# Here Comes Atari Logo

### by
### Shoneen Gervich

Atari Logo is on the way! Boasting four turtles, floating point arithmetic, and a full array of list processing capabilities, it has the potential to become one of the most popular versions of Logo. Developed by LCSI to take advantage of the unique capabilities of the Atari computers, it features most of the "usual" Logo primitives plus some exciting new ones which give the Logo juggling act a completely different slant.

## THUNDERING TURTLES

A herd of four turtles is available to carry out both individual and collective commands. That is, each turtle can move independently or in concert with the others, responding to primitives such as TELL, ASK, EACH, and WHO.

Moreover, these turtles actually look like turtles instead of the sometimes confusing triangles. Each has a round body with four legs and a tail. A turtle head points clearly in the direction of the heading.

## TURTLE CONTROLS

Each turtle has three pens, each of which can draw in any of 128 different colors. Moreover, each of these colors is available for the background, and for the colors of the turtles themselves. The Atari palette will give your students color possibilities which are practically unlimited.

The drawing speeds of the turtles can be controlled by the primitive SETSP and a number from 0 to 199. Thus, a turtle which has been told SETSP 5 will draw rather slowly, a feature perhaps useful with beginners, while one with SETSP 150 will draw much faster. Also, a line drawn at high speed will be less solid than one drawn slowly, giving an added texture capability.

The Atari Logo turtles can change shape, making it possible to create animated sequences. Up to 15 user-defined shapes may be in memory at any one time. Cars, planes, human figures, animals, and the like can come to life on the screen very easily by rapidly changing turtles from one shape to another, in a manner similar to that often done with the TI LOGO Sprites.

Possibly the most unique feature of Atari Logo is its collision detection. Beings called "WHEN Demons" check to see when specified turtles collide or when they cross lines. Predetermined lists of commands are then carried out. For example, if Turtle 1 and Turtle 3 collide, they could change shape or rebound or almost anything else imaginable.

The TOOT primitive will create sounds which can be played through the speaker of the television. Frequency, duration, and volume may be specified for two voices, making it possible to compose music, create special effects, and the like.

With Atari Logo, the heart-felt desire of almost every child to create a video game is now within reach.

## NUTS AND BOLTS

Atari Logo comes in a plug-in 16K ROM cartridge which will fit the 400, 800, and 1200 models and their successors. When used with a 48K machine, such as the 800, Atari Logo has about one thousand more nodes of memory available in the workspace than any of the Apple versions.

Atari Logo comes with a reference card, and two books, "Introduction to Programming Through Turtle Graphics" and "Atari Logo Reference Manual."

A disk drive is recommended, in order to take full advantage of the language. Storage and retrieval tasks are straightforward.

The cost of an Atari Logo system is quite low. The language, a disk drive, and 64K computer can be put together for under $900. By using a tape cassette storage system and the 16K computer, you can drive the price below $400. This is about the lowest price you will find for a full Logo implementation.

### EFFECTS

You may expect Atari Logo to have a significant effect on both teachers and students, and on the teaching of Logo.

The wealth of options available with Atari Logo will stimulate those already familiar with other versions of the language, and will serve as a beckoning enticement to those contemplating entering the Logo microworlds for the first time.

The multiple turtle capability makes possible new ways of thinking about solving problems. Turtle control becomes more complex, more challenging. Creativity and imagination become even more important.

Atari has made Logo affordable, powerful, and irresistible. It is up to us and our students to make the most of it.

(For more information, write: Atari Logo, PO Box 16525, Denver CO 80216 — Ed.)

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Shoneen Gervich teaches children's classes in PILOT, Logo, and (only if she has to) BASIC, through various community agencies in the South Bay area of San Francisco.

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## NLX Back Issues Available

A limited number of sets of Volume 1 of The National Logo Exchange newsletter are available, covering the period from September 1982 through May 1983. Many beginning Logo teachers have found this set to be a helpful resource for ideas and activities, as well as for general Logo information. To order your set, send $25 to NLX Volume 1, PO Box 5341, Charlottesville VA 22905.

# From The Editor

September always has a special zing to it, doesn't it? There is something invigorating about hallways alive with young people once more. Facing a class full of new friends and new challenges is stimulating. And, of course, having Logo in your lesson plans for the coming year is exciting!

This school year is going to be one of incredible growth for Logo. Thousands of teachers everywhere are starting to use it in their classrooms. More and more versions are being released for more and more computers. Several Logo books are being published, and more are on the way. Nearly every educational computing magazine now has a Logo section.

This growth has excited many people: teachers, parents, administrators, professors, software developers, publishers. And the children are the most excited of all!

With you, we welcome this growth. Our motto FORWARD 100! was chosen to reflect this attitude. FORWARD is the direction of progress, improvement, growth. 100% of our newsletter supports you, the Logo teachers. The exclamation mark represents the excitement Logo brings to learning. By working together and sharing Logo ideas, we can multiply this growth to proportions that cannot be imagined. Your students are the direct beneficiaries of this growth!

To all our earlier subscribers, we send a hearty WELCOME BACK! We appreciated meeting you last year, and look forward to working with you again this school year. To our many new subscribers, we extend a special HELLO! We hope that this year will be one of healthy challenges and professional growth for all of us.

As a personal note, I'd like to add that, after 13 years of marriage, my wife, Posy, and I have been blessed with a child! We are pleased that our son, Kyser, will be able to grow up with Logo, and with Logo teachers such as you!

FORWARD 100!

# TIPPS for TEACHERS
## Borders and Frames

by
Steve Tipps

Salutations on a new year of Logo!

In this column, I enjoy presenting ideas which are not complete programs; instead, they are starters for developing problem-solving and programming skills. Teachers and students should work cooperatively as they learn from and about Logo.

In Logo, both process and product are important; in fact, they are inseparable. You should become aware of your own problem-solving and learning strategies as you switch back and forth between completing a task and playing with the capabilities of the Logo language.

One example of a project which has a nice balance between product and process is drawing frames for completed Logo drawings. Starting the new school year may mean finding interesting ways to reintroduce commands and hone programming skills in Logo. Making frames will refresh memories of commands and skills or demand new skills.

The project can be tackled by using only the beginning turtle commands of FORWARD, BACK, RIGHT, and LEFT, or it can extend and challenge skills through variable procedures with recursion. However, the focal skill for FRAMES is the use of simple procedures in REPEAT statements.

### TO FRAME

The simplest frame which you can make for a turtle drawing would be to draw around the whole picture with a single turtle line. A square frame can be drawn with separate turtle commands or with a REPEAT statement, such as

```
REPEAT 4 [ FORWARD 100 RIGHT 90 ]
```

A procedure might be written for a rectangular frame. For example,

```
TO RECT.FRAME
   REPEAT 2 [ FD 100 RT 90 FD 160 RT 90]
   END
```

Different turtle canvases will require different shapes and sizes for your frames. Procedures such as CIRC.FRAME, SQ.FRAME, and RECT.FRAME can be made for fixed sizes or with variables.

Another procedure makes moving to the beginning point for the frame more convenient. SET.UP moves the turtle to the lower left corner of the frame.

```
TO SET.UP
   DRAW
   PENUP
   BACK 60 LEFT 90
   FORWARD 100
   PENDOWN
   END
```

```
TO SET.UP :DOWN :SIDE.LEFT
   PENUP
   HOME
   BACK :DOWN LEFT 90
   FORWARD :SIDE.LEFT
   PENDOWN
   END
```

The value of having a procedure for moving the turtle to the starting position is soon obvious. The variable procedure for SET.UP also demonstrates the real advantages of variability. Whether you use DRAW or HOME as the initial positioner for the turtle will depend on whether you want to redraw the canvas you are framing.

### BEGINNING DECORATIONS

Decorating the frame is an obvious extension of drawing a plain frame. Changing PENCOLORs is one way to decorate, but more interesting possibilities soon arise. Gradually increasing the size of basic rectangles, squares, diamonds, or circles drawn around a picture can give the illusion of depth. These concentric shapes require repositioning the turtle from one starting corner to the next. This could be a major puzzle. The SET.UP procedure with variables may provide a clue for solving this.

Another way to decorate the frame is to place a small figure at each corner. A star, rosette, or a square in a procedure could be added into a REPEAT statement for the frame. The size for each of the decorations has been confined to 10 turtle steps or so to keep them in proportion with the screen and pictures. You and your students may want to make them larger or smaller.

```
TO ROSETTE
    REPEAT 10 [ FD 10 BK 10 RT 36 ]
END

TO STAR
    REPEAT 5 [ FD 15 RT 144 ]
END
```

By adding the rosette in the REPEAT statement for a square frame, each corner is decorated. However, the same process with STAR is not as successful at first.

```
REPEAT 4 [ RT 90 FD 100 ROSETTE ]
```

```
REPEAT 4 [ RT 90 FD 80 STAR ]
```

The problem encountered with the STAR is that it does not sit at the corner of the frame. Some repositioning is needed to make a CORNER.STAR for the frame procedure.

```
TO CORNER.STAR ; REPOSITIONS STAR INTO
CORNER
    LEFT 72 STAR RT 72
END
```

```
TO STAR.CORNER.SQ.FRAME
    SET.UP
    REPEAT 4 [ RT 90 FD 80 CORNER.STAR ]
END
```

By adding a decoration to the REPEAT for a rectangle or circle, a procedure like STAR.CORNER.RECT.FRAME or STAR.CIRC.FRAME can be made. STAR.CIRC.FRAME reminds me of "Mirror, mirror, on the wall," and might inspire a completely different Logo project complete with text.

### CONTINUING DECORATION

When everyone sees how decorative elements can be incorporated into a REPEAT, the scene is set for many borders using different designs. Spirals, squares, triangles, points, slanting lines, lattice work, waves, and Greek keys can be added to the simple frame. For convenience, all the examples here are scaled to fit work with squares of size 10. However, variable procedures also can be developed so that sizes can easily be changed. Some stock designs which are useful might be:

```
TO SQ ; DRAWS THREE SIDES OF SQUARE
    REPEAT 3 [ FD 10 RT 90 ]
    RT 90
END
```

```
TO TRI ; DRAWS TWO SIDES OF EQUAL
TRIANGLE
    RT 30
    REPEAT 2 [ FD 10 RT 120 ]
    RT 90
END
```

```
TO KEY ; DRAWS A GREEK KEY DESIGN
    REPEAT 2 [ FD 10 RT 90 ]
    FD 5 RT 90
    REPEAT 3 [ FD 5 LT 90 ]
END
```

These designs can be used in REPEATs to make an edge

```
REPEAT 10 [ KEY ]
```

```
REPEAT 8 [ TRI ]
```

or to make the entire frame with a double REPEAT.

```
REPEAT 4 [ REPEAT 10 [ SQ ] RT 90 ]
```

```
REPEAT 4 [ REPEAT 10 [ KEY ] FD 10
LT 90 ]
```

The frame can also be made from combinations of elements. The combinations can be used on either side to draw different borders.

```
REPEAT 10 [ SQ TRI ]
```

```
REPEAT 10 [ SQ TRI SQ ]
```

For SQ, TRI, and KEY, the turtle starts in the lower left corner of an imaginary 10 by 10 grid and ends in the lower right corner. The turtle begins and ends pointing the same direction.

The drawings of ROSETTE and STAR are different because they begin and end in exactly the same position and direction (this is state transparency). ROSETTE or STAR in a REPEAT statement will draw over itself. To get one of these to make a border, a procedure which moves the turtle along the edge is needed. MOVE is a procedure to do this.

```
TO MOVE
    RT 90 FD 10 LT 90
END
```

REPEATs can be created with any combination of figures and moves.

```
REPEAT 10 [ ROSETTE MOVE MOVE ]
REPEAT 10 [ SQ MOVE CORNER.STAR MOVE ]
REPEAT 12 [ ROSETTE MOVE MOVE TRI TRI
MOVE MOVE ]
REPEAT 4 [ SQ CORNER.STAR ]
```

After working out combinations and positioning in the immediate mode with the turtle using single or repeated commands, an edge can be put into a procedure.

```
TO EDGE.ROSETTE.AND.SQ
    REPEAT 8 [ ROSETTE MOVE MOVE SQ MOVE
MOVE ]
    END
```

```
TO EDGE.STARS
    REPEAT 8 [ CORNER.STAR MOVE MOVE ]
    END
```

The edges are easier to compose with a variable for the number of REPEATs. The length of the edge can be manipulated by changing :NUMBER.

```
TO EDGE.SQ.KEY :NUMBER
    REPEAT :NUMBER [ SQ KEY ]
    END
```

```
TO EDGE.SQ :NUMBER
    REPEAT :NUMBER [ SQ ]
    END
```

Combinations of designs are limitless. As you find new designs, such as semicircles or lattice work, new problems of size, placement, and control will arise. Planning the length of the edge controlled by the :NUMBER in REPEAT requires measuring the pattern and multiplication of the length of the pattern.

### THE FINAL FRAME

After exploring many possibilities, you may decide on a particular design, color, and size. Perhaps it is a 100 by 160 rectangular frame with squares and keys on all the sides.

```
TO FRAME
    SET.UP
    RT 90 RECT.FRAME LT 90
    EDGE.SQ.KEY 5 RT 90
    EDGE.SQ.KEY 8 RT 90
    EDGE.SQ.KEY 5 RT 90
    EDGE.SQ.KEY 8 RT 90
    END
```

The final touch may be to add colors and corner pieces. When the frame is worked out, it can be saved (with Terrapin Logo) as a picture on the diskette with the command SAVEPICT "SQ.KEY.FRAME and read back onto the screen as READPICT "SQ.KEY.FRAME. The procedure for the turtle drawing is then executed and the whole thing can be saved as a different picture. Several picture frames can be made and saved for later pictures.

Although the original intent may have been to put a frame around a turtle drawing, making decorative borders may become a product with its own merits of problem solving and programming. The importance of pattern recognition in programming is re-emphasized for making borders. ( "Tipps for Teachers, Patterns and Repetition, Parts I and II," NLX November and December 1982.)

Modular thinking is emphasized in the development of design elements which can be combined in many different ways. Positioning is separated from actual drawing by making separate procedures of MOVE and SETUP. Variability in procedures can also be introduced or explored with different size edges and frames. The project of borders and frames may also serve as an introduction to tessellations or other complex repeated graphic designs.

If you and your students develop interesting frames or other projects from frame designs, please share them with me.

Steve Tipps is a professor in the University of Virginia's School of Education, and presents Logo workshops for school systems throughout the eastern United States.

# Logo Notes

UNICOM now has a version of Terrapin Logo which will run on Corvus hard disk networks. Any size Corvus disk may be used. This Logo version is rumored to perform more smoothly than the floppy disk version. For more information, write to UNICOM, 297 Elmwood Avenue, Providence, RI 02907.

Plans are being made for a National Logo Conference during the summer of 1984. We will keep you posted as more information becomes available.

# MICROWORLDS

## The Utilitarian Turtle

by

Glenn Bull

Logo is most commonly thought of as a tool for learning. However, the language also lends itself to development of short utilities to aid teachers in their administrative work as well. A Bachelor's thesis exploring some of these possibilities was recently completed at the University of Virginia. (Linda Keiser, "A Logo Software Package for Elementary School Teachers," Bachelor's Thesis in the School of Engineering, University of Virginia, March 1983)

Recently, when the batteries in my calculator died, I was not interested in the abstract applications of Logo. I wanted to complete the scores for a test without a trip to an all-night drug store. The ideal solution would have been a program to send the turtle to the store for more batteries! Failing that, I decided to let Logo calculate my grades.

I had foolishly written a test with 37 questions, rather than one with a nice round number such as 20 or 50. Therefore, my immediate need was a procedure to calculate percentages. This can be expressed in English as:

(Number Correct / Total Points) * 100

This quantity is rounded to a whole number in the Logo procedure which calculates percentages.

```
TO % :NO.CORRECT :TOTAL.POINTS
    OUTPUT ROUND (:NO.CORRECT /
:TOTAL.POINTS * 100 )
    END
```

The first student answered 33 of 37 questions correctly. When I typed in the percent sign followed by the number of correct answers and the total points, the following appeared:

```
% 33 37
RESULT: 89
```

It immediately occurred to me that it was silly to type in the number of points on the test for each student. Also, I usually subtract the number missed from the total number of points in my head when I use a calculator. I decided to design a procedure so the computer could perform these calculations for me using Logo.

```
TO MISSED :NO.MISSED
    PRINT % ( 37 - :NO.MISSED) 37
    END
```

Thus, I could now type MISSED followed by the number of questions which the student missed and get as a result the percent of the number correct.

```
MISSED 4
89
```

I soon tired of typing MISSED over and over. Therefore, I developed another procedure in about the same amount of time that it would have taken me to finish calculating my scores and go to bed. (Working with Logo is often like that, isn't it?)

I decided to make the number missed a value input from the keyboard. In the MIT Logo versions (Terrapin, Krell), this is accomplished with the command REQUEST, as shown in the procedures which follow. In the Apple (LCSI) version of Logo, the command READLIST is used. A set of procedures written in Apple Logo appears at the end of this column.

```
TO CALCULATE.SCORES
    MAKE "NO.MISSED FIRST REQUEST
    PRINT % ( 37 - :NO.MISSED ) 37
    CALCULATE.SCORES
    END
```

I then figured all the remaining percentages for the class, and went to bed. A few days later, I loaded the file containing the procedures to calculate scores for a different test.

When I began using the program, some of the values seemed a bit strange. I recalled that this test had 28 questions, rather than 37, as before. I changed that value in the procedure, but then discovered the results were still incorrect. After some cogitating, I realized that I had been putting in the number of correct answers rather than the number missed. Obviously, the procedure needed some more work to protect me from myself!

The better documented version has a procedure called FORMATTED.SCORES which initializes the total number of points on the examination. This procedure then calls a second procedure SCORE.LOOP which asks for the number of points missed by each student. The information which is requested is clearly labeled on the screen.

```
TO FORMATTED.SCORES
   CLEARTEXT
   PRINT [ HOW MANY POINTS WERE ON THE
TEST? ]
   MAKE "TOTAL.POINTS FIRST REQUEST
   CLEARTEXT
   SCORE.LOOP :TOTAL.POINTS
   END
TO SCORE.LOOP :TOTAL POINTS
   CURSOR 5 10
   PRINT1 [ ' NUMBER MISSED:  ' ]
   MAKE "NO.MISSED FIRST REQUEST
   CURSOR 5 12
   PRINT1 [ 'PERCENT CORRECT:  ' ]
   PRINT % (:TOTAL.POINTS - :NO.MISSED)
:TOTAL.POINTS
   SCORE.LOOP :TOTAL.POINTS
   END
```

the following appears on the screen:

```
NUMBER MISSED:
PERCENT CORRECT:
```

As each value is typed beside NUMBER MISSED the grade is displayed beside PERCENT CORRECT. Fool-proof at last! (????)

Apple (LCSI) Version:

```
TO FORMATTED.SCORES
   CLEARTEXT
   PRINT [ HOW MANY POINTS WERE ON THE
TEST? ]
   MAKE "TOTAL.POINTS FIRST READLIST
   CLEARTEXT
   SCORE.LOOP :TOTAL.POINTS
   END

TO SCORE.LOOP :TOTAL.POINTS
   SETCURSOR [ 7 10 ]
   TYPE SE [ NUMBER MISSED: ] CHAR 32
   MAKE "NO.MISSED FIRST READLIST
   SETCURSOR [ 5 12 ]
   TYPE SE [ PERCENT CORRECT: ]    %
( :TOTAL.POINTS - :NO.MISSED) :TOTAL.POINTS
   SCORE.LOOP :TOTAL.POINTS
   END
```

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Glen Bull is a professor in University of Virginia's School of Education, and teaches Logo courses at both the the graduate and undergraduate level.

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# Slow Turtle Moves Clearly
by
Tom Lough

When introducing LOGO to older children and adults, teachers might choose to omit some or all of the usual off-computer movement activities, and let them work at the computer after a minimum of orientation. This is not necessarily bad.

However, it is important to recognize that incorrect and confusing concepts of distance and direction can be "discovered." Try the following sequence:

```
HOME
FORWARD 50
FORWARD 500
FORWARD 5000
```

"Hey! The turtle moves a shorter distance when I entered the larger numbers! I don't understand."

```
RIGHT 1
RIGHT 100
RIGHT 300
```

"Why does the turtle turn left when I told it to turn right?"

In each of the situations above, the speedy turtle assumed its new position or heading in a twinkling, leaving the student with the impression that it moved by the shortest way.

Since the screen is about 200 units high, FORWARD 500 will "wrap around" twice plus a little bit. A sudden turn 300 degrees to the right looks just like a 60 degree left turn. Thus, the turtle can appear to go backwards with FORWARD (if its heading is exactly vertical or horizontal), and to turn left with RIGHT. This can be confusing at best.

Here is a technique which I have found successful. Try using the following procedures instead of the regular ones as the very first commands given for LOGO exploration. The turtle will slow down to a speed which will allow the user to observe each complete movement directly. This means confusion such as that shown above can be avoided.

(If you are concerned that your children "putter" with large numbers in a disorganized manner, these procedures will encourage the initial use of smaller input numbers to the moves and turns. Who wants to wait all day while the turtle does RIGHT 10000?)

Here are the procedures:

```
TO F :N
   REPEAT :N [ FORWARD 1 ]
   END

TO B :N
   REPEAT :N [ BACK 1 ]
   END

TO R :N
   REPEAT :N [ RIGHT 1 ]
   END

TO L :N
   REPEAT :N [ LEFT 1 ]
   END
```

Once you have these procedures in the workspace, your students can explore with commands such as F 100, R 72, and the like. What really happens for F 500 and R 300 can be observed clearly.

This set of procedures makes it less necessary to teach degrees directly. Instead, degrees can be experienced before the idea of degrees is even conceived. Then, when the questions about the "magic" numbers of 90 or 60 or 72 arise, the concept of 360 degrees can be understood in terms of something the students have done, instead of something they have read or heard.

When you start to hear comments such as, "I wish the turtle could draw faster," you know it is time to give the varsity commands of FORWARD, BACK, LEFT, and RIGHT, with the assurance that the students have a fairly good mental picture of the turtle's motion.

I have used this technique with both children and adults. In all cases, the concepts of the turtle movements (distance and direction) seemed to be clearly and quickly understood.

In the case of adults, it gives them a boost to be able to deduce that the numbers on the turns correspond to degrees! I have seen a 12 year old boy turn an admiring face to his mother and exclaim, "Wow, Mom! How did you figure that out?!"

F 100!

# Join The Logo Penpal Network

Are you looking for ideas to spice up your Logo classes? Then consider participating in the NLX's 1983-84 Logo Class Penpal Network. It is an opportunity for Logo classes in all parts of the country (and the world) to correspond with each other and share Logo ideas.

Participating Logo teachers and their classes will be matched with counterparts from various regions of the USA or Canada (or perhaps from one of several overseas countries). Assignments will be based on grade level, Logo experience, interests, computer compatibility, and Logo version(s) used.

During the school year, Logo ideas, procedures, and projects can be exchanged periodically. Your students will learn Logo, but they will also learn about people in other places. This adds an exciting new dimension to many different subject areas!

To obtain a free application kit for you and your Logo class, send a long stamped self-addressed envelope to NLX, Attn: Logo Penpals, PO Box 5341, Charlottesville, VA 22905.

Editor......................................Tom Lough