RSX-11D SPEC

TO: RSX-11D Distribution

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Unless specified otherwise, the terms "RSX" and "RSX-11" imply "RSX-11D".

System Directives, or Directives, are instructions to the executive to perform an indicated operation. All Directives are implemented as an "EMT 377" instruction, and a parameter list called a "Directive Parameter Block" or "DPB".

All information pertaining to an RSX Directive is contained in the DPB, and the EMT instruction is used only as a means of trapping to the executive. The 8-bit immediate operands contained in the low order portion of EMT instructions are NOT used in RSX Directives for two reasons: (1) System organization is cleaner when parameters for an operation are specified in one place [this does not preclude concatination of argument blocks via the DPB], and (2) By using only EMT 377, programs using EMT 0 thru EMT 376 [which includes programs written for all existing systems] can be run under RSX via the "Non-RSX System Trap". This mechanism traps to a Task contained service routine whenever an EMT other than EMT 377 is executed. This service routine is written to simulate the other environment to whatever degree is desired.

Directives are issued from Tasks by execution of an EMT 377 instruction with the address of a DPB, or a DPB itself, on the top of the issuing Task's stack.[1] When the stack contains a DPB pointer (address), the pointer is removed (popped) as the Directive is processed. When the stack contains a DPB, the DPB is left on the stack after the Directive is processed. In either case, the DPB is not altered when the Directive is processed.

With the exception of Directives that cause an issuing Task to EXIT, control is returned at the word (instruction) following the EMT 377 instruction, with the "V" condition code and a "Directive Status Word" set to indicate performance or rejection.

Each Task has its own Directive Status Word, or DSW, at its virtual location zero.

When a Directive is performed, the "V" condition code is set, and the Directive Status Word is set positive. When a Directive is rejected, the "V" condition code is cleared, and the Directive Status Word is set negative where its magnitude indicates the reason for rejection.

Associated with many Directive is an "Event Flag" which is set, cleared, or tested, as a result of the Directive. Sixty-four different Event Flags, numbered from 1 thru 64 may be used. The first thirty-two (1-32) are unique to each Task, and cannot be altered by other Tasks, the second thirty-two Event Flags are common for ALL Tasks.

Whenever a Directive sets an Event Flag, a Significant Event is declared. (I.e., A stimulus is provided for the event-driven system.)

The first byte of all DPBs contains a Directive Identification Code (DIC), that indicates which Directive is to be performed. Following is a list of DICs and the coresponding Directives.

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[1] The first word of all DPBs is always odd, and the address of all DPBs is always even. Hence, the system can always differentiate between a DPB and its address.

DIC	DIRECTIVE
1	QUEUE I/O PER TASK ASSIGNMENT
3	QUEUE I/O PER MCR ASSIGNMENT
5	GET INFORMATION PER LUN
7	ASSIGN LUN
11	REQUEST
13	EXECUTE
15	SCHEDULE
17	RUN
19	SYNC
21	INSTALL & REQUEST
23	MARK TIME
25	CANCEL SCHEDULED REQUESTS
27	CANCEL MARK TIMES
31	CLEAR EVENT FLAG
33	SET EVENT FLAG
35	DECLARE SIGNIFICANT EVENT
37	READ EVENT FLAG
41	WAITFOR EVENT FLAG(S)
43	SUSPEND
45	RESUME
51	EXIT
53	EXITIF
61	GET TIME
63	GET TASK PARAMETERS
71	SEND
73	SEND AND REQUEST
75	RECEIVE
77	RECEIVE OR EXIT
81	DISABLE
83	ENABLE
85	FIX IN MEMORY
87	UNFIX
89	ABORT
95	DECLARE NOT CHECKPOINTABLE
97	DECLARE CHECKPOINTABLE
101	SET SYSTEM TRAP VECTOR
103	EXIT SYSTEM TRAP

ADDITIONAL DIRECTIVES WILL BE ADDED

The remainder of this spec is a description of each of the Directives listed above. The following convensions and assumptions are used throughout.

Decimal radix is used in all cases except (1) hardware addresses and (2) device unit numbers.

Task and Partition names may be up to six characters long, and are always indicated as two words in Radix-50 representation.

Device names are two characters long, and are always indicated by one word in ASCII representation.

Optional elements are enclosed in square brackets ([]), and a value of zero in these cases implies "none specified".

Time unit indicators are: one (1) for clock ticks, two (2) for seconds, three (3) for minutes, and four (4) for hours.

A Directive Status of -100 is returned whenever an invalid DIC is specified.

A Directive Status of -101 is returned whenever an invalid EFN is detected. An EFN is invalid when it is (1) outside the range 1-64 when an Event Flag MUST be specified, or (2) outside the range 0-64 where an Event Flag MAY be specified).

A Directive Status of -102 is returned whenever an invalid LUN (Logical Unit Number) is detected. Each Task may have as many LUNs as desired, but the smallest LUN is always one (+1).

A Directive Status of -103 is returned whenever an invalid address is detected. This normally occurs because a part of a DPB or a DPB specified buffer is outside the address space of the issuing Task.

A Directive Status of -104 is returned whenever an invalid priority is detected.

A Directive Status of -105 is returned whenever an invalid time parameter is detected.

A Directive Status of -110 is returned whenever a non-existent Task name is detected.

A Directive Status of -111 is returned whenever a non-existent Partition name is detected.

A Directive Status of -112 is returned whenever a non-existnt Device name/unit is detected.

A Directive Status of -999 is returned whenever a directive is rejected because a list element (node) cannot be taken from the Pool (either because the Pool is empty, or because the issuing Task's Pool usage quota has been exceeded).

THE "QUEUE I/O" DIRECTIVES

These Directives instruct the system to place an I/O request for an indicated device in a queue of priority ordered requests for that device-unit. The I/O device-unit is specified as a Logical Unit Number (LUN), which is mapped into a physical unit per LUN assignment.

Each Task has its own set of LUN assignments which are independent of all other Task's, and it is this set of assignments that is normally used when queueing an I/O request. However, there is a class of I/O that is to be directed to a physical unit per the assignments of the MCR Dispatch Task, (viz., MCR Function Task I/O, Handler Task error messages, and User Task communication with the operator.) A Directive Identification Code (DIC) of "01" indicates a (normal) QUEUE I/O PER TASK ASSIGNMENT Directive, and a DIC of "03" indicates a QUEUE I/O PER MCR ASSIGNMENT Directive.

The QUEUE I/O DPBs differ only in the DIC, and are of the following format:

Wd. 00 -- DIC (01 or 03) & [EFN],
Wd. 01 -- I/O Function code,
Wd. 02 -- LUN & [Conditions],
Wd. 03 -- [Address of I/O Status Word],
Wd. 04 -- Parameter #1,
Wd. 05 -- Parameter #2,
Wd. 06 -- Parameter #3,
Wd. 07 -- Parameter #4,
Wd. 10 -- Parameter #5,
Wd. 06 -- Parameter #6,
Wd. 07 -- Parameter #7,
Wd. 10 -- Parameter #8,

Wd. 02 -- Byte zero contains a Logical Unit Number indicating which device-unit request queue is to receive an entry. Byte one contains the following additional conditional queuing information:
Bit-0 -- Queue only if request queue is empty,
Bit-1 -- Queue only if device is unATTACHED,
Bit-2 -- Queue only if no files are open.

Wd. 03 -- a zero in this location indicates that no status is to be returned by the Handler Task (except setting of an indicated Event Flag at completion of service). A non-zero value in this location is taken as as an address (virtual) of a word in which to return I/O Status.

If the Directive is performed, the Event Flag (if specified) is cleared, the I/O Status Word (if specified) is zeroed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

The Event Flag and I/O Status Word (when specified) are set upon completion by the Handler Task.

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-101 -- Invalid EFN,
-102 -- Invalid LUN,
-103 -- Invalid address,
-999 -- Unavailable list element.

When an I/O request is satisfied, the indicated Event Flag is set, and if a Status Return Word was specified, it is set to indicate the status of the I/O operation after completion. Handler Tasks for common peripherials adhere to the following Status Word format conventions:

-10 --
-11 --
-12 --
.
.
.
-99 --

NOTE -- There is no "WAIT" associated with this directive, an Event Flag can be set upon I/O completion, and a Task may test or waitfor the Event Flag.

A "System Trap" will occur at I/O completion, if the Task is setup to service it.

The mechanics of passing requests to I/O Handler Tasks is described in other specs.

THE "GET INFORMATION PER LUN" DIRECTIVE

This Directive instructs the system to return information about the physical unit to which an indicated LUN is assigned. A DPB of the following format is used:

Wd. 00 -- DIC (05) & LUN.
Wd. 01 -- Address of three word buffer.

If the Directive is performed, the indicated three-word buffer is filled as follows, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

Buffer format:

Wd. 00 -- Device name (two ASCII characters).
Wd. 01 -- Unit number & Unused Byte.
Wd. 02 -- Unit characteristics indicator.

If the LUN is not assigned to a physical unit, the device name (Wd. 00) is returned zeroed, and the following two words are not altered.

The bits of the unit characteristics word are defined as follows:

Bit-00 -- Unit is readable.
Bit-01 -- Unit is writeable.
Bit-02 -- Unit is attachable.
Bit-03 -- Unit is file oriented.
Bit-04 -- Unit ..... to be completed .....

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative valued to indicate rejection and the reason:

-100 -- Invalid DIC.
-102 -- Invalid LUN.
-103 -- Invalid address.

THE "ASSIGN LUN" DIRECTIVE

This Directive instructs the system to assign an indicated Logical Unit Number to an indicated physical unit. A DPB of the following format is used:

Wd. 00 -- DPB (07) & LUN.
Wd. 01 -- Device name (two ASCII characters).
Wd. 02 -- Unit number & Unused Byte.

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-102 -- Invalid LUN.
-103 -- Invalid address.
-112 -- Non-existent device/unit.

THE "REQUEST" DIRECTIVE

This Directive instructs the system to make a Task active, i.e., To cause its execution contingent upon priority and memory availability, i.e., If a REQUESTed Task is not memory resident, it is loaded as soon as sufficient space in the Indicated Partition becomes available, A Priority and Partition may be specified, If a priority is not specified, the Task will run at the Default Priority specified when the Task was INSTALLed, If a partition is not specified, the Task will run in the Default Partition specified when the Task was INSTALLed, A DPB of the following format is used:

Wd, 00 -- DIC (11) & [Priority],
Wd, 01 -- Task name (first half),
Wd, 02 -- Task name (second half),
Wd, 03 -- [Partition name (first half)],
Wd, 04 -- [Partition name (second half)].

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive (+1),

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-103 -- Invalid address,
-104 -- Invalid Priority,
-110 -- Task not INSTALLED,
-111 -- Partition not in system,
-203 -- Task is active,
-208 -- Task is disabled,
-999 -- Unavailable list node,

THE "EXECUTE" DIRECTIVE

This Directive instructs the system to make a Task active IF, AND ONLY IF MEMORY IS AVAILABLE, A Priority and Partition may be specified. If a priority is not specified, the Task will run at the Default Priority specified when the Task was INSTALLed. If a partition is not specified, the Task will run in the Default Partition specified when the Task was INSTALLed. A DPB of the following format is used:

Wd. 00 -- DIC (13) & [Priority],
Wd. 01 -- Task name (first half),
Wd. 02 -- Task name (second half),
Wd. 03 -- [Partition name (first half)],
Wd. 04 -- [Partition name (second half)],

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-103 -- Invalid address,
-104 -- Invalid Priority,
-110 -- Task not INSTALLED,
-111 -- Partition not in system,
-203 -- Task is active,
-209 -- Task is disabled,
-205 -- No memory available,
-999 -- Unavailable list node.

THE "SCHEDULE" DIRECTIVE

This Directive instructs the system to make a Task active at some future time, specified in terms of 'time of day'. A periodic reschedule interval, Priority, and Partition may be optionally specified. If rescheduling is not specified, the Task is scheduled to run once. If a priority is not specified, the Task will run at the Default Priority specified when the Task was INSTALLed. If a partition is not specified, the Task will run in the Default Partition specified when the Task was INSTALLed. A DPB of the following format is used:

```
Wd, 00 -- DIC (15) & [Priority],
Wd, 01 -- Task name (first half),
Wd, 02 -- Task name (second half),
Wd, 03 -- DAY & HOUR,
Wd, 04 -- MINUTE & SECOND,
Wd, 05 -- [Reschedule interval magnitude],
Wd, 06 -- [Reschedule interval units] & Unused Byte,
Wd, 07 -- [Partition name (first half)],
Wd, 10 -- [Partition name (second half)],
```

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

```
-100 -- Invalid DIC,
-103 -- Invalid address,
-104 -- Invalid Priority,
-105 -- Invalid Time (schedule) parameter,
-110 -- Task not INSTALLED,
-111 -- Partition not in system,
-208 -- Task is disabled,
-999 -- Unavailable list node,
```

THE "RUN" DIRECTIVE

This Directive instructs the system to make a Task active at some future time, specified in terms of 'delta time from Issuance', A periodic reschedule interval, Priority, and Partition may be optionally specified. If rescheduling is not specified, the Task is scheduled to run once. If a priority is not specified, the Task will run at the Default Priority specified when the Task was INSTALLed. If a partition is not specified, the Task will run in the Default Partition specified when the Task was INSTALLed. A DPB of the following format is used:

```
Wd, 00 -- DIC=(17) & [Priority],
Wd, 01 -- Task name (first half),
Wd, 02 -- Task name (second half),
Wd, 03 -- Schedule delta time magnitude,
Wd, 04 -- Schedule delta time units & Unused Byte,
Wd, 05 -- [Reschedule interval magnitude],
Wd, 06 -- [Reschedule interval units] & Unused Byte,
Wd, 07 -- [Partition name (first half)],
Wd, 10 -- [Partition name (second half)],
```

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

```
-100 -- Invalid DIC,
-103 -- Invalid address,
-104 -- Invalid Priority,
-105 -- Invalid Time (schedule) parameter,
-110 -- Task not INSTALLED,
-111 -- Partition not in system,
-200 -- Task is disabled,
-999 -- Unavailable ILST node,
```

THE "SYNC" DIRECTIVE

This Directive instructs the system to make a Task active at some future time, specified in terms of 'delta time from clock unit synchronization'. A periodic reschedule interval, Priority, and Partition may be optionally specified. If rescheduling is not specified, the Task is scheduled to run once. If a priority is not specified, the Task will run at the Default Priority specified when the Task was INSTALLed. If a partition is not specified, the Task will run in the Default Partition specified when the Task was INSTALLed. A DPB of the following format is used:

Wd. 00 -- DIC (19) & [Priority],
Wd. 01 -- Task name (first half),
Wd. 02 -- Task name (second half),
Wd. 03 -- Schedule delta time magnitude,
Wd. 04 -- Schedule delta time units & Unused Byte,
Wd. 05 -- [Reschedule interval magnitude],
Wd. 06 -- [Reschedule interval units] & Unused Byte,
Wd. 07 -- [Partition name (first half)],
Wd. 10 -- [Partition name (second half)],

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-103 -- Invalid address,
-104 -- Invalid Priority,
-105 -- Invalid Time (schedule) parameter,
-110 -- Task not INSTALLED,
-111 -- Partition not in system,
-200 -- Task is disabled,
-999 -- Unavailable list node,

THE "INSTALL & REQUEST" DIRECTIVE

This Directive instructs the system to make a Task active even if it is not INSTALLed (the Task image must have been built and exist as a "TSK" file). If the Task has not been INSTALLed, it is (1) INSTALLED, (2) REQUESTed, and (3) REMOVED. If the Task is already INSTALLed, it is just REQUESTed. A Priority and Partition may be specified. If a priority is not specified, the Task will run at the Default Priority specified when the Task was INSTALLed. If a partition is not specified, the Task will run in the Default Partition specified when the Task was INSTALLed. A DPB of the following format is used:

```
Wd, 00 -- DIC (21) & [Priority],
Wd, 01 -- Task name (first half),
Wd, 02 -- Task name (second half),
Wd, 03 -- [Partition name (first half)],
Wd, 04 -- [Partition name (second half)],
Wd, 05 -- Device name (for "TSK" file),
Wd, 06 -- Device unit number & [EFN],
Wd, 07 -- [Install Status Word],
```

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive as follows:

```
+0 -- Task already INSTALLed (normal REQUEST)
+2 -- Task installation initiated -- Event Flag
and Installation Status Word to be set as follows
Upon completion:

 +1 -- Task INSTALLED,
 -1 -- Task NOT INSTALLED,
```

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

```
-100 -- Invalid DIC,
-103 -- Invalid address,
-104 -- Invalid Priority,
-130 -- Handler not capable of INSTALLATION,
-111 -- Partition not in system,
-203 -- Task is active,
-208 -- Task is disabled,
-999 -- Unavailable list node,
```

THE "MARK TIME" DIRECTIVE

This directive instructs the system to set an indicated Event Flag after an indicated time interval has elapsed. A DPB of the following format is used:

Wd, 00 -- DIC (23) & EFN,
Wd, 01 -- Delta time magnitude,
Wd, 02 -- Delta time units,

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-101 -- Invalid EFN,
-103 -- Invalid address,
-105 -- Invalid Time Parameter,
-999 -- Unavailable list element,

THE "CANCEL SCHEDULED REQUESTS" DIRECTIVE

This Directive instructs the system to delete pending scheduled execution requests for an indicated Task. A DPB of the following format is used:

```
Wd. 00 -- DIC (25) & Mode Indicator,
Wd. 01 -- Task name (first half),
Wd. 02 -- Task name (second half),
```

The following two cancellation modes are recognized: Mode=0 -- only scheduled requests for the indicated Task THAT HAVE BEEN MADE BY THE ISSUING TASK are cancelled. Mode=1 -- ALL scheduled requests for the indicated Task are cancelled.

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

```
-100 -- Invalid DIC,
-103 -- Invalid address,
-110 -- Task not in system,
-130 -- Invalid Mode Indicator.
```

THE "CANCEL MARK TIMES" DIRECTIVE

This Directive instructs the system to delete pending Mark Time requests for the issuing task. A DPB of the following format is used:

Wd, 00 -- DIC (27) & [EFN],

If an EFN is specified, ONLY Mark Time requests (by the issuing Task) to set the indicated Event Flag are cancelled. Otherwise, ALL Mark Time requests for the issuing Task are cancelled.

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-101 -- Invalid EFN,

THE "CLEAR EVENT FLAG" DIRECTIVE

This Directive instructs the system to clear an indicated Event Flag and report the flag's polarity before clearing. A DPB of the following format is used:

```
Wd, ØC. -- DIC (31) & EFN,
```

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive as follows:

```
+Ø -- flag was already clear,
+2 -- flag was set,
```

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

```
-1ØØ -- Invalid DIC,
-1Ø1 -- Invalid EFN,
```

THE "SET EVENT FLAG" DIRECTIVE

This Directive instructs the system to set an indicated Event Flag and report the flag's polarity before setting. A DPB of the following format is used:

```
Wd, ØD -- DIC (33) & EFN,
```

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive as follows:

```
+Ø -- flag was cleared,
+2 -- flag was already set,
```

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

```
-1ØØ -- Invalid DIC,
-1Ø1 -- Invalid EFN,
```

THE "DECLARE SIGNIFICANT EVENT" DIRECTIVE

This Directive instructs the system to declare a Significant Event. Also, an Event Flag may be specified to be set BEFORE the declaration. When an Event Flag is specified to be set, its polarity before setting is reported. A DPB of the following format is used:

Wd, ØØ -- DIC (35) & [EFN],

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive as follows:

+1 -- no Event Flag specified,
+Ø -- Specified Flag was cleared,
+2 -- Specified Flag was already set,

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-1ØØ -- Invalid DIC,
-1Ø1 -- Invalid EFN,

THE "READ EVENT FLAG" DIRECTIVE

This Directive instructs the system to read an indicated Event Flag and report its polarity. A DPB of the following format is used:

Wd, ØØ -- DIC (37) & EFN,

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive as follows:

+2 -- Event Flag is set,
+Ø -- Event Flag is reset,

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-1ØØ -- Invalid DIC,
-1Ø1 -- Invalid EFN,

THE "WAITFOR EVENT FLAG(S)" DIRECTIVE

This Directive instructs the system to suspend the execution of the issuing Task until any indicated Event Flags of one of the five following sets of flags is set:

Set 0 -- Flags 1-16,
Set 1 -- Flags 17-32,
Set 2 -- Flags 33-48,
Set 3 -- Flags 49-64,
Set 4 -- Flags 1-64,

If the indicated condition is met at issuance, Task execution is NOT suspended.

A two-word DPB of the following format is used to wait for Event Flags of sets 0, 1, 2, or 3:

Wd. 00 -- DIC (41) & Set Indicator (0,1,2,3),
Wd. 01 -- Sixteen flag mask word,

A five-word DPB of the following format is used to wait for Event Flags of set 4:

Wd. 00 -- DIC (55) & Set Indicator (4),
Wd. 01 -- Mask word for flags 1-16,
Wd. 02 -- Mask word for flags 17-32,
Wd. 03 -- Mask word for flags 33-48,
Wd. 04 -- Mask word for flags 49-64,

Mask word bits from right-to-left represent increasing Event Flag numbers, and a set mask word bit indicates "wait for the coresponding Event Flag".

For example, the following DPB is used to wait for Flag-19, or Flag-20, or Flag-21, or Flag-32.

```
DPB:    ,BYTE   55,1
        ,WORD   100034
```

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-103 -- Invalid address,
-130 -- Invalid Set Indicator,
-131 -- No Flags indicated in mask(s),

THE "SUSPEND" DIRECTIVE

This Directive instructs the system to suspend the execution of the issuing Task until explicitly instructed to resume (via the RESUME Directive). A DPB of the following format is used:

Wd. 00 -- DIC (43) & Unused Byte.

A Directive Status of +1 with Condition Code "V" set, is always returned.

THE "RESUME" DIRECTIVE

This Directive instructs the system to resume the execution of an indicated Task that has issued a SUSPEND Directive. Execution of the SUSPENDed Task is resumed at the word (instruction) following the SUSPEND EMT. A DPB of the following format is used:

Wd. 00 -- DIC (45) & Unused Byte.
Wd. 01 -- Task name (first half).
Wd. 02 -- Task name (second half).

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-103 -- Invalid address.
-110 -- Task not in system.
-208 -- Task not SUSPENDed.

THE "EXIT" DIRECTIVE

This Directive instructs the system to end the execution of the issuing Task. A DPB of the following format is used:

Wd. 00 -- DIC (51) & Unused Byte.

No Directive Status is returned.

THE "EXITIF" DIRECTIVE

This Directive instructs the system to end the execution of the issuing task if an indicated Event Flag is RESET. A DPB of the following format is used:

Wd. 00 -- DIC (53) & EFN.

If the Directive is accepted and the indicated Event Flag is RESET, the Task is EXITed.

If the Directive is accepted and the indicated Event Flag is SET, Condition Code "V" is set, the Directive Status word is set positive (+1), and execution is allowed to to continue.

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-101 -- Invalid EFN.

THE "GET TIME" DIRECTIVE

This Directive instructs the system to provide the Issuing Task with current time parameters. A DPB of the following format is used:

Wd. 00 -- DIC (61) & Unused Byte.
Wd. 01 -- Address of six-byte buffer.

If the Directive is performed, the indicated six-byte buffer is set as follows, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

Buffer format:

Byte 0 -- Hour.
Byte 1 -- Minute.
Byte 2 -- Second.
Byte 3 -- Day.
Byte 4 -- Month.
Byte 5 -- Year.

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-103 -- Invalid address.

THE "GET TASK PARAMETERS" DIRECTIVE

This Directive instructs the system to provide the issuing Task with current Task parameters. A DPB of the following format is used:

Wd. 00 -- DIC (63) & Unused Byte.
Wd. 01 -- Address of five-word buffer.

If the Directive is performed, the five-word buffer is filled as follows, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

Buffer format:

Wd. 0 -- Task name (first half).
Wd. 1 -- Task name (second half).
Wd. 2 -- Priority & Unused Byte.
Wd. 3 -- Partition name (first half).
Wd. 4 -- Partition name (second half).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-103 -- Invalid address.

THE "SEND" DIRECTIVE

This Directive instructs the system to send a block of data to another Task. A DPB of the following format is used:

```
Wd. ØØ -- DIC (71) & [EFN],
Wd. Ø1 -- Task name (first half),
Wd. Ø2 -- Task name (second half),
Wd. Ø3 -- Data Wd. 1,
Wd. Ø4 -- Data Wd. 2,
Wd. Ø5 -- Data Wd. 3,
Wd. Ø6 -- Data Wd. 4,
Wd. Ø7 -- Data Wd. 5,
Wd. 1Ø -- Data Wd. 6,
Wd. 11 -- Data Wd. 7,
Wd. 12 -- Data Wd. 8,
Wd. 13 -- Data Wd. 9,
Wd. 14 -- Data Wd. 1Ø,
Wd. 15 -- Data Wd. 11,
Wd. 16 -- Data Wd. 12,
```

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

```
-1ØØ -- Invalid DIC,
-1Ø1 -- Invalid EFN,
-1Ø3 -- Invalid Address,
-11Ø -- Task not in system,
-999 -- Unavailable list element,
```

THE "SEND AND REQUEST" DIRECTIVE

This Directive instructs the system to send a block of data to another Task, and issue a REQUEST Directive for that Task. A DPB of the following format is used:

```
Wd, 00 -- DIC (73) & [EFN],
Wd, 01 -- Task name (first half),
Wd, 02 -- Task name (second half),
Wd, 03 -- Data Wd, 1,
Wd, 04 -- Data Wd, 2,
Wd, 05 -- Data Wd, 3,
Wd, 06 -- Data Wd, 4,
Wd, 07 -- Data Wd, 5,
Wd, 10 -- Data Wd, 6,
Wd, 11 -- Data Wd, 7,
Wd, 12 -- Data Wd, 8,
Wd, 13 -- Data Wd, 9,
Wd, 14 -- Data Wd, 10,
Wd, 15 -- Data Wd, 11,
Wd, 16 -- Data Wd, 12.
```

If the SEND operation is performed, the Event Flag (if specified) is set, and the REQUEST operation is attempted.

If the SEND is rejected, the REQUEST is NOT attempted.

If the REQUEST is rejected, the SEND is left in effect.

If both the SEND and REQUEST are performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

```
-100 -- Invalid DIC,
-101 -- Invalid EFN,
-103 -- Invalid Address,
-110 -- Task not in system,
-203 -- Task is active,
-208 -- Task is disabled,
-998 -- Unavailable list element for SEND,
-999 -- Unavailable list element for REQUEST.
```

THE "RECEIVE" DIRECTIVE

This Directive instructs the system to receive a block of data that has been transmitted to the issuing Task via a SEND or SEND AND REQUEST Directive. A DPB of the following format is used:

Wd, 00 -- DIC (75) & Unused Byte.
Wd, 01 -- Address of 14-word buffer.

If the Directive is performed, the indicated 14-word buffer is filled as follows, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

Buffer format:

Wd, 00 -- SENDer Task name (first half).
Wd, 01 -- SENDer Task name (second half).
Wd, 02 -- Data Wd, 1,
Wd, 03 -- Data Wd, 2,
Wd, 04 -- Data Wd, 3,
Wd, 05 -- Data Wd, 4,
Wd, 06 -- Data Wd, 5,
Wd, 07 -- Data Wd, 6,
Wd, 10 -- Data Wd, 7,
Wd, 11 -- Data Wd, 8,
Wd, 12 -- Data Wd, 9,
Wd, 13 -- Data Wd, 10,
Wd, 14 -- Data Wd, 11,
Wd, 15 -- Data Wd, 12,

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-101 -- Invalid EFN,
-103 -- Invalid Address,
-300 -- No data,

THE "RECEIVE OR EXIT" DIRECTIVE

This Directive instructs the system to receive a block of data (that has been transmitted via SEND or SEND AND REQUEST), or to EXIT. If a block of data is found (has been sent), the data is received. If a block of data is not found, the issuing Task is EXITed. A DPB of the following format is used:

Wd. 00 -- DIC (77) & Unused Byte.
Wd. 01 -- Address of 14-word buffer.

If data is received, the indicated 14-word buffer is filled as follows, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

Buffer format:

Wd. 00 -- SENDer Task name (first half).
Wd. 01 -- SENDer Task name (second half).
Wd. 02 -- Data Wd. 1.
Wd. 03 -- Data Wd. 2.
Wd. 04 -- Data Wd. 3.
Wd. 05 -- Data Wd. 4.
Wd. 06 -- Data Wd. 5.
Wd. 07 -- Data Wd. 6.
Wd. 10 -- Data Wd. 7.
Wd. 11 -- Data Wd. 8.
Wd. 12 -- Data Wd. 9.
Wd. 13 -- Data Wd. 10.
Wd. 14 -- Data Wd. 11.
Wd. 15 -- Data Wd. 12.

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-103 -- Invalid Address.

THE "DISABLE" DIRECTIVE

This Directive instructs the system to effectively remove a Task from the system (without physically removing it). A DPB of the following format is used:

Wd, Ø0 -- DIC (81) & Unused Byte,
Wd, Ø1 -- Task name (first half),
Wd, Ø2 -- Task name (second half),

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-1Ø0 -- Invalid DIC,
-1Ø3 -- Invalid address,
-11Ø -- Task not in system,
-2Ø8 -- Task is already disabled,

THE "ENABLE" DIRECTIVE

This Directive instructs the system to enable a DISABLED Task. A DPB of the following format is used:

Wd, Ø0 -- DIC (83) & Unused Byte,
Wd, Ø1 -- Task name (first half),
Wd, Ø2 -- Task name (second half),

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-1Ø0 -- Invalid DIC,
-1Ø3 -- Invalid address,
-11Ø -- Task not in system,
-2Ø8 -- Task is not disabled,

THE "FIX IN MEMORY" DIRECTIVE [1,2]

This Directive instructs the system to "fix" an INACTIVE Task into available memory. A DPB of the following format is used:

Wd. 00 -- DIC (95) & Unused Byte.
Wd. 01 -- Task name (first half).
Wd. 02 -- Task name (second half).
Wd. 03 -- [Partition name (first half)].
Wd. 04 -- [Partition name (second half)].

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-102 -- Invalid DIC.
-103 -- Invalid address.
-110 -- Task not in system.
-111 -- Partition not in system.
-203 -- Task is active.
-205 -- No memory available.
-209 -- Task is already fixed.
-999 -- Unavailable list element.

THE "UNFIX" DIRECTIVE

This Directive instructs the system to un-fix a FIXed Task. A DPB of the following format is used:

Wd, 00 -- DIC (87) & Unused Byte,
Wd, 01 -- Task name (first half),
Wd, 02 -- Task name (second half),

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC,
-103 -- Invalid address,
-110 -- Task not in system,
-208 -- Task not fixed,

THE "ABORT" DIRECTIVE

This Directive instructs the system to terminate the execution of any active Task of lower priority. A DPB of the following format is used:

Wd. 00 -- DIC (89) & Unused Byte.
Wd. 01 -- Task name (first half).
Wd. 02 -- Task name (second half).

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-103 -- Invalid address.
-130 -- Priority error.
-110 -- Task not in system.
-203 -- Task is not active.

THE "DECLARE NOT CHECKPOINTABLE" DIRECTIVE

This Directive instructs the system to consider a checkpointable issuing Task to be non-checkpointable. A DPB of the following format is used:

Wd. 00 -- DIC (95) & Unused Byte.

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-400 -- Task is not checkpointable.

THE "DECLARE CHECKPOINTABLE" DIRECTIVE

This Directive instructs the system to negate a DECLARE NOT CHECKPOINTABLE Directive by the issuing Task. It CANNOT make a Task checkpointable if it were not declared so at its installation. A DPB of the following format is used:

Wd. 00 -- DIC (97) & Unused Byte.

If the Directive is performed, Condition Code "V" is set, and the Directive Status Word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status Word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-400 -- Task has not issued a
DECLARE NOT CHECKPOINTABLE
Directive.

THE "SET SYSTEM TRAP VECTOR" DIRECTIVE

This Directive instructs the system to set an indicated System Trap vector to an indicated address. An address of zero implies "disconnect System Trap". A DPB of the following format is used:

Wd. 00 -- DIC (101) & Unused Byte.
Wd. 01 -- System Trap number.
Wd. 02 -- Service routine entry pt. or zero.

If the Directive is performed, Condition Code "V" is set, and the Directive Status word is set positive (+1).

If the Directive is rejected, Condition Code "V" is cleared, and the Directive Status word is set to one of the following negative values to indicate rejection and the reason:

-100 -- Invalid DIC.
-101 -- Invalid EFN.
-103 -- Invalid address.
-120 -- Illegal Trap ID (number).

System Traps are described in another Spec.

THE "EXIT SYSTEM TRAP" DIRECTIVE

This Directive instructs the system to terminate a System Trap service routine execution. A DPB of the following format is used:

Wd. 00 -- DIC (103) & Unused Byte.

No Directive Status is returned.