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ABSTRACT

Following a brief description of types of computer assisted instruction (tutorial, drill and practice, and simulation/games), this document provides the following BASIC programming routines: variable typing, range error maskings, default entries, having user check input, allowing users to change input, response checker for numbers, response checker for strings, a simple parser, setup interactive style, interactive style, screen scroller, screen oriented format, window poker, print using for numbers, centering text, word wrap, putting text in boxes, printer interfacer, typewriter sound, menu maker, user self pacer, user pacer pre-defined, right answer routine, wrong answer routine, section feedback, fading prompts, help screens, and exit routine. Each description includes purpose and use of the routine, how to check a program for the routine, and how to program the routine in BASIC.
 (LMM)

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Types of CAI

Computer assisted instruction is a generic term covering all uses of the computer for actual instruction. A major component of CAI has been the use of the computer to present material to, or provide practice for the student. The following information identifies the most common types of CAI being used in educational applications.

Tutorial

Tutorial CAI is characterized by the computer serving as a presenter of new information. There are two subtypes of tutorial CAI found in the literature.

Linear and Branching Tutorials are direct descendents of programmed instruction which use the computer as a teaching machine. A linear tutorial takes all students straight through the material to be learned. A branching tutorial allows students to traverse different routes through the material. Most often, tutorials use the computer as little more than an electric page turner.

Dialog tutorials are more interactive than linear and branching tutorials using "conversation" between the student and the computer. Dialog tutorials make more complete use of the computer's abilities than direct linear CAI. Dialogs are descendents of the socratic method of teaching using a questioning technique to instruct the student.

Drill and Practice

Drill and practice CAI provides opportunity for the student to use information previously obtained, much as flash cards are used. Drill and practice is used most often where rote memory is important. Drill and practice consists of solving a set of problems presented by the computer.

Simulation/Games

Simulation/games CAI not only allow the student to use information previously learned, but can also be used to implement discovery learning. These subtypes of simulation/games CAI have been identified in the literature.

Games involve using the computer to compete with students, i.e. the game may be won or lost. Games provide opportunity for students to practice skills.

Simulations of mechanical systems, such as a nuclear reactor or an automobile engine allow students to manipulate a physical environment which may not be otherwise practical.

Simulations of non-mechanical systems such as voters in an election or ecological systems allow students to study complex social and political environments.

There are no distinct dividing lines between the types of CAI. An individual lesson may in fact combine a number of CAI types. Within each CAI type there are often differences in interpretation and application.

Variable Typing

Description of purpose and use: A program written in BASIC expects input variables such as (A) to be presented with NUMBERS and variables such as (AS) to be presented with alphanumeric characters (A-Z and 1-0). To avoid variable type errors in data input, many programmers treat all variables as Strings in INPUT commands. String responses can then be converted to the correct number by use of the VAL command. The Applesoft ASC command can also be used to convert the first letter of a string to decimal ASCII code.

How to check a program for routine: Most microcomputer versions of BASIC will give the user an error message if the wrong variable type is typed into the computer.

How to program routine in BASIC:

```

21100 REM VARIABLE TYPING
21110 PRINT
21120 PRINT "PRESS 1 THEN 'RETURN' TO GO ON": PRINT
21130 FLASH : PRINT "TRY TO ENTER 'ONE!'"; NORMAL
21140 PRINT " ";
21150 INVERSE : PRINT "THEN TRY '1!'": NORMAL
21160 PRINT : INPUT "====>";A9: REM SHOULD BE A9$
21170 PRINT : PRINT "TO AVOID ERRORS!"
21180 PRINT "USE STRING VARIABLES FOR DATA INPUT!"
21190 PRINT : PRINT : PRINT :VP = 23: GOSUB 8000: HOME

```

Range Error Masking

Description of purpose and use: This technique screens out responses that are out of desired range.

How to check a program for routine: If a range screening or masking technique is not used a user can input undesired responses to a program. Out of range responses can cause many calculation problems or 'bomb' the program.

How to program routine in BASIC:

```

1000 REM RANGE ERROR FEEDBACK
1010 REM INPUT VARIABLES -
1020 REM OUTPUT VARIABLES -
1030 REM INTERNAL VARIABLES - J9
1040 PRINT "THINK";
1050 TS = 2000: GOSUB 9500
1060 FOR J9 = 1 TO 5: PRINT CHR$ (8);: REM BACK CURSOR UP

1070 NEXT J9
1080 CALL - 868: REM CLEAR RIGHT/CURSOR
1090 RETURN

```

How to call routine from program: The desired range is checked by ASCII value in main program. Out of range responses branch program to subroutine. Subroutine gives the THINK feedback then resets the cursor for a new response.

Sample program usage:

```

21200 REM RANGE ERROR
21210 HOME
21220 PRINT "ENTER A NUMBER FROM 1 TO 9": PRINT
21230 FLASH : PRINT "TRY TO ENTER '0' OR 'A!'";:
21240 NORMAL : PRINT " ";
21250 INVERSE : PRINT "THEN TRY '6!'": NORMAL : PRINT
21260 GET AN$
21270 IF ASC (AN$) < 49 OR ASC (AN$) > 57 THEN GOSUB
1000: GOTO 21260
21280 PRINT :TS = "IMPROVE PROGRAMMING BY MASKING OFF OUT
OF RANGE RESPONSES.": GOSUB 6300
21290 TS = "STOP": GOSUB 6300:VP = 23: GOSUB 8000

```

Default Entries

Description of purpose and use: This routine allows the user to just press return in order to input a common response. This saves typing time and reduces the chance of error.

How to check a program for routine: If the program prompts the user with common responses requiring the user to only press RETURN (or ENTER) then the program has a default entry routine.

How to program routine in BASIC:

```

2000 REM USING DEFAULT ENTRIES
2010 REM INPUT VARIABLES - DES (DEFAULT)
2020 REM OUTPUT VARIABLES - AS (ANSWER)
2030 REM INTERNAL VARIABLES - I9, A9$, A8$
2040 INVERSE
2050 PRINT DES;
2060 GET A9$
2070 IF A9$ = CHR$ (13) THEN AS = DES: NORMAL : RETURN
2080 FOR I9 = 1 TO LEN (DES): PRINT CHR$ (8):: NEXT I9
2090 CALL - 868: REM CLEAR TO END OF LINE
2100 NORMAL
2110 PRINT A9$;
2120 INPUT " ";A8$
2130 AS = A9$ + A8$
2140 RETURN

```

How to call routine from program: The input variable DES (Default Entry) must be set in the main program before calling the routine. The output variable AS (Answer String) returns the user's answer to the main program. If you want the answer to be a number use the statement A = VAL (AS) before returning to the main program.

Sample program usage:

```

22100 REM DEFAULT ENTRIES
22110 PRINT "ARE DEFAULT ENTRIES USEFUL? ";
22120 DES = "Y": GOSUB 2000
22130 HOME
22140 PRINT : PRINT : PRINT "INSTEAD OF TYPING IN A
FREQUENTLY USED"
22150 PRINT : PRINT "VALUE, ERRORS CAN BE REDUCED BY
OFFERING";
22160 PRINT : PRINT "THE USER A - ";
22170 DES = "DEFAULT": GOSUB 2000
22180 IF AS < > "DEFAULT" THEN 22200
22190 GOTO 22300
22200 PRINT : PRINT "WRONG, DEFAULTS DO HELP REDUCE
ERRORS."
22210 VP = 21: GOSUB 8000
22220 GOTO 22190

```

Having User Check Input

Description of purpose and use: Allows user to check for typing mistakes. If a mistake is found the user may then go and correct it.

How to check a program for routine: A program has this routine if it asks the user if the input data is correct. If the data is incorrect the program should allow the user to change the data.

How to program routine in BASIC:

```

2200 REM HAVING USER CHECK INPUT
2210 REM INPUT VARIABLES -
2220 REM OUTPUT VARIABLES - A1$
2230 REM INTERNAL VARIABLES -
2240 VTAB 23
2250 PRINT "IS THIS INPUT CORRECT? ";: GET A1$
2260 VTAB 23: HTAB 1: CALL - 868: REM CLEAR TO END OF
LINE
2270 RETURN

```

How to call routine from program: This routine asks the user if the input is correct and returns the users answer to the main program as variable A1\$. The main program should then branch according to A1\$ as in line 22420 in the sample program.

Sample program usage:

```

22300 REM CHECKING INPUT & CHANGING INPUT
22310 HOME
22320 PRINT "WHAT IS THE NAME OF YOUR ALMA MATER? ": PRINT
22330 INPUT " ";A$
22340 GOSUB 2200
22350 IF A1$ = "N" THEN 22400
22360 HOME
22370 VTAB 10: PRINT "ANSWER THE 1ST QUESTION WRONG THIS
TIME"
22380 VP = 23: GOSUB 8000
22390 GOTO 22300
22400 V9 = 10:H9 = 1: GOSUB 2400
22410 GOSUB 2200
22420 IF A1$ = "N" THEN 22400
22430 VTAB 15
22440 PRINT "I HOPE ";A$;" IS HAVING"
22450 PRINT : PRINT "A GOOD YEAR IN SPORTS."
22460 VP = 23: GOSUB 8000

```

Allowing User To Change Input

Description of purpose and use: Allows user to correct incorrect input responses by retyping incorrect portions of the original response and copying correct portions by using the right arrow key.

How to check a program for routine: A program has some form of this routine if it allows the user to correct responses by retyping incorrect portions and copying correct responses portions. The cursor restarts at the original input location to facilitate the process.

How to program routine in BASIC:

```

2400 REM ALLOWING USER TO CHANGE INPUT
2410 REM INPUT VARIABLES - A$, V9, H9
2420 REM OUTPUT VARIABLES -
2430 REM INTERNAL VARIABLES - A9$
2440 VTAB V9: HTAB H9
2450 PRINT A$;
2460 VTAB V9: HTAB H9
2470 INPUT "";A9$
2480 IF A9$ = "" THEN RETURN
2490 A$ = A9$
2500 RETURN

```

How to call routine from program: The main program must pass the original incorrect response A\$ (Answer String). The desired cursor location is passed to the routine by V9 (Vertical location) and H9 (Horizontal location). The response A\$ is set equal to the retyped response A9\$ before program control is sent back to the main program.

Sample program usage:

```

22300 REM CHECKING INPUT & CHANGING INPUT
22310 HOME
22320 PRINT "WHAT IS THE NAME OF YOUR ALMA MATER? ": PRINT
22330 INPUT "";A$
22340 GOSUB 2200
22350 IF A1$ = "N" THEN 22400
22360 HOME
22370 VTAB 10: PRINT "ANSWER THE 1ST QUESTION WRONG THIS
TIME"
22380 VP = 23: GOSUB 8000
22390 GOTO 22300
22400 V9 = 10:H9 = 1: GOSUB 2400
22410 GOSUB 2200
22420 IF A1$ = "N" THEN 22400
22430 VTAB 15
22440 PRINT "I HOPE ";A$;" IS HAVING"
22450 PRINT : PRINT "A GOOD YEAR IN SPORTS."
22460 VP = 23: GOSUB 8000

```

Response Checker For Numbers

Description of purpose and use: This routine allows user to answer numerical questions within a preset range (ie. + or - .001 of the desired response). Such a routine allows rounding errors in response checking.

How to check a program for routine: A program without a tolerance in a number input checking routine will not allow user rounding errors.

How to program routine in BASIC:

```

3000 REM RESPONSE CHECKER FOR NUMBERS
3010 REM INPUT VARIABLES - A, CA, TL
3020 REM OUTPUT VARIABLES - CR
3030 REM INTERNAL VARIABLES -
3040 CR = 0
3050 IF (A > = CA - TL) AND (A < = CA + TL) THEN CR = 1
3060 RETURN

```

How to call routine from program: The input variables: A (user Answer), CA (Correct Answer), and TL (ToLerance) must be passed from the main program. The output variable CR (CORrect) will be returned as (1) if response is within the desired range; (0) is returned if response is out-of-range.

Sample program usage:

```

23100 REM NUMBERS
23110 INPUT "WHAT IS 17 + 8? ";AS
23120 GOSUB 2200
23130 IF AS < > "Y" THEN V9 = 8:H9 = 17: GOSUB 2400
23140 A = VAL (AS)
23150 CA = 25:TL = .001: GOSUB 3000
23160 VTAR 10:VP = 23
23170 IF CR = 1 THEN GOSUB 9000: GOSUB 8000
23180 IF CR = 0 THEN GOSUB 9200: GOSUB 8000

```

Response Checker For Strings

Description of purpose and use: This routine allows program to check a user String response against a desired response. Any initial spaces typed by the user prior to the response are ignored.

How to check a program for routine: A string answer checking routine without facility for excluding initial blanks will keep the blank as part of the literal string. This can cause improper error checking.

How to program routine in BASIC:

```

3100 REM RESPONSE CHECKER FOR STRINGS
3110 REM INPUT VARIABLES - AS, CAS
3120 REM OUTPUT VARIABLES - CR
3130 REM INTERNAL VARIABLES -
3140 CR = 0
3150 IF LEFT$(AS,1) = " " THEN AS = RIGHT$(AS,(LEN
(AS) - 1)): GOTO 3150
3160 IF AS = CAS THEN CR = 1
3170 RETURN

```

How to call routine from program: The routine requires the input variables AS (the user Answer String) and CAS (the Correct Answer String) to be passed from the main program. After the routine removes initial response spaces, AS and CAS are evaluated. The output variable CR (CoRrect) is returned as (1) if the strings are identical; (0) is returned if not.

Sample program usage:

```

23300 REM STRINGS
23310 HOME
23320 PRINT "WHAT IS THE PART OF THE COMPUTER USED BY";:
PRINT
23330 PRINT "HUMANS TO GIVE INFORMATION TO COMPUTERS?";:
PRINT
23340 INPUT ";AS
23350 GOSUB 2200
23360 IF A1$ < > "Y" THEN V9 = 12:H9 = 1: GOSUB 2400
23370 CAS = "KEYBOARD": GOSUB 3100
23380 VTAB 15:VP = 23
23390 IF CR = 1 THEN GOSUB 9000: GOSUB 8000
23400 IF CR = 0 THEN GOSUB 9200: GOSUB 8000

```

A Simple Parser

Description of purpose and use: This parser routine allow user to type several words (sentence) in response to a question. The parser then looks at response for a desired word.

How to check a program for routine: Programs with a parser routine for response checking will look for significant portions of a user input.

How to program routine in BASIC:

```

3200 REM A SIMPLE PARSER
3210 REM INPUT VARIABLES - AS, CAS
3220 REM OUTPUT VARIABLES - CR
3230 REM INTERNAL VARIABLES - I9
3240 CR = 0
3250 FOR I9 = 1 TO (( LEN (AS) - LEN (CAS)) + 1)
3260 IF CAS = MIDS (AS,I9,( LEN (CAS))) THEN CR = 1: GOTO
3280
3270 NEXT I9
3280 RETURN

```

How to call routine from program: This parser requires the input variables AS (user Answer String) and CAS (Correct Answer String) to be passed from the main program. The AS is parsed to see if it includes CAS. The output variable CR (Correct) is set to (1) if AS includes CAS; CR is set to (0) if not.

Sample program usage:

```

23500 REM PARSING
23510 HOME
23520 PRINT "TYPE IN A SENTENCE NAMING THE TYPE OF"
23530 PRINT : PRINT "MEMORY LOST WHEN A COMPUTER LOSES
POWER."
23540 INPUT ";AS
23550 GOSUB 2200
23560 IF AIS < > "Y" THEN V9 = 12:H9 = 1: GOSUB 2400
23570 CAS = "RAM": GOSUB 3200
23580 VTAB 15:VP = 23
23590 IF CR = 1 THEN GOSUB 9000: GOSUB 8000
23600 IF CR = 0 THEN GOSUB 9200: GOSUB 8000

```

Setup Interactive Style

Description of purpose and use: This routine asks user to input number of letters in first name (up to 20). User is then asked to type name (return key does not need to be pressed). The typed name can be used in the remainder of the program as an interactive prompt.

How to check a program for routine: If a program asks for the user's name for later use, some form of this routine is being used.

How to program routine in BASIC:

```

4000 REM SET UP INTERACTIVE STYLE
4010 REM INPUT VARIABLES -
4020 REM OUTPUT VARIABLES - NS
4030 REM INTERNAL VARIABLES - NL,NLS,N9$,I9
4040 NS = ""
4050 PRINT "PLEASE TYPE THE NUMBER OF LETTERS IN"
4060 INPUT "YOUR FIRST NAME THEN PRESS 'RETURN'->";NLS
4070 LET NL = VAL (NLS)
4080 IF NL < 1 OR NL > 20 THEN HOME : GOTO 4000
4090 PRINT : PRINT "PLEASE TYPE YOUR FIRST NAME"
4100 PRINT "====>";: FOR I9 = 1 TO NL: PRINT ".";: NEXT I9
4110 FOR I9 = 1 TO NL: CALL - 1008: NEXT I9: REM BACK
CURSOR
4120 FOR I9 = 1 TO NL: GET N9$
4130 IF ASC (N9$) = 8 THEN NS = LEFT$ (NS,( LEN (NS) -
1)): GOTO 4160
4140 IF N9$ = CHR$ (13) THEN RETURN
4150 LET NS = NS + N9$
4160 IF ASC (N9$) = 8 THEN PRINT N9$;".":I9 = I9 - 1
4170 PRINT N9$;
4180 NEXT I9: RETURN

```

How to call routine from program: This routine can be called from any location in the main program. However, it is usually called early to facilitate use of the the user's name in prompts and responses. The routine returns the output variable NS (user Name String).

Sample program usage:

```

24000 REM INTERACTION STYLE
24010 HOME
24020 TS = "INTERACTION STYLE": GOSUB 6500
24030 WL = 0:WW = 40:WT = 7:WR = 24: GOSUB 5000
24040 GOSUB 4000: PRINT : PRINT : GOSUB 4200
24050 VP = 22: GOSUB 8000

```

Interactive Style

Description of purpose and use: Allows program to prompt user with his/her name during processing. The user's name must have first been identified in main program or in the Setup Interactive Style routine. Routine combines user's name with other comments on a random basis.

How to check a program for routine: If a program returns user's name and other prompts or comments on a random basis, some form of this routine is being used.

How to program routine in BASIC:

```

4200 REM INTERACTIVE STYLE
4210 REM INPUT VARIABLES - NS
4220 REM OUTPUT VARIABLES -
4230 REM INTERNAL VARIABLES - X9
4240 PRINT
4250 X9 = INT ( RND (1) * 3) + 1
4260 ON X9 GOTO 4270,4280,4290
4270 PRINT "OK! ";NS;".": RETURN
4280 PRINT "LET'S KEEP GOING ";NS; "!": RETURN
4290 PRINT NS; ", IT'S TIME TO MOVE ON!": RETURN

```

How to call routine from program: This routine can be called from any location in the main program after NS (user's Name String) is identified. Routine prints response on screen after a random selector is generated.

Sample program usage:

```

24000 REM INTERACTION STYLE
24010 HOME
24020 TS = "INTERACTION STYLE": GOSUB 6500
24030 WL = 0:WW = 40:WT = 7:WB = 24: GOSUB 5000
24040 GOSUB 4000: PRINT : PRINT : GOSUB 4200
24050 VP = 22: GOSUB 8000

```

Screen Scroller

Description of purpose and use: This routine creates the visual effect of moving text information up on the screen one page or screen at a time (usually called screen scrolling). Each new PAGE is started at the bottom of the screen and scrolled up.

How to check a program for routine: A program without a page or screen orientation will scroll text lines one at a time with no visual starting or ending point.

How to program routine in BASIC:

```
5100 REM SCREEN SCROLLER
5110 REM INPUT VARIABLES - SS
5120 REM OUTPUT VARIABLES -
5130 REM INTERNAL VARIABLES - I9
5140 VTAB 24: SPEED= 100
5150 FOR I9 = 1 TO SS: PRINT : NEXT I9
5160 SPEED= 255: RETURN
```

How to call routine from program: The input SS (Screen Scroller) controls the number of lines to be scrolled up on the screen. The Applesoft command SPEED is used to slow the process. This routine can be called from any location in the main program.

Sample program usage:

```
25000 REM SCREEN FORMAT
25010 HOME
25020 TS = "SCREEN FORMAT": GOSUB 6500
25030 WL = 0:WW = 40:WT = 7:WB = 24: GOSUB 5000
25040 TS = "PAGE 1": GOSUB 6200
25110 VTAB 20:TS = "THIS IS A DEMONSTRATION OF": GOSUB 6200
25120 TS = "A SCROLLING SCREEN DISPLAY!": GOSUB 6200
25130 TD = 2000: GOSUB 8500
25140 SS = 14: GOSUB 5100
25150 VTAB 8:TS = "PAGE 2": GOSUB 6200
25160 VTAB 20:TS = "THIS IS A DEMONSTRATION OF": GOSUB 6200
25170 TS = "A WHOLE SCREEN ORIENTATION!": GOSUB 6200
25180 POKE - 16368,0:VP = 23: GOSUB 8000
25190 TS = "PAGE 3": GOSUB 6200
25200 VP = 23: GOSUB 8000
```

Screen Oriented Format

Description of purpose and use: Presents information to the user one SCREEN or page at a time.

How to check a program for routine: Programs using this technique present information one page at a time. Processing can be delayed by a time loop (FOR-NEXT). Commonly INPUT or (GET or INKEY) statements are used to cause the computer to wait for a key(s) to be pressed. Each page is usually starting on a new screen (by using the HOME or CLS command).

How to program routine in BASIC:

```
25150 VTAR 8:TS = "PAGE 2": GOSUB 6200
25160 VTAR 20:TS = "THIS IS A DEMONSTRATION OF": GOSUB 6200
25170 TS = "A WHOLE SCREEN ORIENTATION!": GOSUB 6200
25180 POKE -16368,0:VP = 23: GOSUB 8000
25190 TS = "PAGE 3": GOSUB 6200
25200 VP = 23: GOSUB 8000
```

How to call routine from program: The screen orientation desired is produced by the GETS and HOME commands found in the USER SELF-PACER subroutine starting on line 8000. The Vertical Position (VP) of the user prompt must be sent to the subroutine. The POKE -16368,0, for the Apple II, clears the keyboard buffer (to remove the effect of the user pressing extra keys) prior to calling the subroutine.

Window POKER

Description of purpose and use: Allows programmer to change monitor screen window to create special effects or to protect on-screen copy.

How to check a program for routine: If the screen window dimensions change during a program or text is displayed in the same location for several sequential screens the program is using some POKE statement to alter the computers default screen dimensions.

How to program routine in BASIC:

```

5000 REM WINDOW POKER
5010 REM INPUT VARIABLES - WL, WW, WT, WB
5020 REM OUTPUT VARIABLES -
5030 REM INTERNAL VARIABLES -
5040 POKE 32,WL: REM WINDOW LEFTMOST POSITION
5050 POKE 33,WW: REM WINDOW WIDTH
5060 POKE 34,WT: REM WINDOW TOP MARGIN
5070 POKE 35,WB: REM WINDOW BOTTOM MARGIN
5080 CALL - 936: REM CLEAR WINDOW/CURSOR TO TOP LEFT
5090 RETURN

```

How to call routine from program: Main program must send values for WL (Window top Left position), WW (Window Width), WT (Window Top position), and WB (Window Bottom position). Values can be: WL (0-39), WW (1-40), WT (0-23), and WB (0-24) for the APPLE II.

Sample program usage:

```

25300 REM WINDOW POKING DEMO
25310 FOR J1 = 1 TO 15
25320 FOR J = 1 TO 40: PRINT "X";: NEXT J: NEXT J1
25330 WL = 3:WW = 3:WT = 9:WB = 20: GOSUB 5000
25340 WL = 6:WW = 30:WT = 11:WB = 18: GOSUB 5000
25350 WL = 34:WW = 3:WT = 9:WB = 20: GOSUB 5000
25360 POKE 32,0: POKE 33,40: POKE 34,0: POKE 35,24
25370 VTAB 15:TS = " THIS IS A WINDOW DEMONSTRATION":
GOSUB 6200
25380 TD = 1000: GOSUB 8500
25390 WL = 3:WW = 34:WT = 11:WB = 18: GOSUB 5000
25400 LIST 25000 - 25430
25410 POKE 32,0: POKE 33,40: POKE 34,0: POKE 35,24
25420 VP = 23: GOSUB 8000
25430 HOME : GOTO 13000

```

Print Using For Numbers

Description of purpose and use: This routine allows number output to be placed in columns and lined-up with respect to a decimal point.

How to check a program for routine: Some microcomputer versions of BASIC have a built in PRINT USING routine. Programmers must write their own routine for those versions that do not include this aid. If a program does not line up the decimal points when numbers are placed in columns PRINT USING is not being used.

How to program routine in BASIC:

```

6000 REM PRINT USING FOR NUMBERS
6010 REM INPUT VARIABLES - N, DC, PR
6020 REM OUTPUT VARIABLES - NNS
6030 REM INTERNAL VARIABLES - I9, P9, P8, N9, N9$, C9
6040 P9 = (10 ^ PR):P8 = (1 / (10 ^ (PR + 1))) * 5)
6050 N9 = INT ((N + P8) * P9) / P9
6060 N9$ = STRS (N9):C9 = 0
6070 IF LEFTS (N9$,1) = "." THEN 6120
6080 FOR I9 = 1 TO LEN (N9$)
6090 IF MIDS (N9$,I9,1) = "." THEN C9 = I9 - 1
6100 NEXT I9
6110 IF C9 = 0 THEN C9 = LEN (N9$):N9$ = N9$ + ".": FOR I9
= 1 TO PR:N9$ = N9$ + "0": NEXT I9
6120 HTAB (DC - C9)
6130 IF LEN (N9$) - C9 > PR THEN 6150
6140 FOR I9 = 1 TO (ABS (LEN (N9$) - C9 - PR - 1)):N9$ =
N9$ + "0": NEXT I9
6150 NNS = N9$
6160 RETURN

```

How to call routine from program: The input variables N (Number), DC (Decimal Column location), and PR (desired Places Right of decimal) must be passed from the main program. The routine reforms the number to include the decimal point and number as a String. The output variable NNS (New Number String) is passed back to the main program.

Sample program usage:

```

26100 REM NUMERIC PRINT USING
26110 HOME
26120 FOR J = 1 TO 5
26130 P1 = (10 ^ (LEN (STRS (PR)) - 2))
26140 X = INT (RND (1) * 100) + 1:Y = INT (RND (1) * 10)
+ 1
26150 Z = X / Y
26160 DC = 5:PR = 4
26170 N = X:GOSUB 6000
26180 PRINT NNS;
26190 DC = 20

```

```
26200 N = Y: GOSUB 6000
26210 PRINT NNS;
26220 DC = 30
26230 N = Z: GOSUB 6000
26240 PRINT NNS
26250 NEXT J
26260 VP = 23: GOSUB 8000
```

Centering Text

Description of purpose and use: This subroutine facilitates the centering of text strings to meet the width requirements of the screen or printer used for program output or display.

How to check a program for routine: If such a routine is not used the programmer will have to pack a PRINT statement with spaces or individually TAB each printed line to get the desired centering.

How to program routine in BASIC:

```
6200 REM CENTERING TEXT
6210 REM INPUT VARIABLES - TS
6220 REM OUTPUT VARIABLES -
6230 REM INTERNAL VARIABLES - CL
6240 CL = 40: REM # OF SCREEN COLUMNS
6250 HTAB (((CL - LEN (TS)) / 2) + 1)
6260 PRINT TS
6270 RETURN
```

How to call routine from program: The desired message to be centered must be defined as TS (Text String) in the main program. The subroutine's internal variable CL (Center Location) can be changed to facilitate different width output devices (ie. the Apple monitor display is 40 characters wide and the TRS-80 display is 64 characters wide).

Sample program usage:

```
26300 REM CENTERING TEXT
26310 HOME
26320 TS = "THESE": GOSUB 6200
26330 TS = "LINES ARE": GOSUB 6200
26340 TS = "CENTERED WITH": GOSUB 6200
26350 TS = "THE SUBROUTINE IN": GOSUB 6200
26360 TS = "LINES 6200 THROUGH 6260": GOSUB 6200
26370 TS = "INPUT IS GIVEN TO THE ROUTINE": GOSUB 6200
26380 TS = "AS THE STRING VARIABLE TS OUTPUT IS": GOSUB 6200
26390 TS = "PLACED": GOSUB 6200
26400 TS = "IN THE": GOSUB 6200
26410 TS = "CENTER": GOSUB 6200
26420 VP = 23: GOSUB 8000
```

Word Wrap

Description of purpose and use: This routine allows programmer to disregard the character width restrictions of the computers monitor when developing PRINT statements. This method will WRAP excess portions of a display line on the blank space closest to but under the width specified.

How to check a program for routine: Without the use of such a routine, the programmer would have to count the number of characters in each PRINT statement to avoid WRAPPING in the middle of a word.

How to program routine in BASIC:

```

6300 REM WORD WRAP
6310 REM INPUT VARIABLES - TS, SC
6320 REM OUTPUT VARIABLES -
6330 REM INTERNAL VARIABLES - CL, T9$, C9, L9, I9
6340 CL = 40: REM SCREEN WIDTH IN COLUMNS
6350 IF TS = "STOP" THEN PRINT T9$:T9$ = "": PRINT :
RETURN
6360 TS = T9$ + TS
6370 C9 = 0
6380 T9$ = LEFTS (TS,CL - C9)
6390 IF LEN (T9$) = LEN (TS) THEN RETURN
6400 IF RIGHTS (T9$,1) = " " THEN 6430
6410 C9 = C9 + 1
6420 GOTO 6380
6430 PRINT LEFTS (T9$,CL - 1)
6440 IF SC > 1 THEN FOR I9 = 1 TO SC - 1: PRINT : NEXT I9
6450 L9 = LEN (TS) - LEN (T9$)
6460 IF L9 = 0 THEN RETURN
6470 TS = RIGHTS (TS,L9)
6480 GOTO 6370

```

How to call routine from program: To make use of this subroutine the main program must supply the input variable TS (Text String). The input variable SC (SpaCinq) will control the number of spaces between lines for that section or paragraph (ie. single or double space). After each desired string is identified in the main program and sent to the routine with a GOSUB, the next statement should be TS="STOP":GOSUB 6300. The TS="STOP" signals the end of the printing process.

Sample program usage:

```

26500 REM WORD WRAP
26510 HOME
26520 TS = " THIS IS A SAMPLE PARAGRAPH SHOWING HOW WORD
WRAP WORKS.": GOSUB 6300
26530 TS = " WORD WRAP IS A ROUTINE THAT GETS RID OF THE
NASTY MESS CAUSED BY SPLITTING WORDS AT THE END OF LINES.":
GOSUB 6300

```

26540 TS = " ALL TOO OFTEN COMPUTER FORCED SPLITS DON'T
OCCUR IN BETWEEN SYLLABLES.": GOSUB 6300
26550 TS = "STOP": GOSUB 6300
26560 TS = " WITH WORD WRAP LINES CAN ONLY END ON SPACES
NOT IN THE MIDDLE OF A WORD.": GOSUB 6300
26570 TS = " THIS CAUSES THE TEXT PRESENTATION TO BE MUCH
MORE READABLE.": GOSUB 6300
26580 TS = "STOP": GOSUB 6300
26590 VP = 23: GOSUB 8000

Putting Text In Boxes

Description of purpose and use: This routine improves the visual effect of a screen by placing desired text information in a rectangle shape.

How to check a program for routine: If a program has several title screens with information in boxes some form of this routine is being used.

How to program routine in BASIC:

```

6500 REM BOXES
6510 REM INPUT VARIABLES - TS
6520 REM OUTPUT VARIABLES -
6530 REM INTERNAL VARIABLES - B9$, L9, H9, CL, I9
6540 CL = 40:B9$ = "*"
6550 L9 = LEN (TS):L9 = L9 + 4
6560 H9 = ((CL - L9) / 2) + 1
6570 HTAB H9: FOR I9 = 1 TO L9: PRINT B9$;: NEXT I9: PRINT
6580 HTAB H9: PRINT B9$;: HTAB (H9 + L9 - 1): PRINT B9$
6590 HTAB H9: PRINT B9$;" ";TS;" ";B9$
6600 HTAB H9: PRINT B9$;: HTAB (H9 + L9 - 1): PRINT B9$
6610 HTAB H9: FOR I9 = 1 TO L9: PRINT B9$;: NEXT I9: PRINT
6620 RETURN

```

How to call routine from program: The desired message must be identified as TS (Text String) is the main program. The internal variable B9\$="*" defines the character to form the box. The box is automatically formed with the text inside.

Sample program usage:

```

26600 REM BOXES
26610 VTAB 8
26620 TS = "YOUR NAME IN LIGHTS!": GOSUB 6500
26630 TD = 500: GOSUB 8500: HOME
26640 TS = NS: FLASH : GOSUB 6500: NORMAL
26650 VP = 23: GOSUB 8000
26660 HOME

```

Printer Interfacer

Description of purpose and use: This routine permits user to select use of the printer to produce hard copy. User can choose to skip the printing process. Routine prompts user to turn printer on and to position paper before printing.

How to check a program for routine: A program without such a routine will HANG if the printer is OFF LINE when the program wants to PRINT.

How to program routine in BASIC:

```

6700 REM PRINTER INTERFACER
6710 REM INPUT VARIABLES - VP
6720 REM OUTPUT VARIABLES - AS
6730 REM INTERNAL VARIABLES - AS
6740 PRINT : PRINT "DO YOU WANT PRINTER OUTPUT Y OR N ?":
PRINT "PRESS N IF PRINTER IS OFF LINE ->";
6750 GET AS
6760 IF AS < > "Y" AND AS < > "N" THEN 6750
6770 IF AS = "N" THEN PRINT : RETURN
6780 HOME : PRINT "PLEASE TURN PRINTER ON AND ADJUST PAPER"
6790 VP = 23: GOSUB 8000: REM PACER
6800 PRINT : PRINT "PRINTING IS IN PROGRESS": PRINT
6810 PRINT CHR$(4);"PR#1": REM CHR$(4) IS CONTROL-D
6820 RETURN

```

How to call routine from program: A value for (VP) Vertical Position must be passed from the main program to position the printing choice prompt. The variable AS is returned to the main program- (N) skips the printing. Routine activates printer interface (PR#1) and main program deactivates interface (PR#0) for the APPLE (use CMD"Z", "OFF" for TRS-80).

Sample program usage:

```

26700 REM PRINTER INTERFACER DEMONSTRATION
26710 HOME
26720 VP = 10: GOSUB 6700
26790 IF AS < > "Y" THEN GOTO 26890
26800 PRINT "THIS IS THE ITEM TO BE PRINTED"
26810 PRINT "IF THE PRINTER IS ON!"
26820 PRINT CHR$(4);"PR# 3"
26890 VP = 23: GOSUB 8000

```

Typewriter Sound

Description of purpose and use: This routine clicks the computer's speaker during letter printing to simulate a typewriter or tickertape machine.

How to check a program for routine: If an APPLE II program gives a sound effect during text printing a routine similar to this one is being used.

How to program routine in BASIC:

```

6900 REM TYPEWRITER SOUND
6910 REM INPUT VARIABLES - TS,SP
6920 REM OUTPUT VARIABLES -
6930 REM INTERNAL VARIABLES - I9, J9
6940 SPEED= SP: FOR I9 = 1 TO LEN (TS)
6950 IF MID$ (TS,I9,1) = " " THEN PRINT " ";: GOTO 6980
6960 PRINT MID$ (TS,I9,1);
6970 FOR J9 = 1 TO 1:X1 = PEEK ( - 16336): NEXT J9
6980 NEXT I9
6990 SPEED= 255: PRINT : RETURN

```

How to call routine from program: This routine requires the message to be assigned to TS (Text String) in the main program. Also, a value for the variable SP (SPeed) is required to set the Applesoft SPEED command.

Sample program usage:

```

27000 REM TUTORIAL STYLE
27010 HOME
27020 TS = "TUTORIAL STYLE": GOSUB 6500
27030 WL = 0:WW = 40:WT = 7:WB = 24: GOSUB 5000
27040 SP = 150:TS = "WE HAVE SEEN TWO TYPES OF TUTORIAL
STYLE": GOSUB 6900
27050 SP = 150:TS = "USED IN THIS PROGRAM!": GOSUB 6900:
PRINT : PRINT

```

Menu Maker

Description of purpose and use: This routine allows the program user to make branching choices. In the application of Computer Assisted Instruction (CAI) learners can take different paths through instructional materials.

How to check a program for routine: If a program presents the user with a screen of choices to select and control further processing some form of this routine is being used either in the main program or in a subroutine.

How to program routine in BASIC:

```

7000 REM MENU MAKER
7010 REM INPUT VARIABLES - B9$, TLS, BLS, M$(I9),MH$, MN

7020 REM OUTPUT VARIABLES - A$
7030 REM INTERNAL VARIABLES - I9,J9
7040 HOME
7050 FOR I9 = 1 TO 40: PRINT B9$;: NEXT I9
7060 FOR J9 = 1 TO 19: PRINT B9$; TAB(40);B9$;: NEXT J9
7070 FOR I9 = 1 TO 40: PRINT B9$;: NEXT I9
7080 HTAB ((21 - (LEN (TLS) / 2) - 1)): VTAB 1: PRINT "
";TLS;" "
7090 HTAB ((21 - (LEN (BLS) / 2) - 1)): VTAB 21: PRINT "
";BLS;" "
7100 HTAB 6: VTAB 4: PRINT MH$
7110 FOR I9 = 1 TO MN
7120 VTAB 6 + I9: HTAB 6: PRINT M$(I9)
7130 NEXT I9
7140 PRINT
7150 HTAB 6: PRINT "PLEASE ENTER YOUR CHOICE"
7160 HTAB 6: PRINT "====>";
7170 GET AS
7180 IF ASC (A$) < 65 OR ASC (A$) > 64 + MN THEN 7170
7190 HOME : RETURN

```

How to call routine from program: The variable B9\$, defined in the main program, is used to present a box on the screen. Then, TLS (Top Label) and BLS (Bottom Label) are made part of the screen box. The main program must also define: MHS (menu screen's Main Heading), MN (Menu item Number or the number of desired items to be included in the menu), and the actual Menu items passed through the array M\$(I9). The output variable A\$ (Answer) is passed back to the main program in response to the user's menu choice. The main program should then branch according to AS.

Sample program usage:

```

11000 REM TUTORIAL MAIN MENU
11010 LET B9$ = "*"
11020 TLS = "MAIN MENU":BLS = "TUTORIAL"
11030 LET MN = 4

```

```
11040 MHS = "THESE ARE OUR MAJOR CONCEPTS"  
11050 MS(1) = "A. INPUT CONCERNS"  
11060 MS(2) = "B. OUTPUT CONCERNS"  
11070 MS(3) = "C. EDUCATIONAL CONCERNS"  
11080 MS(4) = "D. EXIT PROGRAM"  
11090 GOSUB 7000  
11100 ON ASC (AS) - 64 GOTO 12000,13000,14000,15000
```

User Self Pacer

Description of purpose and use: This routine delays program processing until user presses space bar. Press 'SPACE BAR' prompt is positioned on screen. Use of this routine allows users to read instruction at their own rate.

How to check a program for routine: If a program causes the user to press a single key to allow program to go on some form of this routine is being used (TRS-80 uses INKEY\$ rather than GET).

How to program routine in BASIC:

```

8000 REM USER SELF-PACER
8010 REM INPUT VARIABLE - VP (DESIRED VTAB POSITION -1)
8020 REM OUTPUT VARIABLES -
8030 REM INTERNAL VARIABLES - VP, D9$
8040 VTAB VP: PRINT "**** PRESS 'SPACE BAR' TO CONTINUE
****";
8050 GET D9$: PRINT
8060 IF D9$ < > CHR$ (32) THEN 8040
8070 HOME
8080 RETURN

```

How to call routine from program: The input variable VP (Vertical Position) must be received from the main program to position the PRESS 'SPACE BAR' TO CONTINUE prompt under (or over) the current on screen text.

Sample program usage:

```

28200 REM USER CONTROLLED
28210 HOME :TS = "USER CONTROLLED": GOSUB 6200
28220 POKE - 16368,0:VP = 23: GOSUB 8000: REM THE POKE
CLEARS THE KEYBOARD BUFFER

```

User Pacer Pre-defined

Description of purpose and use: Causes program to delay through a pre-defined time factor. User normally does not have control over this time delay.

How to check a program for routine: If program processing is delayed without user control, some form of this (FOR-NEXT) loop is being used.

How to program routine in BASIC:

```

8500 REM USER PACER PRE-DEFINED TIME DELAY
8510 REM INPUT VARIABLES - TD (TIME DELAY)
8520 REM OUTPUT VARIABLES -
8530 REM INTERNAL VARIABLES - D9
8540 FOR D9 = 1 TO TD: NEXT D9
8550 RETURN

```

How to call routine from program: A value for the input variable TD (Time Delay) must be defined in the main program and passed to the subroutine.

Sample program usage:

```

28100 REM PROGRAMMER CONTROLLED PACING
28110 TS = "PROGRAMMER CONTROLLED": GOSUB 6200
28120 VTAB 22:TS = "PROGRAM IS IN A DELAY LOOP": GOSUB 6200
28130 TD = 3000: GOSUB 8500

```

Right Answer Routine

Description of purpose and use: This routine presents the user with randomly selected positive feedback. The routine includes the user's name in several prompts. A counter records the number of correct responses each time the routine is used.

How to check a program for routine: If a program uses randomly selected user positive feedback and counts the number of correct responses, some form of this routine is being used.

How to program routine in BASIC:

```

9000 REM RIGHT ANSWER ROUTINE
9010 REM INPUT VARIABLES - R, NS
9020 REM OUTPUT VARIABLES - R
9030 REM INTERNAL VARIABLES - X9
9040 R = R + 1
9050 X9 = INT ( RND (1) * 10) + 1
9060 ON X9 GOTO
9070,9080,9090,9100,9110,9120,9130,9140,9150,9160
9070 PRINT "GOOD JOB ": RETURN
9080 PRINT "EXCELLENT ";NS: RETURN
9090 PRINT "YOU GOT IT!": RETURN
9100 PRINT "NO DOUBT ABOUT IT!": RETURN
9110 PRINT "VERY GOOD ";NS: RETURN
9120 PRINT "WONDERFUL!": RETURN
9130 PRINT "BINGO": RETURN
9140 PRINT "WHAT AN ACE!": RETURN
9150 PRINT "CORRECT": RETURN
9160 PRINT NS;" YOU ARE RIGHT": RETURN

```

How to call routine from program: This routine is usually called from the main program after a response is evaluated as correct. The input variable NS (user's Name \$String) and R (total number Right) must be passed from the main program to include the user's name in random responses and to update the right item counter. The updated right item counter (R) is passed back to the main program.

Sample program usage:

```

29100 REM RIGHT ANSWER
29110 TS = "TRY TO ANSWER THE FOLLOWING QUESTIONS
CORRECTLY.": GOSUB 6300
29120 TS = "STOP": GOSUB 6300: PRINT
29130 TS = "TRUE OR FALSE - THE ACRONYM FOR SOFTWARE WHICH
TRANSFERS INFORMATION BETWEEN A COMPUTER AND IT'S DISK
DRIVES IS DOS.": GOSUB 6300
29140 TS = "STOP": GOSUB 6300
29150 GET AS
29160 IF AS < > "T" AND AS < > "F" THEN GOSUB 1000: GOTO
29150

```

```
29170 PRINT
29180 CAS = "T": GOSUB 3100
29190 IF CR = 1 THEN GOSUB 9000
29200 IF CR = 0 THEN GOSUB 9200
29210 VP = 23: GOSUB 8000
```

Wrong Answer Routine

Description of purpose and use: This routine presents the user with randomly selected negative feedback after an incorrect response. The routine includes the user's name in several prompts. Two counters are used. One counter records the overall number of wrong responses each time the routine is used. The second counter is usually reset in the main program and can be used to control the number of user attempts for an item.

How to check a program for routine: If a program uses randomly selected user negative feedback, controls the number of user attempts at a question, or counts the number of wrong responses, some form of this routine is being used.

How to program routine in BASIC:

```

9200 REM WRONG ANSWER ROUTINE
9210 REM INPUT VARIABLES - W, C, NS
9220 REM OUTPUT VARIABLES - W, C
9230 REM INTERNAL VARIABLES - X9
9240 W = W + 1:C = C + 1
9250 X9 = INT ( RND (1) * 10) + 1
9260 ON X9 GOTO
9270,9280,9290,9300,9310,9320,9330,9340,9350,9360
9270 PRINT "WRONG ";NS: RETURN
9280 PRINT "INCORRECT": RETURN
9290 PRINT "NOT RIGHT": RETURN
9300 PRINT NS;" THAT IS INCORRECT": RETURN
9310 PRINT "NOT THIS TIME ";NS: RETURN
9320 PRINT "NOT QUITE": RETURN
9330 PRINT "NOPE": RETURN
9340 PRINT "SORRY ": RETURN
9350 PRINT "MISTAKE": RETURN
9360 PRINT "OOPS": RETURN

```

How to call routine from program: This routine is usually called after an incorrect response is detected in the main program. The input variable W (Wrong answer counter) is used to keep track of the number of total incorrect responses. The input variable C (Counter) keeps track of the number of attempts for each individual item. NS is the user's Name supplied from the main program. After W and C are updated program control returns to the main program.

Sample program usage:

```

29220 HOME
29230 TS = "WHICH OF THE FOLLOWING DEVICES ALLOWS COMPUTERS
TO COMMUNICATE USING THE TELEPHONE SYSTEM?": GOSUB 6300
29240 TS = "STOP": GOSUB 6300
29250 PRINT " A. SPRITES"
29260 PRINT " B. MODEMS"
29270 PRINT " C. SUPRESSORS"

```

```
29280 PRINT "      D. DB-25S"
29290 PRINT "      E. HUB RINGS"
29300 PRINT
29310 GET A$
29320 IF ASC (A$) < 65 OR ASC (A$) > 69 THEN GOSUB 1000:
GOTO 29310
29330 CA$ = "R": GOSUB 3100
29340 IF CR = 1 THEN GOSUB 9000
29350 IF CR = 0 THEN GOSUB 9200
29360 VP = 23: GOSUB 8000: IF CC = 1 THEN 29500
```

Section Feedback

Description of purpose and use: This routine tells the user the number of right and wrong responses and the percent of right and wrong responses.

How to check a program for routine: If a program offers the user summary statistics on section responses some form of this routine is being used.

How to program routine in BASIC:

```

10000 REM SECTION FEEDBACK
10010 REM INPUT VARIABLES - R, W, NS
10020 REM OUTPUT VARIABLES -
10030 REM INTERNAL VARIABLES - R9, W9
10040 HOME
10050 PRINT NS;"-": PRINT : PRINT "YOU GOT "; TAB( 20);R;
TAB( 25);"RIGHT"
10060 PRINT : PRINT TAB( 20)W; TAB( 25);"WRONG"
10070 PRINT : PRINT "OUT OF "; TAB( 20);R + W; TAB(
25);"QUESTIONS."
10080 R9 = R / (R + W):R9 = R9 * 100:R9 = ( INT ((R9 + .005)
* 100)) / 100
10090 W9 = W / (R + W):W9 = W9 * 100:W9 = ( INT ((W9 + .005)
* 100)) / 100
10100 PRINT : PRINT "THAT IS ";R9;" CORRECT AND": PRINT :
PRINT W9;" INCORRECT."
10110 RETURN

```

How to call routine from program: This routine is usually called after a section of 'test' items presented in the main program. Use of this subroutine assumes that the routines for counting R (number of Right responses) and W (number of Wrong responses) was previously used. The internal variables R9 and W9 are used to convert the right and wrong answer counters into percentages. The user's name is added to the summary by use of the input variable NS (Name String).

Sample program usage:

```

30100 HOME
30110 IF CC = 0 THEN PRINT "PLEASE TRY FEEDBACK SECTION
FIRST.":VP = 23:GOSUB 8000:WT = 0:GOSUB 5000:GOTO 14000
30120 GOSUB 10000
30130 GOSUB 8000

```

Fading Prompts

Description of purpose and use: Fading Prompts is a CAI (Computer Assisted Instruction) method which reduces the amount of information given to the user through a series of question or problem screens.

How to check a program for routine: If a program presents the user with a series of question arranged in such a way that the user must supply more of his or her own information in sequential screens the fading prompt method is being used.

How to program routine in BASIC:

```

31260 REM FADING PROMPTS
31270 TS = "FADING PROMPT SCREEN 1": GOSUB 6200: PRINT
31280 TS = "HOW MANY SQUARE INCHES ARE IN A BOARD 2 INCHES
WIDE AND 3 INCHES LONG?": GOSUB 6300
31290 TS = "STOP": GOSUB 6300
31300 PRINT :TS = "WIDTH (2) X LENGTH (3) = TOTAL (6)
SQUARE INCHES.": GOSUB 6300
31310 TS = "STOP": GOSUB 6300: PRINT
31320 INPUT "ENTER ANSWER THEN PRESS 'RETURN'==>";AS
31330 IF AS < > "6" THEN PRINT "NO":VP = 23: GOSUB 8000:
GOTO 31260
31340 PRINT "GOOD":VP = 23: GOSUB 8000
31350 TS = "FADING PROMPT SCREEN 2": GOSUB 6200: PRINT
31360 TS = "HOW MANY SQUARE INCHES ARE IN A BOARD 9 INCHES
WIDE AND 10 INCHES LONG?": GOSUB 6300
31370 TS = "STOP": GOSUB 6300: PRINT
31380 INPUT "ENTER ANSWER THEN PRESS 'RETURN'==>";AS
31390 IF AS < > "90" THEN PRINT "WRONG":VP = 23: GOSUB
8000: HOME : GOTO 31350
31400 PRINT "GOOD":VP = 23: GOSUB 8000

```

Help Screens

Description of purpose and use: Help screens are used to make a program more 'user friendly' by providing access to instructions or important information during program execution. This method displays the help screen when the user presses the (ESC) key in response to a question.

How to check a program for routine: A program uses HELP SCREENS if it allows the user to access instructions or other important information based on the user's needs.

How to program routine in BASIC:

```

31100 REM      HELP SCREENS
31110 A7$ = "MICROCOMPUTER":A6$ = CHR$ (13)
31120 A5$ = A7$ + A6$
31130 PRINT "IF YOU NEED HELP PRESS";: FLASH : PRINT
"ESC": NORMAL
31140 A4$ = ""
31150 PRINT : PRINT "ENTER THE PASS WORD FOR THIS PROGRAM"
31160 PRINT "THEN PRESS 'RETURN'!": PRINT
31170 GET A$
31180 IF ASC (A$) = 8 THEN A4$ = LEFT$ (A4$, ( LEN (A4$) -
1)): GOTO 31200
31190 A4$ = A4$ + A$
31200 IF ASC (A$) = 27 THEN GOSUB 31420: HOME : GOTO
31130
31210 IF ASC (A$) = 8 THEN PRINT A$;" ";
31220 PRINT A$;
31230 IF A4$ = A5$ THEN PRINT : PRINT "THAT IS IT!":VP =
23: GOSUB 8000: GOTO 31260
31240 IF ASC (A$) = 13 AND A4$ < > A7$ THEN PRINT :
PRINT "WRONG":VP = 23: GOSUB 8000: HOME :A4$ = "": GOTO
31130
31250 IF ASC (A$) < > 13 THEN 31170 .
31420 REM      HELP SCREEN FOR ABOVE
31430 HOME :T$ = "THIS IS A HELP SCREEN": GOSUB 6200
31440 PRINT : PRINT : FLASH
31450 T$ = A7$: GOSUB 6200: NORMAL
31460 VP = 23: GOSUB 8000
31470 RETURN

```

How to call routine from program: If ASC (A\$)=8 the program has detected that the user has pressed the 'ESC' key (ASC=8) in response to a question (A\$). The HELP SCREEN is then displayed.

Exit Routine

Description of purpose and use: Gives user a departing message, starts a new screen, and gives user RESTART instructions.

How to check a program for routine: A user friendly program will tell the user how to restart the program.

How to program routine in BASIC:

```
15000 REM PROGRAM EXIT
15010 FOR J9 = 1 TO 23
15020 PRINT TAB( J9 * 1.5)"BYE!": NEXT J9
15030 LET TD = 1000: GOSUB 8500: HOME
15040 PRINT "TYPE 'RUN' AND PRESS 'RETURN' TO RESTART": END
```

How to call routine from program: Program control can be passed to this routine from any location in the program. However, in a main menu driven program a user can only reach the exit routine from the MAIN MENU. Note that this routine passed a value for TD (time delay) to the time delay subroutine starting at line 8500.

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