Military Standard Products

UT69R000 MicroController Software Tools

Product Brief

July 1996

Introduction

The UT69R000 MicroController Software Tools consist of a C Compiler (GCC), a RISC assembler (RASM), a RISC linker (RLNK), and a RISC interactive simulator (IRSIM). Figure 1 and Table 1 describe each tool and function.

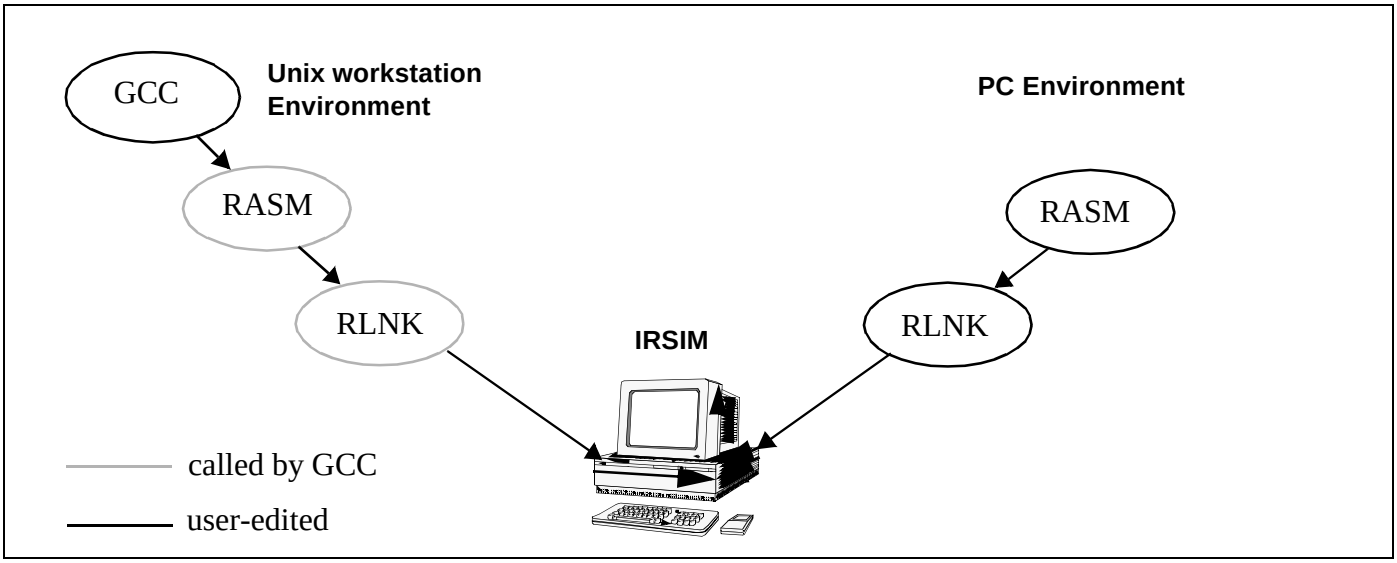

Figure 1: UT69R000 Software Tools

TABLE 1. UT69R000 MicroController Software Tools

Tool Name	What the Tool is...	What the Tool Does...
GCC	C compiler	Generates assembly code for the UT69R000 from C, C++, or Objective C source code.
RASM	Full-featured assembler program	Facilitates assembly language programming by providing a macro capability and detailed error-detection.
RLNK	Companion linker program to RASM	Allows partitioning of complex programs into manageable segments.
IRSIM	Software simulator for the UT69R000	Simulates UT69R000 behavior, which facilitates program debugging. IRSIM simulates the current contents of all registers and user-defined system memory as the program executes.

Features

The following sections more fully describe the features of each of the software tools provided with the UT69R000.

C Compiler (GCC)

The C Compiler has the following features:

- Generates assembly code for the UT69R000 (RASM)
- Completely integrates RASM and RLINK
- Optimizes C code
- Optimizes C code specifically for the UT69R000
- Emulates floating point hardware
- C++ and Objective C capabilities
- Currently supported on Sun/Solaris UNIX workstations

RISC Assembler (RASM)

The RISC Assembler accepts a standard text file of UT69R000 assembly language and generates an object file which contains machine code and instructions. The RISC Assembler operates in both a UNIX and PC environment and has the following features:

- Generates relocatable code for the UT69R000
- Supports the use of macro programming
- Allows the use of symbols as labels for code locations and operand data locations
- Supports common assembler directives including ORG, DW, EQU, EXTERNAL, or PUBLIC
- Allows arithmetic expressions in instruction source field
- Displays clear and concise error messages
- Supported on IBM-compatible PC computers and UNIX workstations

RISC Linker (RLNK)

The RISC Linker merges one or several object files into an executable binary file represented in INTEL hex format for PROM programming. The RISC Linker operates in both a UNIX and PC environment and has the following features:

- Allows a user-defined memory map
- Produces a symbol table output showing the resolution and length of all modules, symbols, and the organization of memory
- Produces symbol table information useful in program simulation
- Output for PROM programming is in standard INTEL hex format
- Currently supported on IBM-compatible PC computers and UNIX workstations

Interactive Simulator (IRSIM)

The Interactive Simulator is a software simulator for the UT69R000. IRSIM permits the development of code without the need for any actual hardware. Features of IRSIM include:

- Turns a PC into a UT69R000 microcontroller development workstation
- Provides software simulation support
- Offers the following debug capabilities:
  - Single step
  - Keyboard-issued run break
  - Flexible user-selectable watch points
  - Elapsed time counters, measured in clock cycles, for measuring real-time program execution
  - Contents of all registers displayed on screen
  - Examination or alteration of all memory locations and internal registers
- Value-specific and access-triggered breakpoints control program flow to aid in the evaluation of branches, loops, etc.
- A trace buffer captures all IRSIM commands along with program code executed. The user selects whether to save the trace buffer to a file or send it to a line printer
- Supports detailed code timing analysis through wait state and clock cycle counter
- Allows for hardware debug, through a monitor mode of operation
- Provides pop-up help menus, available with a single keystroke
- Supported on IBM-compatible PC computers and UNIX workstations

IRSIM Monitor Function

IRSIM provides a monitor function as shown in Figure 2. The monitor function allows the exchange of information for debugging purposes between IRSIM and a UT69R000 system board. IRSIM uses the COM1 port of the PC and the internal UART of the UT69R000 as an RS-232 communication link between IRSIM and the target system.

UTMC provides the target system monitor software which controls the UT69R000 UART and communicates with the IRSIM monitor. Monitor software allows the user to alter program flow/send to, examine/alter code, or data memory contents along with register contents.

Development Process

Figure 2 shows the development environment for the UT69R000. Table 2 describes the process steps for developing program code for the UT69R000. If you are not using the C compiler, write the assembly code using a text editor, and start the process at Step 3.

TABLE 2. Process for Developing Program Code for the UT69R000

Step	Activity
1	Write C code using a text editor, and save the code to a .C file
2	Compile the C code using the supplied GCC compiler creating a source (.s) file
3	Assemble the code, using RASM, creating an object (.o) file
4	Link the code, using RLNK, creating an output (.out) file
5	Transfer the output file to the PC or workstation running IRSIM
6	Execute code in IRSIM to ensure proper operation
7	Download debugged code from IRSIM to the target system
8	Execute code on the target system

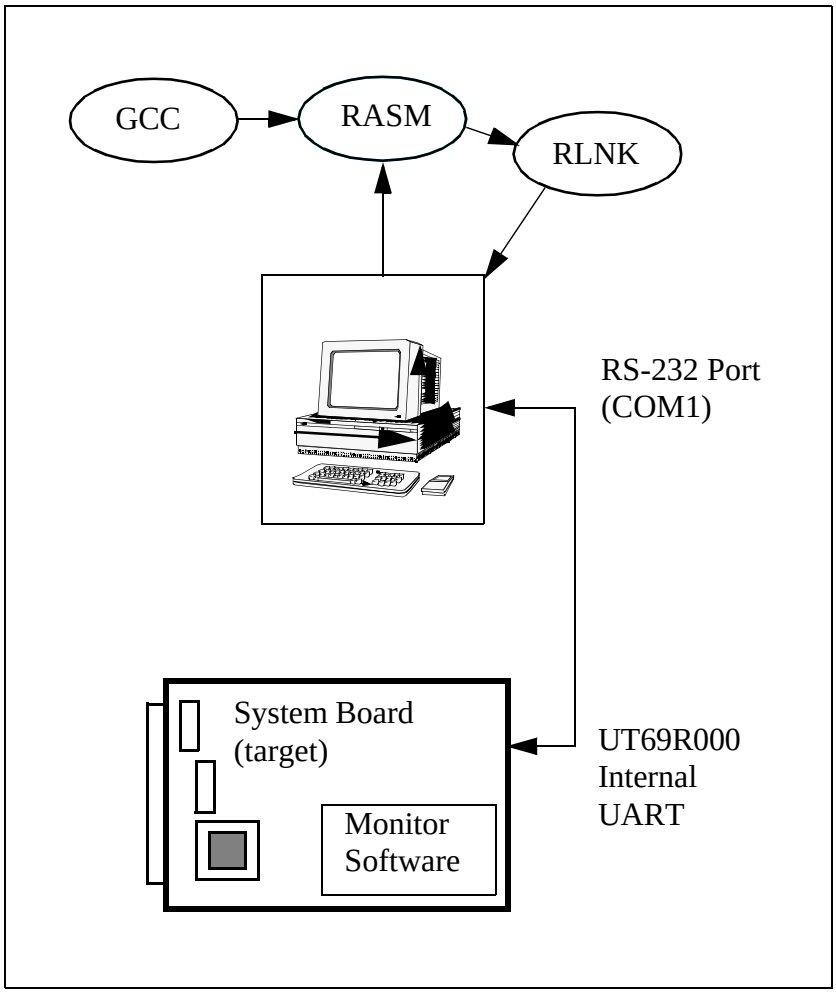

Figure 2: Development Environment with IRSIM and Monitor

Ordering Information

To order a UT69R000 Software ToolKit, use the following part numbers:

Software ToolKit:

UT69R000- **** **

Media Type and Size:

T0 = 1/4” tape
T8 = 8 mm tape
T4 = 4 mm tape
F3 = 3 1/2” floppy disk
F5 = 5 1/2” floppy disk

Operating System:

SNUX = Sun UNIX (C Compiler, RASM, RLNK, IRSIM)[1]
SOUX = Sun Solaris UNIX (C Compiler, RASM, RLNK, IRSIM)[1,2]
MSPC = IBM-PC Compatible (RASM, RLNK, IRSIM)

Notes:

1. Available on T0, T8, and T4 only
2. Sun Solaris users must have a native C compiler in addition to the C cross-compiler.

For example, a UT69R000 software kit, for a Sun UNIX workstation with an 8 mm drive, would be ordered as part number UT69R000-SNUXT8.

For any other information or assistance, contact your UTMC Sales Representative or a sales office.