The Amateur Computerist

(Editor's Note: This newsletter grew out of the cancellation of computer programming classes at the Ford Rouge Plant. The fight to find out why the classes were cancelled and to get them reinstated continues. What follows is a letter from the Wayne County Prosecutor to the Michigan Superintendent of Schools concerning the unconstitutional transfer of Michigan public education funds to the program at Ford. Along with the Prosecutor's letter is a response from a reader differing about the purpose of the training program being run by Ford and the UAW.)

LETTER FROM PROSECUTOR
September 7, 1989

Superintendent of Public Instruction
Michigan Department of Education
608 W. Allegan
P.O. Box 30008
Lansing, MI. 48909
Dear Mr. Bemis:
   "In early 1988, my office received a complaint from a Wayne County resident concerning the operation of the then Garden City-Dearborn Public Schools Adult Education Consortium, now the Dearborn Heights School District No. 7/Dearborn Adult Education Consortium (Consortium) and its relationship to the UAW-Ford National Development and Training Center (the Center), operating on Ford Motor Company property in Dearborn, Michigan. The Consortium and the Center have entered into yearly contracts whereby the Consortium provides to Ford Motor Company-UAW employees, instructional and counseling services at the Ford Rouge Plant Complex. A number of allegations were

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OPPOSING VIEWPOINT
"Training for New Technology: Labor Relations Hoax"

   On September 7, 1989, the Wayne County Prosecutor ordered the Michigan Superintendent of Public Instruction to "cease and desist from making any future payment of public funds ... for any adult education classes held on the premises of the Ford Motor Company for the exclusive benefit of Ford/UAW employees." The Prosecutor had determined that the relationship between the school districts and the UAW-Ford National Development and Training Center "is in contravention of Const 1963, Art 8, Sec 2, since public funds are being paid... to aid a nonpublic school."
   This first very tiny step to correct the violations of the constitution and law may with its temerity help cover up and put off the rectification needed here. The NDTC operations are a form of labor relations and not educational in nature. The purpose of the Center is, according to its literature, to "promote training, retaining and development activities and efforts and, in the process ... contribute to the competitiveness and well being of the Company" or as John Dunlop put it, "training is one of the untapped, unworked areas of labor management relationships."(1) Therefore, what must be stopped are not only the diversion of public resources but

*(**Prosecutor letter** continued)*
made concerning the program, including
the alleged constitutional violation
of Const 1963, Art 8, Sec 2, of the
Michigan Constitution, which prohibits
any public monies being used to main-
tain or aid any private or nonpublic
schools.

As a result of this complaint, my
office did inquire as to the facts and
the law regarding this matter and did
engage in numerous conversations and
a meeting with all interested parties.
After much thought and review I con-
cluded that there did exist a substan-
tial public question regarding the
constitutionality of the contractual
relationship between the Consortium
and the Center. On March 31, 1988, I
did request Attorney General Frank
Kelley to render a written opinion,
under the authority of MCL 14.32, in
order to resolve the following ques-
tion:

Does the payment of public funds
to the Garden City School District/
Dearborn School District Consortium
Adult Education Program for the opera-
tion of adult education classes, held
on Ford Motor Co. private property,
for the exclusive benefit of Ford
Motor Co. employees, violate Const
1963, Art 8, Sec 2? (See Attachment
A.)

On July 20, 1989, Stanley
Steinborn, Chief Assistant Attorney
General, on behalf of the Attorney
General, responded by letter to my
request for an Attorney General's
opinion in answer to the above ques-
tion. (See Attachment B.) In his let-
ter the Attorney General, while decid-
ing not to issue an opinion in this
matter did state the following:

Having conducted a comprehensive
investigation of this matter, you
(Wayne County Prosecutor) are in the
best position to determine whether the
facts establish that the school dis-
tricts are acting in contravention of
Const. 1963, Art 8, Sec 2. Your office
(Wayne County Prosecutor's Office) is
also in the best position to initiate
any corrective action that might be
necessary.

In compliance with the Attorney
General's letter of July 20, 1988, I
have, after lengthy investigation,
determined that the following facts
have been established:

1. The Consortium has been employed
as an independent contractor provid-
ing teaching and administrative ser-
vices to the Center since 1983.

2. All services rendered by the
consortium are performed on the
private property of Ford Motor Com-
pany and performed for the exclusive
benefit of Ford Motor Company-UAW
employees.

3. Under the controlling contract
between the parties, any state money
received by the Consortium as a re-
sult of classes conducted under the
agreement are split between the par-
ties (51% to the Center, 49% to the
Consortium).

4. Under the contract the Center
and Ford Motor Company retain com-
plete control of the premises where
classes are held and the classes
offered are not open to all students
from the Consortium districts. The
Center retains control over the cur-
riculum offered and the class materi-
als utilized.

5. Under the contract the Center
decides where and when classes will
be held and decides where and how
many teachers are assigned to partic-
ular sites.

6. Under the contract, all informa-
tion and data gathered by the Consor-
tium while conducting classes on Ford
premises is the exclusive property of
the Center and can't be disclosed to
any person or organization without
the Center's consent.

7. Under the contract, the Consor-
tium is allowed to hire only third
parties approved by the Center in
writing and in advance.

Having found the above facts to be
true, I have also determined that the
relationship between the Consortium
and the Center is in contravention of
Const 1963, Art 8, Sec 2, since pub-
lic funds are being paid by the
Michigan Department of Education to
aid and maintain a nonpublic school.
All of which facts are inconsistent
with the holding in Traverse School
District v Attorney General, 384 Mich
390 (1971).

In compliance with the Attorney

General's letter of July 20, 1988, I have determined that the necessary corrective action under the circumstances of the instant matter requires the Michigan Department of Education to cease and desist from making any future payment of public funds to the Dearborn Heights School District No. 7/Dearborn Adult Education Consortium for any adult education class held on the premises of the Ford Motor Company for the exclusive benefit of Ford/UAW employees.

I am keenly aware that the training program offered by the UAW-Ford National Education Development and Training Center provides needed and beneficial training to the UAW membership employed by Ford Motor Company. However, the amount of public funds received by the Center and by the Consortium represents a very minor portion the program's budget and its loss should not prevent the program from continuing its important work. I am sure that all of the interested parties should be able to correct their actions so as to conform with the requirements of the Const 1963 Art 8 Sec 2 and yet continue with their worthy program.

Thank you for your cooperation in this matter."

Very truly yours,
John D. O'Hair,
Prosecuting Attorney,
County of Wayne

(Viewpoint continued from page 1) also the use of the cover and credit of the public schools to legitimize an operation that has no license as a school and only has as a pretense the purpose of worker education.

It was a fight by UAW students and their computer teacher that led to the prosecutor's order. That fight has been to get correction of the mistreatment they suffered when the Ford-UAW NDTC ordered the cessation of the computer programming classes they were taking at the Rouge Engine Plant Learning Center.

Over three years ago, in August of 1986, the facts of the Rouge situation were brought to the NLRB. Also in 1986

the facts concerning illegal and unconstitutional activities connected with the NDTC program at the Rouge were brought to the Wayne County Prosecutor's office. That was after a one year fight to continue the computer programming courses had basically met with a stone wall of failure. The facts were also brought to many levels of the UAW, the Ford Motor Company, the two school systems then involved, government representatives at the local, County, State and Federal levels. All without anything but a complete run around.

Only after the details of the Ford-UAW cancellation of computer programming classes were publicized on area BBS's was there a crack made in the stone wall of secrecy surrounding this attack on computer education for workers. A State Representative wrote letters to the Wayne County Prosecutor and to the Michigan Attorney General. The Prosecutor in March, 1988 wrote a letter to the Attorney General asking him to give an opinion about only the unconstitutional activity. The Attorney General, three months later threw the case back to the Prosecutor. In the meanwhile, the teacher was terminated from her job teaching at the Engine Plant Learning Center. She filed a Whistleblowers law suit in Wayne County Circuit Court. Then Dearborn changed partners for this operation.

Nothing more was heard from the Prosecutor until this latest letter. It is interesting that this action occurred just after the computer teacher asked the Prosecutor to intervene in her Whistleblower law case and to reconsider the evidence of illegal activity in this situation. It is now four years since the trouble was first discovered in Fall, 1985.

All this time public education money was transferred out of the public school system in order to help pay for a program that Ford Motor Company was already required to fund at five cents or seventeen cents per hour worked by every Ford hourly employee. In the Detroit Free Press (4/28/88, page 10-B) it was reported that "...the program has received

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slightly more than $100,000 from the State in 1983 to 1986...." Now Dearborn School officials claim that only $8,000 of public money is going to this program per year. Whatever the truth of the amount of public money channeled for this unconstitutional purpose, so far no school or County or State official is working for the return of the money already improperly transferred to the Ford-UAW NDTC nor for the cessation of the cover of the Ford-UAW worker pacification as an educational situation.

There is a serious and important story here. Both privatization of education and weakening of labor unions via this new relations cum training and development are part of the current agenda of which the NDTC operations are just one example. There are major forces preventing the public from knowing this story. The truth is public education can't survive if it is drained by private interests. But public education, independent of city, state, and federal interference, funded separately from other governmental expenses along with strong labor unions are two of the last remaining safeguards of our currently deteriorating society.

(1) Ernest J. Savoie, "Current Developments and Future Agenda in Union Management Cooperation in Training and Retraining of Workers", Labor Law Review, August, 1985, page 535.

Jay Hauben

LETTERS TO THE EDITOR

Enclosed is a check for $5.00 to cover the yearly subscription rate for the Amateur Computerist. Yes, it is fine to use my entire address if anyone does want to correspond with me. For further information on problems concerning the MC68000, I have finally tracked down Computer Express. I strongly advise anyone against ordering anything from this company. I am told by Computer Express that they had problems with supplying the required parts for this motherboard and simply discontinued the product and any items associated with the MC68000. Now, the only contact for the product is in Norway. As for *Radio-Electronics*, be very careful of any item reviewed by them. As I explained before, Radio-Electronics would not respond to any of my letters. The only response I got from anyone associated with their magazine was Don Lancaster, the so-called GURU. The GURU directed me to distributors who did not carry the parts, and manufacturers that did not manufacture the parts. Computer Express knows of one working model at the University in Munich, Germany. It is evident that Radio-Electronics reviewed the product in two of their issues based on only the manual. When they found that it was too difficult to obtain required parts, they dropped the MC68000 and went to the PK68000. Unfortunately, they evidently feel they do not need to apologize to anyone so foolish as to purchase an item based upon their recommendation. It would have been nice to know the problem from the magazine that recommended the product and stated they would support the product, but they abruptly changed the review to a different product with no explanation, apology, or acknowledgment and no response from inquiries. I can not believe that we, as consumers, allow such a magazine to exist. Perhaps the GURU should come down off his mountain to help poor fools who blindly follow his advice. Keep up the good work with the Amateur Computerist. Perhaps this is the only way that we can manage to get such companies, or magazines to either accept responsibility for their own actions, or keep the foolish aware of "acceptable business practices."

Respectfully,
SSG Charley O. Campbell
HHC 7th ATC, Box 3554
APO NY 09114

I haven't yet seen your newsletter, only heard about it. So I'd be interested in having some back issues and a current one, before I make up my

mind about subscribing. Enclosed is a new check. The Society here doesn't have a publication. It's composed of a group of invited academic fellows each year. I'm working on information countercultures, hence the interest in your newsletter.

<div align="right">Best Wishes,
Andrew Ross</div>

I've included a new check, plus a dollar for postage and handling. I have received a copy of your newsletter and enjoyed it very much. I am very much an "AMATEUR COMPUTERIST", and hope to learn much from your work.

<div align="right">Thanks Again
David E. Aime</div>

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*          WANTED ALIVE          *
*                                *
*    "80-column" card for elderly *
*         Apple II Plus          *
*                                *
*        Will pay (almost) any   *
*   reasonable price (if it works) *
*                                *
*            Contact:            *
*   Ron or Pam Webb: 313-274-8137 *
*        (evenings, weekends)    *
*      Pam Webb: 313-582-2218    *
*            (weekdays)          *
************************************
```

COCO CORNER

This is the second column! That's right, time again for all you people out there with TRS-80 Color Computer II's to have a program all to yourselves.

By the time this is printed, school will be in full swing. For all you Algebraic types, I have for this installment a program that actually graphs equations for you, saving untold hours of human labor. It should be a big help to students trying to learn about how graphs work, teachers or parents trying to explain it, or anyone else curious about numbers. It also should help beginning programmers see how some of the things done in this program are actually programmed.

First of all, the key to the program is the loop in lines 50-130. It takes all values from -99 to 99 and plugs them into the equation you supply, then plots the points on the screen. Such an undertaking done manually would take forever, with much less accuracy.

Another important concept is line 70. This takes the numbers generated by the equation and changes them to something that can easily be plotted. I took the CENTER of the screen, (point 128, 96) and used it as the origin of the graph. Then I ADDED the X and Y values to this. The beauty of this is that if the numbers are NEGATIVE, they will be SUBTRACTED from the center and be placed in the correct quadrants!

The variable FUN is definitely not, and is hard to explain, although it is simple in what it does. Since any line drawn using the abbreviated version of LINE command (i.e. LINE -(X,Y),PSET) without a previous LINE command is drawn from the center of the screen to the specified coordinate, I had to first use LINE somehow to keep the big, ugly line from being on the screen from the middle to the start. So thus the FUN variable, which does this function and then keeps itself from being used any more.

The first subroutine tells you the X, Y, H, & V values at the moment you press any key. Also, the color is a unique experience all COCO users should know how to experience. To get it, type SCREEN 0,1. To make it last more than a split second, use a delay like: FOR A=1 TO 1000: NEXT A. Once you experience it, you'll never want another cup of coffee to stay awake again!

Line 160 is a perfect example of condensing two lines into one by 'nesting' IF-THEN statements like loops or something. More than one IF-THEN can certainly be used in a line.

As I mentioned last time, when you use this program please include my name and the date with your listing. It really is the least you can do, especially if you plan to copy this and give it to friends, since this is a free program after all.

I finally thought up the perfect way to sign off (especially considering our subject matter): REMEMBER THAT A COMPUTER IS ONLY AS GOOD AS THE HUMAN PROGRAMMING IT!!

```
0  '   ***************************
1  '   *EQUATION GRAPHING PROGRAM*
2  '   ***************************
3  '   * BY SCOTT MCMAHAN         *
4  '   *          ON 8-17-89      *
5  '   ***************************
6  '   *         VARIABLES        *
7  '   ***************************
8  '   * FUN-SEE TEXT             *
9  '   * X AND Y ARE THE X AND Y  *
10 '   * VALUES OF THE EQUATION.  *
11 '   * H AND V ARE THE X AND Y  *
12 '   * VALUES MODIFIED SO THEY  *
13 '   * CAN BE PLOTTED ON THE    *
14 '   * GRAPHICS SCREEN.         *
15 GOSUB 200
16 SCREEN 1,0: CLS
20 LINE(128,0)-(128,191)
30 LINE(0,96)-(255,96)
40 FUN=0
50 FOR X=-99 TO 99
60 Y=((SIN(X))^3)*10
70 H=128+X: V=96+Y
80 IF INKEY$="" THEN 90 ELSE GOSUB 168
90 IF H<0 OR H>255 OR V<0 OR V>191
THEN 130
100 PSET (H,V),4
110 IF FUN=0 THEN LINE(H,V)-(H,V):
FUN=1
120 LINE-(H,V)
130 NEXT X
140 IF INKEY$="" THEN GOTO 140 ELSE
GOTO 150
150 CLS: PRINT"PRESS <ENTER> TO END
PROGRAM.     PRESS ANY OTHER KEY TO
RETURN TO MAIN SCREEN."
160 I$=INKEY$: IF I$="" THEN 160 ELSE
IF I$=CHR$(13) THEN END ELSE GOTO 9
165 '***************************
166 '*   SUBROUTINE NUMBER ONE  *
167 '***************************
168 CLS: PRINT: PRINT: PRINT: PRINT:
PRINT: PRINT: PRINT: PRINT"X="X,
"Y="Y, "H="H, "V="V
169 PRINT: PRINT"PRESS ANY KEY TO
ESCAPE THIS INFERNAL ORANGE COLOR."
170 SCREEN 0,1
180 IF INKEY$="" THEN 180 ELSE SCREEN
1,1: RETURN
190 '***************************
191 '* SUBROUTINE NUMBER TWO    *
192 '***************************
200 CLS
210 PRINT"THIS IS THE GRAPHING PRO-
GRAM. TO USE THIS, SUPPLY YOUR OWN
EQUATION BY HITTING  THE <BREAK> KEY,
THEN TYPING THE NUMBER 60 THEN SKIP-
PING A SPACE AND TYPING AN EQUATION.";

220 PRINT" THE EQUATION HAS TO BE IN
THE FORM Y EQUALS SOME EXPRESSION OF
X OR IT WILL NOT WORK."
225 PRINT: PRINT"PRESS ANY KEY  TO
CONTINUE WITH THE DIRECTIONS"
226 IF INKEY$="" THEN GOTO 226 ELSE
CLS: GOTO 230
230 PRINT"TO RETURN TO THIS SCREEN
TYPE RUN AND PRESS <ENTER>. DURING
THE GRAPHING YOU MAY HIT ANY KEY TO
SEE THE NUMERICAL VALUES OF X AND Y."
240 PRINT"AFTER THE GRAPH IS COM-
PLETED, PRESS ANY KEY TO STOP VIEWING
THE GRAPH."
250 PRINT"PRESS  ANY  KEY  TO  VIEW
GRAPH."
260 IF INKEY$="" THEN GOTO 260 ELSE
RETURN

               IBM VERSION
               modified by Mike Hauben
0  '   ***************************
1  '   *EQUATION GRAPHING PROGRAM*
2  '   ***************************
3  '   * BY SCOTT MCMAHAN         *
4  '   *          ON 8-17-89      *
5  '   ***************************
6  '   *         VARIABLES        *
7  '   ***************************
8  '   * FUN-SEE TEXT             *
9  '   * X AND Y ARE THE X AND Y  *
10 '   * VALUES OF THE EQUATION.  *
11 '   * H AND V ARE THE X AND Y  *
12 '   * VALUES MODIFIED SO THEY  *
13 '   * CAN BE PLOTTED ON THE    *
14 '   * GRAPHICS SCREEN.         *
15 GOSUB 200
16 CLS: SCREEN 2: KEY OFF: 'Key off
for IBM (Turns off the function key
display on the bottom of screen)
20 LINE(128,0)-(128,191),1
30 LINE(0,96)-(255,96),1
40 FUN = 0
50 FOR X = -99 TO 99
60 Y = ((SIN(X))^3)*10
70 H = 128+X: V=96+Y
80 IF INKEY$ = "" THEN 90 ELSE GOSUB
168
90 IF H < 0 OR H > 255 OR V < 0 OR V
> 191 THEN 130
100 PSET (H,V),1
110 IF FUN = 0 THEN LINE (H,V) -
(H,V),1: FUN = 1
120 LINE-(H,V),1
130 NEXT X
140 IF INKEY$ = "" THEN GOTO 140 ELSE
GOTO 150
150 CLS: PRINT "PRESS <ENTER> TO END
```

PROGRAM. PRESS ANY OTHER KEY TO RETURN TO MAIN SCREEN."

```
160 I$ = INKEY$: IF I$ = "" THEN 160
ELSE IF I$ = CHR$(13) THEN END ELSE
GOTO 9
165 '*************************
166 '*  SUBROUTINE NUMBER ONE  *
167 '*************************
168 LOCATE 1,1: PRINT"X ="X, "Y ="Y,
"H ="H, "V ="V' I deleted the cls in
this line and replaced all of the
PRINT statements with the locate
statement
169 PRINT: PRINT "Press any key to
return to the graphing." 'instead of
PRINT"PRESS ANY KEY TO ESCAPE THIS
INFERNAL ORANGE COLOR."
170 'SCREEN 0,1 - This line was caus-
ing the screen to clear right after it
displayed the x,y and h,v values.
180 IF INKEY$ = "" THEN 180 ELSE
RETURN: 'iF INKEY$ = "" THEN 180 ELSE
SCREEN 1,1: RETURN
190 '*************************
191 '* SUBROUTINE NUMBER TWO   *
192 '*************************
200 CLS
210 PRINT "THIS IS THE GRAPHING PRO-
GRAM. TO USE THIS, SUPPLY YOUR OWN
EQUATION BY HITTING THE <BREAK> KEY,
THEN TYPING THE NUMBER 60 THEN SKIP-
PING A SPACE AND TYPING AN EQUATION."
220 PRINT "THE EQUATION HAS TO BE IN
THE FORM Y EQUALS SOME EXPRESSION OF
X OR IT WILL NOT WORK."
225 PRINT: PRINT "PRESS ANY KEY TO
CONTINUE WITH THE DIRECTIONS"
226 IF INKEY$ = "" THEN GOTO 226 ELSE
CLS: GOTO 230
230 PRINT "TO RETURN TO THIS SCREEN
TYPE RUN AND PRESS <ENTER>. DURING THE
GRAPHING YOU MAY HIT ANY KEY TO SEE
THE NUMERICAL VALUES OF X AND Y."
240 PRINT "AFTER THE GRAPH IS COM-
PLETED, PRESS ANY KEY TO STOP VIEWING
THE GRAPH."
250 PRINT "PRESS ANY KEY TO VIEW
GRAPH."
260 IF INKEY$ = "" THEN GOTO 260 ELSE
RETURN
```

TRUE HEROS

by Michael Hauben

A hero is not someone who only appears a hero in our eyes, but one who achieves good for the common man, against the will of the establishment. This person must be able to stand up against the common bad, instead of pleasing somebody. Often this person will either have all or most of society going against him. The hero must be able to stand up for what he believes in and not succumb to outside pressure.

Galileo is a good example of a hero. He challenged the Church by publishing his scientific findings, which were against the then current and less accurate Aristotelian science. He kept on studying and his mind was unchanged even after the Inquisition challenged him. So in the end, when the Inquisition tried to silence him by putting him under house-arrest, he still got his writings out to the people. Galileo would not be silenced by the Inquisition because in his search for the truth he was not afraid to oppose authority!

Gary Kindall is another hero or at least part of a heroic movement. He was the creator of CP/M (Control Program for Microprocessors), the first operating system for micro-computers. CP/M was developed during the beginning of the micro-computer revolution. Before micro-computers were developed, IBM (International Business Machines) and other big companies produced the only computers available. The computers that they marketed were incompatible mainframes and mini-computers which only big businesses and big universities could afford. What the micro-computer revolution brought together was a community of people who wanted to bring the power of computers to the common people, instead of just to these institutions. This community succeeded in making the personal computer. They insisted that the personal computer have an open architecture and be compatible. CP/M played a big part in making the personal computers compatible. After a while, IBM wanted to get into the micro-computer market, so they introduced a micro--computer that was incompatible with everything else. No one would have anything to do with this machine, so IBM was forced to come out with a

more compatible and open machine! IBM went to Gary Kindall and asked to use a version of CP/M for the IBM PC (Personal Computer), but first they wanted him to sign a nondisclosure agreement. He wouldn't agree to IBM's requirement of secrecy because that would be breaking the micro-computer principle of keeping everything open and available to all the people. So IBM didn't use CP/M. Instead they used something that was almost exactly like CP/M except it was developed especially for IBM's PC. Gary Kindall and the people who brought the micro-computer into existence are heroes! They brought the secret of computer power from IBM and other big companies to all the people!

Sports heroes and celebrities are not true heroes because they cannot bring about real changes. People like Galileo and Kindall are real heroes because they make a significant change in the world benefitting the common person. All ages have untrue heroes, but true heroes are rare.

TRIGONOMETRY LESSON for IBM

```
10 KEY OFF: SCREEN 2: CLS
20 PI = 4 * ATN(1)
30 LOCATE 1,1
40 PRINT "What is a CIRCLE?"
50 A = 300: B = 100: R = 50
60 FOR I = 0 TO 2 * PI STEP 2 *
PI/100
70 X = A + 2.2 * R * COS(I): Y = B -
R * SIN(I)
80 LINE(A,B)-(X,Y)
90 LINE(A,B)-(X,Y),2
100 PSET(X,Y)
110 NEXT
120 LOCATE 1,1
130 PRINT "A CIRCLE is the locus of
all points equidistant from a point
within called the center. We made
this one by fixing one end of a line
segment and tracing the path of the
other end as the line segment
rotated through 360 degrees (which";
140 PRINT "equals 2 * pi radians).":
PRINT
150 GOSUB 5000
160 LOCATE 1,1
170 PRINT "Study the following dia-
gram.
                    ":REM 51 spaces
180 L = 5: GOSUB 6000
190 LINE(A,B) - (A + 2.2 * R,B)
200 LINE(A,B) - (A + 2.2 * R *
COS(PI/3), B - R * SIN(PI/3))
210 U = A + 2.2 * R * COS(PI/3): V =
B - R * SIN(PI/3)
220 LOCATE 13,33
230 PRINT "(a,b)"
240 LOCATE 10,41
250 LOCATE 7,46
260 PRINT "(u,v)"
270 LOCATE 10,41
280 PRINT "R"
290 LOCATE 12,41
300 PRINT "A"
310 LINE(A + 2.2 * R * COS(PI/3), B
- R * SIN(PI/3)) - (A + 2.2 * R *
COS(PI/3), B)
320 LOCATE 13,42
330 PRINT "x"
340 LOCATE 11,45
350 PRINT "y"
360 LOCATE 3,1
370 PRINT "A = angle, R = radius,
(a,b) = center. Do you see why for
every point on the circle

                    x^2+y^2=R^2
?": REM 111 spaces
380 PRINT
390 GOSUB 5000
400 LOCATE 7,1: PRINT"
          ": REM 26 spaces
410 LOCATE 2,1
420 L = 4: GOSUB 6000
430 LOCATE 3,1
440 PRINT "Can you express x in
terms of A and R ? Think about sines
and cosines."
450 PRINT
460 PRINT "Can you express y in
terms of A and R ? Think about sines
and cosines."
470 PRINT
480 GOSUB 5000
490 PRINT: PRINT: PRINT: PRINT:
500 PRINT "   x = R * cos(A)"
510 PRINT
520 PRINT "   y = R * sin(A)"
530 LOCATE 7,1: GOSUB 7000
540 LOCATE 18,1
550 GOSUB 5000
560 LOCATE 18,1
570 PRINT "
": REM 27 spaces
580 LOCATE 7,1
590 PRINT "
```

```
": REM 26 spaces
600 LOCATE 2,1
610 L = 4: GOSUB 6000
620 LOCATE 3,1
630 PRINT "Do you see why  u = a + x
and  v = b + y ?": PRINT
640 GOSUB 5000
650 LOCATE 5,1: GOSUB 7000
660 LINE (0,182) - (U + 35,182):
LINE (5,197) - (5,V - 10)
670 LOCATE 5,1: PRINT "Y"
680 LOCATE 23,53: PRINT "X"
690 LINE(5,V) - (U,V)
700 LINE (A,V - 2) - (A,V + 2)
710 LOCATE 7,A/16: PRINT "a"
720 LOCATE 19,45: PRINT "b"
730 LOCATE 7,42: PRINT "x"
740 LINE (U,182) - (U,B)
750 LOCATE 1,50
760 PRINT "Now to write a program
to"
770 LOCATE 2,50
780 PRINT "draw a circle."
790 LOCATE 4,50
800 GOSUB 5000
810 LOCATE 4,48
820 PRINT "5 FOR A = 0 to 2 * pi
step 2 * pi/100"
830 LOCATE 5,48
840 PRINT "10 x = R * cos(A): y = R
* sin(A)"
850 LOCATE 6,48
860 PRINT "20 u = a + x : v = b + y"
870 LOCATE 7,46
880 PRINT"  30 PSET (u,v)
890 LOCATE 8,46
900 PRINT"  40 NEXT A"
1000 LOCATE 10,55
1010 PRINT "The step in line 5 "
1020 LOCATE 11,55
1030 PRINT "allows for 100 dots."
1040 LOCATE 13,55
1050 PRINT "In APPLESOFT change
line"
1060 LOCATE 14,55
1070 PRINT "30 to HPLOT(u,v)"
1080 LOCATE 16,55
1090 PRINT "If you only want part of
a"
1100 LOCATE 17,55
1110 PRINT "circle choose
appropriate"
1120 LOCATE 18,55
1130 PRINT "limits in line 5. For
ex-"
1140 LOCATE 19,55
1150 PRINT "ample For A = pi/4 to
pi/2"
1160 LOCATE 20,55
1170 PRINT "draws a small arc:"
1180 CIRCLE(570,180),40,,PI/4,PI/2
1190 LOCATE 22,55: PRINT "THE END"
1200 CIRCLE (460,172),27
4999 END
5000 PRINT "Press any key to con-
tinue."
5010 IF INKEY$ = "" THEN 5010
5020 RETURN
6000 FOR Q = 1 TO L
6010 PRINT "

                    ":REM 79 spaces
6020 NEXT Q
6030 RETURN
7000 PRINT "
":REM 27 spaces
7010 RETURN
```

HISTORY OF THE COMPUTER
Part 4

[Editor's Note: This is the 4th part of an article which began in the Jan, 1989 issue. See note accompanying part 1 for background. This article is accompanied by a BASIC (IBM version) program which is interspersed with the relevant sections of the article.]

The article announcing Titus's Mark-8 computer was printed in the July, 1974 issue of *Radio-Electronics*. Ten thousand people sent for the instruction manual offered in the article for $5.50. And about 2,500 people sent for the circuit boards that were advertised. "The Mark-8 computer was a significant seed in the grassroots movement to make the computer available to everyone," writes Augarten.

```
1380 PRINT "ALTAIR 8800"
1390 PRINT "POPULAR ELECTRONICS"
1400 PRINT "JAN 1975"
1405 GOSUB 5000
```

He describes what happened next. "In January, 1975, six months after Mark-8's introduction, *Popular Electronics* published the first install-ment of a two-part article on a more sophisticated computer, the Altair 8800. The Altair was the first, the very first full-fledged personal computer on the market."(p 270) The article was featured on the front

cover of the magazine: "Project Breakthrough!:" it announced, "World's First Minicomputer Kit to Rival Commercial Models... Altair 8800. Save Over $1000." And it was available in kit form for $395 or in assembled form for $650. MITS, the manufacturer of the Altair, received thousands of orders.

```
1400 PRINT "GATES AND ALLEN"
1410 PRINT "BASIC INTERPRETER"
1420 PRINT "FOR ALTAIR"
1425 GOSUB 5000
```

The firm was overwhelmed with orders. Augarten explains, "If you wanted to get the Altair to do something...you had to write a program in machine code and enter it, bit by bit, via the toggle switches on the front panel." It only had a 256-byte memory, too small to do much with. "As a result," writes Augarten, "all you could really do with the Altair was play with it, and one of its first programs was a game that generated increasingly complicated patterns of lights on the front panel to be duplicated by the players."(p 274)

What the Altair needed was a language interpreter or compiler (a program that would allow the machine users to write programs in a programming language). Paul Allen, was a programmer working in the Boston area. He was walking through Harvard Square when the January 1975 issue of *Popular Electronics* caught his eye on the newsstand. He had been a computer hobbyist and hacker in his teen years. He bought the magazine and went to visit his friend and fellow hacker, William Gates, who was a freshman at Harvard. The two phoned Roberts, owner of MITS, with the claim that they had a BASIC language interpreter usable on the Altair. Roberts invited them to bring it to Albuquerque. Gates and Allen went out and bought a manual for the 8080 chip and set to work. They worked day and night. Six weeks later, Allen flew out to Albuquerque with their BASIC interpreter. Roberts met him at the airport and brought him to his factory. The program was loaded into an Altair, and it worked. Allen accepted the job of software director for MITS. Gates dropped out of Harvard and became a freelance software writer. Gates and Allen later set up the Microsoft Corporation in Bellevue, Washington (their home town) which is now one of the largest software companies in the world.

```
1440 PRINT "HOMEBREW COMPUTER CLUB"
1450 PRINT "MARCH 1975"
1460 PRINT "SOON 500 MEMBERS"
1465 GOSUB 5000
```

The Altair inspired other hobbyists to design their own computers. One of these was Stephen Wozniak (Woz). The ferment going on because of the introduction of the Altair had led to the formation of computer clubs all over the country, particularly one in Silicon Valley known as the Homebrew Computer Club. Woz went to a meeting in March, 1975. From the 30 people who showed up at the March meeting, the group soon found itself with 500 members. The excitement generated by the Altair was catching. "Meetings," Augarten explains,"were divided into a "random-access" period during which the floor was thrown open to anyone who had anything to say, and a `mapping' period when the audience broke up into small groups devoted to common concerns." (Augarten, p 278)

```
1470 PRINT "WOZNIAK"
1480 PRINT "BOUGHT 6502 CHIP"
1490 PRINT "WROTE BASIC
     INTERPRETER"
1500 PRINT "CREATED APPLE WITH
     JOBS"
1510 PRINT "1977 APPLE II"
1515 GOSUB 5000
```

Woz bought a 8-bit microprocessor, the 6502 from MOS technology – now part of Commodore for $20. Virtually the first thing he did was write a BASIC interpreter for it. Then he created the computer to run the interpreter. His machine wasn't as powerful as the Altair but it was cheaper and less complicated. He and Steve Jobs went on to market it as the APPLE Computer.

In 1977 they introduced the Apple II with 16K of RAM for $1,195. Woz who loved to play games had designed the computer for that purpose.

```
1610 PRINT "IBM 5100"
1620 PRINT "PRINCIPLES OF COMPUTER
     ESTABLISHMENT"
1630 PRINT
```

```
1635 PRINT "SECRET ARCHITECTURE"
1640 PRINT "INCOMPATIBLE"
1650 PRINT "FALLS FLAT"
1651 PRINT
1652 PRINT "IBM 5150"
1654 PRINT "ADOPTS PRINCIPLES SET
     BY"
1656 PRINT "HOMEBREW COMPUTER CLUB"
1657 PRINT "OPEN ARCHITECTURE"
1658 PRINT "OPEN CODE"
1659 GOSUB 5000
```

In an article called "How We Trapped the Dinosaurs," Lee Felsenstein who was the head of the Homebrew Club during this fruitful period and who ran the club meetings describes the period. Following is an extensive quote from the article which is a helpful summary of how the homebrew club gave birth to the personal computer. He explains: "Many of us were then starting to shed our adolescent views of technological development as we moved from the educational system into the lowest levels of the production system. Many of us quickly noticed that our noble managers knew less about the technology with which we were working than we knew.

We also started to see that the business of Business was making money, not products, and that if they could make money with turkey products, then we would be put to making turkey products and nothing else.

And we discovered that the Big Boys of the computers were not after all engaged in a race to get the most users at the lowest cost but were instead playing marketing muscle games to lock the biggest proportion of users to the highest cost computers possible.

So we did the only thing we could under the circumstances, we learned as much as we could about our technology and kept alive our sci-fi dreams of a future where everyone could have a computer, and no one be locked out of all the fun and fascinating things we knew could be done with computers.... We hadn't spent all that time learning all that stuff because someone had asked us to. It had a beauty all its own which we could understand and which we wanted to share with everyone.

Then, with the sudden ferocity of events overtaking the dreamer, we were in the midst of the explosion.

When Altair 8080 computer kit appeared in January 1975, we scrutinized the designs.... In March the first sample arrived in the San Francisco area and the Homebrew Computer Club galvanized around it. (Serial Number 8) No I/O available, no software. This was raw standardized opportunity. And nobody was looking! We could do anything we wanted to.

What happened in those `unforgettable next two year...' was that thousands of people sank their own money into learning about computers in the hardest and best way -- by trying to build or program them from elements which were barely adequate at best. Hundreds of people became sufficiently involved in attempting to produce new hardware and software that they became participants in a kind of group sport.

Like Athletes, they strove to do what had never been done to exceed their known limits and to share their successes and efforts with each other in the hopes that all would gain. The people who created this atmosphere were not subordinate to money men... We ran ahead of the lumbering giants of the computer industry and frantically staked out our territory. We learned as pioneers must to rely on each other for support.

When the dust cloud cleared and the dinosaurs hove into sight we were prepared -- and we prevailed.

In 1978 IBM put its foot over the line and said "that's mine" with the 5100, a breadbox wonder of incompatibility that epitomized the IBM way. They don't like to talk about what happened to them. In 1981 they returned with the 5150 (the PC) and with it they followed the rules we had laid out. Anyone can play, the rules read, but you must make your architecture and executive code as public as possible, and you must encourage individuals to write programs and create add-ons. You can play games, but you must help others to play as well.

We didn't give the Corporate Establishment free rein in the hopes that they would bless us with innova-

tions. We trampled all over their organized ways of doing things."

"It was a lot of fun," he summarizes, "and I think it can be done again, where technology can be implemented in a small or intermediate scale by people who treat it as an art and a sport. As an early Mad Magazine quipped," he ends, "`fools rush in and get the best seats'." (quoted from Creative Computing, Nov. 1984, p 193-194)

Through all of this, magazines like Creative Computing and Byte sprang up and were helpful to people who wanted to become involved with personal computers. Computer Clubs like the Commodore and Apple clubs sprang up across the country. There were computer fairs and exhibitions that helped to demonstrate and spread the rapidly developing technology. And in the process of all this it became clear that games played an important role in the development of the computer and of computer software.

"The big companies had conceived of computers solely for number crunching," explains a writer summarizing the breakthrough represented by the personal computer. "The personal computer was the result of the available technology being used in a way totally unpredictable. Computers could be more than number crunchers." (Creative Computing, Nov. 1984, p 97)

Uses undreamed of or conceived of only in science fiction have been developed like word processing, telecommunication, operating robots, etc. The speed, data collection, and miniaturization made available by electronics means that totally novel situations can be dealt with.

One pioneer of the modern computer, explains what he feels is the significance of the change they represent. In pre-electronic days of digital computing, computers were conceived to ease the burden of companies and government in modest ways without creating any significant change. "It was not until the electronic era " he writes of the period marked by the invention of the personal computer, "that totally new burdens could be undertaken by machines to better man's life." (Goldstine, p 347)