DRAPER PASCAL[#]

Version 2.1

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For the Atari 400, 800, XL, or XE series computers

Disks: Draper Pascal/drpascal.atr Draper Pascal/drpascb.atr

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Disk Based Documentation[#]

This document contains the "Getting Started" section plus other sections from the actual Draper Pascal manual. It is designed to get you up and running and doing useful things with Draper Pascal in a very short time. It does not, however, contain a detailed description of all the Draper Pascal definitions or pretend to be a comprehensive tutorial or user's reference. Registered users will receive the actual Draper Pascal manual which does contain a complete description of all definitions plus other information. Details on registering are in the last section titled "Registration Form".

The Shareware Concept[#]

Draper Pascal is distributed on a Shareware basis. You may use Draper Pascal without charge for the purpose of evaluating it's suitability for your use. If you find that Draper Pascal is worth continuing to use, then you are requested to become a registered user and gain the additional benefits that go along with it. Simply complete the registration form and mail it in to us with the very reasonable payment of only $15.00. When you register your copy of Draper Pascal, you'll receive the latest version of the software if your registered version is not current, along with a comprehensive printed user manual.

Features[#](#)

- Draper Pascal is a complete package allowing the user to create, compile, and execute programs written in the Pascal language.
- Many features from both UCSD and ISO standard Pascals plus many extensions, such as sound and graphics, to make use of the versatile Atari hardware.
- Pascal structured programming features, including IF-THEN-ELSE, WHILE-DO, CASE-OF-ELSE, FOR-TO/DOWNTO-DO, and REPEAT-UNTIL are included.
- FUNCTIONs and PROCEDUREs using local or global variables. Integer type variables can be passed directly.
- Data types supported include: Character, String, Integer, Real, Boolean, Record, and File. One and two dimension arrays are also supported for all data types other than File and Record.
- Only one disk drive and 48K RAM are required. Multiple, and double density, disk drives are supported.
- Machine language subroutines may be loaded and called.
- Program chaining is supported.
- No limit on source program size. "Include" files are supported.
- One-pass compiler generates pseudo code directly.
- Maximum program pseudo code size is about 30K bytes.
- Textual compiler error messages.
- Execution debugging features include instruction trace and stack display.
- Special options for error display and break key disable.
- Single keystroke program execution repeat, exit to DOS, or exit to Main Menu program are featured.
- Includes Editor program to create, modify, and print Pascal source files, or other text type files.
- Includes Main Menu program (Pascal source included) for easy select of Compiler, Editor, or utility functions, such as directory or file listing. Main Menu program may be replaced with a user written program to create a turnkey operation.
- Ramdisk support. Details provided to registered users.
- Works with most popular versions of DOS.
- Easy to use. No linking required. Compile and execute immediately.
- Royalty free license available to registered users.
- Includes sample programs.
- Comprehensive user manual provided to registered users. Complete examples and BASIC equivalents given for each reserved word.

Introduction[#](#)

Draper Software welcomes you to the world of Pascal for the Atari 400/800, XL, and XE series Computer systems.

What is Pascal?#

Pascal is a high-level structured programming language developed by Niklaus Wirth in 1971. It is easy to understand and well suited for program development and maintenance.

What is Draper Pascal?#

Draper Pascal is not a "standard" Pascal. It has a number of commands which are exactly like ISO and UCSD versions, some which are similar, and many "extensions" which bring out the true power of the Atari computer in an easy to use manner. It was designed to require only one disk drive for operation, but not be limited to only one. At this time, it has been shown to work with all hardware and software configurations where enough memory is provided. This implementation also has a number of commands which are familiar to Atari BASIC users, such as POKE, PEEK, SETCOLOR, NOTE, POINT, etc..

About this manual#

This manual is intended to familiarize you with all the features of Draper Pascal. It is not intended to teach you how to program in Pascal. However, if you already know Atari BASIC, then you can understand the Pascal statements more easily by referring to their BASIC equivalents shown after the definition of each Pascal reserved word in the complete manual provided to registered users. It is recommended that you read this manual completely to be familiarized with its features and restrictions.

What is Draper Pascal made of?#

This implementation of Pascal is made up of three main components. They are the Supervisor (sometimes referred to as runtime routines), the Compiler, and the Editor. The Supervisor is a high performance machine language program which simulates a 16-bit pseudo computer. The Compiler translates Pascal source code into pseudo-code instructions to be executed by the Supervisor. The Editor is used to enter and modify Pascal source programs. It may also be used to edit data files, or BASIC programs which have been LISTed to a disk or tape. These components are explained in detail within this manual.

For a description of the various files included on the supplied diskette, refer to the 'System Information' section.

About the DOS#

Draper Pascal can be used with most popular Disk Operating Systems. It has been tested with Atari DOS 2.5, SpartaDOS 3.2d, and MYDOS. You should format a diskette with DOS on it to contain the Draper Pascal system. Since the Draper Pascal Supervisor is named AUTORUN.SYS, it will execute immediately after the disk is booted. For XL and XE computers, you do not need to hold down the Option key while booting unless you are using SpartaDOS. If using SpartaDOS, you may want to rename AUTORUN.SYS to PASCAL.COM and create a STARTUP.BAT file containing the following two lines:

```
BASIC OFF
PASCAL
```

This documentation file is not required to be on that same diskette.

Ramdisk support[#](#)

Draper Pascal supports the use of the "Ramdisk" capability provided by using a DOS that supports a ramdisk like Atari DOS 2.5 or SpartaDOS 3.x with an Atari computer system having sufficient memory to support the ramdisk. While using this feature, the Editor takes less than two seconds to load and the Compiler takes less than three seconds. Details on setup and use of this feature are provided in the complete manual provided to registered users.

Getting Started[#](#)

This section is intended to show by example how to use the Draper Pascal system. You will edit, compile, and run a sample program. Information displayed by the computer is shown in normal type while responses to be entered by you are shown underlined with dashes (---). To begin with, make sure you have 48K RAM installed and no cartridge in place. Boot the disk now by placing it in disk drive 1 and turning on the power to the Atari computer. After the Supervisor has finished loading, you will see a screen that looks like this:

```
DRAPER PASCAL


1 - Run Program

2 - Disk Directory

3 - Compile Program

4 - Edit a Program

5 - Exit to DOS

6 - List a file

7 - Trace on

                DRAPER SOFTWARE
                     EDITOR



            A - Add line(s) at end
            C - Change line(s)
            D - Delete line(s)
            E - Edit a line
            F - Filer menu
            I - Insert before line
            L - List line(s)
            M - Menu
            P - Print line(s)
            Q - Quit
            S - Scan line(s)
            X - Exit to Compiler
    A,C,D,E,F,I,L,M,P,Q,S,X,?->F          Select Filer menu
-


            A - Append file
            D - Directory list
```

```
        L - Load file
        S - Save file

        L                               Load a file
        -

Enter filename  -> SAMPLE1              Enter the name of the file
                   -------              to be loaded. The name of
                                        the last file edited,
                                        compiled, or run will be
                                        filled in by the Editor.
                                        You may have to overtype
                                        it with the name shown.

A,C,D,E,F,I,L,M,P,Q,S,X,?->L            List the file on the
                           -            screen

Line from ->                            Just press RETURN for
            -                           'Line from' and 'Line to'.
Line to   ->                            This will give a list of
            -                           the entire program in
                                        memory.


  1:PROGRAM KALEIDOSCOPE;
  2:VAR I,J,K,W,X:INTEGER;
  3:BEGIN
  4: MAXGRAPH(19);
  5: GRAPHICS(19);
  6: X:=0;
  7: REPEAT
  8: FOR W:=3 TO 50 DO
  9:  BEGIN
 10:    FOR I:=1 TO 10 DO
 11:    BEGIN
 12:     FOR J:=0 TO 10 DO
 13:      BEGIN
 14:       K:=I+J;
 15:       COLOR(J*3/(I+3)+I*W/12);
 16:       PLOT(I+8,K);
 17:       PLOT(K+8,I);
 18:       PLOT(32-I,24-K);
 19:       PLOT(32-K,24-I);
 20:       PLOT(K+8,24-I);
 21:       PLOT(32-I,K);
 22:       PLOT(I+8,24-K);
 23:       PLOT(32-K,I)
 24:      END
 25:    END
 26:  END
 27: UNTIL X=99 (* UNENDING LOOP *)
 28:END.
A,C,D,E,F,I,L,M,P,Q,S,X,?->I            Let's insert a comment
                           -            before line 15.
Line -> 15
        --


 15:      (* MY FIRST EDIT *)           Enter the data to be
          ------------------            inserted when prompted for
 16:                                    line 15. Just press RETURN
```

```
        -                                when prompted for line 16.
                                         This will terminate insert
                                         mode.


A,C,D,E,F,I,L,M,P,Q,S,X,?->L             List again to verify that
                         -               the change was made
                                         correctly.


Line from ->
           -
Line to    ->
           -

  1:PROGRAM KALEIDOSCOPE;
  2:VAR I,J,K,W,X:INTEGER;
  3:BEGIN
  4: MAXGRAPH(19);
  5: GRAPHICS(19);
  6: X:=0;
  7: REPEAT
  8: FOR W:=3 TO 50 DO
  9:  BEGIN
 10:    FOR I:=1 TO 10 DO
 11:    BEGIN
 12:     FOR J:=0 TO 10 DO
 13:      BEGIN
 14:       K:=I+J;
 15:       (* MY FIRST EDIT *)
 16:       COLOR(J*3/(I+3)+I*W/12);
 17:       PLOT(I+8,K);
 18:       PLOT(K+8,I);
 19:       PLOT(32-I,24-K);
 20:       PLOT(32-K,24-I);
 21:       PLOT(K+8,24-I);
 22:       PLOT(32-I,K);
 23:       PLOT(I+8,24-K);
 24:       PLOT(32-K,I)
 25:      END
 26:    END
 27:  END
 28: UNTIL X=99 (* UNENDING LOOP *)
 29:END.
A,C,D,E,F,I,L,M,P,Q,S,X,?->F             Let's save the program
                         -               back to disk drive 1
                                         under the same name.


        A - Append file
        D - Directory list
        L - Load file
        S - Save file



        S
        -
Enter filename  -> SAMPLE1
                   -------
A,C,D,E,F,I,L,M,P,Q,S,X,?->X             Now let's exit directly to
                         -               the Compiler.
```

```
              Draper Software

              Pascal Compiler

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              Enter Filename:
              SAMPLE1                      Enter name of program to
              -------                      be compiled. The name of
                                           the last program edited,
                                           compiled, or run will be
                                           filled in by the
                                           Compiler.

    Enter List Output Filespec
    Default is E:                          Just press RETURN at this
                   -                       point to have the compile
                                           list directed to the
                                           screen.


    0000 PROGRAM KALEIDOSCOPE;
    0000 VAR I,J,K,W,X:INTEGER;
    0003 BEGIN
    0003  MAXGRAPH(19);
    0017  GRAPHICS(19);
    001B  X:=0;
    001E  REPEAT
    0022  FOR W:=3 TO 50 DO
    002A   BEGIN
    0035     FOR I:=1 TO 10 DO
    003D     BEGIN
    0048      FOR J:=0 TO 10 DO
    004F       BEGIN
    005A        K:=I+J;
    0062        COLOR(J*3/(I+3)+I*W/12);
    008A        PLOT(I+8,K);
    0098        PLOT(K+8,I);
    00A6        PLOT(32-I,24-K);
    00B8        PLOT(32-K,24-I);
    00CA        PLOT(K+8,24-I);
    00DC        PLOT(32-I,K);
    00EA        PLOT(I+8,24-K);
    00FC        PLOT(32-K,I)
    010A       END
    010A     END
    010C   END
    011C  UNTIL X=99 (* UNENDING LOOP *)
    0142 END.
    0147
    ADDR   NAME
    ---- --------
    0003 I
```

```
0004 J
0005 K
0006 W
0007 X
5 Compiler table entries used
*** Program Execution Completed ***    Press the SELECT key at
Highest Stack Address Used = $AFF8     this point to take us to
<START>Repeat,<SELECT>Menu,<ESC>Exit   the main menu.
```

```
              DRAPER PASCAL

               VERSION 2.1

        1 - Run Program

        2 - Disk Directory

        3 - Compile Program

        4 - Edit a Program

        5 - Exit to DOS

        6 - List a file

        7 - Trace on




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```

```
        1                              Select '1' to run the
        -                              program that was just
                                       compiled.

    Enter name of program to be run

        SAMPLE1                        The name of the last
        -------                        program edited, compiled,
                                       or run will be filled in
                                       by the main menu program.
                                       Overtype the name if you
                                       want to run a different
                                       program.
```

At this point you should have a nice kaleidoscope pattern being displayed on your television screen. To stop it, press the BREAK key. To repeat execution, press the START key. To return to the main menu, press the SELECT key. To exit to DOS, press the ESC key.

Another program, SAMPLE2, is also provided for you to practice with. It will display Roman numerals for powers of two between 1 and 4096. Compile it, turn on the trace via the main menu, and run it. After it is finished, press CTRL-T to display the trace table, and CTRL-S to display the stack contents. When prompted for 'Where? Filespec', enter 'E:'. For a description of the stack display line, refer to

the 'DUMPSTK' command in the 'Pascal Definitions' section of the manual provided to registered users.

Main Menu[#](#)

The Main Menu is the initial program to be run by the Supervisor. It is written in Pascal. The source code is provided for it and you may customize it as you see fit. The disk filename for the source is 'INIT.PAS'. The pseudo code program that is initially executed is 'INIT.PCD'. It would be wise to copy 'INIT.PCD' to another name to be used in case your compile of the menu program is not successful. Or, you could rename INIT.PAS to something else, like NEWINIT.PAS, and compile it to produce NEWINIT.PCD. Then you can use the 'run' option (mentioned below) to test your modified program.

The Main Menu appears as follows:

```
            DRAPER PASCAL

             VERSION 2.1

      1 - Run Program

      2 - Disk Directory

      3 - Compile Program

      4 - Edit a Program

      5 - Exit to DOS

      6 - List a file

      7 - Trace on



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```

Each of the menu options will now be explained:

Run Program[#](#)

Use this option to execute a program that has previously been successfully compiled. You will see the following prompt:

```
      Enter name of program to be run
```

The Main Menu program will fill in the name of the last program edited, compiled, or run. If this is the one you want, all you have to do is press RETURN. If it is not the one you want, just overtype the name shown with the one you want.

Disk Directory[#](#)

This option will provide you with a list of all, or selected, files on one of your disk drives. You will receive the prompt 'Filespec?'. If you just press RETURN at this point, you will see a list of all files on the default drive. If you enter 'D2:', you will see all files on drive 2. To show only selected files, use wildcards in the normal manner. For example, enter 'D1:INIT.*' to show only files named INIT with

any suffix from drive one. At the end of the list, you will be prompted to press any key to continue. After pressing any key, the Main Menu will be re-displayed.

Compile Program#

This option sends you directly to the Pascal compiler. You will be prompted for the name of the program to be compiled, after the Compiler is loaded. If you have already edited, compiled, or run a program, the name will be shown and may be used by just pressing the RETURN key. For more information, refer to the section of this manual on 'The Compiler'.

Edit a Program#

Control is transfered to the Draper Pascal Editor when this option is chosen. For more information, refer to the section of this manual on 'The Editor'.

Exit to DOS#

Pascal execution is terminated by this option. Control is passed to the Disk Operating System.

List a file#

This convenience entry is provided to allow you to view, on the screen, any text file on disk or tape. You are prompted to enter the name of the file to be listed. The file is assumed to reside on the default drive if a colon (:) is not found within the name you specify. At the end of the list, you will be prompted to press any key to continue. After pressing a key, the Main Menu will appear again.

Trace on#

The wraparound internal trace may be turned on (or off) with this option. The trace is used only for debugging purposes and may be viewed at program termination time by pressing CTRL-T. Program execution speed is slightly degraded while the trace is active. You will be prompted to enter the number of trace entries to be maintained by the system. Each trace entry requires 10 bytes of storage at the high end of memory. The trace may not be used during graphics displays because screen memory is also at the high end of memory. To turn the trace off and remove the memory allocation of the trace table, enter zero when prompted for the number of entries to maintain. The trace format is described in the manual provided to registered users.

The Editor#

The Editor is used to create, modify, and save Pascal source files. It may also be used to process other text type files, like BASIC programs which have been LISTed to disk or tape. It is a line oriented editor. Combined with some type of formatting program, it may be used for word processing applications. The entire source to be edited must be in memory at one time. If your Pascal program will not fit within the limits of the Editor, then you can use the INCLUDE feature of the Compiler to allow segments of a program to be edited separately. Refer to the section on "THE COMPILER" for more information on the INCLUDE feature. Source code for the Editor is listed in the manual provided to registered users. Some key points to be noted about this editor are as follows:

1. Each line is referred to by line number, however, no line numbers are stored either internally or on the disk or tape.
2. Each line may contain up to 80 characters. This may be changed by altering the constant called MAXLENGTH and re-compiling the Editor. A source listing of the Editor is provided to registered users.
3. A maximum of 250 lines of text may be edited at one time. This may be changed by altering the constant called MAXLINES and re-compiling the Editor. An increase in MAXLINES should

correspond with a decrease in MAXLENGTH, and vice versa. A source listing of the Editor is provided to registered users.

4. When entering or editing a line, the line must be terminated by pressing the RETURN key.
5. As lines are inserted into, or deleted from, the source file, the remaining lines are automatically renumbered.
6. A line of source may extend onto more than one screen line.
7. Due to operation of the Atari operating system, a blank line may not be directly entered. To enter a blank line, you must first enter a non-blank character (like a period), then use the Editor Change command to change the character to a space.
8. Input operations (Append and Insert) are terminated by entering a null line (just pressing the RETURN key).
9. The BREAK key is disabled by the Editor to prevent loss of data. It is enabled again at termination of the Editor.
10. If you enter or change data then try to Quit or exit to the Compiler without first saving the data onto disk, you will receive an option to either save the data or ignore it and continue.
11. Cassette tape files may be loaded, edited, and saved by the Editor. The Compiler does not support tape input, though. You would first have to load the file from tape, with the Editor, then save it to disk.

Wiki-Editing pending

```
                    EDITOR COMMANDS



                    General Prompts


    The following prompts are general in nature and are common among
    many of the editor commands to be described below.

    Line ->

    You are prompted to enter one line number, as opposed to a range
    of line numbers. It is used by the INSERT Editor command and
    refers to the line before which the inserted line(s) will be
    placed.

    Line from ->

    This is the first prompt for a range of line numbers. Enter the
    low number of the range. If you just press RETURN, line number 1
    is assumed.

    Line to   ->

    Enter the high line number in the range desired. If only one line
    is to be acted upon, that number must be entered in both this
    prompt and the one mentioned above. If you just press RETURN, the
    highest line number in the buffer will be assumed. If the number
    you enter is less than the 'Line from' value, the 'Line from'
    value will be used here.
```

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Enter filename ->

This prompt is shown when loading, appending, and saving files.
The last filename used is filled in after the arrow. If this is
the file you wish to use now, then all you have to do is press
RETURN. A full filespec may be entered, but is not required. If a
colon (:) is not found within the filename specified, then the
default drive is assumed. If the filename given does not contain a
period (.), then a suffix of .PAS is assumed.

                        The Commands

A - Add line(s) at end

This command is used to add lines after the last line currently in
the buffer. If the buffer is currently empty, then line 1 will be
assumed as the starting point. In this manner, you can create a
new file if one has not been loaded. You can append as many lines
as you like. When you are finished entering lines, just press
RETURN without entering any data on the line (null line).
Prompts used: None

C - Change line(s)

The Change command allows you to change one specified string
pattern to another for the first occurance in each line within the
range of lines specified. After being prompted for the line number
range, you are asked for the data to 'Change from ->' and 'Change
to ->'. Enter any string of characters at each prompt. Imbedded
blanks are allowed. If you just press RETURN for the 'Change to'
prompt, the first occurance of the 'Change from' data within each
line will be deleted.
Prompts used: 'Line from', 'Line to', 'Change from', 'Change to'

D - Delete line(s)

This command allows you to delete a line or a range of lines from
the file in memory. The whole file in memory will be deleted if
you just press RETURN when prompted for both 'Line from' and 'Line
to'. Be aware that all lines following the range deleted will be
renumbered, to fill the gap just made. If you desire to delete a

number of line ranges, delete those with the highest numbers first
and proceed toward the beginning of the file. That way, you won't
have to do a LIST after each range delete to find out what the new
line numbers for the following lines are.
Prompts used: 'Line from', 'Line to'

Draper Pascal 2.1   The Editor

E - Edit line(s)

The Edit command is used to edit (or make individual changes to) a
line or range of lines that already exist in memory. If a range is
specified, the lines are presented to you one at a time. As each
line is presented, you may use any of the normal Atari editing
keys (like right and left cursor, insert, delete), to alter the
data. Just press RETURN when you are finished with each change. If
you don't want to make a change to a line shown, just press
RETURN.
Prompts used: 'Line from', 'Line to'

F - Filer menu

The Filer is a subsystem which handles communication with an
external device (disk or tape). The features provided are as
follows:

    A - Append file

    A file is read from disk or tape and added to the end of the
    file currently in memory. The data in memory prior to the
    append remains unchanged.
    Prompts used: 'Enter filename'

    D - Directory list

    This command is used to provide a directory list of the
    different files on a diskette. You are prompted for
    'Filespec?'. Enter the disk drive number and selection
    criteria for the directory list. If you just press RETURN you
    will see a directory list of all files on the default drive.
    To see all files on drive two, enter 'D2:' or 'D2:*.*'. To see
    only files with a suffix of PAS on drive one, enter

'D1:*.PAS'.
Prompts used: 'Filespec?'

    L - Load file

    This is the way to load a file into memory from disk or tape.
    If any data was currently in memory, it is deleted and
    replaced by the file read in.
    Prompts used: 'Enter filename'

    S - Save file

    Data is copied from memory to disk or tape with this command.
    The data currently in memory remains unchanged. You are
    prompted for filename and may use whatever name you wish. It
    is not necessary to save a file under the same name as was
    used to load the file. You should save data to disk frequently
    if you are making extensive changes. That way you won't have
    to re-do as much if something goes wrong.
    Prompts used: 'Enter filename'

I - Insert before line

This command allows you to insert one or more lines at any point
within the file in memory. The inserted data is placed before the
line number you specify. To terminate insert mode, just press
RETURN without entering any data on the same line (null line).
Note that all lines after the point of insertion will
automatically be renumbered.
Prompts used: 'Line ->'

L - List line(s)

One or more lines of data from memory are listed on the screen
with this command. During the list, you may stop the scrolling by
pressing either the space bar or RETURN. To resume scrolling,
press any other key other than ESC. The ESC key may be pressed to

prematurely terminate the listing.
Prompts used: 'Line from', 'Line to'

M - Menu

The main Editor menu is presented in response to this command. A
question mark (?) may also be used to display the main menu.
Prompts used: None

P - Print line(s)

This command is used to create a list of data in memory on a
printer attached to the Atari parallel port (P:). Internal line
numbers are also directed to the printer although they do not
actually exist within the file on disk or tape.
Prompts used: 'Line from', 'Line to'

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Q - Quit

This command is used to exit from the Editor when you are finished
editing your data. Control is given to the Main Menu program. If
you have changed the data in memory and have not saved it prior to
quitting, you will be given the option of saving the data or
ignoring the changes and exiting. If you are going to compile a
Pascal program immediately after quitting the Editor, you may use
the 'X' command described below.
Prompts used: None

S - Scan line(s)'

This command allows you to display all lines within a specified
range which contain a specified character string. The character
string may contain any characters, including imbedded blanks. To
temporarily stop the listing, press either the space bar or
RETURN. To abort the listing, press ESC. Press any other key to
continue as normal.
Prompts used: 'Line from', 'Line to', 'Scan for'

X - Exit to Compiler

This command terminates the Editor and transfers control directly
to the Compiler. If the file in memory has been changed but not
saved prior to the Exit command, you will be prompted to either
save the file or ignore the changes and proceed to the Compiler.
Prompts used: None

The Compiler

The Compiler is used to translate words that we humans understand
into "words" that the computer can understand. The computer words
are referred to as pseudo-code, or p-code for short. These
pseudo-code instructions are understood and executed by the
Supervisor.

This is a single pass goal oriented compiler. It expects the
proper syntax for a statement. If correct syntax is not found, the
compilation stops, and an error number with associated text
description is displayed. At this point, you are given the option
of quitting or returning to the Editor to correct the problem and
do the compile again.

The Compiler itself is written in Draper Pascal and occupies about 28K of RAM memory space.

The first prompt from the Compiler is 'Enter filename:'. The name of the last program edited, run, or compiled is filled in for your convenience. If this is the one you want, just press RETURN. If it is not the one you want, just overtype it with the name you desire. The name you provide will become the new default name for the Editor, Compiler, and Main Menu 'Run' option. No suffix is allowed when specifying filename. The Compiler will add the standard '.PAS' to it for you. If the source does not reside on the default disk drive, then you must prefix the filename with 'Dn:' where 'n' is the disk drive number where the source resides. The default disk drive is normally disk drive number one, but is changed to the Ramdisk drive number if you are taking advantage of the Ramdisk feature of a Disk Operating System that supports it. Ramdisk initialization is explained in the manual provided to registered users.

The next prompt is 'Enter List Output Filespec'. The default (if you just press RETURN) is the screen (E:). The list output may go to any normal output device, such as printer (P:) or disk (D:LISTNAME.PRN).

A number of additional points are mentioned below:

  1. Comments are delimited by '(*' on the left end and '*)' on the right end. Any characters may appear within comments. Comments may appear anywhere within the program.

  2. 'Include' files are supported. You may have procedures, functions, or any part of a program included in a compile, even though it is not actually part of the file being compiled. It is a variation of a comment which allows you to do this. The format is as follows:

     (*$I XXXXXXXX *) or (*$I D1:XXXXXXXX *)

     The dollar sign and 'I' must be right next to '(*' and must be followed by one space. Then you may mention the 'D' for disk and drive number (if other than the default drive is to be used). Follow it with a colon (:) and the filename. A suffix of '.PAS' will be automatically added to the file name. Then have at least one space and '*)'.

3. Pascal source files must reside on disk.

4. The output pseudo-code from the compile will be directed to
   the same disk drive that the Pascal source resides on. It will
   be created with a filename suffix of '.PCD'. If you have
   multiple disk drives and the source and pcode will not both
   fit on one disk, have a small file on the output disk with an
   'include' for the source which resides on the other disk.

5. The hexadecimal offset of the pseudo instructions generated is
   given at the left side of the output listing. This offset may
   be useful for debugging purposes. It may be referred to when
   looking at a program trace (see TRACEON in the Pascal
   Definitions section of the manual provided to registered
   users). It also may be referred to in case of an error message
   or termination caused by pressing the BREAK key. The offset
   shown may not always be accurate. If not exact, the values are
   very close.

6. The name and stack offset of each variable defined is shown at
   the end of the compile listing. The offset value is shown in
   hexadecimal. Each stack entry is two bytes wide. The first
   three stack entries are reserved for system use. Therefore,
   the offset of the first variable will be 0003, which is
   actually six bytes into the stack. If a variable is defined
   within a procedure or function, the offset shown is relative
   the beginning of that procedure or function.

7. The program is ready to run immediately after the compile is
   finished. No linking is required. (Some Pascal systems require
   linking of output code after the compile and before
   execution).

8. Nested procedures are supported. You may define one procedure
   within another.

9. Recursive procedures are supported. A procedure may call
   itself. If variables are defined within the procedure, they
   are cleared with each entry into the procedure and refreshed
   upon exit from the recursive procedure call.

10. No forward references are allowed. A procedure may not be
    referenced before it is defined. In most cases, nesting the
    procedures will take care of this problem.

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11. Double density disk drives are supported for both source and pcode files. The pcode will be written to the same drive that the initial source is taken from.

12. Only integer type parameters may be passed to procedures and functions. Other types of data may be passed by using global type variables setup at the beginning of the program (not within a procedure or function).

13. A function may only return an integer type value. Procedures do not return values.

14. Hexadecimal constants and literals are prefixed by dollar signs ($).

15. To write out an integer in hexadecimal format, precede the variable name with a percent sign (%).

16. A total of 170 compiler table entries may be used. One table entry is used for each variable definition, procedure name, function name, and parameter name used with procedures and functions. Table entries for variables defined within procedures are re-used following the 'END' for that procedure. The number of table entries used within a compile is displayed at the end of the output list from the Compiler.

17. The time needed to compile a program can be reduced by turning off the ANTIC chip within the computer. This turns off the display to the screen yet gives a fairly significant increase to the Atari's internal speed. In a normal Pascal program, you can have POKE(559,0) to turn it off and POKE(559,34) to turn it back on. But a special compile time option is provided to make use of this feature to speed up compiles. It is as follows. Have a statement (*$S+*) to turn the ANTIC off (increase speed), and use (*$S-*) to turn the ANTIC on (resume normal speed). These options may appear anywhere within a program. The ANTIC is automatically turned back on at compile termination and at time of error (if any).

                          The Supervisor

The Supervisor is a high performance machine language program
which simulates a pseudo 16-bit stack oriented computer. It
executes the pseudo code that is generated by the Compiler.

It is loaded into memory by disk operating system at the hex
location $1D7C, which is just above DOS in memory. It should work
with any DOS that allows a program to load at that address, such
as Atari DOS 2.1S, Atari DOS 2.5, or SpartaDOS version 2.x or
higher. A message will be displayed if the Supervisor cannot be
loaded at the proper location.

The disk filename for the Supervisor's object code is
'AUTORUN.SYS'. It may be renamed to anything you desire, such as
'PASCAL.COM', but will not be automatically loaded when the disk
is booted if the name is other than 'AUTORUN.SYS'. To start the
Pascal system from the DOS menu, use the 'L', binary load, option
to load 'AUTORUN.SYS' into memory. Execution will begin
automatically.

The Supervisor begins execution by loading and executing the
Pascal program 'INIT.PCD' from the default drive, which is always
disk drive 1 immediately after loading the Supervisor. 'INIT.PCD'
is the name of the main menu program. You may substitute any
compiled Pascal program of your own by naming it 'INIT.PCD'. In
this manner, you can have a true turnkey system where your program
begins execution after booting the disk.

After termination of each Pascal program, the Supervisor gives you
a choice of what to do next. You are prompted with the following
line:

<START>Repeat,<SELECT>Menu,<ESC>Exit

If you press the START key, your Pascal program will execute again
from the beginning. If you press the SELECT key, control will be
transfered to the main menu program (INIT.PCD). If you press the
ESC key, you will exit to the DOS utility menu. You also have two
other options at this point. They are both used for debugging
purposes. If you press CTRL-S (the 'S' key while holding down the
CTRL key), the stack values, at termination time, will be
displayed. If you press CTRL-T, the internal trace table, if
active, will be displayed. With either of these two debugging
options, you will be asked where the display should be sent by the
prompt 'WHERE? (FILESPEC)'. To see it on the screen, enter 'E:'.
It also may be sent to printer or disk by following normal
filespec naming conventions. If the display is sent to the screen,
you may stop the scrolling by use of the space bar. Press the ESC
key if you have seen enough and wish to return to the Supervisor
termination prompt. Any other key causes scrolling to continue as
normal.

Pascal Definitions

Syntax is shown below for each of the Draper Pascal reserved
words. The complete manual provided to registered users, however,
contains COMPLETE definitions, COMPLETE sample programs
demonstrating the use of each reserved word, as well as BASIC
equivalents.

```
ABS                 FUNCTION ABS(Number):INTEGER;

ADDR                FUNCTION ADDR(Var):INTEGER;

AND

ARCTAN              FUNCTION ARCTAN(Var):REAL;

ARRAY               ARRAY[Number1] OF Type
                    ARRAY[Number1,Number2] OF Type

ASC                 FUNCTION ASC(Cvar):INTEGER;

BEGIN

BLOAD               PROCEDURE BLOAD(Program);

BOOLEAN

CALL                PROCEDURE CALL(Address);

CASE                CASE expr1 OF const1 : stmt1;
                              const2 : stmt2;
                              ...
                              constn : stmtn
                    END;

                    CASE expr1 OF const1 : stmt1;
                              const2 : stmt2;
                              ...
                              constn : stmtn
                    ELSE stmtx
                    END;


CHAR
```

```
CHR                 FUNCTION CHR(expr1):CHAR;

CLOSE               PROCEDURE CLOSE(File);

COLOR               PROCEDURE COLOR(Number);
```

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```
CONCAT              PROCEDURE CONCAT(Parm1,Parm2,...):STRING;

CONST               CONST name1=value1; name2=value2; ...

COPY                FUNCTION COPY(Source,Index,Length) : STRING;

COS                 FUNCTION COS(Var):REAL;

CVTREAL             FUNCTION CVTREAL(Ivar):REAL

DEG                 PROCEDURE DEG;

DELETE              PROCEDURE DELETE(Source,Index,Size);

DIV

DOS                 PROCEDURE DOS;

DRAWTO              PROCEDURE DRAWTO(X,Y);

DUMPSTK             PROCEDURE DUMPSTK;

DVSTAT              PROCEDURE DVSTAT(A,B,C,D);

END

EOF                 EOF(File);

EOLN                EOLN(File);

EXIT                PROCEDURE EXIT;

EXP                 FUNCTION EXP(Var):REAL;

EXP10               FUNCTION EXP10(Var):REAL;

FALSE
```

```
FILE

FOR                 FOR var := expr1 TO expr2 DO statement;
                    FOR var := expr1 DOWNTO expr2 DO statement;

FUNCTION

GOTOXY              PROCEDURE GOTOXY(X,Y);

GRAPHICS            PROCEDURE GRAPHICS(Number);

HIMEM               PROCEDURE HIMEM(Value);
```

```
IF                  IF expr1 THEN stmt1;
                    IF expr1 THEN stmt1 ELSE stmt2;

INSERT              PROCEDURE INSERT(Source,Destination,Index);

INTEGER

IORESULT            FUNCTION IORESULT:INTEGER;

KEYPRESS            FUNCTION KEYPRESS:INTEGER;

LENGTH              FUNCTION LENGTH(svar):INTEGER;

LN                  FUNCTION LN(Var):REAL;

LOCATE              FUNCTION LOCATE(X,Y):INTEGER;

LOCK                PROCEDURE LOCK(Filename);

LOG                 FUNCTION LOG(Var):REAL;

LPENH, LPENV        FUNCTION LPENH:INTEGER;
                    FUNCTION LPENV:INTEGER;

MAXGRAPH            PROCEDURE MAXGRAPH(Mode);

MOD

NOT

NOTE                PROCEDURE NOTE(Iocbno,Sector,Byte);
```

```
ODD                FUNCTION ODD(iexp);

OPEN               PROCEDURE OPEN(Fileno,Aux1,Aux2,Filename);;

OPTIONKEY

OPTIONS            OPTIONS(Opt1,Opt2,...,Optn);

OR

ORD                FUNCTION ORD(Realvar):INTEGER;

PADDLE             FUNCTION PADDLE(Number):INTEGER;

PEEK               FUNCTION PEEK(Address):INTEGER;

PLOT               PROCEDURE PLOT(X,Y);

POINT              PROCEDURE POINT(Iocbno,Sector,Byte);
```

```
POKE               PROCEDURE POKE(Address,Value);

POS                FUNCTION POS(Pattern,Source):INTEGER;

PROCEDURE          PROCEDURE Name;
                   PROCEDURE Name(Parm1,Parm2,...,Parmn);

PROGRAM            PROGRAM Name;

PTRIG              FUNCTION PTRIG(Number):INTEGER;

PURGE              PROCEDURE PURGE(Filespec);

RAD

READ, READLN       PROCEDURE READ(File,Var1,Var2,...Varn);

REAL

RECORD

REPEAT             REPEAT Stmt1; ... ;Stmtn UNTIL Condition;

RESET              PROCEDURE RESET(File,Filespec);
```

```
REWRITE            PROCEDURE REWRITE(File,Filespec);

RND                FUNCTION RND(Iexp):INTEGER;

SELECTKEY

SETCOLOR           PROCEDURE SETCOLOR(Register,Hue,Luminance);

SHL                Expr1 SHL Expr2

SHR                Expr1 SHR Expr2

SIN                FUNCTION SIN(Var):REAL;

SOUND              PROCEDURE SOUND(Voice,Pitch,Distortion,Volume);


SQR                FUNCTION SQR(Var):REAL;

SQRT               FUNCTION SQRT(Var):REAL;

STARTKEY

STATUS             PROCEDURE STATUS(Iocbno,Ivar);

STICK              FUNCTION STICK(Number):INTEGER;
```

```
STR                FUNCTION STR(Var):STRING;

STRIG              FUNCTION STRIG(Number):INTEGER;

STRING

TRACEOFF           PROCEDURE TRACEOFF;

TRACEON            PROCEDURE TRACEON;
                   PROCEDURE TRACEON('Number);

TRUE

UNLOCK             PROCEDURE UNLOCK(Filespec);

VAL                FUNCTION VAL(Svar):INTEGER or REAL;
```

```
VAR                     VAR Name1,Name2,...,Namen : Type;
                        VAR Name1,Name2,...,Namen : ARRAY[Number]
                            OF Type;

WAIT                    PROCEDURE WAIT(Number);

WHILE                   WHILE Condition DO Statement;

WRITE                   WRITE(File,Expr1,Expr2,...);
                        WRITE(File,Expr1:Fldwdth...);
                        WRITE(File,Expr1:Fldwdth:Numdec...);

WRITELN                 WRITELN(File,Expr1,Expr2,...);
                        WRITELN(File,Expr1:Fldwdth...);
                        WRITELN(File,Expr1:Fldwdth:Numdec...);

XCTL                    PROCEDURE XCTL(Filespec);

XIO                     PROCEDURE XIO(Number,File,Aux1,Aux2,Filespec);
```

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Draper Pascal 2.1   System Information

System Information

The Supervisor uses zero page locations $A0 - $BF. Locations $80 -
$9F are available for your use if desired. Various locations
between $D4 and $FD are used by the floating point routines. Page
six ($600 - $6FF) is available for your use and not used by the
Pascal system.

The Supervisor is loaded into memory by DOS at the address $1D7C.
If this memory location is not available, then an error message is

given, along with an explanation of the probable cause of the problem. The pseudo code program to be executed is loaded in memory immediately after the end of the Supervisor. The pseudo machine stack extends from the end of the pseudo code program to the MEMTOP position, just before screen memory.

Filename Descriptions

The files named below are included in this ARC file:

AUTORUN.SYS	Supervisor object code
COMPILER.PCD	Compiler pcode
EDITOR.PCD	Editor pcode
INIT.PCD	Main Menu pcode
INIT.PAS	Main Menu Pascal source
EXPLNERR.PCD	Error code explainor (used by Compiler)
RSVDWRDS.TXT	Reserved word list (used by Compiler)
ERRORS.TXT	Text for compile errors (used by EXPLNERR.PCD)
RAMDISK1.DAT	Ramdisk setup (See complete manual)
RAMDISK2.DAT	Ramdisk setup (See complete manual)
RAMDISK3.DAT	Ramdisk setup (See complete manual)
NOTITLE.OBJ	Used to suppress title (See complete manual)
SAMPLE1.PAS	Kaleidoscope sample program source
SAMPLE2.PAS	Roman numeral sample program source
PASCAL.DOC	This introduction manual

Draper Pascal 2.1   Reserved Word List

Reserved Word List

ABS   DEG   FUNCTION ODD   READLN   STRING

```
ADDR       DELETE     GOTOXY     OF         REAL       THEN
AND        DIV        GRAPHICS   OPEN       RECORD     TO
ARCTAN     DO         HIMEM      OPTIONKEY  REPEAT     TRACEOFF
ARRAY      DOS        IF         OPTIONS    RESET      TRACEON
ASC        DOWNTO     INSERT     OR         REWRITE    TRUE
BEGIN      DRAWTO     INTEGER    ORD        RND        UNLOCK
BLOAD      DUMPSTK    IORESULT   PADDLE     SELECTKEY  UNTIL
BOOLEAN    DVSTAT     KEYPRESS   PEEK       SETCOLOR   VAL
CALL       ELSE       LENGTH     PLOT       SHL        VAR
CASE       END        LN         POINT      SHR        WAIT
CHAR       EOF        LOCATE     POKE       SIN        WHILE
CHR        EOLN       LOCK       POS        SOUND      WRITE
CLOSE      EXIT       LOG        PROC       SQR        WRITELN
COLOR      EXP        LPENH      PROCEDURE  SQRT       XCTL
CONCAT     EXP10      LPENV      PROGRAM    STARTKEY   XIO
CONST      FALSE      MAXGRAPH   PTRIG      STATUS
COPY       FILE       MOD        PURGE      STICK
COS        FOR        NOT        RAD        STR
CVTREAL    FUNC       NOTE       READ       STRIG
```

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```
                              Operators

Operator                        Operation
_____                        _____


   :=                           assignment


arithmetic:
   +                            addition
   -                            subtraction
   *                            multiplication
   / or DIV                     division
   MOD                          modulo (remainder after
                                        division)


Relational:
   =                            equality
   <>                           inequality
   <                            less than
   >                            greater than
   <=                           less than or equal to
   >=                           greater than or equal to


Logical:
   OR
   AND
   NOT
```

Error Messages

COMPILE TIME ERROR MESSAGES

```
01: Compiler table overflow (max 170)
02: Number expected
03: '=' expected
04: Identifier expected
05: Constant type identifier, number, or string constant expected
06: 'BEGIN' expected
07: Too many nesting levels
08: ':' expected
09: '.' expected
10: ';' expected
11: Undeclared identifier
12: Invalid type of identifier
13: ':=' expected
14: 'END' expected
15: ';', 'ELSE', or 'END' expected
16: 'THEN' expected
17: '#' expected
18: 'DO' expected
19: '#' or FILE type identifier expected
20: '[' expected
21: ']' expected
22: ')' expected
23: Illegal factor or identifier type
24: INCLUDE file nesting too deep
25:
26: 'OF' expected
27: Mismatched data types
28: 'TO' or 'DOWNTO' expected
29: 'UNTIL' expected
30: Range error
31: '(' expected
32: ',' expected
33: Literal too long or missing end quote (')
34: 'END' but no RECORD started
35: Incorrect number of parameters
36: INTEGER type identifier expected
37: STRING type identifier expected
38: REAL type identifier expected
39: CHAR type identifier expected
40: FILE type identifier expected
41: HEX type identifier expected
42: STRING constant expected
```

Draper Pascal 2.1   Error Messages

                    EXECUTION TIME ERROR MESSAGES

INDEX TOO HIGH

            This message occurs if an attempt is made to
            store a string array element into an occurance
            that is higher than defined for the variable.
            For example, if you tried to store the
            twentieth entry of an array that was only
            defined to hold ten occurances, you would get
            the message. This message only applies to
            string arrays since other array types are not
            checked for valid occurance numbers.

UNABLE TO OPEN DEBUG IOCB (7)

            This message is issued if the list output
            device you specify in response to the 'WHERE?
            (FILESPEC)' prompt cannot be opened. The
            prompt is issued only for the debug features
            trace and stack display.

CIO ERROR xxx FOR IOCB # y

            Some kind of Input-Output operation was
            performed which resulted in an abnormal return
            code from the Atari operating system. Refer to
            your BASIC or DOS manual for the meaning of
            the error number 'xxx'. 'y' is the IOCB number
            which the error occured on. Note that this
            message will not be printed if OPTIONS(0) is
            in effect. In this case it is your
            responsibility to check the return code by
            interrogating IORESULT after each I/O type
            instruction.

AT OFFSET

This message accompanies some other error
message and refers to the offset within the
pseudo code of the instruction that had the
error. Refer to the offset shown on your
compile listing to determine the Pascal
instruction that experienced the error.

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STOPPED BY <BREAK> KEY

This message indicates that execution of the
program was stopped because the BREAK key was
pressed. The offset of the instruction
executing is shown in the 'AT OFFSET' message.
Note that this message will not occur (and the
program will not stop after BREAK is pressed)
if OPTIONS(4) is in effect.

INSUFFICIENT MEMORY

This message indicates that an attempt was
made to increase the value of the stack
pointer to a value which would overlay screen
memory or the trace buffer, if the trace was
active. It may also be caused by manipulation
of a record without sufficient room between
the top of the stack and the top of available
memory (MEMTOP) to temporarily hold it.

INVALID OPCODE

This message should not occur. It indicates
that a pseudo instruction was encountered
which is invalid. If you get this message, it
means that your '.PCD' file has been corrupted
somehow or an XCTL was made to a file that was
not a pseudo code file. To correct, re-compile
the program in question. It may also occur if
you attempt to run a Draper Pascal program
which was compiled under a previous release of

this software.

Draper Pascal 2.1   Registration Form

Registration Form

When you register for a fee of only $15.00, you will receive a
copy of the latest version of the Draper Pascal manual. Also, if
a later version of the software is more current than the version
you are registering, you will receive a diskette containing it.
In addition to all relative information in this manual, the
complete manual provided to registered users contains the
following:

*   Complete Draper Pascal reserved word definitions

*   Complete Draper Pascal example programs demonstrating the use
    of each reserved word

*   BASIC equivalents for each reserved word, where applicable

*   Information on setup and use of a Ramdisk for Draper Pascal.
    After proper initialization, the Editor will take less than two
    seconds to load and the Compiler will take less than three
    seconds. Also, the default drive will be automatically set to
    the Ramdisk.

*   A royalty-free, non-exclusive license to allow you to
    distribute software developed using Draper Pascal

*   Complete Draper Pascal source listings for the Editor, Main

Menu program, Ramdisk initialization program, and sample
        programs

*   Editor command summary

*   Information on how to suppress the title screen from being
    displayed

*   Trace format descriptions

*   Internal data format descriptions

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*   Technical support, by mail, at no charge

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Draper Pascal 2.1   Registration Form

===

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```