ABI-DOS

QUICK REFERENCE GUIDE

System Administrator

ABI-DOS SOFTWARE

Contents

UBITS

Summary

UBITS are the fundamental information blocks in the ABI-DOS system. They move along designated pathways (wires) on the chip board, carrying both a numerical value and a color. As they travel, they interact with icons to perform various functions.

Properties of UBITS

- Value: Each UBIT holds an integer between -999 and 999. If an operation causes the value to exceed these limits, it is clamped to the maximum or minimum accordingly.
- Countdown: UBITS display a countdown when stopped by an Obstructor. While moving, they show an ellipsis (…) instead.
- Color: UBITS can be neutral (no color) or possess one of the following colors, defined by their RGB components:
    - Red
    - Blue
    - Green
    - Magenta (Red + Blue)
    - Cyan (Green + Blue)
    - Yellow (Red + Green)
    - Gray (Red + Green + Blue)

Movement Rules

- Initial Direction: UBITS start moving in the direction they were spawned and continue unless stopped by specific icons.
- Continuous Motion: UBITS never stop moving on their own. If they reach a dead end, they turn around and continue in the opposite direction.
- Navigation Logic: When unable to proceed, a UBIT will attempt to:
    1. Turn right
    2. Turn left
    3. Turn backward
- Note: At a perpendicular T-junction, a UBIT will default to turning right unless manually inverted by the user.

Double left click (or press Q) on a T junction in paint mode to mirror it.

Interaction with Icons

When a UBIT touches an icon, it executes the function associated with that icon. For example, if a UBIT interacts with an Adder icon, the icon's value is added to the UBIT's current value.

Input and Output Ports

SIMULATION START

- UBIT Spawning: At the beginning of a simulation, a single UBIT spawns at each Input Port, inheriting the value and color of the character or value held by the pointer of the signal linked to that port.
- Initial Movement: Each UBIT travels in the direction specified by its respective Input Port.

OUTPUT BEHAVIOR

- When a UBIT reaches an Output Port:
    - Its value and color are sent to the corresponding signal, and written at the position specified by the signal's screen pointer.
    - The UBIT is then destroyed.

UBIT Collision

COLLISION MECHANICS

- Merging UBITS: When two or more UBITS arrive at the same tile simultaneously, they merge into a single UBIT.
- Value Addition: The values of the colliding UBITS are added together and clamped within the -999 to 999 range if necessary.
- Color Addition: The RGB components of the UBITS' colors are combined. For example, a red UBIT colliding with a blue UBIT results in a magenta UBIT.
- Countdown behaviour: When a UBIT stopped by an Obstructor merges with another UBIT, the resulting UBIT inherits the countdown of the stopped UBIT and continues from that point until reaching a value of *zero*.

DIRECTION AFTER COLLISION

- Different Values: The resulting UBIT moves in the direction of the original UBIT with the higher value.
- Same Values: The resulting UBIT's direction is randomly chosen from the incoming directions.

WIRES

Wires are essential for UBIT movement and signal transmission between sensors and triggerable icons. There are three types:

1. White Wires: Pathways for UBIT movement.
2. Red Wires: Transmit signals from sensors to triggerable icons.
3. Blue Wires: Additional signal pathways, functioning like red wires.

To enter paint mode, hold down the ALT key. While holding ALT, use the left mouse button to create wires or the right mouse button to delete wires.

White Wires

- Function: Exclusively used for UBIT movement.
- Characteristics:
    - Can only be drawn on tiles that support UBIT paths.
    - UBITS move along white wires and ignore red and blue wires.

To select this wire type, hold down the ALT key and press 1. Alternatively, you can hold ALT and scroll the mouse wheel to choose this wire type.

Red Wires

- Function: Transmit signals from sensors to triggerable icons.
- Characteristics:
    - UBITS ignore red wires; they do not interact with them.
    - When a UBIT interacts with a sensor, the signal travels through red wires to connected icons.

To select this wire type, hold down the ALT key and press 2. Alternatively, you can hold ALT and scroll the mouse wheel to choose this wire type.

Blue Wires

- Function: Serve as additional signal pathways, similar to red wires.
- Characteristics:
    - UBITS ignore blue wires.
    - Blue wires can overlap with red wires without signal interference.

To select this wire type, hold down the ALT key and press 3. Alternatively, you can hold ALT and scroll the mouse wheel to choose this wire type

SIGNALS

Introduction

Signals are arrays of information displayed on screens located to the right of the board. There are two types of signals:

- Input Signals: Linked to input ports, these signals are read-only.
- Output Signals: Linked to output ports, these signals can be written to.

Signal Structure

- Slots: Each signal consists of multiple slots, indexed starting from 0.
- Value: Each slot holds a specific value, which can be numerical or character-based.

Types of Signals

1. Electric Signals
    - Representation: Values are shown as horizontal bars.
    - Coloring: Bars may be colored for clarity but do not carry inherent color values.
    - Usage: Ideal for visualizing numerical or analog data.
2. Standard Signals
    - Representation: Values are displayed as colored characters.
    - Character Consistency: Each character represents the same value regardless of color.
    - Color Significance: The color corresponds to the UBIT's color when interacting with ports.

Interaction with UBITS

OUTPUT PORTS

When a UBIT reaches an Output Port linked to a signal:

1. Value Conversion: The UBIT's numerical value is converted into a character (for standard signals).
2. Writing to Signal:
    - The character is written at the position indicated by the screen pointer.
    - It adopts the UBIT's color (for standard signals).
3. Pointer Movement:

- The screen pointer moves one position to the right, looping the screen if necessary (unless configured otherwise).

INPUT PORTS

When an Input Port is triggered:

1. Reading from Signal: The character at the screen pointer position is read.
    1. Standard Signals: A UBIT is created with the value and color associated with the corresponding character.
    2. Electric Signals: A colorless (neutral) UBIT is generated with the corresponding value.
2. Pointer Movement: The screen pointer moves one position to the right, looping the screen if necessary (unless configured otherwise).
3. Automatic Generation: At simulation start, input ports automatically generate UBITS in this manner.

Screen Pointer

- Definition: A visual marker highlighting the current slot in a signal.
- Function:
    - Indicates where characters are read from or written to.
    - Moves automatically after each operation unless configured otherwise.

User Interaction with Ports

SEMI-ACTIVE MODE

- Input Ports:
    - Users can set an input port to semi-active mode.
    - Prevents automatic UBIT generation at simulation start, allowing manual control.
- Output Ports:
    - Users can set an output port to semi-active mode.
    - Stops the screen pointer from moving automatically after writing, enabling controlled pointer movement or overwriting.

> To make a port (either input or output) semi-active, simply right-click on the port. Note: Some segments may not support this functionality.

ICONS

Overview

Icons are static blocks that perform actions on UBITS within the ABI-DOS system. They are primarily found in the toolbox and can be individually placed on the main board. The exception is ports, which are already placed on the board.

Types of Icons

There are four main types of icons:

1. Input and Output Ports

- Placement: Already located on the board; cannot be deleted.
- Quantity: One port per signal.
- Semi-active Mode: Ports can be set to semi-active as described in the Signals section.

> To make a port (either input or output) semi-active, simply right-click on the port. Note: Some segments may not support this functionality.

2. Sensors

- Function: Detect when a UBIT triggering them meets a specific condition.
- Behavior:
    - If the UBIT fulfills the condition, connected triggerable icons switch to State B.
    - If the UBIT does not fulfill the condition, connected triggerable icons switch to State A.
- Connections: Linked to triggerable icons via red or blue wires.

3. Triggerable Icons

- Initial State: Start the simulation in State A, which can be set as active or inactive by the user.
- State Switching:
    - State A and State B are opposite in activity (if one is active, the other is inactive).
    - When triggered by a sensor meeting its condition, the icon switches to State B.
    - If the condition is not met, it switches back to State A.
- Customization: Users define whether State A is active or inactive at the start.

> Double-click a triggerable icon to set its STATE A (active or inactive). However, *Obstructors* are an exception; their initial STATE A is always active and cannot be manually changed.

4. Normal Icons

- Description: Icons that do not fall into the above categories.
- Behavior: Have standard functions without special behaviors.

Some icons come with variations—alternative versions with similar functionalities. These are indicated by a "variations" label in their toolbox description.

Writable icons

Some icons are writable, allowing you to input numbers directly into them.

> While the cursor is over the icon, type the number you want to assign to it. You can include the plus (+) or minus (–) sign if needed. Use the Backspace key to delete individual digits.

Note: The number you enter will be restricted to a specific range, which is specified in the icon's description. Make sure to check this range to ensure your input is valid.

Managing Icons

- Adding Icons: Drag icons from the toolbox and place them on the main board where needed.
- Deleting Icons: All icons except input and output ports can be deleted manually.
- Connecting Icons: Use red or blue wires to link sensors to triggerable icons, allowing dynamic responses based on UBIT conditions.

> Add an Icon: Left-click and drag it from the toolbox to the main board.
>
> Delete an Icon: Right-click on the icon (except ports) on the board.
>
> Select Icon Variations: Scroll the mouse wheel over an icon in the main board to choose a different version.

ORDER OF EXECUTION

In every simulation, the sequence of interactions is always as follows:

1. UBITS collide between them.
2. UBITS interact with icons in ascending Order of Execution (OE): OE 0 first, then OE 1, OE 2, and so on. When multiple icons with the same OE are triggered simultaneously, they do so from top to bottom and left to right.
3. Output ports are triggered.

Table 1. Order of execution. The values in the right column follow the same order as the icons in the left column.

Icons	OE
	0, 1, 2, 3
	4, 5, 6, 7
	8, 9
	10, 11
	12, 13
	14, 15, 16, 17

				18, 19
				20
				20
				20
				20
				21
				22, 23, 24, 25
				26, 27, 28
				29
				30

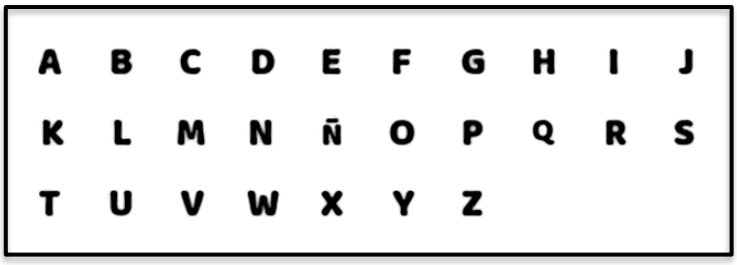
	31
	32

GLYPH MAP

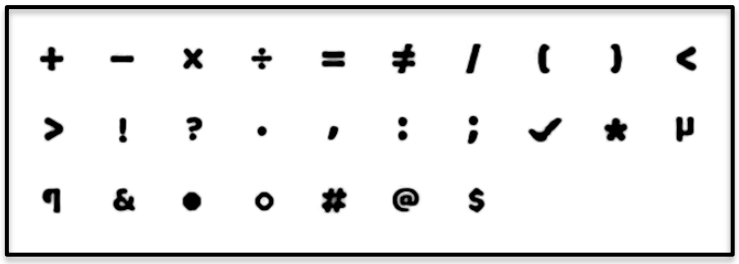
Each character consistently maps to the same value when converted to or from a UBIT. This rule applies only to standard signals, not electric signals. The mappings are as follows:

- Values from 0 to 99 are displayed as their exact numbers, with one exception for the value 0. If the value is 0 and has a neutral color, it appears as an empty cell. If the value is 0 but has a non-neutral color, it is shown as a colored 0.

- Values from 100 to 126 correspond to letters.



- Values from 127 to 153 corresponds to various symbols.



- Values from 154 to 181 corresponds to progress symbols. Values higher than 181 are always clamped to 181.