The Formal Specification and Definition of KIT

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Chapter 1
INTRODUCTION

1.1 The Purpose of this Report

KIT is a verified operating system kernel [Bevier 87]. This technical report contains all the definitions and shells provided to the Boyer-Moore theorem prover in the specification and definition of KIT. The events[1] are given in the order they are presented to the theorem prover. The event numbers shown here correspond to their numbers in the original script. The index at the end of this report gives an alphabetized listing of event names and the page numbers on which they occur. The definitions which the theorem prover automatically loads when booted are not shown.

Not all of the definitions reported here are pertinent to the specification or definition of KIT. Some definitions, for instance **`NUMBER-AND-LIST-INDUCTION`**, are merely aids for guiding the theorem prover to the proof of a particular lemma. We include all definitions for completeness.

1.2 An Outline of the KIT Project

1.2.1 The Goals of the KIT Project

The purpose of the KIT project is to address the problem of operating systems kernel verification. In particular, we are concerned with the correct implementation of processes. KIT is an operating system kernel written in the assembler language of a uni-processor computer with a typical von Neumann architecture. KIT is proved to implement, on a shared computer, a fixed number of conceptually distributed communicating processes. In addition to implementing processes, the kernel provides the following verified services:

- Process scheduling and allocation of CPU time,
- Response to program error conditions (e.g. unrecognized opcode),
- Single-word message passing among processes,
- Character I/O to asynchronous devices.

The result is an operating system kernel which correctly implements a set of concurrent processes. A set of communicating processes will run as specified on KIT provided there are no hardware errors. The operating system is proved not to introduce implementation bugs. KIT and its specification are defined in the Boyer-Moore logic, and the proof is mechanically checked with the Boyer-Moore theorem prover

[1] Any extension to the logic presented to the theorem prover, e.g., an axiom, lemma, definition or shell, is called an *event*.

[Boyer 79].

1.2.2 The KIT Proof Structure

The KIT report [Bevier 87] contains a detailed description of the specification, implementation and verification of KIT. We let a brief outline of the structure of the proof suffice here.

The main result in the verification of KIT is the theorem **OS-IMPLEMENTS-PARALLEL-TASKS**. It is an interpreter equivalence theorem which demonstrates that the behavior of a single task running under the kernel implements an abstract definition of a process.

```
Theorem. OS-IMPLEMENTS-PARALLEL-TASKS:
(IMPLIES
 (AND (GOOD-OS OS)
      (PLISTP ORACLE)
      (FINITE-NUMBERP I (LENGTH (AK-PSTATES (MAPUP-OS OS)))))
 (EQUAL (PROJECT-ITH-TASK I (TM-PROCESSOR OS (OS-ORACLE OS ORACLE)))
        (TASK-PROCESSOR (PROJECT-ITH-TASK I OS)
                        I
                        (CONTROL-ORACLE I (MAPUP-OS OS) ORACLE))))
```

The problem is decomposed into two steps, as pictured in Figure 1-1. An intermediate machine, called the *abstract kernel* gives an operational specification for KIT. The proof of **OS-IMPLEMENTS-PARALLEL-TASKS** is a result of the theorems **AK-IMPLEMENTS-PARALLEL-TASKS** and **CORRECTNESS-OF-OPERATING-SYSTEM**, which handle the top and bottom interpreter equivalence theorems, respectively, of Figure 1-1.

Figure 1-1: KIT Proof Structure

```
Theorem.  AK-IMPLEMENTS-PARALLEL-TASKS (rewrite):
(IMPLIES (AND (GOOD-AK AK)
              (FINITE-NUMBERP I (LENGTH (AK-PSTATES AK))))
         (EQUAL (PROJECT I (AK-PROCESSOR AK ORACLE))
                (TASK-PROCESSOR (PROJECT I AK)
                                I
                                (CONTROL-ORACLE I AK ORACLE))))
```

```
Theorem.  CORRECTNESS-OF-OPERATING-SYSTEM (rewrite):
(IMPLIES (AND (GOOD-OS OS)
              (PLISTP ORACLE))
         (EQUAL (MAPUP-OS (TM-PROCESSOR OS (OS-ORACLE OS ORACLE)))
                (AK-PROCESSOR (MAPUP-OS OS) ORACLE)))
```

The verification of KIT spans these layers of interpreters. For each layer, two definitions are of interest: a predicate which defines a machine state set, and an interpreter function which defines how a machine makes transitions on a state.

The *task* layer is at the top. It provides a definition of a single communicating process. The shell **TASK** defines the structure of a task state, and the function **GOOD-TASK** defines the task state set. The function **TASK-PROCESSOR** gives the definition of the task interpreter.

The second layer, the *abstract kernel*, gives the kernel specification. The abstract kernel contains a fixed number of task states. The state space of the abstract kernel is such that the isolation of task states is easily established. A function **PROJECT** maps the state of *i*th task out of the abstract kernel and up to the task layer. The shell **AK** defines the structure of an abstract kernel state, and the function **GOOD-AK** defines the abstract kernel state set. **AK-PROCESSOR** defines the abstract kernel interpreter. **GOOD-AK** is an invariant of **AK-PROCESSOR**.

The bottom layer defines the target machine. The target machine is a very simple von Neumann computer. We are particularly interested in the state of a target machine when loaded with the machine code for KIT. In such a machine state, defined by the predicate **GOOD-OS**, the implementations of tasks are not transparently isolated. We must prove that they are isolated as defined by the abstract kernel. The function **MAPUP-OS** maps the kernel state up to an abstract kernel state. It not only maps up the state of each task, but the state of all data structures (e.g. the ready queue) which the kernel uses to manage tasks. The shell **TM** defines the structure of a target machine state, and the predicate **GOOD-TM** defines the target machine state set. **TM-PROCESSOR** defines the target machine interpreter. **GOOD-TM** is an invariant of **TM-PROCESSOR**.

Chapter 2

THE SCRIPT OF DEFINITIONS AND SHELLS

```
Definition {23}.
(EXP I J)
   =
(IF (ZEROP J)
    1
    (TIMES I (EXP I (SUB1 J))))

Definition {41}.
(DIVIDES X Y) = (ZEROP (REMAINDER Y X))

Definition {83}.
(NUMBER-AND-LIST-INDUCTION N L)
   =
(IF (ZEROP N)
    0
    (IF (LISTP L)
        (NUMBER-AND-LIST-INDUCTION (SUB1 N)
                                   (CDR L))
        0))

Definition {84}.
(DOUBLE-NUMBER-INDUCTION X Y)
   =
(IF (OR (ZEROP X) (ZEROP Y))
    0
    (DOUBLE-NUMBER-INDUCTION (SUB1 X)
                             (SUB1 Y)))

Definition {85}.
(DOUBLE-NUMBER-DOUBLE-LIST-INDUCTION I J L1 L2)
   =
(IF (AND (LISTP L1) (LISTP L2))
    (IF (OR (ZEROP I) (ZEROP J))
        0
        (DOUBLE-NUMBER-DOUBLE-LIST-INDUCTION (SUB1 I)
                                             (SUB1 J)
                                             (CDR L1)
                                             (CDR L2)))
    0)

Definition {141}.
(LESSP-QUOTIENT-INDUCTION A B C)
   =
(IF (ZEROP B)
    0
    (IF (ZEROP C)
        0
        (IF (LESSP A C)
            0
            (LESSP-QUOTIENT-INDUCTION (DIFFERENCE A C)
                                      (SUB1 B)
                                      C))))
```

```
Definition {145}.
(MIN A B) = (IF (LESSP A B) A B)

Definition {151}.
(LESSP-QUOTIENT-QUOTIENT-INDUCTION N A B)
   =
(IF (ZEROP N)
    0
    (IF (LESSP A N)
        0
        (IF (LESSP B N)
            0
            (LESSP-QUOTIENT-QUOTIENT-INDUCTION N
                                               (DIFFERENCE A N)
                                               (DIFFERENCE B N)))))

Definition {164}.
(APPEND A B)
   =
(IF (LISTP A)
    (CONS (CAR A) (APPEND (CDR A) B))
    B)

Definition {165}.
(INSERT I L)
   =
(IF (LISTP L)
    (IF (LESSP I (CAR L))
        (CONS I L)
        (CONS (CAR L) (INSERT I (CDR L))))
    (CONS I L))

Definition {166}.
(OCCURRENCES X L)
   =
(IF (LISTP L)
    (IF (EQUAL X (CAR L))
        (ADD1 (OCCURRENCES X (CDR L)))
        (OCCURRENCES X (CDR L)))
    0)

Definition {167}.
(REMOVE X L)
   =
(IF (LISTP L)
    (IF (EQUAL X (CAR L))
        (CDR L)
        (CONS (CAR L) (REMOVE X (CDR L))))
    L)

Definition {168}.
(PERMUTATION A B)
   =
(IF (LISTP A)
    (AND (MEMBER (CAR A) B)
         (PERMUTATION (CDR A)
                      (REMOVE (CAR A) B)))
    (NLISTP B))

Definition {169}.
(PLISTP L)
   =
(IF (LISTP L)
    (PLISTP (CDR L))
    (EQUAL L NIL))

Definition {170}.
(SETP L)
   =
(IF (LISTP L)
    (AND (NOT (MEMBER (CAR L) (CDR L)))
         (SETP (CDR L)))
```

```
    (EQUAL L NIL))
```

<u>Definition</u> {171}.
```
(SORTED L)
   =
(IF (LISTP L)
    (IF (LISTP (CDR L))
        (IF (LESSP (CADR L) (CAR L))
            F
            (SORTED (CDR L)))
        T)
    T)
```

<u>Definition</u> {200}.
```
(TRANSITIVITY-OF-PERMUTATION-INDUCTION A B C)
   =
(IF (LISTP A)
    (TRANSITIVITY-OF-PERMUTATION-INDUCTION (CDR A)
                                           (REMOVE (CAR A) B)
                                           (REMOVE (CAR A) C))
    0)
```

<u>Definition</u> {205}.
```
(SETP-PERMUTATION-INDUCTION A B)
   =
(IF (LISTP A)
    (SETP-PERMUTATION-INDUCTION (CDR A)
                                (REMOVE (CAR A) B))
    0)
```

<u>Definition</u> {210}.
```
(GETNTH N L)
   =
(IF (LISTP L)
    (IF (ZEROP N)
        (CAR L)
        (GETNTH (SUB1 N) (CDR L)))
    0)
```

<u>Definition</u> {211}.
```
(PUTNTH V N L)
   =
(IF (LISTP L)
    (IF (ZEROP N)
        (CONS V (CDR L))
        (CONS (CAR L)
              (PUTNTH V (SUB1 N) (CDR L))))
    L)
```

<u>Definition</u> {212}.
```
(GETSEG N K L)
   =
(IF (ZEROP K)
    NIL
    (CONS (GETNTH N L)
          (GETSEG (ADD1 N) (SUB1 K) L)))
```

<u>Definition</u> {213}.
```
(PUTSEG S N L)
   =
(IF (LISTP S)
    (PUTNTH (CAR S) N (PUTSEG (CDR S) (ADD1 N) L))
    L)
```

<u>Definition</u> {214}.
```
(FIXLENGTH N L DEFAULT)
   =
(IF (LISTP L)
    (IF (ZEROP N)
        NIL
        (CONS (CAR L)
              (FIXLENGTH (SUB1 N) (CDR L) DEFAULT)))
```

```
    (IF (ZEROP N)
        NIL
        (CONS DEFAULT
              (FIXLENGTH (SUB1 N) L DEFAULT))))
```

Definition {215}.

```
(FIRSTN N L)
   =
(IF (LISTP L)
    (IF (ZEROP N)
        NIL
        (CONS (CAR L)
              (FIRSTN (SUB1 N) (CDR L))))
    NIL)
```

Definition {216}.

```
(NTHCDR N L)
   =
(IF (LISTP L)
    (IF (ZEROP N)
        L
        (NTHCDR (SUB1 N) (CDR L)))
    L)
```

Definition {269}.

```
(GETNTH-GETSEG-INDUCTION I N K)
   =
(IF (OR (ZEROP I) (ZEROP K))
    0
    (GETNTH-GETSEG-INDUCTION (SUB1 I)
                             (ADD1 N)
                             (SUB1 K)))
```

Definition {313}.

```
(INTEGER-INDUCTION-INSTANCE N K)
   =
(IF (ZEROP K)
    0
    (INTEGER-INDUCTION-INSTANCE (ADD1 N)
                                (SUB1 K)))
```

Definition {318}.

```
(GETSEG-PUTSEG-INDUCTION I K S N)
   =
(IF (ZEROP K)
    0
    (IF (LISTP S)
        (GETSEG-PUTSEG-INDUCTION (ADD1 I)
                                 (SUB1 K)
                                 (CDR S)
                                 (ADD1 N))
        0))
```

Definition {330}.

```
(NESTED-INTERVALS N1 K1 N2 K2)
   =
(AND (LEQ N1 N2)
     (LEQ (PLUS N2 K2) (PLUS N1 K1)))
```

Definition {331}.

```
(STRANGE-INDUCTION A B C D)
   =
(IF (OR (ZEROP A) (ZEROP B))
    0
    (STRANGE-INDUCTION (SUB1 A)
                       (SUB1 B)
                       (ADD1 C)
                       (ADD1 D)))
```

Definition {340}.

```
(GETNTH2 I J L) = (GETNTH J (GETNTH I L))
```

Definition {341}.
```
(PUTNTH2 V I J L) = (PUTNTH (PUTNTH V J (GETNTH I L)) I L)
```

Definition {351}.
```
(REVERSE L)
   =
(IF (LISTP L)
    (APPEND (REVERSE (CDR L))
            (LIST (CAR L)))
    NIL)
```

Definition {357}.
```
(FINITE-NUMBERP N LUB) = (AND (NUMBERP N) (LESSP N LUB))
```

Definition {358}.
```
(NUMBER-LISTP L)
   =
(IF (LISTP L)
    (AND (NUMBERP (CAR L))
         (NUMBER-LISTP (CDR L)))
    T)
```

Definition {359}.
```
(FINITE-NUMBER-LISTP L LUB)
   =
(IF (LISTP L)
    (AND (FINITE-NUMBERP (CAR L) LUB)
         (FINITE-NUMBER-LISTP (CDR L) LUB))
    T)
```

Definition {360}.
```
(NON-ZERO-LISTP L)
   =
(IF (LISTP L)
    (AND (NOT (ZEROP (CAR L)))
         (NON-ZERO-LISTP (CDR L)))
    T)
```

Definition {407}.
```
(TABLEP N L)
   =
(IF (LISTP L)
    (AND (PLISTP (CAR L))
         (EQUAL (LENGTH (CAR L)) N)
         (TABLEP N (CDR L)))
    (EQUAL L NIL))
```

Definition {409}.
```
(TABLE N L)
   =
(IF (ZEROP N)
    L
    (IF (LISTP L)
        (CONS (GETSEG 0 N L)
              (TABLE N (NTHCDR N L)))
        NIL))
```

Definition {410}.
```
(FLATTEN TABLE)
   =
(IF (LISTP TABLE)
    (APPEND (CAR TABLE)
            (FLATTEN (CDR TABLE)))
    NIL)
```

Definition {427}.
```
(INTEGER-NTHCDR-INDUCTION I N L)
   =
(IF (ZEROP N)
    0
    (IF (LISTP L)
        (IF (ZEROP I)
```

```
            0
            (INTEGER-NTHCDR-INDUCTION (SUB1 I)
                                      N
                                      (NTHCDR N L)))
        0))
```

Definition {445}.

```
(FINITE-NUMBER-TABLEP N L LUB)
   =
(IF (LISTP L)
    (AND (PLISTP (CAR L))
         (FINITE-NUMBER-LISTP (CAR L) LUB)
         (EQUAL (LENGTH (CAR L)) N)
         (FINITE-NUMBER-TABLEP N (CDR L) LUB))
    (EQUAL L NIL))
```

Definition {458}.

```
(NONLAST L) = (GETSEG 0 (SUB1 (LENGTH L)) L)
```

Definition {464}.

```
(INCR-MOD N LUB) = (IF (LESSP (ADD1 N) LUB) (ADD1 N) 0)
```

Definition {465}.

```
(DECR-MOD N LUB) = (IF (ZEROP N) (SUB1 LUB) (SUB1 N))
```

Definition {470}.

```
(QFIRST TABLE) = (CAR TABLE)
```

Definition {471}.

```
(ENQ ITEM TABLE) = (APPEND TABLE (LIST ITEM))
```

Definition {472}.

```
(DEQ TABLE) = (CDR TABLE)
```

Definition {473}.

```
(QEMPTYP TABLE) = (EQUAL (LENGTH TABLE) 0)
```

Definition {474}.

```
(QFULLP TABLE MAX) = (NOT (LESSP (LENGTH TABLE) MAX))
```

Definition {475}.

```
(QREPLACE ITEM QUEUE) = (ENQ ITEM (NONLAST QUEUE))
```

Definition {494}.

```
(QHEAD-FIELD) = 0
```

Definition {495}.

```
(QTAIL-FIELD) = 1
```

Definition {496}.

```
(QCURRLENGTH-FIELD) = 2
```

Definition {497}.

```
(QMAXLENGTH-FIELD) = 3
```

Definition {498}.

```
(QARRAY-FIELD) = 4
```

Definition {499}.

```
(DELTA A B MAX)
   =
(IF (LEQ B A)
    (PLUS (DIFFERENCE MAX A) B)
    (DIFFERENCE B A))
```

Definition {505}.

```
(ARRAY-QINDEX-RELATION QUEUE)
   =
(EQUAL (DELTA (GETNTH (QHEAD-FIELD) QUEUE)
              (GETNTH (QTAIL-FIELD) QUEUE)
              (GETNTH (QMAXLENGTH-FIELD) QUEUE))
       (IF (ZEROP (GETNTH (QCURRLENGTH-FIELD) QUEUE))
           (GETNTH (QMAXLENGTH-FIELD) QUEUE)
           (GETNTH (QCURRLENGTH-FIELD) QUEUE)))
```

Definition {506}.

```
(ARRAY-QUEUEP QUEUE)
   =
(AND (PLISTP QUEUE)
     (EQUAL (LENGTH QUEUE)
            (PLUS (QARRAY-FIELD)
                  (GETNTH (QMAXLENGTH-FIELD) QUEUE)))
     (NUMBERP (GETNTH (QHEAD-FIELD) QUEUE))
     (NUMBERP (GETNTH (QTAIL-FIELD) QUEUE))
     (NUMBERP (GETNTH (QCURRLENGTH-FIELD) QUEUE))
     (NOT (ZEROP (GETNTH (QMAXLENGTH-FIELD) QUEUE)))
     (LESSP (GETNTH (QHEAD-FIELD) QUEUE)
            (GETNTH (QMAXLENGTH-FIELD) QUEUE))
     (LESSP (GETNTH (QTAIL-FIELD) QUEUE)
            (GETNTH (QMAXLENGTH-FIELD) QUEUE))
     (LESSP (GETNTH (QCURRLENGTH-FIELD) QUEUE)
            (ADD1 (GETNTH (QMAXLENGTH-FIELD) QUEUE)))
     (ARRAY-QINDEX-RELATION QUEUE))
```

<u>Definition</u> {520}.

```
(ARRAY-ENQ ITEM QUEUE)
   =
(PUTNTH (INCR-MOD (GETNTH (QTAIL-FIELD) QUEUE)
                  (GETNTH (QMAXLENGTH-FIELD) QUEUE))
        (QTAIL-FIELD)
 (PUTNTH (ADD1 (GETNTH (QCURRLENGTH-FIELD) QUEUE)) (QCURRLENGTH-FIELD)
  (PUTNTH ITEM (PLUS (QARRAY-FIELD)
                              (GETNTH (QTAIL-FIELD) QUEUE))
   QUEUE)))
```

<u>Definition</u> {521}.

```
(ARRAY-DEQ QUEUE)
   =
(PUTNTH (INCR-MOD (GETNTH (QHEAD-FIELD) QUEUE)
                  (GETNTH (QMAXLENGTH-FIELD) QUEUE))
        (QHEAD-FIELD)
 (PUTNTH (SUB1 (GETNTH (QCURRLENGTH-FIELD) QUEUE)) (QCURRLENGTH-FIELD)
  QUEUE))
```

<u>Definition</u> {522}.

```
(ARRAY-QFIRST QUEUE)
   =
(GETNTH (PLUS (QARRAY-FIELD)
              (GETNTH (QHEAD-FIELD) QUEUE))
        QUEUE)
```

<u>Definition</u> {523}.

```
(ARRAY-QFULLP QUEUE)
   =
(EQUAL (GETNTH (QCURRLENGTH-FIELD) QUEUE)
       (GETNTH (QMAXLENGTH-FIELD) QUEUE))
```

<u>Definition</u> {524}.

```
(ARRAY-QEMPTYP QUEUE) = (ZEROP (GETNTH (QCURRLENGTH-FIELD) QUEUE))
```

<u>Definition</u> {547}.

```
(ARRAY-NONLAST QUEUE)
   =
(PUTNTH (DECR-MOD (GETNTH (QTAIL-FIELD) QUEUE)
                  (GETNTH (QMAXLENGTH-FIELD) QUEUE))
        (QTAIL-FIELD)
 (PUTNTH (SUB1 (GETNTH (QCURRLENGTH-FIELD) QUEUE)) (QCURRLENGTH-FIELD)
  QUEUE))
```

<u>Definition</u> {560}.

```
(ARRAY-QREPLACE ITEM QUEUE) = (ARRAY-ENQ ITEM (ARRAY-NONLAST QUEUE))
```

<u>Definition</u> {574}.

```
(DELTA-SEGMENT A B S)
   =
(IF (LEQ B A)
    (APPEND (GETSEG A (DIFFERENCE (LENGTH S) A) S)
            (GETSEG 0 B S))
```

```
    (GETSEG A (DIFFERENCE B A) S))
```

Definition {579}.

```
(MAPUP-QUEUE QUEUE)
   =
(IF (ARRAY-QEMPTYP QUEUE)
    NIL
    (DELTA-SEGMENT (GETNTH (QHEAD-FIELD) QUEUE)
                   (GETNTH (QTAIL-FIELD) QUEUE)
                   (GETSEG (QARRAY-FIELD)
                           (GETNTH (QMAXLENGTH-FIELD) QUEUE)
                           QUEUE)))
```

Definition {605}.

```
(QFIRST2 I J QTABLE) = (QFIRST (GETNTH2 I J QTABLE))
```

Definition {606}.

```
(ENQ2 MSG I J QTABLE)
   =
(PUTNTH2 (ENQ MSG (GETNTH2 I J QTABLE)) I J QTABLE)
```

Definition {607}.

```
(DEQ2 I J QTABLE)
   =
(PUTNTH2 (DEQ (GETNTH2 I J QTABLE)) I J QTABLE)
```

Definition {608}.

```
(QFULLP2 I J QTABLE MAX) = (QFULLP (GETNTH2 I J QTABLE) MAX)
```

Definition {609}.

```
(QEMPTYP2 I J QTABLE) = (QEMPTYP (GETNTH2 I J QTABLE))
```

Definition {613}.

```
(TM-WORDSIZE) = 16
```

Definition {614}.

```
(TM-WORDLUB) = (EXP 2 (TM-WORDSIZE))
```

Definition {615}.

```
(ALU-RESULT VALUE CARRY) = (LIST VALUE CARRY)
```

Definition {616}.

```
(ALU-VALUE ALU-RESULT) = (CAR ALU-RESULT)
```

Definition {617}.

```
(ALU-CARRY ALU-RESULT) = (CADR ALU-RESULT)
```

Definition {618}.

```
(TM-ALU-DECR A)
   =
(IF (ZEROP A)
    (ALU-RESULT (SUB1 (TM-WORDLUB)) T)
    (ALU-RESULT (REMAINDER (SUB1 A) (TM-WORDLUB))
                F))
```

Definition {619}.

```
(TM-ALU-DECR-MOD A B)
   =
(ALU-RESULT (DECR-MOD (REMAINDER A (TM-WORDLUB))
                      (REMAINDER B (TM-WORDLUB)))
            F)
```

Definition {620}.

```
(TM-ALU-DIFFERENCE A B)
   =
(IF (LESSP B A)
    (ALU-RESULT (REMAINDER (DIFFERENCE (TM-WORDLUB)
                                       (DIFFERENCE A B))
                           (TM-WORDLUB))
                T)
    (ALU-RESULT (REMAINDER (DIFFERENCE B A)
                           (TM-WORDLUB))
                F))
```

Definition {621}.

```
(TM-ALU-INCR A)
   =
(IF (LESSP (ADD1 A) (TM-WORDLUB))
    (ALU-RESULT (ADD1 A) F)
    (ALU-RESULT 0 T))
```

<u>Definition</u> {622}.
```
(TM-ALU-INCR-MOD A B)
   =
(ALU-RESULT (INCR-MOD (REMAINDER A (TM-WORDLUB))
                      (REMAINDER B (TM-WORDLUB)))
            F)
```

<u>Definition</u> {623}.
```
(TM-ALU-MOD A B)
   =
(IF (ZEROP (REMAINDER B (TM-WORDLUB)))
    (ALU-RESULT (REMAINDER A (TM-WORDLUB))
                F)
    (ALU-RESULT (REMAINDER A
                           (REMAINDER B (TM-WORDLUB)))
                F))
```

<u>Definition</u> {624}.
```
(TM-ALU-MULT A B)
   =
(IF (LESSP (TIMES A B) (TM-WORDLUB))
    (ALU-RESULT (TIMES A B) F)
    (ALU-RESULT (REMAINDER (TIMES A B) (TM-WORDLUB))
                T))
```

<u>Definition</u> {625}.
```
(TM-ALU-PLUS A B)
   =
(IF (LESSP (PLUS A B) (TM-WORDLUB))
    (ALU-RESULT (PLUS A B) F)
    (ALU-RESULT (REMAINDER (PLUS A B) (TM-WORDLUB))
                T))
```

<u>Definition</u> {662}.
```
(TM-INCR A) = (REMAINDER (ADD1 A) (TM-WORDLUB))
```

<u>Definition</u> {663}.
```
(TM-INCRN N A) = (IF (ZEROP N)
                     A
                     (TM-INCR (TM-INCRN (SUB1 N) A)))
```

<u>Definition</u> {664}.
```
(TM-DECR A) = (IF (ZEROP A)
                  (SUB1 (TM-WORDLUB))
                  (SUB1 A))
```

<u>Shell</u> <u>Definition</u> {668}.
Add the shell TM with recognizer TM-SHELLP,
defining the record structure
<TM-MEMORY, TM-REGS, TM-CC, TM-ERROR, TM-SVCFLAG, TM-SVCID,
 TM-BASE, TM-LIMIT, TM-SLIMIT, TM-SVMODE, TM-RWSTATE,
 TM-CLOCK, TM-IPORTS, TM-OPORTS>.

<u>Definition</u> {669}.
(TM-REGSIZE) = 3

<u>Definition</u> {670}.
(TM-CHARSIZE) = 8

<u>Definition</u> {671}.
(TM-CCSIZE) = 2

<u>Definition</u> {672}.
(TM-ERRORSIZE) = 6

<u>Definition</u> {673}.
(TM-SVCFLAGSIZE) = 1

<u>Definition</u> {674}.

(TM-SVCIDSIZE) = 7

<u>Definition</u> {675}.
(TM-CCLUB) = (EXP 2 (TM-CCSIZE))

<u>Definition</u> {676}.
(TM-ERRORLUB) = (EXP 2 (TM-ERRORSIZE))

<u>Definition</u> {677}.
(TM-SVCFLAGLUB) = (EXP 2 (TM-SVCFLAGSIZE))

<u>Definition</u> {678}.
(TM-SVCIDLUB) = (EXP 2 (TM-SVCIDSIZE))

<u>Definition</u> {679}.
(TM-REGLENGTH) = (EXP 2 (TM-REGSIZE))

<u>Definition</u> {680}.
(TM-MEMLENGTH) = (TM-WORDLUB)

<u>Definition</u> {681}.
(TM-CHARLUB) = (EXP 2 (TM-CHARSIZE))

<u>Definition</u> {682}.
(TM-PORT-LENGTH) = 16

<u>Definition</u> {683}.
(TM-PC-ADDRESS) = 0

<u>Definition</u> {684}.
(TM-SP-ADDRESS) = 1

<u>Definition</u> {685}.
```
(TM-SET-MEMORY MEMORY TM)
   =
(TM MEMORY
    (TM-REGS TM)
    (TM-CC TM)
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

<u>Definition</u> {686}.
```
(TM-SET-REGS REGS TM)
   =
(TM (TM-MEMORY TM)
    REGS
    (TM-CC TM)
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

<u>Definition</u> {687}.
```
(TM-SET-CC CC TM)
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    CC
```

```
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

<u>Definition</u> {688}.

```
(TM-SET-ERROR ERROR TM)
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    (TM-CC TM)
    ERROR
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

<u>Definition</u> {689}.

```
(TM-SET-SVCFLAG SVCFLAG TM)
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    (TM-CC TM)
    (TM-ERROR TM)
    SVCFLAG
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

<u>Definition</u> {690}.

```
(TM-SET-SVCID SVCID TM)
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    (TM-CC TM)
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    SVCID
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

<u>Definition</u> {691}.

```
(TM-SET-BASE BASE TM)
   =
(TM (TM-MEMORY TM)
```

```
     (TM-REGS TM)
     (TM-CC TM)
     (TM-ERROR TM)
     (TM-SVCFLAG TM)
     (TM-SVCID TM)
     BASE
     (TM-LIMIT TM)
     (TM-SLIMIT TM)
     (TM-SVMODE TM)
     (TM-RWSTATE TM)
     (TM-CLOCK TM)
     (TM-IPORTS TM)
     (TM-OPORTS TM))
```

<u>**Definition**</u> **{692}.**

```
(TM-SET-LIMIT LIMIT TM)
   =
(TM (TM-MEMORY TM)
     (TM-REGS TM)
     (TM-CC TM)
     (TM-ERROR TM)
     (TM-SVCFLAG TM)
     (TM-SVCID TM)
     (TM-BASE TM)
     LIMIT
     (TM-SLIMIT TM)
     (TM-SVMODE TM)
     (TM-RWSTATE TM)
     (TM-CLOCK TM)
     (TM-IPORTS TM)
     (TM-OPORTS TM))
```

<u>**Definition**</u> **{693}.**

```
(TM-SET-SLIMIT SLIMIT TM)
   =
(TM (TM-MEMORY TM)
     (TM-REGS TM)
     (TM-CC TM)
     (TM-ERROR TM)
     (TM-SVCFLAG TM)
     (TM-SVCID TM)
     (TM-BASE TM)
     (TM-LIMIT TM)
     SLIMIT
     (TM-SVMODE TM)
     (TM-RWSTATE TM)
     (TM-CLOCK TM)
     (TM-IPORTS TM)
     (TM-OPORTS TM))
```

<u>**Definition**</u> **{694}.**

```
(TM-SET-SVMODE SVMODE TM)
   =
(TM (TM-MEMORY TM)
     (TM-REGS TM)
     (TM-CC TM)
     (TM-ERROR TM)
     (TM-SVCFLAG TM)
     (TM-SVCID TM)
     (TM-BASE TM)
     (TM-LIMIT TM)
     (TM-SLIMIT TM)
     SVMODE
     (TM-RWSTATE TM)
     (TM-CLOCK TM)
     (TM-IPORTS TM)
     (TM-OPORTS TM))
```

<u>**Definition**</u> **{695}.**

```
(TM-SET-RWSTATE RWSTATE TM)
```

```
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    (TM-CC TM)
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    RWSTATE
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

Definition {696}.

```
(TM-SET-CLOCK CLOCK TM)
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    (TM-CC TM)
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    CLOCK
    (TM-IPORTS TM)
    (TM-OPORTS TM))
```

Definition {697}.

```
(TM-SET-IPORTS IPORTS TM)
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    (TM-CC TM)
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    IPORTS
    (TM-OPORTS TM))
```

Definition {698}.

```
(TM-SET-OPORTS OPORTS TM)
   =
(TM (TM-MEMORY TM)
    (TM-REGS TM)
    (TM-CC TM)
    (TM-ERROR TM)
    (TM-SVCFLAG TM)
    (TM-SVCID TM)
    (TM-BASE TM)
    (TM-LIMIT TM)
    (TM-SLIMIT TM)
    (TM-SVMODE TM)
    (TM-RWSTATE TM)
    (TM-CLOCK TM)
    (TM-IPORTS TM)
    OPORTS)
```

<u>Definition</u> {699}.
```
(TM-PC TM) = (GETNTH (TM-PC-ADDRESS) (TM-REGS TM))
```

<u>Definition</u> {700}.
```
(TM-SET-PC PC TM)
   =
(TM-SET-REGS (PUTNTH PC (TM-PC-ADDRESS)
              (TM-REGS TM))
             TM)
```

<u>Definition</u> {701}.
```
(TM-SP TM) = (GETNTH (TM-SP-ADDRESS) (TM-REGS TM))
```

<u>Definition</u> {702}.
```
(TM-SET-SP SP TM)
   =
(TM-SET-REGS (PUTNTH SP (TM-SP-ADDRESS)
              (TM-REGS TM))
             TM)
```

<u>Definition</u> {703}.
```
(TM-NON-ZERO-NO-CARRY-CONDITION) = 0
```

<u>Definition</u> {704}.
```
(TM-ZERO-NO-CARRY-CONDITION) = 1
```

<u>Definition</u> {705}.
```
(TM-NON-ZERO-CARRY-CONDITION) = 2
```

<u>Definition</u> {706}.
```
(TM-ZERO-CARRY-CONDITION) = 3
```

<u>Definition</u> {707}.
```
(TM-CC-VALUE ALU-RESULT)
   =
(IF (ZEROP (ALU-VALUE ALU-RESULT))
    (IF (FALSEP (ALU-CARRY ALU-RESULT))
        (TM-ZERO-NO-CARRY-CONDITION)
        (TM-ZERO-CARRY-CONDITION))
    (IF (FALSEP (ALU-CARRY ALU-RESULT))
        (TM-NON-ZERO-NO-CARRY-CONDITION)
        (TM-NON-ZERO-CARRY-CONDITION)))
```

<u>Definition</u> {708}.
```
(TM-CC-DIVISOR) = (EXP 2 (TM-CCSIZE))
```

<u>Definition</u> {709}.
```
(TM-ERROR-DIVISOR) = (EXP 2 (PLUS (TM-CCSIZE) (TM-ERRORSIZE)))
```

<u>Definition</u> {710}.
```
(TM-SVCFLAG-DIVISOR)
   =
(EXP 2
     (PLUS (TM-CCSIZE)
           (TM-ERRORSIZE)
           (TM-SVCFLAGSIZE)))
```

<u>Definition</u> {711}.
```
(TM-PACK-PSW CC ERROR SVCFLAG SVCID)
   =
(PLUS CC
      (PLUS (TIMES ERROR (TM-CC-DIVISOR))
            (PLUS (TIMES SVCFLAG (TM-ERROR-DIVISOR))
                  (TIMES SVCID (TM-SVCFLAG-DIVISOR)))))
```

<u>Definition</u> {713}.
```
(TM-UNPACK-CC PSW) = (REMAINDER PSW (TM-CC-DIVISOR))
```

<u>Definition</u> {714}.
```
(TM-UNPACK-ERROR PSW)
   =
(QUOTIENT (REMAINDER PSW (TM-ERROR-DIVISOR))
          (TM-CC-DIVISOR))
```

<u>Definition</u> {715}.

```
(TM-UNPACK-SVCFLAG PSW)
   =
(QUOTIENT (REMAINDER PSW (TM-SVCFLAG-DIVISOR))
          (TM-ERROR-DIVISOR))
```

Definition {716}.
```
(TM-UNPACK-SVCID PSW) = (QUOTIENT PSW (TM-SVCFLAG-DIVISOR))
```

Definition {721}.
```
(TM-REGISTER-SAVE-AREA-ADDR) = 0
```

Definition {722}.
```
(TM-CLOCK-NEW-PC-ADDR) = 3
```

Definition {723}.
```
(TM-ERROR-NEW-PC-ADDR) = 4
```

Definition {724}.
```
(TM-SVC-NEW-PC-ADDR) = 5
```

Definition {725}.
```
(TM-INPUT-NEW-PC-ADDR) = 6
```

Definition {726}.
```
(TM-OUTPUT-NEW-PC-ADDR) = 7
```

Definition {727}.
```
(TM-SVCID-ADDR) = 8
```

Definition {728}.
```
(TM-INPUT-DEVID-ADDR) = 8
```

Definition {729}.
```
(TM-INPUT-CHAR-ADDR) = 9
```

Definition {730}.
```
(TM-OUTPUT-DEVID-ADDR) = 9
```

Definition {731}.
```
(TM-NO-ERROR) = 0
```

Definition {732}.
```
(TM-HALT-STATUS) = 1
```

Definition {733}.
```
(TM-OPCODE-ERROR) = 2
```

Definition {734}.
```
(TM-PRIVILEGE-ERROR) = 3
```

Definition {735}.
```
(TM-STACK-OVERFLOW-ERROR) = 4
```

Definition {736}.
```
(TM-STACK-UNDERFLOW-ERROR) = 5
```

Definition {737}.
```
(TM-ADDRESS-ERROR) = 6
```

Definition {738}.
```
(TM-PC-ADDRESS-ERROR) = 7
```

Definition {739}.
```
(TM-SUPERVISOR-MODE) = 1
```

Definition {740}.
```
(TM-USER-MODE) = 0
```

Definition {741}.
```
(TM-IN-SUPERVISOR-MODE TM)
   =
(EQUAL (TM-SVMODE TM) (TM-SUPERVISOR-MODE))
```

Definition {742}.
```
(TM-WAIT-STATE) = 1
```

Definition {743}.
```
(TM-RUN-STATE) = 0
```

Definition {744}.
```
(TM-WAITING TM)
   =
(EQUAL (TM-RWSTATE TM) (TM-WAIT-STATE))
```

Definition {745}.
```
(TM-SVC) = 1
```

Definition {746}.
```
(TM-NO-SVC) = 0
```

Definition {747}.
```
(TM-CLEARED-SVCFLAG) = (TM-NO-SVC)
```

Shell Definition {748}.
Add the shell TM-IPORT with recognizer TM-IPORTP,
defining the record structure <TM-IINTERRUPT-FLAG, TM-IERROR-FLAG, TM-ICHAR>.

Shell Definition {749}.
Add the shell TM-OPORT with recognizer TM-OPORTP,
defining the record structure <TM-OINTERRUPT-FLAG, TM-OBUSY-FLAG, TM-OCHAR>.

Definition {750}.
```
(TM-IPORT-ERRORP ID PORTS)
   =
(EQUAL (TM-IERROR-FLAG (GETNTH ID PORTS)) 1)
```

Definition {751}.
```
(TM-CLEAR-INPUT-INTERRUPT ID PORTS)
   =
(PUTNTH (TM-IPORT 0
                  (TM-IERROR-FLAG (GETNTH ID PORTS))
                  (TM-ICHAR (GETNTH ID PORTS)))
        ID
 PORTS)
```

Definition {752}.
```
(TM-POST-INPUT-INTERRUPT CHAR ID PORTS)
   =
(PUTNTH (TM-IPORT 1
                  (TM-IINTERRUPT-FLAG (GETNTH ID PORTS))
                  CHAR)
        ID
        PORTS)
```

Definition {753}.
```
(TM-OPORT-IDLEP ID PORTS)
   =
(EQUAL (TM-OBUSY-FLAG (GETNTH ID PORTS)) 0)
```

Definition {754}.
```
(TM-START-OUTPUT CHAR ID PORTS)
   =
(PUTNTH (TM-OPORT 0 1 (REMAINDER CHAR (TM-CHARLUB)))
        ID
        PORTS)
```

Definition {755}.
```
(TM-POST-OUTPUT-INTERRUPT ID PORTS) = (PUTNTH (TM-OPORT 1 0 0) ID PORTS)
```

Definition {756}.
```
(TM-CLEAR-OUTPUT-INTERRUPT ID PORTS)
   =
(PUTNTH (TM-OPORT 0
                  (TM-OBUSY-FLAG (GETNTH ID PORTS))
                  (TM-OCHAR (GETNTH ID PORTS)))
        ID
        PORTS)
```

Definition {757}.
```
(REAL-ADDR SOURCE NUM) = (LIST SOURCE NUM)
```

Definition {758}.
```
(REAL-ADDR-SOURCE REAL-ADDR) = (CAR REAL-ADDR)
```

Definition {759}.
```
(REAL-ADDR-NUM REAL-ADDR) = (CADR REAL-ADDR)
```

Definition {760}.
```
(TM-ARG-MODE X) = (CAR X)
```

Definition {761}.
```
(TM-ARG-DATUM X) = (CADR X)
```

Definition {762}.
```
(TM-ARG-INDEX X) = (CADDR X)
```

Definition {763}.
```
(TM-FIX-WORD N) = (REMAINDER N (TM-WORDLUB))
```

Definition {764}.
```
(TM-FIX-REG-ADDRESS N) = (REMAINDER N (TM-REGLENGTH))
```

Definition {765}.
```
(TM-COMPUTE-ADDRESS ARG TM)
   =
(IF (ZEROP (TM-ARG-MODE ARG))
    (REAL-ADDR 0 (TM-FIX-WORD (PLUS (TM-ARG-DATUM ARG)
                                    (TM-ARG-INDEX ARG))))
(IF (EQUAL (TM-ARG-MODE ARG) 1)
    (REAL-ADDR 1 (TM-FIX-REG-ADDRESS (TM-ARG-DATUM ARG)))

(IF (EQUAL (TM-ARG-MODE ARG) 2)
    (REAL-ADDR 2 (TM-FIX-WORD (PLUS (TM-ARG-DATUM ARG)
                                    (TM-ARG-INDEX ARG))))

    (REAL-ADDR 2 (TM-FIX-WORD (PLUS (GETNTH (TM-FIX-REG-ADDRESS (TM-ARG-DATUM ARG))
                                            (TM-REGS TM))
                                    (TM-ARG-INDEX ARG)))))))
```

Definition {766}.
```
(TM-GOOD-ADDRESS ADDR TM)
   =
(IF (ZEROP (REAL-ADDR-SOURCE ADDR))
    (FINITE-NUMBERP (REAL-ADDR-NUM ADDR)
                    (TM-WORDLUB))
    (IF (EQUAL (REAL-ADDR-SOURCE ADDR) 1)
        (FINITE-NUMBERP (REAL-ADDR-NUM ADDR)
                        (TM-REGLENGTH))
        (IF (TM-IN-SUPERVISOR-MODE TM)
            (FINITE-NUMBERP (REAL-ADDR-NUM ADDR)
                            (TM-WORDLUB))
            (FINITE-NUMBERP (REAL-ADDR-NUM ADDR)
                            (MIN (DIFFERENCE (TM-MEMLENGTH)
                                             (TM-BASE TM))
                                 (TM-LIMIT TM))))))
```

Definition {767}.
```
(TM-INCR-ADDRESS ADDR)
   =
(IF (ZEROP (REAL-ADDR-SOURCE ADDR))
    (REAL-ADDR (REAL-ADDR-SOURCE ADDR)
               (TM-INCR (REAL-ADDR-NUM ADDR)))
    (IF (EQUAL (REAL-ADDR-SOURCE ADDR) 1)
        (REAL-ADDR (REAL-ADDR-SOURCE ADDR)
                   (REMAINDER (ADD1 (REAL-ADDR-NUM ADDR))
                              (TM-REGLENGTH)))
        (REAL-ADDR (REAL-ADDR-SOURCE ADDR)
                   (TM-INCR (REAL-ADDR-NUM ADDR)))))
```

Definition {768}.
```
(TM-INCRN-ADDRESS N A)
   =
(IF (ZEROP N)
    A
    (TM-INCR-ADDRESS (TM-INCRN-ADDRESS (SUB1 N) A)))
```

Definition {769}.

```
(TM-FETCH-FROM-MEMORY ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (GETNTH ADDR (TM-MEMORY TM))
    (GETNTH (PLUS (TM-BASE TM) ADDR)
            (TM-MEMORY TM)))
```

Definition {770}.

```
(TM-STORE-IN-MEMORY VALUE ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-MEMORY (PUTNTH VALUE ADDR (TM-MEMORY TM))
                   TM)
    (TM-SET-MEMORY (PUTNTH VALUE (PLUS (TM-BASE TM) ADDR)
                    (TM-MEMORY TM))
                   TM))
```

Definition {771}.

```
(TM-FETCH-FROM-REGMEM ADDR TM) = (GETNTH ADDR (TM-REGS TM))
```

Definition {772}.

```
(TM-STORE-IN-REGMEM VALUE ADDR TM)
   =
(TM-SET-REGS (PUTNTH VALUE ADDR (TM-REGS TM))
             TM)
```

Definition {773}.

```
(TM-FETCH ADDR TM)
   =
(IF (ZEROP (REAL-ADDR-SOURCE ADDR))
    (REAL-ADDR-NUM ADDR)
    (IF (EQUAL (REAL-ADDR-SOURCE ADDR) 1)
        (TM-FETCH-FROM-REGMEM (REAL-ADDR-NUM ADDR)
                              TM)
        (TM-FETCH-FROM-MEMORY (REAL-ADDR-NUM ADDR)
                              TM)))
```

Definition {774}.

```
(TM-STORE VALUE ADDR TM)
   =
(IF (ZEROP (REAL-ADDR-SOURCE ADDR))
    TM
    (IF (EQUAL (REAL-ADDR-SOURCE ADDR) 1)
        (TM-STORE-IN-REGMEM VALUE
                            (REAL-ADDR-NUM ADDR)
                            TM)
        (TM-STORE-IN-MEMORY VALUE
                            (REAL-ADDR-NUM ADDR)
                            TM)))
```

Definition {775}.

```
(TM-STACK-OVERFLOWP TM) = (ZEROP (TM-SP TM))
```

Definition {776}.

```
(TM-STACK-UNDERFLOWP TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (NOT (LESSP (ADD1 (TM-SP TM))
                (TM-SLIMIT TM)))
    (NOT (LESSP (ADD1 (TM-SP TM))
                (MIN (DIFFERENCE (TM-MEMLENGTH)
                                 (TM-BASE TM))
                     (TM-LIMIT TM)))))
```

Definition {778}.

```
(TM-EXECUTE-ADD ADDR1 ADDR2 TM)
   =
(TM-STORE (ALU-VALUE (TM-ALU-PLUS (TM-FETCH ADDR1 TM)
                                  (TM-FETCH ADDR2 TM)))
          ADDR1
          (TM-SET-CC (TM-CC-VALUE (TM-ALU-PLUS (TM-FETCH ADDR1 TM)
                                               (TM-FETCH ADDR2 TM)))
```

```
                     TM))
```

<u>Definition</u> {779}.

```
(TM-EXECUTE-BRANCH ADDR TM) = (TM-SET-PC (TM-FETCH ADDR TM) TM)
```

<u>Definition</u> {780}.

```
(TM-EXECUTE-BRANCH-ON-ZERO ADDR TM)
   =
(IF (EQUAL (TM-CC TM)
           (TM-ZERO-NO-CARRY-CONDITION))
    (TM-SET-PC (TM-FETCH ADDR TM) TM)
    TM)
```

<u>Definition</u> {781}.

```
(TM-EXECUTE-BRANCH-NOT-ZERO ADDR TM)
   =
(IF (EQUAL (TM-CC TM)
           (TM-ZERO-NO-CARRY-CONDITION))
    TM
    (TM-SET-PC (TM-FETCH ADDR TM) TM))
```

<u>Definition</u> {782}.

```
(TM-EXECUTE-CALL ADDR TM)
   =
(IF (TM-STACK-OVERFLOWP TM)
    (TM-SET-ERROR (TM-STACK-OVERFLOW-ERROR)
                  TM)
    (IF (TM-GOOD-ADDRESS (REAL-ADDR 2 (TM-SP TM))
                         TM)
        (TM-STORE (TM-PC TM)
                  (REAL-ADDR 2 (TM-SP TM))
                  (TM-SET-PC (TM-FETCH ADDR TM)
                             (TM-SET-SP (TM-DECR (TM-SP TM)) TM)))
        (TM-SET-ERROR (TM-ADDRESS-ERROR) TM)))
```

<u>Definition</u> {783}.

```
(TM-EXECUTE-COMPARE ADDR1 ADDR2 TM)
   =
(TM-SET-CC (TM-CC-VALUE (TM-ALU-DIFFERENCE (TM-FETCH ADDR1 TM)
                                           (TM-FETCH ADDR2 TM)))
           TM)
```

<u>Definition</u> {784}.

```
(TM-EXECUTE-DECR ADDR TM)
   =
(TM-STORE (ALU-VALUE (TM-ALU-DECR (TM-FETCH ADDR TM)))
          ADDR
          (TM-SET-CC (TM-CC-VALUE (TM-ALU-DECR (TM-FETCH ADDR TM)))
                     TM))
```

<u>Definition</u> {785}.

```
(TM-EXECUTE-DECR-MOD ADDR1 ADDR2 TM)
   =
(TM-STORE (ALU-VALUE (TM-ALU-DECR-MOD (TM-FETCH ADDR1 TM)
                                      (TM-FETCH ADDR2 TM)))
          ADDR1
          (TM-SET-CC (TM-CC-VALUE (TM-ALU-DECR-MOD (TM-FETCH ADDR1 TM)
                                                   (TM-FETCH ADDR2 TM)))
                     TM))
```

<u>Definition</u> {786}.

```
(TM-EXECUTE-INCR ADDR TM)
   =
(TM-STORE (ALU-VALUE (TM-ALU-INCR (TM-FETCH ADDR TM)))
          ADDR
          (TM-SET-CC (TM-CC-VALUE (TM-ALU-INCR (TM-FETCH ADDR TM)))
                     TM))
```

<u>Definition</u> {787}.

```
(TM-EXECUTE-INCR-MOD ADDR1 ADDR2 TM)
   =
(TM-STORE (ALU-VALUE (TM-ALU-INCR-MOD (TM-FETCH ADDR1 TM)
```

```
                                    (TM-FETCH ADDR2 TM)))
          ADDR1
          (TM-SET-CC (TM-CC-VALUE (TM-ALU-INCR-MOD (TM-FETCH ADDR1 TM)
                                                   (TM-FETCH ADDR2 TM)))
                     TM))
```

Definition {788}.

```
(TM-EXECUTE-LOAD-BASE ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-BASE (TM-FETCH ADDR TM) TM)
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {789}.

```
(TM-EXECUTE-LOAD-LIMIT ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-LIMIT (TM-FETCH ADDR TM) TM)
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {790}.

```
(TM-EXECUTE-LOAD-PSW ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-SVMODE (TM-USER-MODE)
     (TM-SET-PC (TM-FETCH ADDR TM)
      (TM-SET-SP (TM-FETCH (TM-INCRN-ADDRESS 1 ADDR) TM)
       (TM-SET-CC (TM-UNPACK-CC (TM-FETCH (TM-INCRN-ADDRESS 2 ADDR)TM))
        (TM-SET-ERROR (TM-UNPACK-ERROR (TM-FETCH (TM-INCRN-ADDRESS 2 ADDR) TM))
         (TM-SET-SVCFLAG (TM-UNPACK-SVCFLAG (TM-FETCH (TM-INCRN-ADDRESS 2 ADDR) TM))
          (TM-SET-SVCID (TM-UNPACK-SVCID (TM-FETCH (TM-INCRN-ADDRESS 2 ADDR) TM))
                        TM)))))))
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR) TM))
```

Definition {791}.

```
(TM-EXECUTE-MOD ADDR1 ADDR2 TM)
   =
(TM-STORE (ALU-VALUE (TM-ALU-MOD (TM-FETCH ADDR1 TM)
                                 (TM-FETCH ADDR2 TM)))
          ADDR1
          (TM-SET-CC (TM-CC-VALUE (TM-ALU-MOD (TM-FETCH ADDR1 TM)
                                              (TM-FETCH ADDR2 TM)))
                     TM))
```

Definition {792}.

```
(TM-EXECUTE-MOVE ADDR1 ADDR2 TM) = (TM-STORE (TM-FETCH ADDR2 TM)
                                             ADDR1 TM)
```

Definition {793}.

```
(TM-EXECUTE-MULTIPLY ADDR1 ADDR2 TM)
   =
(TM-STORE (ALU-VALUE (TM-ALU-MULT (TM-FETCH ADDR1 TM)
                                  (TM-FETCH ADDR2 TM)))
          ADDR1
          (TM-SET-CC (TM-CC-VALUE (TM-ALU-MULT (TM-FETCH ADDR1 TM)
                                               (TM-FETCH ADDR2 TM)))
                     TM))
```

Definition {794}.

```
(TM-EXECUTE-POST-OUTPUT-INTERRUPT ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-OPORTS (TM-POST-OUTPUT-INTERRUPT (TM-FETCH ADDR TM)
                                             (TM-OPORTS TM))
                   TM)
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {795}.

```
(TM-EXECUTE-RETURN TM)
```

```
   =
(IF (TM-STACK-UNDERFLOWP TM)
    (TM-SET-ERROR (TM-STACK-UNDERFLOW-ERROR)
                  TM)
    (TM-SET-PC (TM-FETCH (REAL-ADDR 2 (TM-INCR (TM-SP TM)))
                         TM)
               (TM-SET-SP (TM-INCR (TM-SP TM)) TM)))
```

Definition {796}.

```
(TM-EXECUTE-RUN TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-RWSTATE (TM-RUN-STATE) TM)
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {797}.

```
(TM-EXECUTE-SET-CLOCK ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-CLOCK (TM-FETCH ADDR TM) TM)
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {798}.

```
(TM-EXECUTE-START-OUTPUT ADDR1 ADDR2 TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-OPORTS (TM-START-OUTPUT (TM-FETCH ADDR2 TM)
                                    (TM-FETCH ADDR1 TM)
                                    (TM-OPORTS TM))
                   TM)
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {799}.

```
(TM-EXECUTE-SVC ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    TM
    (TM-SET-SVCFLAG (TM-SVC)
                    (TM-SET-SVCID (REMAINDER (TM-FETCH ADDR TM)
                                             (TM-SVCIDLUB))
                                  TM)))
```

Definition {800}.

```
(TM-EXECUTE-SVC-RETURN ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-SVMODE (TM-USER-MODE)
     (TM-SET-PC (TM-FETCH ADDR TM)
      (TM-SET-SP (TM-FETCH (TM-INCRN-ADDRESS 1 ADDR) TM)
       (TM-SET-CC (TM-UNPACK-CC (TM-FETCH (TM-INCRN-ADDRESS 2 ADDR) TM))
        (TM-SET-ERROR (TM-UNPACK-ERROR (TM-FETCH (TM-INCRN-ADDRESS 2 ADDR) TM))
         (TM-SET-SVCFLAG (TM-NO-SVC)
          (TM-SET-SVCID (TM-UNPACK-SVCID (TM-FETCH (TM-INCRN-ADDRESS 2 ADDR) TM))
                        TM)))))))
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR) TM))
```

Definition {801}.

```
(TM-EXECUTE-TEST-IPORT ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (IF (TM-IPORT-ERRORP (REMAINDER (TM-FETCH ADDR TM)
                                    (TM-PORT-LENGTH))
                         (TM-IPORTS TM))
        (TM-SET-CC (TM-ZERO-NO-CARRY-CONDITION)
                   TM)
        (TM-SET-CC (TM-NON-ZERO-NO-CARRY-CONDITION)
                   TM))
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
```

```
                  TM))
```

Definition {802}.

```
(TM-EXECUTE-TEST-OPORT ADDR TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (IF (TM-OPORT-IDLEP (REMAINDER (TM-FETCH ADDR TM)
                                   (TM-PORT-LENGTH))
                        (TM-OPORTS TM))
        (TM-SET-CC (TM-ZERO-NO-CARRY-CONDITION)
                   TM)
        (TM-SET-CC (TM-NON-ZERO-NO-CARRY-CONDITION)
                   TM))
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {803}.

```
(TM-EXECUTE-WAIT TM)
   =
(IF (TM-IN-SUPERVISOR-MODE TM)
    (TM-SET-RWSTATE (TM-WAIT-STATE)
                    (TM-SET-SVMODE (TM-USER-MODE) TM))
    (TM-SET-ERROR (TM-PRIVILEGE-ERROR)
                  TM))
```

Definition {804}.

```
(TM-OPCODE-SIZE) = 6
```

Definition {805}.

```
(TM-MODE-SIZE) = 2
```

Definition {806}.

```
(TM-INDEX-SIZE) = 3
```

Definition {807}.

```
(TM-OPCODE-DIVISOR) = (EXP 2 (TM-OPCODE-SIZE))
```

Definition {808}.

```
(TM-MODE1-DIVISOR) = (EXP 2 (PLUS (TM-OPCODE-SIZE) (TM-MODE-SIZE)))
```

Definition {809}.

```
(TM-INDEX1-DIVISOR)
   =
(EXP 2
     (PLUS (TM-OPCODE-SIZE)
           (TM-MODE-SIZE)
           (TM-INDEX-SIZE)))
```

Definition {810}.

```
(TM-MODE2-DIVISOR)
   =
(EXP 2
     (PLUS (TM-OPCODE-SIZE)
           (TM-MODE-SIZE)
           (TM-INDEX-SIZE)
           (TM-MODE-SIZE)))
```

Definition {811}.

```
(TM-OPCODE INSTRUCTION) = (REMAINDER INSTRUCTION (TM-OPCODE-DIVISOR))
```

Definition {812}.

```
(TM-MODE1 INSTRUCTION)
   =
(QUOTIENT (REMAINDER INSTRUCTION (TM-MODE1-DIVISOR))
          (TM-OPCODE-DIVISOR))
```

Definition {813}.

```
(TM-INDEX1 INSTRUCTION)
   =
(QUOTIENT (REMAINDER INSTRUCTION (TM-INDEX1-DIVISOR))
          (TM-MODE1-DIVISOR))
```

Definition {814}.

```
(TM-MODE2 INSTRUCTION)
```

```
   =
(QUOTIENT (REMAINDER INSTRUCTION (TM-MODE2-DIVISOR))
          (TM-INDEX1-DIVISOR))
```

<u>Definition</u> {815}.

```
(TM-INDEX2 INSTRUCTION) = (QUOTIENT INSTRUCTION (TM-MODE2-DIVISOR))
```

<u>Definition</u> {816}.

```
(TM-NULLARY-INSTRUCTIONP INSTRUCTION)
   =
(EQUAL (REMAINDER (TM-OPCODE INSTRUCTION) 4) 0)
```

<u>Definition</u> {817}.

```
(TM-UNARY-INSTRUCTIONP INSTRUCTION)
   =
(EQUAL (REMAINDER (TM-OPCODE INSTRUCTION) 2)
       0)
```

<u>Definition</u> {818}.

```
(TM-DATUM1 INSTRUCTION-LIST) = (CADR INSTRUCTION-LIST)
```

<u>Definition</u> {819}.

```
(TM-DATUM2 INSTRUCTION-LIST) = (CADDR INSTRUCTION-LIST)
```

<u>Definition</u> {820}.

```
(TM-ARG1 INSTRUCTION-LIST)
   =
(LIST (TM-MODE1 (CAR INSTRUCTION-LIST))
      (TM-DATUM1 INSTRUCTION-LIST)
      (TM-INDEX1 (CAR INSTRUCTION-LIST)))
```

<u>Definition</u> {821}.

```
(TM-ARG2 INSTRUCTION-LIST)
   =
(LIST (TM-MODE2 (CAR INSTRUCTION-LIST))
      (TM-DATUM2 INSTRUCTION-LIST)
      (TM-INDEX2 (CAR INSTRUCTION-LIST)))
```

<u>Definition</u> {822}.

```
(TM-RETURN-OPCODE) = 0
```

<u>Definition</u> {823}.

```
(TM-WAIT-OPCODE) = 4
```

<u>Definition</u> {824}.

```
(TM-RUN-OPCODE) = 8
```

<u>Definition</u> {825}.

```
(TM-EXECUTE-NULLARY OPCODE TM)
   =
(IF (EQUAL OPCODE (TM-RETURN-OPCODE))
    (TM-EXECUTE-RETURN TM)

(IF (EQUAL OPCODE (TM-RUN-OPCODE))
    (TM-EXECUTE-RUN TM)

(IF (EQUAL OPCODE (TM-WAIT-OPCODE))
    (TM-EXECUTE-WAIT TM)

    (TM-SET-ERROR (TM-OPCODE-ERROR) TM))))
```

<u>Definition</u> {826}.

```
(TM-BR-OPCODE) = 2
```

<u>Definition</u> {827}.

```
(TM-BRNZ-OPCODE) = 6
```

<u>Definition</u> {828}.

```
(TM-BRZ-OPCODE) = 10
```

<u>Definition</u> {829}.

```
(TM-CALL-OPCODE) = 14
```

<u>Definition</u> {830}.

```
(TM-DECR-OPCODE) = 18
```

```
Definition {831}.
(TM-INCR-OPCODE) = 22

Definition {832}.
(TM-LBASE-OPCODE) = 26

Definition {833}.
(TM-LLIMIT-OPCODE) = 30

Definition {834}.
(TM-LPSW-OPCODE) = 34

Definition {835}.
(TM-POST-OPCODE) = 38

Definition {836}.
(TM-SVC-OPCODE) = 42

Definition {837}.
(TM-SVC-RETURN-OPCODE) = 46

Definition {838}.
(TM-TESTI-OPCODE) = 50

Definition {839}.
(TM-TESTO-OPCODE) = 54

Definition {840}.
(TM-TIME-OPCODE) = 58

Definition {841}.
(TM-EXECUTE-UNARY OPCODE ADDR TM)
   =
(IF (NOT (TM-GOOD-ADDRESS ADDR TM))
    (TM-SET-ERROR (TM-ADDRESS-ERROR) TM)

(IF (EQUAL OPCODE (TM-BR-OPCODE))
    (TM-EXECUTE-BRANCH ADDR TM)

(IF (EQUAL OPCODE (TM-BRZ-OPCODE))
    (TM-EXECUTE-BRANCH-ON-ZERO ADDR TM)

(IF (EQUAL OPCODE (TM-BRNZ-OPCODE))
    (TM-EXECUTE-BRANCH-NOT-ZERO ADDR TM)

(IF (EQUAL OPCODE (TM-CALL-OPCODE))
    (TM-EXECUTE-CALL ADDR TM)

(IF (EQUAL OPCODE (TM-DECR-OPCODE))
    (TM-EXECUTE-DECR ADDR TM)

(IF (EQUAL OPCODE (TM-INCR-OPCODE))
    (TM-EXECUTE-INCR ADDR TM)

(IF (EQUAL OPCODE (TM-LBASE-OPCODE))
    (TM-EXECUTE-LOAD-BASE ADDR TM)

(IF (EQUAL OPCODE (TM-LLIMIT-OPCODE))
    (TM-EXECUTE-LOAD-LIMIT ADDR TM)

(IF (EQUAL OPCODE (TM-LPSW-OPCODE))
    (TM-EXECUTE-LOAD-PSW ADDR TM)

(IF (EQUAL OPCODE (TM-TIME-OPCODE))
    (TM-EXECUTE-SET-CLOCK ADDR TM)

(IF (EQUAL OPCODE (TM-TESTI-OPCODE))
    (TM-EXECUTE-TEST-IPORT ADDR TM)

(IF (EQUAL OPCODE (TM-TESTO-OPCODE))
    (TM-EXECUTE-TEST-OPORT ADDR TM)

(IF (EQUAL OPCODE (TM-SVC-OPCODE))
```

```
    (TM-EXECUTE-SVC ADDR TM)

(IF (EQUAL OPCODE (TM-SVC-RETURN-OPCODE))
    (TM-EXECUTE-SVC-RETURN ADDR TM)

(IF (EQUAL OPCODE (TM-POST-OPCODE))
    (TM-EXECUTE-POST-OUTPUT-INTERRUPT ADDR TM)

    (TM-SET-ERROR (TM-OPCODE-ERROR) TM)))))))))))))))))
```

Definition {842}.
```
(TM-ADD-OPCODE) = 1
```

Definition {843}.
```
(TM-COMPARE-OPCODE) = 3
```

Definition {844}.
```
(TM-DECR-MOD-OPCODE) = 5
```

Definition {845}.
```
(TM-INCR-MOD-OPCODE) = 7
```

Definition {846}.
```
(TM-MOD-OPCODE) = 9
```

Definition {847}.
```
(TM-MOVE-OPCODE) = 11
```

Definition {848}.
```
(TM-MULT-OPCODE) = 13
```

Definition {849}.
```
(TM-STOUT-OPCODE) = 15
```

Definition {850}.
```
(TM-EXECUTE-BINARY OPCODE ADDR1 ADDR2 TM)
   =
(IF (OR (NOT (TM-GOOD-ADDRESS ADDR1 TM))
        (NOT (TM-GOOD-ADDRESS ADDR2 TM)))
    (TM-SET-ERROR (TM-ADDRESS-ERROR) TM)

(IF (EQUAL OPCODE (TM-ADD-OPCODE))
    (TM-EXECUTE-ADD ADDR1 ADDR2 TM)

(IF (EQUAL OPCODE (TM-COMPARE-OPCODE))
    (TM-EXECUTE-COMPARE ADDR1 ADDR2 TM)

(IF (EQUAL OPCODE (TM-DECR-MOD-OPCODE))
    (TM-EXECUTE-DECR-MOD ADDR1 ADDR2 TM)

(IF (EQUAL OPCODE (TM-INCR-MOD-OPCODE))
    (TM-EXECUTE-INCR-MOD ADDR1 ADDR2 TM)

(IF (EQUAL OPCODE (TM-MOD-OPCODE))
    (TM-EXECUTE-MOD ADDR1 ADDR2 TM)

(IF (EQUAL OPCODE (TM-MOVE-OPCODE))
    (TM-EXECUTE-MOVE ADDR1 ADDR2 TM)

(IF (EQUAL OPCODE (TM-MULT-OPCODE))
    (TM-EXECUTE-MULTIPLY ADDR1 ADDR2 TM)

(IF (EQUAL OPCODE (TM-STOUT-OPCODE))
    (TM-EXECUTE-START-OUTPUT ADDR1 ADDR2 TM)

    (TM-SET-ERROR (TM-OPCODE-ERROR) TM))))))))))
```

Definition {851}.
```
(TM-EXECUTE-INSTRUCTION INSTRUCTION TM)
   =
(IF (EQUAL (LENGTH INSTRUCTION) 1)
    (TM-EXECUTE-NULLARY (TM-OPCODE (CAR INSTRUCTION)) TM)
```

```
(IF (EQUAL (LENGTH INSTRUCTION) 2)
    (TM-EXECUTE-UNARY (TM-OPCODE (CAR INSTRUCTION))
                      (TM-COMPUTE-ADDRESS (TM-ARG1 INSTRUCTION) TM)
                      TM)

(IF (EQUAL (LENGTH INSTRUCTION) 3)
    (TM-EXECUTE-BINARY (TM-OPCODE (CAR INSTRUCTION))
                       (TM-COMPUTE-ADDRESS (TM-ARG1 INSTRUCTION) TM)
                       (TM-COMPUTE-ADDRESS (TM-ARG2 INSTRUCTION) TM)
                       TM)
    (TM-SET-ERROR (TM-OPCODE-ERROR) TM))))
```

<u>Definition</u> {852}.
```
(TM-FETCH-OPCODE TM) = (TM-FETCH (REAL-ADDR 2 (TM-PC TM)) TM)
```

<u>Definition</u> {853}.
```
(TM-FETCH-ARG1 TM) = (TM-FETCH (REAL-ADDR 2 (TM-INCRN 1 (TM-PC TM))) TM)
```

<u>Definition</u> {854}.
```
(TM-FETCH-ARG2 TM) = (TM-FETCH (REAL-ADDR 2 (TM-INCRN 2 (TM-PC TM))) TM)
```

<u>Definition</u> {855}.
```
(TM-EXECUTE OPCODE TM)
   =
(IF (TM-NULLARY-INSTRUCTIONP OPCODE)
    (TM-EXECUTE-INSTRUCTION (LIST OPCODE)
                            (TM-SET-PC (TM-INCRN 1 (TM-PC TM)) TM))
    (IF (TM-GOOD-ADDRESS (REAL-ADDR 2 (TM-INCRN 1 (TM-PC TM))) TM)
        (IF (TM-UNARY-INSTRUCTIONP OPCODE)
            (TM-EXECUTE-INSTRUCTION (LIST OPCODE (TM-FETCH-ARG1 TM))
                                    (TM-SET-PC (TM-INCRN 2 (TM-PC TM)) TM))
            (IF (TM-GOOD-ADDRESS (REAL-ADDR 2 (TM-INCRN 2 (TM-PC TM))) TM)
                (TM-EXECUTE-INSTRUCTION (LIST OPCODE
                                              (TM-FETCH-ARG1 TM)
                                              (TM-FETCH-ARG2 TM))
                                        (TM-SET-PC (TM-INCRN 3 (TM-PC TM)) TM))
                (TM-SET-ERROR (TM-PC-ADDRESS-ERROR) TM)))
        (TM-SET-ERROR (TM-PC-ADDRESS-ERROR) TM)))
```

<u>Definition</u> {856}.
```
(TM-DECREMENT-CLOCK TM)
   =
(IF (ZEROP (TM-CLOCK TM))
    TM
    (IF (NOT (TM-IN-SUPERVISOR-MODE TM))
        (TM-SET-CLOCK (TM-DECR (TM-CLOCK TM))
                      TM)
        TM))
```

<u>Definition</u> {857}.
```
(TM-GOOD-PC-ADDRESS TM) = (TM-GOOD-ADDRESS (REAL-ADDR 2 (TM-PC TM)) TM)
```

<u>Definition</u> {858}.
```
(TM-FETCH-EXECUTE TM)
   =
(IF (TM-GOOD-PC-ADDRESS TM)
    (TM-EXECUTE (TM-FETCH-OPCODE TM)
                (TM-DECREMENT-CLOCK TM))
    (TM-SET-ERROR (TM-PC-ADDRESS-ERROR)
                  (TM-DECREMENT-CLOCK TM)))
```

<u>Definition</u> {859}.
```
(TM-FETCH-NEW-PC-ON-INTERRUPT ADDR TM)
   =
(TM-SET-PC (TM-FETCH-FROM-MEMORY ADDR TM)
           TM)
```

<u>Definition</u> {860}.
```
(TM-STORE-OLD-PSW-ON-INTERRUPT ADDR TM)
   =
(TM-STORE (TM-PC TM)
          (REAL-ADDR 2 ADDR)
```

```
          (TM-STORE (TM-SP TM)
                    (TM-INCRN-ADDRESS 1 (REAL-ADDR 2 ADDR))
                    (TM-STORE (TM-PACK-PSW (TM-CC TM)
                                           (TM-ERROR TM)
                                           (TM-SVCFLAG TM)
                                           (TM-SVCID TM))
                              (TM-INCRN-ADDRESS 2 (REAL-ADDR 2 ADDR))
                              TM)))
```

Definition {861}.

```
(TM-CLOCK-INTERRUPTP TM)
   =
(AND (NOT (TM-IN-SUPERVISOR-MODE TM))
     (ZEROP (TM-CLOCK TM)))
```

Definition {862}.

```
(TM-EXECUTE-CLOCK-INTERRUPT TM)
   =
(TM-SET-SP (TM-DECR (TM-SLIMIT TM))
 (TM-FETCH-NEW-PC-ON-INTERRUPT (TM-CLOCK-NEW-PC-ADDR)
  (TM-STORE-OLD-PSW-ON-INTERRUPT (TM-REGISTER-SAVE-AREA-ADDR)
   (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                  TM))))
```

Definition {863}.

```
(TM-ERRORP TM) = (NOT (EQUAL (TM-ERROR TM) (TM-NO-ERROR)))
```

Definition {864}.

```
(TM-EXECUTE-ERROR-INTERRUPT TM)
   =
(TM-SET-SP (TM-DECR (TM-SLIMIT TM))
 (TM-SET-ERROR (TM-NO-ERROR)
  (TM-FETCH-NEW-PC-ON-INTERRUPT (TM-ERROR-NEW-PC-ADDR)
   (TM-STORE-OLD-PSW-ON-INTERRUPT (TM-REGISTER-SAVE-AREA-ADDR)
    (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                   TM)))))
```

Definition {865}.

```
(TM-SVC-INTERRUPTP TM)
   =
(AND (NOT (TM-IN-SUPERVISOR-MODE TM))
     (EQUAL (TM-SVCFLAG TM) (TM-SVC)))
```

Definition {866}.

```
(TM-STORE-SVCID-ON-INTERRUPT TM)
   =
(TM-STORE (TM-SVCID TM)
          (REAL-ADDR 2 (TM-SVCID-ADDR))
          TM)
```

Definition {867}.

```
(TM-EXECUTE-SVC-INTERRUPT TM)
   =
(TM-SET-SP (TM-DECR (TM-SLIMIT TM))
 (TM-FETCH-NEW-PC-ON-INTERRUPT (TM-SVC-NEW-PC-ADDR)
  (TM-STORE-SVCID-ON-INTERRUPT
   (TM-STORE-OLD-PSW-ON-INTERRUPT (TM-REGISTER-SAVE-AREA-ADDR)
    (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                   TM)))))
```

Definition {868}.

```
(TM-OVERFLOW-CHAR CHAR) = (PLUS (TM-CHARLUB) CHAR)
```

Definition {869}.

```
(TM-SOME-INPUT-INTERRUPTP PORTS)
   =
(IF (LISTP PORTS)
    (OR (EQUAL (TM-IINTERRUPT-FLAG (CAR PORTS))
               1)
        (TM-SOME-INPUT-INTERRUPTP (CDR PORTS)))
    F)
```

Definition {870}.

```
(TM-INPUT-INTERRUPTP TM)
   =
(AND (NOT (TM-IN-SUPERVISOR-MODE TM))
     (TM-SOME-INPUT-INTERRUPTP (TM-IPORTS TM)))
```

Definition {871}.

```
(TM-INTERRUPTING-INPUT-PORT PORTS)
   =
(IF (LISTP PORTS)
    (IF (EQUAL (TM-IINTERRUPT-FLAG (CAR PORTS))
               1)
        0
        (ADD1 (TM-INTERRUPTING-INPUT-PORT (CDR PORTS))))
    0)
```

Definition {872}.

```
(TM-STORE-INTERRUPTING-INPUT-DEVICE ID TM)
   =
(TM-STORE ID
          (REAL-ADDR 2 (TM-INPUT-DEVID-ADDR))
          (TM-STORE (TM-ICHAR (GETNTH ID (TM-IPORTS TM)))
                    (REAL-ADDR 2 (TM-INPUT-CHAR-ADDR))
                    TM))
```

Definition {873}.

```
(TM-EXECUTE-INPUT-INTERRUPT TM)
   =
(TM-SET-SP (TM-DECR (TM-SLIMIT TM))
 (TM-SET-ERROR (TM-NO-ERROR)
  (TM-FETCH-NEW-PC-ON-INTERRUPT (TM-INPUT-NEW-PC-ADDR)
   (TM-SET-IPORTS (TM-CLEAR-INPUT-INTERRUPT
                   (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS TM))
                   (TM-IPORTS TM))
    (TM-STORE-INTERRUPTING-INPUT-DEVICE (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS TM))
     (TM-STORE-OLD-PSW-ON-INTERRUPT (TM-REGISTER-SAVE-AREA-ADDR)
      (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
       (TM-SET-RWSTATE (TM-RUN-STATE)
                       TM))))))))
```

Definition {874}.

```
(TM-SOME-OUTPUT-INTERRUPTP PORTS)
   =
(IF (LISTP PORTS)
    (OR (EQUAL (TM-OINTERRUPT-FLAG (CAR PORTS))
               1)
        (TM-SOME-OUTPUT-INTERRUPTP (CDR PORTS)))
    F)
```

Definition {875}.

```
(TM-OUTPUT-INTERRUPTP TM)
   =
(AND (NOT (TM-IN-SUPERVISOR-MODE TM))
     (TM-SOME-OUTPUT-INTERRUPTP (TM-OPORTS TM)))
```

Definition {876}.

```
(TM-INTERRUPTING-OUTPUT-PORT PORTS)
   =
(IF (LISTP PORTS)
    (IF (EQUAL (TM-OINTERRUPT-FLAG (CAR PORTS))
               1)
        0
        (ADD1 (TM-INTERRUPTING-OUTPUT-PORT (CDR PORTS))))
    0)
```

Definition {877}.

```
(TM-STORE-INTERRUPTING-OUTPUT-DEVICE ID TM)
   =
(TM-STORE ID
          (REAL-ADDR 2 (TM-OUTPUT-DEVID-ADDR))
          TM)
```

Definition {878}.

```
(TM-EXECUTE-OUTPUT-INTERRUPT TM)
   =
(TM-SET-SP (TM-DECR (TM-SLIMIT TM))
 (TM-SET-ERROR (TM-NO-ERROR)
  (TM-FETCH-NEW-PC-ON-INTERRUPT (TM-OUTPUT-NEW-PC-ADDR)
   (TM-SET-OPORTS (TM-CLEAR-OUTPUT-INTERRUPT
                   (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS TM))
                   (TM-OPORTS TM))
    (TM-STORE-INTERRUPTING-OUTPUT-DEVICE (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS TM))
     (TM-STORE-OLD-PSW-ON-INTERRUPT (TM-REGISTER-SAVE-AREA-ADDR)
      (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
       (TM-SET-RWSTATE (TM-RUN-STATE)
                       TM))))))))
```

Shell Definition {879}.
Add the shell TM-DEVICE-INPUT-EVENT with recognizer TM-DEVICE-INPUT-EVENTP, defining the record structure <TM-IDEVID, TM-IDATUM>.

Shell Definition {880}.
Add the shell TM-DEVICE-OUTPUT-EVENT with recognizer TM-DEVICE-OUTPUT-EVENTP, defining the record structure <TM-ODEVID>.

Definition {881}.

```
(TM-POST-INTERRUPT EVENT TM)
   =
(IF (TM-DEVICE-INPUT-EVENTP EVENT)
    (TM-SET-IPORTS (TM-POST-INPUT-INTERRUPT (REMAINDER (TM-IDATUM EVENT)
                                                       (TM-CHARLUB))
                                            (REMAINDER (TM-IDEVID EVENT)
                                                       (TM-PORT-LENGTH))
                                            (TM-IPORTS TM))
                   TM)
    (IF (TM-DEVICE-OUTPUT-EVENTP EVENT)
        (TM-SET-OPORTS (TM-POST-OUTPUT-INTERRUPT (REMAINDER (TM-ODEVID EVENT)
                                                            (TM-PORT-LENGTH))
                                                 (TM-OPORTS TM))
                       TM)
        TM))
```

Definition {882}.

```
(TM-STEP TM)
   =
(IF (TM-INPUT-INTERRUPTP TM)
    (TM-EXECUTE-INPUT-INTERRUPT TM)

(IF (TM-OUTPUT-INTERRUPTP TM)
    (TM-EXECUTE-OUTPUT-INTERRUPT TM)

(IF (TM-WAITING TM)
    TM

(IF (TM-ERRORP TM)
    (TM-EXECUTE-ERROR-INTERRUPT TM)

(IF (TM-CLOCK-INTERRUPTP TM)
    (TM-EXECUTE-CLOCK-INTERRUPT TM)

(IF (TM-SVC-INTERRUPTP TM)
    (TM-EXECUTE-SVC-INTERRUPT TM)

    (TM-FETCH-EXECUTE TM))))))
```

Definition {883}.

```
(TM-PROCESSOR TM ORACLE)
   =
(IF (LISTP ORACLE)
    (TM-PROCESSOR (TM-STEP (TM-POST-INTERRUPT (CAR ORACLE) TM))
                  (CDR ORACLE))
    TM)
```

Definition {903}.

```
(GOOD-TM-IPORT X)
   =
(AND (TM-IPORTP X)
     (FINITE-NUMBERP (TM-IINTERRUPT-FLAG X)
                     2)
     (FINITE-NUMBERP (TM-IERROR-FLAG X) 2)
     (FINITE-NUMBERP (TM-ICHAR X)
                     (TM-CHARLUB)))
```

Definition {904}.

```
(GOOD-TM-IPORT-ARRAY L)
   =
(IF (LISTP L)
    (AND (GOOD-TM-IPORT (CAR L))
         (GOOD-TM-IPORT-ARRAY (CDR L)))
    T)
```

Definition {905}.

```
(GOOD-TM-OPORT X)
   =
(AND (TM-OPORTP X)
     (FINITE-NUMBERP (TM-OINTERRUPT-FLAG X)
                     2)
     (FINITE-NUMBERP (TM-OBUSY-FLAG X) 2)
     (FINITE-NUMBERP (TM-OCHAR X)
                     (TM-CHARLUB)))
```

Definition {906}.

```
(GOOD-TM-OPORT-ARRAY L)
   =
(IF (LISTP L)
    (AND (GOOD-TM-OPORT (CAR L))
         (GOOD-TM-OPORT-ARRAY (CDR L)))
    T)
```

Definition {907}.

```
(GOOD-TM TM)
   =
(AND (TM-SHELLP TM)
     (PLISTP (TM-MEMORY TM))
     (EQUAL (LENGTH (TM-MEMORY TM)) (TM-MEMLENGTH))
     (FINITE-NUMBER-LISTP (TM-MEMORY TM) (TM-WORDLUB))
     (PLISTP (TM-REGS TM))
     (EQUAL (LENGTH (TM-REGS TM)) (TM-REGLENGTH))
     (FINITE-NUMBER-LISTP (TM-REGS TM) (TM-WORDLUB))
     (FINITE-NUMBERP (TM-CC TM) (TM-CCLUB))
     (FINITE-NUMBERP (TM-ERROR TM) (TM-ERRORLUB))
     (FINITE-NUMBERP (TM-SVCFLAG TM) (TM-SVCFLAGLUB))
     (FINITE-NUMBERP (TM-SVCID TM) (TM-SVCIDLUB))
     (FINITE-NUMBERP (TM-BASE TM) (TM-WORDLUB))
     (FINITE-NUMBERP (TM-LIMIT TM) (TM-WORDLUB))
     (FINITE-NUMBERP (TM-SLIMIT TM) (TM-WORDLUB))
     (FINITE-NUMBERP (TM-SVMODE TM) 2)
     (FINITE-NUMBERP (TM-RWSTATE TM) 2)
     (FINITE-NUMBERP (TM-CLOCK TM) (TM-WORDLUB))
     (PLISTP (TM-IPORTS TM))
     (EQUAL (LENGTH (TM-IPORTS TM)) (TM-PORT-LENGTH))
     (GOOD-TM-IPORT-ARRAY (TM-IPORTS TM))
     (PLISTP (TM-OPORTS TM))
     (EQUAL (LENGTH (TM-OPORTS TM)) (TM-PORT-LENGTH))
     (GOOD-TM-OPORT-ARRAY (TM-OPORTS TM)))
```

Definition {961}.

```
(TM-CPU-LENGTH) = 9
```

Definition {962}.

```
(TM-R0 TM) = (GETNTH 0 (TM-REGS TM))
```

Definition {963}.

```
(TM-R1 TM) = (GETNTH 1 (TM-REGS TM))
```

Definition {964}.

```
(TM-R2 TM) = (GETNTH 2 (TM-REGS TM))
```

Definition {965}.
```
(TM-R3 TM) = (GETNTH 3 (TM-REGS TM))
```

Definition {966}.
```
(TM-R4 TM) = (GETNTH 4 (TM-REGS TM))
```

Definition {967}.
```
(TM-R5 TM) = (GETNTH 5 (TM-REGS TM))
```

Definition {968}.
```
(TM-R6 TM) = (GETNTH 6 (TM-REGS TM))
```

Definition {969}.
```
(TM-R7 TM) = (GETNTH 7 (TM-REGS TM))
```

Definition {970}.
```
(TM-CPU TM)
   =
(LIST (TM-R0 TM)
      (TM-R1 TM)
      (TM-R2 TM)
      (TM-R3 TM)
      (TM-R4 TM)
      (TM-R5 TM)
      (TM-R6 TM)
      (TM-R7 TM)
      (TM-PACK-PSW (TM-CC TM)
                   (TM-ERROR TM)
                   (TM-SVCFLAG TM)
                   (TM-SVCID TM)))
```

Definition {971}.
```
(GOOD-CPU CPU)
   =
(AND (PLISTP CPU)
     (EQUAL (LENGTH CPU) (TM-CPU-LENGTH))
     (FINITE-NUMBER-LISTP CPU
                          (TM-WORDLUB)))
```

Definition {972}.
```
(GOOD-CPU-LIST L)
   =
(IF (LISTP L)
    (AND (GOOD-CPU (CAR L))
         (GOOD-CPU-LIST (CDR L)))
    T)
```

Definition {1037}.
```
(TM-GOOD-SUPERVISOR-ADDRESS ADDR)
   =
(IF (ZEROP (REAL-ADDR-SOURCE ADDR))
    (FINITE-NUMBERP (REAL-ADDR-NUM ADDR)
                    (TM-WORDLUB))
    (IF (EQUAL (REAL-ADDR-SOURCE ADDR) 1)
        (FINITE-NUMBERP (REAL-ADDR-NUM ADDR)
                        (TM-REGLENGTH))
        (FINITE-NUMBERP (REAL-ADDR-NUM ADDR)
                        (TM-WORDLUB))))
```

Definition {1115}.
```
(BASE-LIMIT BASE LIMIT) = (LIST BASE LIMIT)
```

Definition {1116}.
```
(BASE BASE-LIMIT) = (CAR BASE-LIMIT)
```

Definition {1117}.
```
(LIMIT BASE-LIMIT) = (CADR BASE-LIMIT)
```

Definition {1118}.
```
(DISJOINT B1 L1 B2 L2) = (OR (LEQ (PLUS B1 L1) B2)
                             (LEQ (PLUS B2 L2) B1))
```

Definition {1120}.

```
(DISJOINT-EVERYWHERE B L TABLE)
   =
(IF (LISTP TABLE)
    (AND (DISJOINT B L
                   (BASE (CAR TABLE))
                   (LIMIT (CAR TABLE)))
         (DISJOINT-EVERYWHERE B L (CDR TABLE)))
    T)
```

Definition {1121}.

```
(MUTUALLY-DISJOINT TABLE)
   =
(IF (LISTP TABLE)
    (AND (DISJOINT-EVERYWHERE (BASE (CAR TABLE))
                              (LIMIT (CAR TABLE))
                              (CDR TABLE))
         (MUTUALLY-DISJOINT (CDR TABLE)))
    T)
```

Definition {1122}.

```
(FINITE-SEGMENT-TABLEP TABLE MAX)
   =
(IF (LISTP TABLE)
    (AND (LEQ (PLUS (BASE (CAR TABLE))
                    (LIMIT (CAR TABLE)))
              MAX)
         (FINITE-SEGMENT-TABLEP (CDR TABLE)
                                MAX))
    T)
```

Definition {1194}.

```
(GOOD-ADDRESS-SPACE X MEMLENGTH)
   =
(AND (TM-SHELLP X)
     (NUMBERP MEMLENGTH)
     (LEQ MEMLENGTH (TM-MEMLENGTH))
     (PLISTP (TM-MEMORY X))
     (FINITE-NUMBER-LISTP (TM-MEMORY X)
                          (TM-WORDLUB))
     (EQUAL (LENGTH (TM-MEMORY X))
            MEMLENGTH)
     (PLISTP (TM-REGS X))
     (FINITE-NUMBER-LISTP (TM-REGS X)
                          (TM-WORDLUB))
     (EQUAL (LENGTH (TM-REGS X))
            (TM-REGLENGTH))
     (FINITE-NUMBERP (TM-CC X) (TM-CCLUB))
     (FINITE-NUMBERP (TM-ERROR X)
                     (TM-ERRORLUB))
     (FINITE-NUMBERP (TM-SVCFLAG X)
                     (TM-SVCFLAGLUB))
     (FINITE-NUMBERP (TM-SVCID X)
                     (TM-SVCIDLUB))
     (EQUAL (TM-BASE X) 0)
     (EQUAL (TM-LIMIT X) MEMLENGTH)
     (EQUAL (TM-SVMODE X) (TM-USER-MODE)))
```

Definition {1266}.

```
(MAPUP-ADDRESS-SPACE MEMORY REGS CC ERROR SVCFLAG SVCID BASE LIMIT)
   =
(TM (GETSEG BASE LIMIT MEMORY)
    REGS CC ERROR SVCFLAG SVCID 0
    (FIX LIMIT)
    0
    (TM-USER-MODE)
    0 0 0 0)
```

Definition {1326}.

```
(TM-EXECUTE-NULLARY2 OPCODE TM)
   =
(IF (EQUAL OPCODE (TM-RUN-OPCODE))
```

```
    (TM-EXECUTE-RUN TM)
    (IF (EQUAL OPCODE (TM-WAIT-OPCODE))
        (TM-EXECUTE-WAIT TM)
        (TM-SET-ERROR (TM-OPCODE-ERROR) TM)))
```

Definition {1327}.

```
(TM-EXECUTE-NULLARY1 OPCODE TM)
   =
(IF (EQUAL OPCODE (TM-RETURN-OPCODE))
    (TM-EXECUTE-RETURN TM)
    (TM-EXECUTE-NULLARY2 OPCODE TM))
```

Definition {1332}.

```
(TM-EXECUTE-UNARY8 OPCODE ADDR TM)
   =
(IF (EQUAL OPCODE (TM-TESTI-OPCODE))
    (TM-EXECUTE-TEST-IPORT ADDR TM)
    (IF (EQUAL OPCODE (TM-TESTO-OPCODE))
        (TM-EXECUTE-TEST-OPORT ADDR TM)
        (TM-SET-ERROR (TM-OPCODE-ERROR) TM)))
```

Definition {1333}.

```
(TM-EXECUTE-UNARY7 OPCODE ADDR TM)
   =
(IF (EQUAL OPCODE (TM-SVC-RETURN-OPCODE))
    (TM-EXECUTE-SVC-RETURN ADDR TM)
    (IF (EQUAL OPCODE (TM-POST-OPCODE))
        (TM-EXECUTE-POST-OUTPUT-INTERRUPT ADDR TM)
        (TM-EXECUTE-UNARY8 OPCODE ADDR TM)))
```

Definition {1334}.

```
(TM-EXECUTE-UNARY6 OPCODE ADDR TM)
   =
(IF (EQUAL OPCODE (TM-TIME-OPCODE))
    (TM-EXECUTE-SET-CLOCK ADDR TM)
    (IF (EQUAL OPCODE (TM-SVC-OPCODE))
        (TM-EXECUTE-SVC ADDR TM)
        (TM-EXECUTE-UNARY7 OPCODE ADDR TM)))
```

Definition {1335}.

```
(TM-EXECUTE-UNARY5 OPCODE ADDR TM)
   =
(IF (EQUAL OPCODE (TM-LLIMIT-OPCODE))
    (TM-EXECUTE-LOAD-LIMIT ADDR TM)
    (IF (EQUAL OPCODE (TM-LPSW-OPCODE))
        (TM-EXECUTE-LOAD-PSW ADDR TM)
        (TM-EXECUTE-UNARY6 OPCODE ADDR TM)))
```

Definition {1336}.

```
(TM-EXECUTE-UNARY4 OPCODE ADDR TM)
   =
(IF (EQUAL OPCODE (TM-INCR-OPCODE))
    (TM-EXECUTE-INCR ADDR TM)
    (IF (EQUAL OPCODE (TM-LBASE-OPCODE))
        (TM-EXECUTE-LOAD-BASE ADDR TM)
        (TM-EXECUTE-UNARY5 OPCODE ADDR TM)))
```

Definition {1337}.

```
(TM-EXECUTE-UNARY3 OPCODE ADDR TM)
   =
(IF (EQUAL OPCODE (TM-BRNZ-OPCODE))
    (TM-EXECUTE-BRANCH-NOT-ZERO ADDR TM)
    (IF (EQUAL OPCODE (TM-DECR-OPCODE))
        (TM-EXECUTE-DECR ADDR TM)
        (TM-EXECUTE-UNARY4 OPCODE ADDR TM)))
```

Definition {1338}.

```
(TM-EXECUTE-UNARY2 OPCODE ADDR TM)
   =
(IF (EQUAL OPCODE (TM-BRZ-OPCODE))
    (TM-EXECUTE-BRANCH-ON-ZERO ADDR TM)
    (IF (EQUAL OPCODE (TM-CALL-OPCODE))
```

```
        (TM-EXECUTE-CALL ADDR TM)
        (TM-EXECUTE-UNARY3 OPCODE ADDR TM)))
```

Definition {1339}.

```
(TM-EXECUTE-UNARY1 OPCODE ADDR TM)
   =
(IF (NOT (TM-GOOD-ADDRESS ADDR TM))
    (TM-SET-ERROR (TM-ADDRESS-ERROR) TM)
    (IF (EQUAL OPCODE (TM-BR-OPCODE))
        (TM-EXECUTE-BRANCH ADDR TM)
        (TM-EXECUTE-UNARY2 OPCODE ADDR TM)))
```

Definition {1350}.

```
(TM-EXECUTE-BINARY6 OPCODE ADDR1 ADDR2 TM)
   =
(IF (EQUAL OPCODE (TM-INCR-MOD-OPCODE))
    (TM-EXECUTE-INCR-MOD ADDR1 ADDR2 TM)
    (TM-SET-ERROR (TM-OPCODE-ERROR) TM))
```

Definition {1351}.

```
(TM-EXECUTE-BINARY5 OPCODE ADDR1 ADDR2 TM)
   =
(IF (EQUAL OPCODE (TM-STOUT-OPCODE))
    (TM-EXECUTE-START-OUTPUT ADDR1 ADDR2 TM)
    (IF (EQUAL OPCODE (TM-DECR-MOD-OPCODE))
        (TM-EXECUTE-DECR-MOD ADDR1 ADDR2 TM)
        (TM-EXECUTE-BINARY6 OPCODE ADDR1 ADDR2 TM)))
```

Definition {1352}.

```
(TM-EXECUTE-BINARY4 OPCODE ADDR1 ADDR2 TM)
   =
(IF (EQUAL OPCODE (TM-MOVE-OPCODE))
    (TM-EXECUTE-MOVE ADDR1 ADDR2 TM)
    (IF (EQUAL OPCODE (TM-MULT-OPCODE))
        (TM-EXECUTE-MULTIPLY ADDR1 ADDR2 TM)
        (TM-EXECUTE-BINARY5 OPCODE ADDR1 ADDR2 TM)))
```

Definition {1353}.

```
(TM-EXECUTE-BINARY3 OPCODE ADDR1 ADDR2 TM)
   =
(IF (EQUAL OPCODE (TM-COMPARE-OPCODE))
    (TM-EXECUTE-COMPARE ADDR1 ADDR2 TM)
    (IF (EQUAL OPCODE (TM-MOD-OPCODE))
        (TM-EXECUTE-MOD ADDR1 ADDR2 TM)
        (TM-EXECUTE-BINARY4 OPCODE ADDR1 ADDR2 TM)))
```

Definition {1354}.

```
(TM-EXECUTE-BINARY2 OPCODE ADDR1 ADDR2 TM)
   =
(IF (EQUAL OPCODE (TM-ADD-OPCODE))
    (TM-EXECUTE-ADD ADDR1 ADDR2 TM)
    (TM-EXECUTE-BINARY3 OPCODE ADDR1 ADDR2 TM))
```

Definition {1355}.

```
(TM-EXECUTE-BINARY1 OPCODE ADDR1 ADDR2 TM)
   =
(IF (OR (NOT (TM-GOOD-ADDRESS ADDR1 TM))
        (NOT (TM-GOOD-ADDRESS ADDR2 TM)))
    (TM-SET-ERROR (TM-ADDRESS-ERROR) TM)
    (TM-EXECUTE-BINARY2 OPCODE ADDR1 ADDR2 TM))
```

Definition {1365}.

```
(TM-EXECUTE-INSTRUCTION2 INSTRUCTION TM)
   =
(IF (EQUAL (LENGTH INSTRUCTION) 3)
    (TM-EXECUTE-BINARY (TM-OPCODE (CAR INSTRUCTION))
                       (TM-COMPUTE-ADDRESS (TM-ARG1 INSTRUCTION)
                                           TM)
                       (TM-COMPUTE-ADDRESS (TM-ARG2 INSTRUCTION)
                                           TM)
                       TM)
    (TM-SET-ERROR (TM-OPCODE-ERROR) TM))
```

Definition {1366}.
```
(TM-EXECUTE-INSTRUCTION1 INSTRUCTION TM)
   =
(IF (EQUAL (LENGTH INSTRUCTION) 1)
    (TM-EXECUTE-NULLARY (TM-OPCODE (CAR INSTRUCTION))
                        TM)
    (IF (EQUAL (LENGTH INSTRUCTION) 2)
        (TM-EXECUTE-UNARY (TM-OPCODE (CAR INSTRUCTION))
                          (TM-COMPUTE-ADDRESS (TM-ARG1 INSTRUCTION)
                                              TM)
                          TM)
        (TM-EXECUTE-INSTRUCTION2 INSTRUCTION TM)))
```

Definition {1375}.
```
(TM-EXECUTE2 OPCODE TM)
   =
(IF (TM-UNARY-INSTRUCTIONP OPCODE)
    (TM-EXECUTE-INSTRUCTION (LIST OPCODE (TM-FETCH-ARG1 TM))
                            (TM-SET-PC (TM-INCRN 2 (TM-PC TM))
                                       TM))
    (IF (TM-GOOD-ADDRESS (REAL-ADDR 2 (TM-INCRN 2 (TM-PC TM)))
                         TM)
        (TM-EXECUTE-INSTRUCTION (LIST OPCODE
                                      (TM-FETCH-ARG1 TM)
                                      (TM-FETCH-ARG2 TM))
                                (TM-SET-PC (TM-INCRN 3 (TM-PC TM))
                                           TM))
        (TM-SET-ERROR (TM-PC-ADDRESS-ERROR)
                      TM)))
```

Definition {1376}.
```
(TM-EXECUTE1 OPCODE TM)
   =
(IF (TM-NULLARY-INSTRUCTIONP OPCODE)
    (TM-EXECUTE-INSTRUCTION (LIST OPCODE)
                            (TM-SET-PC (TM-INCRN 1 (TM-PC TM))
                                       TM))
    (IF (TM-GOOD-ADDRESS (REAL-ADDR 2 (TM-INCRN 1 (TM-PC TM)))
                         TM)
        (TM-EXECUTE2 OPCODE TM)
        (TM-SET-ERROR (TM-PC-ADDRESS-ERROR)
                      TM)))
```

Definition {1383}.
```
(DEQ-ITH-BUFFER ID BUFFERS)
   =
(PUTNTH (DEQ (GETNTH ID BUFFERS)) ID BUFFERS)
```

Definition {1384}.
```
(ENQ-ITH-BUFFER ITEM ID BUFFERS)
   =
(PUTNTH (ENQ ITEM (GETNTH ID BUFFERS)) ID BUFFERS)
```

Definition {1385}.
```
(QREPLACE-ITH-BUFFER ITEM ID BUFFERS)
   =
(PUTNTH (QREPLACE ITEM (GETNTH ID BUFFERS)) ID BUFFERS)
```

Shell Definition {1386}.
Add the shell TASK with recognizer TASK-SHELLP,
defining the record structure <TASK-PSTATE, TASK-CHANNELS>.

Definition {1387}.
```
(TASK-IBUFFERS TASK) = (CAR (TASK-CHANNELS TASK))
```

Definition {1388}.
```
(TASK-OBUFFERS TASK) = (CADR (TASK-CHANNELS TASK))
```

Definition {1389}.
```
(TASK-MBUFFERS TASK) = (CADDR (TASK-CHANNELS TASK))
```

Definition {1390}.
```
(TASK-IBUFFER-CAPACITY) = 4
```

```
Definition {1391}.
(TASK-OBUFFER-CAPACITY) = 4

Definition {1392}.
(TASK-MBUFFER-CAPACITY) = 4

Definition {1393}.
(OS-SVC-SEND-ID) = 0

Definition {1394}.
(OS-SVC-RECEIVE-ID) = 1

Definition {1395}.
(OS-SVC-TYO-ID) = 2

Definition {1396}.
(OS-SVC-TYI-ID) = 3

Definition {1397}.
(TASK-SEND-INSTRUCTIONP TASK)
   =
(EQUAL (REMAINDER (TM-SVCID (TASK-PSTATE TASK))
                  4)
       (OS-SVC-SEND-ID))

Definition {1398}.
(TASK-RECEIVE-INSTRUCTIONP TASK)
   =
(EQUAL (REMAINDER (TM-SVCID (TASK-PSTATE TASK))
                  4)
       (OS-SVC-RECEIVE-ID))

Definition {1399}.
(TASK-TYO-INSTRUCTIONP TASK)
   =
(EQUAL (REMAINDER (TM-SVCID (TASK-PSTATE TASK))
                  4)
       (OS-SVC-TYO-ID))

Definition {1400}.
(TASK-TYI-INSTRUCTIONP TASK)
   =
(EQUAL (REMAINDER (TM-SVCID (TASK-PSTATE TASK))
                  4)
       (OS-SVC-TYI-ID))

Definition {1401}.
(TASK-UPDATE-CONTROL PSTATE) = (TM-SET-SVCFLAG (TM-NO-SVC) PSTATE)

Definition {1402}.
(TASK-COMMUNICATIONP TASK) = (TM-SVC-INTERRUPTP (TASK-PSTATE TASK))

Definition {1403}.
(OS-SRCID TASK MAX) = (REMAINDER (TM-R2 TASK) MAX)

Definition {1404}.
(OS-DESTID TASK MAX) = (REMAINDER (TM-R2 TASK) MAX)

Definition {1405}.
(OS-IDEVID TASK MAX) = (REMAINDER (TM-R2 TASK) MAX)

Definition {1406}.
(OS-ODEVID TASK MAX) = (REMAINDER (TM-R2 TASK) MAX)

Definition {1407}.
(OS-MESSAGE TASK) = (TM-R3 TASK)

Definition {1408}.
(OS-STORE-MESSAGE MSG TASK) = (TM-STORE MSG (LIST 1 3) TASK)

Definition {1409}.
(TASK-SRCID TASK)
   =
(OS-SRCID (TASK-PSTATE TASK)
          (LENGTH (TASK-MBUFFERS TASK)))

Definition {1410}.
```

```
(TASK-DESTID TASK)
   =
(OS-DESTID (TASK-PSTATE TASK)
           (LENGTH (TASK-MBUFFERS TASK)))
```

Definition {1411}.

```
(TASK-IDEVID TASK)
   =
(OS-IDEVID (TASK-PSTATE TASK)
           (LENGTH (TASK-IBUFFERS TASK)))
```

Definition {1412}.

```
(TASK-ODEVID TASK)
   =
(OS-ODEVID (TASK-PSTATE TASK)
           (LENGTH (TASK-IBUFFERS TASK)))
```

Definition {1413}.

```
(TASK-MESSAGE TASK) = (OS-MESSAGE (TASK-PSTATE TASK))
```

Definition {1414}.

```
(TASK-STORE-MESSAGE MSG PSTATE) = (OS-STORE-MESSAGE MSG PSTATE)
```

Definition {1415}.

```
(TASK-FETCH-EXECUTE PSTATE) = (TM-FETCH-EXECUTE PSTATE)
```

Definition {1416}.

```
(TASK-EXECUTE-SEND MSG SRCID DESTID TASK)
   =
(IF (QFULLP2 SRCID DESTID (TASK-MBUFFERS TASK) (TASK-MBUFFER-CAPACITY))
    TASK
    (TASK (TASK-UPDATE-CONTROL (TASK-PSTATE TASK))
          (LIST (TASK-IBUFFERS TASK)
                (TASK-OBUFFERS TASK)
                (ENQ2 MSG SRCID DESTID (TASK-MBUFFERS TASK)))))
```

Definition {1417}.

```
(TASK-EXECUTE-RECEIVE SRCID DESTID TASK)
   =
(IF (QEMPTYP2 SRCID DESTID (TASK-MBUFFERS TASK))
    TASK
    (TASK (TASK-UPDATE-CONTROL
           (TASK-STORE-MESSAGE
            (QFIRST2 SRCID DESTID (TASK-MBUFFERS TASK))
            (TASK-PSTATE TASK)))
          (LIST (TASK-IBUFFERS TASK)
                (TASK-OBUFFERS TASK)
                (DEQ2 SRCID DESTID (TASK-MBUFFERS TASK)))))
```

Definition {1418}.

```
(TASK-EXECUTE-OUTPUT CHAR ID TASK)
   =
(IF (QFULLP (GETNTH ID (TASK-OBUFFERS TASK))
            (TASK-OBUFFER-CAPACITY))
    TASK
    (TASK (TASK-UPDATE-CONTROL (TASK-PSTATE TASK))
          (LIST (TASK-IBUFFERS TASK)
                (ENQ-ITH-BUFFER CHAR ID (TASK-OBUFFERS TASK))
                (TASK-MBUFFERS TASK))))
```

Definition {1419}.

```
(TASK-EXECUTE-INPUT ID TASK)
   =
(IF (QEMPTYP (GETNTH ID (TASK-IBUFFERS TASK)))
    TASK
    (TASK (TASK-UPDATE-CONTROL
           (TASK-STORE-MESSAGE
            (QFIRST (GETNTH ID (TASK-IBUFFERS TASK)))
            (TASK-PSTATE TASK)))
          (LIST (DEQ-ITH-BUFFER ID (TASK-IBUFFERS TASK))
                (TASK-OBUFFERS TASK)
                (TASK-MBUFFERS TASK))))
```

```
Definition {1420}.
(TASK-COMMUNICATION-STEP TASK I)
   =
(IF (TASK-SEND-INSTRUCTIONP TASK)
    (TASK-EXECUTE-SEND (TASK-MESSAGE TASK)
                       I
                       (TASK-DESTID TASK)
                       TASK)
    (IF (TASK-RECEIVE-INSTRUCTIONP TASK)
        (TASK-EXECUTE-RECEIVE (TASK-SRCID TASK)
                              I TASK)
        (IF (TASK-TYO-INSTRUCTIONP TASK)
            (TASK-EXECUTE-OUTPUT (TASK-MESSAGE TASK)
                                 I TASK)
            (TASK-EXECUTE-INPUT I TASK))))

Definition {1421}.
(TASK-PRIVATE-STEP TASK)
   =
(TASK (TASK-FETCH-EXECUTE (TASK-PSTATE TASK))
      (TASK-CHANNELS TASK))

Definition {1422}.
(TASK-STEP TASK I)
   =
(IF (TASK-COMMUNICATIONP TASK)
    (TASK-COMMUNICATION-STEP TASK I)
    (TASK-PRIVATE-STEP TASK))

Definition {1423}.
(TASK-UPDATE-CHANNELS TASK CHANNELS) = (TASK (TASK-PSTATE TASK) CHANNELS)

Definition {1424}.
(TASK-ACTIVEP X) = (EQUAL X T)

Definition {1425}.
(TASK-PROCESSOR TASK I ORACLE)
   =
(IF (LISTP ORACLE)
    (IF (TASK-ACTIVEP (CAR ORACLE))
        (TASK-PROCESSOR (TASK-STEP TASK I)
                        I
                        (CDR ORACLE))
        (TASK-PROCESSOR (TASK-UPDATE-CHANNELS TASK (CAR ORACLE))
                        I
                        (CDR ORACLE)))
    TASK)

Definition {1430}.
(GOOD-TASK-BUFFER BUFFER CAPACITY)
   =
(AND (PLISTP BUFFER)
     (LESSP (LENGTH BUFFER) (ADD1 CAPACITY))
     (FINITE-NUMBER-LISTP BUFFER (TM-WORDLUB)))

Definition {1431}.
(GOOD-TASK-BUFFER-LIST L CAPACITY)
   =
(IF (LISTP L)
    (AND (GOOD-TASK-BUFFER (CAR L) CAPACITY)
         (GOOD-TASK-BUFFER-LIST (CDR L)
                                CAPACITY))
    (EQUAL L NIL))

Definition {1432}.
(GOOD-TASK-BUFFER-TABLE L LENGTH CAPACITY)
   =
(IF (LISTP L)
    (AND (PLISTP (CAR L))
         (EQUAL (LENGTH (CAR L)) LENGTH)
         (GOOD-TASK-BUFFER-LIST (CAR L)
                                CAPACITY)
```

```
         (GOOD-TASK-BUFFER-TABLE (CDR L)
                                 LENGTH CAPACITY))
    (EQUAL L NIL))
```

Definition {1433}.

```
(GOOD-TASK TASK ILENGTH OLENGTH MLENGTH)
   =
(AND (TASK-SHELLP TASK)
     (GOOD-ADDRESS-SPACE (TASK-PSTATE TASK)
                         (LENGTH (TM-MEMORY (TASK-PSTATE TASK))))
     (EQUAL (LENGTH (TASK-IBUFFERS TASK)) ILENGTH)
     (GOOD-TASK-BUFFER-LIST (TASK-IBUFFERS TASK)
                            (TASK-IBUFFER-CAPACITY))
     (EQUAL (LENGTH (TASK-OBUFFERS TASK)) OLENGTH)
     (GOOD-TASK-BUFFER-LIST (TASK-OBUFFERS TASK)
                            (TASK-OBUFFER-CAPACITY))
     (EQUAL (LENGTH (TASK-MBUFFERS TASK)) MLENGTH)
     (GOOD-TASK-BUFFER-TABLE (TASK-MBUFFERS TASK)
                             MLENGTH
                             (TASK-MBUFFER-CAPACITY)))
```

Shell Definition {1443}.

```
Add the shell AK with recognizer AK-SHELLP,
defining the record structure
<AK-PSTATES, AK-IBUFFERS, AK-OBUFFERS, AK-MBUFFERS, AK-READYQ,
 AK-STATUS, AK-RWSTATE, AK-CLOCK, AK-IPORTS, AK-OPORTS>.
```

Definition {1444}.

```
(AK-TASKIDLUB) = (TM-PORT-LENGTH)
```

Definition {1445}.

```
(AK-TIME-SLICE) = 1000
```

Definition {1446}.

```
(AK-TASKID AK) = (QFIRST (AK-READYQ AK))
```

Definition {1447}.

```
(AK-SEND-INSTRUCTIONP AK)
   =
(EQUAL (REMAINDER (TM-SVCID (GETNTH (AK-TASKID AK)
                                    (AK-PSTATES AK)))
                  4)
       (OS-SVC-SEND-ID))
```

Definition {1448}.

```
(AK-RECEIVE-INSTRUCTIONP AK)
   =
(EQUAL (REMAINDER (TM-SVCID (GETNTH (AK-TASKID AK)
                                    (AK-PSTATES AK)))
                  4)
       (OS-SVC-RECEIVE-ID))
```

Definition {1449}.

```
(AK-TYO-INSTRUCTIONP AK)
   =
(EQUAL (REMAINDER (TM-SVCID (GETNTH (AK-TASKID AK)
                                    (AK-PSTATES AK)))
                  4)
       (OS-SVC-TYO-ID))
```

Definition {1450}.

```
(AK-TYI-INSTRUCTIONP AK)
   =
(EQUAL (REMAINDER (TM-SVCID (GETNTH (AK-TASKID AK)
                                    (AK-PSTATES AK)))
                  4)
       (OS-SVC-TYI-ID))
```

Definition {1451}.

```
(AK-UPDATE-CONTROL ID PSTATES)
   =
(PUTNTH (TM-SET-SVCFLAG (TM-NO-SVC)
                        (GETNTH ID PSTATES)) ID
```

```
 PSTATES)
```

Definition {1452}.

```
(AK-COMMUNICATIONP AK)
   =
(TM-SVC-INTERRUPTP (GETNTH (AK-TASKID AK) (AK-PSTATES AK)))
```

Definition {1453}.

```
(AK-ERRORP AK) = (TM-ERRORP (GETNTH (AK-TASKID AK) (AK-PSTATES AK)))
```

Definition {1454}.

```
(AK-SVC-INTERRUPTP AK)
   =
(TM-SVC-INTERRUPTP (GETNTH (AK-TASKID AK) (AK-PSTATES AK)))
```

Definition {1455}.

```
(AK-DESTID AK)
   =
(OS-DESTID (GETNTH (AK-TASKID AK) (AK-PSTATES AK))
           (AK-TASKIDLUB))
```

Definition {1456}.

```
(AK-SRCID AK)
   =
(OS-SRCID (GETNTH (AK-TASKID AK) (AK-PSTATES AK))
          (AK-TASKIDLUB))
```

Definition {1457}.

```
(AK-IDEVID AK)
   =
(OS-IDEVID (GETNTH (AK-TASKID AK) (AK-PSTATES AK))
           (TM-PORT-LENGTH))
```

Definition {1458}.

```
(AK-ODEVID AK)
   =
(OS-ODEVID (GETNTH (AK-TASKID AK) (AK-PSTATES AK))
           (TM-PORT-LENGTH))
```

Definition {1459}.

```
(AK-MESSAGE AK) = (OS-MESSAGE (GETNTH (AK-TASKID AK) (AK-PSTATES AK)))
```

Definition {1460}.

```
(AK-STORE-MESSAGE MSG TASKID PSTATES)
   =
(PUTNTH (OS-STORE-MESSAGE MSG (GETNTH TASKID PSTATES))
        TASKID
        PSTATES)
```

Definition {1461}.

```
(AK-FETCH-EXECUTE ID PSTATES)
   =
(PUTNTH (TM-FETCH-EXECUTE (GETNTH ID PSTATES))
        ID
        PSTATES)
```

Definition {1462}.

```
(AK-OPORT-IDLEP ID OPORTS) = (TM-OPORT-IDLEP ID OPORTS)
```

Definition {1463}.

```
(AK-POST-OUTPUT-INTERRUPT ID OPORTS) = (TM-POST-OUTPUT-INTERRUPT ID OPORTS)
```

Definition {1464}.

```
(AK-CLEAR-INPUT-INTERRUPT ID IPORTS) = (TM-CLEAR-INPUT-INTERRUPT ID IPORTS)
```

Definition {1465}.

```
(AK-CLEAR-OUTPUT-INTERRUPT ID OPORTS)
   =
(TM-CLEAR-OUTPUT-INTERRUPT ID OPORTS)
```

Definition {1466}.

```
(AK-START-OUTPUT CHAR ID OPORTS) = (TM-START-OUTPUT CHAR ID OPORTS)
```

Definition {1467}.

```
(AK-INPUT-INTERRUPTP AK) = (TM-SOME-INPUT-INTERRUPTP (AK-IPORTS AK))
```

<u>Definition</u> {1468}.
```
(AK-OUTPUT-INTERRUPTP AK) = (TM-SOME-OUTPUT-INTERRUPTP (AK-OPORTS AK))
```

<u>Definition</u> {1469}.
```
(AK-INTERRUPTING-INPUT-PORT IPORTS) = (TM-INTERRUPTING-INPUT-PORT IPORTS)
```

<u>Definition</u> {1470}.
```
(AK-INTERRUPTING-OUTPUT-PORT OPORTS) = (TM-INTERRUPTING-OUTPUT-PORT OPORTS)
```

<u>Definition</u> {1471}.
```
(AK-STATUS-FLAG-FIELD) = 0
```

<u>Definition</u> {1472}.
```
(AK-STATUS-TASKID-FIELD) = 1
```

<u>Definition</u> {1473}.
```
(AK-READY-STATUS) = 0
```

<u>Definition</u> {1474}.
```
(AK-ERROR-STATUS) = 1
```

<u>Definition</u> {1475}.
```
(AK-SEND-STATUS) = 2
```

<u>Definition</u> {1476}.
```
(AK-RECEIVE-STATUS) = 3
```

<u>Definition</u> {1477}.
```
(AK-OUTPUT-STATUS) = 4
```

<u>Definition</u> {1478}.
```
(AK-INPUT-STATUS) = 5
```

<u>Definition</u> {1479}.
```
(AK-STATUS-LUB) = 6
```

<u>Definition</u> {1480}.
```
(AK-STATUS-LENGTH) = 2
```

<u>Definition</u> {1481}.
```
(AK-READY-STATUSP TASKID AK)
   =
(EQUAL (GETNTH (AK-STATUS-FLAG-FIELD)
               (GETNTH TASKID (AK-STATUS AK)))
       (AK-READY-STATUS))
```

<u>Definition</u> {1482}.
```
(AK-WAITING-TO-SENDP SRCID DESTID AK)
   =
(AND (EQUAL (GETNTH (AK-STATUS-FLAG-FIELD)
                    (GETNTH SRCID (AK-STATUS AK)))
            (AK-SEND-STATUS))
     (EQUAL (GETNTH (AK-STATUS-TASKID-FIELD)
                    (GETNTH SRCID (AK-STATUS AK)))
            DESTID))
```

<u>Definition</u> {1483}.
```
(AK-WAITING-TO-RECEIVEP SRCID DESTID AK)
   =
(AND (EQUAL (GETNTH (AK-STATUS-FLAG-FIELD)
                    (GETNTH DESTID (AK-STATUS AK)))
            (AK-RECEIVE-STATUS))
     (EQUAL (GETNTH (AK-STATUS-TASKID-FIELD)
                    (GETNTH DESTID (AK-STATUS AK)))
            SRCID))
```

<u>Definition</u> {1484}.
```
(AK-WAITING-TO-OUTPUTP ID AK)
   =
(EQUAL (GETNTH (AK-STATUS-FLAG-FIELD)
               (GETNTH ID (AK-STATUS AK)))
       (AK-OUTPUT-STATUS))
```

<u>Definition</u> {1485}.
```
(AK-WAITING-TO-INPUTP ID AK)
   =
```

```
(EQUAL (GETNTH (AK-STATUS-FLAG-FIELD)
               (GETNTH ID (AK-STATUS AK)))
       (AK-INPUT-STATUS))
```

Definition {1486}.

```
(AK-WAIT-STATE) = (TM-WAIT-STATE)
```

Definition {1487}.

```
(AK-RUN-STATE) = (TM-RUN-STATE)
```

Definition {1488}.

```
(AK-WAITING AK) = (EQUAL (AK-RWSTATE AK)
                         (AK-WAIT-STATE))
```

Definition {1489}.

```
(AK-DISPATCHER AK)
   =
(AK (AK-PSTATES AK)
    (AK-IBUFFERS AK)
    (AK-OBUFFERS AK)
    (AK-MBUFFERS AK)
    (AK-READYQ AK)
    (AK-STATUS AK)
    (IF (QEMPTYP (AK-READYQ AK))
        (AK-WAIT-STATE)
        (AK-RUN-STATE))
    (IF (QEMPTYP (AK-READYQ AK))
        (AK-CLOCK AK)
        (AK-TIME-SLICE))
    (AK-IPORTS AK)
    (AK-OPORTS AK))
```

Definition {1490}.

```
(AK-CLOCK-INTERRUPT-HANDLER AK)
   =
(AK-DISPATCHER
  (AK (AK-PSTATES AK)
      (AK-IBUFFERS AK)
      (AK-OBUFFERS AK)
      (AK-MBUFFERS AK)
      (ENQ (AK-TASKID AK) (DEQ (AK-READYQ AK)))
      (AK-STATUS AK)
      (AK-RWSTATE AK)
      (AK-CLOCK AK)
      (AK-IPORTS AK)
      (AK-OPORTS AK)))
```

Definition {1491}.

```
(AK-ERROR-HANDLER AK)
   =
(AK-DISPATCHER
  (AK (AK-PSTATES AK)
      (AK-IBUFFERS AK)
      (AK-OBUFFERS AK)
      (AK-MBUFFERS AK)
      (DEQ (AK-READYQ AK))
      (PUTNTH (LIST (AK-ERROR-STATUS) 0) (AK-TASKID AK) (AK-STATUS AK))
      (AK-RWSTATE AK)
      (AK-CLOCK AK)
      (AK-IPORTS AK)
      (AK-OPORTS AK)))
```

Definition {1492}.

```
(AK-BLOCK-SEND SRCID DESTID AK)
   =
(AK-DISPATCHER
  (AK (AK-PSTATES AK)
      (AK-IBUFFERS AK)
      (AK-OBUFFERS AK)
      (AK-MBUFFERS AK)
      (DEQ (AK-READYQ AK))
      (PUTNTH (LIST (AK-SEND-STATUS) DESTID) SRCID (AK-STATUS AK))
```

```
      (AK-RWSTATE AK)
      (AK-CLOCK AK)
      (AK-IPORTS AK)
      (AK-OPORTS AK)))
```

Definition {1493}.

```
(AK-EXECUTE-SEND-TO-BUFFER MSG SRCID DESTID AK)
   =
(AK (AK-UPDATE-CONTROL SRCID (AK-PSTATES AK))
    (AK-IBUFFERS AK)
    (AK-OBUFFERS AK)
    (ENQ2 MSG SRCID DESTID (AK-MBUFFERS AK))
    (IF (AK-WAITING-TO-RECEIVEP SRCID DESTID AK)
        (ENQ DESTID (AK-READYQ AK))
        (AK-READYQ AK))
    (IF (AK-WAITING-TO-RECEIVEP SRCID DESTID AK)
        (PUTNTH (LIST (AK-READY-STATUS) 0) DESTID (AK-STATUS AK))
        (AK-STATUS AK))
    (AK-RWSTATE AK)
    (AK-CLOCK AK)
    (AK-IPORTS AK)
    (AK-OPORTS AK))
```

Definition {1494}.

```
(AK-EXECUTE-SEND MSG SRCID DESTID AK)
   =
(IF (QFULLP2 SRCID DESTID (AK-MBUFFERS AK) (TASK-MBUFFER-CAPACITY))
    (AK-BLOCK-SEND SRCID DESTID AK)
    (AK-EXECUTE-SEND-TO-BUFFER MSG SRCID DESTID AK))
```

Definition {1495}.

```
(AK-BLOCK-RECEIVE SRCID DESTID AK)
   =
(AK-DISPATCHER
  (AK (AK-PSTATES AK)
      (AK-IBUFFERS AK)
      (AK-OBUFFERS AK)
      (AK-MBUFFERS AK)
      (DEQ (AK-READYQ AK))
      (PUTNTH (LIST (AK-RECEIVE-STATUS) SRCID) DESTID (AK-STATUS AK))
      (AK-RWSTATE AK)
      (AK-CLOCK AK)
      (AK-IPORTS AK)
      (AK-OPORTS AK)))
```

Definition {1496}.

```
(AK-EXECUTE-RECEIVE-FROM-BUFFER SRCID DESTID AK)
   =
(AK (AK-UPDATE-CONTROL DESTID
     (AK-STORE-MESSAGE (QFIRST2 SRCID DESTID (AK-MBUFFERS AK))
                       DESTID
                       (AK-PSTATES AK)))
    (AK-IBUFFERS AK)
    (AK-OBUFFERS AK)
    (DEQ2 SRCID DESTID (AK-MBUFFERS AK))
    (IF (AK-WAITING-TO-SENDP SRCID DESTID AK)
        (ENQ SRCID (AK-READYQ AK))
        (AK-READYQ AK))
    (IF (AK-WAITING-TO-SENDP SRCID DESTID AK)
        (PUTNTH (LIST (AK-READY-STATUS) 0) SRCID (AK-STATUS AK))
        (AK-STATUS AK))
    (AK-RWSTATE AK)
    (AK-CLOCK AK)
    (AK-IPORTS AK)
    (AK-OPORTS AK))
```

Definition {1497}.

```
(AK-EXECUTE-RECEIVE SRCID DESTID AK)
   =
(IF (QEMPTYP2 SRCID DESTID (AK-MBUFFERS AK))
    (AK-BLOCK-RECEIVE SRCID DESTID AK)
```

```
    (AK-EXECUTE-RECEIVE-FROM-BUFFER SRCID DESTID AK))
```

Definition {1498}.

```
(AK-BLOCK-OUTPUT ID AK)
   =
(AK-DISPATCHER
  (AK (AK-PSTATES AK)
      (AK-IBUFFERS AK)
      (AK-OBUFFERS AK)
      (AK-MBUFFERS AK)
      (DEQ (AK-READYQ AK))
      (PUTNTH (LIST (AK-OUTPUT-STATUS) 0) ID (AK-STATUS AK))
      (AK-RWSTATE AK)
      (AK-CLOCK AK)
      (AK-IPORTS AK)
      (AK-OPORTS AK)))
```

Definition {1499}.

```
(AK-EXECUTE-OUTPUT-TO-BUFFER CHAR ID AK)
   =
(AK (AK-UPDATE-CONTROL ID (AK-PSTATES AK))
    (AK-IBUFFERS AK)
    (ENQ-ITH-BUFFER CHAR ID (AK-OBUFFERS AK))
    (AK-MBUFFERS AK)
    (AK-READYQ AK)
    (AK-STATUS AK)
    (AK-RWSTATE AK)
    (AK-CLOCK AK)
    (AK-IPORTS AK)
    (IF (AK-OPORT-IDLEP ID (AK-OPORTS AK))
        (AK-POST-OUTPUT-INTERRUPT ID (AK-OPORTS AK))
        (AK-OPORTS AK)))
```

Definition {1500}.

```
(AK-EXECUTE-OUTPUT CHAR ID AK)
   =
(IF (QFULLP (GETNTH ID (AK-OBUFFERS AK)) (TASK-OBUFFER-CAPACITY))
    (AK-BLOCK-OUTPUT ID AK)
    (AK-EXECUTE-OUTPUT-TO-BUFFER CHAR ID AK))
```

Definition {1501}.

```
(AK-BLOCK-INPUT ID AK)
   =
(AK-DISPATCHER (AK (AK-PSTATES AK)
                   (AK-IBUFFERS AK)
                   (AK-OBUFFERS AK)
                   (AK-MBUFFERS AK)
                   (DEQ (AK-READYQ AK))
                   (PUTNTH (LIST (AK-INPUT-STATUS) 0) ID
                    (AK-STATUS AK))
                   (AK-RWSTATE AK)
                   (AK-CLOCK AK)
                   (AK-IPORTS AK)
                   (AK-OPORTS AK)))
```

Definition {1502}.

```
(AK-EXECUTE-INPUT-FROM-BUFFER ID AK)
   =
(AK
   (AK-UPDATE-CONTROL ID
    (AK-STORE-MESSAGE (QFIRST (GETNTH ID (AK-IBUFFERS AK)))
                      ID
                      (AK-PSTATES AK)))
   (PUTNTH (DEQ (GETNTH ID (AK-IBUFFERS AK))) ID (AK-IBUFFERS AK))
   (AK-OBUFFERS AK)
   (AK-MBUFFERS AK)
   (AK-READYQ AK)
   (AK-STATUS AK)
   (AK-RWSTATE AK)
   (AK-CLOCK AK)
   (AK-IPORTS AK)
```

```
   (AK-OPORTS AK))
```

Definition {1503}.

```
(AK-EXECUTE-INPUT ID AK)
   =
(IF (QEMPTYP (GETNTH ID (AK-IBUFFERS AK)))
    (AK-BLOCK-INPUT ID AK)
    (AK-EXECUTE-INPUT-FROM-BUFFER ID AK))
```

Definition {1504}.

```
(AK-SVC-HANDLER AK)
   =
(IF (AK-SEND-INSTRUCTIONP AK)
    (AK-EXECUTE-SEND (AK-MESSAGE AK)
                     (AK-TASKID AK)
                     (AK-DESTID AK)
                     AK)
    (IF (AK-RECEIVE-INSTRUCTIONP AK)
        (AK-EXECUTE-RECEIVE (AK-SRCID AK)
                            (AK-TASKID AK)
                            AK)
        (IF (AK-TYO-INSTRUCTIONP AK)
            (AK-EXECUTE-OUTPUT (AK-MESSAGE AK)
                               (AK-TASKID AK)
                               AK)
            (AK-EXECUTE-INPUT (AK-TASKID AK)
                              AK))))
```

Definition {1505}.

```
(AK-PRIVATE-STEP AK)
   =
(AK (AK-FETCH-EXECUTE (AK-TASKID AK)
                      (AK-PSTATES AK))
    (AK-IBUFFERS AK)
    (AK-OBUFFERS AK)
    (AK-MBUFFERS AK)
    (AK-READYQ AK)
    (AK-STATUS AK)
    (AK-RWSTATE AK)
    (SUB1 (AK-CLOCK AK))
    (AK-IPORTS AK)
    (AK-OPORTS AK))
```

Definition {1506}.

```
(AK-UPDATE-IBUFFER ID AK)
   =
(IF (QFULLP (GETNTH ID (AK-IBUFFERS AK)) (TASK-IBUFFER-CAPACITY))
    (QREPLACE-ITH-BUFFER
      (TM-OVERFLOW-CHAR (TM-ICHAR (GETNTH ID (AK-IPORTS AK))))
      ID
      (AK-IBUFFERS AK))
    (IF (TM-IPORT-ERRORP ID (AK-IPORTS AK))
        (ENQ-ITH-BUFFER (TM-OVERFLOW-CHAR (TM-ICHAR (GETNTH ID (AK-IPORTS AK))))
                        ID
                        (AK-IBUFFERS AK))
        (ENQ-ITH-BUFFER (TM-ICHAR (GETNTH ID (AK-IPORTS AK)))
                        ID
                        (AK-IBUFFERS AK))))
```

Definition {1507}.

```
(AK-WAITING-INPUT-INTERRUPT-HANDLER ID AK)
   =
(AK-DISPATCHER
  (AK (AK-PSTATES AK)
      (AK-UPDATE-IBUFFER ID AK)
      (AK-OBUFFERS AK)
      (AK-MBUFFERS AK)
      (IF (AK-WAITING-TO-INPUTP ID AK)
          (ENQ ID (AK-READYQ AK))
          (AK-READYQ AK))
      (IF (AK-WAITING-TO-INPUTP ID AK)
```

```
          (PUTNTH (LIST (AK-READY-STATUS) 0) ID (AK-STATUS AK))
          (AK-STATUS AK))
      (AK-RWSTATE AK)
      (AK-CLOCK AK)
      (AK-CLEAR-INPUT-INTERRUPT ID (AK-IPORTS AK))
      (AK-OPORTS AK)))
```

<u>Definition</u> {1508}.

```
(AK-RUNNING-INPUT-INTERRUPT-HANDLER ID AK)
   =
(AK (AK-PSTATES AK)
    (AK-UPDATE-IBUFFER ID AK)
    (AK-OBUFFERS AK)
    (AK-MBUFFERS AK)
    (IF (AK-WAITING-TO-INPUTP ID AK)
        (ENQ ID (AK-READYQ AK))
        (AK-READYQ AK))
    (IF (AK-WAITING-TO-INPUTP ID AK)
        (PUTNTH (LIST (AK-READY-STATUS) 0) ID (AK-STATUS AK))
        (AK-STATUS AK))
    (AK-RWSTATE AK)
    (AK-CLOCK AK)
    (AK-CLEAR-INPUT-INTERRUPT ID (AK-IPORTS AK))
    (AK-OPORTS AK))
```

<u>Definition</u> {1509}.

```
(AK-INPUT-INTERRUPT-HANDLER ID AK)
   =
(IF (AK-WAITING AK)
    (AK-WAITING-INPUT-INTERRUPT-HANDLER ID AK)
    (AK-RUNNING-INPUT-INTERRUPT-HANDLER ID AK))
```

<u>Definition</u> {1510}.

```
(AK-WAITING-OUTPUT-INTERRUPT-HANDLER ID AK)
   =
(AK-DISPATCHER
  (AK (AK-PSTATES AK)
      (AK-IBUFFERS AK)
      (IF (QEMPTYP (GETNTH ID (AK-OBUFFERS AK)))
          (AK-OBUFFERS AK)
          (DEQ-ITH-BUFFER ID (AK-OBUFFERS AK)))
      (AK-MBUFFERS AK)
      (IF (AK-WAITING-TO-OUTPUTP ID AK)
          (ENQ ID (AK-READYQ AK))
          (AK-READYQ AK))
      (IF (AK-WAITING-TO-OUTPUTP ID AK)
          (PUTNTH '(0 0) ID (AK-STATUS AK))
          (AK-STATUS AK))
      (AK-RWSTATE AK)
      (AK-CLOCK AK)
      (AK-IPORTS AK)
      (IF (QEMPTYP (GETNTH ID (AK-OBUFFERS AK)))
          (AK-CLEAR-OUTPUT-INTERRUPT ID (AK-OPORTS AK))
          (AK-START-OUTPUT (QFIRST (GETNTH ID (AK-OBUFFERS AK)))
                           ID
                           (AK-OPORTS AK)))))
```

<u>Definition</u> {1511}.

```
(AK-RUNNING-OUTPUT-INTERRUPT-HANDLER ID AK)
   =
(AK (AK-PSTATES AK)
    (AK-IBUFFERS AK)
    (IF (QEMPTYP (GETNTH ID (AK-OBUFFERS AK)))
        (AK-OBUFFERS AK)
        (DEQ-ITH-BUFFER ID (AK-OBUFFERS AK)))
    (AK-MBUFFERS AK)
    (IF (AK-WAITING-TO-OUTPUTP ID AK)
        (ENQ ID (AK-READYQ AK))
        (AK-READYQ AK))
    (IF (AK-WAITING-TO-OUTPUTP ID AK)
```

```
        (PUTNTH '(0 0) ID (AK-STATUS AK))
        (AK-STATUS AK))
    (AK-RWSTATE AK)
    (AK-CLOCK AK)
    (AK-IPORTS AK)
    (IF (QEMPTYP (GETNTH ID (AK-OBUFFERS AK)))
        (AK-CLEAR-OUTPUT-INTERRUPT ID (AK-OPORTS AK))
        (AK-START-OUTPUT (QFIRST (GETNTH ID (AK-OBUFFERS AK)))
                         ID
                         (AK-OPORTS AK))))
```

<u>Definition</u> {1512}.

```
(AK-OUTPUT-INTERRUPT-HANDLER ID AK)
   =
(IF (AK-WAITING AK)
    (AK-WAITING-OUTPUT-INTERRUPT-HANDLER ID AK)
    (AK-RUNNING-OUTPUT-INTERRUPT-HANDLER ID AK))
```

<u>Definition</u> {1513}.

```
(AK-CLOCK-INTERRUPTP AK) = (ZEROP (AK-CLOCK AK))
```

<u>Definition</u> {1514}.

```
(AK-STEP AK)
   =
(IF (AK-INPUT-INTERRUPTP AK)
    (AK-INPUT-INTERRUPT-HANDLER
     (AK-INTERRUPTING-INPUT-PORT (AK-IPORTS AK))
     AK)

(IF (AK-OUTPUT-INTERRUPTP AK)
    (AK-OUTPUT-INTERRUPT-HANDLER
     (AK-INTERRUPTING-OUTPUT-PORT (AK-OPORTS AK))
     AK)

(IF (AK-WAITING AK)
    AK

(IF (AK-ERRORP AK)
    (AK-ERROR-HANDLER AK)

(IF (AK-CLOCK-INTERRUPTP AK)
    (AK-CLOCK-INTERRUPT-HANDLER AK)

(IF (AK-SVC-INTERRUPTP AK)
    (AK-SVC-HANDLER AK)

    (AK-PRIVATE-STEP AK))))))
```

<u>Definition</u> {1515}.

```
(AK-POST-INTERRUPT INTERRUPT AK)
   =
(AK (AK-PSTATES AK)
    (AK-IBUFFERS AK)
    (AK-OBUFFERS AK)
    (AK-MBUFFERS AK)
    (AK-READYQ AK)
    (AK-STATUS AK)
    (AK-RWSTATE AK)
    (AK-CLOCK AK)
    (IF (TM-DEVICE-INPUT-EVENTP INTERRUPT)
        (TM-POST-INPUT-INTERRUPT (REMAINDER (TM-IDATUM INTERRUPT)
                                            (TM-CHARLUB))
                                 (REMAINDER (TM-IDEVID INTERRUPT)
                                            (AK-TASKIDLUB))
                                 (AK-IPORTS AK))
        (AK-IPORTS AK))
    (IF (TM-DEVICE-OUTPUT-EVENTP INTERRUPT)
        (TM-POST-OUTPUT-INTERRUPT (REMAINDER (TM-ODEVID INTERRUPT)
                                             (AK-TASKIDLUB))
                                  (AK-OPORTS AK))
```

```
        (AK-OPORTS AK)))
```

Definition {1516}.
```
(AK-PROCESSOR AK ORACLE)
   =
(IF (LISTP ORACLE)
    (AK-PROCESSOR (AK-STEP (AK-POST-INTERRUPT (CAR ORACLE) AK))
                  (CDR ORACLE))
    AK)
```

Definition {1519}.
```
(GOOD-ADDRESS-SPACE-LIST L)
   =
(IF (LISTP L)
    (AND (GOOD-ADDRESS-SPACE (CAR L)
                             (LENGTH (TM-MEMORY (CAR L))))
         (GOOD-ADDRESS-SPACE-LIST (CDR L)))
    (EQUAL L NIL))
```

Definition {1523}.
```
(GOOD-STATUS TASK-STATUS)
   =
(AND (PLISTP TASK-STATUS)
     (EQUAL (LENGTH TASK-STATUS) (AK-STATUS-LENGTH))
     (FINITE-NUMBERP (GETNTH (AK-STATUS-FLAG-FIELD) TASK-STATUS)
                     (AK-STATUS-LUB))
     (FINITE-NUMBERP (GETNTH (AK-STATUS-TASKID-FIELD) TASK-STATUS)
                     (AK-TASKIDLUB)))
```

Definition {1524}.
```
(GOOD-STATUS-LIST STATUS)
   =
(IF (LISTP STATUS)
    (AND (GOOD-STATUS (CAR STATUS))
         (GOOD-STATUS-LIST (CDR STATUS)))
    (EQUAL STATUS NIL))
```

Definition {1529}.
```
(STATUS-FLAG-READYP TASK-STATUS)
   =
(EQUAL (GETNTH (AK-STATUS-FLAG-FIELD)
               TASK-STATUS)
       (AK-READY-STATUS))
```

Definition {1530}.
```
(INDEX-READY-SET N STATUS)
   =
(IF (LISTP STATUS)
    (IF (STATUS-FLAG-READYP (CAR STATUS))
        (CONS (FIX N)
              (INDEX-READY-SET (ADD1 N)
                               (CDR STATUS)))
        (INDEX-READY-SET (ADD1 N)
                         (CDR STATUS)))
    NIL)
```

Definition {1531}.
```
(AK-READY-SET AK) = (INDEX-READY-SET 0 (AK-STATUS AK))
```

Definition {1532}.
```
(GOOD-AK AK)
   =
(AND (AK-SHELLP AK)
     (EQUAL (LENGTH (AK-PSTATES AK)) (AK-TASKIDLUB))
     (GOOD-ADDRESS-SPACE-LIST (AK-PSTATES AK))
     (EQUAL (LENGTH (AK-IBUFFERS AK)) (AK-TASKIDLUB))
     (GOOD-TASK-BUFFER-LIST (AK-IBUFFERS AK) (TASK-IBUFFER-CAPACITY))
     (EQUAL (LENGTH (AK-OBUFFERS AK)) (AK-TASKIDLUB))
     (GOOD-TASK-BUFFER-LIST (AK-OBUFFERS AK) (TASK-OBUFFER-CAPACITY))
     (EQUAL (LENGTH (AK-MBUFFERS AK)) (AK-TASKIDLUB))
     (GOOD-TASK-BUFFER-TABLE (AK-MBUFFERS AK)
                             (AK-TASKIDLUB)
```

```
                             (TASK-MBUFFER-CAPACITY))
     (PLISTP (AK-READYQ AK))
     (LESSP (LENGTH (AK-READYQ AK)) (ADD1 (AK-TASKIDLUB)))
     (FINITE-NUMBER-LISTP (AK-READYQ AK) (AK-TASKIDLUB))
     (EQUAL (LENGTH (AK-STATUS AK)) (AK-TASKIDLUB))
     (GOOD-STATUS-LIST (AK-STATUS AK))
     (FINITE-NUMBERP (AK-RWSTATE AK) 2)
     (FINITE-NUMBERP (AK-CLOCK AK) (TM-WORDLUB))
     (PLISTP (AK-IPORTS AK))
     (EQUAL (LENGTH (AK-IPORTS AK)) (TM-PORT-LENGTH))
     (GOOD-TM-IPORT-ARRAY (AK-IPORTS AK))
     (PLISTP (AK-OPORTS AK))
     (EQUAL (LENGTH (AK-OPORTS AK)) (TM-PORT-LENGTH))
     (GOOD-TM-OPORT-ARRAY (AK-OPORTS AK))
     (PERMUTATION (AK-READYQ AK) (AK-READY-SET AK))
     (IFF (AK-WAITING AK) (QEMPTYP (AK-READYQ AK))))
```

Definition {1573}.

```
(SET-STATUS-INDUCTION I N L)
   =
(IF (ZEROP I)
    0
    (IF (LISTP L)
        (SET-STATUS-INDUCTION (SUB1 I)
                              (ADD1 N)
                              (CDR L))
        0))
```

Definition {1580}.

```
(NUMBER-OF-READY-TASKS STATUS)
   =
(IF (LISTP STATUS)
    (IF (STATUS-FLAG-READYP (CAR STATUS))
        (ADD1 (NUMBER-OF-READY-TASKS (CDR STATUS)))
        (NUMBER-OF-READY-TASKS (CDR STATUS)))
    0)
```

Definition {1581}.

```
(NUMBER-OF-UNREADY-TASKS STATUS)
   =
(IF (LISTP STATUS)
    (IF (STATUS-FLAG-READYP (CAR STATUS))
        (NUMBER-OF-UNREADY-TASKS (CDR STATUS))
        (ADD1 (NUMBER-OF-UNREADY-TASKS (CDR STATUS))))
    0)
```

Definition {1671}.

```
(AK-CHANNELS AK)
   =
(LIST (AK-IBUFFERS AK) (AK-OBUFFERS AK) (AK-MBUFFERS AK))
```

Definition {1672}.

```
(PROJECT I AK) = (TASK (GETNTH I (AK-PSTATES AK)) (AK-CHANNELS AK))
```

Definition {1673}.

```
(CONTROL-ORACLE-STEP I AK)
   =
(IF (AK-INPUT-INTERRUPTP AK)
    (AK-CHANNELS
     (AK-INPUT-INTERRUPT-HANDLER
       (TM-INTERRUPTING-INPUT-PORT (AK-IPORTS AK))
       AK))

(IF (AK-OUTPUT-INTERRUPTP AK)
    (AK-CHANNELS
      (AK-OUTPUT-INTERRUPT-HANDLER
        (TM-INTERRUPTING-OUTPUT-PORT (AK-OPORTS AK))
        AK))

(IF (AK-WAITING AK)
    (AK-CHANNELS AK)
```

```
 (IF (AK-ERRORP AK)
     (AK-CHANNELS (AK-ERROR-HANDLER AK))

 (IF (AK-CLOCK-INTERRUPTP AK)
     (AK-CHANNELS (AK-CLOCK-INTERRUPT-HANDLER AK))

(IF (AK-SVC-INTERRUPTP AK)
    (IF (EQUAL I (AK-TASKID AK))
        T
        (AK-CHANNELS (AK-SVC-HANDLER AK)))

    (IF (EQUAL I (AK-TASKID AK))
        T
        (AK-CHANNELS (AK-PRIVATE-STEP AK))))))))
```

Definition {1674}.

```
(CONTROL-ORACLE I AK ORACLE)
   =
(IF (LISTP ORACLE)
    (CONS (CONTROL-ORACLE-STEP I (AK-POST-INTERRUPT (CAR ORACLE) AK))
          (CONTROL-ORACLE I
                          (AK-STEP (AK-POST-INTERRUPT (CAR ORACLE) AK))
                          (CDR ORACLE)))
    NIL)
```

Definition {1690}.

```
(ASM-OPCODE-ALIST)
   =
(LIST (CONS 'RETURN (TM-RETURN-OPCODE))
      (CONS 'WAIT (TM-WAIT-OPCODE))
      (CONS 'RUN (TM-RUN-OPCODE))
      (CONS 'BR (TM-BR-OPCODE))
      (CONS 'BRZ (TM-BRZ-OPCODE))
      (CONS 'BRNZ (TM-BRNZ-OPCODE))
      (CONS 'CALL (TM-CALL-OPCODE))
      (CONS 'DECR (TM-DECR-OPCODE))
      (CONS 'DECRM (TM-DECR-MOD-OPCODE))
      (CONS 'INCR (TM-INCR-OPCODE))
      (CONS 'INCRM (TM-INCR-MOD-OPCODE))
      (CONS 'LBASE (TM-LBASE-OPCODE))
      (CONS 'LLIMIT (TM-LLIMIT-OPCODE))
      (CONS 'LPSW (TM-LPSW-OPCODE))
      (CONS 'POST (TM-POST-OPCODE))
      (CONS 'SVC (TM-SVC-OPCODE))
      (CONS 'SVCR (TM-SVC-RETURN-OPCODE))
      (CONS 'TIME (TM-TIME-OPCODE))
      (CONS 'ADD (TM-ADD-OPCODE))
      (CONS 'COMPARE (TM-COMPARE-OPCODE))
      (CONS 'MOD (TM-MOD-OPCODE))
      (CONS 'MOVE (TM-MOVE-OPCODE))
      (CONS 'MULT (TM-MULT-OPCODE))
      (CONS 'STOUT (TM-STOUT-OPCODE))
      (CONS 'TESTI (TM-TESTI-OPCODE))
      (CONS 'TESTO (TM-TESTO-OPCODE)))
```

Definition {1691}.

```
(APPEND-N-TIMES N LIST)
   =
(IF (ZEROP N)
    NIL
    (APPEND LIST
            (APPEND-N-TIMES (SUB1 N) LIST)))
```

Definition {1692}.

```
(BOUNDP X ALIST)
   =
(IF (LISTP ALIST)
    (IF (LISTP (CAR ALIST))
        (IF (EQUAL X (CAAR ALIST))
            T
```

```
            (BOUNDP X (CDR ALIST)))
        (BOUNDP X (CDR ALIST)))
    F)
```

Definition {1693}.

```
(NUMBER-AND-LITATOM-LISTP X)
   =
(IF (LISTP X)
    (AND (OR (NUMBERP (CAR X))
             (LITATOM (CAR X)))
         (NUMBER-AND-LITATOM-LISTP (CDR X)))
    T)
```

Definition {1694}.

```
(DC-FORMP X)
   =
(AND (LISTP X)
     (EQUAL (CAR X) 'DC)
     (NUMBERP (CADR X))
     (OR (NUMBERP (CADDR X))
         (LITATOM (CADDR X))
         (LISTP (CADDR X))
         (NUMBER-AND-LITATOM-LISTP (CADDR X))))
```

Definition {1695}.

```
(TRANSLATE-DC-ARG ARG SYMTAB)
   =
(IF (NUMBERP ARG)
    ARG
    (IF (LITATOM ARG)
        (IF (BOUNDP ARG SYMTAB)
            (LOOKUP ARG SYMTAB)
            ARG)
        ARG))
```

Definition {1696}.

```
(TRANSLATE-DC-ARGLIST ARGLIST SYMTAB)
   =
(IF (LISTP ARGLIST)
    (CONS (TRANSLATE-DC-ARG (CAR ARGLIST)
                            SYMTAB)
          (TRANSLATE-DC-ARGLIST (CDR ARGLIST)
                                SYMTAB))
    NIL)
```

Definition {1697}.

```
(TRANSLATE-DC DC-FORM SYMTAB)
   =
(IF (DC-FORMP DC-FORM)
    (APPEND-N-TIMES (CADR DC-FORM)
                    (TRANSLATE-DC-ARGLIST (IF (LISTP (CADDR DC-FORM))
                                              (CADDR DC-FORM)
                                              (LIST (CADDR DC-FORM)))
                                          SYMTAB))
    DC-FORM)
```

Definition {1698}.

```
(ASM-INSTRUCTION-OPCODE INSTRUCTION)
   =
(LOOKUP (CAR INSTRUCTION)
        (ASM-OPCODE-ALIST))
```

Definition {1699}.

```
(ASM-INSTRUCTION-MODE1 INSTRUCTION SYMTAB)
   =
(IF (LISTP (CADR INSTRUCTION))
    (IF (BOUNDP (CAR (CADR INSTRUCTION))
                SYMTAB)
        (LOOKUP (CAR (CADR INSTRUCTION))
                SYMTAB)
        (CAR (CADR INSTRUCTION)))
    0)
```

```
Definition {1700}.
(ASM-INSTRUCTION-ARG1 INSTRUCTION SYMTAB)
   =
(IF (LISTP (CADR INSTRUCTION))
    (IF (BOUNDP (CADR (CADR INSTRUCTION))
                SYMTAB)
        (LOOKUP (CADR (CADR INSTRUCTION))
                SYMTAB)
        (CADR (CADR INSTRUCTION)))
    (IF (BOUNDP (CADR INSTRUCTION) SYMTAB)
        (LOOKUP (CADR INSTRUCTION) SYMTAB)
        (CADR INSTRUCTION)))

Definition {1701}.
(ASM-INSTRUCTION-INDEX1 INSTRUCTION SYMTAB)
   =
(IF (LISTP (CADR INSTRUCTION))
    (IF (BOUNDP (CADDR (CADR INSTRUCTION))
                SYMTAB)
        (LOOKUP (CADDR (CADR INSTRUCTION))
                SYMTAB)
        (CADDR (CADR INSTRUCTION)))
    0)

Definition {1702}.
(ASM-INSTRUCTION-MODE2 INSTRUCTION SYMTAB)
   =
(IF (LISTP (CADDR INSTRUCTION))
    (IF (BOUNDP (CAR (CADDR INSTRUCTION))
                SYMTAB)
        (LOOKUP (CAR (CADDR INSTRUCTION))
                SYMTAB)
        (CAR (CADDR INSTRUCTION)))
    0)

Definition {1703}.
(ASM-INSTRUCTION-ARG2 INSTRUCTION SYMTAB)
   =
(IF (LISTP (CADDR INSTRUCTION))
    (IF (BOUNDP (CADR (CADDR INSTRUCTION))
                SYMTAB)
        (LOOKUP (CADR (CADDR INSTRUCTION))
                SYMTAB)
        (CADR (CADDR INSTRUCTION)))
    (IF (BOUNDP (CADDR INSTRUCTION) SYMTAB)
        (LOOKUP (CADDR INSTRUCTION) SYMTAB)
        (CADDR INSTRUCTION)))

Definition {1704}.
(ASM-INSTRUCTION-INDEX2 INSTRUCTION SYMTAB)
   =
(IF (LISTP (CADDR INSTRUCTION))
    (IF (BOUNDP (CADDR (CADDR INSTRUCTION))
                SYMTAB)
        (LOOKUP (CADDR (CADDR INSTRUCTION))
                SYMTAB)
        (CADDR (CADDR INSTRUCTION)))
    0)

Definition {1705}.
(ASM-GOOD-ARG ARG MODE)
   =
(IF (OR (EQUAL MODE 0) (EQUAL MODE 2))
    (FINITE-NUMBERP ARG (TM-WORDLUB))
    (FINITE-NUMBERP ARG (TM-REGLENGTH)))

Definition {1706}.
(ASM-GOOD-INSTRUCTION INSTRUCTION SYMTAB)
   =
(AND (BOUNDP (CAR INSTRUCTION)
             (ASM-OPCODE-ALIST))
```

```
     (EQUAL (LENGTH INSTRUCTION)
            (IF (TM-NULLARY-INSTRUCTIONP (LOOKUP (CAR INSTRUCTION)
                                                 (ASM-OPCODE-ALIST)))
                1
                (IF (TM-UNARY-INSTRUCTIONP (LOOKUP (CAR INSTRUCTION)
                                                   (ASM-OPCODE-ALIST)))
                    2 3)))
     (FINITE-NUMBERP (ASM-INSTRUCTION-MODE1 INSTRUCTION SYMTAB)
                     4)
     (FINITE-NUMBERP (ASM-INSTRUCTION-MODE2 INSTRUCTION SYMTAB)
                     4)
     (ASM-GOOD-ARG (ASM-INSTRUCTION-ARG1 INSTRUCTION SYMTAB)
                   (ASM-INSTRUCTION-MODE1 INSTRUCTION SYMTAB))
     (ASM-GOOD-ARG (ASM-INSTRUCTION-ARG2 INSTRUCTION SYMTAB)
                   (ASM-INSTRUCTION-MODE2 INSTRUCTION SYMTAB))
     (FINITE-NUMBERP (ASM-INSTRUCTION-INDEX1 INSTRUCTION SYMTAB)
                     8)
     (FINITE-NUMBERP (ASM-INSTRUCTION-INDEX2 INSTRUCTION SYMTAB)
                     8))
```

Definition {1707}.

```
(ASM-PACK-WORD1 INSTRUCTION SYMTAB)
   =
(IF (EQUAL (LENGTH INSTRUCTION) 1)
    (ASM-INSTRUCTION-OPCODE INSTRUCTION)
    (IF (EQUAL (LENGTH INSTRUCTION) 2)
        (PLUS (ASM-INSTRUCTION-OPCODE INSTRUCTION)
              (PLUS (TIMES (ASM-INSTRUCTION-MODE1 INSTRUCTION SYMTAB)
                           (TM-OPCODE-DIVISOR))
                    (TIMES (ASM-INSTRUCTION-INDEX1 INSTRUCTION SYMTAB)
                           (TM-MODE1-DIVISOR))))
        (PLUS (ASM-INSTRUCTION-OPCODE INSTRUCTION)
              (PLUS (TIMES (ASM-INSTRUCTION-MODE1 INSTRUCTION SYMTAB)
                           (TM-OPCODE-DIVISOR))
                    (PLUS (TIMES (ASM-INSTRUCTION-INDEX1 INSTRUCTION SYMTAB)
                                 (TM-MODE1-DIVISOR))
                          (PLUS (TIMES (ASM-INSTRUCTION-MODE2 INSTRUCTION
                                                              SYMTAB)
                                       (TM-INDEX1-DIVISOR))
                                (TIMES (ASM-INSTRUCTION-INDEX2 INSTRUCTION
                                                               SYMTAB)
                                       (TM-MODE2-DIVISOR)))))))
```

Definition {1708}.

```
(ASM-PACK-INSTRUCTION INSTRUCTION SYMTAB)
   =
(IF (EQUAL (LENGTH INSTRUCTION) 1)
    (LIST (ASM-PACK-WORD1 INSTRUCTION SYMTAB))
    (IF (EQUAL (LENGTH INSTRUCTION) 2)
        (LIST (ASM-PACK-WORD1 INSTRUCTION SYMTAB)
              (ASM-INSTRUCTION-ARG1 INSTRUCTION SYMTAB))
        (LIST (ASM-PACK-WORD1 INSTRUCTION SYMTAB)
              (ASM-INSTRUCTION-ARG1 INSTRUCTION SYMTAB)
              (ASM-INSTRUCTION-ARG2 INSTRUCTION SYMTAB))))
```

Definition {1709}.

```
(TRANSLATE-INSTRUCTION INSTRUCTION SYMTAB)
   =
(IF (ASM-GOOD-INSTRUCTION INSTRUCTION SYMTAB)
    (ASM-PACK-INSTRUCTION INSTRUCTION SYMTAB)
    INSTRUCTION)
```

Definition {1710}.

```
(TRANSLATE-SOURCE SOURCE SYMTAB)
   =
(IF (LISTP SOURCE)
    (IF (LITATOM (CAR SOURCE))
        (TRANSLATE-SOURCE (CDR SOURCE) SYMTAB)
        (IF (AND (LISTP (CAR SOURCE))
                 (EQUAL (CAAR SOURCE) 'DCL))
```

```
            (TRANSLATE-SOURCE (CDR SOURCE) SYMTAB)
            (IF (AND (LISTP (CAR SOURCE))
                     (EQUAL (CAAR SOURCE) 'DC))
                (APPEND (TRANSLATE-DC (CAR SOURCE) SYMTAB)
                        (TRANSLATE-SOURCE (CDR SOURCE)
                                          SYMTAB))
                (APPEND (TRANSLATE-INSTRUCTION (CAR SOURCE)
                                               SYMTAB)
                        (TRANSLATE-SOURCE (CDR SOURCE)
                                          SYMTAB)))))
    NIL)
```

Definition {1711}.

```
(INCR-DC-POSITION DC-FORM)
   =
(IF (LISTP (CADDR DC-FORM))
    (TIMES (CADR DC-FORM)
           (LENGTH (CADDR DC-FORM)))
    (CADR DC-FORM))
```

Definition {1712}.

```
(INCR-INSTRUCTION-POSITION INSTRUCTION)
   =
(IF (BOUNDP (CAR INSTRUCTION)
            (ASM-OPCODE-ALIST))
    (IF (TM-NULLARY-INSTRUCTIONP (LOOKUP (CAR INSTRUCTION)
                                         (ASM-OPCODE-ALIST)))
        1
        (IF (TM-UNARY-INSTRUCTIONP (LOOKUP (CAR INSTRUCTION)
                                           (ASM-OPCODE-ALIST)))
            2 3))
    0)
```

Definition {1713}.

```
(BUILD-SYMTAB SOURCE SYMTAB POSITION)
   =
(IF
 (LISTP SOURCE)
 (IF
    (LITATOM (CAR SOURCE))
    (BUILD-SYMTAB (CDR SOURCE)
                  (CONS (CONS (CAR SOURCE) POSITION)
                        SYMTAB)
                  POSITION)
    (IF (AND (LISTP (CAR SOURCE))
             (EQUAL (CAAR SOURCE) 'DCL))
        (BUILD-SYMTAB (CDR SOURCE)
                      (CONS (CONS (CADR (CAR SOURCE))
                                  (CADDR (CAR SOURCE)))
                            SYMTAB)
                      POSITION)
        (IF (AND (LISTP (CAR SOURCE))
                 (EQUAL (CAAR SOURCE) 'DC))
            (BUILD-SYMTAB (CDR SOURCE)
                          SYMTAB
                          (PLUS POSITION
                                (INCR-DC-POSITION (CAR SOURCE))))
            (BUILD-SYMTAB (CDR SOURCE)
                          SYMTAB
                          (PLUS POSITION
                                (INCR-INSTRUCTION-POSITION (CAR SOURCE)))))))
 SYMTAB)
```

Definition {1714}.

```
(FIND-DUPLICATE-SYMBOL SYMTAB ALREADY-SEEN)
   =
(IF (LISTP SYMTAB)
    (IF (LISTP (CAR SYMTAB))
        (IF (MEMBER (CAR (CAR SYMTAB))
                    ALREADY-SEEN)
```

```
            (CAAR SYMTAB)
            (FIND-DUPLICATE-SYMBOL (CDR SYMTAB)
                                   (CONS (CAR (CAR SYMTAB))
                                         ALREADY-SEEN)))
        (FIND-DUPLICATE-SYMBOL (CDR SYMTAB)
                               ALREADY-SEEN))
    F)
```

Definition {1715}.

```
(ASSEMBLY-ERRORP ASSEMBLER-RESULT)
   =
(NOT (AND (PLISTP ASSEMBLER-RESULT)
          (EQUAL (LENGTH ASSEMBLER-RESULT) 2)
          (EQUAL (CADR ASSEMBLER-RESULT) T)))
```

Definition {1716}.

```
(FIND-NON-FINITE-NUMBER L)
   =
(IF (LISTP L)
    (IF (FINITE-NUMBERP (CAR L) (TM-WORDLUB))
        (FIND-NON-FINITE-NUMBER (CDR L))
        (CAR L))
    NIL)
```

Definition {1717}.

```
(ASSEMBLE2 MEMORY)
   =
(IF (FINITE-NUMBER-TABLEP 100
                          (TABLE 100 MEMORY)
                          (TM-WORDLUB))
    (LIST MEMORY T)
    (LIST NIL
          (LIST 'ASSEMBLY
                'ERROR
                (FIND-NON-FINITE-NUMBER MEMORY))))
```

Definition {1718}.

```
(ASSEMBLE1 SOURCE SYMTAB)
   =
(IF (FIND-DUPLICATE-SYMBOL SYMTAB NIL)
    (LIST NIL
          (LIST 'ASSEMBLY
                'ERROR
                'DUPLICATE
                'LABEL
                (FIND-DUPLICATE-SYMBOL SYMTAB NIL)))
    (ASSEMBLE2 (TRANSLATE-SOURCE SOURCE SYMTAB)))
```

Definition {1719}.

```
(ASSEMBLE SOURCE) = (ASSEMBLE1 SOURCE
                               (BUILD-SYMTAB SOURCE NIL 0))
```

Definition {1721}.

```
(REVERSE-ALIST ALIST)
   =
(IF (LISTP ALIST)
    (CONS (CONS (CDR (CAR ALIST))
                (CAR (CAR ALIST)))
          (REVERSE-ALIST (CDR ALIST)))
    ALIST)
```

Definition {1722}.

```
(ASM-REVERSE-OPCODE-ALIST) = (REVERSE-ALIST (ASM-OPCODE-ALIST))
```

Definition {1723}.

```
(ASM-SYMBOLIC-OPCODE N) = (LOOKUP (TM-OPCODE N)
                                  (ASM-REVERSE-OPCODE-ALIST))
```

Definition {1724}.

```
(OS-READYQ-LENGTH) = (PLUS (AK-TASKIDLUB) (QARRAY-FIELD))
```

Definition {1725}.

```
(OS-TASK-TABLE-LENGTH) = (TIMES (AK-TASKIDLUB) (TM-CPU-LENGTH))
```

```
Definition {1726}.
(OS-SEGMENT-TABLE-LENGTH) = (TIMES (AK-TASKIDLUB) 2)

Definition {1727}.
(OS-STATUS-TABLE-LENGTH) = (TIMES (AK-TASKIDLUB)
                                  (AK-STATUS-LENGTH))

Definition {1728}.
(OS-IBUFFER-LENGTH) = (PLUS (TASK-IBUFFER-CAPACITY)
                            (QARRAY-FIELD))

Definition {1729}.
(OS-IBUFFERS-LENGTH) = (TIMES (AK-TASKIDLUB)
                              (OS-IBUFFER-LENGTH))

Definition {1730}.
(OS-OBUFFER-LENGTH) = (PLUS (TASK-OBUFFER-CAPACITY)
                            (QARRAY-FIELD))

Definition {1731}.
(OS-OBUFFERS-LENGTH) = (TIMES (AK-TASKIDLUB)
                              (OS-OBUFFER-LENGTH))

Definition {1732}.
(OS-MBUFFER-LENGTH) = (PLUS (TASK-MBUFFER-CAPACITY)
                            (QARRAY-FIELD))

Definition {1733}.
(OS-MBUFFERS-LENGTH)
   =
(TIMES (TIMES (AK-TASKIDLUB) (AK-TASKIDLUB))
       (OS-MBUFFER-LENGTH))

Definition {1734}.
(OS-MBUFFERS-LENGTH-QUARTER) = (QUOTIENT (OS-MBUFFERS-LENGTH) 4)

Definition {1736}.
(OS-SOURCE)
   =
(FLATTEN
 (LIST
  (LIST '(DCL R0 0)
        '(DCL R1 1)
        '(DCL R2 2)
        '(DCL R3 3)
        '(DCL R4 4)
        '(DCL R5 5)
        '(DCL R6 6)
        '(DCL R7 7)
        '(DCL INTERRUPT-PC-FIELD 0)
        '(DCL INTERRUPT-SP-FIELD 1)
        '(DCL INTERRUPT-FLAG-FIELD 2)
        (LIST 'DCL 'SVCID-ADDR (TM-SVCID-ADDR))
        (LIST 'DCL 'INPUT-DEVID-ADDR (TM-INPUT-DEVID-ADDR))
        (LIST 'DCL 'INPUT-CHAR-ADDR (TM-INPUT-CHAR-ADDR))
        (LIST 'DCL 'OUTPUT-DEVID-ADDR (TM-OUTPUT-DEVID-ADDR))
        (LIST 'DCL 'CHARLUB (TM-CHARLUB))
        (LIST 'DCL 'SEND-SVCID (OS-SVC-SEND-ID))
        (LIST 'DCL 'RECEIVE-SVCID (OS-SVC-RECEIVE-ID))
        (LIST 'DCL 'TYO-SVCID (OS-SVC-TYO-ID))
        (LIST 'DCL 'TYI-SVCID (OS-SVC-TYI-ID))
        (LIST 'DCL 'TASK-TABLE-LENGTH (OS-TASK-TABLE-LENGTH))
        (LIST 'DCL 'TASK-TABLE-ENTRY-LENGTH (TM-CPU-LENGTH))
        '(DCL PC-FIELD 0)
        '(DCL SP-FIELD 1)
        '(DCL R2-FIELD 2)
        '(DCL R3-FIELD 3)
        '(DCL R4-FIELD 4)
        '(DCL R5-FIELD 5)
        '(DCL R6-FIELD 6)
        '(DCL R7-FIELD 7)
        '(DCL FLAG-FIELD 8)
```

```
      (LIST 'DCL 'READYQ-LENGTH (OS-READYQ-LENGTH))
      (LIST 'DCL 'QHEAD-FIELD (QHEAD-FIELD))
      (LIST 'DCL 'QTAIL-FIELD (QTAIL-FIELD))
      (LIST 'DCL 'QCURRLENGTH-FIELD (QCURRLENGTH-FIELD))
      (LIST 'DCL 'QMAXLENGTH-FIELD (QMAXLENGTH-FIELD))
      (LIST 'DCL 'QARRAY-FIELD (QARRAY-FIELD))
      (LIST 'DCL 'SEGMENT-TABLE-LENGTH (OS-SEGMENT-TABLE-LENGTH))
      '(DCL BASE-FIELD 0)
      '(DCL LIMIT-FIELD 1)
      (LIST 'DCL 'STATUS-ENTRY-LENGTH 2)
      (LIST 'DCL 'STATUS-FLAG-FIELD (AK-STATUS-FLAG-FIELD))
      (LIST 'DCL 'STATUS-TASKID-FIELD (AK-STATUS-TASKID-FIELD))
      (LIST 'DCL 'READY-STATUS (AK-READY-STATUS))
      (LIST 'DCL 'ERROR-STATUS (AK-ERROR-STATUS))
      (LIST 'DCL 'SEND-STATUS (AK-SEND-STATUS))
      (LIST 'DCL 'RECEIVE-STATUS (AK-RECEIVE-STATUS))
      (LIST 'DCL 'OUTPUT-STATUS (AK-OUTPUT-STATUS))
      (LIST 'DCL 'INPUT-STATUS (AK-INPUT-STATUS))
      (LIST 'DCL 'INPUT-BUFFER-LENGTH (OS-IBUFFER-LENGTH))
      (LIST 'DCL 'OUTPUT-BUFFER-LENGTH (OS-OBUFFER-LENGTH))
      (LIST 'DCL 'MESSAGE-BUFFER-LENGTH (OS-MBUFFER-LENGTH))
      (LIST 'DCL 'SOURCE-MULTIPLIER (TIMES (AK-TASKIDLUB)
                                           (OS-MBUFFER-LENGTH)))
      (LIST 'DCL 'DEST-MULTIPLIER (OS-MBUFFER-LENGTH))
      (LIST 'DCL 'TASKIDLUB (AK-TASKIDLUB)))
(LIST 'REG-SAVE-AREA  '(DC 3 0)
      'CLOCK-NEW-PC   '(DC 1 CLOCK-INTERRUPT-HANDLER)
      'ERROR-NEW-PC   '(DC 1 ERROR-INTERRUPT-HANDLER)
      'SVC-NEW-PC     '(DC 1 SVC-INTERRUPT-HANDLER)
      'INPUT-NEW-PC   '(DC 1 INPUT-INTERRUPT-HANDLER)
      'OUTPUT-NEW-PC  '(DC 1 OUTPUT-INTERRUPT-HANDLER)
      'INTERRUPT-DATA '(DC 2 0)
      'BRANCH-ADDRESS '(DC 1 0)
      'TIME-SLICE     (LIST 'DC 1 (AK-TIME-SLICE))
      'CURRENT-TASKID '(DC 1 0)
      'TEMP-R2        '(DC 1 0)
      'TEMP-R3        '(DC 1 0)
      'TASK-TABLE     (LIST 'DC (OS-TASK-TABLE-LENGTH) 0)
      'SEGMENT-TABLE  (LIST 'DC (OS-SEGMENT-TABLE-LENGTH) 0)
      'READYQ         (LIST 'DC (OS-READYQ-LENGTH) 0)
      'STATUS-TABLE   (LIST 'DC (OS-STATUS-TABLE-LENGTH) 0)
      'IBUFFERS       (LIST 'DC (OS-IBUFFERS-LENGTH) 0)
      'OBUFFERS       (LIST 'DC (OS-OBUFFERS-LENGTH) 0)
      'MBUFFERS       (LIST 'DC (OS-MBUFFERS-LENGTH-QUARTER) 0)
                      (LIST 'DC (OS-MBUFFERS-LENGTH-QUARTER) 0)
                      (LIST 'DC (OS-MBUFFERS-LENGTH-QUARTER) 0)
                      (LIST 'DC (OS-MBUFFERS-LENGTH-QUARTER) 0))
'(SAVE-STATE
  (MOVE (2 TEMP-R2) (1 R2))
  (MOVE (2 TEMP-R3) (1 R3))
  (MOVE (1 R3) READYQ)
  (CALL QFIRST)
  SAVE-STATE-RETURN
  (MULT (1 R2) TASK-TABLE-ENTRY-LENGTH)
  (ADD  (1 R2) TASK-TABLE)
  (MOVE (3 R2 PC-FIELD) (2 REG-SAVE-AREA INTERRUPT-PC-FIELD))
  (MOVE (3 R2 SP-FIELD) (2 REG-SAVE-AREA INTERRUPT-SP-FIELD))
  (MOVE (3 R2 R2-FIELD) (2 TEMP-R2))
  (MOVE (3 R2 R3-FIELD) (2 TEMP-R3))
  (MOVE (3 R2 R4-FIELD) (1 R4))
  (MOVE (3 R2 R5-FIELD) (1 R5))
  (MOVE (3 R2 R6-FIELD) (1 R6))
  (MOVE (3 R2 R7-FIELD) (1 R7))
  (ADD  (1 R2) FLAG-FIELD)
  (MOVE (3 R2) (2 REG-SAVE-AREA INTERRUPT-FLAG-FIELD))
  (MOVE (1 R2) (2 TEMP-R2))
  (MOVE (1 R3) (2 TEMP-R3))
  (RETURN)
  RESTORE-STATE
```

```
(MOVE (1 R3) (1 R2))
(MULT (1 R2) TASK-TABLE-ENTRY-LENGTH)
(ADD (1 R2) TASK-TABLE)
(MULT (1 R3) 2)
(ADD (1 R3) SEGMENT-TABLE)
(LBASE (3 R3 BASE-FIELD))
(LLIMIT (3 R3 LIMIT-FIELD))
(MOVE (1 R3) (1 R2))
(ADD (1 R3) FLAG-FIELD)
(MOVE (2 REG-SAVE-AREA INTERRUPT-PC-FIELD) (3 R2 PC-FIELD))
(MOVE (2 REG-SAVE-AREA INTERRUPT-SP-FIELD) (3 R2 SP-FIELD))
(MOVE (2 REG-SAVE-AREA INTERRUPT-FLAG-FIELD) (3 R3))
(MOVE (1 R7) (3 R2 R7-FIELD))
(MOVE (1 R6) (3 R2 R6-FIELD))
(MOVE (1 R5) (3 R2 R5-FIELD))
(MOVE (1 R4) (3 R2 R4-FIELD))
(MOVE (1 R3) (3 R2 R3-FIELD))
(MOVE (1 R2) (3 R2 R2-FIELD))
(RETURN)
CLOCK-INTERRUPT-HANDLER
(CALL SAVE-STATE)
TRACE-LABEL1
(MOVE (1 R3) READYQ)
(CALL QFIRST)
(CALL DEQUEUE)
(CALL ENQUEUE)
TRACE-LABEL2
(BR DISPATCHER)
ERROR-INTERRUPT-HANDLER
(CALL SAVE-STATE)
TRACE-LABEL3
(MOVE (1 R3) READYQ)
(CALL QFIRST)
(CALL DEQUEUE)
TRACE-LABEL4
(MULT (1 R2) STATUS-ENTRY-LENGTH)
(ADD (1 R2) STATUS-TABLE)
(MOVE (3 R2 STATUS-FLAG-FIELD) ERROR-STATUS)
(MOVE (3 R2 STATUS-TASKID-FIELD) 0)
(BR DISPATCHER)
SVC-INTERRUPT-HANDLER
(CALL SAVE-STATE)
TRACE-LABEL5
(MOD (2 SVCID-ADDR) 4)
(COMPARE (2 SVCID-ADDR) SEND-SVCID)
(BRZ SEND-SVC-HANDLER)
(COMPARE (2 SVCID-ADDR) RECEIVE-SVCID)
(BRZ RECEIVE-SVC-HANDLER)
(COMPARE (2 SVCID-ADDR) TYO-SVCID)
(BRZ TYO-SVC-HANDLER)
(BR TYI-SVC-HANDLER)
SEND-SVC-HANDLER
(MOVE (1 R6) (1 R2))
(MOD (1 R6) TASKIDLUB)
(MOVE (1 R7) (1 R3))
(MOVE (1 R3) READYQ)
(CALL QFIRST)
TRACE-LABEL6
(MOVE (2 CURRENT-TASKID) (1 R2))
(MOVE (1 R4) (1 R6))
(MULT (1 R4) DEST-MULTIPLIER)
(MOVE (1 R3) (1 R2))
(MULT (1 R3) SOURCE-MULTIPLIER)
(ADD (1 R3) (1 R4))
(ADD (1 R3) MBUFFERS)
TRACE-LABEL7
(CALL QFULLP)
(BRZ BLOCK-SEND)
(MOVE (1 R2) (1 R7))
```

```
(CALL ENQUEUE)
TRACE-LABEL8
(MOVE (1 R3) (1 R6))
(MULT (1 R3) STATUS-ENTRY-LENGTH)
(ADD (1 R3) STATUS-TABLE)
(COMPARE (3 R3 STATUS-FLAG-FIELD) RECEIVE-STATUS)
(BRNZ SVC-RESUME-TASK)
(COMPARE (3 R3 STATUS-TASKID-FIELD) (2 CURRENT-TASKID))
(BRNZ SVC-RESUME-TASK)
(MOVE (3 R3 STATUS-FLAG-FIELD) READY-STATUS)
(MOVE (3 R3 STATUS-TASKID-FIELD) 0)
(MOVE (1 R2) (1 R6))
(MOVE (1 R3) READYQ)
(CALL ENQUEUE)
TRACE-LABEL9
(BR SVC-RESUME-TASK)
BLOCK-SEND
(MOVE (1 R3) READYQ)
(CALL DEQUEUE)
TRACE-LABEL10
(MOVE (1 R3) (2 CURRENT-TASKID))
(MULT (1 R3) STATUS-ENTRY-LENGTH)
(ADD (1 R3) STATUS-TABLE)
(MOVE (3 R3 STATUS-FLAG-FIELD) SEND-STATUS)
(MOVE (3 R3 STATUS-TASKID-FIELD) (1 R6))
(BR DISPATCHER)
RECEIVE-SVC-HANDLER
(MOVE (1 R6) (1 R2))
(MOD (1 R6) TASKIDLUB)
(MOVE (1 R3) READYQ)
(CALL QFIRST)
TRACE-LABEL11
(MOVE (2 CURRENT-TASKID) (1 R2))
(MOVE (1 R4) (1 R2))
(MULT (1 R4) DEST-MULTIPLIER)
(MOVE (1 R3) (1 R6))
(MULT (1 R3) SOURCE-MULTIPLIER)
(ADD (1 R3) (1 R4))
(ADD (1 R3) MBUFFERS)
TRACE-LABEL12
(CALL QEMPTYP)
(BRZ BLOCK-RECEIVE)
(CALL QFIRST)
(CALL DEQUEUE)
TRACE-LABEL13
(MOVE (1 R3) (2 CURRENT-TASKID))
(MULT (1 R3) TASK-TABLE-ENTRY-LENGTH)
(ADD (1 R3) TASK-TABLE)
(MOVE (3 R3 R3-FIELD) (1 R2))
TRACE-LABEL14
(MOVE (1 R3) (1 R6))
(MULT (1 R3) STATUS-ENTRY-LENGTH)
(ADD (1 R3) STATUS-TABLE)
(COMPARE (3 R3 STATUS-FLAG-FIELD) SEND-STATUS)
(BRNZ SVC-RESUME-TASK)
(COMPARE (3 R3 STATUS-TASKID-FIELD) (2 CURRENT-TASKID))
(BRNZ SVC-RESUME-TASK)
(MOVE (3 R3 STATUS-FLAG-FIELD) READY-STATUS)
(MOVE (3 R3 STATUS-TASKID-FIELD) 0)
(MOVE (1 R2) (1 R6))
(MOVE (1 R3) READYQ)
(CALL ENQUEUE)
TRACE-LABEL15
(BR SVC-RESUME-TASK)
BLOCK-RECEIVE
(MOVE (1 R3) READYQ)
(CALL DEQUEUE)
TRACE-LABEL16
(MOVE (1 R3) (2 CURRENT-TASKID))
```

```
(MULT (1 R3) STATUS-ENTRY-LENGTH)
(ADD (1 R3) STATUS-TABLE)
(MOVE (3 R3 STATUS-FLAG-FIELD) RECEIVE-STATUS)
(MOVE (3 R3 STATUS-TASKID-FIELD) (1 R6))
(BR DISPATCHER)
TYO-SVC-HANDLER
(MOVE (1 R7) (1 R3))
(MOVE (1 R3) READYQ)
(CALL QFIRST)
TRACE-LABEL17
(MOVE (2 CURRENT-TASKID) (1 R2))
(MOVE (1 R3) (1 R2))
(MULT (1 R3) OUTPUT-BUFFER-LENGTH)
(ADD (1 R3) OBUFFERS)
TRACE-LABEL18
(CALL QFULLP)
(BRZ BLOCK-TYO)
(MOVE (1 R2) (1 R7))
(CALL ENQUEUE)
TRACE-LABEL19
(TESTO (2 CURRENT-TASKID))
(BRNZ SVC-RESUME-TASK)
(POST (2 CURRENT-TASKID))
(BR SVC-RESUME-TASK)
BLOCK-TYO
(MOVE (1 R3) READYQ)
(CALL DEQUEUE)
TRACE-LABEL20
(MOVE (1 R3) (2 CURRENT-TASKID))
(MULT (1 R3) STATUS-ENTRY-LENGTH)
(ADD (1 R3) STATUS-TABLE)
(MOVE (3 R3 STATUS-FLAG-FIELD) OUTPUT-STATUS)
(MOVE (3 R3 STATUS-TASKID-FIELD) 0)
(BR DISPATCHER)
TYI-SVC-HANDLER
(MOVE (1 R3) READYQ)
(CALL QFIRST)
TRACE-LABEL21
(MOVE (2 CURRENT-TASKID) (1 R2))
(MOVE (1 R3) (1 R2))
(MULT (1 R3) INPUT-BUFFER-LENGTH)
(ADD (1 R3) IBUFFERS)
TRACE-LABEL22
(CALL QEMPTYP)
(BRZ BLOCK-TYI)
(CALL QFIRST)
(CALL DEQUEUE)
TRACE-LABEL23
(MOVE (1 R3) (2 CURRENT-TASKID))
(MULT (1 R3) TASK-TABLE-ENTRY-LENGTH)
(ADD (1 R3) TASK-TABLE)
(MOVE (3 R3 R3-FIELD) (1 R2))
(BR SVC-RESUME-TASK)
BLOCK-TYI
(MOVE (1 R3) READYQ)
(CALL DEQUEUE)
TRACE-LABEL24
(MOVE (1 R3) (2 CURRENT-TASKID))
(MULT (1 R3) STATUS-ENTRY-LENGTH)
(ADD (1 R3) STATUS-TABLE)
(MOVE (3 R3 STATUS-FLAG-FIELD) INPUT-STATUS)
(MOVE (3 R3 STATUS-TASKID-FIELD) 0)
(BR DISPATCHER)
INPUT-INTERRUPT-HANDLER
(MOVE (2 BRANCH-ADDRESS) DISPATCHER)
(MOVE (2 TEMP-R3) (1 R3))
(MOVE (1 R3) READYQ)
(CALL QEMPTYP)
TRACE-LABEL25
```

```
(BRZ IIH-SKIP-SAVE-STATE)
(MOVE (2 BRANCH-ADDRESS) RESUME-TASK)
(MOVE (1 R3) (2 TEMP-R3))
(CALL SAVE-STATE)
TRACE-LABEL26 IIH-SKIP-SAVE-STATE
(MOVE (1 R5) (2 INPUT-DEVID-ADDR))
(MULT (1 R5) STATUS-ENTRY-LENGTH)
(ADD (1 R5) STATUS-TABLE)
(COMPARE (3 R5 STATUS-FLAG-FIELD) INPUT-STATUS)
(BRNZ CHECK-FOR-FULL-INPUT-BUFFER)
(MOVE (1 R2) (2 INPUT-DEVID-ADDR))
(MOVE (1 R3) READYQ)
(CALL ENQUEUE)
TRACE-LABEL27
(MOVE (3 R5 STATUS-FLAG-FIELD) READY-STATUS)
(MOVE (3 R5 STATUS-TASKID-FIELD) 0)
TRACE-LABEL28 CHECK-FOR-FULL-INPUT-BUFFER
(MOVE (1 R3) (2 INPUT-DEVID-ADDR))
(MULT (1 R3) INPUT-BUFFER-LENGTH)
(ADD (1 R3) IBUFFERS)
(CALL QFULLP)
(BRNZ CHECK-FOR-IPORT-ERROR)
(MOVE (1 R2) (2 INPUT-CHAR-ADDR))
(ADD (1 R2) CHARLUB)
(CALL QREPLACE)
TRACE-LABEL29
(BR (2 BRANCH-ADDRESS))
CHECK-FOR-IPORT-ERROR
(TESTI (2 INPUT-DEVID-ADDR))
(BRNZ ENQUEUE-INPUT-CHARACTER)
(MOVE (1 R2) (2 INPUT-CHAR-ADDR))
(ADD (1 R2) CHARLUB)
(CALL ENQUEUE)
TRACE-LABEL30
(BR (2 BRANCH-ADDRESS))
ENQUEUE-INPUT-CHARACTER
(MOVE (1 R2) (2 INPUT-CHAR-ADDR))
(CALL ENQUEUE)
TRACE-LABEL31
(BR (2 BRANCH-ADDRESS))
OUTPUT-INTERRUPT-HANDLER
(MOVE (2 BRANCH-ADDRESS) DISPATCHER)
(MOVE (2 TEMP-R3) (1 R3))
(MOVE (1 R3) READYQ)
(CALL QEMPTYP)
TRACE-LABEL32
(BRZ OIH-SKIP-SAVE-STATE)
(MOVE (2 BRANCH-ADDRESS) RESUME-TASK)
(MOVE (1 R3) (2 TEMP-R3))
(CALL SAVE-STATE)
TRACE-LABEL33 OIH-SKIP-SAVE-STATE
(MOVE (1 R5) (2 OUTPUT-DEVID-ADDR))
(MULT (1 R5) STATUS-ENTRY-LENGTH)
(ADD (1 R5) STATUS-TABLE)
(COMPARE (3 R5 STATUS-FLAG-FIELD) OUTPUT-STATUS)
(BRNZ CHECK-FOR-EMPTY-OUTPUT-BUFFER)
(MOVE (1 R2) (2 OUTPUT-DEVID-ADDR))
(MOVE (1 R3) READYQ)
(CALL ENQUEUE)
TRACE-LABEL34
(MOVE (3 R5 STATUS-FLAG-FIELD) READY-STATUS)
(MOVE (3 R5 STATUS-TASKID-FIELD) 0)
TRACE-LABEL35 CHECK-FOR-EMPTY-OUTPUT-BUFFER
(MOVE (1 R3) (2 OUTPUT-DEVID-ADDR))
(MULT (1 R3) OUTPUT-BUFFER-LENGTH)
(ADD (1 R3) OBUFFERS)
(CALL QEMPTYP)
(BRZ (2 BRANCH-ADDRESS))
(CALL QFIRST)
```

```
(STOUT (2 OUTPUT-DEVID-ADDR) (1 R2))
(CALL DEQUEUE)
TRACE-LABEL36
(BR (2 BRANCH-ADDRESS))
DISPATCHER
(MOVE (1 R3) READYQ)
(CALL QEMPTYP)
DISPATCHER-TRACE-LABEL1
(BRZ READYQ-EMPTY)
(CALL QFIRST)
(CALL RESTORE-STATE)
DISPATCHER-TRACE-LABEL2
(TIME (2 TIME-SLICE 0))
(LPSW (2 REG-SAVE-AREA))
READYQ-EMPTY
(WAIT)
PC-AFTER-WAIT SVC-RESUME-TASK
(MOVE (1 R3) READYQ)
(CALL QFIRST)
(CALL RESTORE-STATE)
SVC-RESUME-TASK-TRACE-LABEL1
(SVCR (2 REG-SAVE-AREA))
RESUME-TASK
(MOVE (1 R3) READYQ)
(CALL QFIRST)
(CALL RESTORE-STATE)
RESUME-TASK-TRACE-LABEL1
(LPSW (2 REG-SAVE-AREA))
ENQUEUE
(MOVE (1 R4) (1 R3))
(ADD (1 R4) QARRAY-FIELD)
(ADD (1 R4) (3 R3 QTAIL-FIELD))
(MOVE (3 R4) (1 R2))
(INCR (3 R3 QCURRLENGTH-FIELD))
(INCRM (3 R3 QTAIL-FIELD) (3 R3 QMAXLENGTH-FIELD))
(RETURN)
QREPLACE
(MOVE (1 R4) (3 R3 QTAIL-FIELD))
(DECRM (1 R4) (3 R3 QMAXLENGTH-FIELD))
(ADD (1 R4) (1 R3))
(ADD (1 R4) QARRAY-FIELD)
(MOVE (3 R4) (1 R2))
(RETURN)
DEQUEUE
(DECR (3 R3 QCURRLENGTH-FIELD))
(INCRM (3 R3 QHEAD-FIELD) (3 R3 QMAXLENGTH-FIELD))
(RETURN)
QFIRST
(MOVE (1 R2) (1 R3))
(ADD (1 R2) QARRAY-FIELD)
(ADD (1 R2) (3 R3 QHEAD-FIELD))
(MOVE (1 R2) (3 R2))
(RETURN)
QEMPTYP
(COMPARE (3 R3 QCURRLENGTH-FIELD) 0)
(RETURN)
QFULLP
(COMPARE (3 R3 QCURRLENGTH-FIELD) (3 R3 QMAXLENGTH-FIELD))
(RETURN)
END-OF-OS-SOURCE)))
```

Definition {1738}.

```
(OS-SYMTAB) = (BUILD-SYMTAB (OS-SOURCE) NIL 0)
```

Definition {1739}.

```
(OS-TASK-TABLE-ADDRESS) = (LOOKUP 'TASK-TABLE (OS-SYMTAB))
```

Definition {1740}.

```
(OS-READYQ-ADDRESS) = (LOOKUP 'READYQ (OS-SYMTAB))
```

```
Definition {1741}.
(OS-SEGMENT-TABLE-ADDRESS) = (LOOKUP 'SEGMENT-TABLE (OS-SYMTAB))

Definition {1742}.
(OS-STATUS-TABLE-ADDRESS) = (LOOKUP 'STATUS-TABLE (OS-SYMTAB))

Definition {1743}.
(OS-IBUFFERS-ADDRESS) = (LOOKUP 'IBUFFERS (OS-SYMTAB))

Definition {1744}.
(OS-OBUFFERS-ADDRESS) = (LOOKUP 'OBUFFERS (OS-SYMTAB))

Definition {1745}.
(OS-MBUFFERS-ADDRESS) = (LOOKUP 'MBUFFERS (OS-SYMTAB))

Definition {1746}.
(OS-CLOCK-INTERRUPT-HANDLER-ADDRESS)
   =
(LOOKUP 'CLOCK-INTERRUPT-HANDLER (OS-SYMTAB))

Definition {1747}.
(OS-ERROR-HANDLER-ADDRESS)
   =
(LOOKUP 'ERROR-INTERRUPT-HANDLER (OS-SYMTAB))

Definition {1748}.
(OS-SVC-HANDLER-ADDRESS)
   =
(LOOKUP 'SVC-INTERRUPT-HANDLER (OS-SYMTAB))

Definition {1749}.
(OS-INPUT-INTERRUPT-HANDLER-ADDRESS)
   =
(LOOKUP 'INPUT-INTERRUPT-HANDLER (OS-SYMTAB))

Definition {1750}.
(OS-OUTPUT-INTERRUPT-HANDLER-ADDRESS)
   =
(LOOKUP 'OUTPUT-INTERRUPT-HANDLER (OS-SYMTAB))

Definition {1751}.
(OS-CODE-ADDRESS) = (LOOKUP 'SAVE-STATE (OS-SYMTAB))

Definition {1752}.
(OS-SAVE-STATE-RETURN-ADDRESS)
   =
(LOOKUP 'SAVE-STATE-RETURN (OS-SYMTAB))

Definition {1753}.
(OS-DISPATCHER-RETURN-ADDRESS)
   =
(LOOKUP 'DISPATCHER-RETURN (OS-SYMTAB))

Definition {1754}.
(OS-TIME-SLICE-ADDRESS) = (LOOKUP 'TIME-SLICE (OS-SYMTAB))

Definition {1755}.
(OS-CODE-LENGTH)
   =
(DIFFERENCE (LOOKUP 'END-OF-OS-SOURCE (OS-SYMTAB))
            (OS-CODE-ADDRESS))

Definition {1756}.
(NTHCDR-N-TIMES N K L)
   =
(IF (ZEROP N)
    L
    (NTHCDR-N-TIMES (SUB1 N)
                    K
                    (NTHCDR K L)))

Definition {1757}.
(FIRSTN-N-TIMES N K L)
   =
(IF (ZEROP N)
```

```
    NIL
    (APPEND (FIRSTN K L)
            (FIRSTN-N-TIMES (SUB1 N)
                            K
                            (NTHCDR K L))))
```

Definition {1758}.

```
(FIRSTN-WITH-SMALL-RECURSION N L MAX)
   =
(APPEND (FIRSTN (REMAINDER N MAX) L)
        (FIRSTN-N-TIMES (QUOTIENT N MAX)
                        MAX
                        (NTHCDR (REMAINDER N MAX) L)))
```

Definition {1759}.

```
(NTHCDR-WITH-SMALL-RECURSION N L MAX)
   =
(NTHCDR (REMAINDER N MAX)
        (NTHCDR-N-TIMES (QUOTIENT N MAX)
                        MAX L))
```

Definition {1760}.

```
(GETSEG-WITH-SMALL-RECURSION N K L MAX)
   =
(FIRSTN-WITH-SMALL-RECURSION K
                             (NTHCDR-WITH-SMALL-RECURSION N L MAX)
                             MAX)
```

Definition {1761}.

```
(OS-MACHINE-CODE)
   =
(GETSEG-WITH-SMALL-RECURSION (OS-CODE-ADDRESS)
                             (OS-CODE-LENGTH)
                             (CAR (ASSEMBLE (OS-SOURCE)))
                             200)
```

Definition {1762}.

```
(OS-LIMIT) = (PLUS (LOOKUP 'END-OF-OS-SOURCE
                           (OS-SYMTAB))
                   10)
```

Definition {1763}.

```
(OS-TASK-TABLE OS)
   =
(GETSEG (OS-TASK-TABLE-ADDRESS)
        (OS-TASK-TABLE-LENGTH)
        (TM-MEMORY OS))
```

Definition {1764}.

```
(OS-READYQ OS)
   =
(GETSEG (OS-READYQ-ADDRESS)
        (OS-READYQ-LENGTH)
        (TM-MEMORY OS))
```

Definition {1765}.

```
(OS-SEGMENT-TABLE OS)
   =
(GETSEG (OS-SEGMENT-TABLE-ADDRESS)
        (OS-SEGMENT-TABLE-LENGTH)
        (TM-MEMORY OS))
```

Definition {1766}.

```
(OS-STATUS-TABLE OS)
   =
(GETSEG (OS-STATUS-TABLE-ADDRESS)
        (OS-STATUS-TABLE-LENGTH)
        (TM-MEMORY OS))
```

Definition {1767}.

```
(OS-IBUFFERS OS)
   =
(GETSEG (OS-IBUFFERS-ADDRESS)
```

```
        (OS-IBUFFERS-LENGTH)
        (TM-MEMORY OS))
```

Definition {1768}.

```
(OS-OBUFFERS OS)
   =
(GETSEG (OS-OBUFFERS-ADDRESS)
        (OS-OBUFFERS-LENGTH)
        (TM-MEMORY OS))
```

Definition {1769}.

```
(OS-MBUFFERS OS)
   =
(GETSEG (OS-MBUFFERS-ADDRESS)
        (OS-MBUFFERS-LENGTH)
        (TM-MEMORY OS))
```

Definition {1770}.

```
(OS-CODE OS) = (GETSEG (OS-CODE-ADDRESS)
                       (OS-CODE-LENGTH)
                       (TM-MEMORY OS))
```

Definition {1785}.

```
(OS-CURRENT-TASKID-ADDRESS) = (LOOKUP 'CURRENT-TASKID (OS-SYMTAB))
```

Definition {1786}.

```
(OS-TRACE-LABEL1) = (LOOKUP 'TRACE-LABEL1 (OS-SYMTAB))
```

Definition {1787}.

```
(OS-TRACE-LABEL2) = (LOOKUP 'TRACE-LABEL2 (OS-SYMTAB))
```

Definition {1788}.

```
(OS-TRACE-LABEL3) = (LOOKUP 'TRACE-LABEL3 (OS-SYMTAB))
```

Definition {1789}.

```
(OS-TRACE-LABEL4) = (LOOKUP 'TRACE-LABEL4 (OS-SYMTAB))
```

Definition {1790}.

```
(OS-TRACE-LABEL5) = (LOOKUP 'TRACE-LABEL5 (OS-SYMTAB))
```

Definition {1791}.

```
(OS-TRACE-LABEL6) = (LOOKUP 'TRACE-LABEL6 (OS-SYMTAB))
```

Definition {1792}.

```
(OS-TRACE-LABEL7) = (LOOKUP 'TRACE-LABEL7 (OS-SYMTAB))
```

Definition {1793}.

```
(OS-TRACE-LABEL8) = (LOOKUP 'TRACE-LABEL8 (OS-SYMTAB))
```

Definition {1794}.

```
(OS-TRACE-LABEL9) = (LOOKUP 'TRACE-LABEL9 (OS-SYMTAB))
```

Definition {1795}.

```
(OS-TRACE-LABEL10) = (LOOKUP 'TRACE-LABEL10 (OS-SYMTAB))
```

Definition {1796}.

```
(OS-SVC-RECEIVE-HANDLER-ADDRESS)
   =
(LOOKUP 'RECEIVE-SVC-HANDLER
        (OS-SYMTAB))
```

Definition {1797}.

```
(OS-TRACE-LABEL11) = (LOOKUP 'TRACE-LABEL11 (OS-SYMTAB))
```

Definition {1798}.

```
(OS-TRACE-LABEL12) = (LOOKUP 'TRACE-LABEL12 (OS-SYMTAB))
```

Definition {1799}.

```
(OS-TRACE-LABEL13) = (LOOKUP 'TRACE-LABEL13 (OS-SYMTAB))
```

Definition {1800}.

```
(OS-TRACE-LABEL14) = (LOOKUP 'TRACE-LABEL14 (OS-SYMTAB))
```

Definition {1801}.

```
(OS-TRACE-LABEL15) = (LOOKUP 'TRACE-LABEL15 (OS-SYMTAB))
```

Definition {1802}.

```
(OS-TRACE-LABEL16) = (LOOKUP 'TRACE-LABEL16 (OS-SYMTAB))
```

```
Definition {1803}.
(OS-SVC-TYO-HANDLER-ADDRESS) = (LOOKUP 'TYO-SVC-HANDLER (OS-SYMTAB))

Definition {1804}.
(OS-TRACE-LABEL17) = (LOOKUP 'TRACE-LABEL17 (OS-SYMTAB))

Definition {1805}.
(OS-TRACE-LABEL18) = (LOOKUP 'TRACE-LABEL18 (OS-SYMTAB))

Definition {1806}.
(OS-TRACE-LABEL19) = (LOOKUP 'TRACE-LABEL19 (OS-SYMTAB))

Definition {1807}.
(OS-TRACE-LABEL20) = (LOOKUP 'TRACE-LABEL20 (OS-SYMTAB))

Definition {1808}.
(OS-SVC-TYI-HANDLER-ADDRESS) = (LOOKUP 'TYI-SVC-HANDLER (OS-SYMTAB))

Definition {1809}.
(OS-TRACE-LABEL21) = (LOOKUP 'TRACE-LABEL21 (OS-SYMTAB))

Definition {1810}.
(OS-TRACE-LABEL22) = (LOOKUP 'TRACE-LABEL22 (OS-SYMTAB))

Definition {1811}.
(OS-TRACE-LABEL23) = (LOOKUP 'TRACE-LABEL23 (OS-SYMTAB))

Definition {1812}.
(OS-TRACE-LABEL24) = (LOOKUP 'TRACE-LABEL24 (OS-SYMTAB))

Definition {1813}.
(OS-TRACE-LABEL25) = (LOOKUP 'TRACE-LABEL25 (OS-SYMTAB))

Definition {1814}.
(OS-TRACE-LABEL26) = (LOOKUP 'TRACE-LABEL26 (OS-SYMTAB))

Definition {1815}.
(OS-TRACE-LABEL27) = (LOOKUP 'TRACE-LABEL27 (OS-SYMTAB))

Definition {1816}.
(OS-TRACE-LABEL28) = (LOOKUP 'TRACE-LABEL28 (OS-SYMTAB))

Definition {1817}.
(OS-TRACE-LABEL29) = (LOOKUP 'TRACE-LABEL29 (OS-SYMTAB))

Definition {1818}.
(OS-TRACE-LABEL30) = (LOOKUP 'TRACE-LABEL30 (OS-SYMTAB))

Definition {1819}.
(OS-TRACE-LABEL31) = (LOOKUP 'TRACE-LABEL31 (OS-SYMTAB))

Definition {1820}.
(OS-TRACE-LABEL32) = (LOOKUP 'TRACE-LABEL32 (OS-SYMTAB))

Definition {1821}.
(OS-TRACE-LABEL33) = (LOOKUP 'TRACE-LABEL33 (OS-SYMTAB))

Definition {1822}.
(OS-TRACE-LABEL34) = (LOOKUP 'TRACE-LABEL34 (OS-SYMTAB))

Definition {1823}.
(OS-TRACE-LABEL35) = (LOOKUP 'TRACE-LABEL35 (OS-SYMTAB))

Definition {1824}.
(OS-TRACE-LABEL36) = (LOOKUP 'TRACE-LABEL36 (OS-SYMTAB))

Definition {1825}.
(OS-DISPATCHER-TRACE-LABEL1)
   =
(LOOKUP 'DISPATCHER-TRACE-LABEL1 (OS-SYMTAB))

Definition {1826}.
(OS-DISPATCHER-TRACE-LABEL2)
   =
(LOOKUP 'DISPATCHER-TRACE-LABEL2 (OS-SYMTAB))

Definition {1827}.
(OS-SVC-RESUME-TASK-ADDRESS) = (LOOKUP 'SVC-RESUME-TASK (OS-SYMTAB))
```

Definition {1828}.
```
(OS-SVC-RESUME-TASK-TRACE-LABEL1)
   =
(LOOKUP 'SVC-RESUME-TASK-TRACE-LABEL1 (OS-SYMTAB))
```

Definition {1829}.
```
(OS-RESUME-TASK-ADDRESS) = (LOOKUP 'RESUME-TASK (OS-SYMTAB))
```

Definition {1830}.
```
(OS-RESUME-TASK-TRACE-LABEL1)
   =
(LOOKUP 'RESUME-TASK-TRACE-LABEL1 (OS-SYMTAB))
```

Definition {1831}.
```
(OS-PC-AFTER-WAIT) = (LOOKUP 'PC-AFTER-WAIT (OS-SYMTAB))
```

Definition {1832}.
```
(OS-TEMP-R2-ADDRESS) = (LOOKUP 'TEMP-R2 (OS-SYMTAB))
```

Definition {1833}.
```
(OS-TEMP-R3-ADDRESS) = (LOOKUP 'TEMP-R3 (OS-SYMTAB))
```

Definition {1834}.
```
(OS-DISPATCHER-ADDRESS) = (LOOKUP 'DISPATCHER (OS-SYMTAB))
```

Definition {1835}.
```
(OS-DISPATCHER-PC-AFTER-WAIT)
   =
(ADD1 (LOOKUP 'READYQ-EMPTY (OS-SYMTAB)))
```

Definition {1836}.
```
(OS-DISPATCHER-QEMPTYP-RETURN-ADDRESS) = (PLUS 5 (OS-DISPATCHER-ADDRESS))
```

Definition {1837}.
```
(OS-RESTORE-STATE-ADDRESS) = (LOOKUP 'RESTORE-STATE (OS-SYMTAB))
```

Definition {1840}.
```
(FINITE-NUMBER-QUEUEP QUEUE CAPACITY LUB)
   =
(AND (ARRAY-QUEUEP QUEUE)
     (EQUAL (GETNTH (QMAXLENGTH-FIELD) QUEUE)
            CAPACITY)
     (FINITE-NUMBER-LISTP (GETSEG (QARRAY-FIELD) CAPACITY QUEUE)
                          LUB))
```

Definition {1857}.
```
(FINITE-NUMBER-QUEUE-LISTP LIST CAPACITY LUB)
   =
(IF (LISTP LIST)
    (AND (FINITE-NUMBER-QUEUEP (CAR LIST)
                               CAPACITY LUB)
         (FINITE-NUMBER-QUEUE-LISTP (CDR LIST)
                                    CAPACITY LUB))
    T)
```

Definition {1860}.
```
(FINITE-NUMBER-QUEUE-TABLEP N L CAPACITY LUB)
   =
(IF (LISTP L)
    (AND (PLISTP (CAR L))
         (EQUAL (LENGTH (CAR L)) N)
         (FINITE-NUMBER-QUEUE-LISTP (CAR L)
                                    CAPACITY LUB)
         (FINITE-NUMBER-QUEUE-TABLEP N
                                     (CDR L)
                                     CAPACITY LUB))
    T)
```

Definition {1871}.
```
(OS-CURRENT-TASKID OS) = (ARRAY-QFIRST (OS-READYQ OS))
```

Definition {1872}.
```
(OS-READY-SET OS) = (INDEX-READY-SET 0 (TABLE 2 (OS-STATUS-TABLE OS)))
```

Definition {1873}.

```
(OS-READYQ-QARRAY OS)
   =
(GETSEG (QARRAY-FIELD)
        (GETNTH (QMAXLENGTH-FIELD) (OS-READYQ OS))
        (OS-READYQ OS))
```

Definition {1874}.

```
(GOOD-OS OS)
   =
(AND
    (GOOD-TM OS)
    (EQUAL (TM-SLIMIT OS) (OS-LIMIT))
    (EQUAL (OS-CODE OS) (OS-MACHINE-CODE))
    (EQUAL (GETNTH (TM-CLOCK-NEW-PC-ADDR) (TM-MEMORY OS))
           (OS-CLOCK-INTERRUPT-HANDLER-ADDRESS))
    (EQUAL (GETNTH (TM-ERROR-NEW-PC-ADDR) (TM-MEMORY OS))
           (OS-ERROR-HANDLER-ADDRESS))
    (EQUAL (GETNTH (TM-SVC-NEW-PC-ADDR) (TM-MEMORY OS))
           (OS-SVC-HANDLER-ADDRESS))
    (EQUAL (GETNTH (TM-INPUT-NEW-PC-ADDR) (TM-MEMORY OS))
           (OS-INPUT-INTERRUPT-HANDLER-ADDRESS))
    (EQUAL (GETNTH (TM-OUTPUT-NEW-PC-ADDR) (TM-MEMORY OS))
           (OS-OUTPUT-INTERRUPT-HANDLER-ADDRESS))
    (EQUAL (GETNTH (OS-TIME-SLICE-ADDRESS) (TM-MEMORY OS))
           (AK-TIME-SLICE))
    (NOT (TM-IN-SUPERVISOR-MODE OS))
    (GOOD-CPU-LIST (TABLE (TM-CPU-LENGTH) (OS-TASK-TABLE OS)))
    (GOOD-STATUS-LIST (TABLE (AK-STATUS-LENGTH) (OS-STATUS-TABLE OS)))
    (FINITE-NUMBER-QUEUEP (OS-READYQ OS) (AK-TASKIDLUB) (AK-TASKIDLUB))
    (MUTUALLY-DISJOINT (TABLE 2 (OS-SEGMENT-TABLE OS)))
    (DISJOINT-EVERYWHERE 0 (OS-LIMIT) (TABLE 2 (OS-SEGMENT-TABLE OS)))
    (FINITE-SEGMENT-TABLEP (TABLE 2 (OS-SEGMENT-TABLE OS))
                           (TM-MEMLENGTH))
    (FINITE-NUMBER-QUEUE-LISTP (TABLE (OS-IBUFFER-LENGTH) (OS-IBUFFERS OS))
                               (TASK-IBUFFER-CAPACITY)
                               (TM-WORDLUB))
    (FINITE-NUMBER-QUEUE-LISTP (TABLE (OS-OBUFFER-LENGTH) (OS-OBUFFERS OS))
                               (TASK-OBUFFER-CAPACITY)
                               (TM-WORDLUB))
    (FINITE-NUMBER-QUEUE-LISTP (TABLE (OS-MBUFFER-LENGTH) (OS-MBUFFERS OS))
                               (TASK-MBUFFER-CAPACITY)
                               (TM-WORDLUB))
    (PERMUTATION (MAPUP-QUEUE (OS-READYQ OS)) (OS-READY-SET OS))
    (IFF (TM-WAITING OS) (ARRAY-QEMPTYP (OS-READYQ OS)))
    (IMPLIES (NOT (TM-WAITING OS))
             (AND (EQUAL (TM-BASE OS)
                         (BASE (GETNTH (OS-CURRENT-TASKID OS)
                                       (TABLE 2 (OS-SEGMENT-TABLE OS)))))
                  (EQUAL (TM-LIMIT OS)
                         (LIMIT (GETNTH (OS-CURRENT-TASKID OS)
                                        (TABLE 2 (OS-SEGMENT-TABLE OS))))))))
```

Definition {1899}.

```
(OS-TASKID OS) = (ARRAY-QFIRST (OS-READYQ OS))
```

Definition {1938}.

```
(MAPUP-CPU TASKID OS)
   =
(IF (TM-WAITING OS)
    (GETNTH TASKID
            (TABLE (TM-CPU-LENGTH)
                   (OS-TASK-TABLE OS)))
    (IF (EQUAL TASKID (OS-CURRENT-TASKID OS))
        (TM-CPU OS)
        (GETNTH TASKID
                (TABLE (TM-CPU-LENGTH)
                       (OS-TASK-TABLE OS)))))
```

Definition {1939}.

```
(MAPUP-REGS TASKID OS) = (GETSEG 0
```

```
                                 (TM-REGLENGTH)
                                 (MAPUP-CPU TASKID OS))
```

<u>Definition</u> {1940}.

```
(MAPUP-CC TASKID OS)
   =
(TM-UNPACK-CC (GETNTH (TM-REGLENGTH)
                      (MAPUP-CPU TASKID OS)))
```

<u>Definition</u> {1941}.

```
(MAPUP-ERROR TASKID OS)
   =
(TM-UNPACK-ERROR (GETNTH (TM-REGLENGTH)
                         (MAPUP-CPU TASKID OS)))
```

<u>Definition</u> {1942}.

```
(MAPUP-SVCFLAG TASKID OS)
   =
(TM-UNPACK-SVCFLAG (GETNTH (TM-REGLENGTH)
                           (MAPUP-CPU TASKID OS)))
```

<u>Definition</u> {1943}.

```
(MAPUP-SVCID TASKID OS)
   =
(TM-UNPACK-SVCID (GETNTH (TM-REGLENGTH)
                         (MAPUP-CPU TASKID OS)))
```

<u>Definition</u> {1944}.

```
(MAPUP-BASE TASKID OS)
   =
(BASE (GETNTH TASKID
              (TABLE 2 (OS-SEGMENT-TABLE OS))))
```

<u>Definition</u> {1945}.

```
(MAPUP-LIMIT TASKID OS)
   =
(LIMIT (GETNTH TASKID
               (TABLE 2 (OS-SEGMENT-TABLE OS))))
```

<u>Definition</u> {1946}.

```
(MAPUP-TASK TASKID OS)
   =
(MAPUP-ADDRESS-SPACE (TM-MEMORY OS)
                     (MAPUP-REGS TASKID OS)
                     (MAPUP-CC TASKID OS)
                     (MAPUP-ERROR TASKID OS)
                     (MAPUP-SVCFLAG TASKID OS)
                     (MAPUP-SVCID TASKID OS)
                     (MAPUP-BASE TASKID OS)
                     (MAPUP-LIMIT TASKID OS))
```

<u>Definition</u> {1947}.

```
(MAPUP-TASKS TASKID OS)
   =
(IF (LESSP TASKID (AK-TASKIDLUB))
    (CONS (MAPUP-TASK TASKID OS)
          (MAPUP-TASKS (ADD1 TASKID) OS))
    NIL)
```

<u>Definition</u> {1948}.

```
(MAPUP-OS-TASKS OS) = (MAPUP-TASKS 0 OS)
```

<u>Definition</u> {1949}.

```
(MAPUP-QUEUE-LIST L)
   =
(IF (LISTP L)
    (CONS (MAPUP-QUEUE (CAR L))
          (MAPUP-QUEUE-LIST (CDR L)))
    NIL)
```

<u>Definition</u> {1950}.

```
(MAPUP-OS-IBUFFERS OS)
   =
```

```
(MAPUP-QUEUE-LIST (TABLE (OS-IBUFFER-LENGTH)
                         (OS-IBUFFERS OS)))
```

Definition {1951}.

```
(MAPUP-OS-OBUFFERS OS)
   =
(MAPUP-QUEUE-LIST (TABLE (OS-OBUFFER-LENGTH)
                         (OS-OBUFFERS OS)))
```

Definition {1952}.

```
(MAPUP-OS-MBUFFERS OS)
   =
(TABLE (AK-TASKIDLUB)
       (MAPUP-QUEUE-LIST (TABLE (OS-MBUFFER-LENGTH)
                                (OS-MBUFFERS OS))))
```

Definition {1953}.

```
(MAPUP-OS OS)
   =
(AK (MAPUP-OS-TASKS OS)
    (MAPUP-OS-IBUFFERS OS)
    (MAPUP-OS-OBUFFERS OS)
    (MAPUP-OS-MBUFFERS OS)
    (MAPUP-QUEUE (OS-READYQ OS))
    (TABLE (AK-STATUS-LENGTH) (OS-STATUS-TABLE OS))
    (TM-RWSTATE OS)
    (TM-CLOCK OS)
    (TM-IPORTS OS)
    (TM-OPORTS OS))
```

Definition {2044}.

```
(DISJOINT-SEGMENTS-INDUCTION I J L)
   =
(IF (ZEROP I)
    0
    (IF (LISTP L)
        (DISJOINT-SEGMENTS-INDUCTION (SUB1 I)
                                     (SUB1 J)
                                     (CDR L))
        0))
```

Definition {2085}.

```
(TICK N) = (FIXLENGTH N NIL 'TICK)
```

Definition {2095}.

```
(OS-READYQ-QARRAY-ADDRESS) = (PLUS (OS-READYQ-ADDRESS)
                                   (QARRAY-FIELD))
```

Definition {2108}.

```
(OS-NEW-TASK-TABLE OS)
   =
(PUTSEG (TM-CPU OS) (TIMES (TM-CPU-LENGTH)
               (ARRAY-QFIRST (OS-READYQ OS)))
 (OS-TASK-TABLE OS))
```

Definition {2109}.

```
(OS-NEW-REGS TASKID TM)
   =
(GETSEG 0
        (TM-REGLENGTH)
        (GETNTH TASKID
                (TABLE (TM-CPU-LENGTH)
                       (OS-NEW-TASK-TABLE TM))))
```

Definition {2110}.

```
(OS-NEW-FLAGS TASKID TM)
   =
(GETNTH (TM-REGLENGTH)
        (GETNTH TASKID
                (TABLE (TM-CPU-LENGTH)
                       (OS-NEW-TASK-TABLE TM))))
```

Definition {2111}.

```
(OS-NEW-CC TASKID TM) = (TM-UNPACK-CC (OS-NEW-FLAGS TASKID TM))
```

Definition {2112}.

```
(OS-NEW-ERROR TASKID TM) = (TM-UNPACK-ERROR (OS-NEW-FLAGS TASKID TM))
```

Definition {2113}.

```
(OS-NEW-SVCFLAG TASKID TM) = (TM-UNPACK-SVCFLAG (OS-NEW-FLAGS TASKID TM))
```

Definition {2114}.

```
(OS-NEW-SVCID TASKID TM) = (TM-UNPACK-SVCID (OS-NEW-FLAGS TASKID TM))
```

Definition {2115}.

```
(OS-NEW-BASE TASKID OS)
   =
(BASE (GETNTH TASKID
              (TABLE 2 (OS-SEGMENT-TABLE OS))))
```

Definition {2116}.

```
(OS-NEW-LIMIT TASKID OS)
   =
(LIMIT (GETNTH TASKID
               (TABLE 2 (OS-SEGMENT-TABLE OS))))
```

Definition {2129}.

```
(OS-UPDATE-STATUS ID STATUS FLAG OS)
   =
(PUTSEG (LIST STATUS FLAG) (TIMES (AK-STATUS-LENGTH) ID)
 (OS-STATUS-TABLE OS))
```

Definition {2134}.

```
(OS-MBUFFER-SOURCE-MULTIPLIER) = (TIMES (AK-TASKIDLUB)
                                        (OS-MBUFFER-LENGTH))
```

Definition {2135}.

```
(OS-MBUFFER-DEST-MULTIPLIER) = (OS-MBUFFER-LENGTH)
```

Definition {2136}.

```
(OS-MBUFFERS-ADDRESS-PLUS-QTAIL-FIELD)
   =
(PLUS (OS-MBUFFERS-ADDRESS)
      (QTAIL-FIELD))
```

Definition {2137}.

```
(OS-MBUFFERS-ADDRESS-PLUS-QCURRLENGTH-FIELD)
   =
(PLUS (OS-MBUFFERS-ADDRESS)
      (QCURRLENGTH-FIELD))
```

Definition {2138}.

```
(OS-MBUFFERS-ADDRESS-PLUS-QMAXLENGTH-FIELD)
   =
(PLUS (OS-MBUFFERS-ADDRESS)
      (QMAXLENGTH-FIELD))
```

Definition {2139}.

```
(OS-MBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
   =
(PLUS (OS-MBUFFERS-ADDRESS)
      (QARRAY-FIELD))
```

Definition {2140}.

```
(OS-CURRENT-MBUFFER SID DID OS)
   =
(GETNTH (PLUS (TIMES (AK-TASKIDLUB) SID) DID)
        (TABLE (OS-MBUFFER-LENGTH)
               (OS-MBUFFERS OS)))
```

Definition {2165}.

```
(OS-MBUFFERS-WITH-ENQUEUED-MESSAGE OS)
   =
(PUTSEG (ARRAY-ENQ (GETNTH 3 (TM-REGS OS))
                   (OS-CURRENT-MBUFFER (ARRAY-QFIRST (OS-READYQ OS))
                                       (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                  (AK-TASKIDLUB))
                                       OS))
```

```
        (PLUS (TIMES (OS-MBUFFER-LENGTH)
                     (REMAINDER (GETNTH 2 (TM-REGS OS))
                                (AK-TASKIDLUB)))
              (TIMES (OS-MBUFFER-SOURCE-MULTIPLIER)
                     (ARRAY-QFIRST (OS-READYQ OS))))
 (OS-MBUFFERS OS))
```

Definition {2168}.

```
(OS-MBUFFERS-WITH-DEQUEUED-MESSAGE OS)
   =
(PUTSEG (ARRAY-DEQ (OS-CURRENT-MBUFFER (OS-SRCID OS (AK-TASKIDLUB))
                                       (OS-CURRENT-TASKID OS)
                                       OS))
        (PLUS (TIMES 8
                     (ARRAY-QFIRST (OS-READYQ OS)))
              (TIMES 128
                     (REMAINDER (GETNTH 2 (TM-REGS OS))
                                (AK-TASKIDLUB))))
 (OS-MBUFFERS OS))
```

Definition {2188}.

```
(OS-IBUFFERS-ADDRESS-PLUS-QTAIL-FIELD)
   =
(PLUS (OS-IBUFFERS-ADDRESS)
      (QTAIL-FIELD))
```

Definition {2189}.

```
(OS-IBUFFERS-ADDRESS-PLUS-QCURRLENGTH-FIELD)
   =
(PLUS (OS-IBUFFERS-ADDRESS)
      (QCURRLENGTH-FIELD))
```

Definition {2190}.

```
(OS-IBUFFERS-ADDRESS-PLUS-QMAXLENGTH-FIELD)
   =
(PLUS (OS-IBUFFERS-ADDRESS)
      (QMAXLENGTH-FIELD))
```

Definition {2191}.

```
(OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
   =
(PLUS (OS-IBUFFERS-ADDRESS)
      (QARRAY-FIELD))
```

Definition {2192}.

```
(OS-CURRENT-IBUFFER ID OS)
   =
(GETNTH ID
        (TABLE (OS-IBUFFER-LENGTH)
               (OS-IBUFFERS OS)))
```

Definition {2207}.

```
(OS-IBUFFERS-WITH-DEQUEUED-CHARACTER OS)
   =
(PUTSEG (ARRAY-DEQ (OS-CURRENT-IBUFFER (OS-CURRENT-TASKID OS)
                                       OS))
        (TIMES (OS-IBUFFER-LENGTH)
               (OS-CURRENT-TASKID OS))
 (OS-IBUFFERS OS))
```

Definition {2210}.

```
(OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
   =
(PUTSEG (ARRAY-QREPLACE
         (TM-OVERFLOW-CHAR
                      (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                        (TM-IPORTS OS))))
         (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                 (TABLE 8 (OS-IBUFFERS OS))))
        (TIMES 8
               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
 (OS-IBUFFERS OS))
```

```
Definition {2213}.
(OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
   =
(PUTSEG (ARRAY-ENQ
         (TM-OVERFLOW-CHAR
                       (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TM-IPORTS OS))))
         (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                 (TABLE 8 (OS-IBUFFERS OS))))
        (TIMES 8
               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
 (OS-IBUFFERS OS))
```

```
Definition {2216}.
(OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
   =
(PUTSEG (ARRAY-ENQ (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                     (TM-IPORTS OS)))
                   (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TABLE 8 (OS-IBUFFERS OS))))
        (TIMES 8
               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
 (OS-IBUFFERS OS))
```

```
Definition {2233}.
(OS-OBUFFERS-ADDRESS-PLUS-QTAIL-FIELD)
   =
(PLUS (OS-OBUFFERS-ADDRESS)
      (QTAIL-FIELD))
```

```
Definition {2234}.
(OS-OBUFFERS-ADDRESS-PLUS-QCURRLENGTH-FIELD)
   =
(PLUS (OS-OBUFFERS-ADDRESS)
      (QCURRLENGTH-FIELD))
```

```
Definition {2235}.
(OS-OBUFFERS-ADDRESS-PLUS-QMAXLENGTH-FIELD)
   =
(PLUS (OS-OBUFFERS-ADDRESS)
      (QMAXLENGTH-FIELD))
```

```
Definition {2236}.
(OS-OBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
   =
(PLUS (OS-OBUFFERS-ADDRESS)
      (QARRAY-FIELD))
```

```
Definition {2237}.
(OS-CURRENT-OBUFFER ID OS)
   =
(GETNTH ID
        (TABLE (OS-OBUFFER-LENGTH)
               (OS-OBUFFERS OS)))
```

```
Definition {2249}.
(OS-OBUFFERS-WITH-ENQUEUED-CHARACTER OS)
   =
(PUTSEG (ARRAY-ENQ (GETNTH 3 (TM-REGS OS))
                   (OS-CURRENT-OBUFFER (OS-CURRENT-TASKID OS)
                                       OS))
        (TIMES (OS-OBUFFER-LENGTH)
               (OS-CURRENT-TASKID OS))
 (OS-OBUFFERS OS))
```

```
Definition {2252}.
(OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
   =
(PUTSEG (ARRAY-DEQ (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                       OS))
        (TIMES 8
               (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
```

```
 (OS-OBUFFERS OS))
```

Definition {2261}.

```
(OS-TASK-TABLE-WITH-DELIVERED-CHARACTER OS)
   =
(PUTSEG (PUTNTH (ARRAY-QFIRST (GETNTH (OS-CURRENT-TASKID OS)
                                      (TABLE 8 (OS-IBUFFERS OS))))
                3
         (TM-CPU OS))
        (TIMES (TM-CPU-LENGTH)
               (ARRAY-QFIRST (OS-READYQ OS)))
 (OS-TASK-TABLE OS))
```

Definition {2268}.

```
(OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS)
   =
(PUTSEG (PUTNTH (ARRAY-QFIRST (GETNTH (PLUS (ARRAY-QFIRST (OS-READYQ OS))
                                            (TIMES 16
                                                   (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                              16)))
                                      (TABLE 8 (OS-MBUFFERS OS))))
                3
         (TM-CPU OS))
        (TIMES (TM-CPU-LENGTH)
               (ARRAY-QFIRST (OS-READYQ OS)))
 (OS-TASK-TABLE OS))
```

Definition {2275}.

```
(OS-INTENDED-CLOCK-INTERRUPT TM)
   =
(TM-SET-MEMORY
 (PUTNTH (TM-PC TM) 0
  (PUTNTH (TM-SP TM) 1
   (PUTNTH (TM-PACK-PSW (TM-CC TM)
                        (TM-ERROR TM)
                        (TM-SVCFLAG TM)
                        (TM-SVCID TM))
           2
    (PUTSEG (OS-TASK-TABLE TM) (OS-TASK-TABLE-ADDRESS)
     (PUTSEG (OS-SEGMENT-TABLE TM) (OS-SEGMENT-TABLE-ADDRESS)
      (PUTSEG (OS-READYQ TM) (OS-READYQ-ADDRESS)
       (PUTSEG (OS-CODE TM) (OS-CODE-ADDRESS)
        (TM-MEMORY TM))))))))
 (TM-SET-PC
      (OS-CLOCK-INTERRUPT-HANDLER-ADDRESS)
      (TM-SET-SP (SUB1 (OS-LIMIT))
                 (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                                (TM-SET-ERROR (TM-NO-ERROR)
                                              (TM-SET-RWSTATE (TM-RUN-STATE)
                                                              TM))))))
```

Definition {2277}.

```
(OS-TIME-FOR-CLOCK-INTERRUPT-HANDLER-THRU-SAVE-STATE OS) = (TICK 25)
```

Definition {2278}.

```
(OS-CLOCK-INTERRUPT-HANDLER-THRU-SAVE-STATE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
         (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
```

```
          (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
           (PUTNTH (OS-TRACE-LABEL1) (SUB1 (OS-LIMIT))
            (TM-MEMORY OS))))))))))))
 (PUTNTH (OS-TRACE-LABEL1) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R2 OS) 2
    (PUTNTH (TM-R3 OS) 3 (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS (OS-TASK-TABLE-ADDRESS)
                                 (TIMES (TM-CPU-LENGTH)
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           (TM-REGLENGTH)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2280}.

```
(OS-TIME-FOR-CLOCK-INTERRUPT-HANDLER-TO-DISPATCHER OS) = (TICK 20)
```

Definition {2281}.

```
(OS-CLOCK-INTERRUPT-HANDLER-TO-DISPATCHER OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (ARRAY-ENQ (ARRAY-QFIRST (OS-READYQ OS))
                           (ARRAY-DEQ (OS-READYQ OS)))
                (OS-READYQ-ADDRESS)
         (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
          (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
           (PUTNTH (OS-TRACE-LABEL2) (SUB1 (OS-LIMIT))
            (TM-MEMORY OS))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS (OS-READYQ-QARRAY-ADDRESS)
                   (GETNTH (QTAIL-FIELD)
                           (ARRAY-DEQ (OS-READYQ OS))))
             4
      (TM-REGS OS))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH (QTAIL-FIELD)
                                       (ARRAY-DEQ (OS-READYQ OS)))
                               (AK-TASKIDLUB)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
```

```
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2283}.
```
(OS-TIME-FOR-CLOCK-INTERRUPT-HANDLER-TO-RESTORE-STATE OS) = (TICK 12)
```

Definition {2284}.
```
(OS-CLOCK-INTERRUPT-HANDLER-TO-RESTORE-STATE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (ARRAY-ENQ (ARRAY-QFIRST (OS-READYQ OS))
                           (ARRAY-DEQ (OS-READYQ OS)))
                (OS-READYQ-ADDRESS)
         (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
          (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
           (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
            (TM-MEMORY OS))))))))))))
 (PUTNTH (OS-RESTORE-STATE-ADDRESS) 0
  (PUTNTH (SUB1 (SUB1 (OS-LIMIT))) 1
   (PUTNTH (ARRAY-QFIRST (ARRAY-ENQ (ARRAY-QFIRST (OS-READYQ OS))
                                    (ARRAY-DEQ (OS-READYQ OS))))
           2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS (OS-READYQ-QARRAY-ADDRESS)
                   (GETNTH (QTAIL-FIELD)
                           (ARRAY-DEQ (OS-READYQ OS))))
             4
      (TM-REGS OS))))))
 (TM-CC-VALUE (TM-ALU-PLUS (OS-READYQ-QARRAY-ADDRESS)
                           (GETNTH (QHEAD-FIELD)
                                   (ARRAY-ENQ (ARRAY-QFIRST (OS-READYQ OS))
                                              (ARRAY-DEQ (OS-READYQ OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2286}.
```
(OS-CLOCK-NEW-READYQ OS)
   =
(ARRAY-ENQ (ARRAY-QFIRST (OS-READYQ OS))
           (ARRAY-DEQ (OS-READYQ OS)))
```

Definition {2287}.
```
(OS-TIME-FOR-CLOCK-INTERRUPT-HANDLER-TO-FINISH OS) = (TICK 21)
```

Definition {2288}.
```
(OS-CLOCK-INTERRUPT-HANDLER OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
```

```
       0
 (PUTNTH (GETNTH (PLUS 1
                       (TIMES (TM-CPU-LENGTH)
                              (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))))
                 (OS-NEW-TASK-TABLE OS))
        1
  (PUTNTH (GETNTH (PLUS 8
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
         2
   (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
    (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
     (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
      (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
       (PUTSEG (OS-CLOCK-NEW-READYQ OS) (OS-READYQ-ADDRESS)
        (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
         (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
          (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
           (TM-MEMORY OS))))))))))))
(OS-NEW-REGS (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))
             OS)
(OS-NEW-CC (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))
           OS)
(OS-NEW-ERROR (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))
              OS)
(OS-NEW-SVCFLAG (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))
                OS)
(OS-NEW-SVCID (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))
              OS)
(OS-NEW-BASE (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))
             OS)
(OS-NEW-LIMIT (ARRAY-QFIRST (OS-CLOCK-NEW-READYQ OS))
              OS)
(TM-SLIMIT OS)
(TM-USER-MODE)
(TM-RUN-STATE)
(AK-TIME-SLICE)
(TM-IPORTS OS)
(TM-OPORTS OS))
```

Definition {2290}.
```
(OS-CIH-TIME1 OS) = (TICK 53)
```

Definition {2291}.
```
(OS-CIH-TIME2 OS) = (TICK 33)
```

Definition {2292}.
```
(OS-TIME-FOR-CLOCK-INTERRUPT-HANDLER OS) = (TICK 78)
```

Definition {2297}.
```
(OS-INTENDED-ERROR-INTERRUPT TM)
   =
(TM-SET-MEMORY
 (PUTNTH (TM-PC TM) 0
  (PUTNTH (TM-SP TM) 1
   (PUTNTH (TM-PACK-PSW (TM-CC TM)
                        (TM-ERROR TM)
                        (TM-SVCFLAG TM)
                        (TM-SVCID TM))
         2
    (PUTSEG (OS-TASK-TABLE TM) (OS-TASK-TABLE-ADDRESS)
     (PUTSEG (OS-SEGMENT-TABLE TM) (OS-SEGMENT-TABLE-ADDRESS)
      (PUTSEG (OS-READYQ TM) (OS-READYQ-ADDRESS)
       (PUTSEG (OS-STATUS-TABLE TM) (OS-STATUS-TABLE-ADDRESS)
        (PUTSEG (OS-CODE TM) (OS-CODE-ADDRESS)
         (TM-MEMORY TM))))))))
 (TM-SET-PC
       (OS-ERROR-HANDLER-ADDRESS)
       (TM-SET-SP (SUB1 (OS-LIMIT))
```

```
                   (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                                  (TM-SET-ERROR (TM-NO-ERROR)
                                                (TM-SET-RWSTATE (TM-RUN-STATE)
                                                                TM))))))
```

Definition {2299}.

```
(OS-TIME-FOR-ERROR-HANDLER-THRU-SAVE-STATE OS) = (TICK 25)
```

Definition {2300}.

```
(OS-ERROR-HANDLER-THRU-SAVE-STATE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
         (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
          (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
           (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
            (PUTNTH (OS-TRACE-LABEL3) (SUB1 (OS-LIMIT))
             (TM-MEMORY OS))))))))))))
 (PUTNTH (OS-TRACE-LABEL3) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R2 OS) 2
    (PUTNTH (TM-R3 OS) 3 (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS (OS-TASK-TABLE-ADDRESS)
                                 (TIMES (TM-CPU-LENGTH)
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           (TM-REGLENGTH)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2302}.

```
(OS-TIME-FOR-ERROR-HANDLER-TO-DISPATCHER OS) = (TICK 16)
```

Definition {2303}.

```
(OS-ERROR-HANDLER-TO-DISPATCHER OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
         (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                   (AK-ERROR-STATUS)
```

```
                                   0 OS)
                 (OS-STATUS-TABLE-ADDRESS)
          (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
           (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
            (PUTNTH (OS-TRACE-LABEL4) (SUB1 (OS-LIMIT))
             (TM-MEMORY OS))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                 (TIMES (AK-STATUS-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS))))
           2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 2
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-STATUS-TABLE-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2305}.
```
(OS-TIME-FOR-ERROR-HANDLER-TO-WAIT-STATE OS) = (TICK 6)
```

Definition {2306}.
```
(OS-ERROR-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
         (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                   (AK-ERROR-STATUS)
                                   0 OS)
                 (OS-STATUS-TABLE-ADDRESS)
          (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
           (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
            (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
             (TM-MEMORY OS))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                 (TIMES (AK-STATUS-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS))))
           2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (TM-REGS OS)))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
```

```
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-WAIT-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2308}.

```
(OS-TIME-FOR-ERROR-HANDLER-TO-RESTORE-STATE OS) = (TICK 12)
```

Definition {2309}.

```
(OS-ERROR-HANDLER-TO-RESTORE-STATE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
         (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                   (AK-ERROR-STATUS)
                                   0 OS)
                 (OS-STATUS-TABLE-ADDRESS)
          (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
           (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
            (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
             (TM-MEMORY OS))))))))))))
 (PUTNTH (OS-RESTORE-STATE-ADDRESS) 0
  (PUTNTH (SUB1 (SUB1 (OS-LIMIT))) 1
   (PUTNTH (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS))) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (OS-READYQ-QARRAY-ADDRESS)
                           (GETNTH (QHEAD-FIELD)
                                   (ARRAY-DEQ (OS-READYQ OS)))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2311}.

```
(OS-TIME-FOR-ERROR-HANDLER-TO-FINISH OS) = (TICK 21)
```

Definition {2312}.

```
(OS-ERROR-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS))))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                  (OS-NEW-TASK-TABLE OS))
```

```
       1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                   (OS-NEW-TASK-TABLE OS))
        2
    (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
         (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                   (AK-ERROR-STATUS)
                                   0 OS)
                 (OS-STATUS-TABLE-ADDRESS)
          (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
           (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
            (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
             (TM-MEMORY OS))))))))))))
 (OS-NEW-REGS (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-CC (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
            OS)
 (OS-NEW-ERROR (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-SVCFLAG (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                 OS)
 (OS-NEW-SVCID (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-BASE (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-LIMIT (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (AK-TIME-SLICE)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2314}.
```
(OS-ERROR-TIME1 OS) = (TICK 22)
```

Definition {2315}.
```
(OS-TIME-FOR-ERROR-HANDLER-PATH1 OS) = (TICK 47)
```

Definition {2319}.
```
(OS-ERROR-TIME2 OS) = (TICK 49)
```

Definition {2320}.
```
(OS-ERROR-TIME3 OS) = (TICK 33)
```

Definition {2321}.
```
(OS-TIME-FOR-ERROR-HANDLER-PATH2 OS) = (TICK 74)
```

Definition {2326}.
```
(OS-TIME-FOR-ERROR-HANDLER OS)
   =
(IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
    (OS-TIME-FOR-ERROR-HANDLER-PATH1 OS)
    (OS-TIME-FOR-ERROR-HANDLER-PATH2 OS))
```

Definition {2327}.
```
(OS-ERROR-HANDLER OS)
   =
(IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
    (OS-ERROR-HANDLER-PATH1 OS)
    (OS-ERROR-HANDLER-PATH2 OS))
```

Definition {2329}.
```
(OS-INTENDED-SVC-SEND-INTERRUPT TM)
   =
```

```
(TM-SET-MEMORY
 (PUTNTH (TM-PC TM) 0
  (PUTNTH (TM-SP TM) 1
   (PUTNTH (TM-PACK-PSW (TM-CC TM)
                        (TM-ERROR TM)
                        (TM-SVCFLAG TM)
                        (TM-SVCID TM))
           2
    (PUTNTH (TM-SVCID TM) (TM-SVCID-ADDR)
     (PUTSEG (OS-TASK-TABLE TM) (OS-TASK-TABLE-ADDRESS)
      (PUTSEG (OS-SEGMENT-TABLE TM) (OS-SEGMENT-TABLE-ADDRESS)
       (PUTSEG (OS-READYQ TM) (OS-READYQ-ADDRESS)
        (PUTSEG (OS-STATUS-TABLE TM) (OS-STATUS-TABLE-ADDRESS)
         (PUTSEG (OS-MBUFFERS TM) (OS-MBUFFERS-ADDRESS)
          (PUTSEG (OS-CODE TM) (OS-CODE-ADDRESS)
           (TM-MEMORY TM))))))))))))
 (TM-SET-PC
       (OS-SVC-HANDLER-ADDRESS)
       (TM-SET-SP (SUB1 (OS-LIMIT))
                  (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                                 (TM-SET-ERROR (TM-NO-ERROR)
                                               (TM-SET-RWSTATE (TM-RUN-STATE)
                                                               TM))))))
```

<u>Definition</u> {2331}.
```
(OS-TIME-FOR-SVC-SEND-HANDLER-THRU-SAVE-STATE OS) = (TICK 25)
```

<u>Definition</u> {2332}.
```
(OS-SVC-SEND-HANDLER-THRU-SAVE-STATE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-SVCID OS) (TM-SVCID-ADDR)
     (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
              (PUTNTH (OS-TRACE-LABEL5) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL5) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R2 OS) 2
    (PUTNTH (TM-R3 OS) 3 (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS (OS-TASK-TABLE-ADDRESS)
                                 (TIMES (TM-CPU-LENGTH)
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           (TM-REGLENGTH)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2334}.
```
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-QFULLP-TEST OS) = (TICK 20)
```

Definition {2335}.
```
(OS-SVC-SEND-HANDLER-TO-QFULLP-TEST OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL6) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL7) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-MBUFFERS-ADDRESS)
                  (PLUS (TIMES (OS-MBUFFER-DEST-MULTIPLIER)
                               (REMAINDER (TM-R2 OS) (AK-TASKIDLUB)))
                        (TIMES (OS-MBUFFER-SOURCE-MULTIPLIER)
                               (ARRAY-QFIRST (OS-READYQ OS)))))
            3
     (PUTNTH (TIMES (OS-MBUFFER-DEST-MULTIPLIER)
                    (REMAINDER (TM-R2 OS) (AK-TASKIDLUB)))
             4
      (PUTNTH (REMAINDER (TM-R2 OS) (AK-TASKIDLUB)) 6
       (PUTNTH (TM-R3 OS) 7
        (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS (TIMES 8
                                        (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                   (AK-TASKIDLUB)))
                                 (TIMES 128
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           (OS-MBUFFERS-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2337}.
```
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-DISPATCHER OS) = (TICK 15)
```

Definition {2338}.
```
(OS-SVC-SEND-HANDLER-TO-DISPATCHER OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
```

```
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-SEND-STATUS)
                                     (OS-DESTID OS (AK-TASKIDLUB))
                                     OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL10) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (ARRAY-QFIRST (OS-READYQ OS))))
            3
     (PUTNTH (TIMES 8
                                            (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                       (AK-TASKIDLUB))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                        (AK-TASKIDLUB)) 6
       (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
        (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 2
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-STATUS-TABLE-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2340}.
```
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-WAIT-STATE OS) = (TICK 6)
```

<u>Definition</u> {2341}.
```
(OS-SVC-SEND-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
```

```
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-SEND-STATUS)
                                     (OS-DESTID OS (AK-TASKIDLUB))
                                     OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (TIMES 8
                                         (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                    (AK-TASKIDLUB))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                     (AK-TASKIDLUB)) 6
       (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
        (TM-REGS OS))))))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-WAIT-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2343}.
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-LPSW OS) = (TICK 33)

Definition {2344}.

```
(OS-SVC-SEND-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS))))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-SEND-STATUS)
                                     (OS-DESTID OS (AK-TASKIDLUB))
                                     OS)
                   (OS-STATUS-TABLE-ADDRESS)
```

```
            (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (OS-NEW-REGS (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-CC (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
            OS)
 (OS-NEW-ERROR (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-SVCFLAG (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                 OS)
 (OS-NEW-SVCID (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-BASE (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-LIMIT (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (AK-TIME-SLICE)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2346}.
(OS-TIME-FOR-SVC-SEND-HANDLER-THRU-ENQUEUE OS) = (TICK 13)

Definition {2347}.

```
(OS-SVC-SEND-HANDLER-THRU-ENQUEUE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-ENQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL8) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL8) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R3 OS) 2
    (PUTNTH (PLUS (OS-MBUFFERS-ADDRESS)
                  (PLUS (TIMES 8
                               (REMAINDER (GETNTH 2 (TM-REGS OS))
                                          (AK-TASKIDLUB)))
                        (TIMES 128
                               (ARRAY-QFIRST (OS-READYQ OS)))))
            3
     (PUTNTH (PLUS 503
                   (PLUS (PLUS (TIMES 8
                                      (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                 (AK-TASKIDLUB)))
                               (TIMES 128
```

```
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           (GETNTH 1
                                   (GETNTH (PLUS (TIMES (AK-TASKIDLUB)
                                                        (ARRAY-QFIRST (OS-READYQ OS)))
                                                 (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                            (AK-TASKIDLUB)))
                                           (TABLE 8 (OS-MBUFFERS OS))))))
              4
       (PUTNTH (REMAINDER (TM-R2 OS) (AK-TASKIDLUB)) 6
        (PUTNTH (TM-R3 OS) 7
         (TM-REGS OS))))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                (GETNTH 1
                        (GETNTH (PLUS (TIMES (AK-TASKIDLUB)
                                             (ARRAY-QFIRST (OS-READYQ OS)))
                                      (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                 (AK-TASKIDLUB)))
                                (TABLE 8 (OS-MBUFFERS OS))))
                (GETNTH 3
                        (GETNTH (PLUS (TIMES (AK-TASKIDLUB)
                                             (ARRAY-QFIRST (OS-READYQ OS)))
                                      (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                 (AK-TASKIDLUB)))
                                (TABLE 8 (OS-MBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2349}.
```
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-SVC-RESUME-TASK1 OS) = (TICK 20)
```

Definition {2350}.
```
(OS-SVC-SEND-HANDLER-TO-SVC-RESUME-TASK1 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (OS-DESTID OS (AK-TASKIDLUB))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (OS-DESTID OS (AK-TASKIDLUB))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-ENQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL9) (SUB1 (OS-LIMIT))
```

```
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-SVC-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                              (AK-TASKIDLUB)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                      (AK-TASKIDLUB)) 6
       (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
        (TM-REGS OS))))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH 1 (OS-READYQ OS))
                               (AK-TASKIDLUB)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2352}.

```
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-SVC-RESUME-TASK2 OS) = (TICK 5)
```

<u>Definition</u> {2353}.

```
(OS-SVC-SEND-HANDLER-TO-SVC-RESUME-TASK2 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-ENQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL8) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-SVC-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R3 OS) 2
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (OS-DESTID OS (AK-TASKIDLUB))))
            3
     (PUTNTH (PLUS 503
                   (PLUS (PLUS (TIMES 8
                                      (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                 (AK-TASKIDLUB)))
                               (TIMES 128
                                      (ARRAY-QFIRST (OS-READYQ OS))))
                         (GETNTH 1
                                 (GETNTH (PLUS (TIMES (AK-TASKIDLUB)
                                                      (ARRAY-QFIRST (OS-READYQ OS)))
```

```
                                             (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                        (AK-TASKIDLUB)))
                                       (TABLE 8 (OS-MBUFFERS OS))))))
            4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                         (AK-TASKIDLUB)) 6
       (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
        (TM-REGS OS))))))))
 (TM-CC-VALUE
        (TM-ALU-DIFFERENCE (GETNTH (TIMES 2
                                          (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                     (AK-TASKIDLUB)))
                                   (OS-STATUS-TABLE OS))
                           (AK-RECEIVE-STATUS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2355}.
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-SVC-RESUME-TASK3 OS) = (TICK 7)

<u>Definition</u> {2356}.

```
(OS-SVC-SEND-HANDLER-TO-SVC-RESUME-TASK3 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-ENQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL8) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))))
 (PUTNTH (OS-SVC-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R3 OS) 2
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (OS-DESTID OS (AK-TASKIDLUB))))
            3
     (PUTNTH (PLUS 503
                   (PLUS (PLUS (TIMES 8
                                      (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                 (AK-TASKIDLUB)))
                               (TIMES 128
                                      (ARRAY-QFIRST (OS-READYQ OS))))
                         (GETNTH 1
                                 (GETNTH (PLUS (TIMES (AK-TASKIDLUB)
```

```
                                                      (ARRAY-QFIRST (OS-READYQ OS)))
                                               (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                          (AK-TASKIDLUB)))
                                         (TABLE 8 (OS-MBUFFERS OS))))))
             4
         (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                            (AK-TASKIDLUB)) 6
          (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
           (TM-REGS OS)))))))
  (TM-CC-VALUE
    (TM-ALU-DIFFERENCE (GETNTH (PLUS 1
                                     (TIMES 2
                                            (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                       (AK-TASKIDLUB))))
                               (OS-STATUS-TABLE OS))
                       (ARRAY-QFIRST (OS-READYQ OS))))
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-SUPERVISOR-MODE)
  (TM-RUN-STATE)
  (TM-CLOCK OS)
  (TM-IPORTS OS)
  (TM-OPORTS OS))
```

Definition {2358}.
(OS-TIME-FOR-SVC-SEND-HANDLER-TO-SVCR OS) = (TICK 28)

Definition {2359}.

```
(OS-SVC-SEND-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (OS-DESTID OS (AK-TASKIDLUB))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (OS-DESTID OS (AK-TASKIDLUB))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-ENQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-SVC-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
```

```
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-NO-SVC)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2361}.

```
(OS-SVC-SEND-HANDLER-PATH4 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (OS-SVC-SEND-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-ENQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-SVC-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-NO-SVC)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2364}.

```
(OS-SVC-SEND-TIME1 OS) = (TICK 41)
```

<u>Definition</u> {2365}.

```
(OS-SVC-SEND-TIME2 OS) = (TICK 21)
```

<u>Definition</u> {2366}.

```
(OS-TIME-FOR-SVC-SEND-HANDLER-PATH1 OS) = (TICK 66)
```

<u>Definition</u> {2371}.

```
(OS-SVC-SEND-TIME3 OS) = (TICK 68)
```

```
Definition {2372}.
(OS-SVC-SEND-TIME4 OS) = (TICK 48)

Definition {2373}.
(OS-TIME-FOR-SVC-SEND-HANDLER-PATH2 OS) = (TICK 93)

Definition {2378}.
(OS-SVC-SEND-TIME5 OS) = (TICK 81)

Definition {2379}.
(OS-SVC-SEND-TIME6 OS) = (TICK 61)

Definition {2380}.
(OS-SVC-SEND-TIME7 OS) = (TICK 48)

Definition {2381}.
(OS-TIME-FOR-SVC-SEND-HANDLER-PATH3 OS) = (TICK 106)

Definition {2387}.
(OS-SVC-SEND-TIME8 OS) = (TICK 66)

Definition {2388}.
(OS-SVC-SEND-TIME9 OS) = (TICK 46)

Definition {2389}.
(OS-SVC-SEND-TIME10 OS) = (TICK 33)

Definition {2390}.
(OS-TIME-FOR-SVC-SEND-HANDLER-PATH4A OS) = (TICK 91)

Definition {2396}.
(OS-SVC-SEND-TIME11 OS) = (TICK 68)

Definition {2397}.
(OS-SVC-SEND-TIME12 OS) = (TICK 48)

Definition {2398}.
(OS-SVC-SEND-TIME13 OS) = (TICK 35)

Definition {2399}.
(OS-TIME-FOR-SVC-SEND-HANDLER-PATH4B OS) = (TICK 93)

Definition {2405}.
(OS-TIME-FOR-SVC-SEND-HANDLER-PATH4 OS)
   =
(IF (NOT (EQUAL (GETNTH (TIMES 2
                                (OS-DESTID OS (AK-TASKIDLUB)))
                        (OS-STATUS-TABLE OS))
                (AK-RECEIVE-STATUS)))
    (OS-TIME-FOR-SVC-SEND-HANDLER-PATH4A OS)
    (OS-TIME-FOR-SVC-SEND-HANDLER-PATH4B OS))

Definition {2407}.
(OS-TIME-FOR-SVC-SEND-HANDLER OS)
   =
(IF (ARRAY-QFULLP (OS-CURRENT-MBUFFER (OS-CURRENT-TASKID OS)
                                      (OS-DESTID OS (AK-TASKIDLUB))
                                      OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-TIME-FOR-SVC-SEND-HANDLER-PATH1 OS)
        (OS-TIME-FOR-SVC-SEND-HANDLER-PATH2 OS))
    (IF (AND (EQUAL (GETNTH (TIMES 2
                                   (OS-DESTID OS (AK-TASKIDLUB)))
                            (OS-STATUS-TABLE OS))
                    (AK-RECEIVE-STATUS))
             (EQUAL (GETNTH (PLUS 1
                                  (TIMES 2
                                         (OS-DESTID OS (AK-TASKIDLUB))))
                            (OS-STATUS-TABLE OS))
                    (OS-CURRENT-TASKID OS)))
        (OS-TIME-FOR-SVC-SEND-HANDLER-PATH3 OS)
        (OS-TIME-FOR-SVC-SEND-HANDLER-PATH4 OS)))

Definition {2408}.
(OS-SVC-SEND-HANDLER OS)
```

```
   =
(IF (ARRAY-QFULLP (OS-CURRENT-MBUFFER (OS-CURRENT-TASKID OS)
                                      (OS-DESTID OS (AK-TASKIDLUB))
                                      OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-SVC-SEND-HANDLER-PATH1 OS)
        (OS-SVC-SEND-HANDLER-PATH2 OS))
    (IF (AND (EQUAL (GETNTH (TIMES 2
                                   (OS-DESTID OS (AK-TASKIDLUB)))
                            (OS-STATUS-TABLE OS))
                    (AK-RECEIVE-STATUS))
             (EQUAL (GETNTH (PLUS 1
                                  (TIMES 2
                                         (OS-DESTID OS (AK-TASKIDLUB))))
                            (OS-STATUS-TABLE OS))
                    (OS-CURRENT-TASKID OS)))
        (OS-SVC-SEND-HANDLER-PATH3 OS)
        (OS-SVC-SEND-HANDLER-PATH4 OS)))
```

Definition {2410}.
(OS-INTENDED-SVC-RECEIVE-INTERRUPT TM) = (OS-INTENDED-SVC-SEND-INTERRUPT TM)

Definition {2412}.
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-THRU-SAVE-STATE OS)
   =
(OS-TIME-FOR-SVC-SEND-HANDLER-THRU-SAVE-STATE OS)

Definition {2413}.
(OS-SVC-RECEIVE-HANDLER-THRU-SAVE-STATE OS)
   =
(OS-SVC-SEND-HANDLER-THRU-SAVE-STATE OS)

Definition {2415}.
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-QEMPTYP-TEST OS) = (TICK 21)

Definition {2416}.
(OS-SVC-RECEIVE-HANDLER-TO-QEMPTYP-TEST OS)

```
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL11) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-TRACE-LABEL12) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-MBUFFERS-ADDRESS)
                  (PLUS (TIMES (OS-MBUFFER-DEST-MULTIPLIER)
                               (ARRAY-QFIRST (OS-READYQ OS)))
                        (TIMES (OS-MBUFFER-SOURCE-MULTIPLIER)
                               (REMAINDER (TM-R2 OS)
                                          (AK-TASKIDLUB)))))
            3
     (PUTNTH (TIMES (OS-MBUFFER-DEST-MULTIPLIER)
                    (ARRAY-QFIRST (OS-READYQ OS)))
```

```
            4
      (PUTNTH (REMAINDER (TM-R2 OS) (AK-TASKIDLUB)) 6
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS (TIMES 8
                                        (ARRAY-QFIRST (OS-READYQ OS)))
                                 (TIMES 128
                                        (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                   (AK-TASKIDLUB))))
                           (OS-MBUFFERS-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2418}.
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-DISPATCHER OS) = (TICK 15)

<u>Definition</u> {2419}.

```
(OS-SVC-RECEIVE-HANDLER-TO-DISPATCHER OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-RECEIVE-STATUS)
                                     (OS-SRCID OS (AK-TASKIDLUB))
                                     OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL16) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (ARRAY-QFIRST (OS-READYQ OS))))
            3
     (PUTNTH (TIMES 8
                                              (ARRAY-QFIRST (OS-READYQ OS))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                          (AK-TASKIDLUB)) 6
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 2
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-STATUS-TABLE-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
```

```
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2421}.

```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-WAIT-STATE OS) = (TICK 6)
```

Definition {2422}.

```
(OS-SVC-RECEIVE-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-RECEIVE-STATUS)
                                     (OS-SRCID OS (AK-TASKIDLUB))
                                     OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (TIMES 8
                                        (ARRAY-QFIRST (OS-READYQ OS))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                    (AK-TASKIDLUB)) 6
       (TM-REGS OS)))))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-WAIT-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2424}.

```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-LPSW OS) = (TICK 33)
```

Definition {2425}.

```
(OS-SVC-RECEIVE-HANDLER-PATH2 OS)
   =
(TM
```

```
  (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                         (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          0
   (PUTNTH (GETNTH (PLUS 1
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                   (OS-NEW-TASK-TABLE OS))
           1
    (PUTNTH (GETNTH (PLUS 8
                          (TIMES (TM-CPU-LENGTH)
                                 (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                    (OS-NEW-TASK-TABLE OS))
            2
     (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
      (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
            (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                      (AK-RECEIVE-STATUS)
                                      (OS-SRCID OS (AK-TASKIDLUB))
                                      OS)
                    (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-MBUFFERS OS) (OS-MBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
  (OS-NEW-REGS (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
  (OS-NEW-CC (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
             OS)
  (OS-NEW-ERROR (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                OS)
  (OS-NEW-SVCFLAG (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                  OS)
  (OS-NEW-SVCID (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                OS)
  (OS-NEW-BASE (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
  (OS-NEW-LIMIT (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                OS)
  (TM-SLIMIT OS)
  (TM-USER-MODE)
  (TM-RUN-STATE)
  (AK-TIME-SLICE)
  (TM-IPORTS OS)
  (TM-OPORTS OS))
```

Definition {2427}.
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-THRU-DELIVERY OS) = (TICK 18)

Definition {2428}.

```
(OS-SVC-RECEIVE-HANDLER-THRU-DELIVERY OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
```

```
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-DEQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL13) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL14) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (PLUS (ARRAY-QFIRST (OS-READYQ OS))
                                       (TIMES (AK-TASKIDLUB)
                                              (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                         (AK-TASKIDLUB))))
                                 (TABLE 8 (OS-MBUFFERS OS))))
           2
    (PUTNTH (PLUS (OS-TASK-TABLE-ADDRESS)
                  (TIMES 9
                         (ARRAY-QFIRST (OS-READYQ OS))))
            3
     (PUTNTH (TIMES 8
                                 (ARRAY-QFIRST (OS-READYQ OS))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                             (AK-TASKIDLUB)) 6
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 9
                                    (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-TASK-TABLE-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2430}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-SVC-RESUME-TASK1 OS) = (TICK 20)
```

<u>Definition</u> {2431}.
```
(OS-SVC-RECEIVE-HANDLER-TO-SVC-RESUME-TASK1 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (OS-SRCID OS (AK-TASKIDLUB))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (OS-SRCID OS (AK-TASKIDLUB))
```

```
                                    (AK-READY-STATUS)
                                    0 OS)
                  (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-MBUFFERS-WITH-DEQUEUED-MESSAGE OS)
                   (OS-MBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
              (PUTNTH (OS-TRACE-LABEL15) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-SVC-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                             (AK-TASKIDLUB)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                     (AK-TASKIDLUB)) 6
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH 1 (OS-READYQ OS))
                               (AK-TASKIDLUB)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2433}.
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-SVC-RESUME-TASK2 OS) = (TICK 5)

Definition {2434}.

```
(OS-SVC-RECEIVE-HANDLER-TO-SVC-RESUME-TASK2 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-DEQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL13) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-SVC-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (PLUS (ARRAY-QFIRST (OS-READYQ OS))
                                       (TIMES (AK-TASKIDLUB)
                                              (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                         (AK-TASKIDLUB))))
                                 (TABLE 8 (OS-MBUFFERS OS))))
           2
```

```
   (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                 (TIMES 2
                        (REMAINDER (GETNTH 2 (TM-REGS OS))
                                   (AK-TASKIDLUB))))
          3
    (PUTNTH (TIMES 8
                           (ARRAY-QFIRST (OS-READYQ OS))) 4
     (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                          (AK-TASKIDLUB)) 6
      (TM-REGS OS)))))))
 (TM-CC-VALUE
        (TM-ALU-DIFFERENCE (GETNTH (TIMES 2
                                          (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                     (AK-TASKIDLUB)))
                                   (OS-STATUS-TABLE OS))
                              2))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2436}.

```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-SVC-RESUME-TASK3 OS) = (TICK 7)
```

Definition {2437}.

```
(OS-SVC-RECEIVE-HANDLER-TO-SVC-RESUME-TASK3 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
          2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-DEQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL13) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-SVC-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (PLUS (ARRAY-QFIRST (OS-READYQ OS))
                                       (TIMES (AK-TASKIDLUB)
                                              (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                         (AK-TASKIDLUB))))
                                 (TABLE 8 (OS-MBUFFERS OS))))
          2
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (REMAINDER (GETNTH 2 (TM-REGS OS))
                                    (AK-TASKIDLUB))))
```

```
           3
     (PUTNTH (TIMES 8
                                (ARRAY-QFIRST (OS-READYQ OS))) 4
      (PUTNTH (REMAINDER (GETNTH 2 (TM-REGS OS))
                                            (AK-TASKIDLUB)) 6
       (TM-REGS OS)))))))
 (TM-CC-VALUE
   (TM-ALU-DIFFERENCE (GETNTH (PLUS 1
                                     (TIMES 2
                                            (REMAINDER (GETNTH 2 (TM-REGS OS))
                                                       (AK-TASKIDLUB))))
                               (OS-STATUS-TABLE OS))
                       (ARRAY-QFIRST (OS-READYQ OS))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2439}.

```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-TO-SVCR OS) = (TICK 28)
```

<u>Definition</u> {2440}.

```
(OS-SVC-RECEIVE-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS))
        0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS))
         1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS))
          2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (OS-SRCID OS (AK-TASKIDLUB))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (OS-SRCID OS (AK-TASKIDLUB))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-DEQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-SVC-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (ARRAY-QFIRST (OS-CURRENT-MBUFFER (OS-SRCID OS (AK-TASKIDLUB))
                                           (OS-CURRENT-TASKID OS)
                                           OS))
```

```
        3
  (TM-REGS OS))
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-NO-SVC)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2442}.

```
(OS-SVC-RECEIVE-HANDLER-PATH4 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS))
        0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS))
         1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS))
          2
    (PUTNTH (OS-SVC-RECEIVE-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-MESSAGE OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-MBUFFERS-WITH-DEQUEUED-MESSAGE OS)
                    (OS-MBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-SVC-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (ARRAY-QFIRST (OS-CURRENT-MBUFFER (OS-SRCID OS (AK-TASKIDLUB))
                                           (OS-CURRENT-TASKID OS)
                                           OS))
        3
  (TM-REGS OS))
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-NO-SVC)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2445}.

```
(OS-SVC-RECEIVE-TIME1 OS) = (TICK 42)
```

Definition {2446}.

```
(OS-SVC-RECEIVE-TIME2 OS) = (TICK 21)
```

Definition {2447}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH1 OS) = (TICK 67)
```

Definition {2452}.
```
(OS-SVC-RECEIVE-TIME3 OS) = (TICK 69)
```

Definition {2453}.
```
(OS-SVC-RECEIVE-TIME4 OS) = (TICK 48)
```

Definition {2454}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH2 OS) = (TICK 94)
```

Definition {2459}.
```
(OS-SVC-RECEIVE-TIME5 OS) = (TICK 87)
```

Definition {2460}.
```
(OS-SVC-RECEIVE-TIME6 OS) = (TICK 66)
```

Definition {2461}.
```
(OS-SVC-RECEIVE-TIME7 OS) = (TICK 48)
```

Definition {2462}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH3 OS) = (TICK 112)
```

Definition {2468}.
```
(OS-SVC-RECEIVE-TIME8 OS) = (TICK 72)
```

Definition {2469}.
```
(OS-SVC-RECEIVE-TIME9 OS) = (TICK 51)
```

Definition {2470}.
```
(OS-SVC-RECEIVE-TIME10 OS) = (TICK 33)
```

Definition {2471}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH4A OS) = (TICK 97)
```

Definition {2477}.
```
(OS-SVC-RECEIVE-TIME11 OS) = (TICK 74)
```

Definition {2478}.
```
(OS-SVC-RECEIVE-TIME12 OS) = (TICK 53)
```

Definition {2479}.
```
(OS-SVC-RECEIVE-TIME13 OS) = (TICK 35)
```

Definition {2480}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH4B OS) = (TICK 99)
```

Definition {2486}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH4 OS)
   =
(IF (NOT (EQUAL (GETNTH (TIMES 2 (OS-SRCID OS (AK-TASKIDLUB)))
                        (OS-STATUS-TABLE OS))
                (AK-SEND-STATUS)))
    (OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH4A OS)
    (OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH4B OS))
```

Definition {2488}.
```
(OS-TIME-FOR-SVC-RECEIVE-HANDLER OS)
   =
(IF (ARRAY-QEMPTYP (OS-CURRENT-MBUFFER (OS-SRCID OS (AK-TASKIDLUB))
                                       (OS-CURRENT-TASKID OS)
                                       OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH1 OS)
        (OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH2 OS))
    (IF (AND (EQUAL (GETNTH (TIMES 2 (OS-SRCID OS (AK-TASKIDLUB)))
                            (OS-STATUS-TABLE OS))
                    (AK-SEND-STATUS))
             (EQUAL (GETNTH (PLUS 1
                                  (TIMES 2
                                         (OS-SRCID OS (AK-TASKIDLUB))))
                            (OS-STATUS-TABLE OS))
                    (OS-CURRENT-TASKID OS)))
```

```
        (OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH3 OS)
        (OS-TIME-FOR-SVC-RECEIVE-HANDLER-PATH4 OS)))
```

Definition {2489}.

```
(OS-SVC-RECEIVE-HANDLER OS)
   =
(IF (ARRAY-QEMPTYP (OS-CURRENT-MBUFFER (OS-SRCID OS (AK-TASKIDLUB))
                                       (OS-CURRENT-TASKID OS)
                                       OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-SVC-RECEIVE-HANDLER-PATH1 OS)
        (OS-SVC-RECEIVE-HANDLER-PATH2 OS))
    (IF (AND (EQUAL (GETNTH (TIMES 2 (OS-SRCID OS (AK-TASKIDLUB)))
                            (OS-STATUS-TABLE OS))
                    (AK-SEND-STATUS))
             (EQUAL (GETNTH (PLUS 1
                                  (TIMES 2
                                         (OS-SRCID OS (AK-TASKIDLUB))))
                            (OS-STATUS-TABLE OS))
                    (OS-CURRENT-TASKID OS)))
        (OS-SVC-RECEIVE-HANDLER-PATH3 OS)
        (OS-SVC-RECEIVE-HANDLER-PATH4 OS)))
```

Definition {2491}.

```
(OS-INTENDED-SVC-TYI-INTERRUPT TM)
   =
(TM-SET-MEMORY
 (PUTNTH (TM-PC TM) 0
  (PUTNTH (TM-SP TM) 1
   (PUTNTH (TM-PACK-PSW (TM-CC TM)
                        (TM-ERROR TM)
                        (TM-SVCFLAG TM)
                        (TM-SVCID TM))
           2
    (PUTNTH (TM-SVCID TM) (TM-SVCID-ADDR)
     (PUTSEG (OS-TASK-TABLE TM) (OS-TASK-TABLE-ADDRESS)
      (PUTSEG (OS-SEGMENT-TABLE TM) (OS-SEGMENT-TABLE-ADDRESS)
       (PUTSEG (OS-READYQ TM) (OS-READYQ-ADDRESS)
        (PUTSEG (OS-STATUS-TABLE TM) (OS-STATUS-TABLE-ADDRESS)
         (PUTSEG (OS-IBUFFERS TM) (OS-IBUFFERS-ADDRESS)
          (PUTSEG (OS-CODE TM) (OS-CODE-ADDRESS)
           (TM-MEMORY TM)))))))))))
 (TM-SET-PC
       (OS-SVC-HANDLER-ADDRESS)
       (TM-SET-SP (SUB1 (OS-LIMIT))
                  (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                                 (TM-SET-ERROR (TM-NO-ERROR)
                                               (TM-SET-RWSTATE (TM-RUN-STATE)
                                                               TM))))))
```

Definition {2493}.

```
(OS-TIME-FOR-SVC-TYI-HANDLER-THRU-SAVE-STATE OS) = (TICK 25)
```

Definition {2494}.

```
(OS-SVC-TYI-HANDLER-THRU-SAVE-STATE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-SVCID OS) (TM-SVCID-ADDR)
     (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
```

```
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
              (PUTNTH (OS-TRACE-LABEL5) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-TRACE-LABEL5) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R2 OS) 2
    (PUTNTH (TM-R3 OS) 3 (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS (OS-TASK-TABLE-ADDRESS)
                                 (TIMES (TM-CPU-LENGTH)
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           (TM-REGLENGTH)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2496}.
```
(OS-TIME-FOR-SVC-TYI-HANDLER-TO-QEMPTYP-TEST OS) = (TICK 19)
```

Definition {2497}.
```
(OS-SVC-TYI-HANDLER-TO-QEMPTYP-TEST OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-TYI-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL21) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL22) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                  (TIMES 8
                         (ARRAY-QFIRST (OS-READYQ OS))))
            3
     (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 8
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-IBUFFERS-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
```

```
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2499}.

```
(OS-TIME-FOR-SVC-TYI-HANDLER-TO-DISPATCHER OS) = (TICK 15)
```

<u>Definition</u> {2500}.

```
(OS-SVC-TYI-HANDLER-TO-DISPATCHER OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-TYI-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-INPUT-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL24) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (ARRAY-QFIRST (OS-READYQ OS))))
            3
     (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 2
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-STATUS-TABLE-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2502}.

```
(OS-TIME-FOR-SVC-TYI-HANDLER-TO-WAIT-STATE OS) = (TICK 6)
```

<u>Definition</u> {2503}.

```
(OS-SVC-TYI-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
```

```
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
            2
        (PUTNTH (OS-SVC-TYI-ID) (TM-SVCID-ADDR)
         (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
          (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
           (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
            (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
             (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
              (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
               (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                         (AK-INPUT-STATUS)
                                         0 OS)
                       (OS-STATUS-TABLE-ADDRESS)
                (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
                 (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                  (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                   (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                    (TM-MEMORY OS)))))))))))))))
     (PUTNTH (OS-PC-AFTER-WAIT) 0
      (PUTNTH (SUB1 (OS-LIMIT)) 1
       (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
        (PUTNTH (OS-READYQ-ADDRESS) 3
         (TM-REGS OS)))))
     (TM-ZERO-NO-CARRY-CONDITION)
     (TM-NO-ERROR)
     (TM-SVCFLAG OS)
     (TM-SVCID OS)
     (TM-BASE OS)
     (TM-LIMIT OS)
     (TM-SLIMIT OS)
     (TM-USER-MODE)
     (TM-WAIT-STATE)
     (TM-CLOCK OS)
     (TM-IPORTS OS)
     (TM-OPORTS OS))
```

<u>Definition</u> {2505}.

```
(OS-TIME-FOR-SVC-TYI-HANDLER-TO-LPSW OS) = (TICK 33)
```

<u>Definition</u> {2506}.

```
(OS-SVC-TYI-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS))))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (OS-SVC-TYI-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-INPUT-STATUS)
                                     0 OS)
```

```
                    (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
 (OS-NEW-REGS (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-CC (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
            OS)
 (OS-NEW-ERROR (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-SVCFLAG (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                 OS)
 (OS-NEW-SVCID (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-BASE (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-LIMIT (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (AK-TIME-SLICE)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2508}.

```
(OS-TIME-FOR-SVC-TYI-HANDLER-THRU-DELIVERY OS) = (TICK 19)
```

Definition {2509}.

```
(OS-SVC-TYI-HANDLER-THRU-DELIVERY OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-TYI-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-CHARACTER OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL23) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-SVC-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (ARRAY-QFIRST (OS-READYQ OS))
                                 (TABLE 8 (OS-IBUFFERS OS))))
           2
    (PUTNTH (PLUS (OS-TASK-TABLE-ADDRESS)
                  (TIMES 9
                         (ARRAY-QFIRST (OS-READYQ OS))))
            3
     (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 9
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-TASK-TABLE-ADDRESS)))
```

```
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2511}.

```
(OS-TIME-FOR-SVC-TYI-HANDLER-TO-SVCR OS) = (TICK 28)
```

Definition {2512}.

```
(OS-SVC-TYI-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-TASK-TABLE-WITH-DELIVERED-CHARACTER OS))
        0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-TASK-TABLE-WITH-DELIVERED-CHARACTER OS))
         1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-TASK-TABLE-WITH-DELIVERED-CHARACTER OS))
          2
    (PUTNTH (OS-SVC-TYI-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE-WITH-DELIVERED-CHARACTER OS)
                (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-SVC-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (ARRAY-QFIRST (GETNTH (OS-CURRENT-TASKID OS)
                               (TABLE 8 (OS-IBUFFERS OS))))
        3
  (TM-REGS OS))
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-NO-SVC)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2514}.

```
(OS-SVC-TYI-TIME1 OS) = (TICK 40)
```

Definition {2515}.

```
(OS-SVC-TYI-TIME2 OS) = (TICK 21)
```

Definition {2516}.
```
(OS-TIME-FOR-SVC-TYI-HANDLER-PATH1 OS) = (TICK 65)
```

Definition {2521}.
```
(OS-SVC-TYI-TIME3 OS) = (TICK 67)
```

Definition {2522}.
```
(OS-SVC-TYI-TIME4 OS) = (TICK 48)
```

Definition {2523}.
```
(OS-TIME-FOR-SVC-TYI-HANDLER-PATH2 OS) = (TICK 92)
```

Definition {2528}.
```
(OS-SVC-TYI-TIME5 OS) = (TICK 66)
```

Definition {2529}.
```
(OS-SVC-TYI-TIME6 OS) = (TICK 47)
```

Definition {2530}.
```
(OS-TIME-FOR-SVC-TYI-HANDLER-PATH3 OS) = (TICK 91)
```

Definition {2535}.
```
(OS-TIME-FOR-SVC-TYI-HANDLER OS)
   =
(IF (ARRAY-QEMPTYP (OS-CURRENT-IBUFFER (OS-CURRENT-TASKID OS)
                                       OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-TIME-FOR-SVC-TYI-HANDLER-PATH1 OS)
        (OS-TIME-FOR-SVC-TYI-HANDLER-PATH2 OS))
    (OS-TIME-FOR-SVC-TYI-HANDLER-PATH3 OS))
```

Definition {2536}.
```
(OS-SVC-TYI-HANDLER OS)
   =
(IF (ARRAY-QEMPTYP (OS-CURRENT-IBUFFER (OS-CURRENT-TASKID OS)
                                       OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-SVC-TYI-HANDLER-PATH1 OS)
        (OS-SVC-TYI-HANDLER-PATH2 OS))
    (OS-SVC-TYI-HANDLER-PATH3 OS))
```

Definition {2538}.
```
(OS-INTENDED-SVC-TYO-INTERRUPT TM)
   =
(TM-SET-MEMORY
 (PUTNTH (TM-PC TM) 0
  (PUTNTH (TM-SP TM) 1
   (PUTNTH (TM-PACK-PSW (TM-CC TM)
                        (TM-ERROR TM)
                        (TM-SVCFLAG TM)
                        (TM-SVCID TM))
           2
    (PUTNTH (TM-SVCID TM) (TM-SVCID-ADDR)
     (PUTSEG (OS-TASK-TABLE TM) (OS-TASK-TABLE-ADDRESS)
      (PUTSEG (OS-SEGMENT-TABLE TM) (OS-SEGMENT-TABLE-ADDRESS)
       (PUTSEG (OS-READYQ TM) (OS-READYQ-ADDRESS)
        (PUTSEG (OS-STATUS-TABLE TM) (OS-STATUS-TABLE-ADDRESS)
         (PUTSEG (OS-OBUFFERS TM) (OS-OBUFFERS-ADDRESS)
          (PUTSEG (OS-CODE TM) (OS-CODE-ADDRESS)
           (TM-MEMORY TM)))))))))))
 (TM-SET-PC
       (OS-SVC-HANDLER-ADDRESS)
       (TM-SET-SP (SUB1 (OS-LIMIT))
                  (TM-SET-SVMODE (TM-SUPERVISOR-MODE)
                                 (TM-SET-ERROR (TM-NO-ERROR)
                                               (TM-SET-RWSTATE (TM-RUN-STATE)
                                                               TM))))))
```

Definition {2540}.
```
(OS-TIME-FOR-SVC-TYO-HANDLER-THRU-SAVE-STATE OS) = (TICK 25)
```

Definition {2541}.
```
(OS-SVC-TYO-HANDLER-THRU-SAVE-STATE OS)
```

```
    =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-SVCID OS) (TM-SVCID-ADDR)
     (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
              (PUTNTH (OS-TRACE-LABEL5) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-TRACE-LABEL5) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-R2 OS) 2
    (PUTNTH (TM-R3 OS) 3 (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS (OS-TASK-TABLE-ADDRESS)
                                 (TIMES (TM-CPU-LENGTH)
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           (TM-REGLENGTH)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2543}.
(OS-TIME-FOR-SVC-TYO-HANDLER-TO-QFULLP-TEST OS) = (TICK 19)

<u>Definition</u> {2544}.

```
(OS-SVC-TYO-HANDLER-TO-QFULLP-TEST OS)
    =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-TYO-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL17) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL18) 0
```

```
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                  (TIMES 8
                         (ARRAY-QFIRST (OS-READYQ OS))))
          3
     (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
      (TM-REGS OS))))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 8
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-OBUFFERS-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2546}.
```
(OS-TIME-FOR-SVC-TYO-HANDLER-TO-DISPATCHER OS) = (TICK 15)
```

<u>Definition</u> {2547}.
```
(OS-SVC-TYO-HANDLER-TO-DISPATCHER OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
          2
    (PUTNTH (OS-SVC-TYO-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-OUTPUT-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL20) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (ARRAY-QFIRST (OS-READYQ OS))))
          3
     (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
      (TM-REGS OS))))))
 (TM-CC-VALUE (TM-ALU-PLUS (TIMES 2
                                  (ARRAY-QFIRST (OS-READYQ OS)))
                           (OS-STATUS-TABLE-ADDRESS)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
```

```
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2549}.

```
(OS-TIME-FOR-SVC-TYO-HANDLER-TO-WAIT-STATE OS) = (TICK 6)
```

Definition {2550}.

```
(OS-SVC-TYO-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (OS-SVC-TYO-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-OUTPUT-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
      (TM-REGS OS))))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-WAIT-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2552}.

```
(OS-TIME-FOR-SVC-TYO-HANDLER-TO-LPSW OS) = (TICK 33)
```

Definition {2553}.

```
(OS-SVC-TYO-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS))))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
```

```
                              (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                 (OS-NEW-TASK-TABLE OS))
         1
   (PUTNTH (GETNTH (PLUS 8
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))))
                  (OS-NEW-TASK-TABLE OS))
          2
    (PUTNTH (OS-SVC-TYO-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-DEQ (OS-READYQ OS)) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (ARRAY-QFIRST (OS-READYQ OS))
                                     (AK-OUTPUT-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (OS-NEW-REGS (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-CC (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
            OS)
 (OS-NEW-ERROR (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-SVCFLAG (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
                 OS)
 (OS-NEW-SVCID (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (OS-NEW-BASE (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
              OS)
 (OS-NEW-LIMIT (ARRAY-QFIRST (ARRAY-DEQ (OS-READYQ OS)))
               OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (AK-TIME-SLICE)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2555}.
```
(OS-TIME-FOR-SVC-TYO-HANDLER-THRU-ENQUEUE OS) = (TICK 13)
```

Definition {2556}.
```
(OS-SVC-TYO-HANDLER-THRU-ENQUEUE OS)
   =
(TM
 (PUTNTH (TM-R0 OS) 0
  (PUTNTH (TM-R1 OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
          2
    (PUTNTH (OS-SVC-TYO-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                    (OS-OBUFFERS-ADDRESS)
```

```
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL19) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL19) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (GETNTH 3 (TM-REGS OS)) 2
    (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                  (TIMES 8
                         (ARRAY-QFIRST (OS-READYQ OS))))
            3
     (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (ARRAY-QFIRST (OS-READYQ OS)))
                         (GETNTH 1
                                 (GETNTH (ARRAY-QFIRST (OS-READYQ OS))
                                         (TABLE 8 (OS-OBUFFERS OS))))))
             4
      (PUTNTH (GETNTH 3 (TM-REGS OS)) 7
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH 1
                                       (GETNTH (ARRAY-QFIRST (OS-READYQ OS))
                                               (TABLE 8 (OS-OBUFFERS OS))))
                               (GETNTH 3
                                       (GETNTH (ARRAY-QFIRST (OS-READYQ OS))
                                               (TABLE 8 (OS-OBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

Definition {2558}.

```
(OS-TIME-FOR-SVC-TYO-HANDLER-TO-SVCR1 OS) = (TICK 32)
```

Definition {2559}.

```
(OS-SVC-TYO-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (OS-SVC-TYO-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                    (OS-OBUFFERS-ADDRESS)
```

```
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-SVC-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-NO-SVC)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-POST-OUTPUT-INTERRUPT (ARRAY-QFIRST (OS-READYQ OS))
                           (TM-OPORTS OS)))
```

<u>Definition</u> {2561}.
(OS-TIME-FOR-SVC-TYO-HANDLER-TO-SVCR2 OS) = (TICK 30)

<u>Definition</u> {2562}.

```
(OS-SVC-TYO-HANDLER-PATH4 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (OS-SVC-TYO-ID) (TM-SVCID-ADDR)
     (PUTNTH (ARRAY-QFIRST (OS-READYQ OS)) (OS-CURRENT-TASKID-ADDRESS)
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                    (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-SVC-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-NO-SVC)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-OPORTS OS))
```

<u>Definition</u> {2564}.
(OS-SVC-TYO-TIME1 OS) = (TICK 40)

```
Definition {2565}.
(OS-SVC-TYO-TIME2 OS) = (TICK 21)

Definition {2566}.
(OS-TIME-FOR-SVC-TYO-HANDLER-PATH1 OS) = (TICK 65)

Definition {2571}.
(OS-SVC-TYO-TIME3 OS) = (TICK 67)

Definition {2572}.
(OS-SVC-TYO-TIME4 OS) = (TICK 48)

Definition {2573}.
(OS-TIME-FOR-SVC-TYO-HANDLER-PATH2 OS) = (TICK 92)

Definition {2578}.
(OS-SVC-TYO-TIME5 OS) = (TICK 64)

Definition {2579}.
(OS-SVC-TYO-TIME6 OS) = (TICK 45)

Definition {2580}.
(OS-TIME-FOR-SVC-TYO-HANDLER-PATH3 OS) = (TICK 89)

Definition {2585}.
(OS-SVC-TYO-TIME7 OS) = (TICK 62)

Definition {2586}.
(OS-SVC-TYO-TIME8 OS) = (TICK 43)

Definition {2587}.
(OS-TIME-FOR-SVC-TYO-HANDLER-PATH4 OS) = (TICK 87)

Definition {2592}.
(OS-TIME-FOR-SVC-TYO-HANDLER OS)
   =
(IF (ARRAY-QFULLP (OS-CURRENT-OBUFFER (OS-CURRENT-TASKID OS)
                                      OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-TIME-FOR-SVC-TYO-HANDLER-PATH1 OS)
        (OS-TIME-FOR-SVC-TYO-HANDLER-PATH2 OS))
    (IF (TM-OPORT-IDLEP (ARRAY-QFIRST (OS-READYQ OS))
                        (TM-OPORTS OS))
        (OS-TIME-FOR-SVC-TYO-HANDLER-PATH3 OS)
        (OS-TIME-FOR-SVC-TYO-HANDLER-PATH4 OS)))

Definition {2593}.
(OS-SVC-TYO-HANDLER OS)
   =
(IF (ARRAY-QFULLP (OS-CURRENT-OBUFFER (OS-CURRENT-TASKID OS)
                                      OS))
    (IF (ARRAY-QEMPTYP (ARRAY-DEQ (OS-READYQ OS)))
        (OS-SVC-TYO-HANDLER-PATH1 OS)
        (OS-SVC-TYO-HANDLER-PATH2 OS))
    (IF (TM-OPORT-IDLEP (ARRAY-QFIRST (OS-READYQ OS))
                        (TM-OPORTS OS))
        (OS-SVC-TYO-HANDLER-PATH3 OS)
        (OS-SVC-TYO-HANDLER-PATH4 OS)))

Definition {2595}.
(OS-INTENDED-INPUT-INTERRUPT TM)
   =
(TM-SET-MEMORY
 (PUTNTH (TM-PC TM) 0
  (PUTNTH (TM-SP TM) 1
   (PUTNTH (TM-PACK-PSW (TM-CC TM)
                        (TM-ERROR TM)
                        (TM-SVCFLAG TM)
                        (TM-SVCID TM))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS TM)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS TM))
                               (TM-IPORTS TM)))
             9
```

```
      (PUTSEG (OS-TASK-TABLE TM) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE TM) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (OS-READYQ TM) (OS-READYQ-ADDRESS)
         (PUTSEG (OS-STATUS-TABLE TM) (OS-STATUS-TABLE-ADDRESS)
          (PUTSEG (OS-IBUFFERS TM) (OS-IBUFFERS-ADDRESS)
           (PUTSEG (OS-CODE TM) (OS-CODE-ADDRESS)
            (TM-MEMORY TM))))))))))))
 (TM-SET-PC
  (OS-INPUT-INTERRUPT-HANDLER-ADDRESS)
  (TM-SET-SP
   (SUB1 (OS-LIMIT))
   (TM-SET-SVMODE
    (TM-SUPERVISOR-MODE)
    (TM-SET-ERROR
     (TM-NO-ERROR)
     (TM-SET-RWSTATE
      (TM-RUN-STATE)
      (TM-SET-IPORTS
        (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS TM))
                                  (TM-IPORTS TM))
        TM)))))))
```

Definition {2597}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-THRU-READYQ-EMPTY-TEST OS) = (TICK 7)

Definition {2598}.

```
(OS-WAITING-INPUT-HANDLER-THRU-READYQ-EMPTY-TEST OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-TRACE-LABEL25) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-TRACE-LABEL26) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (OS-READYQ-ADDRESS) 3
    (TM-REGS OS))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2600}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST OS) = (TICK 17)

Definition {2601}.

```
(OS-WAITING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-TRACE-LABEL27) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-TRACE-LABEL28) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH 1 (OS-READYQ OS))
                               (AK-TASKIDLUB)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2603}.

```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-DISPATCHER1 OS) = (TICK 17)
```

Definition {2604}.

```
(OS-WAITING-INPUT-HANDLER-TO-DISPATCHER1 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
```

```
   (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
    (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                              (TM-IPORTS OS)))
            9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                            (OS-READYQ OS))
                 (OS-READYQ-ADDRESS)
          (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                    (AK-READY-STATUS)
                                    0 OS)
                  (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                   (OS-IBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-TRACE-LABEL29) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
(PUTNTH (OS-DISPATCHER-ADDRESS) 0
 (PUTNTH (SUB1 (OS-LIMIT)) 1
  (PUTNTH (PLUS 256
                (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TM-IPORTS OS))))
          2
   (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                 (TIMES 8
                        (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
           3
    (PUTNTH (PLUS
             (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
             (PLUS
              (TIMES 8
                     (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
              (DECR-MOD (GETNTH 1
                                (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                        (TABLE 8 (OS-IBUFFERS OS))))
                        4)))
            4
     (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                   (TIMES 2
                          (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
             5
      (TM-REGS OS)))))))
(TM-CC-VALUE
 (TM-ALU-PLUS
  (PLUS
   (OS-IBUFFERS-ADDRESS)
   (PLUS
    (TIMES 8
           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
    (DECR-MOD (GETNTH 1
                      (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                              (TABLE 8 (OS-IBUFFERS OS))))
              4)))
  4))
(TM-NO-ERROR)
(TM-SVCFLAG OS)
(TM-SVCID OS)
(TM-BASE OS)
(TM-LIMIT OS)
(TM-SLIMIT OS)
(TM-SUPERVISOR-MODE)
(TM-RUN-STATE)
(TM-CLOCK OS)
(TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                          (TM-IPORTS OS))
(TM-OPORTS OS))
```

<u>Definition</u> {2606}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-DISPATCHER2 OS) = (TICK 20)

<u>Definition</u> {2607}.

```
(OS-WAITING-INPUT-HANDLER-TO-DISPATCHER2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-TRACE-LABEL30) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS 256
                 (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                   (TM-IPORTS OS))))
           2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
            3
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                  (GETNTH 1
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))
                  (GETNTH 3
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
```

```
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2609}.
```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-DISPATCHER3 OS) = (TICK 19)
```

Definition {2610}.
```
(OS-WAITING-INPUT-HANDLER-TO-DISPATCHER3 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-TRACE-LABEL31) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (TM-IPORTS OS)))
           2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
            3
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                (GETNTH 1
                        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TABLE 8 (OS-IBUFFERS OS))))
                (GETNTH 3
```

```
                         (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 (TABLE 8 (OS-IBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2612}.
```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-LPSW OS) = (TICK 33)
```

Definition {2613}.
```
(OS-WAITING-INPUT-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES 9
                        (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                 (OS-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                   (OS-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (GETSEG 0 8
         (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                 (TABLE 9 (OS-TASK-TABLE OS))))
 (REMAINDER
          (GETNTH (PLUS 8
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          4)
 (QUOTIENT
  (REMAINDER
          (GETNTH (PLUS 8
                        (TIMES 9
```

```
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                    (OS-TASK-TABLE OS))
            256)
  4)
 (QUOTIENT
  (REMAINDER
            (GETNTH (PLUS 8
                          (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                    (OS-TASK-TABLE OS))
            512)
  256)
 (QUOTIENT (GETNTH (PLUS 8
                          (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                    (OS-TASK-TABLE OS))
            512)
 (BASE (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
               (TABLE 2 (OS-SEGMENT-TABLE OS))))
 (LIMIT (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                (TABLE 2 (OS-SEGMENT-TABLE OS))))
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (AK-TIME-SLICE)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

<u>Definition</u> {2615}.

```
(OS-WAITING-INPUT-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES 9
                        (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                 (OS-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                   (OS-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (GETSEG 0 8
         (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
```

```
                 (TABLE 9 (OS-TASK-TABLE OS))))
 (REMAINDER
           (GETNTH (PLUS 8
                         (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                   (OS-TASK-TABLE OS))
           4)
 (QUOTIENT
  (REMAINDER
           (GETNTH (PLUS 8
                         (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                   (OS-TASK-TABLE OS))
           256)
  4)
 (QUOTIENT
  (REMAINDER
           (GETNTH (PLUS 8
                         (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                   (OS-TASK-TABLE OS))
           512)
  256)
 (QUOTIENT (GETNTH (PLUS 8
                         (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                   (OS-TASK-TABLE OS))
           512)
 (BASE (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
               (TABLE 2 (OS-SEGMENT-TABLE OS))))
 (LIMIT (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                (TABLE 2 (OS-SEGMENT-TABLE OS))))
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (AK-TIME-SLICE)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2617}.

```
(OS-WAITING-INPUT-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES 9
                        (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                 (OS-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES 9
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                   (OS-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
```

```
          (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                    (AK-READY-STATUS)
                                    0 OS)
                  (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                   (OS-IBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
(GETSEG 0 8
        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                (TABLE 9 (OS-TASK-TABLE OS))))
(REMAINDER
          (GETNTH (PLUS 8
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          4)
(QUOTIENT
 (REMAINDER
          (GETNTH (PLUS 8
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          256)
 4)
(QUOTIENT
 (REMAINDER
          (GETNTH (PLUS 8
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          512)
 256)
(QUOTIENT (GETNTH (PLUS 8
                        (TIMES 9
                               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                  (OS-TASK-TABLE OS))
          512)
(BASE (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
              (TABLE 2 (OS-SEGMENT-TABLE OS))))
(LIMIT (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
               (TABLE 2 (OS-SEGMENT-TABLE OS))))
(TM-SLIMIT OS)
(TM-USER-MODE)
(TM-RUN-STATE)
(AK-TIME-SLICE)
(TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                          (TM-IPORTS OS))
(TM-OPORTS OS))
```

Definition {2619}.
(OS-WAITING-INPUT-TIME1 OS) = (TICK 67)

Definition {2620}.
(OS-WAITING-INPUT-TIME2 OS) = (TICK 50)

Definition {2621}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH1 OS) = (TICK 74)

Definition {2626}.
(OS-WAITING-INPUT-TIME3 OS) = (TICK 70)

Definition {2627}.
(OS-WAITING-INPUT-TIME4 OS) = (TICK 53)

Definition {2628}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH2 OS) = (TICK 77)

Definition {2633}.
(OS-WAITING-INPUT-TIME5 OS) = (TICK 69)

<u>Definition</u> {2634}.
```
(OS-WAITING-INPUT-TIME6 OS) = (TICK 52)
```

<u>Definition</u> {2635}.
```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH3 OS) = (TICK 76)
```

<u>Definition</u> {2640}.
```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST2 OS) = (TICK 5)
```

<u>Definition</u> {2641}.
```
(OS-WAITING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-TRACE-LABEL25) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-TRACE-LABEL28) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (OS-READYQ-ADDRESS) 3
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
            5
     (TM-REGS OS)))))
 (TM-CC-VALUE
  (TM-ALU-DIFFERENCE
                  (GETNTH (TIMES 2
                                 (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                          (OS-STATUS-TABLE OS))
                  5))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

<u>Definition</u> {2643}.
```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-DISPATCHER4 OS) = (TICK 17)
```

<u>Definition</u> {2644}.
```
(OS-WAITING-INPUT-HANDLER-TO-DISPATCHER4 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
```

```
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
          2
   (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
    (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
            9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                   (OS-IBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-TRACE-LABEL29) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
(PUTNTH (OS-DISPATCHER-ADDRESS) 0
 (PUTNTH (SUB1 (OS-LIMIT)) 1
  (PUTNTH (PLUS 256
                (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TM-IPORTS OS))))
          2
   (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                 (TIMES 8
                        (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
           3
    (PUTNTH (PLUS
             (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
             (PLUS
              (TIMES 8
                     (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
              (DECR-MOD (GETNTH 1
                                (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                        (TABLE 8 (OS-IBUFFERS OS))))
                        4)))
            4
     (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                   (TIMES 2
                          (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
             5
      (TM-REGS OS))))))
(TM-CC-VALUE
 (TM-ALU-PLUS
  (PLUS
   (OS-IBUFFERS-ADDRESS)
   (PLUS
       (TIMES 8
              (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
       (DECR-MOD (GETNTH 1
                         (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 (TABLE 8 (OS-IBUFFERS OS))))
                 4)))
  4))
(TM-NO-ERROR)
(TM-SVCFLAG OS)
(TM-SVCID OS)
(TM-BASE OS)
(TM-LIMIT OS)
(TM-SLIMIT OS)
(TM-SUPERVISOR-MODE)
(TM-RUN-STATE)
(TM-CLOCK OS)
(TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                          (TM-IPORTS OS))
(TM-OPORTS OS))
```

```
Definition {2646}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-DISPATCHER5 OS) = (TICK 20)

Definition {2647}.
(OS-WAITING-INPUT-HANDLER-TO-DISPATCHER5 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-TRACE-LABEL30) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS 256
                 (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                   (TM-IPORTS OS))))
           2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
            3
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                  (GETNTH 1
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))
                  (GETNTH 3
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
```

```
                          (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2649}.

```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-DISPATCHER6 OS) = (TICK 19)
```

Definition {2650}.

```
(OS-WAITING-INPUT-HANDLER-TO-DISPATCHER6 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-TRACE-LABEL31) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (TM-IPORTS OS)))
           2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
            3
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                  (GETNTH 1
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))
                  (GETNTH 3
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
```

```
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

<u>Definition</u> {2652}.

```
(OS-TIME-FOR-WAITING-INPUT-HANDLER-TO-WAIT OS) = (TICK 6)
```

<u>Definition</u> {2653}.

```
(OS-WAITING-INPUT-HANDLER-PATH4 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS 256
                 (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                   (TM-IPORTS OS))))
           2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS
              (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
              (PLUS
               (TIMES 8
                      (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
               (DECR-MOD (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))
                         4)))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-WAIT-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

```
Definition {2655}.
(OS-WAITING-INPUT-HANDLER-PATH5 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-DISPATCHER-ADDRESS) 10
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
               (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS 256
                 (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                   (TM-IPORTS OS))))
           2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-WAIT-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

```
Definition {2657}.
(OS-WAITING-INPUT-HANDLER-PATH6 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
```

```
           2
      (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
       (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 (TM-IPORTS OS)))
             9
        (PUTNTH (OS-DISPATCHER-ADDRESS) 10
         (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
          (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
           (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
            (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
             (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
              (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                      (OS-IBUFFERS-ADDRESS)
               (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                (PUTNTH (OS-DISPATCHER-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))
   (PUTNTH (OS-PC-AFTER-WAIT) 0
    (PUTNTH (SUB1 (OS-LIMIT)) 1
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
           2
      (PUTNTH (OS-READYQ-ADDRESS) 3
       (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                     (PLUS (TIMES 8
                                  (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                           (GETNTH 1
                                   (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                           (TABLE 8 (OS-IBUFFERS OS))))))
             4
        (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                      (TIMES 2
                             (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
         (TM-REGS OS)))))))
   (TM-ZERO-NO-CARRY-CONDITION)
   (TM-NO-ERROR)
   (TM-SVCFLAG OS)
   (TM-SVCID OS)
   (TM-BASE OS)
   (TM-LIMIT OS)
   (TM-SLIMIT OS)
   (TM-USER-MODE)
   (TM-WAIT-STATE)
   (TM-CLOCK OS)
   (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (TM-IPORTS OS))
   (TM-OPORTS OS))
```

Definition {2659}.
(OS-WAITING-INPUT-TIME7 OS) = (TICK 28)

Definition {2660}.
(OS-WAITING-INPUT-TIME8 OS) = (TICK 23)

Definition {2661}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH4 OS) = (TICK 35)

Definition {2666}.
(OS-WAITING-INPUT-TIME9 OS) = (TICK 31)

Definition {2667}.
(OS-WAITING-INPUT-TIME10 OS) = (TICK 26)

Definition {2668}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH5 OS) = (TICK 38)

Definition {2673}.
(OS-WAITING-INPUT-TIME11 OS) = (TICK 30)

Definition {2674}.
(OS-WAITING-INPUT-TIME12 OS) = (TICK 25)

```
Definition {2675}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH6 OS) = (TICK 37)

Definition {2680}.
(OS-TIME-FOR-WAITING-INPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-INPUT-STATUS))
 (IF
  (ARRAY-QFULLP
              (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  OS))
  (OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH1 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH2 OS)
      (OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH3 OS)))
 (IF
  (ARRAY-QFULLP
              (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  OS))
  (OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH4 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH5 OS)
      (OS-TIME-FOR-WAITING-INPUT-HANDLER-PATH6 OS))))

Definition {2681}.
(OS-WAITING-INPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-INPUT-STATUS))
 (IF
  (ARRAY-QFULLP
              (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  OS))
  (OS-WAITING-INPUT-HANDLER-PATH1 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-WAITING-INPUT-HANDLER-PATH2 OS)
      (OS-WAITING-INPUT-HANDLER-PATH3 OS)))
 (IF
  (ARRAY-QFULLP
              (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  OS))
  (OS-WAITING-INPUT-HANDLER-PATH4 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-WAITING-INPUT-HANDLER-PATH5 OS)
      (OS-WAITING-INPUT-HANDLER-PATH6 OS))))

Definition {2683}.
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-THRU-SAVE-STATE OS) = (TICK 34)

Definition {2684}.
(OS-RUNNING-INPUT-HANDLER-THRU-SAVE-STATE OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
```

```
          2
     (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
      (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 (TM-IPORTS OS)))
            9
       (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
        (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
         (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
          (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
           (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
            (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
             (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
              (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
               (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                 (PUTNTH (OS-TRACE-LABEL26) (SUB1 (OS-LIMIT))
                  (TM-MEMORY OS))))))))))))))))
  (PUTNTH (OS-TRACE-LABEL26) 0
   (PUTNTH (SUB1 (OS-LIMIT)) 1
    (PUTNTH (GETNTH 2 (TM-REGS OS)) 2
     (PUTNTH (GETNTH 3 (TM-REGS OS)) 3
      (TM-REGS OS)))))
  (TM-CC-VALUE (TM-ALU-PLUS (PLUS 15
                                   (TIMES 9
                                          (ARRAY-QFIRST (OS-READYQ OS))))
                             8))
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-SUPERVISOR-MODE)
  (TM-RUN-STATE)
  (TM-CLOCK OS)
  (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (TM-IPORTS OS))
  (TM-OPORTS OS))
```

<u>Definition</u> {2686}.
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST OS) = (TICK 17)

<u>Definition</u> {2687}.

```
(OS-RUNNING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
          2
     (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
      (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 (TM-IPORTS OS)))
            9
       (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
        (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
         (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
          (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
           (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
            (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (OS-READYQ OS))
                    (OS-READYQ-ADDRESS)
             (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                       (AK-READY-STATUS)
                                       0 OS)
                     (OS-STATUS-TABLE-ADDRESS)
```

```
             (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-TRACE-LABEL27) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-TRACE-LABEL28) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
             5
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH 1 (OS-READYQ OS))
                               (AK-TASKIDLUB)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2689}.
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-RESUME-TASK1 OS) = (TICK 17)

Definition {2690}.

```
(OS-RUNNING-INPUT-HANDLER-TO-RESUME-TASK1 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                              (OS-READYQ OS))
                   (OS-READYQ-ADDRESS)
            (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                      (AK-READY-STATUS)
                                      0 OS)
                    (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-TRACE-LABEL29) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS 256
```

```
                   (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                     (TM-IPORTS OS))))
            2
      (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                    (TIMES 8
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
             3
       (PUTNTH (PLUS
                (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                (PLUS
                 (TIMES 8
                        (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                 (DECR-MOD (GETNTH 1
                                  (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                          (TABLE 8 (OS-IBUFFERS OS))))
                           4)))
              4
        (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                      (TIMES 2
                             (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
               5
         (TM-REGS OS)))))))
   (TM-CC-VALUE
    (TM-ALU-PLUS
     (PLUS
      (OS-IBUFFERS-ADDRESS)
      (PLUS
          (TIMES 8
                 (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
          (DECR-MOD (GETNTH 1
                           (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                   (TABLE 8 (OS-IBUFFERS OS))))
                    4)))
     4))
   (TM-NO-ERROR)
   (TM-SVCFLAG OS)
   (TM-SVCID OS)
   (TM-BASE OS)
   (TM-LIMIT OS)
   (TM-SLIMIT OS)
   (TM-SUPERVISOR-MODE)
   (TM-RUN-STATE)
   (TM-CLOCK OS)
   (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (TM-IPORTS OS))
   (TM-OPORTS OS))
```

Definition {2692}.

```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-RESUME-TASK2 OS) = (TICK 20)
```

Definition {2693}.

```
(OS-RUNNING-INPUT-HANDLER-TO-RESUME-TASK2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
```

```
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                              (OS-READYQ OS))
                   (OS-READYQ-ADDRESS)
            (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                      (AK-READY-STATUS)
                                      0 OS)
                    (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-TRACE-LABEL30) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS 256
                 (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                   (TM-IPORTS OS))))
           2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
            3
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                (GETNTH 1
                        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TABLE 8 (OS-IBUFFERS OS))))
                (GETNTH 3
                        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TABLE 8 (OS-IBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2695}.

```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-RESUME-TASK3 OS) = (TICK 19)
```

Definition {2696}.

```
(OS-RUNNING-INPUT-HANDLER-TO-RESUME-TASK3 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
```

```
                        (TM-SVCID OS))
             2
     (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
      (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TM-IPORTS OS)))
               9
       (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
        (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
         (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
          (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
           (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
            (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (OS-READYQ OS))
                    (OS-READYQ-ADDRESS)
             (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                       (AK-READY-STATUS)
                                       0 OS)
                     (OS-STATUS-TABLE-ADDRESS)
              (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                      (OS-IBUFFERS-ADDRESS)
               (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                 (PUTNTH (OS-TRACE-LABEL31) (SUB1 (OS-LIMIT))
                  (TM-MEMORY OS)))))))))))))))))
  (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
   (PUTNTH (SUB1 (OS-LIMIT)) 1
    (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                              (TM-IPORTS OS)))
             2
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                   (TIMES 8
                          (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              3
      (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                    (PLUS (TIMES 8
                                 (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                          (GETNTH 1
                                  (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                          (TABLE 8 (OS-IBUFFERS OS))))))
               4
       (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                     (TIMES 2
                            (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
                5
        (TM-REGS OS)))))))
  (TM-CC-VALUE
   (TM-ALU-INCR-MOD
                  (GETNTH 1
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))
                  (GETNTH 3
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))))
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-SUPERVISOR-MODE)
  (TM-RUN-STATE)
  (TM-CLOCK OS)
  (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                            (TM-IPORTS OS))
  (TM-OPORTS OS))
```

Definition {2698}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-LPSW OS) = (TICK 28)
```

<u>Definition</u> {2699}.

```
(OS-RUNNING-INPUT-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
        0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                              (OS-READYQ OS))
                   (OS-READYQ-ADDRESS)
            (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                      (AK-READY-STATUS)
                                      0 OS)
                    (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS)))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

<u>Definition</u> {2701}.

```
(OS-RUNNING-INPUT-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
        0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
```

```
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
      (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
       (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 (TM-IPORTS OS)))
             9
        (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
         (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
          (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
           (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
            (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
             (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (OS-READYQ OS))
                     (OS-READYQ-ADDRESS)
              (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                        (AK-READY-STATUS)
                                        0 OS)
                      (OS-STATUS-TABLE-ADDRESS)
               (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                       (OS-IBUFFERS-ADDRESS)
                (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                 (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                  (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                   (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

<u>Definition</u> {2703}.

```
(OS-RUNNING-INPUT-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
```

```
                              (OS-READYQ OS))
                         (OS-READYQ-ADDRESS)
                  (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                            (AK-READY-STATUS)
                                            0 OS)
                          (OS-STATUS-TABLE-ADDRESS)
                   (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                           (OS-IBUFFERS-ADDRESS)
                    (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                     (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                      (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                       (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2705}.
(OS-RUNNING-INPUT-TIME1 OS) = (TICK 62)

Definition {2706}.
(OS-RUNNING-INPUT-TIME2 OS) = (TICK 45)

Definition {2707}.
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH1 OS) = (TICK 96)

Definition {2712}.
(OS-RUNNING-INPUT-TIME3 OS) = (TICK 65)

Definition {2713}.
(OS-RUNNING-INPUT-TIME4 OS) = (TICK 48)

Definition {2714}.
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH2 OS) = (TICK 99)

Definition {2719}.
(OS-RUNNING-INPUT-TIME5 OS) = (TICK 64)

Definition {2720}.
(OS-RUNNING-INPUT-TIME6 OS) = (TICK 47)

Definition {2721}.
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH3 OS) = (TICK 98)

Definition {2726}.
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST2 OS) = (TICK 5)

Definition {2727}.

```
(OS-RUNNING-INPUT-HANDLER-TO-IBUFFER-FULL-TEST2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
```

```
        (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
         (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
          (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
           (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
            (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
             (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
              (PUTSEG (OS-IBUFFERS OS) (OS-IBUFFERS-ADDRESS)
               (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                 (PUTNTH (OS-TRACE-LABEL26) (SUB1 (OS-LIMIT))
                  (TM-MEMORY OS))))))))))))))))
  (PUTNTH (OS-TRACE-LABEL28) 0
   (PUTNTH (SUB1 (OS-LIMIT)) 1
    (PUTNTH (GETNTH 2 (TM-REGS OS)) 2
     (PUTNTH (GETNTH 3 (TM-REGS OS)) 3
      (PUTNTH (PLUS 211
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS))))))
  (TM-CC-VALUE
   (TM-ALU-DIFFERENCE
                 (GETNTH (TIMES 2
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (OS-STATUS-TABLE OS))
                 5))
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-SUPERVISOR-MODE)
  (TM-RUN-STATE)
  (TM-CLOCK OS)
  (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                            (TM-IPORTS OS))
  (TM-OPORTS OS))
```

Definition {2729}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-RESUME-TASK4 OS) = (TICK 17)
```

Definition {2730}.
```
(OS-RUNNING-INPUT-HANDLER-TO-RESUME-TASK4 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
            (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-TRACE-LABEL29) (SUB1 (OS-LIMIT))
```

```
                (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS 256
                (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TM-IPORTS OS))))
           2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                 (TIMES 8
                        (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
            3
     (PUTNTH (PLUS
              (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
              (PLUS
               (TIMES 8
                      (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
               (DECR-MOD (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))
                         4)))
             4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                   (TIMES 2
                          (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-CC-VALUE
  (TM-ALU-PLUS
   (PLUS
    (OS-IBUFFERS-ADDRESS)
    (PLUS
        (TIMES 8
               (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
        (DECR-MOD (GETNTH 1
                          (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                  (TABLE 8 (OS-IBUFFERS OS))))
                  4)))
   4))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2732}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-RESUME-TASK5 OS) = (TICK 20)
```

Definition {2733}.
```
(OS-RUNNING-INPUT-HANDLER-TO-RESUME-TASK5 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
```

```
       (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
        (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
         (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
          (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
           (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
            (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
             (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
              (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
               (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                 (PUTNTH (OS-TRACE-LABEL30) (SUB1 (OS-LIMIT))
                  (TM-MEMORY OS))))))))))))))))
  (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
   (PUTNTH (SUB1 (OS-LIMIT)) 1
    (PUTNTH (PLUS 256
                  (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                    (TM-IPORTS OS))))
            2
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                   (TIMES 8
                          (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
             3
      (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                    (PLUS (TIMES 8
                                 (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                          (GETNTH 1
                                  (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                          (TABLE 8 (OS-IBUFFERS OS))))))
              4
       (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                     (TIMES 2
                            (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
               5
        (TM-REGS OS)))))))
  (TM-CC-VALUE
   (TM-ALU-INCR-MOD
                (GETNTH 1
                        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TABLE 8 (OS-IBUFFERS OS))))
                (GETNTH 3
                        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TABLE 8 (OS-IBUFFERS OS))))))
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-SUPERVISOR-MODE)
  (TM-RUN-STATE)
  (TM-CLOCK OS)
  (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                            (TM-IPORTS OS))
  (TM-OPORTS OS))
```

Definition {2735}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-TO-RESUME-TASK6 OS) = (TICK 19)
```

Definition {2736}.
```
(OS-RUNNING-INPUT-HANDLER-TO-RESUME-TASK6 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
```

```
          2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
            9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
            (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-TRACE-LABEL31) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
 (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                             (TM-IPORTS OS)))
          2
    (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
           3
     (PUTNTH (PLUS (OS-IBUFFERS-ADDRESS-PLUS-QARRAY-FIELD)
                   (PLUS (TIMES 8
                                (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                         (GETNTH 1
                                 (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                         (TABLE 8 (OS-IBUFFERS OS))))))
            4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))))
             5
       (TM-REGS OS)))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                (GETNTH 1
                        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TABLE 8 (OS-IBUFFERS OS))))
                (GETNTH 3
                        (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                (TABLE 8 (OS-IBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2738}.

```
(OS-RUNNING-INPUT-HANDLER-PATH4 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
        0
  (PUTNTH (GETNTH (PLUS 1
```

```
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
            (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS-WITH-QREPLACED-OVERFLOW-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2740}.

```
(OS-RUNNING-INPUT-HANDLER-PATH5 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
```

```
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-OVERFLOW-CHARACTER OS)
                    (OS-IBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2742}.

```
(OS-RUNNING-INPUT-HANDLER-PATH6 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)) 8
     (PUTNTH (TM-ICHAR (GETNTH (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                               (TM-IPORTS OS)))
             9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
            (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-IBUFFERS-WITH-ENQUEUED-CHARACTER OS)
                     (OS-IBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-CLEAR-INPUT-INTERRUPT (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
```

```
                           (TM-IPORTS OS))
 (TM-OPORTS OS))
```

Definition {2744}.
```
(OS-RUNNING-INPUT-TIME7 OS) = (TICK 50)
```

Definition {2745}.
```
(OS-RUNNING-INPUT-TIME8 OS) = (TICK 45)
```

Definition {2746}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH4 OS) = (TICK 84)
```

Definition {2751}.
```
(OS-RUNNING-INPUT-TIME9 OS) = (TICK 53)
```

Definition {2752}.
```
(OS-RUNNING-INPUT-TIME10 OS) = (TICK 48)
```

Definition {2753}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH5 OS) = (TICK 87)
```

Definition {2758}.
```
(OS-RUNNING-INPUT-TIME11 OS) = (TICK 52)
```

Definition {2759}.
```
(OS-RUNNING-INPUT-TIME12 OS) = (TICK 47)
```

Definition {2760}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH6 OS) = (TICK 86)
```

Definition {2765}.
```
(OS-TIME-FOR-RUNNING-INPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-INPUT-STATUS))
 (IF
  (ARRAY-QFULLP
             (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 OS))
  (OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH1 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH2 OS)
      (OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH3 OS)))
 (IF
  (ARRAY-QFULLP
             (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 OS))
  (OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH4 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH5 OS)
      (OS-TIME-FOR-RUNNING-INPUT-HANDLER-PATH6 OS))))
```

Definition {2766}.
```
(OS-RUNNING-INPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-INPUT-STATUS))
 (IF
  (ARRAY-QFULLP
             (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                 OS))
  (OS-RUNNING-INPUT-HANDLER-PATH1 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-RUNNING-INPUT-HANDLER-PATH2 OS)
```

```
      (OS-RUNNING-INPUT-HANDLER-PATH3 OS)))
 (IF
  (ARRAY-QFULLP
            (OS-CURRENT-IBUFFER (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                                OS))
  (OS-RUNNING-INPUT-HANDLER-PATH4 OS)
  (IF (TM-IPORT-ERRORP (TM-INTERRUPTING-INPUT-PORT (TM-IPORTS OS))
                       (TM-IPORTS OS))
      (OS-RUNNING-INPUT-HANDLER-PATH5 OS)
      (OS-RUNNING-INPUT-HANDLER-PATH6 OS))))
```

Definition {2768}.

```
(OS-INTENDED-OUTPUT-INTERRUPT TM)
   =
(TM-SET-MEMORY
 (PUTNTH (TM-PC TM) 0
  (PUTNTH (TM-SP TM) 1
   (PUTNTH (TM-PACK-PSW (TM-CC TM)
                        (TM-ERROR TM)
                        (TM-SVCFLAG TM)
                        (TM-SVCID TM))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS TM)) 9
     (PUTSEG (OS-TASK-TABLE TM) (OS-TASK-TABLE-ADDRESS)
      (PUTSEG (OS-SEGMENT-TABLE TM) (OS-SEGMENT-TABLE-ADDRESS)
       (PUTSEG (OS-READYQ TM) (OS-READYQ-ADDRESS)
        (PUTSEG (OS-STATUS-TABLE TM) (OS-STATUS-TABLE-ADDRESS)
         (PUTSEG (OS-OBUFFERS TM) (OS-OBUFFERS-ADDRESS)
          (PUTSEG (OS-CODE TM) (OS-CODE-ADDRESS)
           (TM-MEMORY TM)))))))))))
 (TM-SET-PC
  (OS-OUTPUT-INTERRUPT-HANDLER-ADDRESS)
  (TM-SET-SP
   (SUB1 (OS-LIMIT))
   (TM-SET-SVMODE
    (TM-SUPERVISOR-MODE)
    (TM-SET-ERROR
     (TM-NO-ERROR)
     (TM-SET-RWSTATE
      (TM-RUN-STATE)
      (TM-SET-OPORTS
       (TM-CLEAR-OUTPUT-INTERRUPT
                                 (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS TM))
                                 (TM-OPORTS TM))
       TM)))))))
```

Definition {2770}.

```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-THRU-READYQ-EMPTY-TEST OS) = (TICK 7)
```

Definition {2771}.

```
(OS-WAITING-OUTPUT-HANDLER-THRU-READYQ-EMPTY-TEST OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH 3146 (SUB1 (OS-LIMIT))
```

```
             (TM-MEMORY OS)))))))))))))
 (PUTNTH 3156 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (OS-READYQ-ADDRESS) 3
    (TM-REGS OS))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

Definition {2773}.
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST OS) = (TICK 17)

Definition {2774}.

```
(OS-WAITING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
          2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (OS-READYQ OS))
                 (OS-READYQ-ADDRESS)
          (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                    (AK-READY-STATUS)
                                    0 OS)
                  (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-TRACE-LABEL34) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS)))))))))))))
 (PUTNTH (OS-TRACE-LABEL35) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             5
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH 1 (OS-READYQ OS))
                               (AK-TASKIDLUB)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
```

```
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

Definition {2776}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-DISPATCHER1 OS) = (TICK 7)
```

Definition {2777}.
```
(OS-WAITING-OUTPUT-HANDLER-TO-DISPATCHER1 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (OS-READYQ OS))
                 (OS-READYQ-ADDRESS)
          (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                    (AK-READY-STATUS)
                                    0 OS)
                  (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH 3195 (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 2
    (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
            3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (PLUS 211
                    (TIMES 2
                           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

Definition {2779}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-DISPATCHER2 OS) = (TICK 19)
```

Definition {2780}.
```
(OS-WAITING-OUTPUT-HANDLER-TO-DISPATCHER2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
```

```
    (PUTNTH (TM-SP OS) 1
     (PUTNTH (TM-PACK-PSW (TM-CC OS)
                          (TM-ERROR OS)
                          (TM-SVCFLAG OS)
                          (TM-SVCID OS))
             2
       (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
        (PUTNTH (OS-DISPATCHER-ADDRESS) 10
         (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
          (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
           (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
            (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                               (OS-READYQ OS))
                    (OS-READYQ-ADDRESS)
             (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                       (AK-READY-STATUS)
                                       0 OS)
                     (OS-STATUS-TABLE-ADDRESS)
              (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                      (OS-OBUFFERS-ADDRESS)
               (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
                (PUTNTH (OS-TRACE-LABEL36) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS)))))))))))))
   (PUTNTH (OS-DISPATCHER-ADDRESS) 0
    (PUTNTH (SUB1 (OS-LIMIT)) 1
     (PUTNTH (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                   (TABLE 8 (OS-OBUFFERS OS))))
             2
       (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                     (TIMES 8
                            (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
              3
        (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
         (PUTNTH (PLUS 211
                       (TIMES 2
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                5
          (TM-REGS OS)))))))
   (TM-CC-VALUE
    (TM-ALU-INCR-MOD
                    (GETNTH 0
                            (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                    (TABLE 8 (OS-OBUFFERS OS))))
                    (GETNTH 3
                            (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                    (TABLE 8 (OS-OBUFFERS OS))))))
   (TM-NO-ERROR)
   (TM-SVCFLAG OS)
   (TM-SVCID OS)
   (TM-BASE OS)
   (TM-LIMIT OS)
   (TM-SLIMIT OS)
   (TM-SUPERVISOR-MODE)
   (TM-RUN-STATE)
   (TM-CLOCK OS)
   (TM-IPORTS OS)
   (TM-START-OUTPUT
             (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                   (TABLE 8 (OS-OBUFFERS OS))))
             (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
             (TM-OPORTS OS)))
```

Definition {2782}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-LPSW OS) = (TICK 33)
```

Definition {2783}.
```
(OS-WAITING-OUTPUT-HANDLER-PATH1 OS)
   =
(TM
```

```
(PUTNTH (GETNTH (TIMES 9
                       (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                (OS-TASK-TABLE OS))
        0
 (PUTNTH (GETNTH (PLUS 1
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         1
  (PUTNTH (GETNTH (PLUS 8
                        (TIMES 9
                               (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                  (OS-TASK-TABLE OS))
          2
   (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
    (PUTNTH (OS-DISPATCHER-ADDRESS) 10
     (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
      (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
       (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
        (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                           (OS-READYQ OS))
                (OS-READYQ-ADDRESS)
         (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                   (AK-READY-STATUS)
                                   0 OS)
                 (OS-STATUS-TABLE-ADDRESS)
          (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
           (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
            (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
             (TM-MEMORY OS))))))))))))))
(GETSEG 0 8
        (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                (TABLE 9 (OS-TASK-TABLE OS))))
(REMAINDER
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         4)
(QUOTIENT
 (REMAINDER
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         256)
 4)
(QUOTIENT
 (REMAINDER
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         512)
 256)
(QUOTIENT
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         512)
(BASE (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
              (TABLE 2 (OS-SEGMENT-TABLE OS))))
(LIMIT (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
               (TABLE 2 (OS-SEGMENT-TABLE OS))))
(TM-SLIMIT OS)
(TM-USER-MODE)
(TM-RUN-STATE)
(AK-TIME-SLICE)
```

```
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

Definition {2785}.

```
(OS-WAITING-OUTPUT-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES 9
                       (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                (OS-TASK-TABLE OS))
        0
  (PUTNTH (GETNTH (PLUS 1
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         1
   (PUTNTH (GETNTH (PLUS 8
                        (TIMES 9
                               (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                  (OS-TASK-TABLE OS))
          2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (OS-READYQ OS))
                (OS-READYQ-ADDRESS)
          (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                    (AK-READY-STATUS)
                                    0 OS)
                 (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                  (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-DISPATCHER-TRACE-LABEL2) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS)))))))))))))
 (GETSEG 0 8
        (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                (TABLE 9 (OS-TASK-TABLE OS))))
 (REMAINDER
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         4)
 (QUOTIENT
  (REMAINDER
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         256)
  4)
 (QUOTIENT
  (REMAINDER
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
         512)
  256)
 (QUOTIENT
         (GETNTH (PLUS 8
                       (TIMES 9
                              (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
                 (OS-TASK-TABLE OS))
```

```
          512)
 (BASE (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
               (TABLE 2 (OS-SEGMENT-TABLE OS))))
 (LIMIT (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                (TABLE 2 (OS-SEGMENT-TABLE OS))))
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (AK-TIME-SLICE)
 (TM-IPORTS OS)
 (TM-START-OUTPUT
           (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
           (TM-OPORTS OS)))
```

<u>Definition</u> {2787}.

```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST2 OS) = (TICK 5)
```

<u>Definition</u> {2788}.

```
(OS-WAITING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-TRACE-LABEL32) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-TRACE-LABEL35) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (OS-READYQ-ADDRESS) 3
    (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                  (TIMES 2
                         (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
            5
     (TM-REGS OS)))))
 (TM-CC-VALUE
  (TM-ALU-DIFFERENCE
                 (GETNTH (TIMES 2
                                (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                         (OS-STATUS-TABLE OS))
                 4))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

<u>Definition</u> {2790}.

```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-DISPATCHER3 OS) = (TICK 7)
```

<u>Definition</u> {2791}.

```
(OS-WAITING-OUTPUT-HANDLER-TO-DISPATCHER3 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH 3195 (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                 (TIMES 8
                        (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
           3
    (PUTNTH (PLUS 211
                  (TIMES 2
                         (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
            5
     (TM-REGS OS)))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

<u>Definition</u> {2793}.

```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-DISPATCHER4 OS) = (TICK 19)
```

<u>Definition</u> {2794}.

```
(OS-WAITING-OUTPUT-HANDLER-TO-DISPATCHER4 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
```

```
                   (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-TRACE-LABEL36) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-DISPATCHER-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           2
    (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
            3
     (PUTNTH (PLUS 211
                   (TIMES 2
                          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             5
      (TM-REGS OS))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                 (GETNTH 0
                         (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
                 (GETNTH 3
                         (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-START-OUTPUT
           (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
           (TM-OPORTS OS)))
```

<u>Definition</u> {2796}.
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-TO-WAIT OS) = (TICK 6)

<u>Definition</u> {2797}.

```
(OS-WAITING-OUTPUT-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-DISPATCHER-QEMPTYP-RETURN-ADDRESS) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
```

```
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 211
                   (TIMES 2
                          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             5
      (TM-REGS OS)))))
  (TM-ZERO-NO-CARRY-CONDITION)
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-USER-MODE)
  (TM-WAIT-STATE)
  (TM-CLOCK OS)
  (TM-IPORTS OS)
  (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (TM-OPORTS OS)))
```

Definition {2799}.

```
(OS-WAITING-OUTPUT-HANDLER-PATH4 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-DISPATCHER-ADDRESS) 10
      (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
       (PUTSEG (OS-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
        (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
         (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
          (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
           (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                   (OS-OBUFFERS-ADDRESS)
            (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
             (PUTNTH (OS-DISPATCHER-QEMPTYP-RETURN-ADDRESS) (SUB1 (OS-LIMIT))
              (TM-MEMORY OS))))))))))))))
 (PUTNTH (OS-PC-AFTER-WAIT) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 211
                   (TIMES 2
                          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             5
      (TM-REGS OS))))))
 (TM-ZERO-NO-CARRY-CONDITION)
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-WAIT-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-START-OUTPUT
           (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
```

```
           (TM-OPORTS OS)))
```

Definition {2801}.
```
(OS-WAITING-OUTPUT-TIME1 OS) = (TICK 57)
```

Definition {2802}.
```
(OS-WAITING-OUTPUT-TIME2 OS) = (TICK 40)
```

Definition {2803}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH1 OS) = (TICK 64)
```

Definition {2808}.
```
(OS-WAITING-OUTPUT-TIME3 OS) = (TICK 69)
```

Definition {2809}.
```
(OS-WAITING-OUTPUT-TIME4 OS) = (TICK 52)
```

Definition {2810}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH2 OS) = (TICK 76)
```

Definition {2815}.
```
(OS-WAITING-OUTPUT-TIME5 OS) = (TICK 18)
```

Definition {2816}.
```
(OS-WAITING-OUTPUT-TIME6 OS) = (TICK 13)
```

Definition {2817}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH3 OS) = (TICK 25)
```

Definition {2822}.
```
(OS-WAITING-OUTPUT-TIME7 OS) = (TICK 30)
```

Definition {2823}.
```
(OS-WAITING-OUTPUT-TIME8 OS) = (TICK 25)
```

Definition {2824}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH4 OS) = (TICK 37)
```

Definition {2829}.
```
(OS-TIME-FOR-WAITING-OUTPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-OUTPUT-STATUS))
 (IF
  (ARRAY-QEMPTYP
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 OS))
  (OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH1 OS)
  (OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH2 OS))
 (IF
  (ARRAY-QEMPTYP
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 OS))
  (OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH3 OS)
  (OS-TIME-FOR-WAITING-OUTPUT-HANDLER-PATH4 OS)))
```

Definition {2830}.
```
(OS-WAITING-OUTPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-OUTPUT-STATUS))
 (IF
  (ARRAY-QEMPTYP
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 OS))
  (OS-WAITING-OUTPUT-HANDLER-PATH1 OS)
  (OS-WAITING-OUTPUT-HANDLER-PATH2 OS))
 (IF
  (ARRAY-QEMPTYP
```

```
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                   OS))
   (OS-WAITING-OUTPUT-HANDLER-PATH3 OS)
   (OS-WAITING-OUTPUT-HANDLER-PATH4 OS)))
```

Definition {2832}.

```
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-THRU-SAVE-STATE OS) = (TICK 34)
```

Definition {2833}.

```
(OS-RUNNING-OUTPUT-HANDLER-THRU-SAVE-STATE OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL33) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL33) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (GETNTH 2 (TM-REGS OS)) 2
    (PUTNTH (GETNTH 3 (TM-REGS OS)) 3
     (TM-REGS OS)))))
 (TM-CC-VALUE (TM-ALU-PLUS (PLUS 15
                                 (TIMES 9
                                        (ARRAY-QFIRST (OS-READYQ OS))))
                           8))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

Definition {2835}.

```
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST OS) = (TICK 17)
```

Definition {2836}.

```
(OS-RUNNING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
```

```
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL34) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-TRACE-LABEL35) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 2
    (PUTNTH (OS-READYQ-ADDRESS) 3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (PLUS (OS-STATUS-TABLE-ADDRESS)
                    (TIMES 2
                           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
              5
       (TM-REGS OS)))))))
 (TM-CC-VALUE (TM-ALU-INCR-MOD (GETNTH 1 (OS-READYQ OS))
                               (AK-TASKIDLUB)))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

Definition {2838}.
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK1 OS) = (TICK 7)

Definition {2839}.

```
(OS-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK1 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
```

```
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH 3195 (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS)))))))))))))))
  (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
   (PUTNTH (SUB1 (OS-LIMIT)) 1
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 2
     (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                   (TIMES 8
                          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             3
      (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
       (PUTNTH (PLUS 211
                     (TIMES 2
                            (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
               5
        (TM-REGS OS)))))))
  (TM-ZERO-NO-CARRY-CONDITION)
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-SUPERVISOR-MODE)
  (TM-RUN-STATE)
  (TM-CLOCK OS)
  (TM-IPORTS OS)
  (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (TM-OPORTS OS)))
```

Definition {2841}.

```
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK2 OS) = (TICK 19)
```

Definition {2842}.

```
(OS-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                    (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL36) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           2
```

```
    (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
            3
     (PUTNTH (PLUS 195 (GETNTH 1 (OS-READYQ OS))) 4
      (PUTNTH (PLUS 211
                    (TIMES 2
                           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
              5
       (TM-REGS OS))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                 (GETNTH 0
                         (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
                 (GETNTH 3
                         (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-START-OUTPUT
           (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
           (TM-OPORTS OS)))
```

<u>Definition</u> {2844}.
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-TO-LPSW OS) = (TICK 28)

<u>Definition</u> {2845}.

```
(OS-RUNNING-OUTPUT-HANDLER-PATH1 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
        0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
```

```
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

<u>Definition</u> {2847}.

```
(OS-RUNNING-OUTPUT-HANDLER-PATH2 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (ARRAY-ENQ (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (OS-READYQ OS))
                  (OS-READYQ-ADDRESS)
           (PUTSEG (OS-UPDATE-STATUS (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                     (AK-READY-STATUS)
                                     0 OS)
                   (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                    (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-START-OUTPUT
```

```
          (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                (TABLE 8 (OS-OBUFFERS OS))))
          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
          (TM-OPORTS OS)))
```

<u>Definition</u> {2849}.

```
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST2 OS) = (TICK 5)
```

<u>Definition</u> {2850}.

```
(OS-RUNNING-OUTPUT-HANDLER-TO-OBUFFER-EMPTY-TEST2 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-TRACE-LABEL33) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))))
 (PUTNTH (OS-TRACE-LABEL35) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (GETNTH 2 (TM-REGS OS)) 2
    (PUTNTH (GETNTH 3 (TM-REGS OS)) 3
     (PUTNTH (PLUS 211
                   (TIMES 2
                          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             5
      (TM-REGS OS))))))
 (TM-CC-VALUE
  (TM-ALU-DIFFERENCE
                 (GETNTH (TIMES 2
                                (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                         (OS-STATUS-TABLE OS))
                 4))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

<u>Definition</u> {2852}.

```
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK3 OS) = (TICK 7)
```

<u>Definition</u> {2853}.

```
(OS-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK3 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
```

```
                         (TM-ERROR OS)
                         (TM-SVCFLAG OS)
                         (TM-SVCID OS))
            2
     (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
      (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
       (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
        (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
         (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
          (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
           (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
            (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
             (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
              (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
               (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
                (PUTNTH 3195 (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS))))))))))))))))
  (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
   (PUTNTH (SUB1 (OS-LIMIT)) 1
    (PUTNTH (GETNTH 2 (TM-REGS OS)) 2
     (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                   (TIMES 8
                          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             3
      (PUTNTH (PLUS 211
                    (TIMES 2
                           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
              5
       (TM-REGS OS))))))
  (TM-ZERO-NO-CARRY-CONDITION)
  (TM-NO-ERROR)
  (TM-SVCFLAG OS)
  (TM-SVCID OS)
  (TM-BASE OS)
  (TM-LIMIT OS)
  (TM-SLIMIT OS)
  (TM-SUPERVISOR-MODE)
  (TM-RUN-STATE)
  (TM-CLOCK OS)
  (TM-IPORTS OS)
  (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                             (TM-OPORTS OS)))
```

Definition {2855}.

```
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK4 OS) = (TICK 19)
```

Definition {2856}.

```
(OS-RUNNING-OUTPUT-HANDLER-TO-RESUME-TASK4 OS)
   =
(TM
 (PUTNTH (TM-PC OS) 0
  (PUTNTH (TM-SP OS) 1
   (PUTNTH (TM-PACK-PSW (TM-CC OS)
                        (TM-ERROR OS)
                        (TM-SVCFLAG OS)
                        (TM-SVCID OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                    (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
```

```
               (PUTNTH (OS-TRACE-LABEL36) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (PUTNTH (OS-RESUME-TASK-ADDRESS) 0
  (PUTNTH (SUB1 (OS-LIMIT)) 1
   (PUTNTH (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           2
    (PUTNTH (PLUS (OS-OBUFFERS-ADDRESS)
                  (TIMES 8
                         (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
            3
     (PUTNTH (PLUS 211
                   (TIMES 2
                          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))))
             5
      (TM-REGS OS))))))
 (TM-CC-VALUE
  (TM-ALU-INCR-MOD
                (GETNTH 0
                        (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                (TABLE 8 (OS-OBUFFERS OS))))
                (GETNTH 3
                        (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                (TABLE 8 (OS-OBUFFERS OS))))))
 (TM-NO-ERROR)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-SUPERVISOR-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-START-OUTPUT
           (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 (TABLE 8 (OS-OBUFFERS OS))))
           (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
           (TM-OPORTS OS)))
```

<u>Definition</u> {2858}.

```
(OS-RUNNING-OUTPUT-HANDLER-PATH3 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS OS) (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
```

```
                (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                 (TM-MEMORY OS)))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-CLEAR-OUTPUT-INTERRUPT (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                            (TM-OPORTS OS)))
```

<u>Definition</u> {2860}.

```
(OS-RUNNING-OUTPUT-HANDLER-PATH4 OS)
   =
(TM
 (PUTNTH (GETNTH (TIMES (TM-CPU-LENGTH)
                        (ARRAY-QFIRST (OS-READYQ OS)))
                 (OS-NEW-TASK-TABLE OS))
         0
  (PUTNTH (GETNTH (PLUS 1
                        (TIMES (TM-CPU-LENGTH)
                               (ARRAY-QFIRST (OS-READYQ OS))))
                  (OS-NEW-TASK-TABLE OS))
          1
   (PUTNTH (GETNTH (PLUS 8
                         (TIMES (TM-CPU-LENGTH)
                                (ARRAY-QFIRST (OS-READYQ OS))))
                   (OS-NEW-TASK-TABLE OS))
           2
    (PUTNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)) 9
     (PUTNTH (OS-RESUME-TASK-ADDRESS) 10
      (PUTNTH (TM-R2 OS) (OS-TEMP-R2-ADDRESS)
       (PUTNTH (TM-R3 OS) (OS-TEMP-R3-ADDRESS)
        (PUTSEG (OS-NEW-TASK-TABLE OS) (OS-TASK-TABLE-ADDRESS)
         (PUTSEG (OS-SEGMENT-TABLE OS) (OS-SEGMENT-TABLE-ADDRESS)
          (PUTSEG (OS-READYQ OS) (OS-READYQ-ADDRESS)
           (PUTSEG (OS-STATUS-TABLE OS) (OS-STATUS-TABLE-ADDRESS)
            (PUTSEG (OS-OBUFFERS-WITH-DEQUEUED-CHARACTER OS)
                    (OS-OBUFFERS-ADDRESS)
             (PUTSEG (OS-CODE OS) (OS-CODE-ADDRESS)
              (PUTNTH (OS-SAVE-STATE-RETURN-ADDRESS) (SUB1 (SUB1 (OS-LIMIT)))
               (PUTNTH (OS-RESUME-TASK-TRACE-LABEL1) (SUB1 (OS-LIMIT))
                (TM-MEMORY OS)))))))))))))))
 (TM-REGS OS)
 (TM-CC OS)
 (TM-ERROR OS)
 (TM-SVCFLAG OS)
 (TM-SVCID OS)
 (TM-BASE OS)
 (TM-LIMIT OS)
 (TM-SLIMIT OS)
 (TM-USER-MODE)
 (TM-RUN-STATE)
 (TM-CLOCK OS)
 (TM-IPORTS OS)
 (TM-START-OUTPUT
          (ARRAY-QFIRST (GETNTH (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                (TABLE 8 (OS-OBUFFERS OS))))
          (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
          (TM-OPORTS OS)))
```

<u>Definition</u> {2862}.

```
(OS-RUNNING-OUTPUT-TIME1 OS) = (TICK 52)
```

```
Definition {2863}.
(OS-RUNNING-OUTPUT-TIME2 OS) = (TICK 35)

Definition {2864}.
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH1 OS) = (TICK 86)

Definition {2869}.
(OS-RUNNING-OUTPUT-TIME3 OS) = (TICK 64)

Definition {2870}.
(OS-RUNNING-OUTPUT-TIME4 OS) = (TICK 47)

Definition {2871}.
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH2 OS) = (TICK 98)

Definition {2876}.
(OS-RUNNING-OUTPUT-TIME5 OS) = (TICK 40)

Definition {2877}.
(OS-RUNNING-OUTPUT-TIME6 OS) = (TICK 35)

Definition {2878}.
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH3 OS) = (TICK 74)

Definition {2883}.
(OS-RUNNING-OUTPUT-TIME7 OS) = (TICK 52)

Definition {2884}.
(OS-RUNNING-OUTPUT-TIME8 OS) = (TICK 47)

Definition {2885}.
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH4 OS) = (TICK 86)

Definition {2890}.
(OS-TIME-FOR-RUNNING-OUTPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-OUTPUT-STATUS))
 (IF
  (ARRAY-QEMPTYP
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 OS))
  (OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH1 OS)
  (OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH2 OS))
 (IF
  (ARRAY-QEMPTYP
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 OS))
  (OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH3 OS)
  (OS-TIME-FOR-RUNNING-OUTPUT-HANDLER-PATH4 OS)))

Definition {2891}.
(OS-RUNNING-OUTPUT-HANDLER OS)
   =
(IF
 (EQUAL (GETNTH (TIMES 2
                       (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS)))
                (OS-STATUS-TABLE OS))
        (AK-OUTPUT-STATUS))
 (IF
  (ARRAY-QEMPTYP
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 OS))
  (OS-RUNNING-OUTPUT-HANDLER-PATH1 OS)
  (OS-RUNNING-OUTPUT-HANDLER-PATH2 OS))
 (IF
  (ARRAY-QEMPTYP
             (OS-CURRENT-OBUFFER (TM-INTERRUPTING-OUTPUT-PORT (TM-OPORTS OS))
                                 OS))
  (OS-RUNNING-OUTPUT-HANDLER-PATH3 OS)
  (OS-RUNNING-OUTPUT-HANDLER-PATH4 OS)))
```

```
Definition {3618}.
(OS-SVC-HANDLER OS)
   =
(IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
           (OS-SVC-SEND-ID))
    (OS-SVC-SEND-HANDLER OS)
    (IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
               (OS-SVC-RECEIVE-ID))
        (OS-SVC-RECEIVE-HANDLER OS)
        (IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
                   (OS-SVC-TYO-ID))
            (OS-SVC-TYO-HANDLER OS)
            (OS-SVC-TYI-HANDLER OS))))

Definition {3619}.
(OS-TIME-FOR-SVC-HANDLER OS)
   =
(IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
           (OS-SVC-SEND-ID))
    (OS-TIME-FOR-SVC-SEND-HANDLER OS)
    (IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
               (OS-SVC-RECEIVE-ID))
        (OS-TIME-FOR-SVC-RECEIVE-HANDLER OS)
        (IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
                   (OS-SVC-TYO-ID))
            (OS-TIME-FOR-SVC-TYO-HANDLER OS)
            (OS-TIME-FOR-SVC-TYI-HANDLER OS))))

Definition {3620}.
(OS-INTENDED-SVC-INTERRUPT OS)
   =
(IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
           (OS-SVC-SEND-ID))
    (OS-INTENDED-SVC-SEND-INTERRUPT OS)
    (IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
               (OS-SVC-RECEIVE-ID))
        (OS-INTENDED-SVC-RECEIVE-INTERRUPT OS)
        (IF (EQUAL (REMAINDER (TM-SVCID OS) 4)
                   (OS-SVC-TYO-ID))
            (OS-INTENDED-SVC-TYO-INTERRUPT OS)
            (OS-INTENDED-SVC-TYI-INTERRUPT OS))))

Definition {3626}.
(OS-INPUT-INTERRUPT-HANDLER OS)
   =
(IF (TM-WAITING OS)
    (OS-WAITING-INPUT-HANDLER OS)
    (OS-RUNNING-INPUT-HANDLER OS))

Definition {3627}.
(OS-TIME-FOR-INPUT-INTERRUPT-HANDLER OS)
   =
(IF (TM-WAITING OS)
    (OS-TIME-FOR-WAITING-INPUT-HANDLER OS)
    (OS-TIME-FOR-RUNNING-INPUT-HANDLER OS))

Definition {3630}.
(OS-OUTPUT-INTERRUPT-HANDLER OS)
   =
(IF (TM-WAITING OS)
    (OS-WAITING-OUTPUT-HANDLER OS)
    (OS-RUNNING-OUTPUT-HANDLER OS))

Definition {3631}.
(OS-TIME-FOR-OUTPUT-INTERRUPT-HANDLER OS)
   =
(IF (TM-WAITING OS)
    (OS-TIME-FOR-WAITING-OUTPUT-HANDLER OS)
    (OS-TIME-FOR-RUNNING-OUTPUT-HANDLER OS))

Definition {3634}.
(OS-STEP OS)
```

```
   =
(IF (TM-INPUT-INTERRUPTP OS)
    (OS-INPUT-INTERRUPT-HANDLER OS)
    (IF (TM-OUTPUT-INTERRUPTP OS)
        (OS-OUTPUT-INTERRUPT-HANDLER OS)
        (IF (TM-WAITING OS)
            OS
            (IF (TM-ERRORP OS)
                (OS-ERROR-HANDLER OS)
                (IF (TM-CLOCK-INTERRUPTP OS)
                    (OS-CLOCK-INTERRUPT-HANDLER OS)
                    (IF (TM-SVC-INTERRUPTP OS)
                        (OS-SVC-HANDLER OS)
                        (TM-FETCH-EXECUTE OS)))))))
```

<u>Definition</u> {3635}.

```
(OS-PROCESSOR OS ORACLE)
   =
(IF (LISTP ORACLE)
    (OS-PROCESSOR (OS-STEP (TM-POST-INTERRUPT (CAR ORACLE) OS))
                  (CDR ORACLE))
    OS)
```

<u>Definition</u> {3638}.

```
(TIMED-TM-STEP TM)
   =
(IF (TM-INPUT-INTERRUPTP TM)
    (TM-PROCESSOR (TM-EXECUTE-INPUT-INTERRUPT TM)
                  (OS-TIME-FOR-INPUT-INTERRUPT-HANDLER TM))
    (IF (TM-OUTPUT-INTERRUPTP TM)
        (TM-PROCESSOR (TM-EXECUTE-OUTPUT-INTERRUPT TM)
                      (OS-TIME-FOR-OUTPUT-INTERRUPT-HANDLER TM))
        (IF (TM-WAITING TM)
            TM
            (IF (TM-ERRORP TM)
                (TM-PROCESSOR (TM-EXECUTE-ERROR-INTERRUPT TM)
                              (OS-TIME-FOR-ERROR-HANDLER TM))
                (IF (TM-CLOCK-INTERRUPTP TM)
                    (TM-PROCESSOR (TM-EXECUTE-CLOCK-INTERRUPT TM)
                                  (OS-TIME-FOR-CLOCK-INTERRUPT-HANDLER TM))
                    (IF (TM-SVC-INTERRUPTP TM)
                        (TM-PROCESSOR (TM-EXECUTE-SVC-INTERRUPT TM)
                                      (OS-TIME-FOR-SVC-HANDLER TM))
                        (TM-FETCH-EXECUTE TM)))))))
```

<u>Definition</u> {3639}.

```
(TIMED-TM-PROCESSOR TM ORACLE)
   =
(IF (LISTP ORACLE)
    (TIMED-TM-PROCESSOR (TIMED-TM-STEP (TM-POST-INTERRUPT (CAR ORACLE) TM))
                        (CDR ORACLE))
    TM)
```

<u>Definition</u> {3640}.

```
(OS-ORACLE-STEP EVENT OS)
   =
(IF (TM-INPUT-INTERRUPTP OS)
    (CONS EVENT
          (OS-TIME-FOR-INPUT-INTERRUPT-HANDLER OS))
    (IF (TM-OUTPUT-INTERRUPTP OS)
        (CONS EVENT
              (OS-TIME-FOR-OUTPUT-INTERRUPT-HANDLER OS))
        (IF (TM-WAITING OS)
            (LIST EVENT)
            (IF (TM-ERRORP OS)
                (CONS EVENT
                      (OS-TIME-FOR-ERROR-HANDLER OS))
                (IF (TM-CLOCK-INTERRUPTP OS)
                    (CONS EVENT
                          (OS-TIME-FOR-CLOCK-INTERRUPT-HANDLER OS))
```

```
                    (IF (TM-SVC-INTERRUPTP OS)
                        (CONS EVENT
                              (OS-TIME-FOR-SVC-HANDLER OS))
                        (LIST EVENT))))))
```

Definition {3641}.

```
(OS-ORACLE OS ORACLE)
   =
(IF (LISTP ORACLE)
    (APPEND (OS-ORACLE-STEP (CAR ORACLE)
                            (TM-POST-INTERRUPT (CAR ORACLE) OS))
            (OS-ORACLE (TIMED-TM-STEP (TM-POST-INTERRUPT (CAR ORACLE) OS))
                       (CDR ORACLE)))
    ORACLE)
```

Definition {3645}.

```
(BTIMED-TM-PROCESSOR TM ORACLE)
   =
(IF (LISTP ORACLE)
    (TIMED-TM-STEP (TM-POST-INTERRUPT (CAR ORACLE)
                                      (BTIMED-TM-PROCESSOR TM
                                                           (CDR ORACLE))))
    TM)
```

Definition {3647}.

```
(BOS-PROCESSOR OS ORACLE)
   =
(IF (LISTP ORACLE)
    (OS-STEP (TM-POST-INTERRUPT (CAR ORACLE)
                                (BOS-PROCESSOR OS (CDR ORACLE))))
    OS)
```

Definition {4617}.

```
(BAK-PROCESSOR AK ORACLE)
   =
(IF (LISTP ORACLE)
    (AK-STEP (AK-POST-INTERRUPT (CAR ORACLE)
                                (BAK-PROCESSOR AK (CDR ORACLE))))
    AK)
```

Definition {4622}.

```
(PROJECT-ITH-TASK I OS) = (PROJECT I (MAPUP-OS OS))
```

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