SMART KEYBOARD

PROGRAMMABLE PRINTER CONTROLLER

PROGRAMMING MANUAL

Smart Keyboard Programming Manual

CONTENT

Document Conventions

This manual uses the following typographic conventions

Examples of convention	Description
< >	Angle brackets, enclose mnemonic representations of ASCII control characters.
[ ]	Square brackets, the data within square brackets is optional.
Ctrl	Bold letters represent a key on the keyboard.
Ctrl-C	Two keys with a dash, means to press them simultaneously.
Italic	Italic letters represent explanations given in the context.
Bold Italic	Note. Important information.

Quick Start

1. Please verify if the pin configuration of keyboard COM1 port (keyboard cable) is compatible with your printer COM port. If they are not compatible, please refer to section Specification and Appendix A for more information.
2. Turn off printer power. Connect keyboard COM1 port to printer serial port.
3. Press **F1** to setup the communication parameters of keyboard. Please refer to section Keyboard Utilities for more information.
4. Press **ALT-EXIT** to reset keyboard. It is ready for downloading the program.
5. Key in the program as below:

   CLS

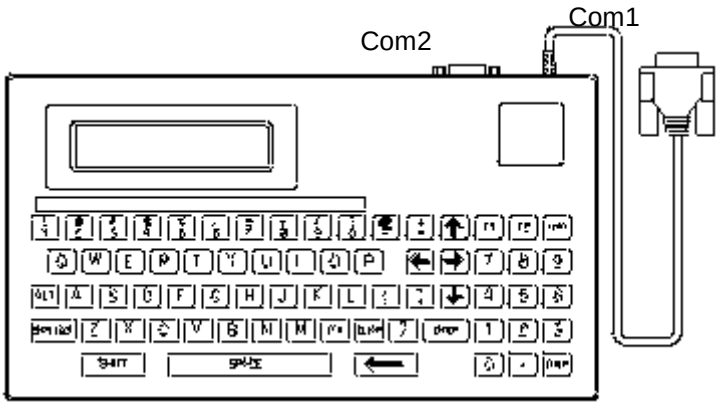
   PRINT “HELLO !”

   A=INKEY()

   END

   NOTE: TSKL only accepts capital letters.
6. Save the file with filename of “DEMO.BAS”.
7. Select Utilities | Download File to download program file to keyboard.

   Note: When download programs (*.BAS), please select BAS file extension in the Download file dialog box.
8. A sharp and short beep sound means the file has been downloaded to keyboard memory.
9. Press **FORM** key and to select the ↑ and ↓ to execute downloaded program.
10. “HELLO !” will be shown on the LCD display. Press any key to end the program.
11. Press **ALT-EXIT** to reset printer.



Features of SMART KEYBOARD

- 68 keys large keypad layout
- Big LCD screen (20 characters × 2 lines)
- Additional RS-232 port for other input device
- Maximum 50 files can be stored in memory (SRAM and FLASH)
- Upload or download files through both serial port
- Real Time Clock (Y2K compatible)
- Built-in Euro logo (ASCII 176, 177)
- Floating point calculation
- Password locking security
- Auto execution function

Specifications

• Keyboard Unit

Size	261mm(L)×142.2mm(W)×31mm(H)
Weight	440g
LCD	20 characters × 2 lines
Max Current	5V, 250mA
External Power	5V, 150mA
Operating Temperature	40°F~104°F (5°C~40°C)
Storage Temperature	-4°F~140°F (-20°C~60°C

• Memory

FLASH	512 KB for system, 1 MB for application
SRAM	128 KB for system, 128KB for application

Communication Interface

The available communication parameters for both 2 serial ports are listed as below:

Baud rate: 2400, 4800, 9600, 19200 bps

Parity check: none, even or odd

Data bits: 7 or 8
Stop bit(s): 1 or 2

COM1 Port

The serial interface COM1 is a 9-pin, male D-style subminiature connector with cable, the pin assignments are shown as below:

Pin	Configuration
1	Power input 5 volts, 250mA
2	RxD
3	TxD
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	Connect with Pin1 internally

COM2 Port

The COM2 is a 9-pin, female D-style subminiature connector. The pin assignments are shown as below:

Pin	Configuration
1	Power input 5 volts, 250mA
2	TxD
3	RxD
4	DSR
5	Ground
6	DTR
7	CTS
8	RTS
9	Connect with Pin1 internally

Safety Regulation

FCC Class A
CE Class A

Check-List

Verify the contents of the container according to the list below, if any parts are missing, please contact your local representative.

- SMART KEYBOARD keyboard unit
- SMART KEYBOARD User's Manual
- 25 pin to 9 pin RS-232 converter
- 2 screws for SI thread
- Codepage stickers

Options

- External power set
  - AC adapter
    Input: 110V AC or 220V AC
    Output: 5V DC
  - RS-232 cable with power adapter jack

Keyboard Setup

Please turn off printer power prior connecting keyboard COM1 port to printer. COM2 port of keyboard is used for download files from PC or can be connected to other input devices such as bar code scanner.

Keyboard Operation

● Power-on Utilities

■ Auto Execution

SMART KEYBOARD will execute the program automatically when turning on power without pressing any key, If one of the downloaded programs is named “AUTO.BAS” Please presses **ALT-F1** first to disable the auto execution functions prior keyboard configuration setup, on-line editing, initialization and extend files manager utilities if the auto execution file is downloaded in keyboard.

■ Keyboard Initialization

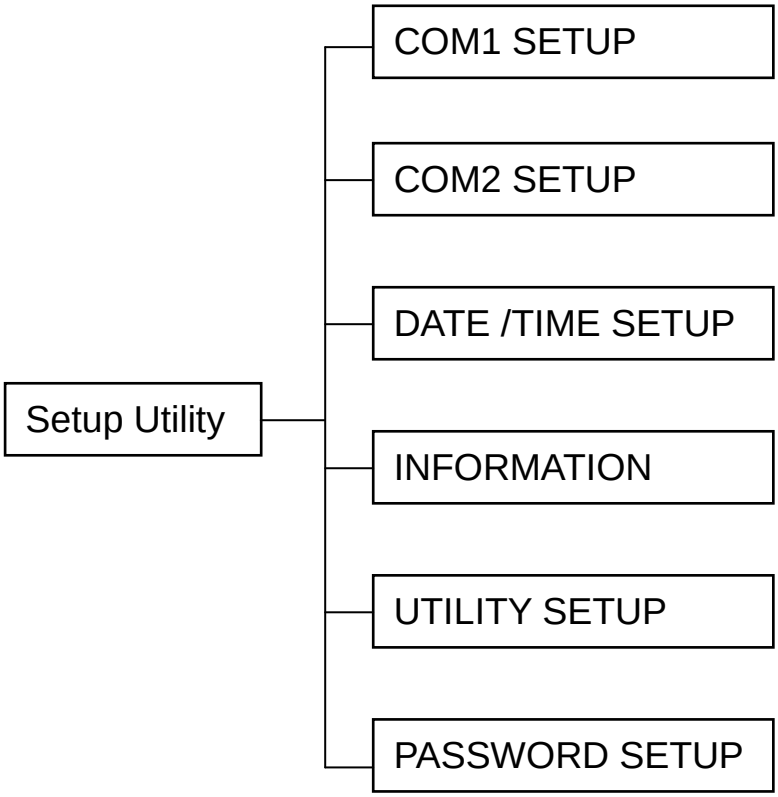
Press the **ALT-CLEAR** while turning on printer power will initialize the keyboard. All files stored in the SRAM will be deleted. Code page and country codes are set to defaults value of 437 and 001 respectively. Both of serial port communications parameters are set to 9600 bps, none parity check, 8 data bits and 1 stop bit.

Items	Default Parameters
COM1 Port	9600,N,8,1,Xon/Xoff
COM2 Port	9600,N,8,1,DSR/DTR
Country Code	001
Code Page	437
Key Sound	On
ID Number*	T.S.C.
Password*	None

Note: The items with asterisk (*) can’t be initialized.

● Keyboard Configuration Setup

Keyboard configurations can be changed by pressing **ALT-F1** keys. The left and right arrow keys are used to select different parameters. Press **ENTER** key to enable the selected parameter. Press **EXIT** to return to upper level of menu.



- COM1, COM2 SETUP:
  With COM1, COM2 SETUP, users can select different communication parameter as well as handshaking to download or upload data.
- DATE / TIME SETUP:
  The built-in Real Time Clock is compatible with year 2000. The leap year timing is automatic. The available setting of year is from 1950 to 2049.
- INFORMATION:
  The information lists the available memory (SRAM) in system and the extended Flash memory status. If the extended memory is installed, it shows 8M else “None” is shown on the display.
- UTILITY SETUP:
  The code page, country code and key sound on/off is set in UTILITY SETUP.
  The available code pages and country code are listed as below:
  - Code pages

437: United States
850: Multilingual
852: Slavic
860: Portuguese
863: Canadian/French
865: Nordic

- Country codes

001: USA
002: Canadian French
003: Spanish (Latin America)
031: Dutch
032: Belgian
033: French (France)
034: Spanish (Spain)
036: Hungarian
038: Yugoslavian
039: Italian
041: Switzerland
042: Slovak
044: United Kingdom
045: Danish
046: Swedish
047: Norwegian
048: Polish
049: Germany
055: Brazil
061: English (International)
351: Portuguese
358: Finnish

There is a beep sound after each key strokes. It can be disabled by set the key sound off.

- PASSWORD SETUP:

SMART KEYBOARD supports password security. With password locked on, the download, uploads programs, on-line editing, deleting files, firmware upgrade and extend files manager will be disabled. The maximum characters of password are up to 14 characters, which are not case sensitive.

Note: If the password is lost, please contact the Customer Service Department of your distributor or reseller.

SMART KEYBOARD provides another password namely ID Number, which can be verified in the program. The allowable maximum number of characters of ID number is 49. The ID number is not case sensitive. The default ID number is T.S.C.

● Keyboard BIOS Update

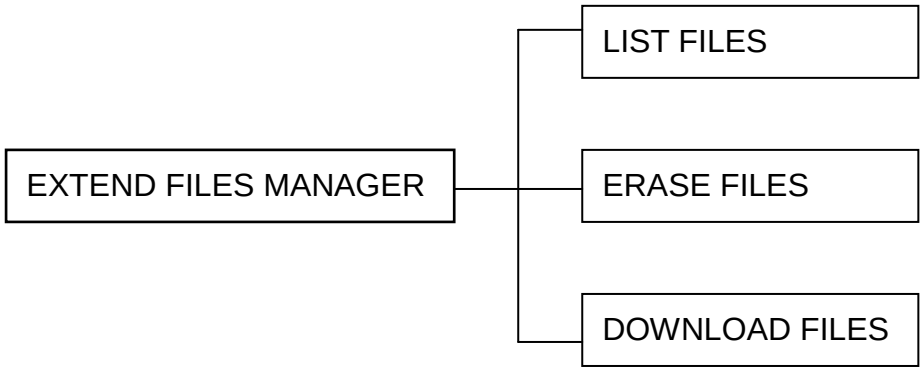
Press **ALT-SHIFT** keys is used to enter the update BIOS utility.
Users can upgrade the BIOS by copying the firmware through specified serial port to keyboard in DOS environment.
If the check sum of BIOS is not correct after upgraded, the “UPDATE FAIL” will show on LCD screen. Please turn off power and enter upgrade mode again.
If the upgrade process is successful, SMART KEYBOARD will boot automatically.

On-Line Editing Utility

On-line editing utility can be acceded by press **ALT-F2** keys. This feature is useful for modifying programs in the field. The available maximum editing characters are 79 characters x 250 lines. The upward and downward arrow keys are used to scroll the files displayed on LCD screen. **Enter** key is used to select program for editing. **ALT-CLEAR** keys are used to delete the files stored in keyboard memory. **F1** key is used to upload the files through the specified serial port of keyboard to the connected device if the cursor is stopped at selected file. Select “New File” and press **Enter** to editing a new file. The available filename is up to 8 characters and 3 characters for extension. Press **F2** to save the file when completed editing.

Extend Files Manager

Extend Files Manager can be accessed by press **ALT-D** keys. Files stored in flash memory are read only and file list, deleting, and download utility must be operated through Extended Files Manager. The download and delete files process will be different than files stored in standard memory. The operations of Extended Files Manager is described as below:



- LIST FILES:
  All the files stored in Flash memory will be listed. The BASIC files stored in Flash memory will also be listed in BASIC program file list by press **Form** key.
- ERASE FILES:
  This utility delete all the files stored in Flash memory. The “KILL” command can’t delete files stored in Flash memory.
- DOWNLOAD FILES:
  Enter this utility before download files to Flash memory. Download files either by DOS command or by SMART KEYBOARD Windows software. Press **EXIT** key to exit download utility.

  Note:

  1. All files will be deleted when invoked DOWNLOAD FILES utility. Copy all the files again although only one file is appended.

  2. With password locked on, the utilities above will be disabled.

Execute downloaded BASIC program

Press **FORM** key to list all the BASIC files stored in smart keyboard. The upper and downward arrow keys are used to scroll files displayed in LCD screen. SMART

KEYBOARD also supports hot key feature to find the program. For example: If the program is named DEMO.BAS, press **FORM** and then press **D**. It scrolls the files to the first one that begins with D automatically. Execute the selected program by press **ENTER** key.

Using SMART KEYBOARD

By the end of this section, you will be able to

1. Edit a TSKL program file on PC.
2. Download the program file to keyboard.
3. Execute the program.

Edit A Program

To edit a program file, you need a plain text editor, for example: DOS Editor, or Windows NotePador

The following example is editing by general text editor.

1. Open a new text file.
2. Add the header at the first line of the file as listed below:
   DOWNLOAD “MYPROG.BAS”
   Where “MYPROG.BAS” is the file name to be stored in keyboard memory.
3. Edit the program contents.
4. Insert a line of command at the end of program as below:
   EOP
5. Save this file.

.

Download A Program

Users can download the program by DOS command.
Connect PC and smart keyboard by board COM2 port.
Connect smart keyboard COM1 RS-232 cable to printer.

- **Download the program by DOS command:**
  Enter the commands as below:
  C:\> MODE COM2 96,N,8,1
  C:\> COPY MYPROG.BAS /B COM2
  Where MYPROG.BAS is the name of program file, COM2 is the serial port of PC.

A sharp and short beep sound means the file has been downloaded to keyboard memory.

Execute A Program

Reset smart keyboard by pressing **ALT-EXIT**.
Press **FORM** to list program files.
Press ↑ and ↓ to select a program to execute.
If you want to interrupt the program, press **ALT-EXIT**.

Variables, Constants, Functions, Operators, and Expressions

The information in this chapter will help you to learn about variables, constants, functions, operators, and expressions in TSKL. Variables and constants are manipulated by operators to form expressions.

Variables

Variables are placeholders used to store values; they have names and data types. The data type of a variable determines how the bits representing those values are stored in the computer's memory. When you declare a variable, you can also supply a data type for it. All variables have a data type that determines what kind of data they can store.

The variable name in TSKL can vary from one to ten characters. The first character must be a letter or an underscore with subsequent characters being letters, numbers, or underscore. There are two categories of variables in TSKL: numeric data type and string data type.

TSKL supplies several numeric data types: long integer, float and double float.

Then maximum numbers of variable available in one program is listed as following:

- 200 long integer and float data type variables
- 100 double float data type variables
- 50 string data type variables

The range of data types in the system are listed as below:

Data Type	Identifier	Byte	Range	Significant digits
Long integer	%	4	-2147483648 to 2147483647	10
Float	N/A	4	-9999999 to 9999999	7
Double float	#	8	-999999999999999 to 999999999999999	15
String	$	256	254 characters	N/A

Long Integer Data Type Variables

The “%” identifier is used to declare a long integer variable by placing the “%” at the end of variable name. For example, A% and SUM% are integer variables.

Float Data Type Variables

The default data type in TSKL is float data type. If no identifier is placed at the end of variable name. The variable will be treated as float data type in the system. For example, A and B are float variables. The precision of float data type is to 6 digits.

Double Float Data Type Variables

The “#” identifier is used to declare a double float variable by placing the “#” at the end of variable name. For example, A# and SUM# are floating point variables. The precision of double float data type is to 15 digits.

String Variables

The “$” identifier is used to declare a string variable by placing the “$” at the end of variable name. For example, A$ and TITLE$ are string variables. Each string variable can store 254 byte of data.

System Variables

System variables are the data maintained by smart keyboard. For example, Real Time Clock.

All the system variables are listed below:

YEAR
MONTH
DATE
HOUR
MINUTE
SECOND
IDNUMBER$

Functions

Functions are built-in procedures or subroutines used to evaluate, make calculations on, or transform data.

Functions used in TSKL can be grouped into numeric functions, string functions. For more information, please refer to **TSKL Functions**.

Numeric Functions

Numeric functions include integral functions and floating point functions. For example, INT(), ASC().

String Functions

String functions include string conversion, string manipulation. For example, RIGHT$(), STR$().

Operators

The operators used in TSKL can be grouped into numeric operators, string operators and relational operators.

Arithmetic Operators

Arithmetic operators: ‘+’, ’-‘, ’*’, ’/’.

String Operators

String operators: ‘+’.

Relational Operators

Relational operators: ‘>’, ‘=’, ‘<’, ‘<>’,’>=’,’<=’

Expressions

Operators, constants, and variables are the constituents of expressions. An expression in TSKL is any valid combination of these pieces. There are three kinds of expressions in TSKL.

Arithmetic Expressions

Arithmetic expressions can be integral expression or floating point expression, depends on the calculation value. In integral expression, floating point operands will be converted to integer, and vice versa.

String Expressions

There is only one operator in string expression, ‘+’, that is, add a string to another string.

Relational Expressions

The relational expressions are used to determine the relationship of one quantity to another. The result is true if the value is non-zero, otherwise, it is false.

Commands and Statements

Commands instruct smart keyboard to work accordingly. Sometimes, commands followed by one or several parameters, For example, INPUT A$. For more information refer to the command in this programming manual..
A statement is composed of one command or several commands, For example, IF…THEN…ELSE.

TSKL Commands

<ESC>!R

Description

This command is used to reset the keyboard. Keyboard will search for AUTO.BAS auto execution program first after reset.

Syntax

<ESC>!R

Remarks

<ESC> is ASCII 27 escape character.

Example

N/A

<ESC>!W

Description

This command is used to upgrade the firmware. Keyboard will enter BIOS upgrade mode after receive this command and disable to execution of AUTO.BAS program.

Syntax

<ESC>!W

Remarks

N/A

Example

N/A

SOUND

Description

Turn the speaker on at the specified frequency of interval.

Syntax

SOUND frequency, interval

where

Frequency: 0~15

Interval: 0~65535

Remarks

N/A

Example

```
DOWNLOAD “SOUND.BAS”
    FOR F=0 TO 15
        FOR I=0 TO 65535
            SOUND F,I
                FOR J=1 TO 10
                NEXT J
        NEXT I
    NEXT F
EOP
```

CLS

Description

Clears the LCD display.

Syntax

CLS

Remarks

CLS clears the LCD and places the cursor in the upper left corner. (at position 0,0)

Example

```
DOWNLOAD "CLS.BAS"
 PRINT "THIS WORD WILL BE CLEARED"
    FOR I = 1 TO 5000
    NEXT I
CLS
    FOR I = 1 TO 2000
    NEXT I
PRINT "PLEASE PRESS ANY KEY "
K= INKEY()
EOP
```

CLEAR

Description

Remove all the declared variables, arrays, and opened files in the program from memory.

Syntax

CLEAR

Remarks

N/A

Example

```
CLEAR
```

CURSOR

Description

Select cursor appearance.

Syntax

CURSOR mode

Remarks

The available modes of cursor are listed below:

0: Hides the cursor.

1: Block with blinked cursor.

2: Fixed Underline cursor.

3: Block blinked and underline fixed cursor. (default)

Example

CURSOR 1

LOCATE

Description

Position cursor in LCD display.

Syntax

LOCATE x, y

Remarks

LOCATE moves the cursor to the given position in LCD display. If the coordinates are invalid, the command will be ignored.

The available value of x parameter is between 0 to 79.

The available value of y parameter is 0 and 1. Where 0 and 1 is the first line and the second line of LCD display respectively.

Example

```
DOWNLOAD "LOCATE.BAS"
      PRINT "ENTER POSITION: (0<NUM<79)"
      INPUT "",A$
       B=VAL(A$)
       LOCATE B,1
      Cur_pos = POS()
      PRINT "CURSOR POSITION    "+STR$(Cur_pos)
  END
EOP
```

PRINT…[USING]

Description

PRINT command is used to output the numeric and strings to LCD display. TSKL also supports formatted output to LCD display by PRINT USING command.

The available maximum numbers of specified format for PRINT USING command is 15.

Syntax

PRINT list of expression[;]

Specify the numeric data output format:

PRINT USING “###.##”,A

Specify the string data output format:

PRINT USING “\ \”,A$

Remarks

A blank line is displayed on LCD if there is no expressions after the PRINT command. The PRINT USING command sends 0D 0A (carriage return and line feed) at the end of the expression if no “;” (semicolon) is at the end of the expression. The “,” (comma) is used to separate the values by 8 spaces. There are no spaces between the two values if the “;” (semicolon) is used between the two expressions. If “;” (semicolon) is the last character of PRINT statement, the cursor will stop in this line.

The “#” (pound sign) and “\” (back slash) is used to specify the output format of numeric data and string data respectively. If the actual value is greater that the specified format, a “%” (percent) sign will be paced at the end of value.

Example

```
DOWNLOAD "P_USING.BAS"
    B=123.45
    PRINT 12+3;ASC("A")
    K=INKEY()
    PRINT USING "####.##",B
    END
EOP
```

INPUT

Description

Input numeric or string from keyboard keypad or COM2 port and assign them to variables.

Syntax

INPUT prompt; variables

Remarks

Prompt must be a string constant. Variable list contains the variable names to be assigned.

The input value will pass to the variable if **ENTER** key is pressed. The other input devices such bar code scanner can be connected to the COM2 port of keyboard to get data instead of key in data by keyboard.

Example

```
DOWNLOAD "INPUT.BAS"
    PRINT "ENTER YOUR NAME:"
    INPUT "",ITEM$
    PRINT "YOUR NAME IS    "+ITEM$
    K=INKEY()
EOP
```

OUT

Description

Output data stream from keyboard serial port.

Syntax

OUT port; list of expressions[;]

Remarks

Port specifies the serial port to send data. It can be 0 (keyboard COM1) or 1 (keyboard COM2). List of expressions consists of string or numeric expression separated by semicolons. The OUT command sends 0D0A (carriage return and line feed) at the end of the expression except that the semicolon is used. (“,” (comma) also sends 0D0A to serial port)

Example

```
DOWNLOAD "OUT.BAS"
C$=CHR$(34)
   PRINT "ENTER YOUR NAME:"
   INPUT "",A$
OUT 1;"YOUR NAME IS ";A$
OUT 0;"TEXT10,10,"+ C$+"4"+ C$+",0,1,1,"+ C$+"YOUR NAME IS "+A$+ C$
OUT 0;"PRINT 1,1"
  PRINT "PRESS ANYKEY TO LEAVE"
K=INKEY()
EOP
```

FOUT

Description

Output specified file from keyboard serial port.

Syntax

FOUT Port, FileHandle, FileSize

Remarks

Port specifies the serial port to send data. It can be 0 (keyboard COM1) or 1 (keyboard COM2). The number of FileHandle is between 0~14. FileSize is expressed in bytes.

Example

```
DOWNLOAD "DATA1.DAT",137,
   SIZE 4,2.5
   GAP 0,0
   SPEED 3
   DENSITY 10
   CLS
   TEXT 10,10,"4",0,1,1,"FOUT TEST"
   BARCODE 10,50,"39",100,1,0,2,5,"123456"
   PRINT 1,1

DOWNLOAD "FOUT.BAS"
   OPEN "DATA1.DAT" FOR INPUT AS #1
   FOUT 1,1,137
SEEK #1,0
   FOUT 0,1,137
CLOSE #1
EOP
```

OUT USING

Description

Output formatted data stream from keyboard serial port.

Syntax

OUT port USING “format”,list of expressions[;]

Remarks

Port specifies keyboard serial port to send data. It can be 0 (keyboard COM1) or (keyboard COM2) port.

List of expressions consists of string or numeric expression separated by semicolons. The OUT USING command sends 0D0A (carriage return and line feed) at the end of the expression except that the semicolon (“;”) is used. Comma (“,”) also sends 0Dh 0Ah to serial port

Example

```
DOWNLOAD "O_USING.BAS"
A=123.45
B$="TSC-PRINTER"
OUT 1 USING "######.## ",A
OUT 1 USING "\           \",B$
EOP
```

DOWNLOAD

Description

The “DOWNLOAD” keyword is the identifier to save files into keyboard memory . There are two types of file that can be downloaded into keyboard memory: program file and data file.

Syntax

Program file:

DOWNLOAD “FILENAME.BAS”

File contents…

EOP

Data file:

DOWNLOAD “FILENAME”, FILESIZE,<DATA FILE>

Remarks

The maximum character of filename is up to 8 characters and extension is up to 3 characters.

The extension of program file must be BAS.

Data file can be any format of file. 0D 0A is used as separator of each data for text dada file.

The FILESIZE parameter is calculated by bytes.

Example

Program file:

DOWNLOAD “DEMO.BAS”

CLS

PRINT “This is a test”

EOP

Data file:

DOWNLOAD “DEMO.DAT”,10,0123456789

EOP

Description

End of program. The keyword must be placed at the end of program file is the DOWNLOAD keyword is used in the program.

Syntax

EOP

Remarks

N/A

Example

```
DOWNLOAD “EOP.BAS”
   CLS
   PRINT “This is a test”
EOP
```

OPEN

Description

To establish file handles for file access. 15 files can be access in one program.

Syntax

OPEN “filename” FOR mode AS #FileHandle.

Remarks

Filename is the name of the file.

Mode parameter specified the file operation mode. It can be :

INPUT : Position to the beginning of the file and this file is “read only”. If the file does not exist, The “File not found” error is displayed on LCD display.

OUTPUT : Position to the beginning of the file, and this file is “write only”. If the file does not exist, a new file is created.

APPEND: Append characters to the end of file.

FileHandle is a constant number or expression result, between 0 and 14.

Remember to close the file handle when the file is no longer used.

Example

```
DOWNLOAD "DATA1.DAT",135,
   SIZE 4,2.5
   GAP 0,0
   SPEED 3
   DENSITY 10
   CLS
   TEXT 10,10,"4",0,1,1,",OPEN TEST"
   BARCODE 10,50,"39",100,1,0,2,5,"123456"
   PRINT 1,1
DOWNLOAD "OPEN.BAS"
   OPEN "DATA1.DAT" FOR INPUT AS #1
   FOUT 1,1,135
     SEEK #1,0
   FOUT 0,1,135
     CLOSE #1
EOP
```

CLOSE

Description

To clear file handles.

Syntax

CLOSE #FileHandle

Remarks

FileHandle must be constant number which the file is opened.

Example

```
DOWNLOAD "DATA1.DAT",136,
    SIZE 4,2.5
    GAP 0,0
    SPEED 3
    DENSITY 10
    CLS
    TEXT 10,10,"4",0,1,1,"CLOSE TEST"
    BARCODE 10,50,"39",100,1,0,2,5,"123456"
    PRINT 1,1

DOWNLOAD "CLOSE.BAS"
  OPEN "DATA1.DAT" FOR INPUT AS #1
  FOUT 1,1,136
  SEEK #1,0
  FOUT 0,1,136
  CLOSE #1
EOP
```

KILL

Description

To delete file(s) in keyboard memory.

Syntax

KILL “filename”

KILL “*.*”

KILL “*”

Remarks

Filename can be any file in the memory.

Wild card (*) supports all files only.

The file must be closed before deleting.

Example

KILL “DEMO.BAS”

KILL “*.*”

KILL “*”

SEEK

Description

Reposition a file pointer in specified file buffer.

Syntax

SEEK #FileHandle, offset.

Remarks

Offset is the number from the beginning of file to the new position.

Example

```
DOWNLOAD "DATA1.DAT",135,
   SIZE 4,2.5
   GAP 0,0
   SPEED 3
   DENSITY 10
   CLS
   TEXT 10,10,"4",0,1,1,"SEEK TEST"
   BARCODE 10,50,"39",100,1,0,2,5,"123456"
   PRINT 1,1

DOWNLOAD "SEEK.BAS"
     OPEN "DATA1.DAT" FOR INPUT AS #1
      SEEK #1,14
      FOUT 0,1,135
      FOUT 1,1,135
     CLOSE #1
EOP
```

(Notice)
1. Printer or PC will receive the below commands, because it begins from 15th byte to the end of file.
2. The 14 bytes of SEEK means SIZE 4,2.5 10 bytes and ODh OAh x2

```
GAP 0,0
SPEED 3
DENSITY 10
CLS
TEXT 10,10,"4",0,1,1,"SEEK TEST"
BARCODE 10,50,"39",100,1,0,2,5,"123456"
PRINT 1,1
```

READ

Description

Read data from data file and assign them to variables.

Syntax

READ #FileHandle; list of variables.

Remarks

FileHandle specifies the file to read data from.

The variables store the data read from the FileHandle.

Example

```
DOWNLOAD "READ.BAS"
OPEN "DATA" FOR INPUT AS #1
READ #1;A$;A
CLOSE #1
PRINT A$
K=INKEY()
PRINT A
END
```

WRITE

Description

Write data to an opened file.

Syntax

WRITE #FileHandle; list of expressions.

Remarks

FileFandle specifies the file to write data to.

The variables are used to write data to opened data file.

Example

```
DOWNLOAD "WRITE.BAS"
OPEN "DATA" FOR OUTPUT AS #1
WRITE #1;"THIS IS (WRITE) TEST"
WRITE #1;"12345678"
CLOSE #1
PRINT "WRITE OK!"
END
EOP
```

GOSUB…RETURN

Description

To branch to, return from a subroutine.

Syntax

```
GOSUB label
    Statement block1
Label:
    Statement block2
RETURN
```

Remarks

Label is a tag to mark a specified position in the program. The available maximum label name is 20 characters. A return statement will cause the program return to the statement following the GOSUB statement.

The total numbers of GOSUB…RETURN statement can't exceed than 40 in one program.

Example

```
DOWNLOAD "GOSUB.BAS"
  PRINT "MAIN ROUTINE (START)"
    K=INKEY()
    GOSUB SUB1
PRINT "MAIN ROUTINE (END)"
 END
  SUB1:
    PRINT "SUBROUTINE"
    K=INKEY()
    RETURN
EOP
```

The execution result should look like as following.

```
OK
MAIN ROUTINE
SUBROUTINE
MAIN ROUTINE
```

Loop Statements

Loop statements allow program to execute one or more lines of code repetitively. The loop statements that TSKL supports include:

- **DO…LOOP**
- **FOR…NEXT**
- **WHILE…WEND**

DO…[EXITDO]…LOOP

Description

Use a **DO** loop to execute a block of statements by an indefinite number of times. There are several variations of **DO…LOOP** statement, but each evaluates a numeric condition to determine whether to continue execution.

Syntax

```
DO {WHILE | LOOP}
    Statements
    {EXITDO}
LOOP

Or

DO
    Statements
    {EXITDO}
LOOP {WHILE | LOOP}

Or
DO
    Statements
    {EXITDO}
LOOP
```

Remarks

The total numbers of nested DO…LOOP statement in one program can not exceed than 40 levels.

The maximum numbers of nested IF…THEN…ELSE, FOR…NEXT, WHILE…WEND, and DO…LOOP statements in one program is up to 40 levels.

Example

```
DOWNLOAD "DOLOOP.BAS"
A=0
  DO WHILE A<10
```

```
    A=A+1
    PRINT A
    K=INKEY()
LOOP
  PRINT "EXIT"
 END
EOP
```

FOR…[EXITFOR]…NEXT

Description

To execute a series of instructions by a specified number of times in a loop.

Syntax

FOR variable= I TO J [STEP K]
    statements
NEXT variable

Remarks

I, J, K are numeric expressions

I: The initial value of the counter

J: The final value of the counter

K: The increment of the counter. If K parameter is ignored, the default increment is 1.

The maximum numbers of IF…THEN…ELSE, FOR…NEXT, WHILE…WEND, and DO…LOOP statements available in one program is up to 40.

Example

The following sample program prints out the sum of numbers between 1 and 10 :

```
DOWNLOAD "FOR.BAS"
SUM=0
  FOR I=1 TO 10
     SUM=SUM+I
     PRINT SUM
     K=INKEY()
  NEXT I
END
EOP
```

WHILE…WEND

Description

To execute a series of statements in a loop until the given condition is false.

Syntax

```
WHILE expression
    statements
WEND
```

Remarks

If expression is true the program will be executed until the WEND statement is encountered, then return to the WHILE statement to check again, as encountering a false condition, program will branch to the statement following the WEND.

The total numbers of nested WHILE…WEND statement in one program can not exceed than 40 levels.
The maximum numbers of nested IF…THEN…ELSE, FOR…NEXT, WHILE…WEND, and DO…LOOP in one program is up to 40 levels.

Example

```
DOWNLOAD "WHILE.BAS"
A=1
WHILE A<10
PRINT "A= "+STR$(A)
A=A+1
K=INKEY()
WEND
EOP
```

GOTO

Description

Branches from program to a specified block of statements.

Syntax

GOTO label

Remarks

Label is a tag to mark a specified position in the program.

The maximum characters of the label name are limited to 20 characters.

The total numbers of GOTO statement in a program can not exceed than 200.

Example

```
DOWNLOAD "IF.BAS"
BEGIN:
  PRINT "LOOK HERE"
  K=INKEY()
CLS
PRINT "REPEAT?(y/n)"
v_CHAR = INKEY()
IF v_CHAR=89 THEN
   CLS
   GOTO BEGIN
ELSE IF v_CHAR=121 THEN
   CLS
   GOTO BEGIN
ENDIF
   PRINT "Press key to quit!"
   SOUND 5,10000
END
EOP
```

Program-Control Statements

The program-control statements are the essence of any computer language because they govern the flow of program execution. program-control statements may be separated into two categories:

- **IF…THEN**
- **IF…THEN…ELSE**

IF…THEN…ELSE

Description

Use an **IF…THEN** block to execute one or more statements conditionally. You can use either a single-line syntax or multiple-line “block” syntax:

Syntax

IF condition THEN statement

Notice that the single-line form of IF…THEN does not use an ENDIF statement.

Or

```
IF condition THEN
    Statements
ENDIF
```

Or

```
IF condition THEN
    Statements
ELSE
    Statements
ENDIF
```

Or

```
IF condition1 THEN
    Statement block 1
ELSEIF condition2 THEN
    Statement block 2
ELSE
    Statement block n
ENDIF
```

Remarks

If the result of the expression is nonzero, the statement following THEN will be executed. If the result of the expression is zero, and the statement following the ELSE present, it will be executed. Otherwise the next line of statement is executed.

If there are block of statements in IF…THEN …ELSE, ENDIF must be used at the end of the IF…THEN…ELSE statement.

Limitations:

The total numbers of nested IF…THEN…ELSE statement in a program can not exceed than 40 levels.

The total numbers of IF…THEN…ELSE, FOR…NEXT, WHILE…WEND, and DO…LOOP in a program can not exceed than 40 levels.

Example

```
DOWNLOAD "IF.BAS"
BEGIN:
  PRINT "LOOK HERE"
  K=INKEY()
CLS
PRINT "REPEAT?(y/n)"
v_CHAR = INKEY()
IF v_CHAR=89 THEN
    CLS
    GOTO BEGIN
ELSE IF v_CHAR=121 THEN
    CLS
    GOTO BEGIN
ENDIF
PRINT "Press key to quit!"
    SOUND 5,10000
    END
EOP
```

END

Description

Terminates the program execution.

Syntax

END

Remarks

END statement may be placed anywhere in a program to terminate the execution.

With END statement, all variables will be released from memory and closed file handles.

Example

```
DOWNLOAD "IF.BAS"
BEGIN:
  PRINT "LOOK HERE"
  K=INKEY()
CLS
PRINT "REPEAT?(y/n)"
v_CHAR = INKEY()
IF v_CHAR=89 THEN
   CLS
   GOTO BEGIN
ELSE IF v_CHAR=121 THEN
   CLS
   GOTO BEGIN
ENDIF
   PRINT "Press key to quit!"
   SOUND 5,10000
END
EOP
```

DIM

Description

An array is a collection of variables of the same type that is referenced by a common name. DIM statement is used to declare the array variables of integer, float and double float data types. The lowest address corresponds to the first element, and the highest address to the last element. A specific element in an array is accessed by an index.

Syntax

DIM variable (subscripts)[, variable (subscripts), …]

Remarks

The base of an array index always begins from 0. For example, DIM A(10), there are totally 11 elements of variable A (0 to 10).

Do not duplicate declare array in the program without executing the FREE statement.

The DIM statement sets all the elements of specified arrays to an initial value of numbers to zero and strings to null string.

The total numbers of array elements (no matter what kind of data type) cannot exceed than 200 elements.

The available maximum array variable name is 10 characters.

The maximum dimensions of an array variables is 3 dimension.

Example

```
DOWNLOAD "DIM.BAS"
DIM A(8),B(8)
FOR I=0 TO 8
A(I)=I+1
FOR J=0 TO 8
B(J)=J+1
OUT 1; A(I);"*";B(J);"=";A(I)*B(J)
NEXT J
NEXT I
PRINT “PRESS ANY KEY!”
END
FREE A
FREE B
EOP
```

FREE

Description

Eliminates array variables from memory.

Syntax

FREE dimension variable

Remarks

Arrays can be re-dimensioned after they are freed, or the memory space previously allocated to the array may be used for other purposes. If an attempt is made to re-dimension an array without first freeing it, an error occurs.

Example

```
DOWNLOAD "DIM.BAS"
DIM A(8),B(8)
FOR I=0 TO 8
A(I)=I+1
FOR J=0 TO 8
B(J)=J+1
OUT 1; A(I);"*";B(J);"=";A(I)*B(J)
NEXT J
NEXT I
END
FREE A
FREE B
EOP
```

REM

Description

Inserts explanatory remarks in a program.

Syntax

REM comments

Remarks

REM statements are not executed.

Example

```
REM *** this is an example ***
DOWNLOAD “REMB.BAS”
PRINT “YOU WILL NOT SEE REM”
REM *** REM ***
END
EOP
```

TSKL Functions

POS()

Description

Gets the current position of the cursor on LCD display.

Syntax

POS()

Remarks

This function returns the value between 0~79.

Example

```
DOWNLOAD "POS.BAS"
      PRINT "ENTER POSITION: (0<NUM<79)"
        INPUT "",A$
          B=VAL(A$)
            LOCATE B,1
          Cur_pos = POS()
        PRINT "CURSOR POSITION    "+STR$(Cur_pos)
   END
EOP
```

INKEY()

Description

To return the ASCII code of the character read from keyboard. The returned ASCII code will not shown on LCD display.

	ASCII		ASCII		ASCII		ASCII		ASCII
A	65	a	97	1	49	SPACE	32	-	45
B	66	b	98	2	50	Back space	8	+	43
C	67	c	99	3	51	EXIT	5	↑	24
D	68	d	100	4	52	CLEAR	9	↓	25
E	69	e	101	5	53	/	47	←	27
F	70	f	102	6	54	;	59	→	26
G	71	g	103	7	55	,	44	F1	6
H	72	h	104	8	56			F2	7
I	73	I	105	9	57			FORM	4
J	74	j	106	0	48			ENTER	13
K	75	k	107						
L	76	l	108						
M	77	m	109						
N	78	n	110						
O	79	o	111						
P	80	p	112						
Q	81	q	113						
R	82	r	114						
S	83	s	115						
T	84	t	116						
U	85	u	117						
V	86	v	118						
W	87	w	119						
X	88	x	120						
Y	89	y	121						
Z	90	z	122						

Syntax

INKEY( )

Remarks

All tasks are pending until a key is pressed.

Example

```
DOWNLOAD "IF.BAS"
BEGIN:
      PRINT "LOOK HERE"
       K=INKEY()
    CLS
    PRINT "REPEAT?(y/n)"
v_CHAR = INKEY()
IF v_CHAR=89 THEN
      CLS
      GOTO BEGIN
ELSE IF v_CHAR=121 THEN
      CLS
      GOTO BEGIN
ENDIF
PRINT "Press key to quit!"
  SOUND 5,10000
  END
EOP
```

INP$()

Description

To return one byte that received from serial port.

Syntax

INP$(expression)

Remarks

The result of the expression must be numeric. (0 or 1)

0: COM1 (Serial port with cable on keyboard)

1: COM2 (Serial port mount on keyboard)

The returned value is a string

Example

```
DOWNLOAD "INP.BAS"
REM *****Total Milage*****
    PRINT "******Distence******"
    Milage1$=""
    OUT 0;"~!@"
    Milage2$=""
    DO
        Milage2$=INP$(0)
        IF ASC(Milage2$)=13 THEN EXITDO
        Milage1$=Milage1$+Milage2$
    LOOP
PRINT Milage1$
END
EOP
```

EOF()

Description

To return nonzero when the end of a file has been reached, or to return 0 if the end of file (EOF) has not been found.

Syntax

EOF(file number)

Remarks

If file pointer points to the end of the file, EOF returns non-zero.

Example

```
DOWNLOAD "DATA",10,1234567890
DOWNLOAD "EOF.BAS"
OPEN "DATA" FOR INPUT AS #1
C=0
Repeat:
IF EOF(1)>0 THEN GOTO End_of_file
READ #1;A
C=C+1
GOTO Repeat
End_of_file:
PRINT "PRESS ANY KEY!"
END
EOP
```

LOF()

Description

To return the size of file.

Syntax

LOF(FileHandle)

Remarks

An integer is returned to indicate the size of file

Example

```
DOWNLOAD "LOF.BAS"
OPEN "DATA" FOR APPEND AS #1
WRITE #1;"ABC"
File_length = LOF(1)
PRINT "File_length= "+STR$(File_length)
CLOSE #1
END
EOP
```

ABS()

Description

To return the absolute value of the expression.

Syntax

ABS(expression)

Remarks

The result of the expression must be numeric.

Example

```
DOWNLOAD "ABS.BAS"
  X=ABS(5-12)
    PRINT "Absolute value: "+X
    K=INKEY()
  X=5-12
    PRINT "Value: "+X
END
EOP
```

ASC()

Description

To return the value of the ASCII code for the first character of the expression.

Syntax

ASC(expression)

Remarks

The result of the expression must be a string.

Example

```
DOWNLOAD "ASC.BAS"
 PRINT "*** INPUT YOUR WORD ***"
     INPUT "Only one world: ",A$
      X=ASC(A$)
     PRINT "ASCII code value "+STR$(X)+" = "+A$
 END
EOP
```

LEN()

Description

To return the length of the string.

Syntax

LEN(string expression)

Remarks

The maximum returned string length is 255.

Example

```
DOWNLOAD "LEN.BAS"
BEGIN:
    PRINT "HOW MANY DIGITS?"
    INPUT "ABC-DEF ",A$
    X=LEN("ABC-DEF")
IF A$=STR$(X) THEN
  PRINT "CORRECT! ANSWER IS "+X
ELSE
  PRINT "WRONG! ANSWER IS "+STR$(X)
ENDIF
END
EOP
```

FRE()

Description

Return the size of free memory.

Syntax

FRE( )

Remarks

It calculates and returns an integer to indicate free memory size of keyboard in K Bytes.

Example

```
DOWNLOAD "FRE.BAS"
    A=FRE( )
    PRINT "REMAIN SPACE: "+STR$(A)+" K bytes"
 END
EOP
```

INT()

Description

To truncate an expression to an integral number.

Syntax

INT(expression)

Remarks

The result of the expression must be numeric.

Example

```
DOWNLOAD "INT.BAS"
    PRINT "INTEGER OF 5/2 = ?"
      K=INKEY()
      A=INT(5/2)
    PRINT "ANSWER IS: "+STR$(A)
END
EOP
```

VAL()

Description

To return the numerical value of the string expression.

Syntax

VAL(expression)

Remarks

The result of the expression must be a string.

Example

```
DOWNLOAD "VAL.BAS"
    PRINT "A=123, B=321, A+B=?"
    K=INKEY()
      A=VAL("123")
      B=VAL("321")
      C=A+B
     PRINT "A+B= "+STR$(C)
END
EOP
```

RND()

Description

RND returns a number between 0 and 1

Syntax

A=RND()

Remarks

N/A

Example

```
DOWNLOAD "RND.BAS"
   A=RND()
    PRINT STR$(A)
   K=INKEY()
EOP
```

CHR$()

Description

To return the ASCII character of the numerical expression.

Syntax

CHR$(expression)

Remarks

The result of the expression must be numeric.

Example

```
DOWNLOAD "CHR.BAS"
PRINT "*** INPUT YOUR VALUE ***"
   INPUT " ",A
    X$=CHR$(A)
   PRINT "ASCII character "+X$+" = "+STR$(A)
END
EOP
```

FREAD$()

Description

To read a number of bytes from specified file.

Syntax

FREAD$ (FileHandle, count)

Remarks

Count is the number of data bytes. Maximum count size is 255.

Example

```
DOWNLOAD "DATA",10,1234567890
DOWNLOAD "FREAD.BAS"
OPEN "DATA" FOR INPUT AS #1
SEEK #1,5
A$=FREAD$(1,5)
CLOSE #1
PRINT A$
END
EOP
```

LEFT$()

Description

To return a number of the leftmost characters of the string expression.

Syntax

LEFT$(expression, count)

Remarks

The result of the expression must be a string.

Count is the number of the leftmost characters.

Example

```
DOWNLOAD "LEFT.BAS"
    A$=CHR$(34)
     PRINT "LEFT("+A$+"123456"+A$+",3) =?"
     B$=LEFT$("123456",3)
    K=INKEY()
     PRINT B$
    K=INKEY()
EOP
```

RIGHT$()

Description

To return a number of the rightmost characters of the string expression.

Syntax

RIGHT$(expression, count)

Remarks

The result of the expression must be a string.

Count is the number of the rightmost characters.

Example

```
DOWNLOAD "RIGHT.BAS"
    A$=CHR$(34)
     PRINT "RIGHT$("+A$+"123456"+A$+",3) =?"
     B$=RIGHT$("123456",3)
    K=INKEY()
    PRINT B$
    K=INKEY()
EOP
```

MID$()

Description

To return a number of characters begin from the starting parameter to the specified length.

Syntax

MID$(String, Starting, Length)

Remarks

String: Can be a string or expression

Start: Character position in string at which the part to be taken begins. If start is greater than the number of characters in string, Mid returns a zero-length string ("").

Length: The numbers of characters to be returned.

Example

```
DOWNLOAD "MID.BAS"
    A$=CHR$(34)
     PRINT "MID$("+A$+"123456"+A$+",3,3) =?"
      B$=MID$("123456",3,3)
     K=INKEY()
     PRINT B$
    K=INKEY()
EOP
```

STR$()

Description

Returns a string representation of a number.

Syntax

STR$(expression)

Remarks

The result of the expression must be a numeric.

Note: STR$() function can not be included in other functions.

Example: VAL(STR$(“123”)

Example

```
DOWNLOAD "STRING.BAS"
    PRINT "1+2+3+4+5=?"
    K=INKEY()
     SUM=1+2+3+4+5
     SUM$=STR$(SUM)
    PRINT "SUM= "+SUM$
    K=INKEY()
EOP
```

SPC$()

Description

To insert a number of spaces in a string.

Syntax

SPC$(expression)

Remarks

The result of the expression must be numeric.

Example

```
DOWNLOAD "SPACE.BAS"
  PRINT "PRICE";SPC$(5);"123.5"
  K=INKEY()
EOP
```

System Variables

YEAR

Description

Set and returns the year of Real Time Clock. The available numbers to set YEAR variable begins from 00 to 99. The returned data iis a 4 digits number. Ex: 1998,2001.

Syntax

YEAR=nn

Where

nn=00~99

A=YEAR

Remarks

The Real Time Clock is Year 2000 compatible.

Example

```
DOWNLOAD "YEAR.BAS"
    YEAR$=STR$(YEAR)
      PRINT "YEAR "+YEAR$
      K=INKEY()
    YEAR$=MID$(YEAR$,3,2)
      PRINT "YEAR "+YEAR$
      K=INKEY()
EOP
```

MONTH

Description

Set and returns the month of Real Time Clock. The available numbers begins from 01 to 12.

Syntax

MONTH=nn

Where

nn=01~12

A=MONTH

Remarks

N/A

Example

```
DOWNLOAD "MONTH.BAS"
        MONTH$=STR$(MONTH)
         PRINT "MONTH "+ MONTH$
        K=INKEY()
EOP
```

DATE

Description

Set and returns the date of Real Time Clock. The available numbers begins from 00 to 99.

Syntax

DATE=nn

Where

nn=01~31

A=DATE

Remarks

The leap year timing is automatic

Example

```
DOWNLOAD "DATE.BAS"
        DATE$=STR$(DATE)
          PRINT "DATE "+ DATE$
        K=INKEY()
EOP
```

HOUR

Description

Set and returns the hour of Real Time Clock. The available numbers begins from 00 to 23.

Syntax

HOUR=nn

Where

nn=00~23

A=HOUR

Remarks

N/A

Example

```
DOWNLOAD "HOUR.BAS"
    HOUR$=STR$(HOUR)
      PRINT "HOUR "+ HOUR$
    K=INKEY()
EOP
```

MINUTE

Description

Set and returns the minute of Real Time Clock. The available numbers begins from 00 to 59.

Syntax

MINUTE=nn

Where

nn=00~59

A=MINUTE

Remarks

N/A

Example

```
DOWNLOAD "MINUTE.BAS"
        MINUTE$=STR$(MINUTE)
          PRINT "MINUTE "+ MINUTE$
        K=INKEY()
EOP
```

SECOND

Description

Set and returns the second of Real Time Clock. The available numbers begins from 00 to 59.

Syntax

SECOND=nn

Where

nn=00~59

A=SECOND

Remarks

N/A

Example

```
DOWNLOAD " SECOND.BAS"
        SECOND $=STR$( SECOND)
          PRINT " SECOND "+ SECOND $
        K=INKEY()
EOP
```

IDNUMBER$

Description

IDNUMBER$ is read only at run time. The ID number can be set in the Setup Utility. With password locked on, users can't change the ID number.

Syntax

A$=IDNUMBER$

Remarks

N/A

Example

```
DOWNLOAD "ID.BAS"
  BEGIN:
       PRINT "ENTER THE ID NUMBER:"
       INPUT "",A$

         IF A$=IDNUMBER$ THEN
            PRINT "HELLO ~ WELCOME!"
            K=INKEY()
          END
         ELSE
      PRINT "WRONG ID -- TO NEXT!"
  K=INKEY()
  GOTO AGAIN
ENDIF

AGAIN:
   PRINT "INPUT AGAIN? (Y/N)"
    v_CHAR = INKEY()
       IF v_CHAR=89 THEN
          CLS
          GOTO BEGIN
       ELSE IF v_CHAR=121 THEN
          CLS
          GOTO BEGIN
       ENDIF
   PRINT "Press key to quit!"
   SOUND 5,10000
  END
       ENDIF
EOP
```

Appendix A Limitations of Keyboard Control Language

- The total numbers of nested IF…THEN…ELSE, FOR…NEXT, WHILE…WEND and DO…LOOP in a program can’t exceed than 40.layers
- The maximum numbers of nested GOSUB…RETURN can’t exceed than 40 layers.
- The number of labels can’t exceed than200.
- 200 long integer and float data type variables
- 100 double float data type variables
- 50 string data type variables
- The maximum number of characters for variable name is 10 characters.
- The maximum number of characters for label name is 20 characters.
- The available memory for download is 128 KB
- The numbers of downloaded file can’t exceed than 50 files for SRAM, 150 files for flash memory (V1.08 and later versions).
- 15 files can be opened simultaneously in one program.
- Maximum numbers of dimensions for array variable is 3 dimensions.
- The total numbers of specified format of PRINT USING and OUT USING statement can’t exceed that 15.

Appendix B Error Messages

(01) Syntax error

The statement syntax is not correct.

(02) IF without THEN

If statement without THEN keyword.

(03) IF without ENDIF

If statement without ENDIF keyword.

(04) ELSEIF without IF

IF…THEN…ELSE…ELSEIF statement without ELSEIF keyword.

(05) ELSE without IF

IF…THEN…ELSE statement without IF keyword.

(06) ENDIF without IF

IF…THEN…ELSE statement without IF keyword.

(07) FOR without NEXT

FOR…NEXT statement without NEXT keyword.

(08) NEXT without FOR

FOR…NEXT statement without FOR keyword.

(09) EXITFOR without FOR

FOR…NEXT statement without FOR keyword.

(10) WHILE without WEND

WHILE…WEND statement without WEND keyword.

(11) WEND without WHILE

WHILE…WEND statement without WHILE keyword.

(12) DO without LOOP

DO…LOOP statement without LOOP keyword.

(13) LOOP without DO

DO…LOOP statement without DO keyword.

(14) RETURN without GOSUB

GOSUB…RETURN without GOSUB keyword

(15) Mode error

File operation access error.

(16) File number error

Illegal file handle number.

(17) File not found

The access file name does not exit in memory.

(18) Too many labels

The total numbers of label in the program is exeeced than 200.

(19) Duplicate label

Declared twice of label name.

(20) Label not found

The specified label does not exit in program.

(21) Illegal function call

Function does not exit.

(22) Illegal variable

The variable name exits illegal letters.

(23) Variable not defined

The variable does not assigned value in the program.

(24) Array not defined

The accessed array does not exit.

(25) Out of string space

The string is longer than 254 bytes.

(26) Too many variables

The number of variables is larger than the definition.

(27) Too many formats

The numbers of specified format of PRINT USING command and OUT USING command is larger than 15.

(28) Type mismatch

The data types of the two variables or returned values are not the same.

(29) Port error

The port specified in OUT and FOUT command is other than 0 and 1.

(30) Stack overflow

The total numbers of GOSUB…RETURN, WHILE…WEND, DO…LOOP, FOR…NEXT, IF…THEN…ELSE statement is larger than the specified number.

(31) Division by zero

The dividend is zero.

(32) Unknown operator

The operator is not defined in keyboard

(33) Expression too complex

Arithmetic expression is too complex.

(35) Duplicate array

Duplicate declare array variable.

(36) Out of memory

There is no t enough memory for download program or data file.

(37) Too many files

The total number of files stored in memory exceeds that 50.

(38) Unmatched brace

One of the right or left parentheses is missing.

Appendix C RS-232 Pin Configurations

Host and Printer RS-232 PIN Definition:

A. RS-232 Serial Interface 9 Pin D Type connector define:

Host				Device	Printer	
IBM PC		Keyboard	Keyboard	Keyboard	Axiohm	TSC
COM1		COM1 (Note 1)	COM1 (Note 2)	COM2	COM2	COM2
Pin 1	/CD ←	+ 5V ←	+ 5V←	+ 5V ←	+ 5V →	+ 5V →
Pin 2	RXD ←	RXD ←	TXD →	TXD →	RXD ←	TXD →
Pin 3	TXD →	TXD →	RXD ←	RXD ←	TXD →	RXD ←
Pin 4	/DTR →	/DTR →	/DSR ←	/DSR ←	NC	/DSR ←
Pin 5	GND	GND	GND	GND	GND	GND
Pin 6	/DSR ←	/DSR ←	/DTR →	/DTR →	NC	RDY →
Pin 7	/RTS →	/RTS →	/CTS ←	/CTS ←	/RTS →	NC
Pin 8	/CTS ←	/CTS ←	/RTS →	/RTS →	/CTS ←	RDY →
Pin 9	RI←	+ 5V ←	+ 5V ←	+ 5V ←	+ 5V →	+ 5V →

Note 1: Smart Keyboard Hardware SW1 & SW2 must ON .
Note 2: SMART KEYBOARD Hardware SW1 & SW2 must OFF .
Note 3: <-- symbol emblem INPUT , --> symbol emblem OUTPUT.

B. RS-232 Serial Interface 25 Pin D Type connector define:

	Printer	Host			
	RS-232C	IBM PC	PC-8801	ProTool+	
	Zebra				
				(Note 1)	
1	Protective Ground	SHELL	GND	Frame GND	Frame GND
2	Transmitted Data	TXD →	TXD	RXD ←	TXD →
3	Received Data	RXD ←	RXD←	TXD →	RXD ←
4	Request to Send	/RTS →	RTS→	/CTS ←	/RTS →
5	Clear to Send	/CTS ←	/CTS ←	/RTS →	/CTS ←
6	Data Set Ready	/DSR ←	/DSR←	/DTR →	/DSR ←
7	Signal Ground	GND	GND	GND	GND
8	Received Line Signal Detector	/CD ←	DCD	NC	NC
9	(Reserved for Data Set Testing)	NC	NC	+ 5V 0.25A ←	5V 1A →
10	(Reserved for Data Set Testing)	NC	NC	+ 5V 0.25A ←	NC
11	Unassigned	NC	NC	NC	NC
12	Secondary Received Line Signal Detector	NC	NC	NC	NC
13	Secondary Clear to Send	NC	NC	NC	NC
14	Secondary Transmitted Data	NC	NC	+ 5V 0.25A ←	NC
15	Transmission Signal Element Timing	NC	NC	NC	NC
16	Secondary Received Data	NC	NC	NC	NC
17	Receiver Signal Element Timing	NC	RXC←	NC	NC
18	Unassigned	NC	NC	NC	NC
19	Secondary Request to Send	NC	NC	NC	NC
20	Data Terminal Ready	/DTR →	/DTR→	/DSR ←	/DTR →
21	Signal Quality Detector	NC	NC	NC	NC
22	Ring Indicator	RI ←	NC	NC	NC
23	Data Signal Rate Selector	NC	NC	+ 5V 0.25A ←	NC
24	Transmitter Signal Element Timing	NC	TXC→	NC	NC
25	Unassigned	NC	NC	NC	NC

(Continued on next page)

	DATAMAX	Ring	TEC	SATO
1 Protective Ground	CHASSIS	Frame GND	Frame GND	Frame GND
2 Transmitted Data	TXD →	TXD →	RXD ←	TXD →
3 Received Data	RXD ←	RXD ←	TXD →	RXD ←
4 Request to Send	/RTS →	/RTS →	/CTS ←	/RTS →
5 Clear to Send	/CTS ←	/CTS ←	/RTS →	/CTS ←
6 Data Set Ready	NC	/DSR ←	/DTR →	/DSR ←
7 Signal Ground	GND	GND	GND	GND
8 Received Line Signal Detector	NC	NC	NC	NC
9 (Reserved for Data Set Testing)	NC	NC	NC	NC
10 (Reserved for Data Set Testing)	NC	+ 5V	NC	NC
11 (Unassigned)	NC	NC	NC	NC
12 (secondary Received Line Signal Detector	NC	NC	NC	NC
13 Secondary Clear to Send	NC	To Be Left Unused	NC	NC
14 Secondary Transmitted Data	+ 5V 0.1A →	To Be Left Unused	NC	NC
15 Transmission Signal Element Timing	NC	NC	NC	NC
16 Secondary Received Data	NC	NC	NC	NC
17 Receiver Signal Element Timing	NC	NC	NC	NC
18 Unassigned	NC	NC	NC	NC
19 Secondary Request to Send	NC	To Be Left Unused	NC	NC
20 Data Terminal Ready	BUSY →	/DTR →	/DSR ←	/DTR →
21 Signal Quality Detector	NC	NC	NC	NC
22 Ring Indicator	NC	NC	NC	NC
23 Data Signal Rate Selector	NC	+ 5V	NC	NC
24 Transmitter Signal Element Timing	NC	NC	NC	NC
25 Unassigned	NC	To Be Left Unused	NC	NC

Operation Guide

Auto Execution Utility

Power on	Execute the “AUTO.BAS” program automatically

Power-on Utility

Power on with **ALT** **F1**	Disable the auto execution utility
Power on with **ALT** **SHIFT**	Upgrade keyboard BIOS
Power on with **ALT** **CLEAR**	Keyboard initialization
Power on with **ALT** **D** or **ALT** **E**	Extend Files Manager utility

Keyboard Utilities

FORM	Select BASIC files to execute
ENTER	Execute the selected item
EXIT	Exit sub-menu
← →	Select parameters
↑ ↓	Scroll files or cursor
ALT **F1**	Keyboard configuration setup
ALT **F2**	On-line editing utility
ALT **F2** **F1**	Upload files
ALT **F2** **CLEAR**	Delete files
ALT **D**	Extend files manager
ALT **EXIT**	Reset keyboard