7

Memory Requirements

7.1 Introduction

Memory is typically a limited resource in real-time embedded systems, therefore, **RTEMS** can be configured to utilize the minimum amount of memory while meeting all of the applications requirements. Worksheets are provided which allow the **RTEMS** application developer to determine the amount of **RTEMS** code and RAM workspace which is required by the particular configuration. Also provided are the minimum code space, maximum code space, and the constant data space required by **RTEMS**.

7.2 Data Space Requirements

RTEMS requires a small amount of memory for its private variables. This data area must be in RAM and is separate from the **RTEMS RAM Workspace**. The following table illustrates the data space required for all configurations of **RTEMS**:

Description	Size
Data Space	712

7.3 Minimum and Maximum Code Space Requirements

A maximum configuration of **RTEMS** includes the core and all managers, including the multiprocessing manager. Conversely, a minimum configuration of **RTEMS** includes only the core and the following managers: initialization, task,

interrupt and fatal error. The following table illustrates the code space required by these configurations of **RTEMS**:

Configuration	Size
Minimum	**20,468**
Maximum	**38,092**

7.4 RTEMS Code Space Worksheet

The **RTEMS Code Space Worksheet** is a tool provided to aid the **RTEMS** application designer to accurately calculate the memory required by the **RTEMS** run-time environment. **RTEMS** allows the custom configuration of the executive by optionally excluding managers which are not required by a particular application. This worksheet provides the included and excluded size of each manager in tabular form allowing for the quick calculation of any custom configuration of **RTEMS**. The **RTEMS Code Space Worksheet** is provided on the next page.

7.5 RTEMS RAM Workspace Worksheet

The **RTEMS RAM Workspace Worksheet** is a tool provided to aid the **RTEMS** application designer to accurately calculate the minimum memory block to be reserved for RTEMS use. This worksheet provides equations for calculating the amount of memory required based upon the number of objects configured, whether for single or multiple processor versions of the executive. This information is presented in tabular form, along with the fixed system requirements, allowing for quick calculation of any application defined configuration of **RTEMS**. The **RTEMS RAM Workspace Worksheet** is provided on the page following the **RTEMS Code Space Worksheet.**

RTEMS Code Space Worksheet

Component	Included	Not Included	Size
Core	12,732	n/a	
Initialization	1,152	n/a	
Task	3,616	n/a	
Interrupt	176	n/a	
Clock	456	n/a	
Timer	1,072	252	
Semaphore	1,588	236	
Message	2,112	396	
Event	960	156	
Signal	392	60	
Partition	1,080	188	
Region	1,344	220	
Dual Ported Memory	640	188	
I/O	640	252	
Fatal Error	88	n/a	
Rate Monotonic	1,336	252	
Extension	400	124	
Multiprocessing	7,728	380	
Total Code Space Requirements			

RTEMS RAM Workspace Worksheet

Description	Equation	Bytes Required
maximum_tasks	* 440 =	
maximum_timers	* 72 =	
maximum_semaphores	* 136 =	
maximum_queues	* 136 =	
maximum_messages	* 32 =	
maximum_regions	* 168 =	
maximum_partitions	* 72 =	
maximum_ports	* 40 =	
maximum_periods	* 40 =	
Floating Point Tasks	NA	
Task Stacks	=	
Total Single Processor Requirements		

Description	Equation	Bytes Required
maximum_nodes	* 64 =	
maximum_global_objects	* 32 =	
maximum_proxies	* 160 =	
Total Multiprocessing Requirements		

Fixed System Requirements	10,184
Total Single Processor Requirements	
Total Multiprocessing Requirements	
Minimum Bytes for RTEMS Workspace	