

commodore **newsletter**

Volume 1, Number 10



PET USERS CLUB

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The Charter of the COMMODORE PET USER CLUB is to provide a method of sharing up-to-date information, and programs relating to the PET/CBM Computer between the many PET/CBM owners and users. Membership charges in the United States and its possessions are \$15.00 annually (or 12 issues), while subscriptions outside the U.S. are \$25.00 annually.

We would like to publish features from PET Users concerning specific applications, interesting discoveries or even bits worthy of sharing. If you would like to contribute to future NEWSLETTERS, please send your article, letter or comments to:

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EDITOR NOTES

The microcomputer industry has made rapid technological advancements over the past few years. A proportional increase in the demand for improved products has also been noted during this period. To meet the increase in demand, Commodore introduced at the Office Automation Conference in Atlanta, Georgia its new product additions. These new products include, the 8000 Series Business Computers, the 8050 Dual Drive Floppy Disk, the CBM 8010 Modem, and the CBM 4010 Voice Synthesizer. These additions are presented in the CBM NEWS section.

Microcomputers are virtually an untapped resource in the education field. However, it is predicted that the significance of the microcomputer will send shock waves throughout education in the 1980's. San Francisco State University and Sheridan College in Canada are two universities who have incorporated the PET/CBM computers into their curriculum. EDUCATION EXCHANGE discusses the success these two universities have had in implementing Computer-Aided Learning programs.

As the saying goes, "To sell, good hardware needs good software and vice versa". The SOFTWARE section reviews educational and business software packages, including Commodore's WordPro 3.

Applications of the PET/CBM computers are bound only by your imagination and your ability to implement your ideas. The APPLICATION section relates one unique application which has come to Commodore's attention. This article may provide the spark needed to stimulate creativity and further expand the applications of the PET/CBM computers.

If you found "A Pointer Sort" interesting reading in Newsletter #9, be sure to read the PROGRAMMING section for a follow-up article. This section also includes Part III of Glossary Terms (acronyms and definitions from the MICROPROCESSOR LEXICON, courtesy of SYBEX, INC.)

The PERIPHERALS AND ATTACHMENTS section introduces the Complications™ C101. The C101 is a printer adapter which is specifically designed for letter-quality word processing applications using the Commodore CBM microcomputer and the NEC "Spinwriter".

Like all products, the PET/CBM computers have matured over the past two years. One change that has occurred is in the system software, specifically in the Read Only Memory (ROM). The USER DIRECTORY AND ANNOUNCEMENTS section contains an article which will explain the Commodore ROM genealogy.

Your response to this newsletter is valued. A complementary subscription (or if you prefer, an additional twelve issues will be added to your current subscription) will be given to anyone who submits an article which is printed in a future newsletter. In order for us to effectively answer any questions you may have regarding your PET/CBM or newsletter contents, write:

The Editor
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DATA EXCHANGE

The following are questions which have been submitted to our Customer Service Department:

Program Crash

Q: WHEN A PROGRAM UNDER DEVELOPMENT "CRASHES" LEAVING A FILE OR FILES OPEN TO THE DISK, A LATER ATTEMPT TO SAVE THE REVISED PROGRAM SEEMS TO BE CORRUPTED BY DATA LEFT OVER IN THE DISK BUFFER.

A: If the program crashes, you must close all files or initialize the drive to flush out left over data. A quick way to close all files is to close the command channel. For example, open 15,8,15 --- close 15.

Modifying WordPro 1

Q: I HAVE AN OLD 8K PET (BASIC VERSION 1) WITH AN EXPANSION RAM FOR 16K MEMORY. HOW CAN I MODIFY MY WORDPRO 1 TO USE THE EXTRA MEMORY AND GIVE ME ADDITIONAL TEXT AREA?

A: We cannot make modifications in existing WordPro programs. The WordPro programs are written entirely in machine language, and the actual code is proprietary information of Pro-Micro Inc. of Toronto. We know of no way to take advantage of the expanded memory at this time.

Recovering Data Destroyed By The Directory

Q: IS IT POSSIBLE TO RECOVER DATA FOR WHICH THE DIRECTORY HAS BEEN DESTROYED BY USING SOME VARIATION OF THE DISPLAY TRACK AND SECTOR PROGRAM TO REWRITE THE DIRECTORY?

A: It is possible to write a program which will read each track & sector, regardless of the directory. However, it is very difficult to find the beginning of each file.

Save a file on a new disk so that it has a directory. If you can find the first file on the bad disk, copy that block to the new disk. The blocks of each particular file point to each other, but you will have to search for the beginning of each file. When you have copied all the blocks for one file, go into the directory and change the file pointer.

The Printer

Q: IF THE PRINTER ("04" ROM) UNEXPECTEDLY BEGINS TO PRINT IN LOWER CASE MODE WHAT CAN BE DONE TO RECOVER OTHER THAN POWER OFF?

A: There is no way to recover from lower case mode on the printer, other than power off. For more information see the Printer Errata (P/N FEB-0313) which can be obtained at your local Authorized Commodore Dealer.

Erasing A Sequential File

The following question is from A. H. McCann of Oxnard, CA:

Q: HOW DO YOU ERASE A SEQUENTIAL FILE FROM A DISKETTE ON THE 2040? THE "S" (SCRATCH) COMMAND DOES NOT SEEM TO WORK.

A: The "s" (scratch) command will work on sequential files. You may have extraneous spaces at the end of the file name. Try `print#15,"s0:filename*"`. The star at the end tells the 2040 to look only that far, and accept any following characters. Your file may also be improperly closed. In this case, a Validate command should remove it.

CBM NEWS

COMMODORE The Great American Solution Machine

Our major advertising campaign begins!

Commodore Business Machines, Inc. announces a major media advertising program supplemented by banners, posters, mailers and all-new promotions. This campaign will be the biggest in Commodore's history.

Watch for our advertisements in: Business Week, Time (the business edition), Nation's Business, INC., Word Processing Systems, Small Business Computers, Rotarian, Kiwanis, and inflight magazines.

BIG THINGS ARE BREAKING AT COMMODORE!

NCC-OAC Show

Despite the fact that it was twenty degrees and snowing in Atlanta, 8000 visitors attended the Office Automation Conference March 3-5. Held in Georgia World Conference Center, the show attracted a wide cross section of U.S. industry representatives from the commercial, educational, small business, and governmental segments.

Most of the attention in Commodore's booth was focussed on CBM's new products. Attracting the most attention were the new 8000 Series Business Computers, the CBM 8050 Dual Drive Floppy Disk, the CBM 8010 Modem, the CBM 4010 Voice Synthesizer and Commodore's Word Processing system. Many visitors were able to view, as well as participate in, the presentations of business and educational software packages.

We wish to express our thanks to the following Software firms whose representatives supported our booth with professional presentations.

Business Enhancement Compuservice
1711 E. Valley Parkway #109
Escondido, CA 92027
(Business)

BPI Systems, Inc.
1600 W. 38th St. Suite 110
Austin TX 78731
(Business)

CompuMax Associates, Inc.
467 Hamilton Ave., Suite 20
Palo Alto, CA 94301
(Business)

CMS Software
5115 Menefee Drive
Dallas, TX 75227
(Business)

Evans Newton Inc.
7335 East Acoma Drive, Suite 102
Scottsdale, AZ 85260
(Education)

Personal Software, Inc.
592 Weddell Drive
Sunnyvale, CA 94086
(Professional -- VisiCalc)

Profit Concepts
3300 University Drive
Coral Springs, FL 33065
(Business)

Pro-Micro
915 Ribston Road
Mississauga, Ontario L4Y 1B4
(Word Processing)

Again, many thanks to all those responsible for making the show a success.

CBM 8000 Series Business Computers

Have you been waiting for a microcomputer with an 80-column screen? Well it's here - the CBM 8000 Series Business Computers. In June, Commodore will introduce to the marketplace the new CBM 8016 (16K random access memory) and 8032 (32K random access memory) computers. The new 8000's will display up to 2000 characters organized into twenty-five 80-column lines of information on a green phosphorus screen. Text editing

and report formatting are faster and easier with the new wide-screen display.

The 8000 series also provides a resident Operating System with expanded functional capabilities. You can use BASIC (version 4.0) on the 8000 computers in both the interactive mode and the program mode, with expanded commands and functions for arithmetic, editing, and disk management.

For data input/output applications, an IEEE parallel port and an IEEE-488 bus are provided for disk and printer

communications. Also included is an eight-bit parallel user port with handshake lines. The 8000 series supports two cassette ports for external cassette input and output.

Like the current 2001 Series, the 8000 series computers are constructed of structural foam for greater durability and uniformity. The computers contain a 73-key typewriter style keyboard with graphic capabilities along with a numeric keypad.

The CBM 8000 series computers are ideally suited for the computing needs of the business marketplace.



CBM 8000 Series Business Computer

CBM 8050 Dual Drive Floppy Disk

To compliment the new 8000 Series Business Computers, Commodore will also introduce, in June, the new CBM 8050 Dual Drive Floppy Disk. This new Floppy is an enhanced version of the intelligent CBM 2040 Disk Drive. The CBM 8050 has all the features of the CBM 2040, and provides more powerful software capabilities, as well as more than one megabyte of online storage capacity. Diskettes which operate on the 2040 will not be compatible with the 8050, however a program will be supplied with the 8050 (on the utility disk) which will allow information to be transferred from a 2040 to a 8050 via the CPU.

The CBM 8050 will continue to utilize 5 1/4 inch diskettes, but a Micropolis Disk Drive is used to provide a track density which is double the typical 48

tracks per inch on most 5 1/4 inch drives.

The CBM 8050 supplies relative record files and automatic diskette initialization. It can copy all the files from one diskette to another without copying unused space. The CBM 8050 also offers improved error recovery and the ability to append to sequential files.

Improved error recovery features include track offset and advanced phase loop lock. A power on/off protect feature prevents the loss of data should a disk remain in the drive at power off. Door interlocks prevent media damage by allowing the disk cabinet to close only when fully aligned.



CBM 8050 Dual Drive Floppy Disk

CBM 8010 MODEM

Attention all CBM and PET owners: Your computer can now communicate. With the CBM 8010 Modem any Commodore computer can 'talk' to almost any other computer including other PETs and CBMs.

Commodore's 8010 Modem is an IEEE-488 (1978 standard) device which communicates via any standard telephone. The 8010 Modem meets Bell 103 standards for communication at a fixed rate of 300 BAUD. The telephone interface is acoustic so the modem is portable. This means Commodore computers can communicate with, large computer systems like The Source and MICRONET, and other small computers. Initially Commodore supplied software will support the following applications, with many more to come.

- 1) Terminal emulation
- 2) Disk file send and receive
- 3) Wordpro 3 sequential file send
- 4) Hardcopy using Commodore printers
- 5) Disk spooling

A switchable four-section bandpass filter provides out-of-band rejection assuring accurate processing of the input from received carrier, even at signal levels of less than -47 dBm. Jitter-free data is guaranteed by a soft limiter and phase lock loop discriminator.

The carrier detect circuitry prevents the CBM Modem from operating when excessive noise would produce errors or cause marginal operation. This feature also assures accurate teleprocessing connections and inhibits chatter when the received signal fades.



CBM 8010 Modem

CBM 4010 Voice Synthesizer

Commodore computers can now talk to you. With the CBM 4010 Voice Synthesizer any Pet or CBM computer can generate speech.

The 4010 Voice Synthesizer unit utilizes principles of "phonetic speech synthesis". Most prior experience with speech output devices involve the playback of pre-recorded analog messages on a tape recorder, perhaps under computer control. Some, more recent techniques, involve digital recording and storage of speech in solid state memory elements, and the reconstruction of that speech from the digital codes. Such techniques usually allow only a limited number of messages or a very limited vocabulary. The dynamic properties (intonation, rhythm, etc.) of human speech are difficult to reconstruct from digitally-stored words. Phonetic synthesis involves the generation and control of the basic speech sounds such that good quality speech with an unlimited vocabulary can be synthesized. These techniques allow the programmer to control the inflections, speed, dialect, pitch, stressed syllables, and dynamic transitions of speech.

"Phonemes" are the basic elements of speech -- they are the sounds that are made by a certain position and movement of the lips, tongue, teeth, vocal cords, and other parts of the human vocal tract.

The 4010 Voice Synthesizer Unit recognizes sixty-three (63) phoneme commands together with four (4) different choices of inflection (pitch). Thus, it provides you with

252 unique synthesizer outputs (sounds) which you may program in any desired sequential order. As an example of the flexibility of phonetic synthesis; consider that there are over four billion possible utterances programmable from the Pet keyboard for just the words containing four phonemes alone.

The applications of the 4010 Voice Synthesizer are numerous. A few examples of possible uses are, 1) computer-aided instruction programs, 2) interaction with handicapped persons, and 3) commentary for complex screen displays, including animation.

The 4010 connects to your computer via the user port so direct control is available without slowing communication over the IEEE Bus.

The Teacher's PET

ATTENTION EDUCATIONAL INSTITUTIONS!
When you buy two Commodore PET computers, Commodore will donate to you a third one free!

Choose from the 8N, 16N, 16B, 32N or 32B models, depending on your particular application. When you buy two of the same model, Commodore will donate a third just like it.

Contact your local authorized Commodore dealer for full details and a demonstration. The "3 for 2" school program will run until August 15, 1980.

EDUCATIONAL EXCHANGE

Editor: Karl Zinn

Personal computers, in the hands of students as well as teachers, will contribute to a shake-up (or shake down?) in education in the next decade. I tried to establish that thesis before an audience of educators, computer professionals, and representatives of government and industry at a plenary session (The Small Computer Earthquake!) of the Personal Computer Festival last year. A similar message was received with only a little more enthusiasm by an audience at the National Educational Computing Conference, by a group planning a national center for personal computers in education, and another one planning a clearinghouse. Teachers I work with in the Ann Arbor area do seem to understand what is happening, and are working to help establish sound practices for personal computing and information processing as constructive aids to learning.

To provoke some dialogue among teachers and resource people who read this newsletter I will briefly summarize one of a number of points from the argument that significant changes are coming.

Beyond programming and literacy (that is, knowing how to give instructions to a computer and having ideas about what to do with it) is a world of learning and performance applications having ten or perhaps 100 times the significance of what is typically expected. Yet the impact of dramatic new aids for students and scholars, writers and artists, will be felt as shock waves throughout education during the 1980's. Study aids such as computation, modeling, simulation and text processing will give considerable advantage to those having the skills, the equipment, and the inclination to use them. Planning aids incorporated in personal computer systems will contribute to scheduling learning activities, allocating time and other resources, and reviewing progress toward personal and institutional goals. Retrieval systems, designed for individuals and further personalized through many hours of

use, will organize personal notes as well as relate efficiently with large and complex data bases of information. Writing will be greatly enhanced, whether reports, essays or personal correspondence. Other kinds of composition, as in music, graphic art and sculpture, will become much more accessible to typical students and more likely to find a place in regular learning activities.

Changes in the way people study, plan, organize information, write, and do other composition are certain to follow from personal computer use. My vision of what will happen in educational institutions is not very clear, and what the computer and publishing industry will do to sell machines and programs to education is not all positive. I look forward to reading the views of teachers, perhaps in the pages of this newsletter.

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Hands-on Computers In The College Classroom

by Bill Finzer
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Introduction

We are beginning to teach computer literacy courses which involve students in hands-on uses of the computer in the college classroom, not just in the laboratory. The computer becomes a classroom tool like the calculator or movie projector. Three new courses utilize a laboratory-as-classroom fitted with 13 PET computers hooked to a Nestar Cluster-One disk system which serves as the program library. This room (known affectionately as the PET Shop) is open 33 hours per week outside of

classroom time for students to use to do their assignments and explore the library programs. The three courses are sketched briefly below.

Computers In The Elementary Classroom

This is a course for pre-service and in-service elementary and junior high teachers. It operates on the basic assumption that the best way to train teachers in the use of computers with children is to have them use computers themselves in a learning situation.

During a semester, students in the course explore about ten areas of mathematics from logic and strategies for games through geometry and probability. In each unit they use both computers and real-object materials.

A minimum of class time is devoted to learning BASIC. Students learn BASIC largely on their own through working on homework assignments which involve creating BASIC programs. In addition they have assignments in a text, "BASIC for the Home Computer" by Albrecht, Finkel, and Brown. They are also asked to complete two projects which are programs which would be useful in teaching children.

Although little class time is spent on BASIC, students are introduced to the concept of programming through two other languages: the first is a dancer language called Pak Jana which allows the user to choreograph a dance for an animated figure on the screen; and the second is a variation of LOGO which fits in with a unit on geometry and design. These two activities are important in preparing the students for the more complete language BASIC.

The course aims to prepare teachers to use computers as a tool in the classroom. The constant interplay of work with real-object materials and PET's serves to model the real-world classroom where most of what goes on is not computer-oriented. Significant discussion goes on during the course about ways that computers can benefit as well as harm education.

Computers Without Fear

This course was born from the realization that the regular introductory computer classes have a 45% drop-out and failure rate. A course was needed to help the large numbers of students who want to learn about computers but are not prepared for the regular introductory courses. Hypotheses for their failure are: they do not have the minimum mathematical background for dealing with algebraically oriented languages; the regular computing facilities constitute a significant barrier to student use by being large, unfriendly, and unnecessarily mysterious; there is insufficient hands-on experience with interactive computers.

Computers without Fear has three strands:

Algebra - The purpose of this strand is to bring students' skills up to the minimum necessary to understand algebraic expressions which appear in computer programs. The concept of a Function Machine is heavily utilized in this strand which makes a nice link with the idea of a computer as a grand function machine. Other parts of this strand deal with the order of algebraic operations, square roots and exponents, solving linear equations, and graphing.

Programming - The programming strand begins with the same dancer-language program mentioned above. Early work in BASIC focusses on the interactive potentials of the small computers the students are using. Accordingly, the use of strings and the INPUT statement are among the first ideas introduced. There is a significant advantage over the regular courses where no terminals are available during class time. The PET Shop as a classroom allows the instructor to deal with the problems students are having as they occur.

About Computers - Work in this strand begins after the students have been able to do some simple programming. It includes visits to various other computer facilities on campus and off,

a debate on the benefits of computers to society, an introduction to the "jargon" of computers and some playful hints on how to deal with it, and a simulation of dealing with computers in real-life situations.

Statistics Without Fear

This course also grew out of the realization that large numbers of students are not able to succeed at statistics courses and that a more basic course was needed to prepare them. Here, it was thought that the use of micro-computers in the classroom might make it possible to motivate this notoriously unmotivated subject.

The three strands of this course are:

Algebra - As with the Computers without Fear course, an hypothesis for students' failure at traditional statistics courses is their lack of preparation in basic algebra. Accordingly, some background work is done in the course focussing on the order of operations, exponents, and graphing. Students are shown how to use the computer as a calculator; and they interact with some programs which focus on algebraic skills.

Statistics - This strand focusses on the building of students' intuitions about statistical concepts. It is based on the hypothesis that students have trouble often because they are following rote rules rather than operating from assimilated concepts.

Several programs have been developed so far which involve the student in simulated statistics experiments on the PET. Some of the ideas for these programs have come from the department of Applied Statistics at the University of Reading in England. The basic idea in these programs is to involve the student in the design of an experiment in a plausibly real situation. The computer provides the results of the experiment and eventually allows the students to check their results against the "true" values which the program has used. The students learn whether their

experimental design was adequate and also of the limitations of even a good experimental design.

A package of programs for the PET has been developed which simulates a small subset of SPSS. An attempt has been made to faithfully follow the standard format of SPSS so that when students meet SPSS later in their careers, they may not be so put off by the rigid requirements of that language. The PET package can handle about 200 items of data and allows the commands INPUT MEDIUM, READ INPUT DATA (from tape or keyboard), WRITE (to tape), EDIT, NEW VARIABLE, VARIABLE LIST, DELETE VARIABLE, COMPUTE, FREQUENCIES, and CROSSTABS. The language is easily expandable because the commands invoke separate modules on the disk.

Summary

It is the overall aim of the Center for Mathematical Literacy to prepare students for an increasingly mathematically-oriented world, a world in which the computational and data processing power of the computer is available to more and more people both at work and at home.

(Note: The Center for Mathematical Literacy is being funded by a two-year grant from FIPSIE. Personnel include Diane Resek, Director; William Finzer, Supervisor of Computer Literacy; Judith Ng, Supervisor of Statistics Literacy; and Vincent Mills, programmer. For information contact the Math Department of San Francisco State University, 1600 Holloway, S.F., CA 94132, (415) 469-2251.)

The following is an excerpt from "Media Message" (Spring Issue 1979, Volume 8, Number 3). Dave MacDougall, Editor, 323 Sawyer Road, Oakville, Ontario L6L 3N6

Microcomputers and Sheridan

By Ted Bangay
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Computer Assisted Instruction at Sheridan College

The college's commitment to microcomputers began in the summer of 1978. Initially microcomputers were used to provide a course in remedial mathematics. This service had previously been provided by terminals connected to the computer at Seneca College using the OISE remedial mathematics programme. Although the OISE system is excellent, its use at Sheridan College entailed certain problems: 1) only three terminals were available to service approximately fifty students per year, 2) the line charges associated with the computer connections were an unacceptable ongoing cost, and 3) several students complained about the inflexibility of the programme's structure.

An experiment was conducted using the Commodore PET (the college owned one at the time) to determine the feasibility of implementing a remedial mathematics course to replace the OISE system. When the results proved successful, it was decided to carry out the project. The college purchased almost thirty PETs, and a microcomputer lab containing fifteen machines was established in the library of the Oakville campus. Ten PETs were placed in the Brampton campus library. The Commodore machine was selected over others for several reasons: 1) the PET has exceptional graphics capabilities, 2) all of the components are housed in one box, facilitating security, and 3) the low price was attractive. On the basis of the yearly costs associated with the OISE system it was estimated that the Oakville microcomputer lab would pay for itself in two years. This benefit, however, is only one of several, as we shall see.

The Micromath Program

Before describing the Micromath course in detail, it is useful to discuss the students who make use of it. The students are enrolled in programmes such as business, community and

transportation planning, and computer studies. They are required to complete various mathematics courses related to their programmes. We have found, however, that many of these students lack the basic skills in mathematics which are prerequisite to their regular math courses. In fact, some students experience difficulties with fundamental arithmetic. It is for these students that Micromath is intended. Micromath is intended to raise the students' competency in basic mathematics to a level which allows them to continue into their regular mathematics courses.

The students are channelled into Micromath by various means. The most common method is for the instructor of the regular math course to test his class early in the school year. On the basis of this pretest some of the students are required to complete all or part of the Micromath course. Other instructors monitor the progress of their students through the regular math course. If the student is doing poorly, the instructor may direct him into the Micromath course. Some students voluntarily enter the course, even though they are not required to study mathematics in any of their programmes. These students recognize their own weaknesses and are trying to upgrade their skills in mathematics.

It is important to note that the students do not receive any credit for completion of Micromath although they are required to do considerable work. In addition, only a few students study Micromath and their regular math courses concurrently.

Micromath is structured around eighteen units which are further subdivided into from three to seven objectives each. In its present form there are a total of ninety-three objectives which cover the topics of greatest importance. These topics range over integer arithmetic, fractions, percents, basic algebra, graphing, and ratios and proportions. These topics were felt to be the most important when the course was designed. However, we expect to receive feedback from our instructors concerning additional topics to be

covered. The original course was written by Sieg Hummelbrunner, an instructor at Sheridan College.

There are several resources available to students in Micromath. Each student is required to purchase a textbook which contains all of the instructional material and a self-test for each unit. The book is intended to complement the material which is presented on the microcomputer. In addition, the microcomputer lab technician is available for individual attention if the need arises.

Micromath is a computer-assisted instruction course using a drill and practice format. A typical lesson on the microcomputer begins with a choice for the student. He is given the option of reading some instructional material or answering a series of practice problems. The student's decision is based on his understanding of the material presented in the text book. If he decides to read the instructional material, he is presented with several frames of computer screen discussing the topic at hand. Upon completion of the instructional material, he enters the practice section of the programme. This is the entry point for students who opt out of the instructional material.

The practice section of the programme generates a series of questions which the student is required to answer. The questions are generated randomly. That is, there is a random number generator in the computer which generates a different question every time. The student's response is made through the keyboard.

The programme incorporates extensive error checking to monitor the student's success and to provide the appropriate feedback. With each question the student is informed as to the correctness of his answer. In the event of an incorrect answer the correct answer is displayed on the screen.

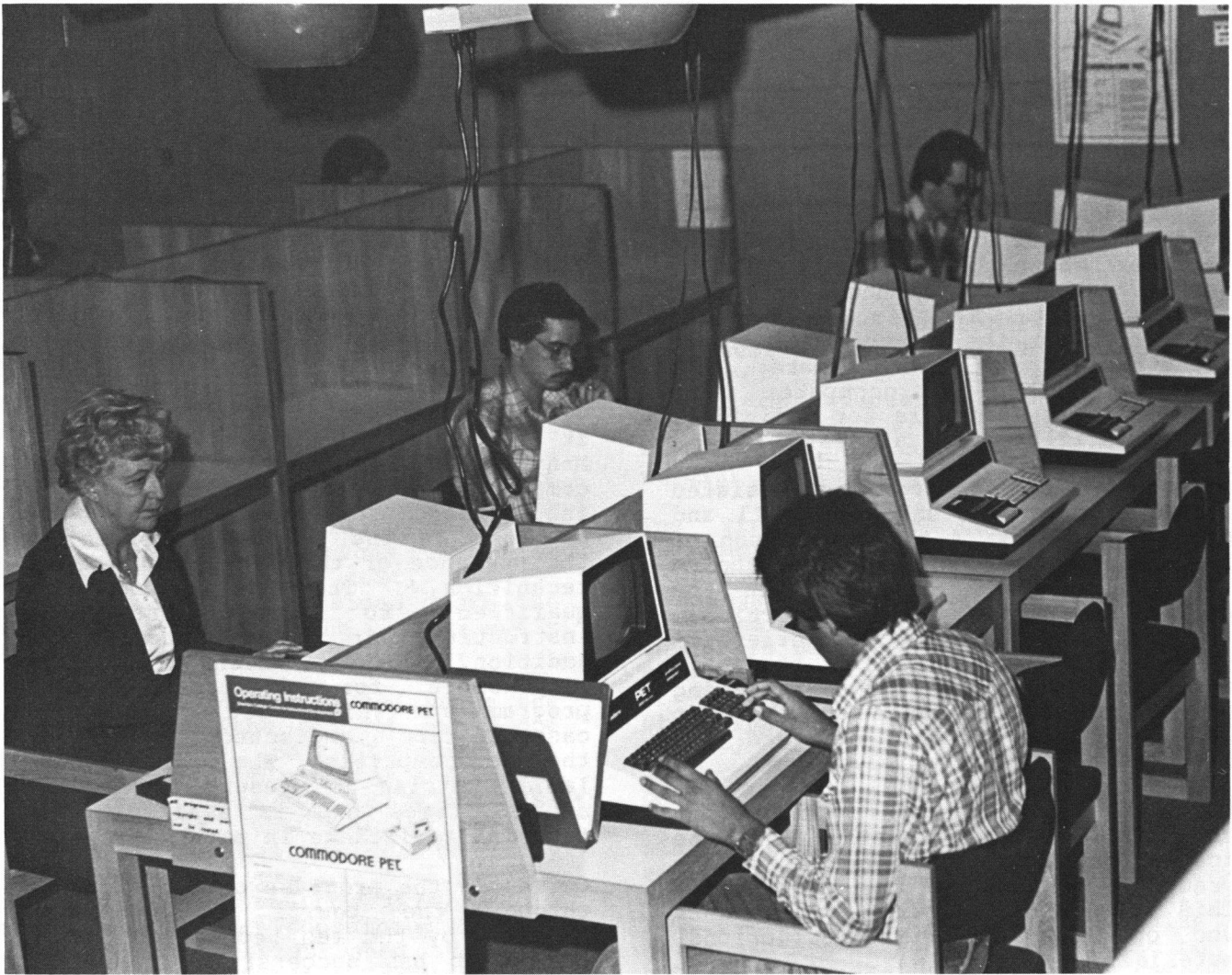
In addition to checking individual answers, the programme monitors the student's overall progress. If the

student is answering most of the questions correctly, the programme allows him to proceed to the next lesson. If most of the answers are incorrect, the programme suggests that the student seek help from his instructor. Between these two extremes, if the student is getting some of the answers right and others wrong, the programme advises the student to review the lesson.

A traditional failing of computer-assisted instruction is that it can be very cold and impersonal. Many students are intimidated by the computer, or feel insulted by its instruction. These problems are overcome in the Micromath course by the presence of the microcomputer lab technician. The technician is qualified to give individual instruction in mathematics. In addition, the technician is responsible for distributing the programmes (which are stored on cassette tape), and scheduling time on the microcomputers. The microcomputer lab technician is present in the lab at all times and is available for tutorial assistance in mathematics.

Currently the progress of the students through the course is monitored manually by the lab technician. When a student has successfully completed the objectives in a unit, he is given a test on the unit using the microcomputer. The tests have similar formats to the objectives, except that the correct answers are not provided to the student until the end of each frame. Since the topics of the course are fundamental and essential for the student's regular math courses we insist on very high standards of performance.

Because the Micromath course has been available for less than a year we have very little feedback as to its effectiveness. However, most of the students have commented that they believe Micromath has helped them. Very few of the students have rejected the computer-assisted approach to remedial mathematics. The students recognize the value of the intensive drill and practice which Micromath provides.



Sheridan College and the PET

Programming Instruction

Although Micromath was the primary reason for Sheridan College's involvement with microcomputers, other uses of the machines have developed. The programming language used by our microcomputers is BASIC. Students from the business, computer studies, research techniques and community planning courses use the microcomputers to learn programming.

There are many advantages to using microcomputers to teach introductory programming. One subtle advantage is that for many students a large computer system can be very intimidating. When confronted with a microcomputer, however, the student realizes that he is dealing with what amounts to an overgrown calculator rather than the threatening machine

mentioned at the beginning of this article. In the absence of this threat, the student is encouraged to experiment without fear of "crashing the system". On the other side of the coin, there is no system for the more enterprising students to attempt to crash.

Microcomputers offer the student computing at his fingertips. The PET in particular has excellent editing features enabling corrections and changes to be made very easily. In addition, the results (or consequences) of these changes can be seen almost immediately on the computer's CRT screen. Implementing such changes on a large computer system requires both keypunching and job submission. This can be time-consuming.

Students use the microcomputer lab facilities for the completion of their programming assignments. In general the students attend the lab for one scheduled hour per week and at any other time when the machines are available. As with the Micromath course, the microcomputer lab technician is available for tutorial assistance. Some instructors permit technicians to assist them in the grading of programming assignments.

Learning By Appointment

In addition to Micromath and computer programming, the microcomputer lab is used in a scheme called "Learning by Appointment". Under this programme members of the general public may rent the use of our microcomputer facilities by the hour. The college has accumulated a library of approximately three hundred programmes which are stored on cassette tapes. Among these programmes are educational

tapes, business applications, games, simulations, and graphics demonstrations. In fact, one programme allows the computer to instruct the user on how to programme. Another programme assisted in the preparation of the 1978 Ontario income tax return. Although there is no instructor available under Learning by Appointment, there are posters mounted in the lab which provide the minimum instruction necessary for beginners to get under way.

Future Growth

Microcomputers have taken a firm hold on Sheridan College. However, we are expanding our facilities and we plan on providing more services to our community. While we currently use the microcomputer lab for Micromath and computer programming, there is considerable room for expansion in the area of computer-assisted instruction. Plans are under way to add more units to the Micromath course as well as other subject areas.



SOFTWARE

Educational Software

Evans Newton Inc.

PROJECT BASIC, ENI Instructional Management Program

Nearly every State Legislature or State Department of Education has recently passed legislation or provided guidelines directing or encouraging local educational agencies to identify, diagnose, and monitor student essential basic skills. PROJECT BASIC or the ENI Instructional Management Program was written to provide administrators and teachers with an efficient system for tracking, monitoring and evaluating student progress of locally selected basic skills and/or any other skills which comprise the instructional program.

With the introduction of PROJECT BASIC, administrators, principals, teachers, parents, and students can obtain Student Basic Skills Records when needed without the hassles of updating complicated student records, searching for information, compiling information, worrying about errors, and making xerox copies that somehow seem never to be available when needed.

A clerk or teacher aide, centrally located in a school, is assigned the responsibility of inserting, updating, and generating all of the instructional information for all of the teachers. The assigned clerk or aide should periodically collect and disseminate the student information in accordance with a schedule which best meets the existing time limitations of the operator and needs of the teachers. The person assigned to operate the microcomputer does not require any prior computer training.

Information is inserted by feeding mark sense cards into the card reader connected to a PET microcomputer. The microcomputer then scores and stores this information automatically in various report locations on class disks. Thereafter, when this updated

information is needed, the clerk simply types in the number of the report needed, such as:

- Diagnostic or Basic Skill Test Scores and Item Analysis
- Student Prescriptions and Progress Reports
- Objective Grouping Reports
- Teacher Daily Class Reports
- Parent Reports
- Student Report Cards
- Grade Status Reports

Directors of curriculum, federal coordinators, principals, and teachers can include and change whenever they want their list of basic skills, test items, teacher and student names for any subject area for any class at any grade level on a school-by-school basis. The program works with your program.

In addition, this program automatically scores district-selected standardized or diagnostic tests up to 100 test items per test or basic skills tests and simultaneously transfers the results to each student's file.

The maximum number of students this program will handle will vary according to how frequently the teachers need the updated information, the number of different subject areas to be included in the program, and how detailed the instructional program is relative to the number of objectives and test items per subject area per instructional level. Generally speaking, there should be little time pressures when one thousand registered students in at least three core subject areas at various grade levels are operational in the program.

PROJECT BASIC was designed to be used only with the following equipment:

1. PET 2001-32N Computer
2. CBM 2022 or 2023 Printer
3. 2040 Dual Drive Mini Floppy Disk
4. Set of Cables
5. MR-500 Mark Sense Card Reader and Cable

Now for the first time, after

extensive field testing by schools throughout the country, each school within the district can efficiently and economically monitor and evaluate student basic skill progress without the headaches of paperwork and teachers who are concerned about becoming superclerks.

For more information please write or call:

EVANS NEWTON INCORPORATED
7335 East Acoma Drive, Suite 102
Scottsdale, AZ 85260
(602) 998-2777



A new basic skills management program that makes record keeping a whiz!

National Coordinating Center For Curriculum Development (Part II)

The National Coordinating Center for Curriculum Development is making available a number of educational computer programs for use on the Commodore PET. Programs are available in the disciplines of mathematics , science, language arts and social studies. Most of the programs are designed for use at the secondary school level, while some of them are appropriate at the elementary school level. (The mathematics and science programs were published in Newsletter #9.)

The programs are written in the BASIC language and will run on 8K PETS. Each program is available on cassette tape for a nominal fee.

LANGUAGE ARTS

T,S-SPELL

If you teach foreign language, science, mathematics, social studies, English or any other subject where it is important that your students learn and use a special vocabulary, SPELL can be a help. Using T-SPELL, you can create data tapes containing lists of words and their definitions. These tapes can be updated from unit to unit. They can be tailored to fit an individual student's needs. A library of data tapes can be created to use each year. Once a data tape has been created, a student can study the words and definitions on it by using the S-SPELL program. A word is randomly chosen from the data tape; its definition appears on the screen along with a number of blanks equal to the number of letters in the target word. The student must supply the correctly spelled word, or he may guess individual letters. Points are deducted for each guess. If a student takes too many guesses, the word will appear again. If a student does well on a word, that word will not appear again during that run.

T,S-PUNC

Tired of correcting your student's punctuation errors? Let the computer give your students practice punctuating sentences. Use T-PUNC to create a data tape containing correctly punctuated sentences. Type in sentences with correct punctuation from any source: newspapers, novels, student papers, grammar books, etc. Structure the sentences to drill specific aspects of punctuation or vary the sentences for an overall review. The S-PUNC program presents the sentences from the data tapes to the student with all punctuation omitted. After the student fills in the missing punctuation, the computer displays the correctly punctuated sentences and indicates any errors the students may have made.

T,S-HYPHEN

Do your students hyphenate words anywhere they please? Do they divide words in the middle of syllables? Use the computer to provide your students with practice in hyphenation. Use T-HYPHEN to type in a list of correctly hyphenated words that are saved on a data tape. The S-HYPHEN program will display words from the data tape with spaces between the letters. The student must insert hyphens in all of the appropriate places. The computer displays the correctly hyphenated word and indicates any errors that the student may have made.

SIMULATIONS

YELLOW LIGHT

Many controlled traffic intersections may be unsafe. The duration of the yellow light at some intersections may be too long or too short, creating a

dilemma zone, i.e., a zone in which it is neither safe to stop nor to go through. This simulation will allow your students to experiment with the various characteristics of an intersection and to determine its safety. These factors include the width of the intersection, the speed limit, the duration of the yellow light, as well as the driver's reaction time and the deceleration rate. Students can enter the characteristics of intersections that they have measured or design their own. The first part of the simulation is used to determine the student's reaction time at the yellow light. The screen displays a traffic light and a car moving toward an intersection. When the light turns yellow, the student must decide whether to stop or to go and must depress a key to indicate his choice. The reaction time is calculated. After five successful stops, the student's average reaction time is calculated, and phase two of the program begins. After the student enters the characteristics of an intersection, the size of the dilemma zone is calculated and displayed graphically. The student may then alter the characteristics in an attempt to eliminate the dilemma zone. This is usually best accomplished by varying the yellow-light duration.

WATER

What steps can be taken to protect a community threatened by drought? What are the relations between water usage and industrial growth? How does the distribution of the labor force affect the availability of industrial goods and agricultural products? What sacrifices, in terms of cutting water consumption, can be expected from consumers? How much do these

sacrifices help? Use the WATER simulation and let your students take charge of a community threatened by imminent drought. The student's goal is to maintain the community through the drought. He can enact legislation to curtail water consumption, build treatment plants, redistribute the labor force, decide how much land to irrigate and adjust the flow of water to other communities downstream. As these changes are entered, the screen displays their effect on the condition of the community. Reports indicating the availability of food, industrial goods and water, as well as the current population and budget, are updated and displayed every few seconds. The interval between displays represents ten days. Students must make decisions quickly and "act" on them before conditions become severe.

SOCIAL STUDIES

POLICY

The role of special interest groups affecting government decision-making is examined. Students represent labor, nationalist, internationalist, business, military and civil rights special interest groups. The students attempt to organize to support or oppose governmental policies. The computer is used to record the votes of the six interest groups, decide which of fourteen policies are adopted and show the effect of those policies on eighteen socio-economic indicators. The values of the indicators can be saved on tape, allowing the simulation to be continued for more than one day.

USPOP

Human Population Model of the United States. Using 1970 census data (stored within the program),

the user explores the roles of fertility, birth distribution, offspring sex ratio, age-dependent mortality and population age structure in determining the pattern of population growth. Extensive materials supplied by the Digital Equipment Corporation explore each of the above factors from a biological and sociological point of view.

Programs on cassette tapes are available for \$3.00 each; two programs for \$5.00. Along with the tape, you will receive a program listing and a brief manual. Program listings alone are available for \$.50 each.

These prices are for NC³D member schools. The price for all others is \$5.00 per program.

Order forms are available from:

National Coordinating Center for Curriculum Development
College of Engineering and Applied Sciences
State University of New York at Stony Brook
Stony Brook, NY 11794

Software Review - Education

HOW TO GET STARTED IN COMPUTING - STRATHCLYDE UNIVERSITY COMES TO THE HOME OF COMPUTER NOVICES...

A totally new concept of computer programming education, initially carried out as an experiment at Strathclyde University (England), will provide BASIC laboratory programming courses with 50 Commodore PET computers for up to 1,125 students each year.

With the release of STRATHCLYDE BASIC, the benefits of this successful experiment are now available in a Teach-Yourself BASIC Programming Course which brings University education standards and University levels of proficiency to the homes of all first time computer users and any educational establishment involved in teaching BASIC.

Whether this "free standing" course is attended at Strathclyde University or followed on the basis of self-tuition, the teaching tools for STRATHCLYDE BASIC are the same: pencil and paper, STRATHCLYDE BASIC (two cassette programs and one workbook) and the Commodore PET computer.

The course is presented in 23 working sessions. Detailed explanations and instructions are alternatively followed in the exercise book, and with the insertion of the cassette program, displayed on the PET screen. This method provides the student with solid programming knowledge and the confidence to convert theoretical knowledge into practice on the computer. At the beginning of each session, the student is encouraged to get down to pencil and paper exercises. Then the PET computer takes the beginner step-by-step through the actual computer programming while displaying instructions and results on the screen.

Working to a given average or maximum time table (which takes into account reading and working with the PET computer), will ensure the certain amount of discipline necessary to achieve results. Designed for the newcomer to computing, if followed during regular periods of study, the course should not exceed 10 weeks, although it can be mastered in as little as five days.

Professor Andrew Collin, Head of the Computer Science Department at Strathclyde University and in charge of the initial experiment, is the author of STRATHCLYDE BASIC.

He explains the reasons for running an experimental "free standing" BASIC course at Strathclyde University: "Strathclyde University is a technological university and has one of the largest engineering schools in this country. For many years, our students have been taught programming in the traditional way. Whilst we were fully aware of the shortcomings of the conventional teaching methods, the introduction of interactive programming courses was an impractical project. The facilities provided came nowhere near to supporting the number of students involved. The cost of purchasing a terminal and connecting it to a central unit were not

economically justifiable. With the introduction of Commodore's PET computer in 1978, our project of providing universal computer education for all students suddenly became feasible. After careful evaluation of several microcomputers we decided on the purchase of 30 Commodore PET computers... which we are now increasing to 50 units."

"The main objectives for our experiment were: Raising the standard of programming ability which the majority of the students can reach in a given time, whilst reducing the number of hours of personal involvement by the teaching staff."

"Over 170 students from different disciplines participated at this experiment of a "free standing" BASIC laboratory course. No formal lectures are held - it relies entirely on supervised self-tuition. Equipped with a workbook, containing some 23 units, students worked on time-tabled sessions and were able to test their newly acquired knowledge on any of the 30 PET computers available. The result was excellent. At the end of the course, over 94% of the students completed the test satisfactorily. Half of the remaining 6% who were prevented from taking the test by illness, have passed it on a later occasion. The failure rate of about 3% falls far below anything in our experience for first year classes and suggests that the new method of teaching is valid. We have had an enthusiastic response to the course and in some cases, students have actually expressed worries as to its academic value, because they find it 'fun'."

"Large scale programming courses can now be held at a very low cost and assuming a life of 4 years for the 30 machines, two full time demonstrators or organizers, maintenance costs and interest on capital, the cost per student comes to approximately \$40 per year, which even in today's difficult financial climate, becomes an economically viable project."

Professor Collin's advice to those wanting to achieve proficiency in BASIC by the end of his course is: "Be your own teacher. Don't jump to the next lesson unless you have fully understood and mastered the previous one".

STRATHCLYDE BASIC (cassettes and handbook) is available from Commodore at \$14.95. Additional copies of the handbook (104 pages) are \$5.95 each. For details, please contact your authorized Commodore dealer.

Business Software

The following article is reprinted with permission from InfoWorld, the Newspaper for the Microcomputing Community, 530 Lytton Ave., Palo Alto, CA 94301. \$18/year.

Commodore WordPro 3

Follows Industry Trend, New WP Software Added

By Maggie Canon

Word Processing in the 1980's should see many, or more advancements, as in the 1970's, particularly in regard to ease-of-operation and price reductions. There are over 75 word processing vendors competing in this market today. However, more and more data processing companies are entering the field, giving their established clientele an inexpensive means to incorporate the advantages of word processing. One such company is Commodore Business Machines, who has recently introduced new word processing software, WordPro 3.

From the operator's point of view the program is versatile. Word processing programs usually fall into one of two categories: designated key, or mnemonics (code-intensive). Designated key, which is a preprogrammed function key (i.e., a key-labeled center), is most commonly found on dedicated word-processing systems. Code-oriented systems require the user to execute several coded steps to perform a function such as centering. However, the vast majority of word processing programs developed to tack onto a data-processing system are code-intensive.

Commodore has created codes that relate to the function. For example, the center code is "cn", and the right adjust code is "ra". Relating the

code abbreviation to the function makes it easier for the operator to memorize the codes. If the operator makes an error in coding, or there is a read error on the disk, the status line at the top of the screen will prompt the operator.

The status line will also provide the user with other information, such as the column and line on which the cursor is located. Once the operator has learned the codes, the system provides standard input and editing features, such as delete, insert, and format control.

WordPro 3 software is loaded into the machine memory, leaving the mini-diskettes free of software to accommodate up to 100 pages of text. After the software is loaded and the disks initialized, the operator may begin work. WordPro 3 features two separate text areas: the main text area, and the alternate text area which is equivalent to a scratch pad. This alternate text area can be used to store sentences or paragraphs that may be called into the main text; addresses may be stored to fill in variable blocks for personalized letters.

The user defines the file name for the directory. Formatting functions are imbedded in the text, preceded by a check mark, and may be changed at any time. Formats include: page length, line feed, margin justification, temporary margins, centering, right alignment, headers, footers, page numbering, forced pages, file linking, comment (comments only - not printed), and decimal and left tabs.

Headers and footers have left, middle and right fields, which may contain different text, including page numbers. The page numbering, once set, is automatic, and may be set to start on any page; the program will also remember the pages should text be deleted or inserted.

After formatting is set and the page has been completed, the operator must memorize (store) the page. WordPro 3 is somewhat of a hybrid program, in that the operator is forced to store each page, yet can virtually scroll through a document regardless of its length. This hybrid concept is a combination of page and document

orientation. Page-oriented programs require that the operator store and recall each individual page in both the input and edit stages. Document-oriented programs on the other hand, automatically store pages, and allow the user to scroll virtually through the text disregarding page boundaries.

Cursor movement is free-floating on the screen. As previously noted, the operator may scroll continuously through the file as well as jump to a specific line. To correct a mistake, the program allows for overstriking characters. To insert, the operator depresses "I" and types or calls in desired text. The program will delete single characters, words or lines, automatically closing the space gap ('scrunch'). The user also has the option to highlight an area in order to decide whether or not to delete the text by using the reverse-video feature. This reverse-video feature may also be used to identify text for block moves or to copy blocks of text. The identified material is moved by the cursor to the desired point of insertion.

WordPro 3 also provides for global search and replace. The program will search for an exact match or any match, and will replace the original text with new text, including underlined material.

The program handles hyphenation semi-automatically; a discretionary hyphen will be recognized only if the word is at the end of the line. The user may also block a group of words or numbers not to be split at the end of the line.

To print the document, the operator has several options. The printer may be told to print continuous-form paper or single sheets; selected pages or multiple copies may also be defined.

Training on the WordPro 3 is arranged independently by the dealer, and usually consists of a 4-hour session with a telephone 'hot line' available for users' questions. A training manual is also provided with the purchase.

The price of WordPro 3 is \$199.95. The program requires 32K of memory and a dual floppy disk drive configuration.

APPLICATION

PET Goes To Church

By James Strasma
120 W. King Street
Decatur, IL 62521

Churches pride themselves on being the last guardians of warmth and personal concern in our society. Thus, churches have been slow to adopt what they consider cold and impersonal technological advancements --- especially computers. Before the use of a computer (PET) can be readily accepted by a church a key question has to be answered, "How will a PET help us with personalized ministry?"

Today very few churches have computers, so the answer to this question isn't clear. There are expectations that computers will be in virtually every church by the end of the decade. The churches that currently have computers are really pioneers.

What churches can do about computers now is "start small, but start". Many churches already have members who own home computers. Most PET owners are more than happy to use their PETs for the church's benefit. What is needed is a key task for the PET to handle. For me, this task is monitoring church attendance by giving early notice of changing attendance habits. PET can also help identify members and visitors needing special attention.

A program was developed, ATTENDANCE, to handle visitor records. When writing ATTENDANCE, my goal was to, 1) protect data, and 2) save memory. Without protection, hours of work could be lost in a moment. Without space-saving, there would not be much to lose. The article titled, 'Saving Time & Space', (The Paper 12/78) contains the tricks I used to write ATTENDANCE.

When finished, my 8K PET held 85 names and their attendance records for one year. By using a directory tape and data tapes, the total number of

records is limited only by one's patience with cassettes.

Last summer I upgraded to a 32K CBM with a business keyboard. The CBM can store 600 records in memory at one time which is adequate for my needs. To reduce the time it takes to sort the records, I have developed a machine language multi-sort program for BASIC string arrays. This program cuts sort time from almost an hour to under 10 seconds per 400 names. (You can find KEYSORT in the April 1980 issue of MICRO. For \$5 I will send you a cassette copy customized for your PET. Be sure to let me know how large your PET's memory is and whether you have the old or new ROMs.)

I wrote ATTENDANCE so that I could add sorting ability and eliminate the need to manually record information on file cards. The program quickly finds all names with perfect attendance for the last month, or any sudden decline in attendance. It also finds records of newcomers, singles, or most any group. This helps me decide who to visit week by week.

I have now reduced the time spent recording our attendance by fifty percent. This helps me better serve the church. The next step will be to put ATTENDANCE on disk, so all of our 2,800 members can be monitored. The program and sort routine are general enough to use in other programs I am developing. Now that PET has proven its ability to monitor attendance, I am looking forward to finding additional ways it can assist the church. Already, I am typing sermons with the PET, and using various Bible games in our youth membership class. I would be glad to hear from others using the PET at church.

PROGRAMMING

An Input Sort With Disk Storage

By Judy Bogart

In the last issue we took a close look at a sort which works by pointer manipulation. The program generated random data, and then sorted it by a key field, printing out the list with the key field lit up. In this article we are going to take a look at a similar program, with some useful enhancements. We will take out features which served to illustrate the sort, make the sort a little more efficient, and change it to an input sort. The sorted data will then be written on a disk, and another program will read the sorted data from the disk.

The first thing we will do is streamline the sort itself. In its original form, the sort routine includes three possible actions: insert at front, insert at end, and insert at middle. Let's take a close look at these actions:

Insert at Front:

```
455 P(C0)=P(0):P(0)=C0:goto250
```

Insert at End:

```
410 P(CL)=C0:P(C0)=-1:goto250
```

Insert in Chain:

```
510 P(C0)=P(CL):P(CL)=C0:goto250
```

Remember that C0 refers to the newest record, C1 refers to the next record in the sorted list, and CL refers to the previous record in the sorted list. P(0) is the head of the list, and -1 is the end-of-list marker.

The three actions are clearly similar and share certain details. With a little manipulation of variables, they can, in fact be reduced to one action. Take the first case, Insert at Front. If, at this point, CL is equal to 0, then this is the same as Insert in Chain. Again, with Insert at End, if P(CL) contains -1 at this point, then

it is the same instruction as Insert in Chain. As long as we make sure that these things are true, we have no need to repeat the instruction in three different places.

It is easy enough to make sure that CL equals 0 the first time around. You just have to declare it before it starts incrementing. There is no actual "last one looked at" the first time around, so this is set to point to the head of the list each time. If the new record is less than the first one in the list, it becomes the first one, P(CL)=C0, and points to the previous first one, P(C0)=P(CL).

In order to make sure that P(CL) equals -1 in cases where the new record is the end of the list, it is simply necessary to go past the incrementing of CL and C1 before testing for end-of-list. The point at which C1=-1 is the point at which P(CL)=-1.

Since there is now only one action to be taken, no matter where the new record is to be inserted, it is no longer necessary to check specially for the case in which the new record is the first in the list. We need only one comparison, and one action. The incrementation routine must be placed so that it is executed if the comparison is unsuccessful, but we must also check for the end-of-file, the case in which the new record is the last in the list, before going on to a new comparison.

With all of these changes, the sort can now be stated in only four lines of BASIC, as follows:

```
410 C0=1:P(0)=1:P(1)=-1
```

This line sets up variables for the first record, which is always the first in the list.

```
510 C0=C0+1:C1=P(0):CL=0
```

This line sets up the variables for each new record. C0 is incremented, C1 goes to the head of the list, CL is declared to be 0 in case the new record is the smallest one.

```

520 IF A$(C0,K)>A$(C1,K)
    THEN CL=C1:C1=P(C1):
    IFCL<>-1THEN 520

```

Here is the comparison. If it fails, that is if the new record is not to be inserted here, we go on to increment CL and C1. If we have not reached the end of the list, we continue the comparisons.

```

530 P(C0)=P(CL):P(CL)=C0

```

This is the action of insertion into the list. We get here if, 1) the comparison succeeds, or 2) we have reached the end of the list without encountering a record greater than the new one.

The first part of the program is the generation of sample data. This has also been modified slightly, partly for greater efficiency, but mainly to incorporate the sort into the input of data. The sort itself is converted into a subroutine, which is called each time a new record is generated. The timing loop starts at the beginning, and the time elapsed will include the generation of data and the sorting time.

Line 260 generates the record title, or the first field of the record, using an I-loop. Within the I-loop is a J-loop, line 265, which generates the remaining fields. The first time through the I-loop, line 270 calls the first subroutine, which sets up the variables for the first record. Each succeeding record in the I-loop will call the main sorting subroutine. When the last record is read in, that is when I reaches C, the total number of records, we go to the output routine and print the sorted list.

After we have displayed the list, to see that it is properly sorted, we want to store it in a sequential file on the disk. The program asks what you would like to name the file. It then opens a channel to the disk and initializes drive 0. It would be possible, of course, to input the drive number, but in this example we will assume that your disk is always in 0. A file is then opened with the name you chose, specifying Sequential

and Write.

The first three pieces of data which will be saved in the new file are the variables: K, the key field, C, the total number of records, and F, the total number of fields. The reason for this will be clear when we attempt to read the data back into memory. Each piece of data is followed by CHR\$(13); : this is a carriage return, with a semi-colon to suppress the line feed. The carriage return serves as a delimiter, separating one item from the next.

The sorted list is now written onto the disk, using the variable N to trace through the pointer list. An I-loop is used to write all fields of the record before incrementing N, each item being separated with a carriage return/semi-colon. When the last record is reached, the file is closed and your sequential file has been successfully written on the disk. You may wish to include, here and in other disk-handling programs, a subroutine to check the error channel after each disk-command.

Now that the file has been stored as a sequential file on the disk, another program is needed, one which knows what order the data is in, so that it can read it back in the right sequence. The program reads the three variables first, so that it can set up the parameters for the data records. It then reads back each piece of data into the correct record and field, lighting up the key sort-field as before.

Here is a modification you can do to see if you understand how the programs work. Put the input sort from the first program into the second read-from-disk program, so that it resorts the list of records by a different field, either as it comes in or after it has been displayed in the original order.

Good luck!

READY.

```
100 REM*****
101 REM READ IN TOTAL # RECORDS, TOTAL # FIELDS
102 REM*****
110 READ C,F
120 DATA 20,7
130 DIM A$(C,F),P(C+1)
200 INPUT"WHICH FIELD DO YOU WISH TO SORT BY";K
210 TI$="000000"
250 REM*****
251 REM GENERATE RANDOM DATA FOR ILLUSTRATION
252 REM*****
255 PRINT"I AM NOW GENERATING AND SORTING THE LIST"
260 FOR I=1 TO C: A$(I,1)="RECORD"+RIGHT$( " "+STR$(I),4)
265 FOR J=2 TO F: A$(I,J)=CHR$(INT(RND(1)*25)+65):NEXT J
270 IF I=1 THEN GOSUB 400:GOTO 280
275 GOSUB 500
280 NEXT I:GOTO 1000
400 REM*****
401 REM SET UP COUNTERS FOR FIRST RECORD
402 REM*****
410 C0=1:P(C0)=1:P(C1)=-1:RETURN
500 REM*****
501 REM SORT ALL FURTHER RECORDS
502 REM*****
510 C0=C0+1:C1=P(C0):CL=0
520 IF A$(C0,K)>A$(C1,K) THEN CL=C1:C1=P(C1):IF C1<>-1 THEN 520
530 P(C0)=P(CL):P(CL)=C0:RETURN
1000 REM*****
1001 REM DISPLAY SORTED LIST
1002 REM*****
1010 PRINT"FINISHED SORTING:TIME: ";TI$
1020 N=0
1030 PRINT:FOR I=1 TO F
1040 IF I=K THEN PRINT" #";A$(P(N),I);"■";" ";
1050 IF I<K THEN PRINT A$(P(N),I);" ";
1060 NEXT I:N=P(N):IF P(N)=-1 THEN 1080
1070 GOTO 1030
1080 PRINT:INPUT"WHAT FILE NAME FOR THIS DISK FILE";B$
2000 REM*****
2001 REM STORE SORTED LIST ON DISK
2002 REM*****
2010 OPEN 15,8,15,"I0"
2020 OPEN 2,8,2,"0:""+B$+"",S,W"
2021 PRINT#2,K;CHR$(13);C;CHR$(13);F;CHR$(13);
2025 N=0
2030 FOR I=1 TO F
2040 PRINT#2,A$(P(N),I);CHR$(13);
2050 NEXT I:N=P(N):IF P(N)=-1 THEN 2060
2055 GOTO 2030
2060 CLOSE 2
2070 PRINT B$" NOW ON DISK"
2080 END
READY.
```

READY.

```
100 REM *****
101 REM READ SORTED FILE FROM DISK
102 REM *****
110 INPUT"FILENAME ";B$
115 OPEN 15,8,15,"I0"
120 OPEN 2,8,2,"0:""+B$+"",S,R"
130 INPUT#2,K,C,F
135 DIM A$(C,F)
140 FOR I=1 TO C
150 FOR J=1 TO F
160 INPUT#2,A$(I,J)
170 NEXT J,I
180 CLOSE 2
200 REM *****
201 REM DISPLAY SORTED FILE
202 REM *****
210 FOR I=1 TO C
220 FOR J=1 TO F
230 IF J=K THEN PRINT" #";A$(I,J);"■ ";
240 IF J<K THEN PRINT A$(I,J);" ";
250 NEXT J
255 PRINT:NEXT I
260 END
READY.
```

GLOSSARY OF DEFINITIONS

Through the courtesy of SYBEX Inc., CBM has been granted permission to excerpt portions of their MICROPROCESSOR LEXICON for publication in the PET Users Club Newsletter over the next year or so. The Lexicon is available at some computer stores, although it can be purchased directly from SYBEX in Berkeley, California at the following address - 2344 Sixth Street, Berkeley, CA 94710; in Europe at this address - 18 rue Planchat, 75020 Paris, France. The MICROPROCESSOR LEXICON sells for \$2.95.

Please note that both the U.S. and European offices have moved.

The Editor feels that these acronyms and definitions will be of value to PET/CBM users and will help you understand some of the jargon that is encountered in the microcomputer industry.



batch Processing mode where a program is submitted to the computer, and the result is delivered back. No interactive communication between program and user is possible

baud Bits Per Second. Actually binary units of information per second. Teletypes transmit at 110 baud. Each character is 11 bits, and the TTY transmits 10 characters per second

block Physical unit of information in a logical record. Usually expressed in bytes

carry A flag bit in the status register of the central processor. Used to indicate the overflow of an operation by the arithmetic logic unit. In MPU's, the carry is also used during shifts

character string One dimensional array, or chain, of characters. Typically each character is individually encoded as a byte. Representation used for encoding external text

control bus Set of control lines (10 to 100) in a computer system. Its function is to carry the synchronization and control information necessary to the system. Examples of signals are Read, Write ("orders"), Interrupt, Hold, Acknowledge ("sync signals")

deadlock Situation where two processes wait indefinitely for each other

descriptor Binary code attached to an internal item (or "token") and used to denote its function such as syntactic type, or data type

garbage collection Technique for collecting empty spaces in a mass memory, and compacting them

glitch A pulse or burst of noise. A small pulse of noise is called a snivitz. Glitch is sometimes reserved for the more annoying types of noise pulses which cause crashes and failures

NMI Non Maskable Interrupt. Interrupt at the highest priority which is not affected by an interrupt mask. Typically used in the event of a power failure

NOP, NOOP No-operation. Instruction used to force a delay of one instruction cycle without changing the status flags or the contents of registers

null detector Circuit to detect when no current is flowing or no voltage present

octal Representation system of numbers where the digits "0" through "7" are used to encode all possible 3-bit combinations, from "000" to "111". Has been essentially superseded by the hexadecimal representation

paging In the case of a CRT, switching from one "page" of information to the next. In the case of a memory, a page is a logical block of storage used for memory management (for example 1K words). An address is then specified by a page address (number), and a displacement (address within the page)

PFR Power Fail Restart

pointer Address used to "point" at a special entity, or a structure. e.g. program pointer stack pointer. Pointers are generally 16 bits long (for 16-bit addresses)

Q Half-width of power spectrum of bandpass filter response in hertz divided by the center frequency in hertz

register One word of memory, usually implemented in fast flip-flops, directly accessible to a processor. Most MPU's include a set of internal registers which can be accessed much faster than the main memory

row scanning Technique used in decoding which key of a keyboard was pressed. Each row is scanned in turn by outputting a "1". The output on the columns is examined, resulting in identification of the key

static memory MOS memory which uses a flip-flop as a storage element. It does not need to be refreshed and does not require a clock. It does not lose its contents as long as power is applied

subroutine Program segment identified by name and bracketed by a "subroutine" and a "return"

statements. Execution is transferred to a subroutine when a subroutine call occurs. Subroutines save memory space at the expense of execution speed

track One of the rings defined on the magnetic surface of a disk or drum. A floppy disk has 77 tracks, numbered from 0 to 76

trap A method of catching program errors when illegal instructions are executed or illegal memory locations are accessed

virtual memory Apparent memory available to any process in execution on the processor. May be larger than the physical memory

yield Proportion of operational chips in a batch

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BITS & PIECES

In Newsletter #8, a hex to decimal conversion program was published; the following is a decimal to hexadecimal conversion subroutine which may also be useful.

DECIMAL TO HEXADECIMAL

By Dale DePriest

READY.

```
10 REM DECIMAL TO HEX CONVERSION
100 INPUT C$: GOSUB 8000
105 NS=VAL(C$): PRINT "DECIMAL: "NS,
110 GOSUB 9000: PRINT "HEXADECIMAL: "C$: GOTO 100
8000 NS=0: FOR IS=1 TO LEN(C$): AS=ASC(MID$(C$, IS))-48
8010 NS=NS*16+AS+7*(AS>9): NEXT IS: RETURN
9000 C$="": NS=ABS(NS)
9010 IS=INT(NS/16): AS=NS-16*IS: C$=CHR$(AS+48-7*(AS>9))+C$
9020 IF IS<>0 THEN NS=IS: GOTO 9010
9030 RETURN
```

PERIPHERALS AND ATTACHMENTS

Commodore PET[®]/CBM[®] Printer Adapter



FEATURES

- IEEE-488 listener input
- "Centronics" parallel output
- Input/output cables included
- Designed specifically for PET[®]/CBM[®]
- Upper case only for listings
- Upper/lower case for text
- Edge-connector adapter optional
- Six-foot (two meter) printer cable
- Meets IEEE-488 specifications
- 72-hour burn-in, fully-tested
- Total mounting flexibility
- Compatible with all peripherals

APPLICATIONS

- Word-processing systems
- Program and data printout
- All Centronics-compatible printers
- NEC "Spinwriter"
- Centronics 700 series (all members)
- Anadex DP-8000, DP-9500 (by jumper)
- C. Itoh Model 8300
- Okidata Microline 80 and Slimline
- Superbrain LP-80
- Dataroyal IPS-7048/IPS-7049
- Computer Devices Miniterm 1210/Q3
- Other parallel input printers

DESCRIPTION

The complications C101 printer adapter is specifically designed for letter-quality word-processing applications using the Commodore CBM[®] microcomputer and the NEC "Spinwriter." It is also suited for use with other printers having a Centronics-compatible parallel ASCII input. To minimize installed cost, an IEEE-488 and printer ribbon cable are included with the adapter—no expensive cables are required to make the system operational. The C101 adapter is fully-compatible with IEEE-488 specifications and uses bus transceivers for proper line termination. No interference with the operation of other IEEE-488-compatible peripherals is created by the adapter and no modifications to standard PET[®]/CBM[®] programs are required.

INSTALLATION AND USE

The Complications C101 printer adapter is designed specifically for use with Commodore PET®/CBM® microcomputers and printers having a Centronics-compatible parallel ASCII interface.

Certain printers require minor modification for proper operation with the Complications C101 printer adapter. A 0.01 microfarad capacitor and an additional wire (included with the adapter) must be added to the input connector of the NEC "Spinwriter" for total conformance to Centronics specifications. This can be accomplished by the dealer from whom the "Spinwriter" is purchased or by the user in approximately 15 minutes. Complete instructions are provided for this minor modification.

A switch is provided for selection of upper case only or upper/lower case printout. Upper case only mode is ordinarily used for program listings which will print in upper case regardless of the appearance on the CRT screen. Upper/lower case operation should be selected for text printing. For tape-based systems where the user does not have a Commodore edge connector/IEEE-488 cable, the C101A adapter should be ordered with the C101 printer interface.

PET®/CBM® GRAPHIC CHARACTERS

Unless designed specifically for use with the Commodore PET® or CBM® microcomputers, daisywheel, dot-matrix and thermal printers will not reproduce Commodore graphic or reverse video characters. The printer may ignore or may print an arbitrary substitute character for non-standard instructions such as "clear screen" or "cursor home." For clarity of program listings with standard ASCII printers, the use of CHR\$(XXX) equivalents to graphic characters is recommended.

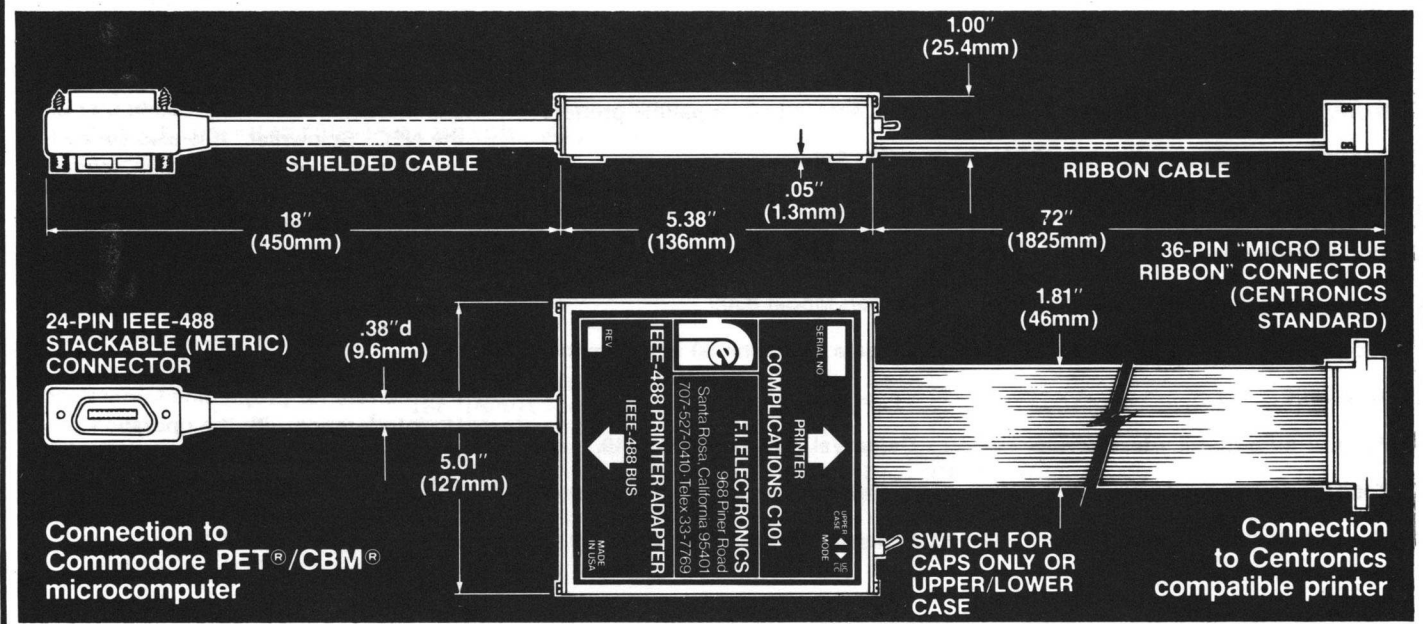
SPECIFICATIONS AND PRICE

- INPUT:** IEEE-488 (1978) general-purpose instrumentation bus (GPIB) with standard bus transceivers for proper termination, 18-inch cable, 24-pin stackable connector, preset by jumper to address #4
- OUTPUT:** 7-bit parallel ASCII, TTL-level "Centronics" de-facto standard format, full 128 upper and lower case alphanumeric characters, 72-inch ribbon cable with 36-pin "Micro Blue Ribbon" connector
- CODE:** Converts Commodore print code to ASCII equivalent. Interpretation of graphic characters depends on printer
- POWER:** 5 volts $\pm 10\%$, 150 ma, supplied by printer
- WARRANTY:** 90 days from date of purchase (see limited warranty data on price list)
- LIST PRICE:** Model C101: \$225.00 with cables
Edge connector to IEEE-488 adapter, model C101A: \$25.00
- TERMS:** F.O.B. Santa Rosa, California. UPS charges or postage included with prepaid orders

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Santa Rosa, California 95401
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VISA, Mastercharge or personal checks accepted for domestic U.S.A. and Canadian shipments (U.S. funds). Contact factory for international shipment data.



USER DIRECTORY & ANNOUNCEMENTS

Corrections To Newsletter #8

Page 37 - Line 8140 of the Hex to Decimal program should read as follows:

```
8140 NS=NS+(16↑IS)*(AS+7*(AS>9))
```

Page 4 - The answer concerning the Character Generator ROM is incorrect. The correct answer is as follows:

A: No, there is not a Retrofit Character Generator ROM available for the 8K 6540 Character Generator ROM (28 pin, P/N 901439-08).

There is, however, a Retrofit ROM available for the 8K, 6316 Character Generator ROM (24 pin, P/N 901447-08). This Retrofit ROM (P/N 901447-10) is available from your Commodore dealer.

The 901447-10 Retrofit ROM can be used in the:

- 1) Static 8K, logic board P/N - 320027
- 2) Static 8K, logic board P/N - 320136
- 3) Dynamic 8K, 16K, 32K, logic board P/N - 320350

The following article will clarify the proper ROM which is utilized in each Commodore microcomputer.

The Official

Commodore ROM Genealogy

The PET/CBM computer has been around now for over two years, and like all products, it has "matured". Translated, that means there have been changes, especially in the important system software that is stored in the Read Only Memory, known as the ROMs. As you may have discovered, one of the ROMs in our "old 8K PETs" has a different "dash number" than more recent "old 8K PETs". Dave Jackson, a Senior Technician, compiled the list

which we present here. Please note that there is a fairly important change in the ROM for the 2022 and 2023 printers. The new ROM, part number 901472-04, provides significant improvements in the performance of the printer. If you have a pre-December, 1979 printer, chances are you'll need the new ROM. The best news is that Commodore is providing the replacement printer ROM at no cost! See your authorized Commodore dealer to get the new ROM.

When the PET 2001 first went into production September, 1977, there were two ROM Sets incorporated into the system. One ROM Set is the 6540 type ROM. This is a 28 Pin ROM which is manufactured by MOS Technology, Inc. You will find these ROMs in the following locations on the PET 2001-4K and 2001-8K Main Logic Board:

<u>Location</u>	<u>ROM</u>	<u>Part Number</u>
H1	6540-019	901439-09 or 01
H2	6540-013	901439-02
H3	6540-015	901439-03
H4	6540-016	901439-04
H5	6540-012	901439-05
H6	6540-014	901439-06
H7	6540-018	901439-07
A2	6540-010	901439-08

NOTE: There is an 019 ROM at the H1 location. On some earlier Main Logic Boards you will find a 6540-011 at H1. This ROM has been updated to an 019 due to an intermittent bug in the edit software. This ROM Set is Basic Level II.

The other ROM Set incorporated into the PET 2001 is a type 2316B 24 Pin ROM. You will find these ROM's in the following locations on the PET 2001-4K and 2001-8K Main Logic Board:

<u>Location</u>	<u>ROM</u>	<u>Part Number</u>
H1	901447-09	901447-09
H2	901447-03	901447-03
H3	901447-05	901447-05
H4	901447-06	901447-06
H5	901447-02	901447-02
H6	901447-04	901447-04
H7	901447-07	901447-07
A2	901447-08	901447-08

NOTE: There is an 09 ROM at the H1 location. On some earlier Main Logic Boards you will find a 901447-01 ROM. This ROM has been updated to an 09 ROM due to an intermittent bug in the edit software. Like the 6540 ROM Set, this too is a Basic Level II ROM Set. To determine what the 6540 and 2316B ROMs listed above are capable of, I would refer you to the "PET User Manual" Model 2001-8.

The next two ROM Sets are Basic Level III ROMs. They are also Retrofit Kits for the 2316B and 6540 Basic Level II ROMs. The Basic Level III ROMs allow you to access machine language by using a SYS command. Basic Level III allows you to interface the Commodore 2040 Dual Floppy to your PET/CBM. Basic Level II ROMs will not allow you to interface the 2040 Dual Floppy to your PET. The Basic Level III Retrofit ROMs also clear up a bug in limiting the dimensions.

If your PET/CBM has the Basic Level II 6540 ROMs, you would use the following ROMs which come in the form of a Retrofit Kit to upgrade your PET/CBM to Basic Level III.

<u>Location</u>	<u>ROM</u>	<u>Part Number</u>
H1	6540-020	901439-13
H2	6540-022	901439-15
H3	6540-024	901439-17
H4	6540-025	901439-18
H5	6540-021	901439-14
H6	6540-023	901439-16
H7	6540-026	901439-19

If your PET/CBM has the Basic Level II 2316B ROMs, you would use the following ROMs which come in the form of a Retrofit Kit to upgrade your PET/CBM to Basic Level III:

<u>Location</u>	<u>ROM</u>	<u>Part Number</u>
H1	901465-01	901465-01
H2	901465-02	901465-02
H3	901447-24	901447-24
H4	901465-03	901465-03
H5	Blank	
H6	Blank	
H7	Blank	

To determine what the Basic Level III Retrofit ROMs are capable of, I would refer to the "CBM User Manual" Model 2001-16,16N,32,32N. Part number 320856-3.

The following ROM Sets are the ROMs that are currently being used in production. There are two sets of ROMs in use. If you have a graphic style PET, you should have the following ROMs in your unit:

<u>Location</u>	<u>ROM</u>	<u>Part Number</u>
D3	Blank	
D4	Blank	
D5	Blank	
D6	901465-01	901465-01
D7	901465-02	901465-02
D8	901447-24	901447-24
D9	901465-03	901465-03
F10	901447-10	901447-10

If your computer is a business style, you should have the following ROMs in your unit:

<u>Location</u>	<u>ROM</u>	<u>Part Number</u>
D3	Blank	
D4	Blank	
D5	Blank	
D6	901465-01	901465-01
D7	901465-02	901465-02
D8	901447-01	901447-01
D9	901465-03	901465-03

The ROMs in the graphic and business PET/CBM are Basic Level III ROMs. Again, I would refer you to the "CBM User Manual" Model 2001-16,16N,32,32N. Part number 320856-3

The ROMs currently being used in production of the 2040 Dual Floppy are as follows:

<u>Location</u>	<u>ROM</u>	<u>Part Number</u>
UL1	901468-06	901468-06
UK1	Blank	
UH1	901468-07	901468-07
UK3	6530-02	901466-02

These ROMs are DOS Version I.

The 2022 and 2023 Printer went into production using a 901472-03 ROM at Location UL1. This ROM has been updated to a 901472-04. By changing the 03 to 04 ROM, the following enhancement of features and error correction improvements were made:

1. Allow feed switch to generate a continuous feed instead of 5 lines at a time (901472-03).

2. Head motor does not run when a Tractor Feed Printer performs a feed.
3. An extra carriage return is no longer printed after the first line of print after power-up.
4. Cumulative cooling delay time added for reverse field characters.
5. Added secondary address 7 to latch Printer into default upper/lower case mode instead of upper case/graphics mode to work with CBM business keyboard.
6. An enhanced character printed in the first column position no longer loses the first dot column at random.
7. Auto line count adjusted to 66 lines per page default including the page eject control character.

8. Corrections for the 6532 timer bug which caused overprinting (missed line feeds) on the friction feed version (901472-02) and were patched (901472-03) were assembled in line (901472-04).

9. In diagnostic mode, the character set printed is the 64 character ASCII set instead of 64 characters and an extra blank.

10. In diagnostic mode, the ready light is lit after the RAM and ROM tests are passed. Thus if a bad mechanism is attached, more data is given about the nature of the board.

I hope this information will be of great use to you.

Services Offered

One of the major advantages in being a member of the PET USERS CLUB is the ability to get hold of PET/CBM related Software and ideas. Although our Master Library of programs is now growing, we get frequent Software inquiries for a wide range of applications.

In this issue, we have included the current USERS DIRECTORY, containing lists of people writing Software, publishing literature or starting local PET Groups. If you would like to use your PET for fun and profit, why not offer personal tutoring in PET programming to new PET/CBM owners.

Alternatively, if you require a program to be written for you, ask for contacts via the USERS DIRECTORY. The possibilities are endless. Please write to the EDITOR, COMMODORE PET USERS CLUB, at our current address below.

To include your name in the USERS DIRECTORY, please complete the following form:

To include as many contacts as possible, we must restrict each USER to only one line of description.

COMMODORE reserves the right to edit or withdraw any entry.

TO: THE EDITOR
 COMMODORE PET USERS CLUB
 COMMODORE BUSINESS MACHINES
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 SANTA CLARA, CA 95051

NAME: _____

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SERVICES OFFERED/
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LISTED BELOW ARE PET/CBM USERS WHO HAVE RECENTLY SUBMITTED THEIR SPECIALTY OR AREA OF INTEREST TO FURTHER COMMUNICATION WITH PET OWNERS THROUGHOUT THE UNITED STATES. IF YOU WOULD LIKE TO OFFER YOUR SERVICES TO OTHERS, PLEASE FILL OUT THE "USER DIRECTORY" FORM ON THE PREVIOUS PAGE.

NAME AND ADDRESS

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Placentia, CA 92670

Small bus. accounting for personal use, games, ham TV (fast scan)

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Imperial Valley College
Imperial, CA 92251

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BELOW IS BY NO MEANS COMPLETE. PLEASE
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UC Berkeley Computer Project
Room 254
Berkeley 94720

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Burbank 91510

Valley Computer Club
1913 Boothe Road
Ceres 95307

PUG of Silicon Valley
22355 Rancho Ventura Blvd.
Cupertino 95014

Bambug
1450 53rd St.
Emeryville 94608

North Orange County Computer Club
3030 Topaz Apt A
Fullerton 92361

Lincoln Computer Club
750 E. Yosemite
Manteca 95336

Sphinx
314 10th Ave.
Oakland 94606

Sacramento PET Workshop
P.O. Box 26314
Sacramento 95826

Walnut Creek PET Users Club
1815 Ygnacio Valley Rd.
Walnut Creek 94596

CONNECTICUT

Southeast Connecticut PET User Club
c/o Paul W. Sparks
13 Lincoln Dr.
Gales Ferry 06335

FLORIDA

JAPS-Jacksonville Area PET Society
401 Monument Road #177
Jacksonville 32211

PUG
7170 S.W. 11th
West Hollywood 33023

S.P.C.A.
Suncoast PET Computer Association
904 Oakview Ave.
Clearwater 33516
(813) 447-6297

ILLINOIS

PET Users Bunch
Computerland
1500 S. Lake St.
Mundelein 60060
(312) 949-1300
meet: 1st Sat. each month 9 a.m.

MARYLAND

Association of Personal Computer Users
5014 Rodman Rd.
Bethesda 20016

MASSACHUSETTS

The New England Computer Society
PET Users Club
P.O. Box 198
Bedford 01730

PET Users Group of Mass
17 Chesnut St.
Boston, MA 02108

MICHIGAN

PET User Club
c/o Mich (Michigan Computer Hackers)
2235 Lakeshore Drive
Muskegon 49441

MISSOURI

St. Louis PET Set
c/o Bill Garver
1992 Treasure Dr.
Edwardsville 62025

St. Louis Club
40 Westwood Court
St. Louis 63131

NEVADA

Las Vegas PET Users
4884 Irene Ave.
Las Vegas 89110

NEW HAMPSHIRE

Northern New England Computer Society
P.O. Box 69
Berlin 03570

PET User Group of Hypot
P.O. Box 69
Berlin 03570

NEW JERSEY

Amateur Computer Group of New Jersey
18 Alpine Drive
Wayne 07470

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Long Island PET Society
Harborfields High School
Taylor Ave.
Greenlawn 11740

Mid-Hudson PET Users Group
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127 Madison Avenue
New York 10016

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35 Barker Ave.
White Plains 10610

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Durham 27705

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OREGON PET USER'S GROUP
2134 NE 45th Ave.
Portland 97213

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P.O. Box 371
Montgomeryville 18936

PACs PET User Group
La Salle College
20th & Olmes Sts.
Philadelphia 19144

TEXAS

SCOPE
1020 Summit Circle
Carrollton 75006

PET User Group
Texas A & M Microcomputer Club
Texas A & M University
College Station 77843

UTAH

PET User Group
2323 Washington Blvd.
Ogden 84401

VIRGINIA

PET User Club (CAPE)
2054 Eakins Ct
Reston 22091

WASHINGTON

Northwest PET User Group
P.O. Box 482
Vashon 98070

WISCONSIN

The Human Society--United PET Users
1929 Northport Dr. #6
Madison 53704

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