

PASCAL USERS GROUP

Pascal News

NUMBER ~~18~~ 19

COMMUNICATIONS ABOUT THE PROGRAMMING LANGUAGE PASCAL BY PASCALERS

SEPTEMBER, 1980



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

- * 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!
 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 that we can do."
- * Pascal News is produced 3 or 4 times during a year; usually in March, June, September, and December.
- * ALL THE NEWS THAT'S FIT, WE PRINT. Please send material (brevity is a virtue) for Pascal News single-spaced and camera-ready (use dark ribbon and 18.5 cm lines!)
- * Remember: ALL LETTERS TO US WILL BE PRINTED UNLESS THEY CONTAIN A REQUEST TO THE CONTRARY.
- * Pascal News is divided into flexible sections:

POLICY - explains 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 in the news, history, membership rosters, etc.

APPLICATIONS - presents and documents source programs written in Pascal for various algorithms, and software tools for a Pascal environment; news of significant applications programs. Also critiques regarding program/algorithm certification, performance, standards conformance, style, output convenience, and general design.

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 Portable Pascals, Pascal Variants, Feature-Implementation Notes, and Machine-Dependent Implementations.

- - - - - ALL-PURPOSE COUPON - - - - - (15-Sep-80)

Pascal User's Group, c/o Rick Shaw
P.O. Box 888524
Atlanta, Georgia 30338 USA

****NOTE****

- Membership fee and All Purpose Coupon is sent to your Regional Representative.
- SEE THE POLICY SECTION ON THE REVERSE SIDE FOR PRICES AND ALTERNATE ADDRESS if you are located in the European or Australasian Regions.
- Membership and Renewal are the same price.
- Note the discounts below, for multi-year subscription and renewal.
- The U. S. Postal Service does not forward Pascal News.

		USA	Europe	Aust.
<input type="checkbox"/>	Enter me as a new member for:	[] 1 year \$10.	£6.	A\$ 8.
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<input type="checkbox"/>		[] 3 years \$25.	£14.	A\$ 20.

Send Back Issue(s) !

- My new address/phone is listed below
- Enclosed please find a contribution, idea, article or opinion which is submitted for publication in the Pascal News.

Comments: _____

! ENCLOSED PLEASE FIND: \$ _____! £ _____! ! CHECK no. _____! _____!

NAME _____

ADDRESS _____

PHONE _____

COMPUTER _____

DATE _____

JOINING PASCAL USER'S GROUP?

- Membership is open to anyone: Particularly the Pascal user, teacher, maintainer, implementor, distributor, or just plain fan.
- Please enclose the proper prepayment (check payable to "Pascal User's Group"); we will not bill you.
- Please do not send us purchase orders; we cannot endure the paper work!
- When you join PUG any time within a year: January 1 to December 31, you will receive all issues of Pascal News for that year.
- We produce Pascal News as 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. We desire to minimize paperwork, because we have other work to do.

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- American Region (North and South America): Send \$10.00 per year to the address on the reverse side. International telephone: 1-404-252-2600.
 - European Region (Europe, North Africa, Western and Central Asia): Join through PUG (UK). Send £5.00 per year to: Pascal Users Group, c/o Computer Studies Group, Mathematics Department, The University, Southampton SO9 5NH, United Kingdom; or pay by direct transfer into our Post Giro account (28 513 4000); International telephone: 44-703-559122 x700.
 - Australasian Region (Australia, East Asia - incl. Japan): PUG(AUS). Send \$A10.00 per year to: Pascal Users Group, c/o Arthur Sale, Department of Information Science, University of Tasmania, Box 252C GPO, Hobart, Tasmania 7001, Australia. International telephone: 61-02-23 0561 x435
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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 they reprint and distribute Pascal News using a proof copy and mailing labels sent from PUG(USA). Persons in the Australasian and European Regions must join through their regional representatives. People in other places can join through PUG(USA).

RENEWING?

- Please renew early (before November 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. Renewing for more than one year saves us time.

ORDERING BACK ISSUES OR EXTRA ISSUES?

- Our unusual policy of automatically sending all issues of Pascal News to anyone who joins within a year 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 .. 8 (January, 1974 - May 1977) are out of print.
(A few copies of issue 8 remain at PUG(UK) available for £2 each.)
- Issues 9 .. 12 (September, 1977 - June, 1978) are available from PUG(USA) all for \$15.00 and from PUG(AUS) all for \$A15.00
- Issues 13 .. 16 are available from PUG(UK) all for £10; from PUG(AUS) all for \$A15.00; and from PUG(USA) all for \$15.00.
- Extra single copies of new issues (current academic year) are: \$5.00 each - PUG(USA); £3 each - PUG(UK); and \$A5.00 each - PUG(AUS).

SENDING MATERIAL FOR PUBLICATION?

- Your experiences with Pascal (teaching and otherwise), ideas, letters, opinions, notices, news, articles, conference announcements, reports, implementation information, applications, etc. are welcome. Please send material single-spaced and in camera-ready (use a dark ribbon and lines 18.5 cm. wide) form.
- All letters will be printed unless they contain a request to the contrary.

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Contributors to this issue (#19) were:

EDITOR	Rick Shaw
Here & There	John Eisenberg
Books & Articles	Rich Stevens
Applications	Rich Cichelli, Andy Mickel
Standards	Jim Miner, Tony Addyman
Implementation Notes	Bob Dietrich, Greg Marshall
Administration	Moe Ford, Kathy Ford, Jennie Sinclair

APPLICATION FOR LICENSE TO USE VALIDATION SUITE FOR PASCAL

Name and address of requestor: _____
(Company name if requestor is a company) _____

Phone Number: _____

Name and address to which information should
be addressed (Write "as above" if the same) _____

Signature of requestor: _____

Date: _____

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- a) The Validation Suite is recognized as being the copyrighted, proprietary property of R. A. Freak and A.H.J. Sale, and
- b) The requestor will not distribute or otherwise make available machine-readable copies of the Validation Suite, modified or unmodified, to any third party without written permission of the copyright holders.

In return, the copyright holders grant full permission to use the programs and documentation contained in the Validation Suite for the purpose of compiler validation, acceptance tests, benchmarking, preparation of comparative reports, and similar purposes, and to make available the listings of the results of compilation and execution of the programs to third parties in the course of the above activities. In such documents, reference shall be made to the original copyright notice and its source.

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Richard J. Cichelli
On behalf of A.H.J. Sale & R.A. Freak

Editor's Contribution

SO WHATS NEW

Well lots! We have extended the subscriptions of all members by 6 months. The effect of this change is that we align the subscription year to the calendar year instead of an academic year. So now, it should be easier to know when your subscription expires. Note that our policy of sending all back issues for the year has not changed. Therefore the year marked on the labels is the year through which your subscription is effective. Remember, now subscriptions expire on December 31.

Also, as you can see if you have read the new APC, the price of Pascal News is going up. Sorry. We resisted as long as we could. But note that we offer a good price break for multiple year subscriptions. Subscribing for more than one year saves us a great deal of work. Please, please help us save paper work! The new prices will go into effect 1-January-80. Until then, we will accept renewals and subscriptions at the old price. So if you have not yet renewed, do it now, while the price is low low low! We also have a new address! (note the new APC again) You may recognize it as the return address for issues 17 and 18. The address is simple and does not include a company name. (yes the box number really does have six digits and three are 8's) I hope the new address mollifies those people who worried about vendor bias. By the way, my employer provides no support for Pascal Users Group, in any way shape or form. Which leads me to the next subject.

HELP -- I'M BEGGING

Pascal Users Group needs its own computer. It has become a necessity, to be able to maintain our ever increasing data base, and do all of our record keeping. If your company can offer any type of a product for our use either as a gift, for long term use, or at a substantial discount we would like to hear from you. We are not very ambitious. Our thoughts are to secure a micro processor, a terminal, a small line printer, a hard disk, and a set of floppys. Small potatoes! Right? The system must be in place by December in order for us to be on time for the next issue. So, please, won't you call right away. (Jerry Lewis, eat your heart out) I have exhausted all my favors in Atlanta.

CHANGE OF ADDRESS -- A REAL PROBLEM

I just can not believe how many people change there address and do not inform Pascal News! The expense is phenominal. Bulk mail is not forwardable by the post office. It costs

\$.15 to send a change of address card to us, and \$1.43 just in return postage if you do not. That does not include the postage to get it to you at your new address. This is a tremendous expense to PUG when 142 people "just forgot". Please help us get Pascal News to you on time. OK? So if you suspect we may have your back copies, send us a stamped self-addressed envelope with a note telling us which issues you have not recieved and we will give you your copies or a new set, no questions asked. Simple, right?

THE GOOD STUFF -- WHAT'S IN THIS ISSUE

As usual, we have a gigantic "HERE AND THERE" section this issue. it is chock full of feedback from the readers. If you put anything on the "comments" section of the APC or sent anything to me or John that was not a letter, it ends up here. So keep up the notes and comments.

I would also like to call your attention to the section on "BOOKS AND ARTICLES" if you are looking for some side reading on Pascal there are over 300 citings. Wow! And Rich has collected together a very complete list of the text books available on subject of Pascal. If your favorite is not there please drop us a line on an APC. OK?

Since Andy Mickel has a few spare moments lately, he has contributed 3 fine tidbits of information. The first is a thumbnail review of all the back issues of Pascal News (1..16). Second, he has rolled up the 78-79 finances. And third, is a summary of all the machines represented by the PUG membership, derived from the old APCs. Very interesting.

The "APPLICATIONS" section contains Wirth's Pascal-S, the subset Pascal compiler. It has been around for a while but many new users have never seen it. We also have included a LISP interpreter, for those who need the power and flexibility?! Enjoy.

The "ARTICLES" are really great too. Both show a solid approach to making a good thing better.

Jim Miner reports on the standards turmoil. The facts are laid out, and testimony from both sides is presented. You be the judge. And Let us know what you think.

And finally "IMPLEMENTATION NOTES". Fourty pages of them. Note IBM's offical entry. 'Nuff said.

Hope you like it.

RICK

Here and There With Pascal

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T IDBITS

Peter C. Akwai, IBM Kst. 3787, Postfach 33 09,6000 Frankfurt/M1 West Germany: "We are willing to assume some of the unassigned Pascal Newsletter work caused by Andy Mickel's retirement. Let us know what we can do to help. Pasteup, Selectric composer facilities available, some graphics/cartooning, etc." (*79/05/05*)

Haim Avni, Givat Brenner, Israel 60948: "We are a rather new software group, very keen Pascalers and eager to have this line of communication with other Pascal users." (*80/05/09*)

David P. Babcock, 508 First Street, Alamosa, CO 81101: "Disappointed to note address is now DEC. Please try to maintain at least a semblance of independence in any case." (*80/01/20*)

John W. Baxter, 1830 Avenida del Mundo, Apt. 1710, Coronado, CA 92118 is using Pascal on an Apple at home, and also uses "an offspring of PASCAL -- called NCR language -- in my work at NCR Corp." (*79/12/28*)

Hank Becker, Yourdon - Software Products Group, 1133 Ave. of the Americas, New York, NY 10036: "We will be distributing a Concurrent Pascal (compiler is transportable) with P-codes to run on 8080/8085/Z80 and eventually other [micros]." (*80/02/23*)

Paul J. Beckmann, 1907 Bohland, St. Paul, MN 55116: "PN outstanding! Thanks to Andy and the U of M Pascal Think Tank. Good luck to you, Rick, in Georgia." (*80/02/23*)

Norman Belssner, 9616 Thunderbird Drive, San Ramon, CA 94583 is interested in implementations of Pascal on TRS-80. (*80/01/05*)

K.S. Bhaskar, 22828 76th Ave. W. Apt. #33, Edmonds, WA 98020 is using the NBS Pascal Compiler on a PDP 11/70 to generate code which is executed on a stand-alone LSI-11 for real-time applications. (*80/01/21*)

K. Brauer, Universitaet Onasbrueck, 45 Onasbrueck, Postfach 4469 uses and teaches Pascal at University, and is very much interested in getting further issues of the newsletter. (*80/01/03*)

Frank M. Brewster, 1 North Vista Ave., Bradford, PA 16701: "If you live up to Andy's standards, you'll deserve the same huge thanks we owe to him. Good luck." (*80/02/06*)

Frank Bush, Tennessee Tech. Univ., Box 5071, Cookeville, TN 38501 has just started using UCSD B-6700 Pascal. (*80/05/06*)

R. Bush, P.O. Box F, North Bend, OR 97459: "yeah 'Applications', Validation Suite et al. Kudos to AM for service...is nasty K. Bowles really that bad?" (*80/01/23*)

Larry H. Buss, 101 South U St., Apt., 1, Lompoc, CA 93436: "I have a system running under standard CP/M with 48K.... I would like to examine the latest Pascal documentation. It seems that there are so many different versions of Pascal out. Is the standard Pascal from UCSD the best one?" (*80/01/17*)

Robert Caldwell, Scientific/Humanistic Interfaces, 2939 Governor Dr., San Diego, CA 92122: "Superb job - hang in there!" (*80/01/21*)

Dan Cantley, 3423 Carpenter Rd. Lot 10, Ypsilanti, MI 48197: "Just found the Pascal News - it's GREAT. Learned Pascal six months ago...our Accounting Department wanted an A/R package - our system didn't have the time or space - so I wrote the A/R package on our own micro - stuck it in Accounting Department. They love the package, and I love PASCAL." (*80/01/20*)

Chip Chapin, 3960 La Jolla Village Dr., La Jolla, CA 92037: "Should have joined long ago - have worked with UCSD Pascal project for 3 years." (*80/01/02*)

Les Cline, 1235 Wildwood Ave. #361, Sunnyvale, CA 94086: "I know not what others say, but as for me, give me Pascal, or give me Assembler!!" (*80/05/06*)

Roger A. Collins, 1653 Olmeda St., Encinitas, CA 92024: "I have found Pascal News very informative and helpful. Brought up an interpreter (* on a Perkin-Elmer 8/32 *) but found it unworkable in our environment, am now looking for a compiler." (*80/01/23*)

Stan Crouch, Technicon Medical Information Systems Corp., 3255-1 Scott Blvd., Santa Clara, CA 95051: "I am doing a study on the feasibility of converting some on-line programs to Pascal. I need to know whether or not Pascal programs can be made re-entrant and what is required in the operating system. Also, if you have any information on ADA capabilities I would appreciate any input in that area." (*80/04/08*)

Jeff Davis, 1515-J Tivoli Court, Raleigh, NC 27604 belongs to a local Apple users group that has started a Pascal Special Interest Group with good response. (*80/02/06*)

Tony DiCenzo, Digital Equipment, MR1-1/M40, Marlboro, MA 01752: "Good luck Rick - I'm sure this publication will flourish in your capable hands." (*80/02/03*)

George B. Diamond, Diamond Aerosol Corporation, R-D. #1, Glen Gardner, NJ 08826: "If we had this kind of effort in other fields we would not be a 3rd rate power." (*80/01/23*)

John Dickinson, Dept. of Elec. Engr., Univ. of Idaho, Moscow, Idaho 83843 is

running Pascal on an IBM 370/145 and an HP1000 model 40. (*80/04/01*)

M. F. Doore, 1015 E. 10th St., Long Beach, CA 90813 is a Pascal Watcher in Electrical Engineering hoping to be the owner of a Western Digital P Machine soon. (*80/03/31*)

Donald L. Dunstan, Cogitronics Corporation, 5470 N.W. Innisbrook Place, Portland, OR 97229: "Cogitronics develops software for microprocessor development systems. Currently we are working with a GenRad/Futuredata 8085 development system and have generated a Pascal compiler for this system." (*80/01/23*)

Hank Feeser, 644B Washington Ave., Ft. Lawton, Seattle, WA 98199 owns an Apple II with Pascal and would greatly appreciate "any additional information on the implementation of Pascal on the Apple II". (*80/01/23*)

William A. Freberg, Computer Sciences Corporation, 2753 Highland Dr., Las Vegas, NV 89109: "Implementing Pascal 6000 from Zurich on CDC 6400 owned by Department of Energy at Las Vegas NV (NOS/BE operating system)." (*80/05/06*)

Edward R. Friedman, CIMS/New York Univ., 251 Mercer Street, New York, NY 10012: "Pascal is currently being used in courses devoted to programming languages. PROSE is also popular among researchers." Versions in use are Pascal 6000 Release 3 and Pascal from Sweden. (*80/01/23*)

Stuart H. Gage, Department of Entomology, Michigan State Univ., East Lansing, MI 48824 is "currently running UCSD Pascal on a Terak 8510/a and a CRDS MF-211, along with CDC Pascal on a Cyber 750/175. Our applications deal with delivery of agricultural information using microcomputer networks with an emphasis on graphics." (*80/01/23*)

Stephen Gerke, 1646 Parkcrest Cir. #301, Reston, VA 22090 says we should "consider publishing smaller but more regular PNs. Validation reports are very helpful." (*80/05/05*)

Pete Gifford, Allegheny College, Meadville, PA 16335 is running Pascal on an IBM 4331. (*79/12/26*)

Paul J. Gillian, P.O. Box 2202 C.S., Pullman, WA 99163: "finally got my computer (a Western Digital Pascal micro-Engine) and it's great!" (*80/01/23*)

Thomas Giventer, 127 Linden Ave., Ithaca, NY 14850: "You might be interested to know that the latest version of Ithaca Intersystems'...Pascal/Z now runs under CP/M (instead of K2) and supports real numbers and pointer variables.... See Byte, Jan. '80, page 14." (*80/01/23*)

R. Steven Glanville, Silicon Valley Software, Inc., 1531 Sandpiper Ct., Sunnyvale, CA 94087 is currently implementing an MC68000 Pascal compiler (*80/03/04*)

Steven K. Harr, Ohio State University, University Hospitals, 410 W. 10th Avenue, Columbus, OH 43210: "We are currently in the process of evaluating

PASCAL compilers for use at our installation. We are running VS2 Release 1.7J on an IBM 370 Model 158J with 1.5 Mbytes of memory.... Any literature you may have concerning PASCAL compilers for IBM 370 computers would be extremely helpful to us at this point." (*80/01/16*)

Michael E. Harris, 407 W. Calhoun #17, Springfield, IL 62702: "I heartily agree with the PUG direction. I hope to be installing PASCAL on my Z-80 S100 system later this year. The main thing that I would like to see happen relative to PASCAL would be the establishment of an IBM/AMDAHL 370/3033/470 vendor supported standardized version of the language. Anybody out there have a Sperry-Univac/Varian V77-600 PASCAL that an individual could afford?"

Sassan Hazeghi, P.O. Box 4526, Stanford, CA 94305: "How about setting up a Pascal Program Library (a la SHARE)?" (*80/04/01*)

Thomas Hickey, 295 Garden Rd., Columbus, OH 43214: "Enjoy Pascal News very much. Have brought up Brinch-Hansen's Sequential on (*Xerox*) Sigma-9: limited implementation & very slow!" (*80/04/01*)

Jean Philippe Hilsz, 77 rue Vergniaud, 75013 Paris, France would like to know who supplies PASCAL compilers for Interdata 8/32, Interdata 8/16, Perkin Elmer DS 3220 and 3240. (*80/01/23*)

William T. Hole, M.D., 260 Collingwood, San Francisco, CA 94114 has Pascal/M and is hoping to "unleash the power of Pascal on my massive behavioral research observation files, which deal with premature babies in an intensive care nursery." (*80/04/23*)

Kenneth R. Jacobs, 10112 Ashwood Dr., Kensington, Maryland 20795 is using Pascal on a DEC-10 and Xitan (Z-80) (*79/02/13*)

Steve Jay, Computer Center, University of Arizona, Tucson, AZ 85721: "I am manager of software for the University's Computer Center. We provide PASCAL for use by any of our customers (* on a CDC Cyber 175 and a DEC-10 *). So far, they seem happy with it." (*80/01/21*)

R. L. Jenkins, Hartman Technica, #612-815-1st St. S W, Calgary, Alberta, Canada T2P 1N3: "We are particularly interested in PASCAL for microprocessors. As an electronics design consultancy we produce a lot of microprocessor machine code, and would prefer to leave this uninspiring task to a compiler." (*80/02/14*)

Mort Jonas, P.O. Box 390874, Miami Beach, FL 33139: "I've been using Pascal on the Apple II, and would be most interested in seeing how it would do on the validation suite, though I'm afraid I don't have time to do it myself." (*80/01/23*)

Berneta Kipp, 2206 NE 197th Place #D, Seattle, WA, 98155: "I am a programmer for Boeing writing my first PASCAL program to update a Boeing cost accounting data entry system." (*80/01/20*)

Les Kitchen, Computer Science Center, University of Maryland, College Park, MD 20742: "We're using National Bureau of Standards compiler (PDP-11/Unix), Naval Undersea Lab compiler and University of Wisconsin compiler (both

Univac 1108,1100/40) for computer vision research and for teaching programming." (*80/04/03*)

Richard W. Kreutzer, 644 Elizabeth St., Salt Lake City, UT 84102: "I would like to see updates/corrections to the Pascal validation suite published regularly. I think what you are doing is great." (*80/01/23*)

Peter Kugel, Fulton Hall, Computer Science Department, Boston College, Chestnut Hill, MA 02167: "I like Pascal News. (This validation issue is fiendish. Compliment, not insult.) I use Pascal for teaching. Why do I keep hearing so much about Tasmania?" (*80/05/06*)

B. Kumar, 420 Persian Dr., Sunnyvale, CA 94086 would like information on any Pascal compilers available for PRIME systems. (*80/01/23*)

Karl P. Lacher, 1132 W. Skillman Ave., Roseville, MN 55113: "I am an undergraduate at the Univ. of Minnesota in CSci. I was told about PASCAL NEWS by Andy Mickel who taught a SNOBOL short course I attended. PASCAL is definitely superior to FORTRAN." (*80/05/05*)

Carroll R. Lindholm, P.O. Box 3007, Santa Monica, CA 90403: "Please do not attempt to push state-of-the-art in print size reduction. My eyes are out for days after receiving an issue." (*80/01/21*)

Thomas J. Loeb, 2106 E. Park St., Arlington Heights, IL 60004: "We have formed a small user's group here in Arlington Heights. The majority of us are firmly based in BASIC and are finding the transition to Pascal most interesting.... We are unable to find any books that explain how to put the language to practical application. All the information we have been able to locate seems to be directed to the classroom or beginning programmers." (*80/04/06*)

Gary Loitz, 575 S. Rengstorff Ave. #157, Mountain View, CA 94040: "Using OMSI Pascal VI.2 as the primary implementation language for the Watkins-Johnson Magnetic Bubble Memory test system." (*80/02/06*)

Robert S. Lucas, 6941 N. Olin Ave., Portland, OR 97203: "Keep up the good work!!" (*80/05/05*)

James W. Lynch, Computer Services Marketing, Babcock & Wilcox, P.O. Box 1260, Lynchburg, VA 24505: "New to PUG; have Pascal available on NOS & NOS/BE; used by our service bureau customers & limited internal applications; use here is growing but not widespread; am looking forward to 7600 version." (*80/05/05*)

George A. Martinez, 654 1/2 S. Soto St., Los Angeles, CA 90023: "Keep up the good work. You guys are just great." (*80/01/05*)

David Paul McCarthy, 1532 Simpson #1, Madison, WI 53713: "Keep up the fine work." (*80/04/01*)

John J. McCandliss, 12164 Wensley Road, Florissant, MO 63033: "I am very happy to know that you are continuing the 'Pascal News' in the same fashion as before." (*80/01/20*)

Fred McClelland, 5319 Northridge Ave., San Diego, CA 92117: "Would it be possible for you to reprint the first eight issues of Pascal News?? I would be very interested in purchasing them." (*80/01/21*)

Paul McJones, Xerox Corp., 3333 Coyote Hill Road, Palo Alto, CA 94304: "I would like to see more on languages derived from Pascal, such as Modula and Mesa." (*80/04/03*)

Tony Meadow, P.O. Box 5421, Oxnard, CA 93031: "The PUG Newsletter is one (*of*) the most enjoyable & readable journals/books/... in the computer field - and it's not stuffy at all! Keep it up! Some of the features in it which I find of especial interest is the software exchange and information on current implementations of PASCAL." (*80/01/03*)

Bert Mendelson, McConnell Hall, Smith College, Northampton, MA 01063: "We have switched our introductory course to PASCAL, originally using OMSI PASCAL and will change to DEC's version on our VAX." (*80/03/31*)

Paul Minkin, 3141 Rhode Island Ave. S., St. Louis Park, MN 55426: "Leaving a Concurrent Pascal compiler project & finding myself in an assembly language world has made the benefits of Pascal very clear. I finally have the OMSI compiler & will send more as we use Pascal in the CAD/CAM world. My new company is National Computer Sys. CDM Division." (*80/02/14*)

C. W. Misner, Dept of Physics, Univ. of Maryland, College Park, MD 20742: "Teaching myself programming after 15 years away from it by writing a gradebook editor/analyser." (*80/01/04*)

David V. Moffat, Rt. 7 Box 52A, Chapel Hill, NC 27514: "At N.C.S.U., we run several Pascals: A.A.E.C., Stony Brook, on 370; sequential & concurrent, on PDP-11; soon will try Ga. Tech & U. of Hull on a PRIME, and somebody's (?) on the VAX. There is a movement here to use Pascal in intro courses when a friendly, informative, cheap compiler is found." (*80/01/04*)

Hugh W. Morgan, 7725 Berkshire Blvd., Powell, TN 37849: "I have recently purchased Pascal from North Star...since this is my first experience with PASCAL and since I am a computer novice with no experience with machine or assembly language this has been a real experience for me, or perhaps I should say ordeal... If you have any information, or can refer me to any published articles which may help me get the terminal options worked out I would be very grateful to you... Now that PASCAL is running I am very much like the dog which finally caught the school bus. The dog didn't know what to do with the bus and I don't know what to do with PASCAL. That's where I hope the PASCAL NEWS and User's Group may help." (*80/01/05*)

Morgan Morrison, Unicorn Systems Company, Suite 402, 3807 Wilshire Blvd., Los Angeles, CA 90010: "We are engaged in the implementation of a software product that is being written in PASCAL. We are interested in CDC Cyber PASCAL implementations." (*80/02/24*)

Timothy A. Nicholson, 97 Douglass Ave., Atherton, CA 94025: "Will be using SLAC Pascal on IBM & UCSD Pascal on Apple." (*80/05/05/*)

Bill Norton, M.H.S. Div., Harnischfeger Corp., 4400 W. National, Milwaukee, WI 53201: "Keeping the present PUG structure and mission is the best way to go. Best of luck to Rick Shaw and friends. Can't use Pascal much right now, but want to stay current." (*80/01/21*)

Thomas J. Oliver, Blue Hills, Dewey, AZ 86327 has a micro and plans to mainly work on alpha numeric, gray scale, pictorial maps and some LANDSAT satellite algorithms." (*80/03/20*)

Ross R. W. Parlette, Chemical Systems, United Technologies, P.O. Box 35B, Sunnyvale, CA 94086: "I went to a 1 day seminar to introduce Pascal; it was very helpful. We hope to have the Validation Suite ready on the VAX for DEC Pascal in Feb. '80. (*80/01/23*)

Jeff Pepper, 5512 Margareta St. #3, Pittsburgh, PA 15206: "Glad you exist!" (*80/02/24*)

James G. Peterson, 1446 6th St., Manhattan Beach, CA 90266: "Keep up the good work! Some form of advertising might be worthwhile, so that more people would know about PUG. I am writing a large CAD system with PASCAL at TRW DSSG." (*80/01/21*)

Gregory N. Pippert, 1200 Columbia Ave., Riverside, CA 92507: "I am using Electro Science Ind. Pascal to drive an ESI Laser system which is used to trim thick-film potentiometers." (*80/02/14*)

Fred Pospeschil, 3108 Jackson St., Bellevue, NC 68005: "I am looking for Pascal implementations on Heath H8 computers" (* That's a PDP-8 architecture *) (*80/04/03*)

Hardy J. Pottinger, EE Dept., Univ. of Missouri, Rolla, MO 65401: "Keep up the good work! I am using Pascal as a microcomputer system development language." (* 80/01/23*)

Fred W. Powell, P.O. Box 2543, Staunton, VA 24401: "I am now using Pascal on a TI 990/10. Thanks for such a tremendous job with Pascal News." (*80/01/08*)

Charles A. Poynton, 113 Chaplin Cr, Toronto, Canada M5P 1A6: "I anxiously and eagerly await each issue; keep up the excellent work!" (*80/02/14*)

Robert M. Pritchett, Trans-National Leasing, Inc., Box 7245, Dallas, TX 75209 is looking for Pascal for the IBM Series/1 running the EDX operating system, or for source code for a Pascal compiler/interpreter on IBM standard 8-inch single-density diskettes, 128 bytes per sector, single or double sided.

Paul Rabin, Philadelphia Health Mgmt. Corp., 530 Walnut St., 14th Floor, Philadelphia, PA 19106: "I am interested in using Concurrent Pascal to implement a real-time dispatch system for the Phila. fire dept. I am looking for D.G. implementations or help converting another to D.G." (*80/04/03*)

Armando R. Rodriguez, c/o S.P. Wovda, Armanpeergstrasse 15, 8000 Muenchen

90, West Germany: "Coming soon: I'll have all PUG software tools in diskette (8 inch, single density, one-sided) to distribute and/or exchange for other tools." (*80/01/07*)

Bernie Rosman, 864 Watertown St., W. Newton, MA 02165: "We use Pascal heavily at Framingham State College and all in-house software at Paramin, Inc....is written in Pascal. Keep up the good work!" (*80/01/21*)

Ira L. Ruben, 2104 Lincoln Dr. East, Ambler, PA 19002: "Have used Pascal to code a Floyd-Evans production metacompiler, also currently designing and coding a communications system (Univac 'DCA') in Pascal. The language is the best I have ever used for implementation except for its lack of data alignment control and packing control, which is needed when processing bit-oriented protocols. PUG is good, but it would be nice if the news came out at more predictable intervals!" (*80/01/21*)

William John Schaller, 4309 28th Ave. S., Minneapolis MN 55406: "I work for Sperry Univac. We are developing a graphics system on a color terminal (Chromatics). We are using UCSD Pascal on a Z80 to accomplish this." (*80/05/05*)

G. A. Schram, Dr. Neher-Laboratories, P.O. box 421, 2260 AK Leidschendam, The Netherlands would like to know about the availability of a DEC-10 or PDP-11 Pascal cross-compiler for the M6800 or Z-80. (*79/11/07*)

Herbert Schulz, 5820 Oakwood Dr., Lisle, IL 60532: "I've been very excited about Pascal ever since reading about it in BYTE. Have had UCSD Apple Pascal since it came out and just got UCSD Pascal for our H-11/A at the Community College where I teach. Will be teaching Pascal to the faculty next term. I'd appreciate any help for that task!" (*80/04/01*)

Ted Shapin, 5110 E. Elsinore Ave, Orange, CA 92669 sends word that Dr. Donald Knuth and Dr. Luis Trabb Pardo at Stanford University are working on a typesetting system, to be implemented in Pascal.

Richard Siemborski, Communicatons & Computer Sciences Dept., Exxon Corp., Box 153, Florham Park, NJ 07932: "I would like a copy of the listing of ALL known PASCAL implementations for micro's, mini's, and mainframes." (*80/02/03*)

Seymour Singer, Bldg. 606/M.S. K110, Hughes Aircraft Co, P.O. Box 3310, Fullerton, CA 92634: "We are offering a 12-week class on PASCAL programming to Hughes personnel using Grogono's text. We have installed both the SLAC and HITAC compilers on our twin Amdahl 470 V/8 computers. The response to this class has been overwhelming! Many students have bought the UCSD system on the Apple microcomputer." (*80/01/10*)

K R Smith, 1632 Hialeah St., Orlando, FL 32808: "Have just ordered HP/1000 (RTE IVB) Pascal. I'll let you-all know as I start using it." (*80/05/05*)

Jon L. Spear, 1007 S.E. 13th Ave., Minneapolis, MN 55414: "I am working with Prof. S. Bruell and G. M. Schneider on a text: "Advanced Programming and Problem Solving with Pascal" which may be available from Wiley by the fall." (*80/05/06*)

E. L. Stechmann, ARH272, Control Data Corp., 4201 N. Lexington Ave., St. Paul, MN 55112: "I enjoy PUG very much: Pascal News is a high point in a day....Question: How can we get the big mainframe manufacturers to accept & support Pascal to the same extent as FORTRAN & COBOL?" (*80/05/06*)

Andrew Stewart, 11 Woodstock Rd., Mt. Waverley, VIC 3149, Australia: "Pascal is a marvellous language because it is so simple and Elegant. I think Pascal News is an excellent means of communication (when it comes!)" (*80/04/14*)

Frank M. Stewart, Mathematics Department, Brown University, Providence, RI 02912: "I have only today learned of your invaluable organization." (*80/03/31*)

Jerry S. Sullivan, Philips Laboratories, 345 Scarborough Road, Briarcliff Manor, NY 10510: "We have made extensive use of the UCSD Pascal System, written a MODULA compiler in Pascal, (* and *) written a number of micro operating systems in MODULA." (*80/03/31*)

Anthony J. Sutton, 1135 W. 4th St., Winston-Salem, NC 27101 is looking for a Pascal implementation under VM/370 CMS (conversational monitor). (*80/01/23*)

K. Stephen Tinius, 1016 Halsey Drive, Monterey, CA 93940: "I am a student at the Naval Postgraduate School here in Monterey.... PASCAL is taught in our...Introduction to programming course, which follows (usually) intros to COBOL and FORTRAN. We run UCSD PASCAL on Altos microprocessors....For my thesis, I'm (trying) to implement NPS-Pascal on Intel hardware to run under CP/M." (*80/01/23*)

Mike Trahan, University Computing Company, 1930 Hi Line Drive, Dallas, TX 75207: "UCC is using PASCAL Release 3.0.0 on a CDC Cyber 175 and CDC 6600 running the NOS/BE v.1.3 - PSR 498 operating system. We use PASCAL for applications programs, utility programs and general programming." (*80/01/05*)

Transmatic Company, Rt. 2, Box 86, Hamlin, TX 79520 has been moving some programs from other machines onto Texas Instruments Pascal with great difficulty because it does not meet the minimum conformance standards. However, it takes less than two seconds to do a job which takes over three and a half minutes on the same machine in BASIC. (*80/04/22*)

Frederick John Tydeman, 3901 Northfield Road, Austin, TX 78759: "Finished my master's in computer science: 'Abstract Machines, Portability, and a Pascal Compiler'. Defined M-code (mobile code) as an intermediate language and implemented a portable Pascal compiler using it." (*80/03/31*)

Stan Veit, Veit's Diversified Operating Systems Ltd., 19 W. 34th St., Room 1113, New York, NY 10001: "We are eastern reps for A.C.I. (* Pascal microengine *) and a Pascal software house." (*80/02/24*)

Ray Vukceвич, 7840 N. 7th St. #1, Phoenix, AZ 85020 would like to know where to get Pascal on a single density PerSci 8" disc for an Imsai 8080

with 56K. (*79/12/28*)

Howard White, Jr., 799 Clayton St., San Francisco, CA 94117 would like information on Pascal 8000 as developed by the Australian Atomic Energy Commission; he is especially interested in references, bibliographies, and user feedback. (*80/03/18*)

Jerome P. Wood, 6105 Harris, Raytown, MO 64133 is interested in Pascal compilers for an IBM S/370 at work. (*80/02/03*)

Stephen Woodbridge, 642 Stearns Ave., Palm Bay, FL 32905: "Please keep up the great work. #13 is my 1st issue and I can't get enough of it." (*79/12/28*)

R. P. Wolff, Ajax Corp., W154 N8105 Elm La., Menomonee Falls, WI, 53051: "Are any compilers available for a 'Microdata Reality or Royale' system?" (*80/01/23*)

George O. Wright, 700 7th St. SW 635, Washington, DC 20024: "Please be friendly to UCSD PASCAL and micro users!" (*80/02/23*)

Earl M. Yavner, 195 Varick Rd., Newton, MA 02168: "Have just heard that Hewlett Packard will have PASCAL for HP1000 systems in a few months. Will send info as I get it." (*80/04/01*)

Dr. Richard Yensen, 2403 Talbot Road, Baltimore, MD 21216: "LOVE screen interactive features of UCSD Pascal. We need an interchange format for screen control on different CRT terminals." (*80/05/06*)

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JOBS:

(* Note--these listings are intended primarily to show that there are indeed openings for Pascal programmers "out there". By the time you see these listings, the jobs may well be filled. *)

Allen-Bradley, 747 Alpha Drive, Highland Heights, OH 44143, wants software engineers to "apply your software experience - assembly languages, PASCAL, FORTRAN" on a VAX 11/780, DEC 11/34 or TEKTRONIX Development system. (*80/04/24*)

Control Data Corporation, 4201 N. Lexington Ave., Arden Hills, MN 55112 is looking for diagnostic engineers to "utilize both..hardware and softare

aptitudes...in maintenance software systems development and PASCAL applications programming."

Medtronic, Inc. 3055 Old Highway Eight, P.O. Box 1453, Minneapolis, MN 55440 "has a position that recognizes your BSEE, and 6-8 years experience with PASCAL-based computer simulation..." (*80/03/24*)

MTS Systems Corp. P.O. Box 24012, Minneapolis, MN 55424 is looking for a software development engineer for products "based upon latest microprocessor technology. PASCAL and assembly language will be used for implementation." (*80/03/10*)

The New York State Legislature, 250 Broadway - 25th Floor, New York NY 10007 wants a demographer, cartographer, and junior programmers. All applicants "should have practical computer programming experience in FORTRAN, COBOL, or PASCAL." (*80/03/10*)

Northern Telecom, P.O. Box 1222, Minneapolis, MN 55440 is looking for a senior programmer/analyst with "high-level programming language (PASCAL, COBOL, BASIC) and compiler writing." (*80/03/24*)

Texas Instruments, P.O. Box 401628, Dallas, TX 75240, has openings in Dallas and Lewisville, Texas, to work "with real-time software applications for mini/micro computer based systems and on distributed computer architectures and uni-processor systems." One of the languages: Pascal.

(* Andy Mickel passed on to me the following Want Ad, which appeared in the March 1980 issue of the Pug Press, published by Maryanne Johnson of Excelsior, MN 55331. It is offered here, verbatim, without further comment... *)

WANTED - Small PUG stud to breed with the Classiest Bitch in Town. Stud must be experienced yet gentle, loving, and discreet. Contact Ron or Marlys Hampe (612)-890-4141

MANUFACTURERS' ADVERTISEMENTS:

(* A lot of these advertisements appear in several publications; this list is gleaned from a "spot check" of several months' worth of magazines and trade journals. Where a product description is much more detailed than the information given here, a reference is provided. *)

Associated Computer Industries, Inc. 17751 Sky Park East, Suite G, Irvine, CA 92714, announced a Pascal Video terminal for use with UCSD Pascal. It accommodates several international languages character displays by internal switch changes, with no optional ROM required. They also sell the ACI-90 Pascal Professional Performance Computer, based on the Western Digital Microengine. Includes the UCSD Pascal operating system, and business software: General Ledger, Accounts Payable, Accounts Receivable, Payroll, and Order Entry Inventory.

Hewlett-Packard Data Systems Division, Dept. 370, 1100 Wolfe Road, Cupertino, CA 95014 offers Pascal for the HP/1000 computer; it has added double-word integer, double-precision data types, random access I/O, and external

FORTRAN and assembly language capability.

Intel Corporation of Santa Clara now has Pascal for its Intellec development systems, as reported in the Intel Preview of February 1980. It "encompasses the full standard...as defined in Pascal User Manual and Report by Jensen and Wirth", and "...offers several more extensions to the UCSD Standard." The blurb also notes, "The UCSD Pascal implementation has become the industry standard and was the first such implementation of this relatively new programming language." (* The person who sent me this noted, in the margin, "!!!". I agree. *)

Meta Tech, 8672-1 Via Mallorca, La Jolla, CA 92037 advertises Pascal/MT, a compiler running under CPM in 32K bytes or more. Compiles a subset of Pascal into ROMable 8080/Z80 code. Object code costs \$100, source code costs you OEMs \$5000.

North Star, 1440 Fourth St., Berkeley, CA 94710, advertises Pascal for its Horizon system.

Oregon Software, 2340 S.W. Canyon Road, Portland, Oregon 97201 announced OMSI Pascal V1.2 with symbolic debugger and profiler, for any RSTS/E, RT-11, RSX-11, or IAS operating system. (* Computerworld 80/01/28*)

Rational Data Systems, 245 W. 55th St., New York, NY 10019 has Pascal for Data General computers, and also puts out a small Pascal Newsletter. (* And, in my opinion, it looks very nice! *)

Renaissance Systems, Inc., Suite M, 11760 Sorrento Valley Rd., San Diego, CA 92121 offers Proff and Form1, word processing support programs for formatting and printing text files and aiding in document generation. Written in UCSD Pascal, the combination costs \$500. Documentation costs \$25. (* Computerworld 80/01/14 p. 50 *)

SofTech Microsystems, 9494 Black Mountain Road, San Diego, CA 92126, offers UCSD Pascal "with full documentation and support."

Valley Software Inc., 390-6400 Roberts Street, Burnaby, B.C. Canada V5G 4G2 is a systems/design, programming and consulting service offering Pascal compilers for DEC and Data General.

NEWSLETTERS & ARTICLES:

Brown University Computer Center has arranged to lease a new PASCAL compiler developed at the University of Waterloo; it is the PASCAL described in the British Standards Institute DPS/14/3 Working Draft/3...it offers extended I/O capabilities to allow convenient access to CMS files. (* March 1980 *)

The Institute for Information Systems, Mail Code C-021, University of California at San Diego, La Jolla, CA 92093 is publishing newsletters describing the UCSD Pascal System.

Mr. Jim McCord sends a "UCSD Pascal Hobby Newsletter #1." (* Sorry, I have no address on this; could someone out there please provide it? *)

The University of Michigan Computing Center presented a short course on Pascal this April. In the blurb, the newsletter states that..."Pascal offers significant advantages over other languages for general purpose programming." (*80/03/19*)

(* Ah-ha! Here's the article that answers just about all of the "can I get a version of Pascal for my [fill- in-the-blank] microcomputer?" questions. *)

Mini-Micro Systems April 1980 Issue has a lengthy article (pp. 89-110) entitled "High-level languages for microcomputers", by Mokurai Cherlin. Along with the article is a table of microcomputer high-level language suppliers; there are over 40 suppliers of Pascal for fifteen different chips.

The Northwestern University newsletter announced the arrival of the Pascal Release 3 compiler for the Cyber, with compiler options for selecting run-time tests and post-mortem dumps; and defining file buffer and central memory sizes. (*April 1980*)

The University of Southern California is forming a Users Group for PASCAL and ALGOL users. (*February 1980*)

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Commodore displayed a version of Pascal for their PET personal computer at NCC. The compiler was developed in Great Britain.

While at NCC, I heard a rumor that someone is developing a version of Pascal for the Atari 800 personal computer.

I have seen an advert [in Japanese, unfortunately, so I can't give details] for UCSD Pascal for the NEC PC-8000 personal computer, which has colour graphics. The PC-8000 has been on the market in Japan for some months now, and it appears they may be marketing in the U.S. by year's end.

There was a session on Pascal at NCC, according to one of the attendees, it was fairly interesting. He said Ken Bowles spent some of his speaking time trying to defend his position re UCSD Pascal and Softech. Those who are interested in this subject may wish to take a look at past issues of INFOWORLD. Adam Osborne recently wrote a column which seems to address the issue quite objectively and unemotionally. (* NO, I am NOT going to say what I think of the whole thing. Mom always told me not to discuss religion

and politics. *)

The Canadian Information Processing Society held their "Session '80" in Victoria, British Columbia in early May. A good time was had by all. While working the booth for Apple, I noticed that most of the people from universities had an interest in Pascal or were using it in their classes. The business community was aware of Pascal, more so than they may have been in the past, but didn't seem to be as familiar with its capabilities and wide usage. (* Unabashed plug: Victoria is a very beautiful city, and all the people I met were very friendly. It was great. *)

Rick Shaw, Editor

Pascal News

6 August, 1980

Digital Equipment Corporation

Atlanta, Georgia

Mr. Shaw:

Enclosed is a copy of "A Pascal Bibliography (June 1980)". Although it excludes references to articles on Pascal appearing in magazines such as BYTE and Datamation, it may be of some interest to your readers. (* See Page 12 -ed. *)

If anyone wishes to inform me of errors or omitted articles, I would be grateful to hear from him.

Respectfully,



David V. Moffat

Department of Computer Science
North Carolina State University
Raleigh, North Carolina 27650

BOOKS ABOUT PASCAL

(* This is a complete listing of all known books about Pascal *)

- Alagic, S. and M. S. Arbib, The Design of Well-Structured and Correct Programs, Springer-Verlag, 1978, 292 pages, \$12.80.
- Bowles, K. L., Microcomputer Problem Solving Using Pascal, Springer-Verlag, 1977, 563 pages, \$9.80.
- Bowles, K. L., Beginner's Guide for the UCSD Pascal System, Byte Books, 1980, \$11.95.
- Brinch-Hansen, P., The Architecture of Concurrent Programs, Prentice-Hall, 1977, \$22.00.
- Coleman, D., A Structured Programming Approach to Data, MacMillan Press, London, 1978, 222 pages.
- Conway, R. W., Gries, D. and E. C. Zimmerman, A Primer on Pascal, Winthrop Publishers, 1976, 433 pages.
- Conway, R., Archer, J. and R. Conway, Programming for Poets: A Gentle Introduction Using Pascal, Winthrop Publishers, 1979, 352 pages, \$11.95.
- Findlay, B. and D. Watt, Pascal: An Introduction to Methodical Programming, Computer Science Press (UK Edition by Pitman International), 1978.
- Grogono, P., Programming in Pascal, Addison-Wesley, 1978, 359 pages, \$11.50.
- Hartmann, A. C., A Concurrent Pascal Compiler for Minicomputers, Springer-Verlag Lecture Notes in Computer Science, No. 50, 1977, \$8.40.
- Jensen, K. and N. Wirth, Pascal User Manual and Report, Springer-Verlag Lecture Notes in Computer Science, No. 18, 2nd Edition, 1975, 167 pages, \$6.80.
- Kieburtz, R. B., Structured Programming and Problem-Solving with Pascal, Prentice-Hall, 1978, 365 pages, \$12.95.
- Ledgard, H. F. and J. F. Hueras, Pascal With Style: Programming Proverbs, Heyden, 1980, 224 pages, \$6.95.
- Liffick, B. W. (Ed), The BYTE Book of Pascal, Byte Books, 1980, 342 pages, \$25.00.
- Rohl, J. S. and H. J. Barrett, Programming via Pascal, Cambridge University Press, in press.
- Schneider, G. M., Weingart, S. W. and D. M. Perlman, An Introduction to Programming and Problem Solving with Pascal, Wiley and Sons, 1978, 394 pages.
- Webster, C. A. G., Introduction to Pascal, Heyden, 1976, 152 pages, \$11.00.
- Wegner, P., Programming with ADA: An Introduction by Means of Graduated Examples, Prentice-Hall, 1980, 211 pages.
- Welsh, J. and J. Elder, Introduction to Pascal, Prentice-Hall, in press.
- Wilson, I. R. and A. M. Addyman, A Practical Introduction to Pascal, Springer-Verlag, 1978, 144 pages, \$7.90.
- Wirth, N., Systematic Programming: An Introduction, Prentice-Hall, 1973, 169 pages, \$10.50.
- Wirth, N., Algorithms + Data Structures = Programs, Prentice-Hall, 1976, 366 pages, \$20.95.



