

Simplify Troubleshooting Tasks

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This module supports **TotalPlant** Solution (TPS) system network.

TPS is the evolution of TDC 3000^X.

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Table of Contents

Module Introduction	1
Module Objective	1
Terms You Should Know	3
TPS Network Fault Containment/Tolerance Strategy	5
Fault Containment.....	5
Fault Tolerance	5
Self-Diagnostics	6
Built-in Maintenance Aids Provided by Universal Station/Global User Station	7
Event Reporting.....	9
Journal Operations.....	13
System Journal Messages.....	17
SMCC/Maintenance Functions	23
List of SMCC Functions	23
Error Accumulation Thresholds	27
SMCC Detailed Module Error Display	29
Display Format.....	32
Node Administrator Errors	35
Node Dumps	39
LAB EXERCISE	41
Part 1.....	41
Part 2.....	42
Appendix A.....	43
LED Displays	43
LED Displays	45
Appendix B.....	47
Clearing the Error Aggregates from the System HM.....	47
Appendix C.....	51
Where to Find Error Codes in System Documentation.....	51
Appendix D.....	67
Task Names.....	67

Acronyms

ACP	Advanced Control Program
AM	Application Module
APM	Advanced Process Manager
CG	Computer Gateway
CL	Control Language
ET	Event Types
GUS	Global User Station
HG	Hiway Gateway
HM	History Module
HPM	High Performance Process Manager
HVTS	Hardware Verification Test
IOP	Input/Output Processor
LCN	Local Control Network
LM	Logic Manager
NCF	Network Configuration File
NIM	Network Interface Module
OPA	On-Process Analysis
OPA	On-Process Analysis
OPT	Off-Process Test
ORU	Optimum Replaceable Unit
PM	Process Manager
QLT	Quality Logic Tests
RNOS	Real-Time Network Operating System
RTJ	Real Time Journal
SEH	System Error Handling
SM	Safety Manager
SMCC	System Maintenance Control Center
SOE	Sequence of Events
TAC	Technical Assistance Center
TPS	TotalPlant Solutions System
UCN	Universal Control Network
US	Universal Station

Resources

AM Implementation Guidelines	TPS 3035-2
System Control Functions	TPS 3030-2
Engineer's Reference Manual	TPS 3030-2
Messages Directory	TPS 3030-3
Hardware Verification Test System	TPS 3060-3
System Overview	TPS 3010-1

Tables

Table 1 Journal Event Types.....	14
Table 2 SMCC Functions.....	25
Table 3 Load Fail Messages — R430 and Later.....	34

Figures

Figure 1 Fault Definition.....	4
Figure 2 Error Definition.....	4
Figure 3 Failure Definition.....	4
Figure 4 Fault Containment.....	5
Figure 5 System Maintenance Aids	7
Figure 6 Error Handling	9
Figure 7 Event Distribution.....	10
Figure 8 On-Process Analysis.....	11
Figure 9 System Maintenance Message Format	18
Figure 10 System Error Message Format.....	19
Figure 11 SMCC Main Menu.....	24
Figure 12 SMCC Detailed Module Error Display	32

Module Introduction

The TPS Network system has been designed to minimize the time required to diagnose troubles. In some cases, maintenance activities can take place while the system is online. Two key features of the system make contributions to the maintenance environment:

- On-Process Tests These tests run while the system is running and controlling the process.
- Diagnostics These test programs and maintenance support software actually diagnose problems and make specific recommendations, not just report problems.

Module Objective

After studying this module, you will be able to interpret functions of the journals and online maintenance displays in order to minimize time to repair and recovery.

Terms You Should Know

Before discussing maintenance of your system, a review of the following terms will help you understand the underlying philosophy of the status and maintenance displays.

- Fault** A fault is a temporary or permanent condition in a functional unit that makes it deviate from its expected sequence of operations. A fault may exist even though it cannot be seen outside the unit, because the fault can be corrected each time it occurs.
- Error** An error is an abnormal or undesired result of an operation caused by a fault. An error may or may not be overcome by retrying the operation. The TPS Network System is designed to detect virtually all errors.
- Failure** A failure is the inability of a functional unit to perform its expected task because of a "solid" error or an error that recurs too frequently. In an LCN node, there is no such thing as a "partial failure" (as is the case in some process-connected devices).

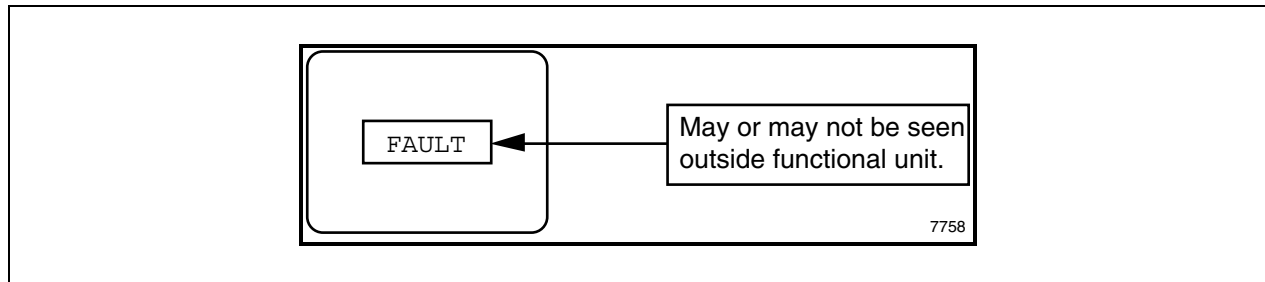


Figure 1 Fault Definition

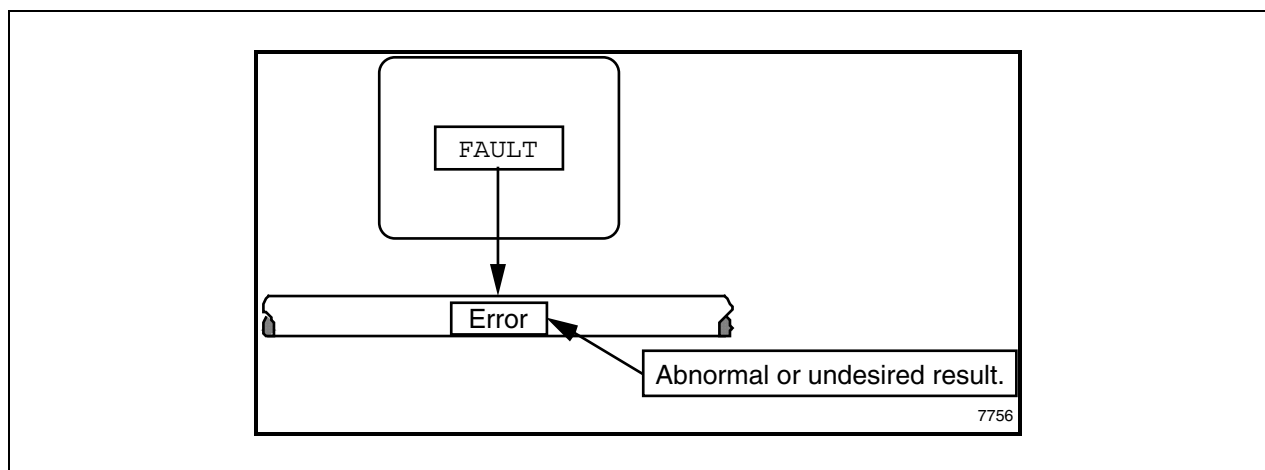


Figure 2 Error Definition

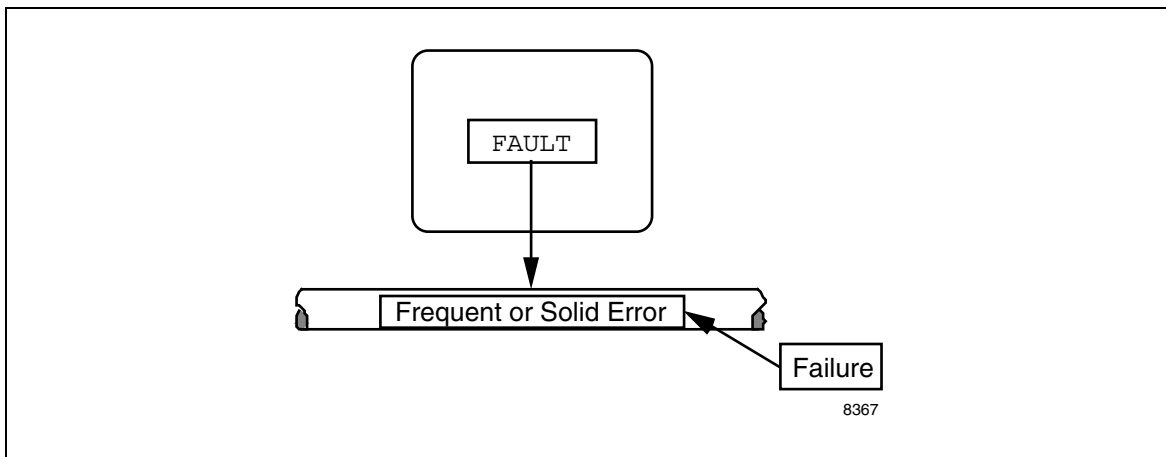


Figure 3 Failure Definition

TPS Network Fault Containment/Tolerance Strategy

Fault Containment

Figure 4 illustrates the TPS Network strategy for fault containment. If a fault occurs in a node on the LCN, the following happens:

- If possible, the result of the fault is corrected.
- If the result is not corrected, the operation is retried one or more times in the hope that the error will not recur.
- If retries are not successful, or if too many errors recur in the module, the module has failed. The operator is notified through an alarm and the module's operation is stopped in a safe state.

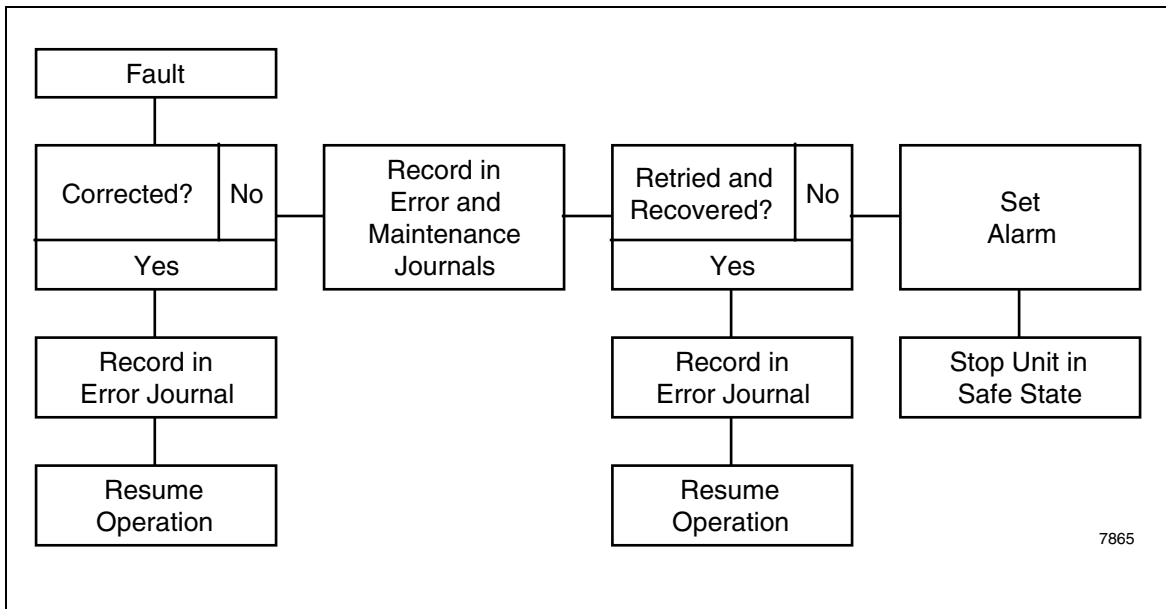


Figure 4 Fault Containment

Fault Tolerance

The TPS Network architecture contributes to fault containment and fault tolerance. If a node on the LCN fails and it has a redundant module backing it up, the backup takes over in five seconds or less. If there is no backup, the system continues to operate without the failed node.

The same strategy applies both to TPS Network control-room equipment (nodes on the LCN and devices connected to the modules) and to process-connected devices.

Self-Diagnostics

The tests built into the TPS Network system equipment are designed to diagnose a high proportion of all failures, pinpointing them to the most easily isolated and removable part, known as the Optimum Replaceable Unit (ORU). These tests run (while the system is online and controlling the process) without intervention by the operator or a maintenance technician.

Any module on the LCN, any peripheral device, and any process-connected device on the UCN or Data Hiway can be maintained and repaired while the remainder of the system is on-process. All on-site repairs are made by replacing ORUs. ORUs themselves are repaired by Honeywell.

The process-connected boxes on the Data Hiway and UCN all have built-in self-tests, which either diagnose or help diagnose failures in those boxes.

Every node on the LCN has three levels of built-in self-tests:

Startup Self-Tests	These test programs are stored in read-only memory on each board that has a microprocessor. They run after power is applied, or when the module containing the board is restarted.
Quality Logic Tests	QLTs are automatically loaded and executed after the startup self-tests. QLTs verify the correct operation of the module hardware and qualifies it for loading of its on-process software.
On-Process Tests	These tests are part of the on-process software of each module and execute whether a module is primary or backup. They run periodically to test the hardware and integrity features. After recovery from an error, these tests record the error in the system error journal for subsequent analysis. A nonrecoverable failure can cause the module to be shut down. The failure and any maintenance recommendation are reported to the operator and are recorded in the error and maintenance journals.

Built-in Maintenance Aids Provided by Universal Station/Global User Station

Purpose

The Universal Station (US)/Global User Station (GUS) has system maintenance software that can be used to do the following:

- Diagnose failures in modules on the LCN that are not diagnosed by the automatic tests.
- Test the operation of the UCN, Data Hiway, and their process-connected boxes.

Maintenance Aids

The US/GUS software plays a significant role in maintenance by providing the following functions to aid the user:

- Displays a snapshot of system status, including the status of LCN nodes and process-connected devices on the UCN and Data Hiway.
- Reports entries in the system error journal to the operator.
- Displays error history from pools kept by the nodes or from accumulations kept in an assigned History Module.
- Interacts with the system maintenance journal, displays information in that journal (including active maintenance recommendations), and accepts maintenance activity entries.
- Inquires into the node status, as requested, including the hardware, firmware, and software revision status of nodes on the LCN.
- Displays the content of memory locations in nodes on the LCN and process-connected devices.

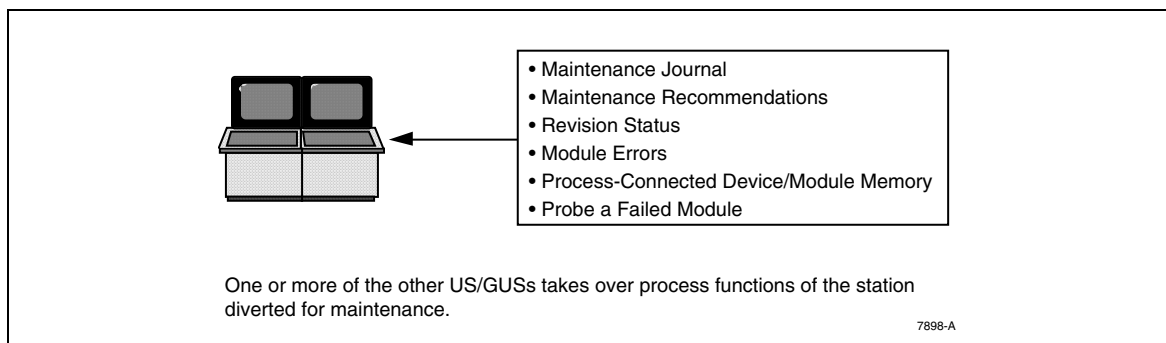


Figure 5 System Maintenance Aids

Event Reporting

System events and maintenance messages are handled by three software subsystems:

- Error Handling,
- Event Distribution, and
- On-Process Analysis.

Error Handling

Error handling consists of alarming and journaling an error. Error handling is initiated by

- applications,
- on-process tests, and
- components of the software environment.

A local error journal is kept for SMCC analysis of any node shutdowns. When a node shuts down, it attempts to send out a message on the LCN that it is going down.

Fault analysis is done on the History Module by a function called On-Process Analysis (OPA) using data sent by the error handlers in all the nodes.

The results are usually a maintenance recommendation to the operator.

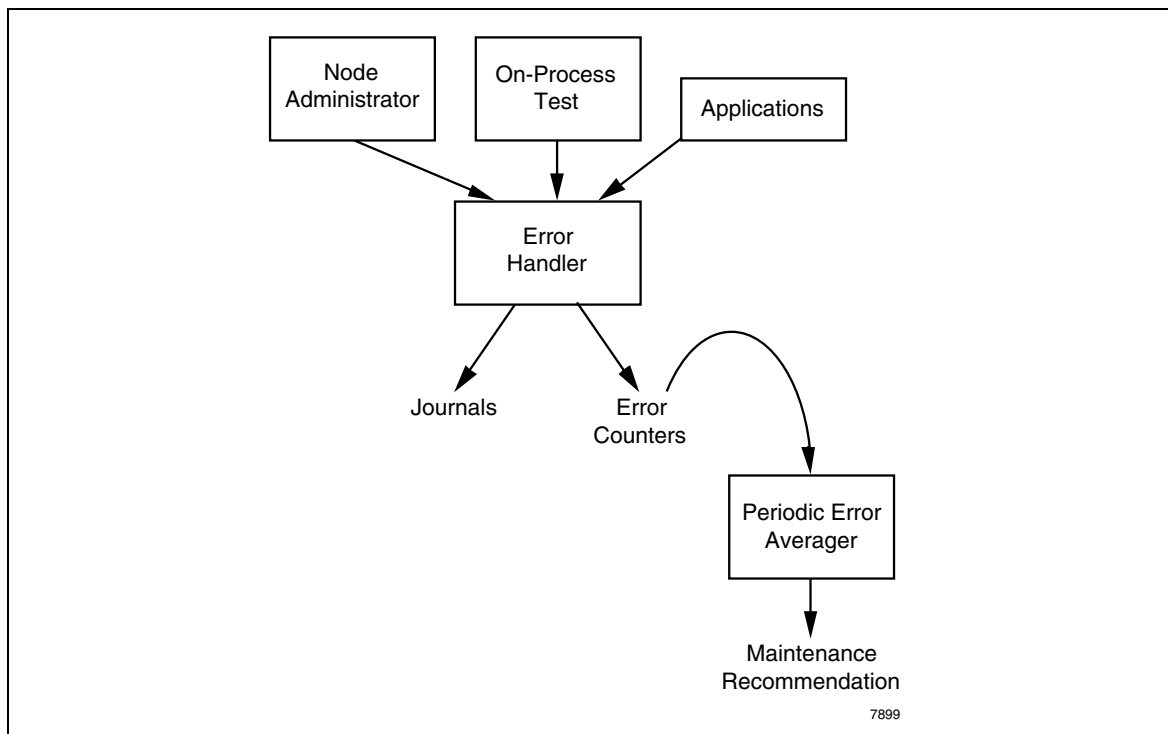


Figure 6 Error Handling

Event Distribution

Events are sent to one or more of four places:

- OPA or On-Process Analysis (Analysis and maintenance recommendations are made by this function.)
- Universal Stations/Global User Stations (Events are sent to the real time journals.)
- SMCC or System Maintenance Control Center.
- Historical Journals on the History Module.

Event distribution sends a message and waits for acknowledgement that the event was received.

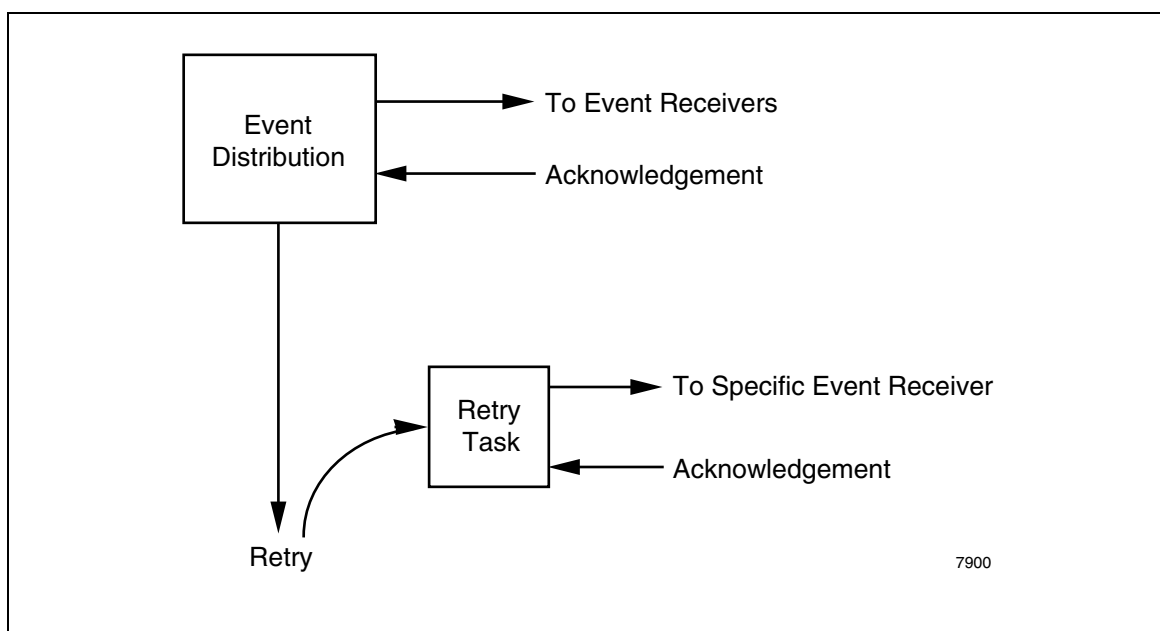


Figure 7 Event Distribution

On-Process Analysis

All errors and maintenance recommendations generated by the built-in tests are accumulated by a History Module for use by the On-Process Analysis (OPA) function. The OPA function resides in the system History Module; its primary role is the collation of error information by error type for each node, in order to perform predictive failure analysis and to issue maintenance recommendations.

On-Process analysis also provides a printed error history that can be returned to the Honeywell factory with the ORU being replaced.

The on-process analysis function in the History Module receives fault reports from the system error handler or on-process test in the LCN nodes through the Event Distribution mechanism.

The HM analyzes the error to decide whether to make a *maintenance recommendation*. The analysis is based on the number of similar errors over a given time period. If a maintenance recommendation should be made, On-Process Analysis sends an event to the history module journals and, through event distribution, to the Real Time Journal on the US/GUS.

Maintenance recommendations are made based on replacing the Optimum Replacement Unit (ORU), which is a board or peripheral device.

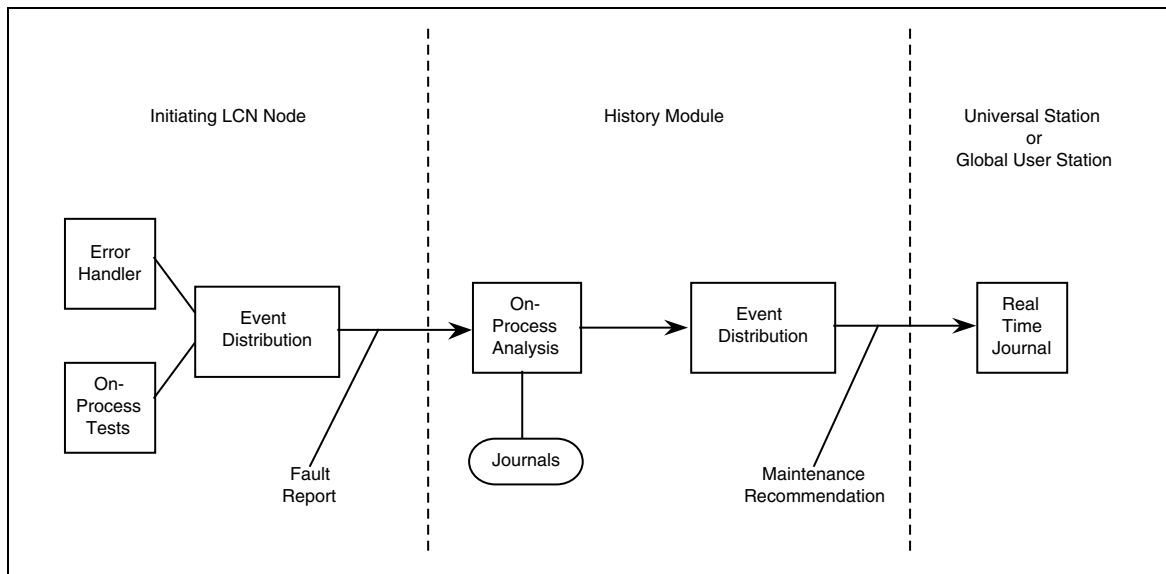


Figure 8 On-Process Analysis

When OPA runs, it correlates each error by ORU, error type, and module and adds it to an error aggregate for the module; additionally, OPA performs analysis of communication errors to help identify their origin. OPA analyzes each error aggregate to determine if error thresholds for each ORU and error type have been exceeded over the last 90 days. These error thresholds are established both for the error rate and for the rate at which the error rate itself is changing. The HM adds OPA generated maintenance recommendations to the Active Maintenance Journal which you may view from SMCC.



ATTENTION

If the system or node is new and has not been in operation for at least 90 days, it is possible that maintenance recommendations may be made based on only a few errors. In this case, you may want to investigate further any OPA generated maintenance recommendation.

Journal Operations

If a History Module is set-up for journalling, events are saved in the HM journal files. These historized journals are available for display or printing through the Report/Log/Trend/Journal Menu Display or the Event History Retrieval Display. Regardless of whether or not the HM is set up for journalling, events can be sent to a printer through the Real Time Journal assignment.

Journal Types

Journals can be separated into two categories, system events and process events.

System journals include

- system status change
- system error
- system maintenance

Process journals include

- process alarms
- operator process changes
- operator messages

Events are sorted by unit and the type of journal they need "to go to." Process events are associated with units 1 to 100, while system events are assigned to the system unit

The software subsystem, called the Journal Manager, does the sorting and storage of theses events to volume !2nn, where nn is the node pair number.

The Active Maintenance Recommendation events are stored by on-process analysis on directory !ESY; they are not stored by the Journal Manager, but only retrieved by it.

Abnormal Indications

A line of asterisks (****) on a journal means the event is out of time order.

The printer message "RTJ Buffer Overflow" means an event(s) occurred that was not printed but may have been historized. You can retrieve the historized event with the Event History Retrieval display by specifying a START TIME a few minutes after the overflow message occurred.

Event Types (ET)

Each event has a numerical event type associated with it (see Table 1). The event type can be seen on the right side of any event printout, such as the Real Time Journal or a printed Event History. In R500 and later, you can access the journal files through the Documentation Tool. You can specify event types in Doc Tool conditions to narrow the scope of the query, or for filtering and sorting.

Table 1 Journal Event Types

Operator Changes

ET

26 values

28 point/unit/console alarm disable/inhibit, unit assignment, sort, filter, suppress audible, freeze

Operator Messages

23 CL message

25 CL msg confirm

32 CL msg ack

34 CL msg clear

Process Alarms

21 process alarm

22 sequence event

24 process alarm change event

27 SOE

30 sequence ack

31 alarm ack

33 SOE ack

35 silence alarm

61 lost process events

65 lost process event ack

66 process event recovery

68 journal overflow operator message

System Errors

0 crash

1 s/w error

2 comm error

3-10 driver error

11 floating point error

12 exception error

14-16 driver error

69 OPT (on process test) error

Table 1 Journal Event Types (ET), *continued***System Maintenance****ET**

- 49 maintenance recommendation
- 50 corrective action
- 51 maintenance action
- 52 maintenance clear
- 53 TAC connect
- 54 TAC disconnect
- 55 maintenance ack

System Status

- 19/20 peripheral error/peripheral recovery
- 36 LCN
- 37 hiway
- 38/39 box
- 41 off-process system change
- 42 operator initiated LCN change
- 43 operator initiated hiway change
- 44 operator initiated box change
- 45 operator initiated time change
- 46 state chg notification (physical node state, logical node state, personality chg)
- 47 slot
- 48 &ASY restore
- 56 LCN event ack
- 57 hiway event ack
- 58 box event ack
- 59 peripheral event ack
- 60 cable status
- 62 lost peripheral event
- 63 lost hiway event
- 64 cable status ack
- 67 lost peripheral ack
- 71 lost hiway ack
- 72 hiway event recovery
- 73 current hiway status
- 74 IOP
- 76 auxiliary status event
- 77 auxiliary status ack
- 78 operator UCN change event

Table 1 Journal Event Types (ET), *continued*

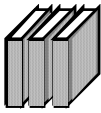
System Status, <i>continued</i>	
79	NIM, PM, APM, HPM, LM, IOP, cable ack
80	HM error handler
81	HM checkpoint control
82	HM operator message system event
83	physical node status change
84	HM startup
87	HM journal manager time change event
88	HM journal manager special event

System Journal Messages

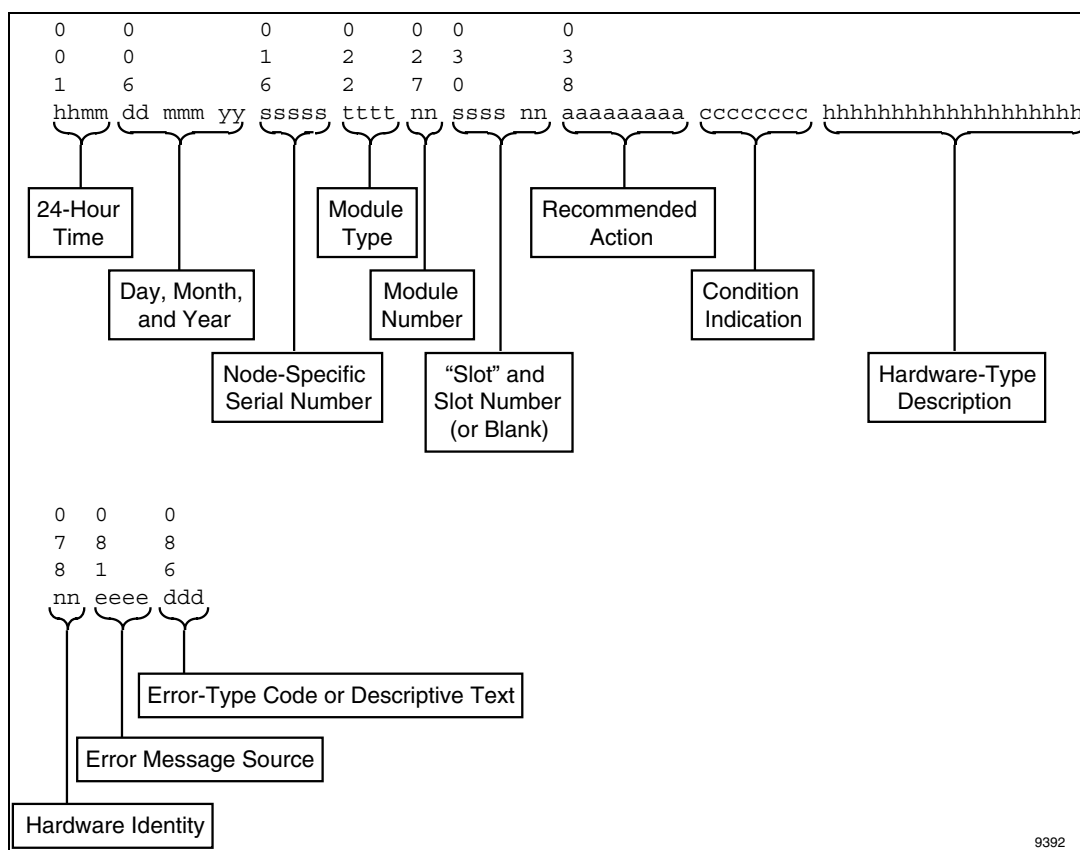
Maintenance messages have a format that defines when the recommendation was made, what module or Optimum Replaceable Unit is affected, what action is recommended, the identity of the node originating the recommendation, and a code number that identifies the specific failure type. Most recommendation messages indicate a specific device to be investigated or replaced, but some indicate the need for further investigation of a module to further isolate the problem.

Example

```
HHMM DD MMM YY      4  US 02  SLOT 05 INVESTIGATE SUSPECT CURSOR DEVICE  QLT03
```



REFERENCE—See the *Messages Directory* for meanings of error-type codes.

**Figure 9 System Maintenance Message Format**

Module Type -- US, HM, AM, HG, NIM, CG

Module Number -- 1 to 64

Slot Number -- 1 to 10

Recommended Action:

TEST, REPLACE, VERIFY, INSTALL, RESET, ENABLE, SWAP, INVESTIGATE, RESTART, FORMAT, CONFIGURE, RELOAD, ANALYZE, REMOVE, MANUAL_LD, RECOVER, RECONFIG_HM, RUN_HVTS

Condition or indication:

MARGINAL, SUSPECT, MISSING, FAILED, CONNECTED_TAC, DISCONNECTED_TAC, CLEARED_MAINTENANCE_RECOMMENDATION, ERASED, UNKNOWN_DEVICE, HISTORY_OVERLOADED, BAD_SECTOR, SECTOR_REASSIGNED

Hardware type description -- Describes the hardware module or subsystem.

Hardware identity -- 1 to 63 (may be Hiway box, etc.)

Error message source -- HM, HG, SEH, OPT, QLT, OPA

Error-type code -- A code number identifying the specific failure.

System Error Messages

System error messages can have various formats, with the one shown in Figure 25 and the examples below the most common format. Most system error messages will require Technical Assistance Center help in interpreting, but there are some codes that indicate problems you can easily resolve.

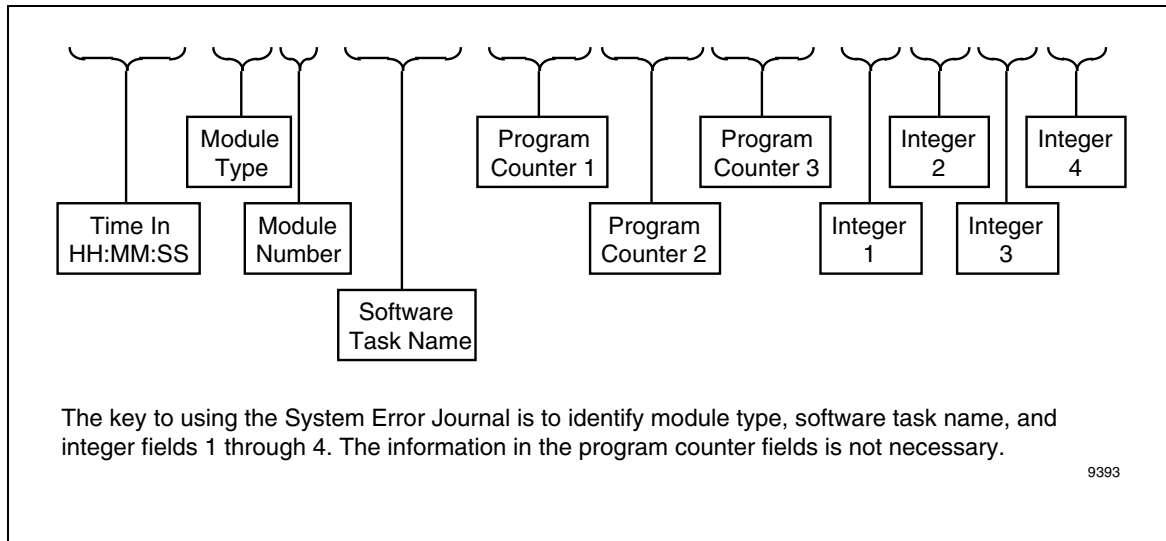


Figure 10 System Error Message Format

Example 1

In this example, Application Module 40 had a failure during node startup. The node startup software task, called B\$NST, failed when it tried to read a master file (such as a master checkpoint) and none were present. This is indicated by the numbers 336, and 4 in the first and last integer fields.

```
11:45:20      AM40      B$NST PC1#  PC2#  PC3#  336      #      #      4
```

Example 2

In this example, Application Module 40 had a failure when it was shut down during a demand or automatic checkpoint. This is indicated by the numbers 381, 1, and 0 in the integer fields. The integer field "uu" will have the unit number that was being checkpointed when the AM was shut down.

```
11:47:20      AM40      B$NST PC1#  PC2#  PC3#  381      1  uu      0
```

Example 3

In this example, Application Module 40 failed because of a point processing overrun. This is indicated by the numbers 226, 1, and 101 in the integer fields. The third integer field, in this example contains 101, informs you of how many overruns you had.

```
11:57:20      AM40      B$PRSTS  PC1#  PC2#  PC3#  226  1  101  #\
```

Example 4

In this example, Application Module 40 failed because the prefetch/poststore segment was too large, caused by external statements or indirection through CDSs. Make block smaller. Use multiple blocks to do required function. Error occurs during compile/link of point.

```
12:01:20      AM40      L$CLL  PC1#  PC2#  PC3#  193  1-123  #
```

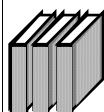
Example 5

In this example, NIM failed to load because a checkpoint file was missing. This is indicated by an 87 or 88 in the second integer field. The key here is the number 88 or 87 which means "no checkpoint file found."

```
12:02:20      NIM24      UG$_CH_SLOW  PC1#  PC2#  PC3#  2587  6  0
```

or

```
12:02:20      NIM24      UG$_CH_SLOW  PC1#  PC2#  PC3#  2588  6  0
```



REFERENCE—The *Application Module Implementation Guidelines* manual lists additional errors for the AM.

Appendix D of this course module lists of many of the software tasks that are referenced in messages.

System Status Changes

The System Status Change journal identifies any system-wide changes that occur on the LCN. These events can be operator initiated changes, alarms, or return-to-normal conditions. Examples of events that are displayed in this journal are time changes, node loads, history collection disable, auto checkpoint disable, and box state changes such as from on-process to idle.

The format for the message varies depending on the message type.

Example:

```
15:48:17 NODE 09 INFORM (INFORM):KEY LEVEL AC RM):KEY LEVEL ACCESS CHANGED TO ENGR  
76
```


SMCC/Maintenance Functions

List of SMCC Functions

The System Maintenance Control Center (SMCC) of the Universal Station or Global User Station contains a number of display-driven functions to diagnosis system hardware or software problems. Table 2 describes the following SMCC functions:

- Display Module Memory
- Display System Maintenance Journal
- Display Active Maintenance (Recommendations) Journal
 - Display Active Maintenance Recommendation and Enter Corrective Action
 - Enter Maintenance Action
 - Initiate On-Process Analysis
 - Print Active Maintenance Recommendations
 - Print Maintenance Recommendations Error Aggregates
 - Print All Error Aggregates
- Display Revision/Configuration Status
- Display Module Errors
- Display Hiway Box Memory
- Probe a Failed Module
- Sector Initialization and Reassignment
- AM Overrun Diagnostic

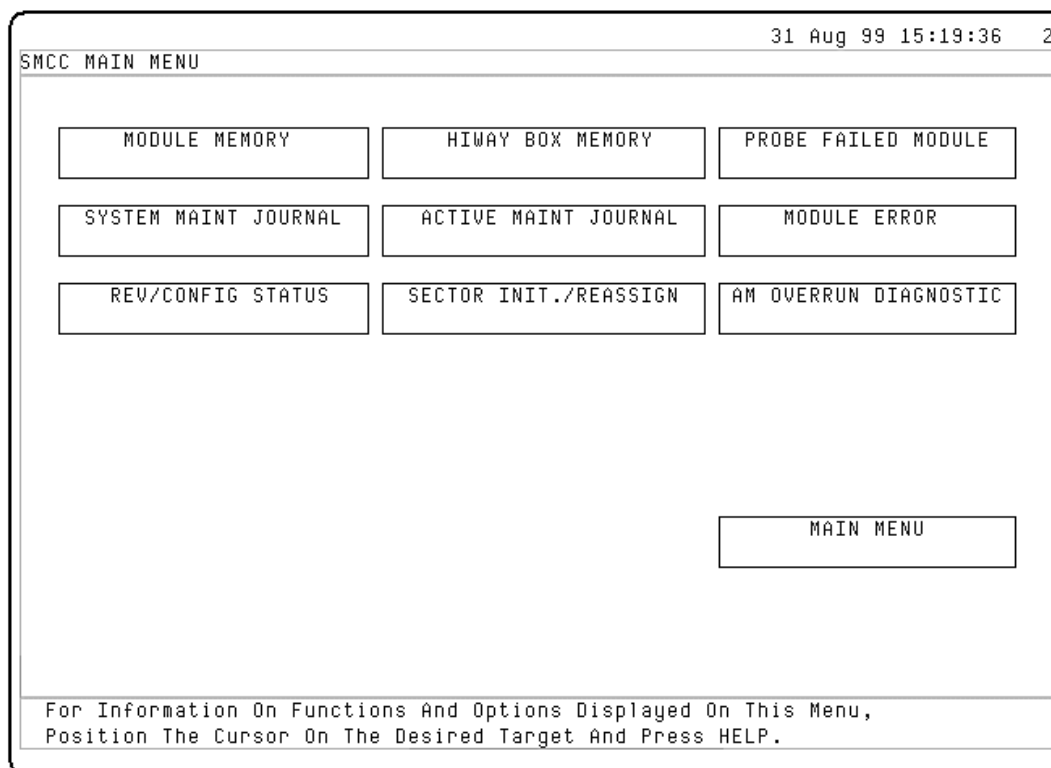


Figure 11 SMCC Main Menu

Table 2 SMCC Functions

SMCC Function	Description
MODULE MEMORY	<p>Used to view the memory contents (in hexadecimal format) of any loaded LCN node. The specific memory address must be known.</p> <p>Primarily used for troubleshooting with Honeywell engineers. One common use of the Display Module Memory target is to monitor the Clock Status Word.</p>
HIWAY BOX MEMORY	<p>Used to view the memory contents (in octal format) of any Data Hiway box connected to the LCN through a Hiway Gateway. The specific memory address must be known.</p> <p>Primarily used for troubleshooting with Honeywell engineers.</p>
PROBE FAILED NODE	<p>Used to display the memory of a node that is in the failed state, if its LCN interface is intact.</p> <p>Primarily used for troubleshooting with Honeywell engineers.</p>
SYSTEM MAINT JOURNAL	<p>Displays a historical list of all system generated recommendations and any user entered corrective actions against a specific recommendation.</p> <p>The user can narrow the scope of the data displayed by specifying the time interval, module number, module type, event type, or serial number (a system generated number assigned to an event and its associated corrective action, once it is entered.)</p>
MODULE ERROR	<p>Selecting this target from the SMCC main menu brings up two targets:</p> <p>MODULE ERRORS SUMMARY</p> <ul style="list-style-type: none"> Displays a summary of the oldest 32 possible error blocks stored in a particular nodes memory. <p>DETAILED MODULE ERRORS</p> <ul style="list-style-type: none"> Shows on initial callup the detail of the oldest stored error for a selected node. Up to 32 error blocks are stored and can be accessed individually by paging through the displays.
REV/CONFIG STATUS	<p>Provides the revision status of the hardware, firmware, and software in a selected node. It also provides the operational status of the ORUs in the node. This data is only available if the node is loaded.</p>
SECTOR INIT./REASSIGN	<p>Allows on-line initialization or reassignment of a specified sector on the history module hard drive.</p>
AM OVERRUN DIAGNOSTIC	<p>Allows analysis of an AM failure due to a processing overrun condition. It provides data on the current point and CL being processed at the time of failure, and the current fast processor and slow processor entities that were most resource-intensive, as well as the slowest CLs per point.</p>

SMCC Function	Description
<div data-bbox="191 281 524 315" style="border: 1px solid black; padding: 2px;">ACTIVE MAINT JOURNAL</div>	<p data-bbox="581 275 1078 304">These selections appear under this target:</p> <div data-bbox="589 333 1153 396" style="border: 1px solid black; padding: 2px;"> Display Active Maintenance Recommendations and Enter Corrective Action </div> <ul data-bbox="581 420 1421 642" style="list-style-type: none"> • Displays system-generated maintenance recommendations for which corrective actions have not yet been entered. • It is here that the user can specify a corrective action against a specific recommendation. Once the corrective action is entered, the maintenance recommendation is deleted from the Active Maintenance Recommendation list, but will continue to be displayed in the System Maintenance Journal along with its corrective action. <div data-bbox="589 672 902 705" style="border: 1px solid black; padding: 2px;"> Enter Maintenance Action </div> <ul data-bbox="581 728 1421 846" style="list-style-type: none"> • Allows the user to enter actions into the maintenance journal for items other than those specifically recommended by the system. For example, the user can log the cleaning of LEDs on a Universal Station. <div data-bbox="589 875 932 909" style="border: 1px solid black; padding: 2px;"> Initiate On-Process-Analysis </div> <ul data-bbox="581 932 1386 1024" style="list-style-type: none"> • OPA runs automatically every 8 hours or whenever accumulated errors reach 75% of error-buffer capacity. If desired, the user can manually initiate an OPA cycle using this target. <div data-bbox="589 1054 1120 1087" style="border: 1px solid black; padding: 2px;"> Print Active Maintenance Recommendations </div> <ul data-bbox="581 1108 1351 1169" style="list-style-type: none"> • Allows the user to direct the printing of the Active Maintenance Recommendations Journal to a printer. <div data-bbox="589 1199 1252 1232" style="border: 1px solid black; padding: 2px;"> Print Maintenance Recommendations Error Aggregates </div> <ul data-bbox="581 1262 1380 1444" style="list-style-type: none"> • Initiates printout of the error aggregate associated with the most recent maintenance recommendation for which there was a corrective action. This printout must be requested in a timely manner because the file will be overwritten by the next corrective action. This printout is usually included with the replaced ORU when it is returned for repair. <div data-bbox="589 1474 891 1507" style="border: 1px solid black; padding: 2px;"> Print all error aggregates </div> <ul data-bbox="581 1537 1406 1690" style="list-style-type: none"> • Used to print all OPA generated error aggregate data for all nodes, including the number of errors reported against each node over the last 90 days and an evaluation of increasing or decreasing error rate. If a node is not included in this printout, it means that there were no errors reported against the node for the period in question.

Error Accumulation Thresholds

System Error Handler Tasks

The System Error Handler (an RNOS subsystem) does the following:

- Keeps a record of the occurrences of an error.
- Compares the error occurrences to a threshold.
- Attempts to take corrective action when an error threshold is exceeded.

Threshold Analysis

Errors are accumulated and totaled and in some cases compared to a threshold. The type of threshold analysis depends on the type of error that has occurred. Knowing what the error types are will help you interpret SMCC error displays. A course of corrective action and/or maintenance recommendation is made when the threshold is exceeded.

The System Error Handler keeps statistics on the number of error instances that have occurred on a given error. A method is used to keep a running average of the number of error occurrences or "instances" over a defined period of time.

Exceeding the Thresholds

The error totals are compared to three thresholds, which are the following:

- Maintenance Recommendation Threshold—When the running error average exceeds this threshold, the System Error Handler reports a maintenance recommendation on that error. These maintenance recommendations are based on predetermined guidelines determined by the design engineers.
- Raw Counter Corrective Action Threshold—When the raw error counter exceeds this threshold, the System Error Handler activates a corrective action program for that error.
- Running Average Corrective Action Threshold—When the running error average exceeds this threshold, the System Error Handler activates its corrective action program for that error.

Corrective Action

Each of the three thresholds varies depending on the error type; additionally, when two of the previously mentioned thresholds are exceeded, a corrective action program is activated. The corrective action program provides analysis of what the problem is, and in some cases takes corrective action.

Another way a corrective program can be started is when the System Error Handler is informed that the error requires immediate action. This indicates that the problem is of a sufficiently serious nature that the fault condition cannot be tolerated. When the error is reported, the corrective action has already begun. In the case of an illogical condition error, for example, the corrective action is to "crash" the node.

If the error is such that corrective action need not be taken immediately, the fault condition can be tolerated and corrective action delayed until one of the thresholds is exceeded.

SMCC Detailed Module Error Display

Error Types Displayed

The error types that the System Error Handler uses are:

- Communication error with second party known
- Communication error with second party not known
- Controller error
- Illogical condition
- Intermediate error buffer overflow
- Node Administrator status broadcast timeout
- Resource error
- Unit error
- Distribute only

Error Type—Communication Error with Second Party Known

Definition: The type of error referred to as COMMUNICATION ERROR WITH SECOND PARTY KNOWN occurs when a software task to software task, or a processor to processor, or a software procedure call has been made and an error resulted. The **physical** node number of the second party in the communication is **known**.

Cause: The error could be caused by a timeout error or a data corruption in the interface.

Examples: The following are examples of communication errors with second party **known**:

- A communication timeout has occurred, where an answer was expected from physical node number 17.
- A procedure call was made with an invalid parameter. The second party is known to be the same physical node, because it was a procedure call within the same physical node.
- Packet sequence error, detected by communications management, an RNOS subsystem. The source of the message is known, even though the packet is received out of order.

Error Type—Communication Error with Second Party Not Known

Definition: The type of error referred to as COMMUNICATION ERROR WITH SECOND PARTY NOT KNOWN occurs when a software task to software task, or a processor to processor, or a software procedure call has been made and an error resulted.

Cause: This type of error could be caused by either of the following:

- A timeout error or a data corruption in the interface. The **physical** node number of the second party in the communication is **NOT known**.
- A packet frame error (or cyclic redundancy check error) detected by communications management and an RNOS subsystem are examples of communication errors with second party **NOT known**.

Error Type—Controller Error

A driver has detected an error that can be directly attributed to the controller or one of its units.

Error Type—Illogical Condition

A logically inconsistent situation has been detected within the local node. Note that corruption of a database by its data owner is considered to be an illogical condition, while corruption of data in an interface is considered to be a communication error.

Error Type—Intermediate Error Buffer Overflow

The rate of calls to the error handler has resulted in the overflow of its error buffer, resulting in errors being lost.

Error Type—Node Administrator Status Broadcast Timeout

The local physical node has not received a Node Administrator periodic status broadcast from a known node when expected.

Error Type—Resource Error

An operation could not be performed because of the unavailability of a resource. There are two reasons for resource errors.

Exhausted Resource	The first reason a resource error could occur is because of the "exhaustion" or "using up" of a resource. Examples of resources that could be exhausted or used up are heap; memory resident file system free space.
--------------------	--

Unavailable Resource	The second reason is that a resource that needs to be referenced is unavailable. An example of a resource that could be unavailable is a file that is opened for exclusive access by another user.
----------------------	--

Error Type—Unit Error

A driver has detected an error that can be directly attributed to a specific unit, a piece of hardware, on a multiunit controller. For example, the node determines that there is an error with the SPC controller in an HM

Error Type—Distribute Only

This is an error event that only needs to be distributed through Event Distribution, an RNOS subsystem. These are not counted against any error threshold.

Display Format

This section describes the format of the SMCC Detailed Module Error display (see Figure 2).

Figure 2 illustrates an illogical condition error caused by loading an LCN node with an NCF.CF version that is not the same version as the one the network is currently using, a very common occurrence in systems that are starting up or undergoing major database changes. This will cause the node that is being loaded to crash, with a "-190" display appearing in the node's processor LEDs. Because a "-190" display indicates an illogical condition, you have to call up a SMCC display to get additional information to determine the cause of the node crash.

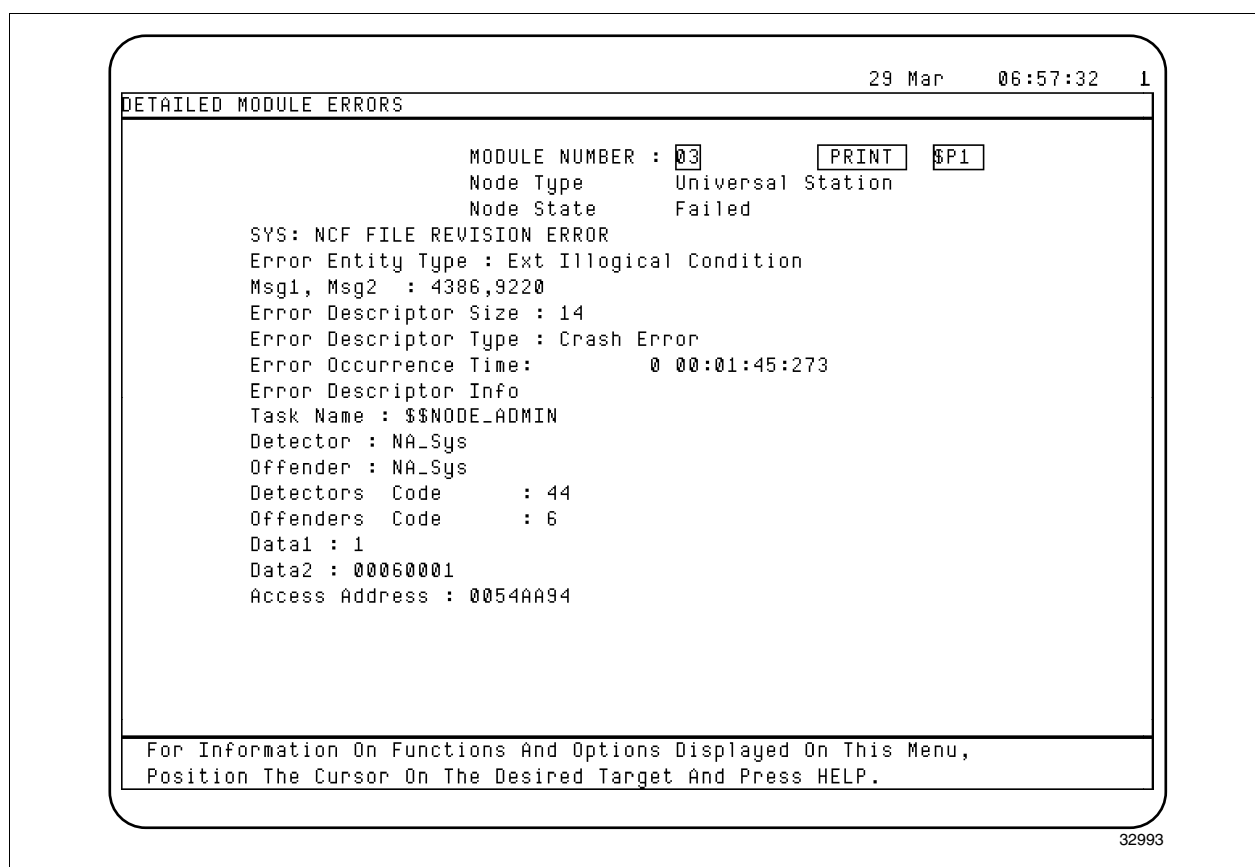


Figure 12 SMCC Detailed Module Error Display

Fail Messages—R430 and Later

On R430 and later, the Detailed Module Error display includes a “Fail Message” field that describes a node’s loading failure. Table 3 lists the possible fail messages that can appear. If you are loading a US, the fail message may also appear on the screen. If you are loading another type of node, the message is indicated in the SMCC Detailed Module Error display.

Example

Notice this message in Table 3 and in Figure 12: “SYS: NCF FILE REVISION ERROR.”

During a remote load, on R430 and later, if the NET NCF is a different revision than that running in the "loader" node, the node being loaded will fail (-190) with the fail message “SYS: NCF File Revision Error.”

During a local load, on R430 and later, the system will continue to prompt for the NCF until it gets the revision it wants.

“Null” Message

The first message in Table 3 is a "null" message used internally, which is never displayed to the user. When a loading error occurs that does not have a fail message, the on-screen message is "See SMCC Detailed Module Errors." On the Detailed Module Error display, the user must interpret the displayed error fields, described later in this course module.

Table 3 Load Fail Messages — R430 and Later

Fail Message	Description/Category
(no message)	B
OS: Error Building NA Database	B
OS: Unable To Allocate Internal Structure	B
OS: Error Building WM Database	B
DA: Error Building Name Table	B
OS: Unable To Allocate Heap Memory	B
SYS: Unable To Open NCF File	A
SYS: Unable To Read Unit Directory File	A
FS: Unable To Define Logical Device	A
OS: Internal MTOS Error	B
SYS: Unable To Mount NCF Volume	A
OS: Unable To Access Internal Structure	B
SYS: Firmware Revision Mismatch	A
SYS: NCF File I/O Error	A
SYS: Operator Aborted Load	A
SYS: Not Enough Physical Memory	A
SYS: Unable To Read Area Database	A
SYS: Unable To Read Console Data	A
SYS: Node Number Not Configured In NCF	A
SYS: Possible NCF Corruption	A
SYS: Unable To Reset Annunciator Or ~	A
CPU: Trap Exception	B
AR: Unable To Copy Critical Display To Memory	B
SYS: Hardware Revision Mismatch	A
SYS: Software Revision Mismatch	A
SYS: Verification Error	B
SYS: Personality Not Found	A
SYS: Unable To Establish ~ / LNI	B
SYS: NCF Not Found On Net>&ASY	A
SYS: UnableToEnableFloatingPointException	A
SYS: NCF File Revision Error	A
SYS: Node Number Error Or Invalid Console Error	A—Node number not configured in NCF or console
SYS: Global Console ~ Table Overflow	B
SYS: Logic Error	B
Category: A—General error that may occur because of configuration. The user may take corrective action. B—Internal system error that is unlikely to occur. The user should call TAC.	

Node Administrator Errors

In the following examples, the software subsystem that "crashed" the node is the Node Administrator. There are subsystems or Node Administrator errors, other than those described in this section, that may cause a node to fail because of an illogical condition, but this course module covers only those errors that you are most likely to encounter.

You may require assistance from the Honeywell Technical Assistance Center to interpret node administrator error codes not listed in this section.

Whenever there is a Node Administrator error, you only need to look at the three fields of information. For an *NCF File Revision Error*, the following error codes are indicated (see Display 2):

```
Detectors Code :      44
Offenders Code :       6
Data 1:          1
```

In this example, the node administrator subsystem had an error and detected it. The `Detector` and `Offender` fields indicate which software subsystem(s) had an error occur and which software subsystem detected the error.

Node Administrator error codes are divided into groups, with the group number usually indicated in the `Data1` field. There are eight possible error groups; not all of them are discussed here, because some groups are unimplemented or irrelevant to customers.

The `Data2` field always shows 60001 on Node Administrator crashes.

Examples of Node Administrator Errors—Group 1

Example 1

The following example indicates that the NCF directory has the wrong record type, possibly caused by a corrupted file.

```
Detectors code :    28
Offenders code :     8
Data 1:         1
```

Example 2

The following example indicates that the node being started requested the NCF from the History Module, but the NCF was not accessible. The HM that has the NCF needs to be started or the NCF must be provided locally.

```
Detectors code :    32
Offenders code :    (file manager return status)
Data 1:         1
```

Example 3

All node administrator errors on file reads are fatal. The following example indicates that the node being started requested the NCF from the HM, but the HM may have gone down during the read, or the NCF on the HM had been corrupted. It can also happen if communications break down during node startup. The node will attempt at least two retries, with a pause between retries. If the HM is still OK, LCN hardware or storage media may be suspect.

```
Detectors Code :    33
Offenders Code : (file manager return status)
Data 1:         1
```

Example 4

In the following example, the operator aborted a mount request for the NCF.

```
Detectors Code :    41
Offenders Code :     8
Data 1:         1
```

Examples of Node Administrator Errors—Group 3

The following error displays are a little more complex, but nonetheless very useful in troubleshooting. These errors occur only in the Node Administrator task and are part of the group 3 error codes. Note that the number "3" will not show up in the `Data1` field, so the field to look for will be Detectors code = 42.

Whenever you see a detectors code of 42, this means you have a group 3 error code and need to interpret the `Offenders Code` and `Data1` field in the following manner:

- | | |
|---------------------------------|---|
| <code>Offenders Code = 1</code> | A board revision mismatch is indicated. The <code>Data1</code> field integer will indicate the board slot that is out of revision. You can check the revision levels by paging through the configurator's system wide values. If the board has the correct revision written on the board, you can check the pin setting. The board should be replaced if incorrect revision, or repinned if at the correct level. |
| <code>Offenders Code = 2</code> | An insufficient number of boards of a given type is indicated. The <code>Data1</code> field will indicate the board type. The node requires additional hardware. |
| <code>Offenders Code = 3</code> | Indicates not enough memory. For this case, the <code>Data1</code> field will be the number of bytes that are missing. More memory must be added. |
| <code>Offenders Code = 4</code> | A software/revision mismatch is indicated. |
| <code>Offenders Code = 5</code> | The firmware revision does not match the NCF for the board slot specified in the <code>Data1</code> field. The board should be replaced. |

Examples of Node Administrator Errors—Group 4

The following are group 4 examples. Most group 4 error codes indicate additional memory is required.

Example 1

In the following example, there was not enough memory to maintain database synchronization; more memory is required.

```
Detectors Code :    16
Offenders Code :    19
Data 1:         4
```

Example 2

In the following example, there was not enough memory to maintain database synchronization; more memory is required.

```
Detectors code :    16
Offenders code :    21
Data 1:         4
```

Node Dumps

Node dumps can be requested by the operator or occur automatically. The Load/Dump software subsystem performs the following functions:

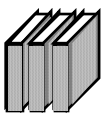
- Autoboosting a History Module
- On-demand boot of an HM or LCN node
- On-demand Load/Dump request from the US/GUS

The node's memory is dumped to a History Module dump volume or to removable media upon node restart.

When a node fails, useful or vital information about the cause of the failure is often contained in the information retained in the node's memory. If this information is dumped on (stored on) an HM or removable media, before the node is restarted, the information can be sent to Honeywell for analysis.

Honeywell recommends that you do the following:

- Configure a Dump volume (&2np) on an HM
- Keep each node's dump state as ENABLE on the Console Status or node status display:
 1. Select a node.
 2. Select
 3. Select
- With dumps enabled, should you attempt to load a failed node
 1. Prompts appear asking if you want to dump the node or to override the dump.
 2. If the node really did fail (it wasn't intentionally shut down), you should proceed with the dump before initiating a load.
- If Honeywell requests a copy of the dump information, you can use the Command Processor to copy the dump data from the HM to removable media to be sent to Honeywell.



REFERENCE—For more information on configuring a dump volume, refer to the *Engineer's Reference Manual*

LAB TIME

≈60 Minutes

Use your US/GUS.

Take with you:

- This module

LAB EXERCISE

This lab exercise has two parts:

- In the first part, you will troubleshoot a system problem.
- In the second part you will request a node dump.

Part 1

In this part of the lab exercise you will use the system error journal and/or the System Maintenance Control Center (SMCC) to troubleshoot "problems" your instructor has installed in the system. The course manager may describe the general symptoms of the problems during the lab. It is your task to identify the cause of the problem.

1. Your course manager will inform you of two problems. List the following for each:

Problem #1

- a. Problem, symptoms:

- b. Error codes (if any):

- c. Problem resolution:

Problem #2

- a. Problem, symptoms:

- b. Error codes (if any):

- c. Problem resolution:

Problem #3 (optional)

- a. Problem, symptoms:

-
- b. Error codes (if any):

-
- c. Problem resolution:
-

Part 2

In this part of this lab you will request a node dump and a copy of !CSY. These steps are part of the data collection procedures you would follow in gathering information for the Technical Assistance Center.

1. Your course manager will identify a node from which you can request a dump.
2. Verify that you have a cartridge available.
3. Verify that the node is in a "FAIL" state before you request the dump. If it is not in the "FAIL" state, execute a SHUTDOWN command twice to force the node to a "FAIL" state.
4. Go to the status display for the node that has failed and select [LOAD/DUMP]:
Select
5. Select
Choose your destination drive, then select
Press [ENTER] to execute.
6. After dumping the node, reboot the node with its normal operating personality.
7. Copy volume !CSY to removable media. Your command can look like this:

```
CP NET>!CSY>*. * $Fd>!CSY>= -D
```

End of Lab Exercise

Appendix A

LED Displays

LED Displays

The leftmost LED can show only one of the following:

- nothing (represented in this appendix as " "),
- "1"
- "-1"
- "-"

The rightmost two LEDs can show any of the following 16 characters:

- 0-9
- A
- "-"
- C
- " "
- E
- F

Some LED examples are

-1	1	1
----	---	---

-	1	1
---	---	---

-1	1	
----	---	--

-1		1
----	--	---

Any code that does not start with a minus sign represents the node number.

All codes starting with a minus sign in the leftmost LED represent errors.

Codes are allocated as follows, where: x = 0-9, A, "-", C, " ", E, F:

Self test:	- x x	-1 0 x	-1 1 x	-1 2 x	-1 3 x
	-1 4 x	-1 5 x	-1 6 x	-1	- x
Boot/load	-1 7 x	-1 8 x			
RNOS	-1 9 x	-1 A x	-1 C x		
/QLTs	-1 E x				
QLTs	-1 F x				

Appendix B

Clearing the Error Aggregates from the System HM

Clear Error Aggregates from System HM

The error aggregates should be cleared from the system History Module when board types have been changed, or if you want to get another starting point from previous aggregates. If a processor type is changed in a node (for example, from HPK2 to K4LCN), OPA will not work on that node until the error aggregates are cleared on the system HM.

1. Clear all Maintenance Recommendations with Corrective Action:

- a) From the Engineering Main Menu, select SMCC/Maintenance
- b) Select Active Maint Journal
- c) Select Display Active Maintenance Recommendation & Enter Corrective Action.
- d) The port should have ALL, but if it does not, type ALL and press ENTER
- e) The display will come up and display all maintenance data
- f) Print the display by pressing the PRINT SCREEN key for each page of data.
- g) Press CTRL PAGE BACK (two times) key and select the Print All Error Aggregates target
- h) Select Display Active Maintenance Recommendation & Enter Corrective Action.
- i) The port should have ALL, but if it does not type ALL and press ENTER
- j) At the port ENTER CA TEXT, type in a corrective action message
- k) Select the maintenance text above and press ENTER
- l) The line disappears from the screen.
- m) Repeat steps f - i for each entry until all messages are gone (check for multiple pages).

2. Clear the files from the HM:

- a) From the command processor type LSV NET to determine which HM has the !ESY directory
- b) Copy the files from directory !ESY to removable media:
CP NET>!ESY>*. * \$Fn>!ESY>= -D
- c) Put the HM in the offline personality.
- d) Type PT PN:nn>!ESY>CA*.CM
- e) Type DL PN:nn>!ESY>*. *
(the error FILE PROTECT OR ACCESS VIOLATION will be displayed due to CA*.CM being protected)

f) Type UNPT PN:nn>!ESY>*. *

3. Reboot the HM (this will recreate the deleted files):

- a) Select the HM and DISABLE history collection.
- b) Select the LOAD/DUMP target.
- c) Select MANUAL LOAD target.
- d) Select OPERATOR PROGRAM target.
- e) Select DEFAULT SOURCE and the EXECUTE COMMAND targets.
- f) Select DEFAULT SOURCE and the EXECUTE COMMAND targets.
- g) Press the ENTER key.
- h) The HM will reload itself, wait for the HM to go to OK.
- i) Enable History collection.

4. Initiate On-Process Analysis cycle and check the Error Aggregates

- a) From the Engineering Main Menu, select SMCC/Maintenance.
- b) Select Active Maint Journal
- c) Select INITATE ON-PROCESS ANALYSIS and watch for the following messages:

On-Process Analysis in Progress and then

On-Process Analysis Complete

- d) Select PRINT ALL ERROR AGGREGATES and wait for the print to complete.

If there are no errors, then the message *Non-Existent Aggregate Record* will be displayed.

If any node is shown in the journal with INCREASING errors (as displayed on the right side of the page), then corrective action is required. If the board is under warranty, replace it. If not, clean the board, reinsert it, and perform step d again on the following day.

If the problem persists, move the board to another node which has the same board type. Perform step d again on the following day. If the board continues to report INCREASING, replace the board.

Appendix C

Where to Find Error Codes in System Documentation

R600 TPS Network

Where to Find Error Codes in the System Documentation

Use the RTJ (Real Time Journal) periodically to determine if there are errors on the system. If the RTJ logs any error, these are the steps to follow.

1. Check the System Status display for error messages such as FAIL, WARNING, or SEVERE and see if the LCN cable A or B has an error.

- a. If FAIL is displayed, call up the Node Status display and see what node has an error.

REFERENCE—Refer to Section 11 - 20 of the *Process Operations manual* in TPS 3050 for information on system operations.

- b. If a node fails, a DUMP of the node needs to be taken to removable media.

REFERENCE—Refer to Section 20 of the Engineer's Reference Manual in TPS 3030-2 for information on node loading and node dumps

- c. A copy of the !CSY needs to be copied from the HM to the same removable media.

- d. Write a detailed explanation of what activity may have led up to the failure.

- e. Have a topology map of the system (connections of the LCN node-to-node layout).

- f. Reload the node and print out the SMCC REV/CONF of the node that failed (this will allow Honeywell to know the hardware and firmware revisions of the boards and the software revision the node is currently running on).

- g. If possible, try to reproduce the problem if the failure will not effect the process.

- h. If the node that failed was the History Module, then attach the printout of the real time journal, because the !CSY volume will not be available.

REFERENCE—Refer to Section 4 of the *Message Directory*, in TPS 3030-3 for the unalarmed abnormal conditions

- i. Attach a copy of the &ASY files.

- j. If the node was a NIM, an HG, or a PLCG, attach a copy of the checkpoints and aDISP PRINT of the process network status display so Honeywell knows what types of nodes are configured on the network.

- k. Check the module LEDs

REFERENCE—Refer to the appropriate service manual in TPS 3030-1 for recommended action:

5-10 Slot Service Manual, Appendix A

Dual Node Service Manual, Appendix A

2. If the LCN cable has an error, check all connections on the LCN:

- a. Check terminators and tees on the paddle cards.
- b. After checking all connections, reset the counters and if no errors, tap on the tees and see if any LCN errors are logged.
- c. If errors are logged, either replace the tees or check the LCN coax or fiber optics cables.
- d. If all connections seem to be good, reset the statistics and continue to next step.

3. Use the \$LNMENU displays to determine the cause.

REFERENCE—Refer to Section 4 of the LCN Guidelines-Implementation, Troubleshooting, and Service manual, in TPS 3025 for detailed information.

- a. Use the NET MEDIA DEAD target and print the screen.
- b. Print out the ERROR RATES for CABLE A and CABLE B.
- c. After checking these statistics, use the target NODE SPECIFIC and print these displays.
- d. After auditing the statistics, take corrective action.
- e. If this doesn't correct the problem, reset the statistics and continue to the next step.

4. Use the CLOKSTAT display to determine if there are clock problems.

REFERENCE—Refer to the Customer Resource Manual, CR13-001, Section PD 25, A01 (A) page 31.

REFERENCE—Refer to Section 10.4 of the Engineer's Reference Manual, in TPS 3030-2 for additional description of the displays.

5. Print out the Error Aggregates using the SMCC Maintenance menu.

If anything is INCREASING and the board is under warranty, replace the board.

If a board cannot be located (board is not in SPARE stock) or is out of warranty:

- shutdown the node using the system,
- power down the node,
- clean the board, and
- reload.

If the problem re-occurs, move the board to another node and see if the problem follows the board. If so, replace the board.

This error is not a FAILURE; the system has detected a hardware problem with the board and with OPA and OPT running, the system tries to correct the problem. Some times it cannot and this is when the board should be replaced.

6. If the system seems to be slow, then follow these steps:

- a. Call up the NODEPERF display and enter the node number. Print the screen and compare it with the baseline screen prints (which were made when the system was in a stable condition).
- b. Compare the display print and determine what was done that may have caused the problem; that is, addition of new entities, more USs added to the LCN, or hardware problems.

REFERENCE—Refer to Section 22 of the *Engineer's Reference Manual* in TPS 3030 2 for the details of the display parameters.

7. You may want to use the performance displays, such as AMDETAIL, HMDETAIL, NGDETAIL to get additional statistics.

REFERENCE—Refer to the *Customer Resource Manual*, CR13-001, Section 25 for the names of the performance displays.

REFERENCE—Refer to Section 22 of the *Engineer's Reference Manual* in TPS 3030-2 for the details of the display parameters.

8. Use the PERFMENU display to monitor the loading of each node.

REFERENCE—Refer to Section 10.4 of the *Engineer's Reference Manual* in TPS 3030-2 for information on these displays.

Refer to the *Messages Directory* in TPS 3030-3 for the information as necessary:

If Maintenance Recommendation messages—Section 2 helps you decipher the RTJ and the display from the Event History Retrieval Menu.

If Error messages—Section 3 lists the error messages that will appear on the US screens.

If File Manager Error—Section 5 lists the file manager errors and their meanings

If using the Command Processor and an error occurs, refer to Section 11 of the Command Processor Operations manual in TPS 3030-1.

If using the Data Entity Builder and an error occurs, refer to Section 10 of the Data Entity Builder manual in TPS 3032-1.

If errors occur on the AM, refer to the AM Implementation Guidelines manual in TPS 3035'2:

- 1) Section 4 contains the errors and the remedies. These errors will come out on the RTJ if the RTJ system error journal is ENABLED.
- 2) Section 5 describes the AM Overrun display. This should be used if there are AM overruns.

If errors occur compiling/running AM/CL programs, refer to Section 6 of the CL/AM Data Entry manual in TPS 3035-2:

- 1) Section 6.1.1—CL Compiler Error Messages
- 2) Section 6.2—Correcting CL Source File Errors
- 3) Section 6.3—How To Determine The Location Of A CL Runtime Error.

If errors occur on the CM50S, refer to the CM50S Users Manual in TPS 3039.

- 1) Sections 9.5, 13.5, 17.5—Commonly made errors
- 2) Sections 9.6, 13.6, 17.6—Error Detection by interface functions
- 3) Appendix A—Status codes

If there are errors on the UCN, do the following:

1. Refer to the *UCN Guidelines* manual in TPS 3041
2. Refer to the *UCN Installation* manual in TPS 3041
3. Refer to the Honeywell supplied schematics: UCNCOMM, UCNEVENT, UCNSUMM, NODESTA1 and NODESTA2 documented in the *Customer Resource Manual*, CR13-001, Section 25.
4. Check all connections, DROPS, TAPS, TRUNKS. They must be torqued at 25lb. per sq. in.
5. Check all connections on the backplanes ensuring the metal plate on the backplane connector is not turning while checking torque.
6. Check grounding on each TAP ensuring there is a good connection and that they are not daisy chained together.
7. Make sure all ISOLATED ports are all going in the same direction (never dot to dot).
8. If there are chains on the terminators or other connections on the TAPS, cut them off. These can cause noise on the cable.
9. Pull gently and wiggle each DROP and TRUNK cable to ensure the connections are good.
10. Check that the DROP and TRUNK cable are twelve inches away from any power cables and if possible, in conduit.
11. After all connections have been made and all LOCAL STATS have been reset, monitor the system.
12. If errors occur, reset LOCAL STATS and, one by one, tap on the TAPS and connections, monitoring the UCN STATS display after each tap has occurred.

If there are errors on the PM, APM, or HPM, refer to the following:

1. TPS 3043 for PM/APM Installation and Checkout.
TPS 3066-3 for *HPM Installation and Checkout*
2. For error handling of each algorithm
TPS 3040-1, PM Control Functions and Algorithms
TPS 3042-2, APM Control Functions and Algorithms
TPS 3066-1, HPM Control Functions and Algorithms
3. For CL compile-time errors and runtime errors (Section 6).
TPS 3040-2, PM Control Language Data Entry
TPS 3042-2, APM Control Language Data Entry
TPS 3066-2, HPM Control Language Data Entry

If there are error codes on individual boxes on the Data Hiway system refer to the *Process Operation manual* TPS 3050, Section 17.

If there are maintenance recommendations reported against a node, refer to TPS 5060-1 *System Maintenance Guide* (SW13-500) and *Maintenance Test Operations* (SW11-502).

If there are maintenance recommendations for the US, refer to the following Sections of the appropriate manual

US (classic console)—*US Service Manual* (US13-500) in TPS 3060-1

US (Z-style console)—*US (Ergonomic) Service Manual* (US13-520) in TPS 3060-1

- 1) CRT Test/Troubleshooting, refer to Section 3, 4, 5 and/or 6
- 2) Touch screen Test/Troubleshooting, refer to Section 7.3
- 3) Keyboard Test/Troubleshooting, refer to Section 8.3
- 4) Trackball Test/Troubleshooting, refer to Section 9.3
- 5) Five/Ten Slot/Dual Node Module Test/Troubleshooting, refer to Section 10.3
- 6) Flexible Disk Drive Test/Troubleshooting, refer to Section 11.3
- 7) Cartridge Disk Drive Test/Troubleshooting, refer to Section 12.3
- 8) Printer Test/Troubleshooting, refer to Section 13, 14, and/or 15
- 9) Trend Pen Recorder Test/Troubleshooting, refer to Section 16.

If there is a maintenance recommendation for the HM or US referring to the HM drives, refer to Section 4 of the *History Module Service manual* (HM13-500) in TPS 3060-2 for Test/Troubleshooting.

1. Refer to the Status Detail Displays, Section 4.3.12.
2. If a bad sector is reported by a maintenance recommendation, refer to Section 4.3.3 (Maintenance Recommendations) and Section 4.3.14 (Sector Initialization/Reassignment Procedure).
3. If a SPC error is generated, refer to Section 4.3.5 (SMCC/Detailed Module Error Messages)
4. If the RTJ reports an error, refer to Section 4.3.6 (Real Time Journal Messages)
5. Here is some helpful information:
 - a. Check the SYSTEM ERROR and SYSTEM STATUS journals for errors on the HM. If the journals detected a BAD SECTOR, refer to the *History Module Service manual*.
 - b. Check all connections, that is, power cord, pinning, and boards.
 - c. Before powering off the HM, follow these steps:
 - 1) DISABLE HISTORY collection.
 - 2) Perform a software SHUTDOWN on the HM.
 - 3) Power down the NODE electronics.
 - 4) Power down the disk drive, if redundant, wait 10 seconds between power down of the redundant drives.
 - 5) In reverse order, power up the drive (if redundant DRIVES, wait 10 seconds between each drive).
 - 6) Power up the node electronics and wait for the AUTOBOOT to complete.
6. If the HM will not AUTOBOOT, then load the HM with the offline personality and perform a backup of the drive(s) using the Honeywell BACKUP command file.
7. Run HVTS test SCMD in the HVTS manual test 19 (Surface Check—append to the bad sector table) and test 21 (Format Test).

If a problem occurs in a Five/Ten Module, refer to the Five/Ten-Slot Module Service manual (LC13-500) in TPS 3060-1:

1. EPDG I/O pinning—Section 2.6
2. LCN I/O Pinning—Section 2.8
3. NIM Modem Pinning—Section 2.11 and 2.12
4. Power Supply Clock Jumpers—Section 2.18 and 2.19
5. Troubleshooting for all boards—Section 3.3
6. Processor Indicators—Appendix A

If a problem occurs in a Dual Node, refer to the Dual Node Service manual (LC13-510) in TPS 3060-1:

1. Address Pinning on the KxLCN, refer to Section 2.7 (Field Adjustments)
2. KxLCN Diagnostic Indicator and Troubleshooting, refer to Section 3.3
3. KxLCN Troubleshooting, refer to Section 3.3

If a problem occurs in a Universal Work Station, refer to the Universal Work Station Installation, Operation, and Service manual (US02-500) in TPS 3060-2.

If a problem occurs which would entail running the Hardware Verification Tests, refer to the manuals in TPS 3060-3:

1. Hardware Verification Test System (SW13-511)
2. LCNI Network Communication Test (SW13-508)

If a problem occurs in a EPLC Gateway refer to TPS 3081:

1. EPLCG Implementation Guidelines (EP12-500)
 - a. Addressing, Section 2.5.2
 - b. Checkpoint error and Recovery, Section 3.2.5
 - c. File Error Recovery, Section 3.2.5.2
2. EPLCG Planning and Installation and Service (EP02-500)
 - a. Configurations and Limitations, Sections 2.4 and 2.5
 - b. PLCI Pinning, Section 3.2.3
 - c. PLC Error and Retry Counters, Section 4.3.1
 - d. General Troubleshooting, Section 5.3
 - e. PLCI System Software Indicators, Section 5.4.3
 - f. Battery Failure, Section 5.4.3.1
 - g. PLCI Hardware Indicator Troubleshooting Chart, Section 5.4.2
3. *EPLCG Gateway Control Functions* (EP09-500)
 - a. Fail-COM, Fail-HDW, Section 2.3.5 and 2.3.6
 - b. Failover scenario, Section 2.4.1
 - c. Errors, Section 2.5

If a problem occurs in a Network Gateway, refer to TPS 2092.

If a problem occurs in the PMM/APM/HPMM IOPs:

1. Refer to the appropriate service manual in TPS 3061-1:
 - *PM/APM Service* (PM13-501)
 - a. Pinning for the UCN address, Section 2.4.22
 - b. Pinning of the I/O link, Section 2.4.23
 - c. Using the PMM/APMM and IOP Status Displays, Section 3.4.4 and 3.4.5
 - d. Electrostatic Discharge Protection, Section 6.2.1
 - e. Removal and replacement of card file, Section 6.3
 - f. IOP Card Replacement, Section 6.3.1
 - g. Battery replacement, Section 6.6.1 and 6.6.2
 - h. IOP Calibration procedures, Section 7
 - i. Precision Test Equipment Required, Section 7.2.2
 - *HPM Service* (HP13-501)
 - a. Pinning for the UCN address, Section 2.15
 - b. Pinning of the I/O link, Section 2.16
 - c. Using the HPMM and IOP Status Displays, Section 3.4.4 and 3.4.5
 - d. Electrostatic Discharge Protection, Section 6.2.1
 - e. Removal and replacement of card file, Section 6.3
 - f. IOP Card Replacement, Section 6.3.1
 - g. Battery replacement, Section 6.6.1 and 6.6.2
 - h. IOP Calibration procedures, Section 7
 - i. Precision Test Equipment Required, Section 7.2.2

3. Here are some important steps to follow:

- a. If the PMM FAILS, print the COMM ERROR BLOCK and the CONTROL ERROR BLOCK.
- b. Refer to Section 4.3 for the description of the error.
 - The error could be AA AA nn nn, where nn nn = the error description in the manual.
 - It may be that the PMM is in such a state that the PMM may display all ??????, in this state, try to reload and then look at the same displays.
 - If BB BB nn nn is displayed, refer to the manual for the detailed description error code.

If a problem occurs in the Logic Manager, refer to TPS 3070:

1. *Logic Manager Implementation Guidelines (LM12-500)*
 - a. Addressing for redundancy operation, Section 3.1
 - b. Fault Detection, Section 3.1.11 and 2.3.5
 - c. Ladder Logic, Section 2.3.6, 3.1.6, Appendix A, 2.4.1, 2.6.1, 3.1.6, 2.3.6,
 - d. Maintenance of consistent NIM and LMM database, Section 2.6.2
 - e. Error in messages from and to the BACKUP Logic controller, Section 3.1.11.2
 - f. Error in message from and to the LEAD Logic controller, Section 3.1.11.3
 - g. Serial I/O Fault detection 2.3.5
2. *Logic Manager Installation (LM20-500)*
 - a. ESD, Section 0
 - b. Cabling, Section 5.6
 - c. Power/Grounding, Section 6
3. *Additional information in the Logic Manager Service manual TPS 3073 (LM13-500)*
 - a. Failure types, Section 3.1
 - b. LMM displays, Section 5
 - c. Logic Manager Self-test display, Section 5.3
 - d. Communication Error Block Display, Section 5.3
 - e. Diagnostics Description, Section 6
 - f. Checksum error functions, Section, 6.2
 - g. Electrostatic Discharge Protection, Section 7.1
 - h. Battery removal and replacement, Section 7.3
 - i. Card File removal and replacement, Section 7.4
 - j. Calibration procedures, Appendix A

If a problem occurs in a Universal Station X, refer to Universal Station X Service (UX13-510) in binder TPS 2093:

1. Indicators—Section 1.6
2. Hard Drive pinning—6.15-19
3. DAT and Cartridge Drive pinning—7.4 and 8.7 respectively
4. Keyboard Test/Troubleshooting—Section 5.5
5. DAT Drive Troubleshooting—Section 7.3
6. Cartridge Drive Troubleshooting—Section 8.4
7. Mouse Troubleshooting—Section 10.3

Minimum board revisions on the LCN,

Section 3, *Customer Release Guide* (SW11-590)

Board revisions on the UCN,

Section 22, *Customer Resource Manual* (CR13-001)

Tools and Test Equipment

Section 12, *Customer Resource Manual* (CR13-001).

TPS Network Local Control Network System

Section 15, *Customer Resource Manual* (CR13-001):

1. Common Hardware For Modules and Gateways
2. Universal Station Equipment
3. Universal Workstation
4. Console and Cabinets
5. Uncategorized

TPS Network Distributed Control Modules

Section 16, *Customer Resource Manual* (CR13-001):

1. Application Module
2. History Module

Honeywell 620 Logic Controllers System (LCS)

Section 18 of the *Customer Resource Manual* (CR13-001)

PM/Process Manager

Section 22 of the *Customer Resource Manual* (CR13-01).

Appendix D

Task Names

This appendix list all of the task names that could appear in the System Error Journal. They are broken down by node type, so you will find that many nodes contain the same task, such as the Node Administrator. Some tasks are unique to a node, such as the Man Machine Interface Kernel for the Universal Stations.

The TPS Network system provides journals and displays that often indicate the cause of a failure and the corrective action to take; however, when you need to perform more detailed troubleshooting, the attached listing will help identify the software subsystem annunciating the error. Honeywell Technical Assistance Center guidance will be needed for further interpretation of the error.

An error found by the system is not necessarily a fault or failed device indication. For example, if someone removes power from a node before performing a shutdown, errors will be logged. This will show up as a Node Administrator broadcast timeout error.

Application Module Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
B\$NST	Control Kernel	Node Startup
B\$PRSTS	Control Kernel	Periodic Functions
B\$RED_TASK	Control Kernel	Redundancy
B\$BUF_EMPTY	Control Kernel	Redundancy maintenance of SW buffer
B\$FPP	Control Kernel	Point Processor (1 second)
B\$SPP	Control Kernel	Point Processor (5 minute - 1 hour)
B\$IIP	Control Kernel	Internetwork Point Processor (5 second)
B\$IIP_PA_REQ	Control Kernel	Extra Parameter Access Requestor
U\$LEADTASK	Control Kernel	Unit Ops State Change processing
B\$EVD	Control Kernel	Event Handling for AM
B\$UNLOAD	Control Kernel	Checkpoint
B\$LH_STARTUP	Local History	Local History startup (Not Used)
L\$CLL	Local History	CL Loader
B\$AM_DUMPER	Control Kernel	AM Dumper (Used only for Debugging)
B\$SCHDMP2	Control Kernel	Schedule Dumper (Used only for Debugging)
LH\$TIMECHNG	Local History	Not Currently Used
LH_COL_LEAD	Local History	" "
LH_COLLECT	Local History	" "
LH_EXPORT	Local History	" "
LH_MONITOR	Local History	" "
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
CUST_TASK_05	Custom Software	" "
CUST_TASK_06	Custom Software	" "

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
CUST_TASK_07	Custom Software	" "
CUST_TASK_08	Custom Software	" "
CUST_TASK_09	Custom Software	" "
CUST_TASK_10	Custom Software	" "
CUST_TASK_11	Custom Software	" "
CUST_TASK_12	Custom Software	" "
CUST_TASK_13	Custom Software	" "
CUST_TASK_14	Custom Software	" "
CUST_TASK_15	Custom Software	" "
CUST_TASK_16	Custom Software	" "
CUST_TASK_17	Custom Software	" "
CUST_TASK_18	Custom Software	" "
CUST_TASK_19	Custom Software	" "
CUST_TASK_20	Custom Software	" "
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_QRY_SRV	Data Access	Query Server
\$D_EI_REQ	Data Access	External to Internal Name Conversion
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	Parameter Access Requestor
\$D_PA_REQ_02	Data Access	Parameter Access Requestor
\$D_PA_REQ_03	Data Access	Parameter Access Requestor
\$D_PA_REQ_04	Data Access	Parameter Access Requestor
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
\$D_PASPPR	Data Access	AM and CG Server Task
\$D_PASPPR_01	Data Access	" "
\$D_PASPPR_02	Data Access	" "

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$D_PASPPR_03	Data Access	" "
\$D_PASPPR_04	Data Access	" "
X\$_DISPATCH	Command Handler	Common Communication Mechanism
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
\$\$EVENT_TASK	RNOS	RNOS Event Capture Function
FMUTIL	RNOS File Manager	FM Utility (Used only for Debugging)
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
TSTMNT	RNOS	Task Perf Mon.(Used only for Debugging)
TSTUSR	RNOS	Task Perf Mon.(Used only for Debugging)
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$FILEMAN 0	RNOS File Manager	Local File Operation Task
\$\$FILEMAN 1	RNOS File Manager	" "
\$\$FILEMAN 2	RNOS File Manager	" "
\$\$FILEMAN 3	RNOS File Manager	" "

Computer Gateway Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
I\$STARTUP	CG Processing	CG Startup and Initialize
I\$SCHEDULER	CG Processing	ACP Scheduler for Upper Level Processor
I\$LCH	CG Processing	Data Link Driver Interface
I\$WHOFR_MF	CG Processing	Miscellaneous Transaction Handler
I\$APPHAND	CG Processing	LCN Transaction Interface
I\$WHOFR_DA1	CG Processing	Multi-point Get Store
I\$WHOFR_DA2	CG Processing	" "
I\$WHOFR_DA3	CG Processing	" "
I\$WHOFR_DA4	CG Processing	" "
I\$BUILD_IDB	CG Processing	Data Definition Table Builder
I\$SP_DTA_ACC	CG Processing	Single Point Get/Store
I\$GET_HIS_OP	CG Processing	Continuous History Retrieval (archaic)
I\$GHISTORY01	CG Processing	Continuous History Retrieval
I\$GHISTORY02	CG Processing	" "
I\$GHISTORY03	CG Processing	" "
I\$GHISTORY04	CG Processing	" "
I\$UNLOAD	CG Processing	Checkpoint Processing
I\$USER_DSPLY	CG Processing	VAX to US Channel
LOOKDB	CG Processing	Database Print (Used only for Debugging)
I\$ARC_DISPCH	Local History	Not Currently Used
I\$ARCHIVER_1	Local History	" "
I\$ARCHIVER_2	Local History	" "
I\$ARCHIVER_3	Local History	" "
I\$FILE_UTIL	CG Processing	File Transfer Function
I\$TEST_VAX	CG Processing	Trans. Simulat. (Used only for Debugging)
LH_ARC_LEAD	Local History	Not Currently Used
T\$OPT_LEAD	On Process Test	OPT Lead Task

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_EI_REQ	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	" "
\$D_PA_REQ_02	Data Access	" "
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_QRY_REQ	Data Access	Query Requestor
\$D_QRY_REQ_1	Data Access	" "
\$D_QRY_REQ_2	Data Access	" "
\$D_QRY_REQ_3	Data Access	" "
\$D_QRY_SRV	Data Access	Query Server
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
\$D_PASPPR	Data Access	AM and CG Server Task
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
X\$_DISPATCH	Command Handler	Common Communication Mechanism
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
CUST_TASK_05	Custom Software	" "
CUST_TASK_06	Custom Software	" "
CUST_TASK_07	Custom Software	" "
CUST_TASK_08	Custom Software	" "
CUST_TASK_09	Custom Software	" "

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
CUST_TASK_10	Custom Software	" "
CUST_TASK_11	Custom Software	" "
CUST_TASK_12	Custom Software	" "
CUST_TASK_13	Custom Software	" "
CUST_TASK_14	Custom Software	" "
CUST_TASK_15	Custom Software	" "
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)

R400 Engineering Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
FMUTIL	RNOS File Manager	FM Utility (Used only for Debugging)
O\$FLP_MOUNT	EP Function	Removable Media Mount Handling
Y\$_SMCC_TASK	SMCC	System Maintenance Control
Y\$PRINT_TASK	SMCC	System Maintenance Control Printing
X\$_DISPATCH	Command Handler	Common Communication Mechanism
K\$RM_LEAD	MMI Kernel	Report Manager
K\$RM_RC	MMI Kernel	Report Manager
K\$RG_CRT	MMI Kernel	Report Generator for CRT
K\$RG_PTR1	MMI Kernel	Report Generator for Printer One
K\$RG_PTR2	MMI Kernel	Report Generator for Printer Two
K\$MMIK_LEAD	MMI Kernel	MMI Kernel Startup
K\$MMIK_EH	MMI Kernel	Event Handler
K\$MMIK_CP	MMI Kernel	Display Context Processor
K\$MMIK_CPT	MMI Kernel	Display Context Processor Timer
K\$MMIK_DC	MMI Kernel	Display Control
K\$MMIK_TT	MMI Kernel	Display Control Timer
K\$MMIK_UT	MMI Kernel	Display Update
K\$MMIK_UT1	MMI Kernel	Display Update 1
K\$MMIK_UT2	MMI Kernel	Display Update 2
T\$US_TESTER	US Test	Keyboard Simulator
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_QRY_REQ	Data Access	Query Requestor
\$D_EI_REQ	Data Access	External to Internal Name Conversion
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$D_PA_REQ_01	Data Access	" "
\$D_PA_REQ_02	Data Access	" "
\$D_PA_REQ_03	Data Access	" "
\$D_PA_REQ_04	Data Access	" "
\$D_PA_REQ_05	Data Access	" "
\$D_PA_REQ_06	Data Access	" "
\$D_PA_REQ_07	Data Access	" "
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
\$D_DB_UPDATE	Data Access	Custom Name Descriptor Handler
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
K\$USER_INIT	MMI Functions	MMI Initialization
M\$SCRN_PRINT	MMI Functions	Screen Print
C\$CM_LEAD	MMI Functions	Console Manager Lead
C\$LOCAL_FUNC	MMI Functions	Console Manager Local Functions
C\$REMOTE_FUN	MMI Functions	Console Manager Remote Functions
E\$S_SDB_TASK	MMI Functions	System Event Manager
M\$SV_CUSTOM	MMI Functions	Custom Data Save
NS_AM_CHKPT	MMI Functions	AM Node Status—Checkpoint Timestamp
E\$L_EVNT_MGR	MMI Functions	Event Manager
M\$EDDUC_TASK	MMI Functions	Display Update Requestor
R\$LEAD_TASK	MMI Functions	Recovery Event Manager
R\$UNIT_GUARD	MMI Functions	Unit Guard Remote Function
E\$AL_LST_MGT	MMI Functions	Alarm List Manager
E\$OPM_TASK	MMI Functions	Operator Message Manager
A\$AREA_MGR	MMI Functions	Area Manager
A\$QRY_SERV	MMI Functions	Area Manager Query Server
\$LOAD_DUMP	RNOS Loader	RNOS Loader Lead Task
\$LOAD	RNOS Loader	RNOS Loading Function
\$LOAD_NET	RNOS Loader	RNOS Network Load
\$DUMP	RNOS Loader	RNOS Dumping Function

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
CUST_TASK_05	Custom Software	" "
CUST_TASK_06	Custom Software	" "
CUST_TASK_07	Custom Software	" "
CUST_TASK_08	Custom Software	" "
CUST_TASK_09	Custom Software	" "
CUST_TASK_10	Custom Software	" "
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$\$FM_IO_TASK	RNOS File Manager	File Manager Remote I/O Handler
\$\$MH_SERVER	RNOS File Manager	Mount Handler Server
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$FILEMAN 0	RNOS File Manager	Local File Operation Task
\$\$FILEMAN 1	RNOS File Manager	" "
:	:	:
:	:	:
\$\$FILEMAN 39	RNOS File Manager	" "

Hiway Gateway Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
D\$LEADTASK	HG Processing	State Change Processing
U\$LEADTASK	HG Processing	Unit Ops State Change Processing
D\$_RED	HG Processing	Redundancy
D\$_SYNCH	HG Processing	Synchronization
D\$_DH_STORE1	HG Processing	Data Handling
D\$_DH_RETRV1	HG Processing	Data Handling
D\$_DH_STORE2	HG Processing	Data Handling
D\$_DH_RETRV2	HG Processing	Data Handling
D\$_DH_STORE3	HG Processing	Data Handling
D\$_DH_RETRV3	HG Processing	Data Handling
D\$_DH_STORE4	HG Processing	Data Handling
D\$_DH_RETRV4	HG Processing	Data Handling
D\$_DH_STORE5	HG Processing	Data Handling
D\$_DH_RETRV5	HG Processing	Data Handling
D\$_DH_STORE6	HG Processing	Data Handling
D\$_DH_RETRV6	HG Processing	Data Handling
D\$_HS_SYSTEM	HG Processing	Hiway Security
D\$_EV_COMMND	HG Processing	Event Handling
D\$_EV_DISTRI	HG Processing	Event Handling
D\$_EV_NORMAL	HG Processing	Event Handling
D\$_EV_CRITIC	HG Processing	Event Handling
D\$_TR_INPUT	HG Processing	Trending
D\$_TR_PRTOCL	HG Processing	Trending
D\$_TR_OUTPUT	HG Processing	Trending
D\$_CH_FAST_C	HG Processing	Box Commands
D\$_CP_CHKPNP	HG Processing	Checkpoint

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
D\$_PER_PFI	HG Processing	Periodic Function
D\$_PER_HRSYN	HG Processing	Periodic Function
D\$_PER_LCNSY	HG Processing	Periodic Function
D\$_MISTY	HG Processing	Misty Eye Check Function
D\$_TIGER	HG Processing	Enhanced Redundancy Dispatcher
X\$_DISPATCH	Command Handler	Common Communication Mechanism
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	" "
\$D_PA_REQ_02	Data Access	" "
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
\$D_PASDAC_1	Data Access	HG Server Task
\$D_PASDAC_2	Data Access	" "
\$D_PASDAC_3	Data Access	" "
\$D_PASDAC_4	Data Access	" "
\$D_PASDAC_5	Data Access	" "
\$D_PASDAC_6	Data Access	" "
\$D_PASDAC_7	Data Access	" "
\$D_PASDAC_8	Data Access	" "
\$D_PASDAC_9	Data Access	" "
\$D_PASDAC_10	Data Access	" "
\$D_QRY_SRV	Data Access	Query Server
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
NTD\$TEST	Network Debugger	Task Debug (Used only for Debugging)
Y\$BKPTASK	Network Debugger	" "

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
Y\$NETWKDBGS	Network Debugger	" "
Y\$IOTASK	Network Debugger	" "
Y\$NETWKDBGM	Network Debugger	" "
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
TSTMNT	RNOS	Task Perf Mon.(Used only for Debugging)
TSTUSR	RNOS	Task Perf Mon.(Used only for Debugging)
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
LH\$TIMECHNG	Local History	Not Currently Used
LH_COL_LEAD	Local History	" "
LH_COLLECT	Local History	" "
LH_EXPORT	Local History	" "
LH_MONITOR	Local History	" "
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)

History Module Offline Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$SOFL_LEAD	HM Offline	HM Offline Startup
S_OFL_DRIVER	HM Offline	Disk Initialize task
\$SOFL_COAT	HM Offline	Offline Utility (Used only for Debugging)
K\$USER_INIT	HM Offline	Startup Initialize
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
\$SLDC_LEAD	HM Loader	HM Loader Task
X\$_DISPATCH	Command Handler	Common Communication Mechanism
AVL_DUMPER	RNOS File Manager	AVL Utility (Used only for Debugging)
FMUTIL	RNOS File Manager	FM Utility (Used only for Debugging)
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	" "
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_QRY_SRV	Data Access	Query Server
\$D_QRY_SRV_1	Data Access	Query Server
\$D_QRY_SRV_2	Data Access	Query Server
\$D_QRY_SRV_3	Data Access	Query Server
\$D_QRY_SRV_4	Data Access	Query Server
\$D_QRY_SRV_5	Data Access	Query Server
\$D_QRY_SRV_6	Data Access	Query Server
\$D_QRY_SRV_7	Data Access	Query Server
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task

UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
NTD\$TEST	Network Debugger	Task Debug (Used only for Debugging)
Y\$BKPTASK	Network Debugger	" "
Y\$NETWKDBGS	Network Debugger	" "
Y\$IOTASK	Network Debugger	" "
Y\$NETWKDBGM	Network Debugger	" "
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$\$FM_IO_TASK	RNOS File Manager	File Manager Remote I/O Handler
\$\$SYNCH_TASK	RNOS File Manager	File Manager Disk Synchronization

\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$FILEMAN 0	RNOS File Manager	Local File Operation Task
\$\$FILEMAN 1	RNOS File Manager	" "
:	:	:
:	:	:
\$\$FILEMAN 30	RNOS File Manager	" "

History Module Online Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
K\$USER_INIT	HM Init	Startup Initialize
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
N\$LEAD	On Process Analysis	OPA Lead Task
N\$EXEC	On Process Analysis	OPA Analysis Task
S\$ONP_LEAD	HM Environment Lead	Lead Startup Task
S_ONP_VAL	HM Validation	Configuration Validation
S_ONP_ERH	HM Error Handler	Disk Error Handling
S_ONP_SCM	HM State Changes	Disk and Node State Changes
H\$LEAD	Continuous History	History Startup
HI_COLLECT	Continuous History	History 60 Second Collection
HI_COLLEC_TW	Continuous History	History 20 Second Collection
HI_COLLECT_T	Continuous History	History 10 Second Collection
HI_COLLECT_F	Continuous History	History 5 Second Collection
CH_MONITOR	Continuous History	History Performance Monitor
H\$DUMPER	Continuous History	HM Dumper (used only for debugging)
J\$LEAD	Journal Manager	Journal Manager Lead Task
J\$TIMER	Journal Manager	Journal 1 second sync. message
J\$INPR	Journal Manager	Journal Message Receiver
J\$SORT	Journal Manager	Journal Sorting
J\$DISP	Journal Manager	Journal Retrieval Acceptor
J\$SERV_1	Journal Manager	Journal Retrieval Function
J\$SERV_2	Journal Manager	" "
J\$SERV_3	Journal Manager	" "
J\$TSTJM	Journal Manager	Journal Utility (used only for debugging)
S\$LDC_LEAD	HM Loader	HM Loader

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$CHC_LEAD	HM Command Handler	HM Checkpoint Scheduler
Y\$BKPTASK	Network Debugger	Task Debug (Used only for Debugging)
Y\$NETWKDBGS	Network Debugger	" "
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	" "
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_QRY_SRV	Data Access	Query Server
\$D_QRY_SRV_1	Data Access	Query Server
\$D_QRY_SRV_2	Data Access	Query Server
\$D_QRY_SRV_3	Data Access	Query Server
\$D_QRY_SRV_4	Data Access	Query Server
\$D_QRY_SRV_5	Data Access	Query Server
\$D_QRY_SRV_6	Data Access	Query Server
\$D_QRY_SRV_7	Data Access	Query Server
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
X\$_DISPATCH	Command Handler	Common Communication Mechanism
AVL_DUMPER	RNOS File Manager	AVL Utility (Used only for Debugging)
FMUTIL	RNOS File Manager	FM Utility (Used only for Debugging)
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
\$\$LOAD_DUMP	RNOS Loader	RNOS Loader Lead Task
\$\$LOAD	RNOS Loader	RNOS Loading Function
\$\$LOAD_NET	RNOS Loader	RNOS Network Load
\$\$DUMP	RNOS Loader	RNOS Dumping Function
\$\$HMAPPL	RNOS Loader	RNOS US N Key Loader
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$\$FM_IO_TASK	RNOS File Manager	File Manager Remote I/O Handler
\$\$SYNCH_TASK	RNOS File Manager	File Manager Disk Synchronization
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$FILEMAN 0	RNOS File Manager	Local File Operation Task
\$\$FILEMAN 1	RNOS File Manager	" "
:	:	:
:	:	:
\$\$FILEMAN 63	RNOS File Manager	" "

Operator Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
K\$MMIK_LEAD	MMI Kernel	MMI Kernel Startup
K\$MMIK_EH	MMI Kernel	Event Handler
K\$MMIK_CP	MMI Kernel	Display Context Processor
K\$MMIK_CPT	MMI Kernel	Display Context Processor Timer
K\$MMIK_DC	MMI Kernel	Display Control
K\$MMIK_TT	MMI Kernel	Display Control Timer
K\$MMIK_UT	MMI Kernel	Display Update
K\$MMIK_UT1	MMI Kernel	High Performance Display Update
K\$MMIK_UT2	MMI Kernel	Background Display Update
K\$MMIK_REMOT	MMI Kernel	Remote Channel
K\$MMIK_PCP	MMI Kernel	YH-POK Context Processor
T\$US_TESTER	US Test	Keyboard Simulator
K\$RM_LEAD	MMI Kernel	Report Manager
K\$RM_RC	MMI Kernel	Report Manager
K\$RM_SCHEDUL	MMI Kernel	Report Manager Scheduler
K\$MMIT_TC	MMI Kernel	Trend Control
K\$MMIT_TT	MMI Kernel	Trend Timer
K\$TP_TC	MMI Kernel	Trend Pen Control
K\$TP_TT	MMI Kernel	Trend Pen Timer
K\$TP_ZIGZAG	MMI Kernel	Trend Pen Zigzag
K\$TP_HOUR	MMI Kernel	Trend Pen Hourly
K\$RG_CRT	MMI Kernel	Report Generator for CRT
K\$RG_PTR1	MMI Kernel	Report Generator for Printer One
K\$RG_PTR2	MMI Kernel	Report Generator for Printer Two
K\$RTJ	MMI Kernel	Real Time Journal
K\$RTJ_PRNT	MMI Kernel	Real Time Journal Print
K\$USER_INIT	MMI Kernel	MMI Initialization

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
M\$SCRN_PRINT	MMI Functions	Screen Print
A\$AREA_MGR	MMI Functions	Area Manager
A\$QRY_SERV	MMI Functions	Area Manager Query Server
E\$L_EVNT_MGR	MMI Functions	Event Manager
M\$EDDUC_TASK	MMI Functions	Display Update Requestor
E\$OPM_TASK	MMI Functions	Operator Message Manager
E\$AL_LST_MGT	MMI Functions	Alarm List Manager
E\$ALTIM	MMI Functions	Alarm List Manager Timer
E\$AVMPGM	MMI Functions	Audio-Visual Manager
E\$ADM_MAIN	MMI Functions	Alarm Display Manager
R\$LEAD_TASK	MMI Functions	Recovery Event Manager
R\$UNIT_GUARD	MMI Functions	Unit Guard Remote Function
M\$TREND_COLL	MMI Functions	Trend Data Collection
C\$CM_LEAD	MMI Functions	Console Manager Lead
C\$LOCAL_FUNC	MMI Functions	Console Manager Local Functions
C\$REMOTE_FUN	MMI Functions	Console Manager Remote Functions
E\$S_SDB_TASK	MMI Functions	System Event Manager
M\$SV_CUSTOM	MMI Functions	Custom Data Save
NS_AM_CHKPT	MMI Functions	AM Node Status—Checkpoint Timestamp
X\$_DISPATCH	Command Handler	Common Communication Mechanism
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_QRY_REQ	Data Access	Query Requestor
\$D_EI_REQ	Data Access	External to Internal Name Conversion
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	" "
\$D_PA_REQ_02	Data Access	" "
\$D_PA_REQ_03	Data Access	" "

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$D_PA_REQ_04	Data Access	" "
\$D_PA_REQ_05	Data Access	" "
\$D_PA_REQ_06	Data Access	" "
\$D_PA_REQ_07	Data Access	" "
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
\$\$LOAD_DUMP	RNOS Loader	RNOS Loader Lead Task
\$\$LOAD	RNOS Loader	RNOS Loading Function
\$\$LOAD_NET	RNOS Loader	RNOS Network Load
\$\$DUMP	RNOS Loader	RNOS Dumping Function
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
CUST_TASK_05	Custom Software	" "
CUST_TASK_06	Custom Software	" "
CUST_TASK_07	Custom Software	" "
CUST_TASK_08	Custom Software	" "
CUST_TASK_09	Custom Software	" "
CUST_TASK_10	Custom Software	" "
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$\$FM_IO_TASK	RNOS File Manager	File Manager Remote I/O Handler
\$\$MH_SERVER	RNOS File Manager	Mount Handler Server
FMUTIL	RNOS File Manager	FM Utility (Used only for Debugging)

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$FILEMAN 0	RNOS File Manager	Local File Operation Task
\$\$FILEMAN 1	RNOS File Manager	" "
:	:	:
:	:	:
\$\$FILEMAN 27	RNOS File Manager	" "

Network Gateway Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
WM_TEST	NG Processing	NG Test Task (Used only for debugging)
NG\$LEAD_TASK	NG Processing	NG Lead Task
NG\$_RPC_TASK	NG Processing	Remote Procedure Call Support
NGBCAST	NG Processing	Periodic Broadcast (1 min.)
NG\$RSYN_TASK	NG Processing	Database Resynchronization
NG\$TIME_CHG	NG Processing	Time Change Management
NGBCAST_TT	NG Processing	NG Test Task (Used only for Debugging)
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	" "
\$D_PA_REQ_02	Data Access	" "
\$D_PA_REQ_03	Data Access	" "
\$D_PA_REQ_04	Data Access	" "
\$D_PA_REQ_05	Data Access	" "
\$D_PA_REQ_06	Data Access	" "
\$D_PA_REQ_07	Data Access	" "
\$D_PA_REQ_08	Data Access	" "
\$D_PA_REQ_09	Data Access	" "
\$D_PA_REQ_10	Data Access	" "
\$D_PA_REQ_11	Data Access	" "
\$D_PA_REQ_12	Data Access	" "
\$D_PA_REQ_13	Data Access	" "
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$D_PA_NGSUR1	Data Access	Parameter Access Surrogate
\$D_PA_NGSUR2	Data Access	" "
\$D_PA_NGSUR3	Data Access	" "
\$D_PA_NGSUR4	Data Access	" "
\$D_PA_NGSUR5	Data Access	" "
\$D_PA_NGSUR6	Data Access	" "
\$D_PA_NGSUR7	Data Access	" "
\$D_PA_NGSUR8	Data Access	" "
\$D_PA_NGSUR9	Data Access	" "
\$D_PA_NGSURA	Data Access	" "
\$D_PA_NGSURB	Data Access	" "
\$D_PA_NGSURC	Data Access	" "
\$D_PA_NGSURD	Data Access	" "
\$D_EI_NGSUR1	Data Access	External to Internal Conversion
\$D_QY_NGSUR1	Data Access	Query Surrogate
\$D_NG_EVENT	Data Access	Operator Change Event Management
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
PP_TASK	NG Processing	Protocol Task
NEM_DBG	Nemesys	Debug Task
NEM_RQSTRS	Nemesys	Network Manger Requestor
NEM_RQRCV	Nemesys	Network Manger Receiver
NEM_RQRCVRAW	Nemesys	Network Manger Receiver Raw
NEM_RSPDR	Nemesys	Network Manger Responder
NEM_RSPDRRAW	Nemesys	Network Manger Responder Raw
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)

Universal Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
O\$FLP_MOUNT	EP Function	Removable Media Mount Handling
Y\$_SMCC_TASK	SMCC	System Maintenance Control
Y\$PRINT_TASK	SMCC	System Maintenance Control Printing
FMUTIL	RNOS File Manager	FM Utility (Used only for Debugging)
\$RNOS_DUMPER	RNOS	Dumpers (Used only for Debugging)
X\$_DISPATCH	Command Handler	Common Communication Mechanism
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_QRY_REQ	Data Access	Query Requestor
\$D_EI_REQ	Data Access	External to Internal Name Conversion
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	" "
\$D_PA_REQ_02	Data Access	" "
\$D_PA_REQ_03	Data Access	" "
\$D_PA_REQ_04	Data Access	" "
\$D_PA_REQ_05	Data Access	" "
\$D_PA_REQ_06	Data Access	" "
\$D_PA_REQ_07	Data Access	" "
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
\$D_DB_UPDATE	Data Access	Custom Name Descriptor Handler
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
\$LOAD_DUMP	RNOS Loader	RNOS Loader Lead Task
\$LOAD	RNOS Loader	RNOS Loading Function
\$LOAD_NET	RNOS Loader	RNOS Network Load

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
\$\$DUMP	RNOS Loader	RNOS Dumping Function
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	" "
CUST_TASK_03	Custom Software	" "
CUST_TASK_04	Custom Software	" "
CUST_TASK_05	Custom Software	" "
CUST_TASK_06	Custom Software	" "
CUST_TASK_07	Custom Software	" "
CUST_TASK_08	Custom Software	" "
CUST_TASK_09	Custom Software	" "
CUST_TASK_10	Custom Software	" "
K\$MMIK_LEAD	MMI Kernel	MMI Kernel Startup
K\$MMIK_EH	MMI Kernel	Event Handler
K\$MMIK_CP	MMI Kernel	Display Context Processor
K\$MMIK_CPT	MMI Kernel	Display Context Processor Timer
K\$MMIK_DC	MMI Kernel	Display Control
K\$MMIK_TT	MMI Kernel	Display Control Timer
K\$MMIK_UT	MMI Kernel	Display Update
K\$MMIK_UT1	MMI Kernel	High Performance Display Update
K\$MMIK_UT2	MMI Kernel	Background Display Update
K\$MMIK_REMOT	MMI Kernel	Remote Channel
K\$MMIK_PCP	MMI Kernel	YH-POK Context Processor
T\$US_TESTER	US Test	Keyboard Simulator
A\$AREA_MGR	MMI Functions	Area Manager
A\$QRY_SERV	MMI Functions	Area Manager Query Server
E\$L_EVNT_MGR	MMI Functions	Event Manager

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
M\$EDDUC_TASK	MMI Functions	Display Update Requestor
E\$OPM_TASK	MMI Functions	Operator Message Manager
E\$AL_LST_MGT	MMI Functions	Alarm List Manager
E\$ALTIM	MMI Functions	Alarm List Manager Timer
E\$AVMPGM	MMI Functions	Audio-Visual Manager
E\$ADM_MAIN	MMI Functions	Alarm Display Manager
R\$LEAD_TASK	MMI Functions	Recovery Event Manager
R\$UNIT_GUARD	MMI Functions	Unit Guard Remote Function
K\$USER_INIT	MMI Kernel	MMI Initialization
M\$SCRN_PRINT	MMI Functions	Screen Print
K\$RM_LEAD	MMI Kernel	Report Manager
K\$RM_RC	MMI Kernel	Report Manager
K\$RM_SCHEDUL	MMI Kernel	Report Manager Scheduler
K\$MMIT_TC	MMI Kernel	Trend Control
K\$MMIT_TT	MMI Kernel	Trend Timer
K\$TP_TC	MMI Kernel	Trend Pen Control
K\$TP_TT	MMI Kernel	Trend Pen Timer
K\$TP_ZIGZAG	MMI Kernel	Trend Pen Zigzag
K\$TP_HOUR	MMI Kernel	Trend Pen Hourly
K\$RG_CRT	MMI Kernel	Report Generator for CRT
K\$RG_PTR1	MMI Kernel	Report Generator for Printer One
K\$RG_PTR2	MMI Kernel	Report Generator for Printer Two
C\$CM_LEAD	MMI Functions	Console Manager Lead
C\$LOCAL_FUNC	MMI Functions	Console Manager Local Functions
C\$REMOTE_FUN	MMI Functions	Console Manager Remote Functions
E\$S_SDB_TASK	MMI Functions	System Event Manager
M\$SV_CUSTOM	MMI Functions	Custom Data Save
NS_AM_CHKPT	MMI Functions	AM Node Status—Checkpoint Timestamp
K\$RTJ	MMI Kernel	Real Time Journal
K\$RTJ_PRNT	MMI Kernel	Real Time Journal Print

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
M\$TREND_COLL	MMI Functions	Trend Data Collection
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
\$\$FM_IO_TASK	RNOS File Manager	File Manager Remote I/O Handler
\$\$MH_SERVER	RNOS File Manager	Mount Handler Server
\$D_EVT_DIS	Event Distribution	Event Initiation
\$D_EVT_RTY	Event Distribution	Event Retry Handling
\$\$COMM_TASK	RNOS	LCN Communications
\$\$NA_STATUS	RNOS	Node Administrator Broadcasts
\$\$WATCHDOG	RNOS	Node Administrator Message Watchdog
\$\$CLOCK_TASK	RNOS	Clock Management
\$\$DELAYEDACT	RNOS	System Error Handling
\$\$SEH_COMMCA	RNOS	System Error Handling Corrective Action
\$\$EXCMGMTSK	RNOS	Exception Management
\$\$NODE_ADMIN	RNOS	Node Administrator Lead Task
\$\$CPTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$UTTSK	MTOS Debugger	Task Debug (Used only for Debugging)
\$\$FILEMAN 0	RNOS File Manager	Local File Operation Task
\$\$FILEMAN 1	RNOS File Manager	" "
:	:	:
:	:	:
\$\$FILEMAN 41	RNOS File Manager	" "

Network Interface Module Personality

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
UG\$LEADTASK	NIM Processing	NIM Function Set State Change processing
U\$LEADTASK	NIM Processing	UCN Function Set State Change processing
UG\$_RED	NIM Processing	Redundancy—LCN Communication
UG\$HPN_STS	NIM Processing	Redundancy—UCN Communication
UG\$_AUTORCNCT	NIM Processing	UCN Autoreconnect Task
UG\$_SYNCHER	NIM Processing	UCN Time Syncher Task
UG\$_MISTY	NIM Processing	Data Handling—Parameter Access Check
UG\$_EV_DISTR	NIM Processing	Event Handling—Distribute Events on LCN
UG\$_EV_PRCSR	NIM Processing	Event Handling—Receive Events on UCN
UG\$_EV_RECOV	NIM Processing	Event Handling—Issues UCN Evt Recovery
UG\$_EV_COMND	NIM Processing	Event Handling—LCN Event Commands
UG\$_NS_TASK	NIM Processing	UCN Node State Scanner
UG\$_DH_PSTP1	NIM Processing	Data Handling—Post-Proc. Highest Priority
UG\$_DH_PREP1	NIM Processing	Data Handling—Pre-Proc. Highest Priority
UG\$_DH_PSTP2	NIM Processing	Data Handling—Post-Proc. Med. High Prior.
UG\$_DH_PREP2	NIM Processing	Data Handling—Pre-Proc. Med. High Priority
UG\$_DH_PSTP3	NIM Processing	Data Handling—Post-Proc. Medium Priority
UG\$_DH_PREP3	NIM Processing	Data Handling—Pre-Proc. Medium Priority
UG\$_DH_PSTP4	NIM Processing	Data Handling—Post-Proc. Med. Low Priority
UG\$_DH_PREP4	NIM Processing	Data Handling—Pre-Proc. Med. Low Priority
UG\$_DH_PSTP5	NIM Processing	Data Handling—Post-Proc. Lowest Priority
UG\$_DH_PREP5	NIM Processing	Data Handling—Pre-Proc. Lowest Priority
UG\$_CH_SLOW	NIM Processing	Checkpoint
UG\$_CH_LOAD	NIM Processing	UCN Node Load
UG\$_CH_DLL	NIM Processing	Sequence/Ladder Logic Loader
HX\$LEADTASK	UCN Exerciser	"Main" task for INIT

<u>TASK NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
HX\$DEBUG	UCN Exerciser	Debug Task (Internal use)
HX\$TRIANGLE	UCN Exerciser	Triangulation Algorithm
HX\$SERVER	UCN Exerciser	"Command"Handler Interface
X\$_DISPATCH	Command Handler	Common Communication Mechanism
DATA_ACCESS	Data Access	Data Access Lead Task
\$D_MONITOR	Data Access	Performance Statistics (15 sec. periodic)
\$D_CHIME	Data Access	Performance Statistics (Hourly max./min.)
\$D_EI_SRV	Data Access	External to Internal Name Conversion
\$D_PA_REQ	Data Access	Parameter Access Requestor
\$D_PA_REQ_01	Data Access	"" ""
\$D_PA_REQ_02	Data Access	"" ""
\$D_PASSTD	Data Access	Unit Ops and PSDP Server Task
\$D_PASDAC_1	Data Access	NIM Server Task
\$D_PASDAC_2	Data Access	"" ""
\$D_PASDAC_3	Data Access	"" ""
\$D_PASDAC_4	Data Access	"" ""
\$D_PASDAC_5	Data Access	"" ""
\$D_PASDAC_6	Data Access	"" ""
\$D_PASDAC_7	Data Access	"" ""
\$D_PASDAC_8	Data Access	"" ""
\$D_PASDAC_9	Data Access	"" ""
\$D_SA_EVENTS	Data Access	Aux Node Status Event Sender
\$D_QRY_SRV	Data Access	Query Server
T\$OPT_LEAD	On Process Test	OPT Lead Task
T\$HP_EXEC	On Process Test	OPT High Priority Tests
T\$BG_EXEC	On Process Test	OPT Low Priority Tests
\$RNOS_DUMPER	RNOS	Dumpers (Used for only for Debugging)
UP\$CUSTOM_SW	Custom Software	Custom SW Lead Task and Loader
CUST_TASK_01	Custom Software	Custom Task
CUST_TASK_02	Custom Software	"" ""

<u>TASK_NAME</u>	<u>SUBSYSTEM</u>	<u>FUNCTIONALITY</u>
CUST_TASK_03	Custom Software	"" ""
CUST_TASK_04	Custom Software	"" ""
CUST_TASK_05	Custom Software	"" ""
CUST_TASK_06	Custom Software	"" ""
CUST_TASK_07	Custom Software	"" ""
CUST_TASK_08	Custom Software	"" ""
CUST_TASK_09	Custom Software	"" ""
CUST_TASK_10	Custom Software	"" ""
\$\$FM_NET_TSK	RNOS File Manager	File Manager Remote Functions
\$\$DSM_TASK	RNOS File Manager	Device State Manager
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LAST PAGE

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