) With the interest of Pascalers in mind we list here as a service contacts who desire people with compiler experience and knowledge of Pascal:

David Shaw, Structured Systems Corp., Suite 605, 2600 El Camino Real, Palo Alto, CA 94306. (415) 321-8111

Charles Moore, ADP Network Services, 175 Jackson Plaza, Ann Arbor, MI 48106. (313) 769-6800 (also Neil Barta, same address and phone)

Gregory Hopwood, Sperry Univac Mini Computer Division (formerly Varian), 2722 Michelson Drive, Irvine, CA 92713. (714) 833-2400

### HELP WANTED!

If Pascal is to make any inroads into serious scientific computing (currently the almost exclusive preserve of FORTRAN) it must have a decent library of scientific subroutines - which means, as far as the U.K. is concerned, that there must be a Pascal version of the NAG (Numerical Algorithms Group) library. (\*...and as far as the U.S. is concerned, that there must be a Pascal version of the IMSL (International Mathematics and Statistics Library) library...\*)

It should be possible to make a Pascal NAG library largely machine-independent, with all machine-dependent features begin collected into the "X" routines. Probably the easiest method of production of the library would be straight transcription of the existing ALGOL-60 versions, together with the writing of the set of "X" routines for each different range of machines.

Please send your views on this matter, and offers of help, to:

Professor D. W. Barron,  
Computer Studies Group,  
Department of Mathematics,  
The University,  
Southampton, Hants, SO9 5NH (United Kingdom)

who is coordinating this project and negotiating with NAG.

### TIDBITS

D. B. Anderson, 280 Bella Vista Drive, Hillsborough, CA 94010: "I am particularly interested in implementations usable on my company's Interdata 7-32." (\* 77/12/12 \*)

David B. Anderson, Dept. of Math., Lehigh University, Bethlehem, PA 18015: "By the way, the section in the newsletter called 'Here and There with Pascal' has been very helpful in stimulating the interest of non-believers." (\* 77/12/17 \*)

Peter A. Armstrong, Digital Data Systems, 1113 Dexter Ave. N., Seattle, WA 98109: "We are immediately interested in information on PASCAL compilers for PDP-11 processors running DEC's RSTS/E monitor. However, we are also interested in any mini- and or

microcomputer PASCAL capabilities." (\* 77/12/13 \*)

Paul Barr, Raytheon Co., Equipment Div., Boston Post Road, Wayland, MA 01778: "Am attempting to use PASCAL for a Signal Processing application (FFT). Am designing hardware to fit the compiler." (\* 77/11/21 \*)

Michael Behar, 428 Windy Hill Rd., Orange, CT 06477: "Do you know if there is a version of PASCAL for a MICRO-MIND-II computer (manufactured by ECD of Cambridge, MA)?" (\* 77/9/22 \*)

Roy E. Bollinger, Dept. 1965, BLD 529, Lockheed, P. O. Box 504, Sunnyvale, CA 94088: "Are there any plans to have any Pascal seminars?" (\* 77/11/8 \*)

Steven L. Brecher, 5221 Marina Pacifica Dr., N. Key 19, Long Beach, CA 90803: "More generally, I am interested in information on any implementation which can be run on/adapted to a Digital Equipment LSI-11 based system." (\* 77/12/19 \*)

A. Charles Buckley, Data/Information Systems, Urban Studies Center, Gardencourt/Alta Vista Road, Louisville, KY 40205: "We are currently interested in any work being done to implement Hansen's CONCURRENT PASCAL on a DEC-10 and/or an IBM 370." (\* 77/11/28 \*)

David Burnett-Hall, Univ. of York, Heslington, York, YO1 5DD, England: "In the discussions on whether array parameters could be dynamic in size, there have been some suggestions that only numerical analysts handling matrices need these facilities. A much more important use, to my mind, is to be able to pass strings of varying lengths. E. g., the DEC-10 compiler has to have 9 almost identical error routines, to handle errors of lengths 15, 20, 25, . . . 55 characters: Stupid." (\* 77/8/10 \*)

Joe Celko, Box # 11023, Atlanta, GA 30310: "Is there a Nova Pascal sitting around?" (\* 77/12/6 \*)

Grant M. Colvin, Management Shares, 2121 W. Airport Frwy., Suite 660, Irving, TX 75062: "Do you know of PASCAL implementations for the Hewlett-Packard 3000 series?" (\* 77/12/5 \*)

C. R. Corner, 514 S. 9th St., Moorhead, MN 56560: "I have a PDP 11/05 and am interested in Pascal activity on the 11 and on micro-based systems." (\* 77/09/29 \*)

Lawrence S. Cram, 64 Bowen Street, Newton, MA 02159: "Although I am not now a user of PASCAL, I certainly would like to be, and I would like to be on your mailing list. I program commercial applications on a DECsystem-10 in COBOL and am fed up with the limitations inherent in COBOL. I was introduced to PASCAL in Wirth's book, Data Structures + Algorithms = Programs and have followed up with Hansen's Principles of Operating Systems and the PASCAL Users' Guide. I currently have a second-hand bootleg PASCAL compiler and I dabble with it occasionally." (\* 77/11/8 \*)

Pierre Desjardins, Departement d'informatique, Universite de Montreal, Immeuble principal V-240, Montreal 101 Quebec H3C 3J7, Canada: "My implementation of the Concurrent Pascal machine on Sigma 6 is presently being used to implement (using Concurrent Pascal, of course) the "line access protocol" necessary for communicating with a packet switching service of Bell Canada called DATAPAC. "I am currently involved in the organisation and realization of a primitive distributed microprocessor system. System programs will be written in CP and executed by a CP machine contained in every MP." (\* 77/10/13 \*)

Robert I. Demrow, 11 Linda Rd., Andover, MA 01810: "I am interested in finding a copy of Pascal that will run on my 8080 computer--presently have 32K and am planning an expansion." (\* 77/11/26 \*)

John DeRosa, The Boston Systems Office, 400-1 Totten Pond Road, Waltham, MA 02154: "We're presently beginning development of PASCAL systems for micro's as well as resident compilers with the intent of creating a PASCAL well-suited for writing system software. Any news from people working in this direction would be appreciated." (\* 77/9/21 \*)

