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iRMX® I
Nucleus System Calls Reference Manual

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Intel Corporation
3065 Bowers Avenue
Santa Clara, California 95051

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PREFACE

This manual documents the system calls of the Nucleus, the main subsystem of the iRMX® I Operating System. The information provided in this manual is intended as a reference to the system calls and provides detailed descriptions of each call.

READER LEVEL

This manual is intended for programmers who are familiar with the concepts and terminology introduced in the *iRMX® I Nucleus User's Guide* and with the PL/M-86 programming language.

CONVENTIONS

System call names appear as headings on the outside upper corner of each page. The first appearance of each system call name is printed in blue ink; subsequent appearances are in black.

Throughout this manual, system calls are shown using a generic shorthand (such as CREATE$TASK instead of RQ$CREATE$TASK). This convention is used to allow easier alphabetic arrangement of the calls. The actual PL/M-86 external-procedure names must be used in all calling sequences.

NOTE

The values NIL and SELECTOR$OF(NIL) are used throughout this manual. You may also use a value of zero in place of NIL and SELECTOR$OF(NIL). However, Intel recommends that you use NIL and SELECTOR$OF(NIL) in your iRMX I code to maintain upward compatibility with the iRMX II Operating System. For a description of the SELECTOR$OF and NIL built-in functions, refer to the PL/M user's guide.

You can also invoke the system calls from assembly language, but you must obey the PL/M-86 calling sequences when doing so. For more information on these calling sequences refer to the *iRMX® I Programming Techniques Reference Manual.*

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Chapter 1. iRMX® I Nucleus System Calls

Chapter 1. iRMX® I Nucleus System Calls (continued)

iRMX® I NUCLEUS SYSTEM CALLS 1

INTRODUCTION

This manual lists the iRMX® I Nucleus system calls in alphabetical order and provides a detailed description of each one.

The calling sequence for each call is the same as for the PL/M-86 interface. The information for each system call is organized in the following order:

- A brief sketch of the effects of the call.
- The PL/M-86 calling sequence for the system call.
- Definitions of the input parameters, if any.
- Definitions of the output parameters, if any.
- A detailed description of the effects of the call.
- An example of how the system call can be used.
- The condition codes that can result from using the call, with a description of the possible causes of each condition.

Throughout this manual, PL/M-86 data types such as BYTE, WORD, POINTER and SELECTOR are used. In addition, the iRMX I data types TOKEN and STRING are used. (See the *iRMX® I Nucleus User's Guide* for more information on these data types.) They are always capitalized, and their definitions are found in Appendix A of the *iRMX® Extended I/O System User's Guide*. If your compiler supports the SELECTOR data type, a TOKEN can be declared literally as SELECTOR or WORD. Because TOKEN is not a PL/M-86 data type, you must declare it to be literally a SELECTOR or a WORD every place you use it. The word "token" in lowercase refers to a value that the iRMX I Operating System returns to a TOKEN (the data type) when it creates the object.

The examples used in this manual assume the reader is familiar with PL/M. In these examples, the appropriate DECLARE and INCLUDE statements are made first. The reader should note the use of an INCLUDE statement that declares all of the system calls included in the iRMX I Operating System. Refer to the *iRMX® I Programming Techniques Manual* for additional information on creating this INCLUDE statement. Further, there is also a literal declaration for TOKEN, which is used in the examples. For the sake of simplicity, the examples assume that an established exception handler is to deal with exceptional conditions. Consequently, they do not illustrate in-line exception processing.

Following this introduction is a system call dictionary in which the calls are grouped according to type. The dictionary includes short descriptions and page numbers of the complete descriptions that follow.

SYSTEM CALL DICTIONARY

JOBS		
Call	**Description**	**Page**
CREATE$JOB	Creates a job with a task and returns a token for the job.	21
DELETE$JOB	Deletes a childless job that contains no extension objects (extension objects are described in the *iRMX® I Nucleus User's Guide*).	52
OFFSPRING	Provides a segment containing tokens of the child jobs of the specified job.	118
TASKS		
CREATE$TASK	Creates a task and returns a token for it.	42
DELETE$TASK	Deletes a task that is not an interrupt task.	67
GET$PRIORITY	Returns the static priority of a task.	102
GET$TASK$TOKENS	Returns to the caller a token for either itself, its job, its job's parameter object, or the root job.	108
RESUME$TASK	Decreases a task's suspension depth by one; resumes (unsuspends) the task if the suspension depth becomes zero.	135
SET$PRIORITY	Changes a task's priority.	165
SLEEP	Places the calling task in the asleep state for a specified amount of time.	178
SUSPEND$TASK	Increases a task's suspension depth by one; suspends the task if it is not already suspended.	180
MAILBOXES		
CREATE$MAILBOX	Creates a mailbox and returns a token for it.	29
DELETE$MAILBOX	Deletes a mailbox.	55
RECEIVE$MESSAGE	Allows the calling task to receive an object; the task has the option of waiting if no objects are present.	124
SEND$MESSAGE	Sends an object to a mailbox.	142

SEMAPHORES		
Call	**Description**	**Page**
CREATE$SEMAPHORE	Creates a semaphore and returns a token for it.	39
DELETE$SEMAPHORE	Deletes a semaphore.	64
RECEIVE$UNITS	Asks for a specific number of units from a semaphore.	128
SEND$UNITS	Adds a specific number of units to a semaphore.	146
SEGMENTS AND MEMORY POOLS		
CREATE$SEGMENT	Creates a segment and returns a token for it.	36
DELETE$SEGMENT	Returns a segment to the memory pool from which it was allocated.	61
GET$POOL$ATTRIBUTES	Returns the following memory pool attributes of the caller's job: pool minimum, pool maximum, initial size, number of allocated 16-byte paragraphs, number of available 16-byte paragraphs.	99
GET$SIZE	Returns the size, in bytes, of a segment.	105
SET$POOL$MIN	Changes the minimum attribute of the memory pool of the caller's job.	162
ALL OBJECTS		
CATALOG$OBJECT	Places an object in an object directory.	12
GET$TYPE	Accepts a token for an object and returns its type code.	110
LOOKUP$OBJECT	Accepts a cataloged name of an object and returns a token for it.	115
UNCATALOG$OBJECT	Removes an object from an object directory.	183
EXCEPTION HANDLERS		
GET$EXCEPTION-$HANDLER	Returns the current values of the caller's exception handler and exception mode attributes.	95
SET$EXCEPTION-$HANDLER	Sets the exception handler and exception mode attributes of the caller.	148

INTERRUPT HANDLERS, TASKS, AND LEVELS (* indicates the system calls that an interrupt handler can make)		
Call	**Description**	**Page**
*DISABLE	Disables an interrupt level.	71
ENABLE	Enables an interrupt level.	77
END$INIT$TASK	Informs the root task that a synchronous initialization process has completed.	84
*ENTER$INTERRUPT	Sets up a previously designated data segment base address for the calling interrupt handler.	85
*EXIT$INTERRUPT	Used by interrupt handlers to send an end-of-interrupt signal to hardware.	89
*GET$LEVEL	Returns the interrupt level of highest priority for which an interrupt handler has started but has not yet finished processing.	97
RESET$INTERRUPT	Cancels the assignment of an interrupt handler to a level and, if applicable, deletes the interrupt task for that level.	131
SET$INTERRUPT	Assigns an interrupt handler and, if desired, an interrupt task to an interrupt level.	154
*SIGNAL$INTERRUPT	Used by interrupt handlers to invoke interrupt tasks.	173
WAIT$INTERRUPT	Puts the calling interrupt task to sleep until it is called into service by an interrupt handler.	187
COMPOSITE OBJECTS		
ALTER$COMPOSITE	Replaces components of composite objects.	10
CREATE$COMPOSITE	Creates a composite object and returns a token for it.	15
DELETE$COMPOSITE	Deletes a composite object.	47
INSPECT$COMPOSITE	Returns a list of the component tokens contained in a composite object.	113
EXTENSION OBJECTS		
CREATE$EXTENSION	Creates a new object type and returns a token for it.	18
DELETE$EXTENSION	Deletes an extension object and all composites of that type.	49

DELETION CONTROL		
Call	**Description**	**Page**
DISABLE$DELETION	Makes an object immune to ordinary deletion.	74
ENABLE$DELETION	Makes an object susceptible to ordinary deletion. Required only if the object has had its deletion disabled.	81
FORCE$DELETE	Deletes objects whose disabling depths are zero or one.	92
OPERATING SYSTEM EXTENSIONS		
SETOSEXTENSION	Either enters the address of an entry (or function) procedure in the Interrupt Vector Table or deletes such an entry.	159
SIGNAL$EXCEPTION	Used by OS extensions to signal the occurrence of an exception.	169
REGIONS		
ACCEPT$CONTROL	Causes the calling task to accept control from the region only if control is immediately available. If control is not available, the calling task does not wait at the region.	7
CREATE$REGION	Creates a region and returns a token for it.	33
DELETE$REGION	Deletes a region.	58
RECEIVE$CONTROL	Causes the calling task to wait at the region until the task receives control.	121
SEND$CONTROL	Relinquishes control to the next task waiting at the region.	139

The ACCEPT$CONTROL system call requests immediate access to data protected by a region.

CAUTION

Tasks that use regions cannot be deleted while they access data protected by the region. Therefore, you should avoid using regions in Human Interface applications. If a task in a Human Interface application uses regions, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal) while the task is in the region.

```
CALL RQ$ACCEPT$CONTROL (region, except$ptr);
```

Input Parameter

region — A TOKEN for the target region.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The ACCEPT$CONTROL system call provides access to data protected by a region if access is immediately available. If access is not immediately available, the E$BUSY condition code is returned and the calling task remains ready.

Once a task has gained control of a region, it should not suspend or delete itself while in control of the region. Doing so will lock the region and prevent other tasks from gaining access.

Example

```
/*************************************************************************
 *  This example illustrates how the ACCEPT$CONTROL system call can be  *
 *  used to access data protected by a region.                           *
 *************************************************************************/

    DECLARE TOKEN                       LITERALLY 'SELECTOR';
                                        /* if your PL/M compiler does not
                                           support this variable type,
                                           declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE region$token                TOKEN;
    DECLARE priority$queue              LITERALLY '1'; /* tasks wait in
                                                          priority order */
    DECLARE status                      WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •   Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In order to access the data within a region, a task must know the   *
 *  token for that region.  In this example, the needed token is known  *
 *  because the calling task creates the region.                         *
 *************************************************************************/

    region$token = RQ$CREATE$REGION   (priority$queue,
                                       @status);
        •
        •   Typical PL/M-86 Statements
        •

/*************************************************************************
 *  At some point in the task, access is needed to the data protected   *
 *  by the region.  The calling task then invokes the ACCEPT$CONTROL    *
 *  system call and obtains access to the data if access is              *
 *  immediately available.                                               *
 *************************************************************************/

    CALL RQ$ACCEPT$CONTROL            (region$token,
                                       @status);
        •
        •   Typical PL/M-86 Statements
        •
```

```
/*************************************************************************
 *  When the task is ready to relinquish access to the data protected   *
 *  by the region, it invokes the SEND$CONTROL system call.             *
 *************************************************************************/

   CALL RQ$SEND$CONTROL              (@status);

      •
      •    Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$BUSY	0003H	Another task currently has access to the protected data.
E$CONTEXT	0005H	The calling task currently has access to the region in question.
E$EXIST	0006H	The region parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The region parameter is a token for an object that is not a region.

The ALTER$COMPOSITE system call replaces components of composite objects.

CAUTION

Composite objects require the creation of extension objects. Jobs that create extension objects cannot be deleted until all the extension objects are deleted. Therefore you should avoid creating composite objects in Human Interface applications. If a Human Interface application creates extension objects, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
CALL RQ$ALTER$COMPOSITE (extension, composite, component$index,
                         replacing$obj, except$ptr);
```

Input Parameters

extension	A TOKEN for the extension type object corresponding to the composite object being altered.
composite	A TOKEN for the composite object being altered.
component$index	A WORD whose value specifies the location (starting at location 1) in the component list of the component to be replaced.
replacing$obj	A TOKEN for the replacement component object. A value of SELECTOR$OF(NIL) or zero represents no object.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The ALTER$COMPOSITE system call changes a component of a composite object. Any component in a composite object can be replaced either with a token for another object or with a placeholding SELECTOR$OF(NIL) or zero that represents no object.

The component$index indicates the position of the target token in the list of components.

Example

See the example in section "The GET BYTE Procedure" of the *iRMX® I Nucleus User's Guide*.

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The composite parameter is not compatible with the extension parameter.
E$EXIST	0006H	The extension, composite, or object parameter(s) is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	One or both of the extension or composite parameters is a token for an object that is not of the correct object type.
E$PARAM	8004H	The component$index parameter refers to a nonexistent position in the component object list.

CATALOG$OBJECT

The CATALOG$OBJECT system call places an entry for an object in an object directory.

```
CALL RQ$CATALOG$OBJECT (job, object, name, except$ptr);
```

Input Parameters

job — A TOKEN that indicates where the object is to be cataloged.

- If SELECTOR$OF(NIL) or zero, it indicates that the object is to be cataloged in the object directory of the job to which the calling task belongs.
- If not SELECTOR$OF(NIL) or zero, it specifies the TOKEN for the job in whose object directory the object is to be cataloged.

object — A TOKEN for the object to be cataloged. A value of SELECTOR$OF(NIL) or zero for this parameter indicates that a null token is being cataloged.

name — A POINTER to a STRING containing the name under which the object is to be cataloged. The name must not be over 12 characters long. Each character can be a byte consisting of any value from 0 to 0FFH.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CATALOG$OBJECT system call places an entry for an object in the object directory of a specific job. The entry consists of both a name and a token for the object. There may be several such entries for a single object in a directory, because the object may have several names. (However, in a given object directory, only one object may be cataloged under a given name.) If another task is waiting, via the LOOKUP$OBJECT system call, for the object to be cataloged, that task is awakened when the entry is cataloged.

Example

```
/*************************************************************************
 *  This example illustrates how the CATALOG$OBJECT system call can be  *
 *  used to place an entry in an object directory.                       *
 *************************************************************************/

    DECLARE TOKEN                 LITERALLY 'SELECTOR';
                                  /* if your PL/M compiler does not
                                     support this variable type,
                                     declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE mbx$token             TOKEN;
    DECLARE mbx$flags             WORD;
    DECLARE job$token             TOKEN;
    DECLARE status                WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    mbx$flags = 0;                /* designates four objects to be queued
                                     on the high performance object
                                     queue;  designates a first-in/
                                     first-out task queue */

    job$token = SELECTOR$OF(NIL); /* indicates objects to be cataloged
                                     into the object directory of the
                                     calling task's job */
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The calling task creates an object, in this example a mailbox,      *
 *  before cataloging the object's token.                                *
 *************************************************************************/

    mbx$token = RQ$CREATE$MAILBOX (mbx$flags,
                                   @status);
       •
       •     Typical PL/M-86 Statements
       •
```

```
/*************************************************************************
 *  After creating the mailbox, the calling task catalogues the mailbox *
 *  token in the object directory of its own job.                        *
 *************************************************************************/

    CALL RQ$CATALOG$OBJECT        (job$token,
                                   mbx$token,
                                   @(3, 'MBX'),
                                   @status);
        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	At least one of the following is true: • The name being cataloged is already in the designated object directory. • The directory's maximum allowable size is 0.
E$EXIST	0006H	Either the job parameter, which is not SELECTOR$OF(NIL) or zero, or the object parameter is not a token for an existing object.
E$LIMIT	0004H	The designated object directory is full.
ENOTCONFIGURED	0008H	This system call is not part of the present operating system configuration.
E$PARAM	8004H	The first BYTE of the STRING pointed to by the name parameter contains a zero or a value greater than 12.
E$TYPE	8002H	The job parameter is a token for an object which is not a job or is not SELECTOR$OF(NIL) or zero.

The CREATE$COMPOSITE system call creates a composite object.

CAUTION

Composite objects require the creation of extension objects. Jobs that create extension objects cannot be deleted until all the extension objects are deleted. Therefore you should avoid creating composite objects in Human Interface applications. If a Human Interface application creates extension objects, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
composite = RQ$CREATE$COMPOSITE (extension, token$list, except$ptr);
```

Input Parameters

extension — A TOKEN for an extension type representing a license to create a composite object.

token$list — A POINTER to a structure of the form:

```
DECLARE
  token$list   STRUCTURE(
  num$slots     WORD,
  num$used      WORD,
  tokens(*)     TOKEN);
```

where:

num$slots — Number of elements in the component objects list that the composite object will contain. This number represents the maximum number of component objects that the composite object can handle. If num$slots is greater than num$used, the values in the extra elements should be set to zero.

num$used — Number of token elements to include in the composite. If num$used is greater than num$slots, the extra components are ignored.

tokens(*) — Tokens that will actually constitute the composite object.

Output Parameters

composite	A TOKEN to which the operating system returns the new composite token.
except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CREATE$COMPOSITE system call creates a composite object of the specified extension type. It accepts a list of tokens that specify the component objects and returns a token for the new composite object. The token$list parameter points to a structure that contains the list of tokens.

The first element in the token list (num$slots) indicates the number of tokens in the data structure; that is, the maximum number of component objects that can be part of a composite. Because you may need to specify that not all of the tokens in the token list be used in the composite object, the second element (num$used) indicates how many of those tokens are actually included in the composite. CREATE$COMPOSITE selects tokens to include beginning with the first token in the token list.

If the number of token elements to include in the composite (num$used) is less than the number of tokens in the token$list (num$slots), CREATE$COMPOSITE sets the remaining elements to zero.

If, on the other hand, the number of tokens in the token list (num$slots) is less than the number of token elements to include in the composite (num$used), CREATE$COMPOSITE ignores the extra components in the token list.

Example

See "The CREATE_RING_BUFFER Procedure" in the *iRMX® I Nucleus User's Guide*.

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The extension parameter or one or more of the non-zero token$list parameters is not a token for an existing object.
E$LIMIT	0004H	The calling task's job has already reached its object limit.

E$MEM	0002H	The memory available to the calling task's job is insufficient to create a composite.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The specified number of components is zero.
E$TYPE	8002H	The extension parameter is a token for an object that is not an extension object.

CREATE$EXTENSION

The CREATE$EXTENSION system call creates a new object type.

CAUTION

Jobs that create extension objects cannot be deleted until the extension object is deleted. Therefore, you should avoid creating extension objects in Human Interface applications. If a Human Interface application creates extension objects, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
extension = RQ$CREATE$EXTENSION (type$code, deletion$mailbox,
                                 except$ptr);
```

Input Parameters

type$code	A WORD containing the type code for the new type. The type code for the new type can be any value from 8000H to 0FFFFH and must not be currently in use. (The type codes 0 through 7FFFH are reserved for Intel products.)
deletion$mailbox	A TOKEN for the mailbox where objects of the new type are sent whenever the extension type or their containing job is deleted. A SELECTOR$OF(NIL) or zero value indicates no deletion mailbox is desired.

Output Parameters

extension	A TOKEN to which the operating system will return a token for the new type.
except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CREATE$EXTENSION system call returns a token for the newly created extension object type.

You can specify a deletion mailbox when the extension type is created. If you do, a task in your type manager for the new type must wait at the deletion mailbox for tokens of objects of the new extension type that are to be deleted. Tokens of objects are sent to the deletion mailbox for deletion either when their extension type is deleted or when their containing job is deleted; they are not sent there when being deleted by DELETE$COMPOSITE. The task servicing the deletion mailbox may do anything with the composite objects sent to it, but it must delete them.

If you do not want to specify a deletion mailbox, set the token value for deletion$mailbox to SELECTOR$OF(NIL) or zero. If the extension type has no deletion mailbox, composite objects of that type are deleted automatically, and the type manager is not informed. The advantage of having a deletion mailbox is that the type manager has the opportunity to do more than merely delete the composite objects.

A job containing a task that creates an extension object cannot be deleted until the extension object is deleted.

Example

See the example in the "Initialization" section of Chapter 10 in the *iRMX® I Nucleus User's Guide*.

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The calling task's job is being deleted.
E$EXIST	0006H	The deletion$mailbox parameter is not a token for an existing object.
E$LIMIT	0004H	The calling task's job has reached its object limit.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to create an extension.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

E$PARAM	8004H	The type$code parameter is invalid.
E$TYPE	8002H	The deletion$mailbox parameter is a token for an object that is not a mailbox.

The CREATE$JOB system call creates a job with a single task.

```
job = RQ$CREATE$JOB (directory$size, param$obj, pool$min, pool$max,
      max$objects, max$tasks, max$priority, except$handler,
      job$flags, task$priority, start$address, data$seg, stack$ptr,
      stack$size, task$flags, except$ptr);
```

Input Parameters

directory$size — A WORD specifying the maximum allowable number of entries a job can have in its object directory. The value zero indicates that no object directory is desired. The maximum value for this parameter is 0FF0H.

param$obj — A TOKEN indicating the presence or absence of a parameter object. See the *iRMX® I Nucleus User's Guide* for an explanation of parameter objects.

- If not SELECTOR$OF(NIL) or zero, it must contain a token for the new job's parameter object.
- If set to SELECTOR$OF(NIL) or zero, it indicates that the new job has no parameter object.

pool$min — A WORD that specifies the minimum allowable size of the new job's pool, in 16-byte paragraphs. The pool$min parameter is also the initial size of the new job's pool. Pool$min should be at least two paragraphs (20H bytes). If the stack$ptr parameter has a base value of SELECTOR$OF(NIL) or zero, pool$min should be at least two paragraphs plus the value of stack$size in 16-byte paragraphs.

pool$max — A WORD that indicates the maximum allowable size of the new job's memory in 16-byte paragraphs. If pool$max is smaller than pool$min, an E$PARAM error is returned.

max$objects — A WORD that specifies the maximum number of objects that the created job can own.

- If not 0FFFFH, contains the maximum number of objects, created by tasks in the new job, that can exist at one time.
- If 0FFFFH, indicates that there is no limit to the number of objects that tasks in the new job can create.

max$tasks — A WORD that specifies the maximum number of tasks that can exist simultaneously in the new job.

- If not 0FFFFH, it contains the maximum number of tasks that can exist simultaneously in the new job.
- If 0FFFFH, it indicates that there is no limit to the number of tasks that tasks in the new job can create.
- It cannot be zero. A value of 0H will produce the E$LIMIT exception.

max$priority — A BYTE that sets an upper limit on the priority of the tasks created in the new job.

- If not zero, it contains the maximum allowable priority of tasks in the new job. If max$priority exceeds the maximum priority of the parent job, an E$LIMIT error is returned.
- If zero, it indicates that the new job is to inherit the maximum priority attribute of its parent job.

except$handler — A POINTER to a structure of the following form:

```
STRUCTURE(
    EXCEPTION$HANDLER$PTR      POINTER,
    EXCEPTION$MODE             BYTE);
```

If exception$handler$ptr is not NIL, then it is a POINTER to the first instruction of the new job's own exception handler. If exception$handler$ptr is NIL, the new job's exception handler is the system default exception handler. In both cases, the exception handler for the new task becomes the default exception handler for the job.

The exception$mode indicates when control is to be passed to the exception handler. It is encoded as follows:

Value	When Control Passes To Exception Handler
0	Never
1	On programmer errors only
2	On environmental conditions only
3	On all exceptional conditions

job$flags

A WORD containing information that the Nucleus needs to create and maintain the job. The bits (where bit 15 is the high-order bit) have the following meanings:

Bits	Meaning
15-2	Reserved bits that should be set to zero.
1	If 0, then whenever a task in the new job or any of its descendant jobs makes a Nucleus system call, the Nucleus will check the parameters for validity. If 1, the Nucleus will not check the parameters of Nucleus system calls made by tasks in the new job. However, if any ancestor of the new job has been created with this bit set to 0, there will be parameter checking for the new job.
0	Reserved bit that should be set to zero.

task$priority

A BYTE that controls the priority of the new job's initial task.

- If not zero, it contains the priority of the new job's initial task. If the task$priority parameter is greater (numerically smaller) than the new job's maximum priority attribute, an E$PARAM error is returned.
- If zero, it indicates that the new job's initial task is to have a priority equal to the new job's maximum priority attribute.

start$address

A POINTER to the first instruction of the new job's initial task (the task created with the job).

data$seg

A TOKEN that specifies which data segment the new job's initial task is to use.

- If not SELECTOR$OF(NIL) or zero, it is the base address of the data segment of the new job's initial task.
- If SELECTOR$OF(NIL) or zero, it indicates that the new job's initial task assigns its own data segment. Refer to the *Guide to the iRMX® I Interactive Configuration Utility* and the *iRMX® I Interactive Configuration Utility Reference Manual* for more information about data segment allocation.

stack$ptr — A POINTER that specifies the location of the stack for the new job's initial task.

- If the base portion is not NIL or zero, the pointer points to the base of the user-provided stack of the new job's initial task.
- If the base portion is NIL or zero, it indicates that the Nucleus should allocate a stack for the new job's initial task. The length of the allocated segment is equal to the value of the stack$size parameter.

stack$size — A WORD containing the size, in bytes, of the stack of the new job's initial task. The stack size must be at least 16 bytes and should be at least 300 (decimal) bytes if the new task is going to make Nucleus system calls. The Nucleus increases specified values that are not multiples of 16 up to the next higher multiple of 16. Refer to the *iRMX® I Programming Techniques Manual* for further information on estimating stack sizes.

If you set the stack$ptr parameter to indicate a user-provided stack, setting the stack$size parameter causes the Nucleus to fill the user-provided stack with special characters which the iRMX 86 Debugger uses to detect stack overflow. Because of this situation, never specify a stack$size value that is larger than size of the user-provided stack.

task$flags — A WORD containing information that the Nucleus needs to create and maintain the job's initial task. The bits (where bit 15 is the high order bit) have the following meanings:

Bits	Meaning
15-1	Reserved bits which should be set to zero.
0	If one, the initial task contains floating-point instructions. These instructions require the Numeric Processor Extension (NPX) component for execution. If zero, the initial task does not contain floating-point instructions.

Output Parameters

job — A TOKEN to which the operating system will return a token for the new job.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CREATE$JOB system call creates a job with an initial task and returns a token for the job. The new job's parent is the calling task's job. The new job counts as one against the parent job's object limit. The new task counts as one against the new job's object and task limits. The new job's resources come from the parent job, as described in the *iRMX® I Nucleus User's Guide*. In particular, the max$task and max$objects values are deducted from the creating job's maximum task and maximum objects attributes, respectively.

Example

```
/*************************************************************************
 *  This example illustrates how the CREATE$JOB system call can be      *
 *  used.                                                                *
 *************************************************************************/

DECLARE TOKEN                    LITERALLY 'SELECTOR';
                                 /* if your PL/M compiler does not
                                    support this variable type,
                                    declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

INITIALTASK: PROCEDURE EXTERNAL;
END INITIALTASK;


    DECLARE job$token            TOKEN;
    DECLARE directory$size       WORD;
    DECLARE param$obj            TOKEN;
    DECLARE pool$min             WORD;
    DECLARE pool$max             WORD;
    DECLARE max$objects          WORD;
    DECLARE max$tasks            WORD;
    DECLARE max$priority         BYTE;
    DECLARE except$handler       POINTER;
    DECLARE job$flags            WORD;
    DECLARE task$priority        BYTE;
    DECLARE start$address        POINTER;
    DECLARE data$seg             TOKEN;
    DECLARE stack$pointer        POINTER;
    DECLARE stack$size           WORD;
    DECLARE task$flags           WORD;
    DECLARE status               WORD;
```

```
SAMPLEPROCEDURE:
    PROCEDURE;

    directory$size = 10;          /* max 10 entries in object directory */
    param$obj = 0;                /* new job has no parameter object    */
    pool$min = 01FFH;             /* min 01FFH, max 0FFFFH 16-byte      */
    pool$max = 0FFFFH;            /*  paragraphs in job pool            */
    max$objects = 0FFFFH;         /* no limit to number of objects     */
    max$tasks = 0AH;              /* 0AH tasks can exist simultaneously */
    max$priority = 0;             /* inherit max priority of parent     */
    except$handler = NIL;         /* use system default except handler  */
    job$flags = 0;                /* no flags set                       */
    task$priority = 0;            /* set initial task to max priority   */
    start$address = @INITIALTASK; /* points to first instruction of
                                     initial task                       */
    data$seg = SELECTOR$OF(NIL);  /* initial task sets up own data
                                     segment                            */
    stack$pointer = NIL;          /* Nucleus allocates stack            */
    stack$size = 512;             /* 512 bytes in stack of initial task */
    task$flags = 0;               /* no floating-point instructions     */

       •
       •   Typical PL/M-86 Statements
       •

 /*************************************************************************
 *  The calling task creates a job with an initial task labeled          *
 *  INITIALTASK.                                                         *
 *************************************************************************/
    job$token = RQ$CREATE$JOB     (directory$size,
                                   param$obj,
                                   pool$min,
                                   pool$max,
                                   max$objects,
                                   max$tasks,
                                   max$priority,
                                   except$handler,
                                   job$flags,
                                   task$priority,
                                   start$address,
                                   data$seg,
                                   stack$pointer,
                                   stack$size,
                                   task$flags,
                                   @status);
       •
       •   Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The job containing the calling task is in the process of being deleted.
E$EXIST	0006H	The param$obj parameter is not SELECTOR$OF(NIL) or zero and is not a token for an existing object.
E$LIMIT	0004H	At least one of the following is true: • max$objects is larger than the unused portion of the object allotment in the calling task's job. • max$tasks is larger than the unused portion of the task allotment in the calling task's job. • max$priority is greater (numerically smaller) than the maximum allowable task priority in the calling task's job. • directory$size is larger than 0FF0H. • The initial task would exceed the object limit in the new job. That is, the max$objects parameter is set to zero. • The initial task would exceed the task limit in the new job. The max$tasks parameter is set to zero.
E$MEM	0002H	At least one of the following is true: • The memory available to the new job is not sufficient to create a job descriptor (an internal data structure) and the object directory. • The memory available to the new job is not sufficient to satisfy the pool$min parameter. • The memory available to the new job is not sufficient to create the task as specified.

E$PARAM	8004H	At least one of the following is true: • pool$min is less than 16 + (number of paragraphs needed for the initial task and a system-allocated stack) + 5 (if the task uses the NPX component). • pool$min is greater than pool$max. • task$priority is unequal to zero and greater (numerically smaller) than max$priority. • stack$size is less than 16. • pool$max is zero. • the exception handler mode is not valid.

The CREATE$MAILBOX system call creates a mailbox.

```
mailbox = RQ$CREATE$MAILBOX (mailbox$flags, except$ptr);
```

Input Parameters

mailbox$flags — A WORD containing information about the new mailbox. The bits (where bit 15 is the high-order bit) have the following meanings:

Bits	Meaning
15-5	Reserved bits which should be set to zero.
4-1	A value that, when multiplied by four, specifies the number of objects that can be queued on the high performance object queue. Additional objects are queued on the slower, overflow queue. Four is the minimum size for the high performance queue; that is, specifying zero or one in these bits results in a high performance queue that holds four objects.
0	A bit that determines the queuing scheme for the task queue of the new mailbox, as follows:

Value	Queuing Scheme
0	First-in/first-out
1	Priority based

Output Parameters

mailbox — A TOKEN to which the operating system will return a token for the new mailbox.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

This system call creates a mailbox, an exchange that tasks can use to exchange tokens for objects. To send an object, use the token for that object as input to the SEND$MESSAGE system call. The RECEIVE$MESSAGE system call can be used to receive object tokens from a mailbox.

When you set up a mailbox, you can also specify the size of a high-performance queue that is associated with the mailbox. This queue is a block of memory that stores objects waiting to be sent or received. It is permanently assigned to the mailbox, even if no objects are queued there.

When more objects than the high-performance queue can hold are queued at a mailbox, the objects overflow into a slower queue whose size is limited only by the amount of memory in the job containing the mailbox. No space is allocated to the overflow queue until the space is needed to contain objects.

Setting the size of the high-performance queue involves a tradeoff between memory and performance. Setting a size that is too large wastes memory, because the unused portion of the queue is unavailable for other uses. But setting a size that is too small forces the Nucleus to create a temporary queue (and creating and deleting objects are relatively slow operations). You should set up a high-performance queue large enough to contain all the objects queued during normal operations, and let the overflow queue handle large overflows or unusual circumstances.

Example

```
/*************************************************************************
 *  This example illustrates how the CREATE$MAILBOX system call can be  *
 *  used.                                                                *
 *************************************************************************/

DECLARE TOKEN                   LITERALLY 'SELECTOR';
                                /* if your PL/M compiler does not
                                   support this variable type,
                                   declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE mbx$token           TOKEN;
    DECLARE mbx$flags           WORD;
    DECLARE status              WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    mbx$flags = 0;              /* designates four objects to be queued
                                   on the high performance object
                                   queue; designates a first-in/
                                   first-out task queue. */
   •
   •     Typical PL/M-86 Statements
   •

/*************************************************************************
 *  The token mbx$token is returned when the calling task invokes the   *
 *  CREATE$MAILBOX system call.                                          *
 *************************************************************************/

    mbx$token = RQ$CREATE$MAILBOX (mbx$flags,
                                   @status);
   •
   •     Typical PL/M-86 Statements
   •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$LIMIT	0004H	The calling task's job has already reached its object limit.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to create a mailbox.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The CREATE$REGION system call creates a region.

CAUTION

Tasks that use regions cannot be deleted while they are in control of the region. Using regions in a Human Interface application task can cause situations where the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal) while the task is in the region. Therefore, you should avoid using regions in Human Interface applications.

```
region = RQ$CREATE$REGION (region$flags, except$ptr);
```

Input Parameters

region$flags	A WORD that specifies the queuing protocol of the new region. If the low-order bit equals zero, tasks await access in FIFO order. If the low-order bit equals one, tasks await access in priority order. The other bits in the WORD are reserved and should be set to zero.

Output Parameters

region	A TOKEN to which the operating system will return a token for the new region.
except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CREATE$REGION system call creates a region and returns a token for the region.

Example

```
/*****************************************************************
 * This example illustrates how the CREATE$REGION system call    *
 * can be  used.                                                 *
 *****************************************************************/
   DECLARE TOKEN       LITERALLY 'SELECTOR';
                       /* if your PL/M compiler does not
                          support this variable type,
                          declare TOKEN a WORD */

   /* NUCLUS.EXT declares all nucleus system calls */
   $INCLUDE(:RMX:INC/NUCLUS.EXT)

   DECLARE region$token    TOKEN;
   DECLARE priority$queue  LITERALLY '1';
                           /* tasks wait in priority order */
   DECLARE status          WORD;

SAMPLEPROCEDURE:
   PROCEDURE;

      •
      •     Typical PL/M-86 Statements
      •

/*****************************************************************
 *  The token region$token is returned when the calling task     *
 *  invokes the CREATE$REGION system call.                       *
 *****************************************************************/

   region$token = RQ$CREATE$REGION  (priority$queue,
                                     @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$LIMIT	0004H	The calling task's job has reached its object limit.
E$MEM	0002H	The memory pool of the calling task's job does not contain a sufficiently large block to satisfy the request.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

CREATE$SEGMENT

The CREATE$SEGMENT system call creates a segment.

```
segment = RQ$CREATE$SEGMENT (size, except$ptr);
```

Input Parameter

size — A WORD that specifies the size of the requested segment.

- If not zero, it contains the size, in bytes, of the requested segment. If the size parameter is not a multiple of 16, it will be rounded up to the nearest higher multiple of 16 before the request is processed by the Nucleus.
- If zero or 0FFFFH, it indicates that the size of the request is 65536 (64K) bytes.

Output Parameters

segment — A TOKEN to which the operating system will return a token for the new segment.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CREATE$SEGMENT system call creates a segment and returns the token for it. The memory for the segment is taken from the free portion of the memory pool of the calling task's job, unless borrowing from the parent job is both necessary and possible. The new segment counts as one against the object limit of the calling task's job.

To gain access into the segment, you should base an array or structure on a pointer by setting the base portion equal to the segment's TOKEN and the offset portion equal to zero. If you have a PL/M-86 compiler that supports the SELECTOR data type, you can accomplish the same thing by basing the array or structure on the SELECTOR.

Example

```
MAINPROC: DO;
/*************************************************************************
 *  This example illustrates how the CREATE$SEGMENT system call can be  *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN                          LITERALLY 'SELECTOR';
                                        /* if your PL/M compiler does not
                                           support this variable type,
                                           declare TOKEN a WORD */

    /* NUCLUS.EXT declares all nucleus system calls */
    $INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE seg$token                   TOKEN;
    DECLARE seg$size                    WORD;
    DECLARE status                      WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    seg$size = 0100H;                   /* the size of the requested segment
                                           is 256 bytes */
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The token seg$token is returned when the calling task invokes the   *
 *  CREATE$SEGMENT system call.                                          *
 *************************************************************************/

    seg$token = RQ$CREATE$SEGMENT (seg$size, @status);

       •
       •     Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
END MAINPROC;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$LIMIT	0004H	The calling task's job has already reached its object limit.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to create a segment of the specified size.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The CREATE$SEMAPHORE system call creates a semaphore.

```
semaphore = RQ$CREATE$SEMAPHORE (initial$value, max$value,
                                 semaphore$flags, except$ptr);
```

Input Parameters

initial$value — A WORD containing the initial number of units to be in the custody of the new semaphore.

max$value — A WORD containing the maximum number of units over which the new semaphore is to have custody at any given time. If max$value is zero, an E$PARAM error is returned.

semaphore$flags — A WORD containing information about the new semaphore. The low-order bit determines the queuing scheme for the new semaphore's task queue:

Value	Queuing Scheme
0	First-in/first-out
1	Priority based

The remaining bits in semaphore$flags are reserved for future use and should be set to zero.

Output Parameters

semaphore — A TOKEN to which the operating system will return a token for the new semaphore.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CREATE$SEMAPHORE system call creates a semaphore and returns a token for it. The created semaphore counts as one against the object limit of the calling task's job.

Example

```
/*************************************************************************
 *  This example illustrates how the CREATE$SEMAPHORE system call can   *
 *  be used.                                                            *
 *************************************************************************/

    DECLARE TOKEN                   LITERALLY 'SELECTOR';
                                    /* if your PL/M compiler does not
                                       support this variable type,
                                       declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE sem$token               TOKEN;
    DECLARE init$value              WORD;
    DECLARE max$value               WORD;
    DECLARE sem$flags               WORD;
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    init$value = 1;                 /* the new semaphore has one initial
                                       unit */
    max$value = 10H;                /* the new semaphore can have a maximum
                                       of 16 units */
    sem$flags = 0;                  /* designates a first-in/
                                       first-out task queue */
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The token sem$token is returned when the calling task invokes the   *
 *  CREATE$SEMAPHORE system call.                                       *
 *************************************************************************/

    sem$token = RQ$CREATE$SEMAPHORE  (init$value,
                                      max$value,
                                      sem$flags,
                                      @status);
       •
       •     Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$LIMIT	0004H	The calling task's job has already reached its object limit.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to create a semaphore.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	At least one of the following is true: • The initial$value parameter is larger than the max$value parameter. • The max$value parameter is 0.

CREATE$TASK

The CREATE$TASK system call creates a task.

```
task = RQ$CREATE$TASK (priority, start$address, data$seg, stack$ptr,
       stack$size, task$flags, except$ptr);
```

Input Parameters

priority — A BYTE that specifies the priority of the new task.

- If not zero, it contains the priority of the new task. The priority parameter must not exceed the maximum allowable priority of the calling task's job. If it does, an E$PARAM error is returned.
- If zero, it indicates that the new task's priority is to equal the maximum allowable priority of the calling task's job.

start$address — A POINTER to the first instruction of the new task.

data$seg — A TOKEN that specifies the new task's data segment.

- If not SELECTOR$OF(NIL) or zero, the TOKEN contains the base address of the new task's data segment.
- If set to SELECTOR$OF(NIL) or zero, the TOKEN indicates that the new task assigns its own data segment. Refer to the *Guide To The iRMX® I Interactive Configuration Utility* and the *iRMX® I Interactive Configuration Utility Reference Manual* for further information on data segment allocation.

stack$ptr — A POINTER that specifies the location of the stack for the new task.

- If the base portion is not NIL or zero, the Nucleus uses the sum of the offset portion and the stack$size parameter (declared during the call to CREATE$TASK) as the value of the SP register (the stack pointer).
- If the base portion is NIL or zero, the Nucleus allocates a stack to the new task. The length of the stack is equal to the value of the stack$size parameter.

stack$size — A WORD containing the size, in bytes, of the new task's stack segment. The stack size must be at least 16 bytes. The Nucleus increases specified values that are not multiples of 16 up to the next higher multiple of 16.

The stack size should be at least 300 bytes if the new task is going to make Nucleus system calls. Refer to the *iRMX® I Programming Techniques Manual* for further information on assigning stack sizes.

If you set the stack$ptr parameter to indicate a user-provided stack, setting the stack$size parameter causes the Nucleus to fill the user-provided stack with special characters which the iRMX I Debugger uses to detect stack overflow. Because of this situation, never specify a stack$size value that is larger than size of the user-provided stack.

task$flags — A WORD containing information that the Nucleus needs to create and maintain the task. The bits (where bit 15 is the high-order bit) have the following meanings:

Bits	Meaning
15-1	Reserved bits which should be set to zero
0	If one, the task contains floating-point instructions. These instructions require the NPX component for execution. If zero, the task does not contain floating-point instructions.

Output Parameters

task — A TOKEN to which the operating system will return a token for the new task.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The CREATE$TASK system call creates a task and returns a token for it. The new task counts as one against the object and task limits of the calling task's job. Attributes of the new task are initialized upon creation as follows:

- priority: as specified in the call.
- execution state: ready.
- suspension depth: 0.
- containing job: the job that contains the calling task.
- exception handler: the exception handler of the containing job.
- exception mode: the exception mode of the containing job.

Example

```
/*************************************************************************
 *  This example illustrates how the CREATE$TASK system call can be      *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                        /* if your PL/M compiler does not
                           support this variable type,
                           declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

TASKCODE: PROCEDURE EXTERNAL;
END TASKCODE;

    DECLARE task$token          TOKEN;
    DECLARE priority$level$66   LITERALLY '66';
    DECLARE start$address       POINTER;
    DECLARE data$seg            TOKEN;
    DECLARE stack$pointer       POINTER;
    DECLARE stack$size$512      LITERALLY '512';
                                /* new task's stack size is 512 bytes */
    DECLARE task$flags          WORD;
    DECLARE status              WORD;
```

```
SAMPLEPROCEDURE:
    PROCEDURE;

    start$address = @TASKCODE;    /* first instruction of the new task */
    data$seg = SELECTOR$OF(NIL); /* task sets up own data segment */
    stack$pointer = NIL;          /* automatic stack allocation  */
    task$flags = 0;               /* designates no floating-point instructions */

       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The task (whose code is labeled TASKCODE) is created when the       *
 *  calling task invokes the CREATE$TASK system call.                   *
 *************************************************************************/

    task$token = RQ$CREATE$TASK   (priority$level$66,
                                   start$address,
                                   data$seg,
                                   stack$pointer,
                                   stack$size$512,
                                   task$flags,
                                   @status);

       •
       •     Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$LIMIT	0004H	The calling task's job has already reached its object limit or task limit.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to create a task as specified (task descriptor, stack, and possibly NPX area).
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	At least one of the following is true: • The stack$size parameter is less than 16. • The priority parameter is nonzero and greater (numerically smaller) than the maximum allowable priority for tasks in the calling task's job.

The DELETE$COMPOSITE system call deletes a composite object.

CAUTION

Composite objects require the creation of extension objects. Jobs that create extension objects cannot be deleted until all the extension objects are deleted. Therefore you should avoid creating composite objects in Human Interface applications. If a Human Interface application creates extension objects, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
CALL RQ$DELETE$COMPOSITE (extension, composite, except$ptr);
```

Input Parameters

extension	A TOKEN for the extension type used as a license to create the composite object to be deleted.
composite	A TOKEN for the composite object to be deleted.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$COMPOSITE system call deletes the specified composite object, but not its component objects.

Example

See the example in the "Initialization" section of Chapter 10 in the *iRMX® I Nucleus User's Guide*.

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The extension type does not match the composite parameter.
E$EXIST	0006H	One or both of the extension or composite parameters is not a token for an existing object.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to complete this operation.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	One or both of the extension or composite parameters is a token for an object that is not of the correct type.

The DELETE$EXTENSION system call deletes an extension object and all composites of that type.

CAUTION

Jobs that create extension objects cannot be deleted until the extension object is deleted. Therefore, you should avoid creating extension objects in Human Interface applications. If a Human Interface application creates extension objects, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
CALL RQ$DELETE$EXTENSION (extension, except$ptr);
```

Input Parameter

extension	A TOKEN for the extension object to be deleted.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$EXTENSION system call deletes the specified extension object and all composite objects of that type, making the corresponding type code available for reuse.

If you specified a deletion mailbox when you created the extension, all the composite objects created subsequently with that extension type are sent to the deletion mailbox. You must delete all the composite objects sent to the deletion mailbox. The DELETE$EXTENSION system call is not completed until all of the composite objects have been deleted.

If an extension has no deletion mailbox, composite objects created by the CREATE$EXTENSION system call are deleted without informing the type manager.

The job containing the task that created the extension object cannot be deleted until the extension object is deleted.

Example

```
/*************************************************************************
 *  This example illustrates how the DELETE$EXTENSION system call can   *
 *  be used.                                                            *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE ext$token         TOKEN;
    DECLARE type$code         WORD;
    DECLARE delete$mbx$token  TOKEN;
    DECLARE status            WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    type$code = 08000h;                    /*  this is a valid value for a
                                               new type  */

    delete$mbx$token = SELECTOR$OF(NIL);  /*  No deletion mailbox is desired
                                               for this new type  */

/*************************************************************************
 *  To delete an extension, a task must know the token for that         *
 *  extension.  In this example, the needed token is known because the  *
 *  calling task creates the extension.                                 *
 *************************************************************************/

    ext$token = RQ$CREATE$EXTENSION  (type$code,
                                      delete$mbx$token,
                                      @status);
        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  When the extension is no longer needed, it may be deleted by any    *
 *  task that knows the token for the extension.                        *
 *************************************************************************/

    CALL RQ$DELETE$EXTENSION       (ext$token,
                                    @status);


END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The extension parameter is not a token for an existing object.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to complete this operation.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The extension parameter is a token for an object that is not an extension object.

DELETE$JOB

The DELETE$JOB system call deletes a job.

```
CALL RQ$DELETE$JOB (job, except$ptr);
```

Input Parameter

job	A TOKEN for the job to be deleted. A value of SELECTOR$OF(NIL) or zero specifies the calling task's job.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$JOB system call deletes the specified job, all of the job's tasks, and all objects created by the tasks. Exceptions are that jobs and extension objects (see the *iRMX® I Nucleus User's Guide*) created by tasks in the target job must be deleted prior to the call to DELETE$JOB. Information concerning the descendants of a job can be obtained by invoking the OFFSPRING system call.

During the deletion of any interrupt tasks owned by the job, the interrupt levels associated with those tasks are reset. The levels that do not have interrupt tasks associated with them will not be reset during an RQ$DELETE$JOB call.

During deletion, all resources that the target job had borrowed from its parent are returned.

Deleting a job causes a credit of one toward the object total of the parent job. Also, the maximum tasks and maximum objects attributes of the deleted job are credited to the current tasks and current objects attributes, respectively, of the parent job.

Example

```
/*************************************************************************
 *  This example illustrates how the DELETE$JOB system call can be      *
 *  used to delete the calling task's job.                               *
 *************************************************************************/

    DECLARE TOKEN                   LITERALLY 'SELECTOR';
                                    /* if your PL/M compiler does not
                                       support this variable type,
                                       declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE calling$tasks$job       LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  If you set the selection parameter to SELECTOR$OF(NIL),              *
 *  the DELETE$JOB system call will delete the calling task's job.       *
 *************************************************************************/

    CALL RQ$DELETE$JOB              (calling$tasks$job,
                                     @status);

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	At least one of the following is true: • There are undeleted jobs or extension objects (see the *iRMX® I Nucleus User's Guide*) which have been created by tasks in the target job. • The deleting task has access to data guarded by a region contained in the job to be deleted. (Refer to the *iRMX® I Nucleus User's Guide* for information concerning regions.)
E$EXIST	0006H	The job parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The job parameter is a token for an object that is not a job.

The DELETE$MAILBOX system call deletes a mailbox.

```
CALL RQ$DELETE$MAILBOX (mailbox, except$ptr);
```

Input Parameter

mailbox	A TOKEN for the mailbox to be deleted.

Output Parameters

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$MAILBOX system call deletes the specified mailbox. If any tasks are queued at the mailbox at the moment of deletion, they are awakened with an E$EXIST exceptional condition. If there is a queue of object tokens at the moment of deletion, the queue is discarded. Deleting the mailbox counts as a credit of one toward the object total of the containing job.

Example

```
/*************************************************************************
 *  This example illustrates how the DELETE$MAILBOX system call can be  *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN                   LITERALLY 'SELECTOR';
                                    /* if your PL/M compiler does not
                                       support this variable type,
                                       declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE mbx$token               TOKEN;
    DECLARE mbx$flags               WORD;
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    mbx$flags = 0;                  /* designates four objects to be queued
                                       on the high performance object
                                       queue;  designates a first-in/
                                       first-out task queue */
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  In order to delete a mailbox, a task must know the token for that   *
 *  mailbox.  In this example, the needed token is known because the    *
 *  calling task creates the mailbox.                                    *
 *************************************************************************/

    mbx$token = RQ$CREATE$MAILBOX (mbx$flags,
                                   @status);
       •
       •     Typical PL/M-86 Statements
       •
```

```
/*************************************************************************
 *  When the mailbox is no longer needed, it may be deleted by any task *
 *  that knows the token for the mailbox.                                *
 *************************************************************************/

    CALL RQ$DELETE$MAILBOX        (mbx$token,
                                   @status);
        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	Either the mailbox parameter is not a token for an existing object or it represents a mailbox whose job is in the process of being deleted.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The mailbox parameter is a token for an object which is not a mailbox.

The DELETE$REGION system call deletes a region.

CAUTION

Tasks which use regions cannot be deleted while they access data protected by the region. Therefore, you should avoid using regions in Human Interface applications. If a task in a Human Interface application uses regions, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal) while the task is in the region.

```
CALL RQ$DELETE$REGION (region, except$ptr);
```

Input Parameter

region	A TOKEN for the region to be deleted.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$REGION system call deletes a region. If a task that has access to data protected by the region requests that the region be deleted, the task receives an E$CONTEXT exceptional condition. If a task requests deletion while another task has access, deletion is delayed until access is surrendered. If two more more tasks request deletion of a region that another task has access to, a deadlock results. A deadlock also results when a task attempts to delete another task that is in the process of trying to delete an occupied region. When the region is deleted, any waiting tasks awaken with an E$EXIST exceptional condition.

Example

```
/*************************************************************************
 *  This example illustrates how the DELETE$REGION system call can be   *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE region$token  TOKEN;
    DECLARE priority$queue   LITERALLY '1'; /* tasks wait in
                                               priority order */
    DECLARE status     WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        .
        .     Typical PL/M-86 Statements
        .

/*************************************************************************
 *  In order to delete a region, a task must know the token for that    *
 *  region.  In this example, the needed token is known because the     *
 *  calling task creates the region.                                     *
 *************************************************************************/

    region$token = RQ$CREATE$REGION    (priority$queue,
                                        @status);
        .
        .     Typical PL/M-86 Statements
        .

/*************************************************************************
 *  When the region is no longer needed, it may be deleted by any task  *
 *  that knows the token for the region.                                 *
 *************************************************************************/

    CALL RQ$DELETE$REGION (region$token,
                           @status);
        .
        .     Typical PL/M-86 Statements
        .

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The deletion is being requested by a task that currently holds access to data protected by the region.
E$EXIST	0006H	The region parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The region parameter is a token for an object that is not a region.

The DELETE$SEGMENT system call deletes a segment.

```
CALL RQ$DELETE$SEGMENT (segment, except$ptr);
```

Input Parameter

segment	A TOKEN for the segment to be deleted.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$SEGMENT system call deletes iRMX I segments created via CREATE$SEGMENT. When deleting iRMX I segments, this system call returns the specified segment to the memory pool from which it was allocated. The deleted segment counts as a credit of one toward the object total of the containing job.

Example

```
/*************************************************************************
 *  This example illustrates how the DELETE$SEGMENT system call can be  *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE seg$token TOKEN;
    DECLARE size      WORD;
    DECLARE status    WORD;

SAMPLEPROCEDURE:
    PROCEDURE;
    size = 64;         /* designates new segment to contain
                          64 bytes */
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  In order to delete a segment, a task must know the token for that   *
 *  segment.  In this example, the needed token is known because the    *
 *  calling task creates the segment.                                   *
 *************************************************************************/

    seg$token = RQ$CREATE$SEGMENT  (size,
                                    @status);
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  When the segment is no longer needed, it may be deleted by any task *
 *  that knows the token for the segment.                               *
 *************************************************************************/

    CALL RQ$DELETE$SEGMENT         (seg$token,
                                    @status);
       •
       •     Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	At least one of the following is true: • The segment parameter is not a token for an existing object. • The segment parameter represents a segment whose job is being deleted.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The segment parameter is a token for an object that is not a segment.

DELETE$SEMAPHORE

The DELETE$SEMAPHORE system call deletes a semaphore.

```
CALL RQ$DELETE$SEMAPHORE (semaphore, except$ptr);
```

Input Parameter

semaphore	A TOKEN for the semaphore to be deleted.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$SEMAPHORE system call deletes the specified semaphore. If there are tasks in the semaphore's queue at the moment of deletion, they are awakened with an E$EXIST exceptional condition. The deleted semaphore counts as a credit of one toward the object total of the containing job.

Example

```
/*************************************************************************
 *  This example illustrates how the DELETE$SEMAPHORE system call can   *
 *  be used.                                                            *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE sem$token   TOKEN;
    DECLARE init$value  WORD;
    DECLARE max$value   WORD;
    DECLARE sem$flags   WORD;
    DECLARE status      WORD;


SAMPLEPROCEDURE:
    PROCEDURE;

    init$value = 1;    /* the new semaphore has one initial
                          unit */
    max$value = 10H;   /* the new semaphore can have a maximum
                          of 16 units */
    sem$flags = 0;     /* designates a first-in/
                          first-out task queue */
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  In order to delete a semaphore, a task must know the token for that *
 *  semaphore.  In this example, the needed token is known because the  *
 *  calling task creates the semaphore.                                 *
 *************************************************************************/

    sem$token = RQ$CREATE$SEMAPHORE  (init$value,
                                      max$value,
                                      sem$flags,
                                      @status);
       •
       •     Typical PL/M-86 Statements
       •
```

```
/*************************************************************************
 *  When the semaphore is no longer needed, it may be deleted by any    *
 *  task that knows the token for the semaphore.                         *
 *************************************************************************/

   CALL RQ$DELETE$SEMAPHORE         (sem$token,
                                     @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	One of the following is true: • The semaphore parameter is not a token for an existing object • The semaphore parameter represents a semaphore whose job is being deleted.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The semaphore parameter is a token for an object that is not a semaphore.

The DELETE$TASK system call deletes a task.

```
CALL RQ$DELETE$TASK (task, except$ptr);
```

Input Parameter

task — A TOKEN that identifies the task to be deleted.

- If not SELECTOR$OF(NIL) or zero, the TOKEN must contain a token for the task to be deleted.
- If SELECTOR$OF(NIL) or zero, this parameter indicates that the calling task should be deleted.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DELETE$TASK system call deletes the specified task from the system and from any queues in which the task was waiting. DELETE$TASK allows any task currently within a region to exit the region before being deleted. Deleting the task counts as a credit of one toward the object total of the containing job. It also counts as a credit of one toward the containing job's task total.

You cannot successfully delete an interrupt task by invoking this system call. Any attempt to do so results in an E$CONTEXT exceptional condition. To delete an interrupt task, invoke the RESET$INTERRUPT system call.

Example

```
/*************************************************************************
 *  This example illustrates how the DELETE$TASK system call can be     *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

TASKCODE: PROCEDURE EXTERNAL;
END TASKCODE;

    DECLARE task$token          TOKEN;
    DECLARE priority$level$66   LITERALLY '66';
    DECLARE start$address       POINTER;
    DECLARE data$seg            TOKEN;
    DECLARE stack$pointer       POINTER;
    DECLARE stack$size$512      LITERALLY '512';  /* new task's stack
                                                     size is 512 bytes */
    DECLARE task$flags          WORD;
    DECLARE status              WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    start$address = @TASKCODE;      /* points to first instruction of
                                       the new task */
    data$seg = SELECTOR$OF(NIL);    /* task sets up own data segment */
    stack$pointer = NIL;            /* automatic stack allocation  */
    task$flags = 0;                 /* indicates no floating-point
                                       instructions */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  In order to delete a task, a task must know the token for that      *
 *  task.  In this example, the needed token is known because the       *
 *  calling task creates the new task (The task's code is labeled       *
 *  TASKCODE).                                                          *
 *************************************************************************/

    task$token = RQ$CREATE$TASK  (priority$level$66,
                                  start$address,
                                  data$seg,
                                  stack$pointer,
                                  stack$size$512,
                                  task$flags,
                                  @status);
        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  The calling task has created a task (whose code is labeled          *
 *  TASKCODE) which is not an interrupt task.  When this task is no     *
 *  longer needed, it may be deleted by any task that knows its token.  *
 *************************************************************************/

   CALL RQ$DELETE$TASK     (task$token,
                            @status);

        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The task parameter is a token for an interrupt task.
E$EXIST	0006H	One of the following conditions has occurred: • The task parameter is not a token for an existing object. • The task parameter represents a task whose job is being deleted. • More than one task is trying to delete a task which is in a region.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The task parameter is a token for an object which is not a task.

The DISABLE system call disables an interrupt level.

```
CALL RQ$DISABLE (level, except$ptr);
```

Input Parameter

level — A WORD that specifies an interrupt level encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call. All exceptional conditions must be processed in-line. Control does not pass to an exception handler.

Description

The DISABLE system call disables the specified interrupt level. It has no effect on other levels. To be disabled, a level must have an interrupt handler assigned to it. Otherwise, the Nucleus returns an E$CONTEXT exception code.

You must not disable the level reserved for the system clock. You determine this level during system configuration (refer to the *iRMX® I Interactive Configuration Utility Reference Manual*).

Example

```
/*************************************************************************
 *  This example illustrates how the DISABLE system call can be used to *
 *  disable an interrupt level.                                          *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

INTERRUPTHANDLER: PROCEDURE INTERRUPT 63 EXTERNAL;
END INTERRUPTHANDLER;

    DECLARE interrupt$level$7     LITERALLY '0000000001111000B';
                                  /* specifies master interrupt level 7 */
    DECLARE interrupt$task$flag   BYTE;
    DECLARE interrupt$handler     POINTER;
    DECLARE data$segment          TOKEN;
    DECLARE status                WORD;
    DECLARE job$token             TOKEN;

SAMPLEPROCEDURE:
    PROCEDURE;

    interrupt$task$flag = 0;          /* indicates no interrupt task on level
                                         7 */

    data$segment = SELECTOR$OF(NIL); /* indicates that interrupt handler
                                        will load its own data segment */

    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                                     /* points to first instruction of
                                        interrupt handler */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  An interrupt level must have an interrupt handler or an interrupt   *
 *  task assigned to it.  Invoking the SET$INTERRUPT system call, the   *
 *  calling task assigns INTERRUPTHANDLER to interrupt level 7.         *
 *************************************************************************/

    CALL RQ$SET$INTERRUPT          (interrupt$level$7,
                                   interrupt$task$flag,
                                   interrupt$handler,
                                   data$segment,
                                   @status);

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
*  The SET$INTERRUPT system call enabled interrupt level 7.  In order  *
*  to disable level 7, the calling task invokes the DISABLE system     *
*  call.                                                               *
*************************************************************************/

    CALL RQ$DISABLE                (interrupt$level$7,
                                    @status);

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The level indicated by the level parameter is already disabled or has no interrupt handler assigned to it.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The level parameter is invalid.

The DISABLE$DELETION system call makes an object immune to ordinary deletion.

CAUTION

DISABLE$DELETION makes an object immune to ordinary deletion by increasing the disabling depth of an object. If a Human Interface application contains objects whose disabling depths are greater than one, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal). Therefore you should not use DISABLE$DELETION (and have no need to use ENABLE$DELETION or FORCE$DELETE) in Human Interface applications.

```
CALL RQ$DISABLE$DELETION (object, except$ptr);
```

Input Parameter

object	A TOKEN for the object whose deletion is to be disabled.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The DISABLE$DELETION system call increases by one the disabling depth of an object, making it immune to ordinary deletion. If an object's disabling depth is two or greater, it is also immune to forced deletion. If a task attempts to delete the object while it is immune, the task sleeps until the immunity is removed. At that time, the object is deleted and the task is awakened.

The ENABLE$DELETION system call is used to decrease the disabling depth of an object, making it susceptible to ordinary deletion.

NOTES

If an object within a job has had its deletion disabled, then the containing job cannot be deleted until that object has had its deletion re-enabled.

Disabling deletion of a suspended task causes the calling task to hang until the suspended task is resumed.

An attempt to raise an object's disabling depth above 255 causes an E$LIMIT exceptional condition.

Example

```
/*************************************************************************
 *  This example illustrates how the DISABLE$DELETION system call can   *
 *  be used to make an object immune to ordinary deletion.              *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE task$token              TOKEN;
    DECLARE calling$task            LITERALLY '0';
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •       Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In this example the calling task will be the object to become       *
 *  immune to ordinary deletion.  The GET$TASK$TOKEN is invoked by the  *
 *  calling task to obtain its own token.                               *
 *************************************************************************/

    task$token = RQ$GET$TASK$TOKENS  (calling$task,
                                      @status);

        •
        •       Typical PL/M-86 Statements
        •

/*************************************************************************
 *  Using its own token, the calling task invokes the DISABLE$DELETION  *
 *  system call to increase its own disabling depth by one.  This makes *
 *  the calling task immune to ordinary deletion.                       *
 *************************************************************************/
```

```
    CALL RQ$DISABLE$DELETION      (task$token, @status);

        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The object parameter is not a token for an existing object.
E$LIMIT	0004H	The object's disabling depth is already 255.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The ENABLE system call enables an interrupt level.

```
CALL RQ$ENABLE (level, except$ptr);
```

Input Parameter

level — A WORD that specifies an interrupt level that is encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The ENABLE system call enables the specified interrupt level. The level must have an interrupt handler assigned to it. A task must not enable the level associated with the system clock.

Example

```
/*************************************************************************
 *  This example illustrates how the ENABLE system call can be used to  *
 *  enable an interrupt level.                                          *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/* NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

INTERRUPTHANDLER: PROCEDURE INTERRUPT 63 EXTERNAL;
END INTERRUPTHANDLER;

    DECLARE interrupt$level$7     LITERALLY '0000000001111000B';
                                  /* specifies master interrupt level 7*/
    DECLARE interrupt$task$flag   BYTE;
    DECLARE interrupt$handler     POINTER;
    DECLARE data$segment          TOKEN;
    DECLARE status                WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    interrupt$task$flag = 0;          /* indicates no interrupt task on level
                                         7 */

    data$segment = SELECTOR$OF(NIL); /* indicates that interrupt handler
                                        will load its own data segment */

    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                                     /* points to first instruction of
                                        interrupt handler */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  An interrupt level must have an interrupt handler or an interrupt   *
 *  task assigned to it.  Invoking the SET$INTERRUPT system call, the   *
 *  calling task assigns INTERRUPTHANDLER to interrupt level 7.         *
 *************************************************************************/

   CALL RQ$SET$INTERRUPT          (interrupt$level$7,
                                   interrupt$task$flag,
                                   interrupt$handler,
                                   data$segment,
                                   @status);
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  The SET$INTERRUPT system call enabled interrupt level 7.  In order  *
 *  to illustrate the use of the ENABLE system call, interrupt level 7  *
 *  must first be disabled.  The calling task invokes the DISABLE       *
 *  system call to disable interrupt level 7.                           *
 *************************************************************************/

   CALL RQ$DISABLE                (interrupt$level$7,
                                   @status);

/*************************************************************************
 *  When an interrupt level needs to be enabled, a task must invoke the *
 *  ENABLE system call.                                                 *
 *************************************************************************/

   CALL RQ$ENABLE                 (interrupt$level$7,
                                   @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	At least one of the following is true: • A non-interrupt task tried to enable a level that was already enabled. • There is not an interrupt handler assigned to the specified level. • There has been an interrupt overflow on the specified level.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The level parameter is invalid.

The ENABLE$DELETION system call enables the deletion of objects that have had deletion disabled.

CAUTION

Human Interface applications should not use the DISABLE$DELETION system call, and therefore, have no need to use the ENABLE$DELECTION and FORCE$DELETE system calls. This is because DISABLE$DELETION increases the disabling depth of an object. A Human Interface application containing objects whose disabling depths are greater than one cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
CALL RQ$ENABLE$DELETION (object, except$ptr);
```

Input Parameter

object	A TOKEN for the object whose deletion is to be enabled.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The ENABLE$DELETION system call decreases by one the disabling depth of an object. If there is a pending deletion request against the object, and the ENABLE$DELETION call makes the object eligible for deletion, the object is deleted and the task which made the deletion request is awakened.

Example

```
/*************************************************************************
 *  This example illustrates how the ENABLE$DELETION system call can be *
 *  used to enable the deletion of a task that had been deletion        *
 *  disabled.                                                           *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE task$token            TOKEN;
    DECLARE calling$task          LITERALLY '0';
    DECLARE status                WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  In this example the calling task will be the object to become       *
 *  immune to deletion.  The GET$TASK$TOKEN is invoked by the calling   *
 *  task to obtain its own token.                                       *
 *************************************************************************/

    task$token = RQ$GET$TASK$TOKENS     (calling$task,
                                         @status);
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  Using its own token, the calling task invokes the DISABLE$DELETION  *
 *  system call to increase its own disabling depth by one.  This makes *
 *  the calling task immune to ordinary deletion.                        *
 *************************************************************************/

    CALL RQ$DISABLE$DELETION       (task$token,
                                    @status);
       •
       •     Typical PL/M-86 Statements
       •
```

```
/*************************************************************************
 *  In order to allow itself to be deleted, the calling task invokes     *
 *  the ENABLE$DELETION system call.  This system call decreases by one  *
 *  the disabling depth of an object.  In this example, the object is    *
 *  the calling task.                                                    *
 *************************************************************************/

   CALL RQ$ENABLE$DELETION            (task$token,
                                       @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The object's deletion is not disabled.
E$EXIST	0006H	The object parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

END$INIT$TASK

The END$INIT$TASK system call is used by an initialization task of a first-level job to inform the root task that it has completed its synchronous initialization process.

```
CALL RQ$END$INIT$TASK;
```

Description

When the initialization task of a first level job finishes its synchronous initialization, it must inform the root task that it is finished, so that the root task can resume execution and create another first-level job. When you call END$INIT$TASK, the root task resumes execution, allowing it to create the next first-level job. You must include this system call in the initialization task of each first-level job, even if the jobs require no synchronous initialization. Refer to the *iRMX® I Interactive Configuration Utility Reference Manual* for more information on first-level jobs and the initialization process.

The ENTER$INTERRUPT system call is used by interrupt handlers to load a previously-specified segment base address into the DS register.

```
CALL RQ$ENTER$INTERRUPT(level, except$ptr);
```

Input Parameter

level — A WORD specifying an interrupt level that is encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call. For this system call, all exceptional conditions must be processed in-line. Control does not pass to an exception handler.

Description

ENTER$INTERRUPT, on behalf of the calling interrupt handler, loads a base address value into the DS register. The value is what was specified when the interrupt handler was set up by an earlier call to SET$INTERRUPT.

If the handler is going to call an interrupt task, ENTER$INTERRUPT allows the handler to place data in the CPU data segment that will be used by the interrupt task. This provides a mechanism for the interrupt handler to pass data to the interrupt task.

Example

```
/*************************************************************************
 *  This example illustrates how the ENTER$INTERRUPT system call can be *
 *  used to load a segment base address into the data segment register. *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE the$first$word  WORD;
    DECLARE E$OK                    LITERALLY '00H';
    DECLARE interrupt$level$7       LITERALLY '0000000001111000B';
                                    /* specifies master interrupt level 7 */

    DECLARE interrupt$task$flag     BYTE;
    DECLARE interrupt$handler       POINTER;
    DECLARE data$segment            TOKEN;
    DECLARE status                  WORD;
    DECLARE interrupt$status        WORD;
    DECLARE ds$pointer              POINTER;
    DECLARE PTR$OVERLAY             LITERALLY 'STRUCTURE (offset   WORD,
                                                          base     TOKEN)';
                                    /* establishes a structure for
                                       overlays */
    DECLARE ds$pointer$ovly         PTR$OVERLAY AT (@ds$pointer);
                                    /* using the overlay structure, the
                                       base address of the interrupt
                                       handler's data segment is
                                       identified */

INTERRUPTHANDLER: PROCEDURE INTERRUPT 59 PUBLIC;   /* 59 is a
                                                      placeholder value.
                                                      ENTER$INTERRUPT
                                                      establishes the
                                                      actual level. */
        •
        •     Typical PL/M-86 Statements
        •
```

```
/*************************************************************************
 *  The calling interrupt handler invokes the ENTER$INTERRUPT system    *
 *  call which loads a base address value (defined by                   *
 *  ds$pointer$ovly.base) into the data segment register.               *
 *************************************************************************/

    CALL RQ$ENTER$INTERRUPT       (interrupt$level$7,
                                   @interrupt$status);
    CALL INLINEERRORPROCESS       (interrupt$status);

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  Interrupt handlers that do not invoke interrupt tasks need to       *
 *  invoke the EXIT$INTERRUPT system call to send an end-of-interrupt   *
 *  signal to the hardware.                                             *
 *************************************************************************/

    CALL RQ$EXIT$INTERRUPT        (interrupt$level$7,
                                   @interrupt$status);
    CALL INLINEERRORPROCESS       (interrupt$status);
END INTERRUPTHANDLER;

INLINEERRORPROCESS: PROCEDURE (int$status);
    DECLARE  int$status   WORD;

    IF int$status <> E$OK THEN
         DO;
             •
             •     Typical PL/M-86 Statements
             •
         END;
END INLINEERRORPROCESS;

SAMPLEPROCEDURE:
    PROCEDURE;

    ds$pointer = @the$first$word; /* a dummy identifier used to point to
                                     interrupt handler's data segment */
    data$segment = ds$pointer$ovly.base;
                                  /* identifies the base address of the
                                     interrupt handler's data segment */
    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                                  /* points to the first instruction of
                                     the interrupt handler */
    interrupt$task$flag = 0;      /* indicates no interrupt task on level
                                     7 */
```

```
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  By first invoking the SET$INTERRUPT system call, the calling task   *
 *  sets up an interrupt level.                                         *
 *************************************************************************/

   CALL RQ$SET$INTERRUPT         (interrupt$level$7,
                                  interrupt$task$flag,
                                  interrupt$handler,
                                  data$segment,
                                  @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	No segment base value has previously been specified in the call to SET$INTERRUPT.
ENOTCONFIGURED	0008H	This system call is not included in the present configuration.
E$PARAM	8004H	The level parameter is invalid.

The EXIT$INTERRUPT system call is used by interrupt handlers when they don't invoke interrupt tasks; this call sends an end-of-interrupt signal to the hardware.

```
CALL RQ$EXIT$INTERRUPT (level, except$ptr);
```

Input Parameter

level — A WORD specifying an interrupt level that is encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit of the interrupt level.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call. For this system call, all exceptional conditions must be processed in-line. Control does not pass to an exception handler.

Description

The EXIT$INTERRUPT system call sends an end-of-interrupt signal to the hardware. This sets the stage for re-enabling interrupts. The re-enabling actually occurs when control passes from the interrupt handler to an application task.

Example

```
/*************************************************************************
 *  This example illustrates how the EXIT$INTERRUPT system call can be  *
 *  used to send an end-of-interrupt signal to the hardware.            *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE interrupt$level$7   LITERALLY '0000000001111000B';
                                /* specifies master interrupt level 7 */
    DECLARE E$OK                LITERALLY '00h';
    DECLARE interrupt$task$flag BYTE;
    DECLARE interrupt$handler   POINTER;
    DECLARE data$segment        TOKEN;
    DECLARE status              WORD;
    DECLARE interrupt$status    WORD;

INTERRUPTHANDLER: PROCEDURE INTERRUPT 59 PUBLIC;   /* 59 is a placeholder
                                                      value. ENTER$INTERRUPT
                                                      establishes actual
                                                      level */
        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  Interrupt handlers that do not invoke interrupt tasks need to       *
 *  invoke the EXIT$INTERRUPT system call to send an end-of-interrupt   *
 *  signal to the hardware.                                             *
 *************************************************************************/

    CALL RQ$EXIT$INTERRUPT        (interrupt$level$7,
                                   @interrupt$status);
    IF interrupt$status <> E$OK THEN
         DO;
             •
             •     Typical PL/M-86 Statements
             •
         END;

END INTERRUPTHANDLER;
```

```
SAMPLEPROCEDURE:
    PROCEDURE;

    interrupt$task$flag = 0;          /* indicates no interrupt task on
                                         level 7 */
    data$segment = SELECTOR$OF(NIL); /* indicates that the interrupt handler
                                         will load its own data segment */
    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                                      /* points to the first instruction of
                                         the interrupt handler */
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  By first invoking the SET$INTERRUPT system call, the calling task   *
 *  sets up an interrupt level.                                          *
 *************************************************************************/

    CALL RQ$SET$INTERRUPT       (interrupt$level$7,
                                 interrupt$task$flag,
                                 interrupt$handler,
                                 data$segment,
                                 @status);
       •
       •     Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The SET$INTERRUPT system call has not been invoked for the specified level.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The level parameter is invalid.

FORCE$DELETE

The FORCE$DELETE system call deletes objects whose disabling depths are zero or one.

CAUTION

Human Interface applications should not use the DISABLE$DELETION system call, and therefore, have no need to use the FORCE$DELETE and ENABLE$DELECTION system calls. This is because DISABLE$DELETION increases the disabling depth of an object. A Human Interface application containing objects whose disabling depths are greater than one cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
CALL RQ$FORCE$DELETE (extension, object, except$ptr);
```

Input Parameters

extension	If the object to be deleted is a composite object, this parameter is a TOKEN for the extension type associated with the composite object to be deleted. Otherwise, the extension parameter must be SELECTOR$OF(NIL) or zero.
object	A TOKEN for the object that is to be deleted.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The FORCE$DELETE system call deletes objects whose disabling depths are zero or one. If an object has a deletion depth of two or more, the calling task is put to sleep until the deletion depth is decreased to one. At that time, the object is deleted and the task is awakened. If the wrong extension parameter is specified when deleting a composite, FORCE$DELETE issues an E$CONTEXT error and returns without deleting the composite. If the object to be force deleted is not a composite, the extension parameter is ignored.

Example

```
/*************************************************************************
 *  This example illustrates how the FORCE$DELETE system call can be     *
 *  used to force the deletion of an task that has had deletion          *
 *  disabled.                                                            *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE sem$token               TOKEN;
    DECLARE init$value              WORD;
    DECLARE max$value               WORD;
    DECLARE sem$flags               WORD;
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    init$value = 1;         /* the new semaphore has one initial unit */

    max$value = 10h;        /* the new semaphore can have a maximum of
                               16 units  */

    sem$flags = 0;          /* designates a first-in/first-out task queue */

/*************************************************************************
 *  In this example the calling task creates the object to become        *
 *  immune to deletion.  The CREATE$SEMAPHORE is invoked by the calling  *
 *  task to create a semphore.                                           *
 *************************************************************************/

    sem$token = RQ$CREATE$SEMAPHORE     (init$value,
                                         max$value,
                                         sem$flags,
                                         @status);
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  Using the semaphore token, the calling task invokes the              *
 *  DISABLE$DELETION system call to increase the disabling depth by one.*
 *  This makes the semaphore immune to ordinary deletion.                *
 *************************************************************************/

    CALL RQ$DISABLE$DELETION        (sem$token,
                                     @status);

/*************************************************************************
 *  In order to delete the semaphore, the calling task invokes           *
 *  the FORCE$DELETE system call.  This system call deletes the semphore*
 *  even though the disabling depth of the semaphore is one.             *
 *************************************************************************/

    CALL RQ$FORCE$DELETE            (SELECTOR$OF(NIL),
                                     sem$token,
                                     @status);
        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The wrong extension type was used in the extension parameter of the FORCE$DELETE system call.
E$EXIST	0006H	One or both of the object or extension parameters is not a token for an existing object.
E$MEM	0002H	The memory available to the calling task's job is not sufficient to complete this call.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The extension parameter is a token for an object that is not an extension object.

The GET$EXCEPT$HANDLER system call returns information about the calling task's exception handler.

```
CALL RQ$GET$EXCEPTION$HANDLER (exception$info$ptr, except$ptr);
```

Output Parameters

exception$info$ptr — A POINTER to a structure of the following form:

```
STRUCTURE(
    EXCEPTION$HANDLER$OFFSET    WORD,
    EXCEPTION$HANDLER$BASE      TOKEN,
    EXCEPTION$MODE              BYTE);
```

where, after the call,

- EXCEPTION$HANDLER$OFFSET contains the offset of the first instruction of the exception handler.
- EXCEPTION$HANDLER$BASE contains a base for the segment containing the first instruction of the exception handler. If exception$handler$base is SELECTOR$OF(NIL) and exception$handler$offset is zero, the calling task's exception handler is the system default exception handler.
- EXCEPTION$MODE contains an encoded indication of the calling task's current exception mode. The value is interpreted as follows:

Value	When to Pass Control to Exception Handler
0	Never
1	On programmer errors only
2	On environmental conditions only
3	On all exceptional conditions

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The GET$EXCEPTION$HANDLER system call returns both the address of the calling task's exception handler and the current value of the task's exception mode.

Example

```
/*************************************************************************
 *  This example illustrates how the GET$EXCEPTION$HANDLER system call  *
 *  can be used to return information about the calling task's           *
 *  exception handler.                                                  *
 *************************************************************************/

    DECLARE TOKEN     LITERALLY 'SELECTOR';  /* if your PL/M compiler does not
                                                support this variable type,
                                                declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE x$handler  STRUCTURE   (x$handler$offset  WORD,
                                    x$handler$base    TOKEN,
                                    x$mode            BYTE);
    DECLARE status  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  The address of the calling task's exception handler and the value   *
 *  of the task's exception mode (which specifies when to pass control  *
 *  to the exception handler) are both returned when the calling task   *
 *  invokes the GET$EXCEPTION$HANDLER system call.                      *
 *************************************************************************/

    CALL RQ$GET$EXCEPTION$HANDLER  (@x$handler, @status);

        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The GET$LEVEL system call returns the number of the level of the highest priority interrupt being serviced.

```
level = RQ$GET$LEVEL (except$ptr);
```

Output Parameters

level — A WORD whose value is interpreted as follows (bit 15 is the high-order bit):

Bits	Value
15-8	Reserved bits that are set to zero.
7	If zero, some level is being serviced and bits 6-0 are significant. If one, no level is being serviced and bits 6-0 are not significant.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The GET$LEVEL system call returns to the calling task the highest (numerically lowest) level which an interrupt handler has started servicing but has not yet finished.

Example

```
/*************************************************************************
 *  This example illustrates how the GET$LEVEL system call can be used. *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE interrupt$level  WORD;
    DECLARE status           WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The GET$LEVEL system call returns to the calling task the number of *
 *  the highest interrupt level being serviced.                          *
 *************************************************************************/

    interrupt$level = RQ$GET$LEVEL (@status);

       •
       •     Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The GET$POOL$ATTRIB system call returns information about the memory pool of the calling task's job.

```
CALL RQ$GET$POOL$ATTRIB (attrib$ptr, except$ptr);
```

Output Parameters

attrib$ptr — A POINTER to a data structure of the following form:

```
STRUCTURE(
          POOL$MAX       WORD,
          POOL$MIN       WORD,
          INITIAL$SIZE   WORD,
          ALLOCATED      WORD,
          AVAILABLE      WORD);
```

The system call fills in the fields of this structure so that after the call:

- POOL$MAX contains the maximum allowable size (in 16-byte paragraphs) of the memory pool of the calling task's job.
- POOL$MIN contains the minimum allowable size (in 16-byte paragraphs) of the memory pool of the calling task's job.
- INITIAL$SIZE contains the original value of the pool$min attribute.
- ALLOCATED contains the number of 16-byte paragraphs currently allocated from the memory pool of the calling task's job.
- AVAILABLE contains the number of 16-byte paragraphs currently available in the memory pool of the calling task's job. It does not include memory that could be borrowed from the parent job. The memory indicated in AVAILABLE may be fragmented and thus not allocatable as a single segment.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The GET$POOL$ATTRIB system call returns information regarding the memory pool of the calling task's job. The data returned comprises the allocated and available portions of the pool, as well as its initial, minimum, and maximum sizes.

Example

```
/*************************************************************************
 *  This example illustrates how the GET$POOL$ATTRIB system call can    *
 *  be used to return information about the memory pool of the          *
 *  calling task's job.                                                 *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE mem$pool  STRUCTURE (mem$pool$max      WORD,
                                 mem$pool$min      WORD,
                                 mem$initial$size  WORD,
                                 mem$allocated     WORD,
                                 mem$available     WORD);
    DECLARE status    WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •
```

```
/*************************************************************************
 *  The maximum and minimum size of the memory pool, the original value *
 *  of the minimum pool size, and the allocated and available number of *
 *  16-byte paragraphs in the memory pool of the calling task's job are *
 *  all returned when the calling task invokes the GET$POOL$ATTRIB      *
 *  system call.                                                        *
 *************************************************************************/

   CALL RQ$GET$POOL$ATTRIB  (@mem$pool,
                             @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The GET$PRIORITY system call returns the priority of a task.

```
priority = RQ$GET$PRIORITY (task, except$ptr);
```

Input Parameter

task — A TOKEN that specifies the task whose priority is being requested.

- If not SELECTOR$OF(NIL) or zero, the TOKEN must contain a token for the task whose priority is being requested.
- If SELECTOR$OF(NIL) or zero, the calling task is asking for its own priority.

Output Parameters

priority — A BYTE in which the system call returns the priority of the task indicated by the task parameter.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The GET$PRIORITY system call returns the priority of the specified task.

Example

```
/*************************************************************************
 *  This example illustrates how the GET$PRIORITY system call can be     *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE priority               BYTE;
    DECLARE calling$tasks$priority LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE status                 WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  The GET$PRIORITY system call returns the priority of the calling     *
 *  task.                                                                *
 *************************************************************************/

    priority = RQ$GET$PRIORITY    (calling$tasks$priority,
                                   @status);
        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The task parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The task parameter is a token for an object that is not a task.

The GET$SIZE system call returns the size, in bytes, of a segment.

```
size = RQ$GET$SIZE (segment, except$ptr);
```

Input Parameter

segment — A TOKEN for a segment whose size is desired.

Output Parameters

size — A WORD in which the system call returns the size of the segment, as follows.

- If not zero, it contains the size, in bytes, of the segment indicated by the segment parameter.
- If zero, the WORD indicates that the size of the segment is 65536 (64K) bytes.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The GET$SIZE system call returns the size, in bytes, of a segment.

Example

```
/*************************************************************************
 *  This example illustrates how the GET$SIZE system call can be used.  *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE mbx$token           TOKEN;
    DECLARE calling$tasks$job   LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE wait$forever        LITERALLY '0FFFFH';
    DECLARE seg$token           TOKEN;
    DECLARE response            TOKEN;
    DECLARE size                WORD;
    DECLARE status              WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        .
        .     Typical PL/M-86 Statements
        .

/*************************************************************************
 *  In order to invoke the GET$SIZE system call, the calling task must  *
 *  know the token for the segment.  In this example, the calling task  *
 *  invokes the LOOKUP$OBJECT and RECEIVE$MESSAGE system calls to       *
 *  receive the token for a segment (seg$token).  The calling task      *
 *  invoked LOOKUP$OBJECT to receive the token for the mailbox named    *
 *  'MBX'. 'MBX' had been designated as the mailbox another task        *
 *  would use to send an object.                                        *
 *************************************************************************/

    mbx$token = RQ$LOOKUP$OBJECT       (calling$tasks$job,
                                        @(3,'MBX'),
                                        wait$forever,
                                        @status);

        .
        .     Typical PL/M-86 Statements
        .
```

```
/*************************************************************************
 *  The RECEIVE$MESSAGE system call returns seg$token to the calling    *
 *  task.                                                                *
 *************************************************************************/

   seg$token = RQ$RECEIVE$MESSAGE     (mbx$token,
                                       wait$forever,
                                       @response,
                                       @status);

      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  The GET$SIZE system call returns the size of the segment pointed    *
 *  to by seg$token.                                                     *
 *************************************************************************/

   size = RQ$GET$SIZE                 (seg$token, @status);

      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The segment parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The segment parameter is a token for an object that is not a segment.

The GET$TASK$TOKENS system call returns the token requested by the calling task.

```
object = RQ$GET$TASK$TOKENS (selection, except$ptr);
```

Input Parameter

selection — A BYTE that tells the iRMX I Operating System what information is desired. It is encoded as follows:

Value	Object for which a Token is Requested
0	The calling task.
1	The calling task's job.
2	The parameter object of the calling task's job.
3	The root job.

Output Parameters

object — A TOKEN to which the iRMX I Operating System will return the requested token.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The GET$TASK$TOKENS system call returns a token for either the calling task, the calling task's job, the parameter object of the calling task's job, or the root job, depending on the encoded request.

Example

```
/*************************************************************************
 *  This example illustrates how the GET$TASK$TOKENS system call can be *
 *  used to return the TOKEN requested by the calling task.             *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE task$token                  TOKEN;
    DECLARE calling$task                LITERALLY '0';
    DECLARE status                      WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •       Typical PL/M-86 Statements
        •

/*************************************************************************
 *  If you set the selection parameter to zero, the GET$TASK$TOKENS     *
 *  system call will return a token for the calling task.               *
 *************************************************************************/

    task$token = RQ$GET$TASK$TOKENS     (calling$task,
                                         @status);
        •
        •       Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$PARAM	8004H	The selection parameter is greater than 3.

The GET$TYPE system call returns the encoded type of an object.

```
type$code = RQ$GET$TYPE (object, except$ptr);
```

Input Parameter

object — A TOKEN for an object whose type is desired.

Output Parameters

type$code — A WORD which contains the encoded type of the specified object. The types for iRMX I objects are encoded as follows:

Value	Type
1	job
2	task
3	mailbox
4	semaphore
5	region
6	segment
7	extension
100H	composite (user)
101H	composite (connection)
300H	composite (I/O job)
301H	composite (logical device)
8000H - 0FFFFH	user-created composites

User and connection composites are described in the *iRMX® Basic I/O System User's Guide*. I/O jobs and logical device composites are described in the *iRMX® Extended I/O System User's Guide*.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The GET$TYPE system call returns the type code for an object. For a composite, type$code contains the composite extension type, not the encoded object type.

Example

```
/*************************************************************************
 *  This example illustrates how the GET$TYPE system call can be used   *
 *  to return the encoded type of an object.                             *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE type$code                  WORD;
    DECLARE mbx$token                  TOKEN;
    DECLARE calling$tasks$job          LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE wait$forever               LITERALLY '0FFFFH';
    DECLARE object$token               TOKEN;
    DECLARE response                   TOKEN;
    DECLARE status                     WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In order to invoke the GET$TYPE system call, the calling task must   *
 *  have the token for an object.  In this example, the calling task     *
 *  invokes the LOOKUP$OBJECT system call and then the RECEIVE$MESSAGE   *
 *  system call to receive the token for an object of unknown type       *
 *  (object$token).                                                      *
 *************************************************************************/

    mbx$token = RQ$LOOKUP$OBJECT       (calling$tasks$job,
                                        @(3,'MBX'),
                                        wait$forever,
                                        @status);

        •
        •     Typical PL/M-86 Statements
        •
```

```
/*************************************************************************
 *  The RECEIVE$MESSAGE system call returns object$token to the calling *
 *  task after the calling task invoked LOOKUP$OBJECT to receive the    *
 *  token for the mailbox named 'MBX'.  'MBX' had been designated       *
 *  as the mailbox another task would use to send an object.            *
 *************************************************************************/

   object$token = RQ$RECEIVE$MESSAGE  (mbx$token,
                                       wait$forever,
                                       @response,
                                       @status);
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  Using the type code returned by the GET$TYPE system call, the       *
 *  calling task can find out if the object is a job,  task,            *
 *  mailbox, region,  segment, semaphore, port, or extension.          *
 *************************************************************************/

   type$code = RQ$GET$TYPE            (object$token,
                                       @status);

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The object parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The INSPECT$COMPOSITE system call returns a list of the component tokens contained in a composite object.

CAUTION

Composite objects require the creation of extension objects. Jobs that create extension objects cannot be deleted until all the extension objects are deleted. Therefore you should avoid creating composite objects in Human Interface applications. If a Human Interface application creates extension objects, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal).

```
CALL RQ$INSPECT$COMPOSITE (extension, composite, token$list$ptr,
                           except$ptr);
```

Input Parameters

extension — A TOKEN for the extension object corresponding to the composite object being inspected.

composite — A TOKEN for the composite object being inspected.

Output Parameters

token$list$ptr — A POINTER to a structure of the form:

```
DECLARE
    token$list$ptr   STRUCTURE(
                     num$slots    WORD,
                     num$used     WORD,
                     tokens(*)    TOKEN);
```

The system call returns information in the fields of this structure, as follows:

num$slots — Number of positions available for tokens in token$list (an upper limit on the number of tokens to be returned). You fill in this field to tell the system call how many tokens to return.

num$used — Number of component tokens making up the composite object.

	tokens(*) The tokens that actually constitute the composite object.
except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The INSPECT$COMPOSITE system call accepts a token for a composite object and returns a list of tokens for the components of the composite object.

The calling task must supply the num$slots value in the data structure pointed to by the token$list parameter. The Nucleus fills in the remaining fields in that structure. If num$slots is set to zero, the Nucleus will fill in only the num$used field.

If the num$slots value is smaller than the actual number of component tokens, only that number (num$slots) of tokens will be returned.

Example

See the "DELETE_RING_BUFFER Procedure" example in the *iRMX® I Nucleus User's Guide*.

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The composite parameter is not compatible with the extension parameter.
E$EXIST	0006H	The composite and/or extension parameter(s) is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	One or both of the extension or composite parameters is a token for an object that is not of the correct type.

The LOOKUP$OBJECT system call returns a token for a cataloged object.

```
object = RQ$LOOKUP$OBJECT (job, name$ptr, time$limit, except$ptr);
```

Input Parameters

job — A TOKEN indicating the object directory to be searched.

- If not SELECTOR$OF(NIL) or zero, the TOKEN must contain a token for the job whose object directory is to be searched.
- If SELECTOR$OF(NIL) or zero, the object directory to be searched is that of the calling task's job.

name$ptr — A POINTER to a STRING which contains the name under which the object is cataloged. During the lookup operation, upper and lower case letters are treated as being different.

time$limit — A WORD indicating the task's willingness to wait.

- If zero, the WORD indicates that the calling task is not willing to wait.
- If 0FFFFH, the WORD indicates that the task will wait as long as is necessary.
- If between 0 and 0FFFFH, the WORD indicates the number of clock intervals that the task is willing to wait. The length of a clock interval is a configuration option. Refer to the *iRMX® I Interactive Configuration Utility Reference Manual* for further information.

Output Parameters

object — A TOKEN containing the requested object token.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The LOOKUP$OBJECT system call returns the token for an object after searching for its name in the specified object directory. Because it is possible that the object is not cataloged at the time of the call, the calling task has the option of waiting, either indefinitely or for a specific period of time, for another task to catalog the object.

Example

```
/*************************************************************************
 *  This example illustrates how the LOOKUP$OBJECT system call can be   *
 *  used to return a token for a cataloged object.                       *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE mbx$token                  TOKEN;
    DECLARE calling$tasks$job          LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE wait$forever               LITERALLY '0FFFFH';
    DECLARE status                     WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In this example, the calling task invokes LOOKUP$OBJECT in order to *
 *  search the object directory of the calling task's job for an object *
 *  with the name 'MBX'.                                                 *
 *************************************************************************/

    mbx$token = RQ$LOOKUP$OBJECT       (calling$tasks$job,
                                        @(3,'MBX'),
                                        wait$forever,
                                        @status);
        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The specified job has an object directory of size 0.
E$EXIST	0006H	At least one of the following is true: • The specified job was deleted while the task was waiting. • The job parameter (which is not SELECTOR$OF(NIL) or zero) is not a token for an existing object. • The name was found, but the cataloged object has a null (NIL) token.
E$LIMIT	0004H	The specified object directory is full and the object being looked up has not yet been cataloged. This code (rather than E$TIME) is returned when a full object directory does not contain the requested object and the calling task is not willing to wait.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The first byte of the string pointed to by the name parameter contains a value greater than 12 or equal to 0.
E$TIME	0001H	One of the following is true: • The calling task indicated its willingness to wait a certain amount of time, but the waiting period elapsed before the object became available. • The task was not willing to wait, the entry indicated by the name parameter is not in the specified object directory, and the object directory is not full.
E$TYPE	8002H	The job parameter contains a token for an object that is not a job.

OFFSPRING

The OFFSPRING system call returns a token for each child (job) of a job.

```
token$list = RQ$OFFSPRING (job, except$ptr);
```

Input Parameter

job — A TOKEN for the job whose offspring are desired. A value of SELECTOR$OF(NIL) or zero specifies the calling task's job.

Output Parameter

token$list — A TOKEN that indicates the children of the specified job.

- If not SELECTOR$OF(NIL) or zero, the TOKEN contains a token for a segment. The first word in the segment contains the number of words in the remainder of the segment. Subsequent words contain the tokens for jobs that are the immediate children of the specified job.
- If SELECTOR$OF(NIL) or zero, the specified job has no children.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The OFFSPRING system call returns the token for a segment. The segment contains a token for each child of the specified job. By repeated use of this call, tokens can be obtained for all descendants of a job; this information is needed by a task which is attempting to delete a job that has child jobs.

Example

```
/*************************************************************************
 *  This example illustrates how the OFFSPRING system call can be used  *
 *  to return a token for each child of a job.                           *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE token$list              TOKEN;
    DECLARE calling$tasks$job       LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •       Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In this example, the calling task invokes the system call OFFSPRING *
 *  to obtain a token for a segment.  This segment contains the tokens  *
 *  for jobs that are immediate children of the calling task's job.     *
 *************************************************************************/

    token$list = RQ$OFFSPRING       (calling$tasks$job,
                                     @status);
        •
        •       Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The job parameter is not a token for an existing object.
E$LIMIT	0004H	The calling task's job has already reached its object limit.
E$MEM	0002H	The memory available to the specified job is not sufficient to complete this call.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The job parameter contains a token for an object that is not a job.

The RECEIVE$CONTROL system call allows the calling task to gain access to data protected by a region.

CAUTION

Tasks which use regions cannot be deleted while they access data protected by the region. Therefore, you should avoid using regions in Human Interface applications. If a task in a Human Interface application uses regions, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal) while the task is in the region.

```
CALL RQ$RECEIVE$CONTROL (region, except$ptr);
```

Input Parameter

region — A TOKEN for the region protecting the data to which the calling task wants access.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The RECEIVE$CONTROL system call requests access to data protected by a region. If no task currently has access, entry is immediate. If another task currently has access, the calling task is placed in the region's task queue and goes to sleep. The task remains asleep until it gains access to the data.

If the region has a priority-based task queue, the priority of the task currently having access is temporarily boosted, if necessary, to match that of the task at the head of the queue.

Example

```
/*************************************************************************
 *  This example illustrates how the RECEIVE$CONTROL system call can be *
 *  used to gain access to data protected by a region.                   *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE region$token               TOKEN;
    DECLARE priority$queue             LITERALLY '1'; /* tasks wait in
                                                         priority order */
    DECLARE status                     WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In order to access the data within a region, a task must know the    *
 *  token for that region.  In this example, the needed token is known   *
 *  because the calling task creates the region.                         *
 *************************************************************************/

    region$token = RQ$CREATE$REGION    (priority$queue,
                                        @status);
        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  When access to the data protected by a region is needed, the         *
 *  calling task may invoke the RECEIVE$CONTROL system call.             *
 *************************************************************************/

    CALL RQ$RECEIVE$CONTROL  (region$token,
                              @status);
        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The region parameter refers to a region already accessed by the calling task.
E$EXIST	0006H	The region parameter is not a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The region parameter contains a token for an object that is not a region.

The RECEIVE$MESSAGE system call delivers the calling task to a mailbox, where it can wait for an object token to be returned.

```
object = RQ$RECEIVE$MESSAGE (mailbox, time$limit, response$ptr,
                             except$ptr);
```

Input Parameters

mailbox — A TOKEN for the mailbox at which the calling task expects to receive an object token.

time$limit — A WORD that indicates how long the calling task is willing to wait.

- If zero, indicates that the calling task is not willing to wait.
- If 0FFFFH, indicates that the task will wait as long as is necessary.
- If between 0 and 0FFFFH, indicates the number of clock intervals that the task is willing to wait. The length of a clock interval is configurable. Refer to the *iRMX® I Interactive Configuration Utility Reference Manual* for further information.

Output Parameters

object — A TOKEN for the object being received.

response$ptr — A POINTER to a TOKEN in which the system returns a value. The returned pointer:

- if not NIL, points to a token for the exchange to which the receiving task is to send a response.
- if NIL, indicates that no response is expected by the sending task.

CAUTION

Response$ptr points to a location for the sending task to use. If you specify a constant value for response$ptr, be careful to ensure that the value does not conflict with system requirements.

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The RECEIVE$MESSAGE system call causes the calling task either to get the token for an object or to wait for the token in the task queue of the specified mailbox. If the object queue at the mailbox is not empty, then the calling task immediately gets the token at the head of the queue and remains ready. Otherwise, the calling task goes into the task queue of the mailbox and goes to sleep, unless the task is not willing to wait. In the latter case, or if the task's waiting period elapses without a token arriving, the task is awakened with an E$TIME exceptional condition.

It is possible that the token returned by RECEIVE$MESSAGE is a token for an object that has already been deleted. To verify that the token is valid, the receiving task can invoke the GET$TYPE system call. However, tasks can avoid this situation by adhering to proper programming practices.

One such practice is for the sending task to request a response from the receiving task and not delete the object until it gets a response. When the receiving task finishes with the object, it sends a response, the nature of which must be determined by the writers of the two tasks, to the response mailbox. When the sending task gets this response, it can then delete the original object, if it so desires.

Example

```
/*************************************************************************
 *  This example illustrates how the RECEIVE$MESSAGE system call can be *
 *  used to receive a message segment.                                   *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE mbx$token               TOKEN;
    DECLARE calling$tasks$job       LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE wait$forever            LITERALLY '0FFFFH';
    DECLARE seg$token               TOKEN;
    DECLARE response                TOKEN;
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In this example the calling task looks up the token for the mailbox *
 *  prior to invoking the RECEIVE$MESSAGE system call.                   *
 *************************************************************************/

    mbx$token = RQ$LOOKUP$OBJECT  (calling$tasks$job,
                                   @(3,'MBX'),
                                   wait$forever,
                                   @status);
        •
        •     Typical PL/M-86 Statements
        •
```

```
/*************************************************************************
 *  Knowing the token for the mailbox, the calling task can wait for a  *
 *  message from this mailbox by invoking the RECEIVE$MESSAGE system    *
 *  call.                                                               *
 *************************************************************************/

    seg$token = RQ$RECEIVE$MESSAGE     (mbx$token,
                                        wait$forever,
                                        @response,
                                        @status);
       •
       •     Typical PL/M-86 Statements
       •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	At least one of the following is true: • The mailbox parameter is not a token for an existing object. • The mailbox was deleted while the task was waiting.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TIME	0001H	One of the following is true: • The calling task was not willing to wait and there was not a token available. • The task waited in the task queue and its designated waiting period elapsed before the task got the desired token.
E$TYPE	8002H	The mailbox parameter contains a token for an object that is not a mailbox.

The RECEIVE$UNITS system call delivers the calling task to a semaphore, where it waits for units.

```
value = RQ$RECEIVE$UNITS (semaphore, units, time$limit, except$ptr);
```

Input Parameters

semaphore	A TOKEN for the semaphore from which the calling task wants to receive units.
units	A WORD containing the number of units that the calling task is requesting.
time$limit	A WORD that indicates how long the calling task is willing to wait. • If zero, the WORD indicates that the calling task is not willing to wait. • If 0FFFFH, the WORD indicates that the task will wait as long as is necessary. • If between 0 and 0FFFFH, the WORD indicates the number of clock intervals that the task is willing to wait. The length of a clock interval is configurable. Refer to the *iRMX® I Interactive Configuration Utility Reference Manual* for further information.

Output Parameters

value	A WORD containing the number of units remaining in the semaphore after the calling task's request is satisfied.
except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The RECEIVE$UNITS system call causes the calling task either to get the units that it is requesting or to wait for them in the semaphore's task queue. If the units are available and the task is at the front of the queue, the task receives the units and remains ready. Otherwise, the task is placed in the semaphore's task queue and goes to sleep, unless the task is not willing to wait. In the latter case, or if the task's waiting period elapses before the requested units are available, the task is awakened with an E$TIME exceptional condition.

Example

```
/*************************************************************************
 *  This example illustrates how the RECEIVE$UNITS system call can be   *
 *  used to receive a unit.                                              *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE sem$token             TOKEN;
    DECLARE calling$tasks$job     LITERALLY 'SELECTOR$OF(NIL)';
    DECLARE wait$forever          LITERALLY '0FFFFH';
    DECLARE seg$token             TOKEN;
    DECLARE units$remaining       WORD;
    DECLARE units$requested       WORD;
    DECLARE status                WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In this example the calling task looks up the token for the         *
 *  semaphore prior to invoking the RECEIVE$UNITS system call.          *
 *************************************************************************/

    sem$token = RQ$LOOKUP$OBJECT       (calling$tasks$job,
                                       @(5,'SEMA4'),
                                       wait$forever,
                                       @status);

        •
        •     Typical PL/M-86 Statements
        •
```

```
/*************************************************************************
 *  Knowing the token for the semaphore, the calling task can wait for  *
 *  units at this semaphore by invoking the RECEIVE$UNITS system call.  *
 *************************************************************************/

   units$remaining = RQ$RECEIVE$UNITS (sem$token,
                                       units$requested,
                                       wait$forever,
                                       @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	At least one of the following is true: • The semaphore parameter is not a token for an existing object. • The semaphore was deleted while the task was waiting.
E$LIMIT	0004H	The units parameter is greater than the maximum value specified for the semaphore when it was created.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TIME	0001H	One of the following is true: • The calling task was not willing to wait and the requested units were not available. • The task waited in the task queue and its designated waiting period elapsed before the requested units were available.
E$TYPE	8002H	The semaphore parameter is a token for an object that is not a semaphore.

The RESET$INTERRUPT system call cancels the assignment of an interrupt handler to a level.

```
CALL RQ$RESET$INTERRUPT (level, except$ptr);
```

Input Parameter

level — A WORD specifying an interrupt level. This word must be encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The RESET$INTERRUPT system call cancels the assignment of the current interrupt handler to the specified interrupt level. If an interrupt task has also been assigned to the level, the interrupt task is deleted. RESET$INTERRUPT also disables the level.

The level reserved for the system clock should not be reset and is considered invalid. This level is a configuration option (refer to the *iRMX® I Interactive Configuration Utility Reference Manual* for further information).

Example

```
/*************************************************************************
 *  This example illustrates how the RESET$INTERRUPT system call can be *
 *  used to cancel the assignment of an interrupt handler to an         *
 *  interrupt level.                                                    *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

INTERRUPTHANDLER:  PROCEDURE INTERRUPT 63 EXTERNAL;
END INTERRUPTHANDLER;

    DECLARE task$token                TOKEN;
    DECLARE priority$level$66         LITERALLY '66';
    DECLARE start$address             POINTER;
    DECLARE data$segment              TOKEN;
    DECLARE stack$pointer             POINTER;
    DECLARE stack$size$512            LITERALLY '512'; /* new task's stack
                                                          size is 512 bytes*/
    DECLARE task$flags                WORD;
    DECLARE interrupt$level$7         LITERALLY '0000000001111000B';
         /* specifies master interrupt level 7 */
    DECLARE interrupt$task$flag       BYTE;
    DECLARE interrupt$handler         POINTER;
    DECLARE interrupt$status          WORD;
    DECLARE status                    WORD;

INTERRUPTTASK: PROCEDURE PUBLIC;

    interrupt$task$flag = 001H;       /* indicates that calling task is
                                         to be interrupt task */
    data$segment = SELECTOR$OF(NIL);  /* use own data segment */
    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                                      /* points to the first instruction
                                         of the interrupt handler */

/*************************************************************************
 *  The first system call in this example, SET$INTERRUPT, makes the     *
 *  calling task (INTERRUPTTASK) the interrupt task for the interrupt   *
 *  level.                                                              *
 *************************************************************************/

   CALL RQ$SET$INTERRUPT          (interrupt$level$7, interrupt$task$flag,
                                   interrupt$handler,data$segment,
                                   @interrupt$status);
```

```
/*************************************************************************
 *  The second system call, WAIT$INTERRUPT, is used by the interrupt     *
 *  task to signal its readiness to service an interrupt.                *
 *************************************************************************/

    CALL RQ$WAIT$INTERRUPT        (interrupt$level$7,
                                   @interrupt$status);
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  When the interrupt task invokes the RESET$INTERRUPT system call,     *
 *  the assignment of the current interrupt handler to interrupt level   *
 *  7 is canceled and, because an interrupt task has also been assigned  *
 *  to the level, the interrupt task is deleted.                         *
 *************************************************************************/

    CALL RQ$RESET$INTERRUPT       (interrupt$level$7,
                                   @interrupt$status);
END INTERRUPTTASK;

SAMPLEPROCEDURE:
    PROCEDURE;

    start$address = @INTERRUPTTASK;
                                  /* 1st instruction of interrupt task */
    stack$pointer = NIL;          /* automatic stack allocation  */
    task$flags = 0;               /* indicates no floating-point
                                     instructions */
    data$segment = SELECTOR$OF(NIL);  /* use own data segment */

       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  In this example the SAMPLEPROCEDURE is needed to create the task     *
 *  labeled INTERRUPTTASK.                                               *
 *************************************************************************/

    task$token = RQ$CREATE$TASK   (priority$level$66,
                                   start$address,
                                   data$segment,
                                   stack$pointer,
                                   stack$size$512,
                                   task$flags,
                                   @status);

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	There is not an interrupt handler assigned to the specified level.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The level parameter is invalid.

The RESUME$TASK system call decreases by one the suspension depth of a task.

```
CALL RQ$RESUME$TASK (task, except$ptr);
```

Input Parameter

task	A TOKEN for the task whose suspension depth is to be decremented.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The RESUME$TASK system call decreases by one the suspension depth of the specified non-interrupt task. The task should be in either the suspended or asleep-suspended state, so its suspension depth should be at least one. If the suspension depth is still positive after being decremented, the state of the task is not changed. If the depth becomes zero, and the task is in the suspended state, then it is placed in the ready state. If the depth becomes zero, and the task is in the asleep-suspended state, then it is placed in the asleep state.

Example

```
/*************************************************************************
 *  This example illustrates how the RESUME$TASK system call can be      *
 *  used to decrease by one the suspension depth of a task.              *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

TASKCODE: PROCEDURE EXTERNAL;
END TASKCODE;

    DECLARE task$token              TOKEN;
    DECLARE priority$level$200      LITERALLY '200';
    DECLARE start$address           POINTER;
    DECLARE data$seg                TOKEN;
    DECLARE stack$pointer           POINTER;
    DECLARE stack$size$512          LITERALLY '512'; /* new task's stack
                                                        size is 512 bytes */
    DECLARE task$flags              WORD;
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    start$address = @TASKCODE;      /* first instruction of the new task */
    data$seg = SELECTOR$OF(NIL);    /* task sets up own data seg         */
    stack$pointer = NIL;            /* automatic stack allocation        */
    task$flags = 0;                 /* indicates no floating-point
                                       instructions                      */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  In this example the calling task creates a non-interrupt task and   *
 *  suspends that task before invoking the RESUME$TASK system call.     *
 *************************************************************************/

   task$token = RQ$CREATE$TASK   (priority$level$200,
                                  start$address,
                                  data$seg,
                                  stack$pointer,
                                  stack$size$512,
                                  task$flags,
                                  @status);
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  After creating the task, the calling task invokes SUSPEND$TASK.     *
 *  This system call increases by one the suspension depth of the new   *
 *  task (whose code is labeled TASKCODE).                              *
 *************************************************************************/

   CALL RQ$SUSPEND$TASK          (task$token,
                                  @status);
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  Using the token for the suspended task (whose code is labeled       *
 *  TASKCODE), the calling task invokes RESUME$TASK to decrease by the  *
 *  one the suspension depth of the suspended task.                     *
 *************************************************************************/

   CALL RQ$RESUME$TASK           (task$token,
                                  @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The task indicated by the task parameter is an interrupt task.
E$EXIST	0006H	The task parameter is not a token for an existing object.
E$STATE	0007H	The task indicated by the task parameter was not suspended when the call was made.
E$TYPE	8002H	The task parameter is a token for an object that is not a task.

The SEND$CONTROL system call allows a task to surrender access to data protected by a region.

CAUTION

Tasks that use regions cannot be deleted while they access data protected by the region. Therefore, you should avoid using regions in Human Interface applications. If a task in a Human Interface application uses regions, the application cannot be deleted asynchronously (via a CONTROL-C entered at a terminal) while the task is in the region.

```
CALL RQ$SEND$CONTROL (except$ptr);
```

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

When a task finishes with data protected by a region, the task invokes the SEND$CONTROL system call to surrender access. If the task is using more than one set of data, each of which is protected by a region, the SEND$CONTROL system call surrenders the most recently obtained access. When access is surrendered, the system allows the next task in line to gain access.

If a task calling SEND$CONTROL has had its priority boosted while it had access through a region, its priority is restored when it relinquishes the access.

Example

```
/*************************************************************************
 *  This example illustrates how the SEND$CONTROL system call can be     *
 *  used to surrender access to data protected by a region.              *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE region$token          TOKEN;
    DECLARE priority$queue        LITERALLY '1'; /* tasks wait in
                                                    priority order*/
    DECLARE status                WORD;

      •
      •     Typical PL/M-86 Statements
      •

SAMPLEPROCEDURE:
    PROCEDURE;

/*************************************************************************
 *  In order to access the data within a region, a task must know the    *
 *  token for that region.  In this example, the needed token is known   *
 *  because the calling task creates the region.                         *
 *************************************************************************/

    region$token = RQ$CREATE$REGION    (priority$queue,
                                        @status);
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  When access to the data protected by a region is needed, the         *
 *  calling task may invoke the RECEIVE$CONTROL system call.             *
 *************************************************************************/

    CALL RQ$RECEIVE$CONTROL            (region$token,
                                        @status);
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  When a task finishes using data protected by a region, the task     *
 *  invokes the SEND$CONTROL system call to surrender access.           *
 *************************************************************************/

   CALL RQ$SEND$CONTROL  (@status);

     •
     •     Typical PL/M-86 Statements
     •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The calling task does not have access to data protected by any region.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

SEND$MESSAGE

The SEND$MESSAGE system call sends an object token to a mailbox.

```
CALL RQ$SEND$MESSAGE (mailbox, object, response, except$ptr);
```

Input Parameters

mailbox	A TOKEN for the mailbox to which an object token is to be sent.
object	A TOKEN containing an object token which is to be sent.
response	A TOKEN for a mailbox or semaphore at which the sending task will wait for a response. • If not SELECTOR$OF(NIL) or zero, contains a token for the desired response mailbox or semaphore. • If SELECTOR$OF(NIL) or zero, indicates that no response is requested.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SEND$MESSAGE system call sends the specified object token to the specified mailbox. If there are tasks in the task queue at that mailbox, the task at the head of the queue is awakened and is given the token. Otherwise, the object token is placed at the tail of the object queue of the mailbox. The sending task has the option of specifying a mailbox or semaphore at which it will wait for a response from the task that receives the object. The nature of the response must be agreed upon by the writers of the two tasks.

Example

```
/*************************************************************************
 *  This example illustrates how the SEND$MESSAGE system call can be     *
 *  used to send a segment token to a mailbox.                           *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE seg$token     TOKEN;
    DECLARE size          WORD;
    DECLARE mbx$token     TOKEN;
    DECLARE mbx$flags     WORD;
    DECLARE no$response   LITERALLY '0';
    DECLARE status        WORD;
    DECLARE job$token     TOKEN;

SAMPLEPROCEDURE:
    PROCEDURE;

    size = 64;                      /* designates new segment to contain 64
                                       bytes */
    mbx$flags = 0;                  /* designates four objects to be queued
                                       on the high performance object
                                       queue;  designates a first-in/
                                       first-out task queue */
    job$token = SELECTOR$OF(NIL);   /* indicates objects to be cataloged
                                       into the object directory of the
                                       calling task's job */
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  The calling task creates a segment and a mailbox and catalogs the    *
 *  mailbox token.  The calling task then uses the tokens for both       *
 *  objects to send a message.                                           *
 *************************************************************************/

    seg$token = RQ$CREATE$SEGMENT  (size,
                                    @status);
    mbx$token = RQ$CREATE$MAILBOX  (mbx$flags,
                                    @status);
```

```
/*************************************************************************
 *  It is not mandatory for the calling task to catalog the mailbox     *
 *  token in order to send a message.  It is necessary, however, to     *
 *  catalog (or in someway communicate) the mailbox token if another    *
 *  task is to receive the message.                                     *
 *************************************************************************/

   CALL RQ$CATALOG$OBJECT            (job$token,
                                      mbx$token,
                                      @(3, 'MBX'),
                                      @status);
     •
     •     Typical PL/M-86 Statements
     •

/*************************************************************************
 *  The calling task invokes the SEND$MESSAGE system call to send the   *
 *  token for the segment to the specified mailbox.                     *
 *************************************************************************/

   CALL RQ$SEND$MESSAGE              (mbx$token,
                                      seg$token,
                                      no$response,
                                      @status);
     •
     •     Typical PL/M-86 Statements
     •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	One or more of the input parameters is not a token for an existing object.
E$MEM	0002H	The high performance queue is full and the calling task's job does not contain sufficient memory to complete the call.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	At least one of the following is true: • The mailbox parameter is a token for an object that is not a mailbox. • The response parameter is a token for an object that is neither a mailbox nor a semaphore.

The SEND$UNITS system call sends units to a semaphore.

```
CALL RQ$SEND$UNITS (semaphore, units, except$ptr);
```

Input Parameters

semaphore	A TOKEN for the semaphore to which the units are to be sent.
units	A WORD containing the number of units to be sent.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SEND$UNITS system call sends the specified number of units to the specified semaphore. If the transmission would cause the semaphore to exceed its maximum allowable supply, then an E$LIMIT exceptional condition occurs. Otherwise, the transmission is successful and the Nucleus attempts to satisfy the requests of the tasks in the semaphore's task queue, beginning at the head of the queue.

Example

```
/*************************************************************************
 *  This example illustrates how the SEND$UNITS system call can be used *
 *  to send units to a semaphore.                                        *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE sem$token             TOKEN;
    DECLARE init$value            WORD;
    DECLARE max$value             WORD;
    DECLARE sem$flags             WORD;
    DECLARE three$units$sent      LITERALLY '3';
    DECLARE status                WORD;
    DECLARE job$token             TOKEN;

SAMPLEPROCEDURE:
    PROCEDURE;

    init$value = 1;               /* the new semaphore has one initial
                                     unit */
    max$value = 10H;              /* the new semaphore can have a maximum
                                     of 16 units */
    sem$flags = 0;                /* designates a first-in/first-out
                                     task queue */
    job$token = SELECTOR$OF(NIL); /* indicates objects to be cataloged
                                     into the object directory of the
                                     calling task's job */
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  The calling task creates a semaphore and catalogs the semaphore     *
 *  token.  The calling task then uses the token to send a unit.        *
 *************************************************************************/

    sem$token = RQ$CREATE$SEMAPHORE  (init$value,
                                      max$value,
                                      sem$flags,
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  It is not mandatory to catalog the semaphore token in order to send *
 *  units.  It is necessary, however, to catalog (or in someway         *
 *  communicate) the semaphore token if another task is to receive the  *
 *  units.                                                              *
 *************************************************************************/

   CALL RQ$CATALOG$OBJECT          (job$token,
                                    sem$token,
                                    @(5, 'SEMA4'),
                                    @status);
     •
     •     Typical PL/M-86 Statements
     •

/*************************************************************************
 *  The calling task invokes the SEND$UNITS system call to send the     *
 *  units to the semaphore just created (sem$token).                    *
 *************************************************************************/

   CALL RQ$SEND$UNITS              (sem$token,
                                    three$units$sent,
                                    @status);
     •
     •     Typical PL/M-86 Statements
     •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$EXIST	0006H	The semaphore parameter is not a token for an existing object.
E$LIMIT	0004H	The number of units that the calling task is trying to send would cause the semaphore's supply of units to exceed its maximum allowable supply.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The semaphore parameter is a token for an object that is not a semaphore.

The SET$EXCEPTION$HANDLER system call assigns an exception handler to the calling task.

```
CALL RQ$SET$EXCEPTION$HANDLER (exception$info$ptr, except$ptr);
```

Input Parameter

exception$info$ptr — A POINTER to a structure of the following form:

```
STRUCTURE(
   EXCEPTION$HANDLER$OFFSET   WORD,
   EXCEPTION$HANDLER$BASE     TOKEN,
   EXCEPTION$MODE             BYTE);
```

where:

- exception$handler$offset contains the offset of the first instruction of the exception handler.
- exception$handler$base contains the base of the CPU segment containing the first instruction of the exception handler.
- exception$mode contains an encoded indication of the calling task's intended exception mode. The value is interpreted as follows:

Value	When to Pass Control to Exception Handler
0	Never
1	On programmer errors only
2	On environmental conditions only
3	On all exceptional conditions

If exception$handler$offset is SELECTOR$OF(NIL) and exception$handler$base is zero, the exception handler of the calling task's parent job is assigned.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SET$EXCEPTION$HANDLER system call enables a task to set its exception handler and exception mode attributes. If you want to designate the Debugger as the exception handler to interactively examine system objects and lists, the following code sets up the needed structure in PL/M-86:

```
DECLARE  X   STRUCTURE (OFFSET   WORD,
                        BASE     TOKEN,
                        MODE     BYTE);  /* establish a structure for
                                            exception handlers */
DECLARE  Y   POINTER AT (@X);

DECLARE EXCEPTION WORD;

Y = @RQDEBUGGEREX;                      /*"@RQDEBUGGER" is the public
                                          symbol for the Debugger, here
                                          it  designates the debugger
                                          as the exception handler*/

X.MODE = ZERO$ONE$TWO$OR$THREE;  /* the mode is a value 0-3 */
CALL  RQ$SET$EXCEPTION$HANDLER (@X, @EXCEPTION);
```

Example

```
/*************************************************************************
 *  This example illustrates how the SET$EXCEPTION$HANDLER system call   *
 *  can be used to assign an exception handler to the calling task.      *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    EXCEPTIONHANDLER: PROCEDURE EXTERNAL;
    END EXCEPTIONHANDLER;

    DECLARE X$HANDLER$STRUCTURE      LITERALLY 'STRUCTURE(  offset  WORD,
                                                            base    TOKEN,
                                                            mode    BYTE)';
                                     /* establishes a structure for
                                        exception handlers */

    DECLARE x$handler                 X$HANDLER$STRUCTURE;
                                     /* using the exception handler
                                        structure, the pointer to the
                                        old exception handler is
                                        defined */

    DECLARE new$x$handler             X$HANDLER$STRUCTURE;
                                      /* using the exception handler
                                         structure, the new exception
                                         handler is defined */

    DECLARE all$exceptions            LITERALLY '3';
                                      /* control is passed to the exception
                                         handler on all exceptional
                                         conditions */

    DECLARE PTR$OVERLAY               LITERALLY 'STRUCTURE( offset  WORD,
                                                            base    TOKEN)';
                                      /* establishes a structure for
                                         overlays */

    DECLARE seg$pointer               POINTER;
    DECLARE seg$pointer$ovly          PTR$OVERLAY AT (@seg$pointer);
                                      /* using the overlay structure, the
                                         first instruction of the
                                         exception handler is identified */

    DECLARE status                    WORD;
```

```
SAMPLEPROCEDURE:
    PROCEDURE;

seg$pointer = @EXCEPTIONHANDLER;      /* pointer to exception handler */

new$x$handler.offset = seg$pointer$ovly.offset;
                                      /* offset of the first instruction
                                         of the exception handler */

new$x$handler.base = seg$pointer$ovly.base;
                                      /* base address of the exception
                                         handler CPU segment containing
                                         the first instruction of the
                                         exception handler */

new$x$handler.mode = all$exceptions;  /* pass control on all conditions */

       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The address of the calling task's exception handler and the value   *
 *  of the task's exception mode (when to pass control to the exception *
 *  handler) are both returned when the calling task invokes the        *
 *  GET$EXCEPTION$HANDLER system call.                                  *
 *************************************************************************/

   CALL RQ$GET$EXCEPTION$HANDLER     (@x$handler,
                                      @status);

       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The calling task may invoke the SET$EXCEPTION$HANDLER system call   *
 *  to first set a new exception handler and then to later reset the    *
 *  old exception handler.                                              *
 *************************************************************************/

   CALL RQ$SET$EXCEPTION$HANDLER     (@new$x$handler,
                                      @status);
       •
       •     Typical PL/M-86 Statements
       •
```

```
/*************************************************************************
 *  No longer needing the new exception handler, the calling task uses  *
 *  the address and mode of the old exception handler to return         *
 *  exception handling to its original exception handler.               *
 *************************************************************************/

   CALL RQ$SET$EXCEPTION$HANDLER     (@x$handler,
                                      @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The exception$mode parameter is greater than 3.

The SET$INTERRUPT system call assigns an interrupt handler to an interrupt level and, optionally, makes the calling task the interrupt task for the level.

```
CALL RQ$SET$INTERRUPT (level, interrupt$task$flag,
                       interrupt$handler, interrupt$handler$ds,
                       except$ptr);
```

Input Parameters

level

A WORD containing an interrupt level that is encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

interrupt$task$flag

A BYTE indicating the interrupt task that services the interrupt level. The value of this parameter indicates the number of outstanding SIGNAL$INTERRUPT requests that can exist. When this limit is reached, the associated interrupt level is disabled. The maximum value for this parameter is 255 decimal. The *iRMX® I Nucleus User's Guide* describes this feature in more detail.

- If zero, indicates that no interrupt task is to be associated with the special level and that the new interrupt handler will not call SIGNAL$INTERRUPT.

CAUTION

If a task sets the interrupt$task$flag to zero, the designated interrupt handler should not be part of a Human Interface application that is loaded into dynamic memory. If such an application is stopped (via a CONTROL-C entered at a terminal), subsequent interrupts to the vector table entry set by this system call could cause unpredictable results.

- If unequal to zero, indicates that the calling task is to be the interrupt task that will be invoked by the interrupt handler being set. The priority of the calling task is adjusted by the Nucleus according to the interrupt level being serviced. Be certain that priorities set in this manner do not violate the max$priority attribute of the containing job.

interrupt$handler — A POINTER to the first instruction of the interrupt handler. To obtain the proper start address for interrupt handlers written in PL/M-86, place the following instruction before the call to SET$INTERRUPT:

```
interrupt$handler = interrupt$ptr (inter);
```

where interrupt$ptr is a PL/M-86 built-in procedure and inter is the name of your interrupt handling procedure.

interrupt$handler$ds — A TOKEN that specifies the interrupt handler's data segment.

- If not SELECTOR$OF(NIL) or zero, it contains the base address of the interrupt handler's data segment. See the description of ENTER$INTERRUPT in this manual for information concerning the significance of this parameter.
- If SELECTOR$OF(NIL) or zero, the parameter indicates that the interrupt handler will load its own data segment and may not invoke ENTER$INTERRUPT.

  It is often desirable for an interrupt handler to pass information to the interrupt task that it calls. The following PL/M-86 statements, when included in the interrupt task's code (with the first statement listed here being the first statement in the task's code), will extract the DS register value used by the interrupt task and make it available to the interrupt handler, which in turn can access it by calling ENTER$INTERRUPT:

```
DECLARE begin        WORD;   /* A DUMMY VARIABLE */
DECLARE data$ptr     POINTER;
DECLARE data$address STRUCTURE (offset WORD,
                                base TOKEN) AT (@DATA$PTR);
                               /* this makes accessible
                                  the two halves of the
                                  pointer DATA$PTR */

data$ptr = @begin;  /* puts the whole address of
                       the data segment into
                       data$ptr and data$address */

ds$base = data$address.base;

CALL RQ$SET$INTERRUPT (...,ds$base,...);
```

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SET$INTERRUPT system call is used to inform the Nucleus that the specified interrupt handler is to service interrupts which come in at the specified level. In a call to SET$INTERRUPT, a task must indicate whether the interrupt handler will invoke an interrupt task and whether the interrupt handler has its own data segment. If the handler is to invoke an interrupt task, the call to SET$INTERRUPT also specifies the number of outstanding SIGNAL$INTERRUPT requests that the handler can make before the associated interrupt level is disabled. This number generally corresponds to the number of buffers used by the handler and interrupt task. Refer to the *iRMX® I Nucleus User's Guide* for further information.

If there is to be an interrupt task, the calling task is that interrupt task. If there is no interrupt task, SET$INTERRUPT also enables the specified level, which must be disabled at the time of the call.

Example

```
/*************************************************************************
 *  This example illustrates how the SET$INTERRUPT system call can be   *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

INTERRUPTHANDLER: PROCEDURE INTERRUPT 63 EXTERNAL;
END INTERRUPTHANDLER;

    DECLARE interrupt$level$7  LITERALLY '0000000001111000B';
                               /* specifies master interrupt level 7 */

    DECLARE interrupt$task$flag BYTE;
    DECLARE interrupt$handler   POINTER;
    DECLARE data$segment        TOKEN;
    DECLARE status              WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    interrupt$task$flag = 0;          /* indicates no interrupt task on level 7 */
    data$segment = SELECTOR$OF(NIL);  /* indicates that the interrupt handler
                                         will load its own data segment */

    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                               /* points to the first instruction of
                                  the interrupt handler */
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  An interrupt level must have an interrupt handler or an interrupt   *
 *  task assigned to it.  Invoking the SET$INTERRUPT system call, the   *
 *  calling task assigns INTERRUPTHANDLER to interrupt level 7.         *
 *************************************************************************/

    CALL RQ$SET$INTERRUPT  (interrupt$level$7,
                            interrupt$task$flag,
                            interrupt$handler,
                            data$segment,
                            @status);
```

```
    •
    •       Typical PL/M-86 Statements
    •
END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	One of the following is true: • The task is already an interrupt task. • The specified level already has an interrupt handler assigned to it. • The job containing the calling task or the calling task itself is in the process of being deleted.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration
E$PARAM	8004H	One of the following is true: • The level parameter is invalid or would cause the task to have a priority not allowed by its job. • The programmable interrupt controller (PIC) corresponding to the specified level is not part of the hardware configuration.

The SETOSEXTENSION system call either enters the address of an entry (or function) procedure in the interrupt vector table or it deletes such an entry.

CAUTION

This system call should not be used by Human Interface applications that are loaded into dynamic memory. If such an application is deleted (via a CONTROL-C entered at a terminal), subsequent interrupts to the vector table entry set by this system call could cause unpredictable results.

```
CALL RQ$SET$OS$EXTENSION (os$extension, start$address, except$ptr);
```

Input Parameters

os$extension	A BYTE designating the entry of the interrupt vector table to be set or reset. This value must be between 192 and 255 (decimal), inclusive. The values in the range 0 to 191 are valid, but are reserved for Intel use.
start$address	A POINTER to the first instruction of an entry (or function) procedure. If start$address contains a NIL or zero value, the specified interrupt vector table entry is being reset (deallocated).

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SETOSEXTENSION system call sets or resets any one of the 32 operating system extension entries in the interrupt vector table. An entry must be reset before its contents can be changed. An attempt to set an already set entry causes an E$CONTEXT exceptional condition.

Example

```
/*************************************************************************
 *  This example illustrates how the SET$OS$EXTENSION system call can   *
 *  be used to reset an entry in the Interrupt Vector Table.  The       *
 *  example assumes that the entry for the level (number 250) was set   *
 *  earlier by another procedure.                                       *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE vector$entry$250      LITERALLY '250';
    DECLARE reset                 LITERALLY '0';
    DECLARE status                WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  The calling task invokes the SET$OS$EXTENSION system call to reset  *
 *  entry 250 (decimal) of the Interrupt Vector Table.                  *
 *************************************************************************/

    CALL RQ$SET$OS$EXTENSION            (vector$entry$250, reset,
                                         @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The entry is already is set. Before you can set the entry again, you must first reset it (call SETOSEXTENSION and specify a 0 for the start$address parameter).
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The OS$extension byte value is less than 192.

SET$POOL$MIN

The SET$POOL$MIN system call sets a job's pool$min attribute.

```
CALL RQ$SET$POOL$MIN (new$min, except$ptr);
```

Input Parameter

new$min — A WORD indicating the pool$min attribute of the calling task's job.

- If 0FFFFH, indicates that the pool$min attribute of the calling task's job is to be set equal to that job's pool$max attribute.
- If less than 0FFFFH, contains the new value of the pool$min attribute of the calling task's job. This new value must not exceed that job's pool$max attribute.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SET$POOL$MIN system call sets the pool$min attribute of the calling task's job. The new value must not exceed that job's pool$max attribute. When the pool$min attribute is made larger than the current pool size, the pool is not enlarged until the additional memory is needed.

Example

```
/*************************************************************************
 *  This example illustrates how the SET$POOL$MIN system call can be     *
 *  used.                                                                *
 *************************************************************************/

    DECLARE TOKEN           LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE new$min     WORD;
    DECLARE status      WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    new$min = 0FFFFH;       /* sets pool$min attribute of calling
                               task's job equal to job's pool$max
                               attribute */
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  In this example the pool$min attribute of the calling task's job     *
 *  is to be set equal to that job's pool$max attribute.                 *
 *************************************************************************/

    CALL RQ$SET$POOL$MIN        (new$min,
                                 @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$LIMIT	0004H	The new$min parameter is not 0FFFFH, but it is greater than the pool$max attribute of the calling task's job.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.

The SET$PRIORITY system call changes the priority of a task.

CAUTION

Tasks can become blocked for long periods of time, and real-time performance of the iRMX I Operating System can be degraded when a task uses this system call to lower its own priority.

```
CALL RQ$SET$PRIORITY (task, priority, except$ptr);
```

Input Parameters

task	A TOKEN for the task whose priority is to be changed. Setting this parameter to SELECTOR$OF(NIL) or zero selects the invoking task.
priority	A BYTE containing the task's new priority. A zero value specifies the maximum priority of the specified task's containing job.

Output Parameter

except$ptr	A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SET$PRIORITY system call allows the priority of a non-interrupt task to be altered dynamically. If the priority parameter is set to zero, the task's new priority is its containing job's maximum priority. Otherwise, the priority parameter contains the new priority of the specified task. The new priority, if explicitly specified, must not exceed its containing job's maximum priority.

Example

```
/*************************************************************************
 *  This example illustrates how the SET$PRIORITY system call can be     *
 *  used to change the priority of a task.                               *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

 TASKCODE: PROCEDURE EXTERNAL;
 END TASKCODE;

    DECLARE task$token                  TOKEN;
    DECLARE priority$level$66           LITERALLY '66';
    DECLARE priority$level$0            LITERALLY '0';
    DECLARE start$address               POINTER;
    DECLARE data$seg                    TOKEN;
    DECLARE stack$pointer               POINTER;
    DECLARE stack$size$512              LITERALLY '512';
                                              /* new task's
                                                 stack size is 512
                                                 bytes */
    DECLARE task$flags                  WORD;
    DECLARE status                      WORD;
    DECLARE job$token                   TOKEN;

SAMPLEPROCEDURE:
    PROCEDURE;

    start$address = @TASKCODE;          /* pointer to first instruction of
                                           interrupt task */
    data$seg = SELECTOR$OF(NIL);        /* task sets up own data segment */
    stack$pointer = NIL;                /* automatic stack allocation  */
    task$flags = 0;                     /* designates no floating-point
                                           instructions */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  In this example, the calling task creates a task whose priority is  *
 *  to be changed.  The new task initially has a priority level 66.     *
 *************************************************************************/

   task$token = RQ$CREATE$TASK   (priority$level$66,
                                  start$address,
                                  data$seg,
                                  stack$pointer,
                                  stack$size$512,
                                  task$flags,
                                  @status);

/*************************************************************************
 *  The calling task in this example does not need to invoke the        *
 *  CATALOG$OBJECT system call to ensure the successful use of the      *
 *  SET$PRIORITY system call.  To allow other tasks access to the new   *
 *  task, however, requires that the task's object token be cataloged.  *
 *************************************************************************/

   CALL RQ$CATALOG$OBJECT        (job$token,
                                  task$token,
                                  @(8, 'TASKCODE'),
                                  @status);
     •
     •     Typical PL/M-86 Statements
     •

/*************************************************************************
 *  The new task (whose code is labeled TASKCODE) is not an interrupt   *
 *  task, so its priority may be changed dynamically by invoking the    *
 *  SET$PRIORITY system call.                                           *
 *************************************************************************/

   CALL RQ$SET$PRIORITY          (task$token,
                                  priority$level$0,
                                  @status);
     •
     •     Typical PL/M-86 Statements
     •
```

```
/*************************************************************************
 *  Once the need for the higher priority is no longer present, the     *
 *  priority of the new task can be changed back to its original        *
 *  priority by invoking SET$PRIORITY a second time.                    *
 *************************************************************************/

   CALL RQ$SET$PRIORITY          (task$token,
                                  priority$level$66,
                                  @status);
     •
     •     Typical PL/M-86 Statements
     •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The specified task is an interrupt task. You cannot set the priority of an interrupt task dynamically.
E$EXIST	0006H	The task parameter is not a token for an existing object.
E$LIMIT	0004H	The priority parameter contains a priority value that is higher than the maximum priority of the specified task's containing job.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$TYPE	8002H	The task parameter is a token for an object that is not a task.

The SIGNAL$EXCEPTION system call is normally used with OS extensions to signal the occurrence of an exceptional condition.

```
CALL RQ$SIGNAL$EXCEPTION (exception$code, param$num, stack$ptr,
                          first$reserved$word, second$reserved$word,
                          except$ptr);
```

Input Parameters

exception$code — A WORD containing the code (see list in the *iRMX® I Nucleus User's Guide*) for the exceptional condition detected.

param$num — A BYTE containing the number of the parameter that caused the exceptional condition. If no parameter is at fault, param$num equals zero.

stack$ptr — A WORD that, if not zero, must contain the value of the stack pointer saved on entry to the operating system extension (see the entry procedure in the *iRMX® I Nucleus User's Guide* for an example). The top five words in the stack (where BP is at the top of the stack) must be as follows:

FLAGS	Saved by software interrupt
CS	to OS extension
IP	
DS	Saved by OS extension
BP	on entry

Upon completion of SIGNAL$EXCEPTION, control is returned to either of two instructions. If stack$pointer contains NIL, control returns to the instruction following the call to SIGNAL$EXCEPTION. Otherwise, control returns to the instruction identified in CS and IP.

first$reserved$word — A WORD reserved for Intel use. Set this parameter to zero.

second$reserved$-word — A WORD reserved for Intel use. Set this parameter to zero.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

Operating system extensions use the SIGNAL$EXCEPTION system call to signal the occurrence of exceptional conditions. Depending on the exceptional condition and the calling task's exception mode, control may or may not pass directly to the task's exception handler.

If the exception handler does not get control, the exceptional condition code is returned to the calling task. The task can then access the code by checking the contents of the word pointed to by the except$ptr parameter for its call (not for the call to SIGNAL$EXCEPTION).

Example

```
/*************************************************************************
 *  This example illustrates how the SIGNAL$EXCEPTION system call can   *
 *  be used to signal the occurrence of the exceptional condition       *
 *  E$CONTEXT.                                                          *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE e$context               LITERALLY '5H';
    DECLARE param$num               BYTE;
    DECLARE stack$pointer           WORD;
    DECLARE reserved$word           LITERALLY '0';
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    param$num = 0;                  /* no parameter at fault */
    stack$pointer = 0;              /* return control to instruction
                                       following call */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  In this example the SIGNAL$EXCEPTION system call is invoked by      *
 *  extensions of the operating system to signal the occurrence of an   *
 *  E$CONTEXT exceptional condition.                                    *
 *************************************************************************/

   CALL RQ$SIGNAL$EXCEPTION      (e$context,
                                  param$num,
                                  stack$pointer,
                                  reserved$word,
                                  reserved$word,
                                  @status);
     •
     •     Typical PL/M-86 Statements
     •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.

SIGNAL$INTERRUPT

The SIGNAL$INTERRUPT system call is used by an interrupt handler to activate an interrupt task.

```
CALL RQ$SIGNAL$INTERRUPT (level, except$ptr);
```

Input Parameter

level — A WORD containing an interrupt level that is encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call. All exceptional conditions must be processed in-line, as control does not pass to an exceptional handler.

Description

An interrupt handler uses SIGNAL$INTERRUPT to start up its associated interrupt task. The interrupt task runs in its own environment with higher (and possibly the same) level interrupts enabled, whereas the interrupt handler runs in the environment of the interrupted task with all interrupts disabled. The interrupt task can also make use of exception handlers, whereas the interrupt handler always receives exceptions in-line.

Example

```
/*************************************************************************
 *  This example illustrates how the SIGNAL$INTERRUPT system call can   *
 *  be used to activate an interrupt task.                               *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE interrupt$level$7     LITERALLY '0000000001111000B';
                                  /* specifies master interrupt level 7*/
    DECLARE E$OK                  LITERALLY '00H';
    DECLARE the$first$word        WORD;
    DECLARE interrupt$task$flag   BYTE;
    DECLARE interrupt$handler     POINTER;
    DECLARE data$segment          TOKEN;
    DECLARE status                WORD;
    DECLARE interrupt$status      WORD;
    DECLARE ds$pointer            POINTER;
    DECLARE PTR$OVERLAY           LITERALLY 'STRUCTURE (offset   WORD,
                                                        base     TOKEN)';
                                  /* establishes a structure for
                                     overlays */

    DECLARE ds$pointer$ovly       PTR$OVERLAY AT (@ds$pointer);
                                  /* using the overlay structure, the
                                     base address of the interrupt
                                     handler's data segment is
                                     identified */

INTERRUPTHANDLER: PROCEDURE INTERRUPT 59 PUBLIC;  /* 59 is meaningless
                                                     value.  ENTER$INTER-
                                                     RUPT establishes
                                                     actual level */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  The calling interrupt handler invokes the ENTER$INTERRUPT system    *
 *  call which loads a base address value (defined by                   *
 *  ds$pointer$ovly.base) into the data segment register.  This         *
 *  register provides a mechanism for the interrupt handler to pass     *
 *  data to the interrupt task to be started up by the SIGNAL$INTERRUPT *
 *  system call.                                                        *
 *************************************************************************/

    CALL RQ$ENTER$INTERRUPT       (interrupt$level$7,
                                   @interrupt$status);
    CALL INLINEERRORPROCESS       (interrupt$status);

      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  The interrupt handler uses SIGNAL$INTERRUPT to start up its         *
 *  associated interrupt task.                                          *
 *************************************************************************/

    CALL RQ$SIGNAL$INTERRUPT      (interrupt$level$7,
                                   @interrupt$status);
    CALL INLINEERRORPROCESS       (interrupt$status);

END INTERRUPTHANDLER;

INLINEERRORPROCESS: PROCEDURE(int$status);
    DECLARE int$status  WORD;

    IF int$status <> E$OK THEN
         DO;

            •
            •     Typical PL/M-86 Statements
            •

         END;

END INLINEERRORPROCESS;
```

```
SAMPLEPROCEDURE:
    PROCEDURE;

    ds$pointer = @the$first$word; /* a dummy identifier used to point to
                                     interrupt handler's data segment */
    data$segment = ds$pointer$ovly.base;
                                  /* identifies the base address of the
                                     interrupt handler's data segment */
    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                                  /* points to the first instruction of
                                     the interrupt handler */
    interrupt$task$flag = 01H;    /* indicates that calling task is to be
                                     interrupt task */
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  By first invoking the SET$INTERRUPT system call, the calling task   *
 *  sets up an interrupt level and becomes the interrupted task for     *
 *  level 7.                                                            *
 *************************************************************************/

    CALL RQ$SET$INTERRUPT         (interrupt$level$7,
                                   interrupt$task$flag,
                                   interrupt$handler,
                                   data$segment,
                                   @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	No interrupt task is assigned to the specified level.
E$INTERRUPT$OVERFLOW	000AH	The interrupt task has accumulated more than the maximum allowable number of SIGNAL$INTERRUPT requests. It had reached its saturation point and then called ENABLE to allow the handler to receive further interrupt signals. It subsequently received an additional SIGNAL$INTERRUPT request before calling WAIT$INTERRUPT.
E$INTERRUPT$SATURATION	0009H	The interrupt task has accumulated the maximum allowable number of SIGNAL$INTERRUPT requests. This is an informative message only. It does not indicate an error.
E$LIMIT	0004H	An overflow has occurred because the interrupt task has received more than 255 SIGNAL$INTERRUPT requests.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The level parameter is invalid.

The SLEEP system call puts the calling task to sleep.

```
CALL RQ$SLEEP (time$limit, except$ptr);
```

Input Parameter

time$limit — A WORD indicating the conditions in which the calling task is to be put to sleep.

- If not zero and not 0FFFFH, causes the calling task to go to sleep for that many clock intervals, after which it will be awakened. The length of a clock interval is configurable. Refer to the *iRMX® I Interactive Configuration Utility Reference Manual* for further information.
- If zero, causes the calling task to be placed on the list of ready tasks, immediately behind all tasks of the same priority. If there are no such tasks, there is no effect and the calling task continues to run.
- If 0FFFFH, an error is returned.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SLEEP system call has two uses. One use places the calling task in the asleep state for a specific amount of time. The other use allows the calling task to defer to the other ready tasks with the same priority. When a task defers in this way it is placed on the list of ready tasks, immediately behind those other tasks of equal priority.

Example

```
/*************************************************************************
 *  This example illustrates how the SLEEP system call can be used.     *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE time$limit              WORD;
    DECLARE status                  WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    time$limit = 100;               /* sleep for 100 clock ticks */

        •
        •       Typical PL/M-86 Statements
        •

/*************************************************************************
 *  The calling task puts itself in the asleep state for 100 clock      *
 *  ticks by invoking the SLEEP system call.                            *
 *************************************************************************/

    CALL RQ$SLEEP                   (time$limit,
                                     @status);
        •
        •       Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The time$limit parameter contains the invalid value 0FFFFH.

The SUSPEND$TASK system call increases by one the suspension depth of a task.

```
CALL RQ$SUSPEND$TASK (task, except$ptr);
```

Input Parameter

task — A TOKEN specifying the task whose suspension depth is to be incremented.

- if not SELECTOR$OF(NIL) or zero, contains a token for the task whose suspension depth is to be incremented.
- if SELECTOR$OF(NIL) or zero, indicates that the calling task is suspending itself.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The SUSPEND$TASK system call increases by one the suspension depth of the specified task. If the task is already in either the suspended or asleep-suspended state, its state is not changed. If the task is in the ready or running state, it enters the suspended state. If the task is in the asleep state, it enters the asleep-suspended state.

SUSPEND$TASK cannot be used to suspend interrupt tasks.

Example

```
/*************************************************************************
 *  This example illustrates how the SUSPEND$TASK system call can be     *
 *  used to increase the suspension depth of a non-interrupt task.       *
 *************************************************************************/

    DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */


/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

TASKCODE: PROCEDURE EXTERNAL;
END TASKCODE;

    DECLARE task$token            TOKEN;
    DECLARE priority$level$200    LITERALLY '200';
    DECLARE start$address         POINTER;
    DECLARE data$seg              TOKEN;
    DECLARE stack$pointer         POINTER;
    DECLARE stack$size$512        LITERALLY '512'; /* new task's stack
                                                      size is 512 bytes */
    DECLARE task$flags            WORD;
    DECLARE status                WORD;

SAMPLEPROCEDURE:
    PROCEDURE;

    start$address = @TASKCODE;    /* first instruction of the new task */
    data$seg =SELECTOR$OF(NIL);   /* task sets up own data seg */
    stack$pointer = NIL;            /* automatic stack allocation  */
    task$flags = 0;               /* designates no floating-point
                                     instructions */
      •
      •     Typical PL/M-86 Statements
      •
```

```
/*************************************************************************
 *  In order to suspend a task, a task must know the token for that     *
 *  task.  In this example, the needed token is known because the       *
 *  calling task creates the new task (whose code is labeled TASKCODE). *
 *************************************************************************/

    task$token = RQ$CREATE$TASK   (priority$level$200,
                                   start$address,
                                   data$seg,
                                   stack$pointer,
                                   stack$size$512,
                                   task$flags,
                                   @status);
        •
        •     Typical PL/M-86 Statements
        •

/*************************************************************************
 *  After creating the task, the calling task invokes SUSPEND$TASK.     *
 *  This system call increases by one the suspension depth of the new   *
 *  task (whose code is labeled TASKCODE).                              *
 *************************************************************************/

    CALL RQ$SUSPEND$TASK (task$token, @status);

        •
        •     Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The specified task is an interrupt task. You cannot suspend interrupt tasks.
E$EXIST	0006H	The task parameter is not a token for an existing object.
E$LIMIT	0004H	The suspension depth for the specified task is already at the maximum of 255.
E$TYPE	8002H	The task parameter is a token for an object that is not a task.

UNCATALOG$OBJECT

The UNCATALOG$OBJECT system call removes an entry for an object from an object directory.

```
CALL RQ$UNCATALOG$OBJECT (job, name, except$ptr);
```

Input Parameters

job — A TOKEN indicating the job of the object directory from which an entry is to be deleted.

- If not SELECTOR$OF(NIL) or zero, the TOKEN contains a token for the job from whose object directory the specified entry is to be deleted.
- If SELECTOR$OF(NIL) or zero, the entry is to be deleted from the object directory of the calling task's job.

name — A POINTER to a STRING containing the name of the object whose entry is to be deleted.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The UNCATALOG$OBJECT system call deletes an entry from the object directory of the specified job.

Example

```
/*************************************************************************
 *  This example illustrates how the UNCATALOG$OBJECT system call can   *
 *  be used.                                                            *
 *************************************************************************/

     DECLARE TOKEN      LITERALLY 'SELECTOR';
                           /* if your PL/M compiler does not
                              support this variable type,
                              declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

    DECLARE seg$token    TOKEN;
    DECLARE size         WORD;
    DECLARE mbx$token    TOKEN;
    DECLARE mbx$flags    WORD;
    DECLARE no$response  LITERALLY '0';
    DECLARE status       WORD;
    DECLARE job$token    TOKEN;

SAMPLEPROCEDURE:
    PROCEDURE;

    size = 64;                    /* designates new segment to contain 64
                                     bytes */
    mbx$flags = 0;                /* designates four objects to be queued
                                     on the high performance object
                                     queue;  designates a first-in/
                                     first-out task queue */
    job$token = SELECTOR$OF(NIL); /* indicates objects to be cataloged
                                     into the object directory of the
                                     calling task's job */

       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The calling task creates a segment and a mailbox and catalogs the   *
 *  mailbox TOKEN.  The calling task then uses the TOKENs for both      *
 *  objects to send a message.                                          *
 *************************************************************************/

    seg$token = RQ$CREATE$SEGMENT  (size,
                                    @status);
    mbx$token = RQ$CREATE$MAILBOX  (mbx$flags,
                                    @status);
```

```
/*************************************************************************
 *  It is not mandatory for the calling task to catalog the mailbox     *
 *  token in order to send a message.  It is necessary, however, to     *
 *  catalog the mailbox token if a task in another job is to receive    *
 *  the message.                                                        *
 *************************************************************************/

   CALL RQ$CATALOG$OBJECT            (job$token,
                                     mbx$token,
                                     @(3, 'MBX'),
                                     @status);
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  The calling task invokes the SEND$MESSAGE system call to send the   *
 *  token for the segment to the specified mailbox.                     *
 *************************************************************************/

   CALL RQ$SEND$MESSAGE              (mbx$token,
                                     seg$token,
                                     no$response,
                                     @status);
      •
      •     Typical PL/M-86 Statements
      •

/*************************************************************************
 *  When the mailbox is no longer needed and there is no need to keep   *
 *  its token cataloged, it may be deleted by any task that knows its   *
 *  token.                                                              *
 *************************************************************************/

   CALL RQ$UNCATALOG$OBJECT          (job$token,
                                     @(3,'MBX'),
                                     @status);

   CALL RQ$DELETE$MAILBOX            (mbx$token,
                                     @status);
      •
      •     Typical PL/M-86 Statements
      •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The specified object directory does not contain an entry with the designated name.
E$EXIST	0006H	The job parameter is neither zero nor a token for an existing object.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The first byte of the STRING pointed to by the name parameter contains a value greater than 12 or equal to 0.
E$TYPE	8002H	The job parameter is a token for an object that is not a job.

WAIT$INTERRUPT

The WAIT$INTERRUPT system call is used by an interrupt task to signal its readiness to service an interrupt.

```
CALL RQ$WAIT$INTERRUPT (level, except$ptr);
```

Input Parameter

level — A WORD specifying an interrupt level which is encoded as follows (bit 15 is the high-order bit):

Bits	Value
15-7	Reserved bits that should be set to zero.
6-4	First digit of the interrupt level (0-7).
3	If one, the level is a master level and bits 6-4 specify the entire level number. If zero, the level is a slave level and bits 2-0 specify the second digit.
2-0	Second digit of the interrupt level (0-7), if bit 3 is zero.

Output Parameter

except$ptr — A POINTER to a WORD to which the iRMX I Operating System will return the condition code generated by this system call.

Description

The WAIT$INTERRUPT system call is used by interrupt tasks immediately after initializing and immediately after servicing interrupts. Such a call suspends an interrupt task until the interrupt handler for the same level resumes it by invoking SIGNAL$INTERRUPT.

While the interrupt task is processing, all lower level interrupts are disabled. The associated interrupt level is either disabled or enabled, depending on the option originally specified with the SET$INTERRUPT system call. If the associated interrupt level is enabled, all SIGNAL$INTERRUPT calls that the handler makes (up to the limit specified with SET$INTERRUPT) are logged. If this count of SIGNAL$INTERRUPT calls is greater than zero when the interrupt task calls WAIT$INTERRUPT, the task is not suspended. Instead it continues processing the next SIGNAL$INTERRUPT request.

If the associated interrupt level is disabled while the interrupt task is running and the number of outstanding SIGNAL$INTERRUPT requests is less than the user-specified limit, the call to WAIT$INTERRUPT enables that level.

Example

```
/*************************************************************************
 *  This example illustrates how the WAIT$INTERRUPT system call can be  *
 *  used to signal a task's readiness to service an interrupt.          *
 *************************************************************************/

    DECLARE TOKEN       LITERALLY 'SELECTOR';
                            /* if your PL/M compiler does not
                               support this variable type,
                               declare TOKEN a WORD */

/*  NUCLUS.EXT declares all nucleus system calls */
$INCLUDE(:RMX:INC/NUCLUS.EXT)

INTERRUPTHANDLER: PROCEDURE INTERRUPT 63 EXTERNAL;
END INTERRUPTHANDLER;

    DECLARE task$token              TOKEN;
    DECLARE priority$level$150      LITERALLY '150';
    DECLARE start$address           POINTER;
    DECLARE data$segment            TOKEN;
    DECLARE stack$pointer           POINTER;
    DECLARE stack$size$512          LITERALLY '512'; /* new task's stack
                                                        size is 512 bytes */
    DECLARE task$flags               WORD;
    DECLARE interrupt$level$7        LITERALLY '0000000001111000B';
                                     /* specifies master interrupt level 7 */
    DECLARE interrupt$task$flag      BYTE;
    DECLARE interrupt$handler        POINTER;
    DECLARE interrupt$status         WORD;
    DECLARE status                   WORD;
```

```
INTERRUPTTASK: PROCEDURE PUBLIC;

    interrupt$task$flag = 01H;          /* indicates that calling task is to
                                           be interrupt task */
    data$segment = SELECTOR$OF(NIL);    /* use own data segment */
    interrupt$handler = INTERRUPT$PTR (INTERRUPTHANDLER);
                                        /* points to the first instruction of
                                           the interrupt handler */

/*************************************************************************
 *  The first system call in this example, SET$INTERRUPT, makes the      *
 *  calling task (INTERRUPTTASK) the interrupt task for interrupt        *
 *  level seven.                                                         *
 *************************************************************************/

    CALL RQ$SET$INTERRUPT           (interrupt$level$7,
                                     interrupt$task$flag,
                                     interrupt$handler,
                                     data$segment,
                                     @interrupt$status);
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  The calling interrupt task invokes WAIT$INTERRUPT to suspend itself  *
 *  until the interrupt handler for the same level resumes the task by   *
 *  invoking the SIGNAL$INTERRUPT system call.                           *
 *************************************************************************/

    CALL RQ$WAIT$INTERRUPT          (interrupt$level$7,
                                     @interrupt$status);
       •
       •     Typical PL/M-86 Statements
       •

/*************************************************************************
 *  When the interrupt task invokes the RESET$INTERRUPT system call,     *
 *  the assignment of the current interrupt handler to interrupt level   *
 *  7 is cancelled and, because an interrupt task has also been          *
 *  assigned to the line, the interrupt task is deleted.                 *
 *************************************************************************/

    CALL RQ$RESET$INTERRUPT         (interrupt$level$7,
                                     @interrupt$status);
END INTERRUPTTASK;
SAMPLEPROCEDURE:
    PROCEDURE;

    start$address = @INTERRUPTTASK;     /* 1st instruction of interrupt
                                           task */
    stack$pointer = NIL;                /* automatic stack allocation */
```

```
    task$flags = 0;                    /* designates no floating-point
                                          instrucitions */
    data$segment = SELECTOR$OF(NIL);   /* use own data segment */

        •
        •      Typical PL/M-86 Statements
        •

/*************************************************************************
 *  In this example the calling task invokes the system call             *
 *  CREATE$TASK to create a task labeled INTERRUPTTASK.                  *
 *************************************************************************/

    task$token = RQ$CREATE$TASK    (priority$level$150,
                                    start$address,
                                    data$segment,
                                    stack$pointer,
                                    stack$size$512,
                                    task$flags,
                                    @status);
        •
        •      Typical PL/M-86 Statements
        •

END SAMPLEPROCEDURE;
```

Condition Codes

E$OK	0000H	No exceptional conditions.
E$CONTEXT	0005H	The calling task is not the interrupt task for the given level.
ENOTCONFIGURED	0008H	This system call is not part of the present configuration.
E$PARAM	8004H	The level parameter is invalid.

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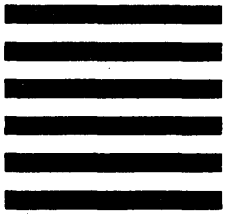

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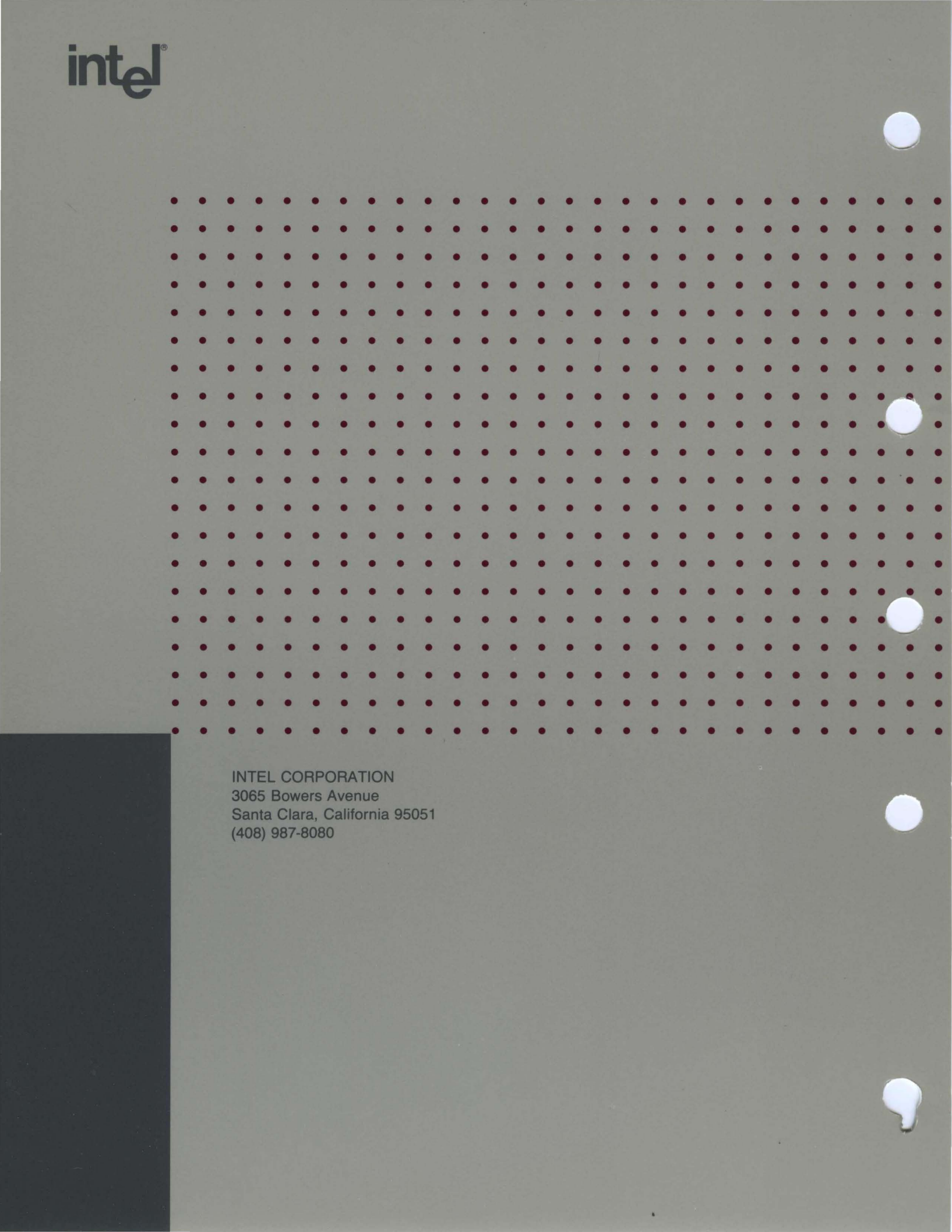

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