S/390®

Service Guide

Parallel Enterprise Server - Generation 5
Parallel Enterprise Server - Generation 6

SY24-6160-08

S/390®

Service Guide

SY24-6160-08

Note!

Before using this information and the product it supports, be sure to read the general information under Appendix F, “Notices” on page F-1.

| **Ninth Edition (September 2005)**

This edition applies to the IBM S/390 Enterprise Server Generations 5 and 6. This major revision replaces and obsoletes SY24-6160-06, SY24-6160-06a, SY24-6160-06b, SY24-6160-06c, SY24-6160-06d, TNL SN25-0985-00, and SY24-6160-07. A technical change to the text or illustration is indicated by a vertical line to the left of the change.

There may be a newer version of this document in PDF format available on Resource Link™. Go to *http://www.ibm.com/servers/resourcelink* and click on Library on the navigation bar. A newer version is indicated by a lower case alphabetic letter following the form number suffix (for example: 00a, 00b, 01a, 01b).

Contents

Safety

Safety Notices

Safety notices may be printed throughout this guide. **DANGER** notices warn you of conditions or procedures that can result in death or severe personal injury. **CAUTION** notices warn you of conditions or procedures that can cause personal injury that is neither lethal nor extremely hazardous. Attention notices warn you of conditions or procedures that can cause damage to machines, equipment, or programs.

The following **CAUTION** notice appears on pages 7-3, 9-1, and 10-1:

CAUTION:

Although the IBM module is safe, there may be other Laser modules in the system link that may not be safe under all conditions. For this reason it is advised to never view the end of the optical fiber cable or open receptacle. However, some repair activities of optical fiber cable assemblies may require the use of special viewing devices. In such cases, disconnecting both ends of the fiber is mandatory. As an additional precaution, viewing equipment with the proper Laser viewing protection filters must be used.

The following **CAUTION** notice appears on page 3-3.

CAUTION:
The Cryptographic Battery Unit (CBU) contains a lithium battery. Do not expose the CBU to heat. Do not attempt to disassemble the CBU or recharge the battery. Dispose of the CBU as required by local ordinances or regulations.

The following **DANGER** notice appears on pages 2-14, and 3-14.
DANGER

You will be measuring dangerous voltages in this step.

World Trade Safety Information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, a safety information booklet is included in the publications package shipped with the product. The booklet contains the safety information in your national language with references to the US English source. Before using a US English publication to install, operate, or service this IBM® product, you must first become familiar with the related safety information in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the US English publications.

Laser Safety Information

All Generation 5 and Generation 6 models can use I/O cards such as PCI adapters, ESCON®, FICON®, Open Systems Adapters (OSA), InterSystem Coupling-3 (ISC-3), or other I/O features which are fiber optic based and utilize lasers or LEDs.

Laser Compliance

All lasers are certified in the US to confirm to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the US, they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

CAUTION:

Although the IBM module is safe, there may be other Laser modules in the system link that may not be safe under all conditions. For this reason it is advised to never view the end of the optical fiber cable or open receptacle. However, some repair activities of optical fiber cable assemblies may require the use of special viewing devices. In such cases, disconnecting both ends of the fiber is mandatory. As an additional precaution, viewing equipment with the proper Laser viewing protection filters must be used.

Environmental Notices

Product Recycling and Disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at *http://www.ibm.com/ibm/environment/products/prp.s html*.

Notice: This mark applies only to countries within the European Union (EU) and Norway.

Appliances are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

These systems contain a modular refrigeration unit with R-507 refrigerant and a polyol ester oil. This refrigerant must not be released or vented to the atmosphere. Skin contact with refrigerant may cause frostbite. Wear appropriate eye and skin protection. Modular refrigeration units are sealed and must not be opened or maintained.

Battery Return Program

This product may contain sealed lead acid, nickel-cadmium, nickel metal hydride, lithium or lithium ion battery(s). Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to *http://www.ibm.com/ibm/environment/products/battery recycle.shtml* or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel-cadmium, nickel metal hydride and other battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the the IBM part number listed on the battery available prior to your call.

In Taiwan, the following applies:

Please recycle batteries 廢電池請回收

IBM Cryptographic Coprocessor Card Return Program

This machine may contain an optional feature, the cryptographic coprocessor card, which includes a polyurethane material that contains mercury. Please follow Local Ordinances or regulations for disposal of this card. IBM has established a return program for certain IBM Cryptographic Coprocessor cards. More information can be found at *http:/www.ibm.com/ibm/environment/products/prp.shtml*.

هـذه الماكيـنة قد تحتـوي على خاصـية اختيارية، وهى كـارت
Cryptographic coprocessor
والتي تحتـوي على مـادة بولـييوريثيـن التي تحتـوي على الزئبـق
رجـاء اتبـاع القوانيـن أو التعليمـات المحـلية للتخـلص من هـذا الكـارت .
قامـت شركة IBM باعداد برنامج لارجاع بعض كـروت IBM Cryptographic Adapter

لمزيد من المعلومات، رجاء زيارة الموقع
http:/www.ibm.com/ibm/environment/products/prp.shtml

Cable Warning

WARNING Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

Preface

Using This Guide

Who Should Use This Guide

This guide is for service representatives who are trained to perform problem isolation and repair actions on the following:

S/390 Coupling Facility Type 9672 (Model R06)
S/390 G5 Enterprise Server Type 9672 (Models RA6-RX6, T16, T26, and Y16-YX6)
S/390 G6 Enterprise Server Type 9672 (Models X17-XZ7 and Z17-ZZ7)

General Comments

- There are representations of Hardware Management Console and support element windows displayed throughout this manual. These are displayed to help you recognize the information that you will see while performing the procedures in this manual. The information displayed on these representations may not agree with that displayed on your system. Always use the instructions and data displayed on your system.
- There may be product features represented in this manual that are not installed on the system and, although announced, may not be available at the time of publication.
- There may be product features on your system that are not represented in this manual.

Where to Start

Start all service activity at “Chapter 1. START.”

Related Publications

System Overview, GA22-1030 (G6 Models)
System Overview, GA22-7158 (G5 Models)
Installation Manual - Physical Planning, GC22-7106
Problem Analysis Guide, SY22-9876
PR/SM Planning Guide, GA22-7236
Planning for the System/390 Open Systems Adapter Feature, GC23-3870
Input/Output Configuration Program User's Guide, GC38-0401
Managing Your Processors, GC38-0452
Hardware Management Console Guide, GC38-0600
Operations Guide, GC38-3119
Standalone Input/Output Configuration Program User's Guide, GC38-0455
Maintenance Information for Desktop Consoles, GC38-3115 or GC28-6847
Maintenance Information for ThinkPad Consoles, GC38-3117
Link Fault Isolation, SY22-9533
Processor Safety Inspection, SY22-9874
Installation Manual, SY24-6157
Enterprise Systems Connection Converter, SY27-2590.

Maintenance Information for Fiber Optic Channel Links, SY27-2597.
Parts Catalog, S123-1151
Monitor Hardware Maintenance Manual, S71G-4197
IBM Personal Computer Hardware Maintenance Manual, S83G-7789
Hardware Maintenance Manual Vol. 2: ThinkPad Computers, S82G-1502 (Model 2635)
Hardware Maintenance Manual for IBM ThinkPad 600, S10L-9619

How to Send your Comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this book:

- Send your comments by using Resource Link at *http://www.ibm.com/servers/resourcelink*. Select **Site Feedback** on the Navigation bar on the left, then **Library Comments**, then **New Subject**. Be sure to include the name of the book, the form number of the book, the version of the book, if applicable, and the specific location of the text your are commenting on (for example, a page number or table number).
- Fill out one of the forms at the back of this book and return it by mail, by fax, or by giving it to an IBM representative.

Chapter 1. START

This is the starting point for all service calls.

Attention: Removing AC power from a Hardware Management Console or CPCplex may cause loss of data on the Hardware Management Console or support element hard disks. If AC power must be removed, shut down the support element and Hardware Management Console. For instructions, refer to "System Shut Down" on page 6-45.

Preventive Maintenance (PM): Once a year and on every service call, check the following:

- Filters in CPC and expansion cages
- Desiccant in refrigeration system (Models with MRUs only)

For PM details, refer to step 19 in "Closing a Call" on page 6-49.

Deferred Calls: If the call was started and then **deferred**, follow this procedure. Use the original call data, if available, or look for a problem in Service History with a status of "Open."

Service Call Data: Service call data is determined by Problem Analysis (PA) at the time of a failure and stored in Service History. This data may be reported to you by the customer or by your Portable Terminal (US only). Steps 1 through 4 ask if specific service call data is available to you. If it is not, you will be directed to the Service History information on the Hardware Management Console or the support element.

1

Are you here to repair an optical Link Incident?

YES **NO**

↓ Go to step 4.

2

Does the Link Incident contain a 9672 node?

YES **NO**

↓ Go to *Link Fault Isolation*, SY22-9533.

3

Go to "Resolving Channel Problems" on page 7-18.

4

Do you have **all** of the service call data shown at the right?

NO **YES**

↓ Go to “Resolving Channel Problems” on page 7-18 .

- SAC (Service Action Code)
- IF (Interface Field) a two byte field where:
  - Byte one is the CPC number.
  - Byte two is the failing CHPID. For information, refer to “Channel Locations by CHPID” on page 7-4.

This is the service call data for an ESCON®, ESCON converter, FICON™, or coupling facility channel problem, it includes link incident information.

5

Do you have **all** of the service call data shown at the right?

NO **YES**

↓ Go to “Starting Service with the Support Element” on page 1-10.

- Machine type and model (DEV)
- Serial number (SER) of the CPC
- Customer problem number (CPN)
- FRU list
- Location of the CPC (CEC_LOCATION) displayed as **A18B** or **A24B** where:
  - The first digit is the frame (A)
  - The last three digits are the EIA location of the CPC

This is the service call data for a CPC problem including: channels, ETR, OSA, storage, and power.

6

Do you have **all** of the service call data shown at the right?

NO **YES**

↓ Go to “Starting Service with the Support Element” on page 1-10.

- Machine type and model (DEV)
- Serial number (SER) of the string the CPC is in
- Customer problem number (CPN)
- FRU list
- Location of the CPC (CEC_LOCATION) displayed as **A99S** or **A99B**

A99S or A99B in the CPC location field indicates a support element problem.

7

Do you have **all** of the service call data shown at the right?

NO **YES**

↓ Go to “Starting Service With the Hardware Management Console” on page 1-26.

- Machine type and model (DEV)
- Serial number (SER) of the string the CPC is in
- Customer problem number (CPN)
- FRU list
- Location of the CPC (CEC_LOCATION) displayed as **A00M**

The A00M in the CPC location field indicates a problem on the Hardware Management Console.

8

Did the customer report that a CPC has a status of "Communication not active"?

NO **YES**

↓ Go to step 27.

Communication not active indicates that the Hardware Management Console is unable to communicate on the LAN with one or more of the support elements for the defined CPCs.

Check for communication not active by opening (double clicking on) the CPC object on the Hardware Management Console Workplace window. Check the Status field of the Details window for the CPC.

9

Did the customer report a problem on a TKE console?

NO **YES**

↓ Go to "Console Failures" on page 2-8.

10

Did the customer report:

- A domain security problem?
- The unexpected disappearance of one or more CPC icons from the Hardware Management Console Workplace?
- A request for assistance to restore the default domain of a console or CPC?

NO **YES**

↓ Go to "Resetting Default Domain Security" in *Maintenance Information for Desktop Consoles*, GC38-3115.

A Hardware Management Console's domain determines which CPCs it can communicate with. Initially, all consoles and CPCs are in the same default domain. Any console in the default domain can communicate with any CPC in the default domain.

The customer can use a console task to customize domains. Consoles in a customized domain can communicate only with the CPCs in the same domain.

Incorrect use of the customize task may leave CPCs outside the domain of any console. This causes them to disappear from the Hardware Management Console Workplace. The domain must be reset to enable communications with the CPCs.

A customer may also request that the default domain be reset for the consoles or CPCs.

---

11 Manual problem determination using a Hardware Management Console

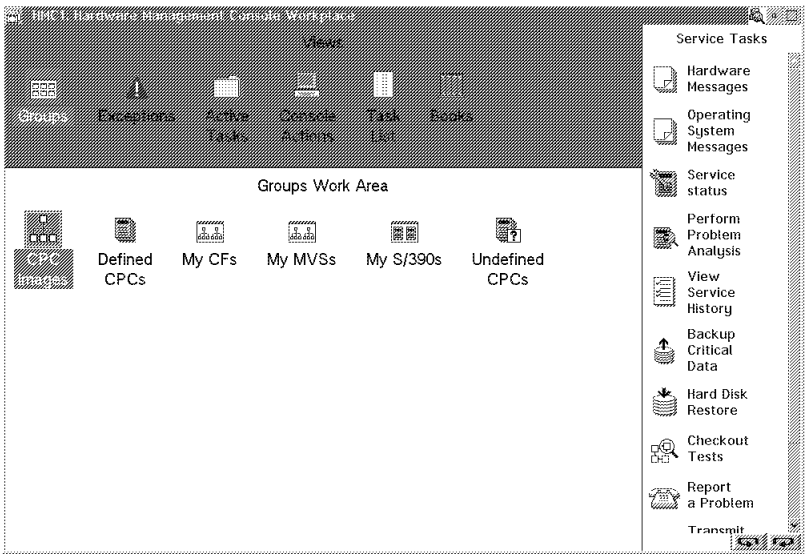
Note: If problems on the Hardware Management Console prevent you from completing a task, go to Chapter 2, “Console Information” on page 2-1.

See if CPC service call data is available from Service History as follows:

- Close any windows that are active until only the Hardware Management Console Workplace window displays.
- Open (double-click on) **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag **Defined CPCs** (using the right-hand mouse button) and drop it on **View Service History** under **Service Tasks**.

Go to step 12.

Note: If possible, use a Hardware Management Console which has all CPCs defined. If all CPCs are not defined on one Hardware Management Console, repeat this step on the other Hardware Management Consoles until you display the service history for all CPCs.



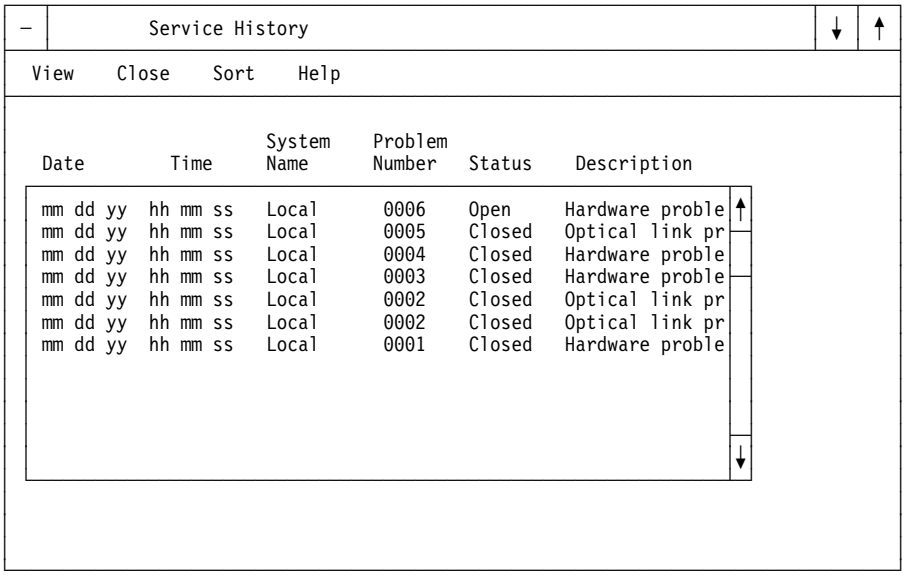
12

Get the date and time of the problem from the customer.

On the Service History window scroll through the menu to see if there is a problem with a status of **Open** that occurred near the time of the reported problem.

Problems are grouped by CPC. The newest problem for each group is listed first.

Go to step 13.



13

Did you find an open problem in Service History?

YES NO

↓ Go to step 15.

14

On the Service History window:

- Select the problem from the menu.
- Select **View** from the menu bar.
- Select **Problem Analysis panels** from the pull-down.

On the first Problem Analysis window:

- Select **Display Service Information**.

Record all the information from the second Problem Analysis window.

Do the following:

- Select **OK** on the second Problem Analysis window.
- Select **Cancel** on the first Problem Analysis window.
- Click on the upper left-hand corner of the Service History window and select **Close** from the pull-down.

Go to "Starting Service with the Support Element" on page 1-10.

Note: If there is more than one open problem near the time of the reported failure, use the **earliest** failure.

15

See if Hardware Management Console, ESCON, ESCON converter, FICON, or coupling facility channel service call data is available from Service History at the Hardware Management Console as follows:

- Close the Service History window that is displayed by clicking on the upper left-hand corner of the window and selecting **Close** from the pull-down.
- Open (double-click on) **Console Actions** from **Views**.
- Open **View Console Service History** from the **Console Actions Work Area**.

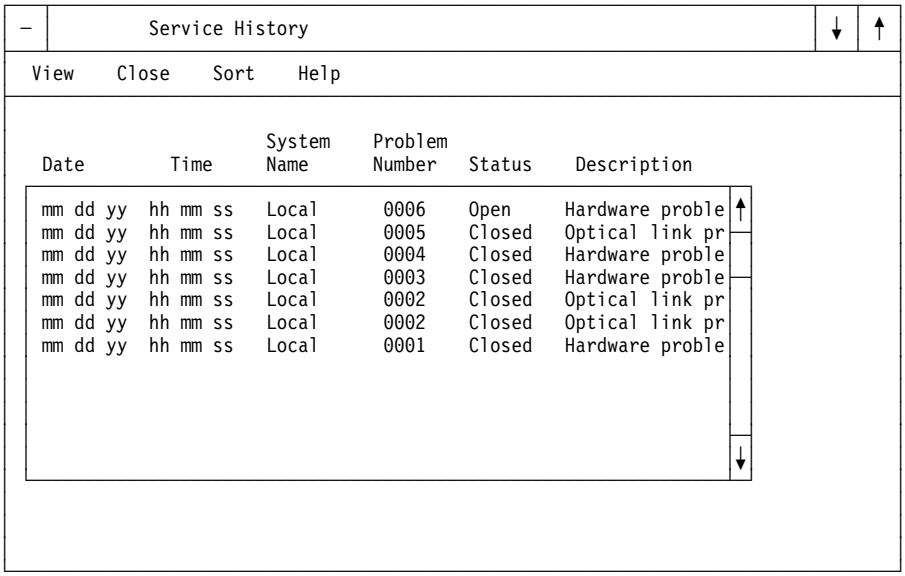
Go to step 16.

Note: If there is more than one Hardware Management Console, link incidents are displayed on all Hardware Management Consoles, but Hardware Management Console errors are displayed only for the Hardware Management Console being used. Repeat this step until you display the service history for all Hardware Management Consoles.

16

On the Service History window scroll through the menu to see if there is a problem with a status of **Open** that occurred near the time of the reported problem.

Go to step 17.



17

In the Service History log is there a problem with a status of **Open**?

This step checks for a hardware problem.

NO **YES**

↓ Go to step 19.

18

In the Service History log is there a problem near the time of failure with a description of **Optical link problem**?

The status for a link incident problem is always set to **Closed**.

YES **NO**

↓ Go to step 20.

19

On the Service History window:

- Select the problem from the menu. (See **Note**.)
- Select **View** from the menu bar.
- Select **Problem Analysis panels** from the pull-down.

On the first Problem Analysis window:

- Select **Display Service Information**.

Record the service call information from the second Problem Analysis window.

- For ESCON, ESCON converter, FICON, or coupling facility channel problems, go to "Resolving Channel Problems" on page 7-18.
- For Hardware Management Console problems, go to Chapter 2, "Console Information" on page 2-1.

Note: If there is more than one open problem near the time of the reported failure, use the **earliest** failure.

20

Were you directed to run channel tests by the following manual: *Link Fault Isolation*, SY22-9533?

NO **YES**

↓ Go to "Resolving Channel Problems" on page 7-18.

You should already have the following information:

- The CPC number.
- The CHPID of the channel to be tested. For information, refer to "Channel Locations by CHPID" on page 7-4.

21

Did the customer report a problem on the Hardware Management Console?

NO **YES**

↓ Go to Chapter 2, "Console Information" on page 2-1.

Examples of Hardware Management Console problems include:

- Display
- PC I/O devices
- PC network or modem
- Operating System error messages

22

Did the customer report any of the following?

- Operating system or Hardware Management Console message indicating a hardware problem?
- A problem with an Integrated Cluster Bus (ICB).
- A problem with a network attached to an Open System Adapter (OSA).

YES **NO**

↓ Go to step 25.

The OSA attached networks can be ATM, FDDI, Ethernet, Fast Ethernet, or Token-Ring.

23

Did the message indicate a problem with the Sysplex Timer® or External Timer Reference (ETR)?

NO **YES**

↓ See the information in the right-hand column, then go to Chapter 8, “Sysplex Timer Feature (ETR) Card Information” on page 8-1.

Find out which CPC (or CPCs) the customer reported the Sysplex Timer or ETR problem on.

If you do not know the location of the CPC, do the following at the Hardware Management Console:

- Open **Groups** from the Views area.
- Open **Defined CPCs** from the Groups Work area.
- Locate the icon for the CPC the failure was reported on.
- Double-click on the CPC icon to display the Details window for the CPC.
- On the Details window find the location of the CPC with the failure.
- Record the location.
- Repeat these steps to find the location of all CPCs that reported a failure.

Go to Chapter 8, “Sysplex Timer Feature (ETR) Card Information” on page 8-1

24

See the information in the right-hand column to find the location of the CPC with the operating system or Hardware Management Console message. Then, go to “Starting Service with the Support Element” on page 1-10.

End of procedure

Find out from the customer which CPC the problem was reported on.

If you do not know the location of the CPC, do the following at the Hardware Management Console:

- Open **Groups** from the Views area.
- Open **Defined CPCs** from the Groups Work area.
- Locate the icon for the CPC with the failure.
- Double-click on the CPC icon to display the Details window for the CPC.
- On the Details window find the location of the CPC with the failure.

Go to “Starting Service with the Support Element” on page 1-10

25

Were you directed to do any of the following service tasks?

- Licensed internal code changes, fixes, or EC level updates
- Backup or restore either the Hardware Management Console or support element hard drives.
- Look at Problem Analysis results for Hardware Management Console (analyze errors)
- Look at the status of a Hardware Management Console problem
- Close an open Hardware Management Console problem

NO **YES**

↓ Go to "Starting Service With the Hardware Management Console" on page 1-26.

26

For all other system tasks and activities, refer to "Additional Service Activities and Information" on page 1-32.

End of procedure.

---

27 Communication not active reported

At the Hardware Management Console:

- Open **Groups** from the Views area.
- Open **Defined CPCs** from the Groups Work area.
- Locate the icon for the CPC with the communications failure (the CPC with a highlighted background).
- Double-click on the CPC icon to display the Details window for the CPC.
- On the Details window find the location of the CPC with the communication failure.

Go to "Starting Service with the Support Element" on page 1-10.

The Hardware Management Console will display the Details window in any user mode.

If there is more than one CPC with a communications failure, use the **first** one defined for the Hardware Management Console.

If no CPCs are highlighted, ask the customer which CPC they reported the failure on.

End of procedure.

Starting Service with the Support Element

Use this procedure when starting a service task on a CPC, and to ensure that the support element is working correctly.

1

Open the front cover of frame A and check to see if the Alternate Support Element feature is installed (see **Note**).

- If the feature is installed, go to step 2.
- If the feature is **not** installed, go to step 4.

Note: If the Alternate Support Element feature is installed, there are two trays with ThinkPad® support elements in the front of frame A. The upper support element is A99S and the lower is A99B. Also, there is a switch assembly at the upper right hand side in the rear of the frame. The switch assembly is used to select which ThinkPad is to be used as the active support element.

2 Alternate Support Element

- Go to the rear of frame A and open the cover over the switch assembly for the alternate support element.
- Check the indicators on the switch assembly.

Is one of the indicators on (see **Note**)?

YES **NO**

↓ Go to “Alternate Support Element Errors” on page 2-16.

Note: Check that only one of the two indicators is on. Also, check that the indicator is on steady (not blinking).

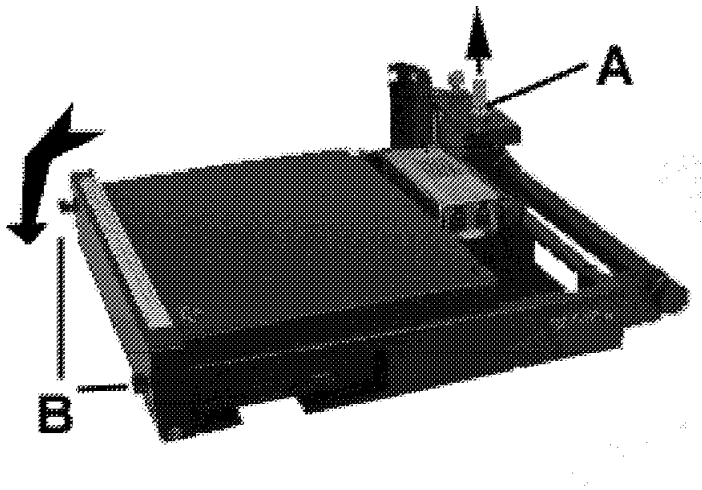
The indicator that is on shows which support element (upper or lower) is selected as the active support element.

3

On the active support element:

- Lift up on (A) to unlatch the support element tray and swing it into the service position. (The tray for the upper support element swings down, the tray for the lower swings up.)
- Unscrew the two thumbscrews (B) at the front the tray and swing the retaining bar down.

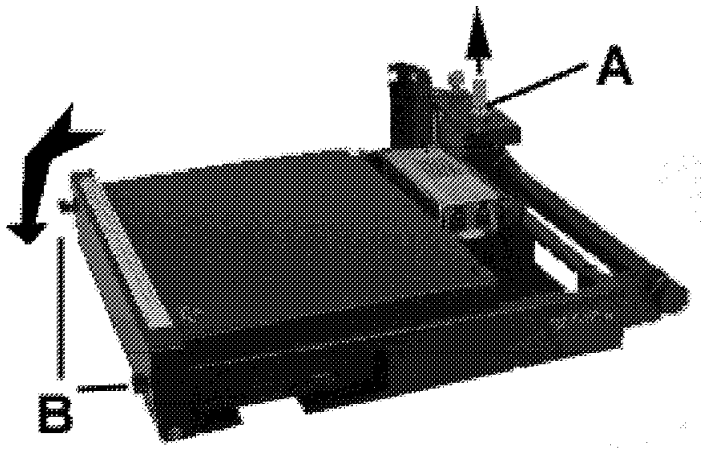
Go to step 5.



4 Single Support Element

At the front of frame A:

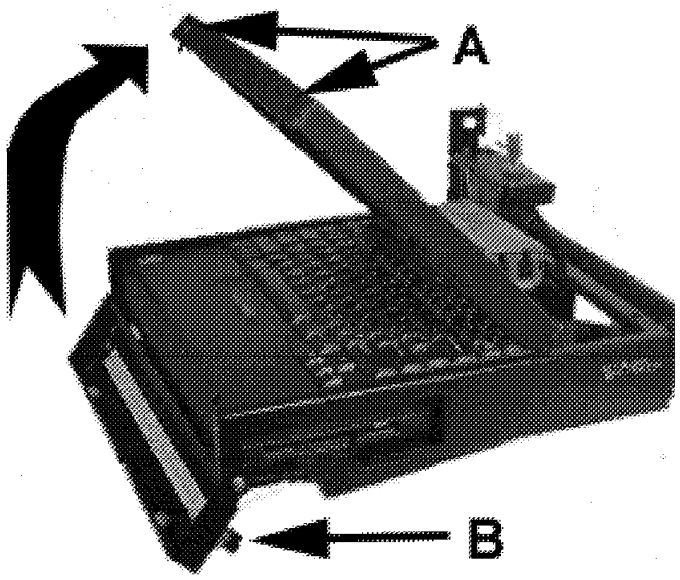
- Lift up on (A) to unlatch the support element tray and swing it into the service position.
- Unscrew the two thumbscrews (B) at the front the tray and swing the retaining bar down.



Go to step 5.

5

- If the ThinkPad has latches on the front as shown on the diagram, slide the latches (A) on both sides of the support element toward the side (left latch to the left and right latch to the right). Then, lift the lid of the ThinkPad.
- If the ThinkPad has latches on the side (not shown), slide both latches toward the front of the support element. Then, lift the lid of the ThinkPad.



Go to step 6.

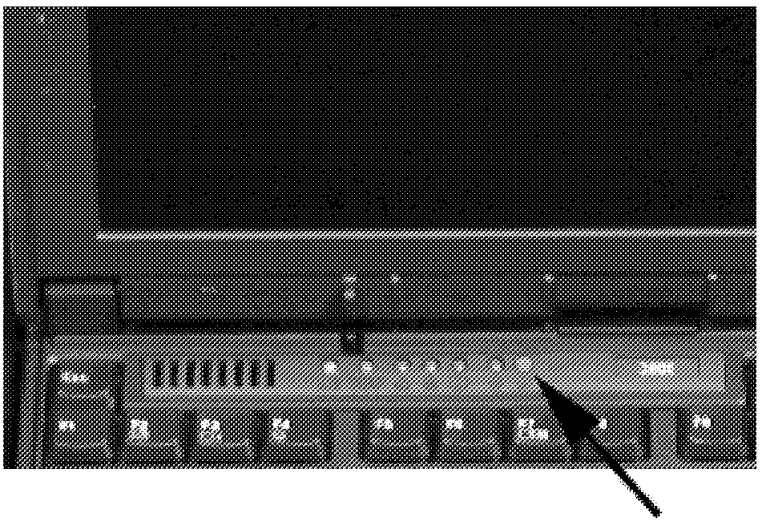
6

- Check the power indicator for the support element.
- If the power indicator is off, refer to the **Note**.

Go to step 7.

Note: Modifications have been made to the ThinkPads to allow the support elements to power up and down with system power. The modifications are different for each ThinkPad machine type used. If the power indicator is off, refer to the information in Table 2-1 on page 2-2 for a description of the modification used in the ThinkPad type you have installed and ensure that the modification is present. Then, try to power on the support element by sliding the power switch to the On position and go to step 7.

If the modification is not available, the support element will power on but will not power back on if AC power is removed then reapplied. Advise the customer not to remove AC power until the modification is in place.



7

Is the power indicator on?

YES **NO**

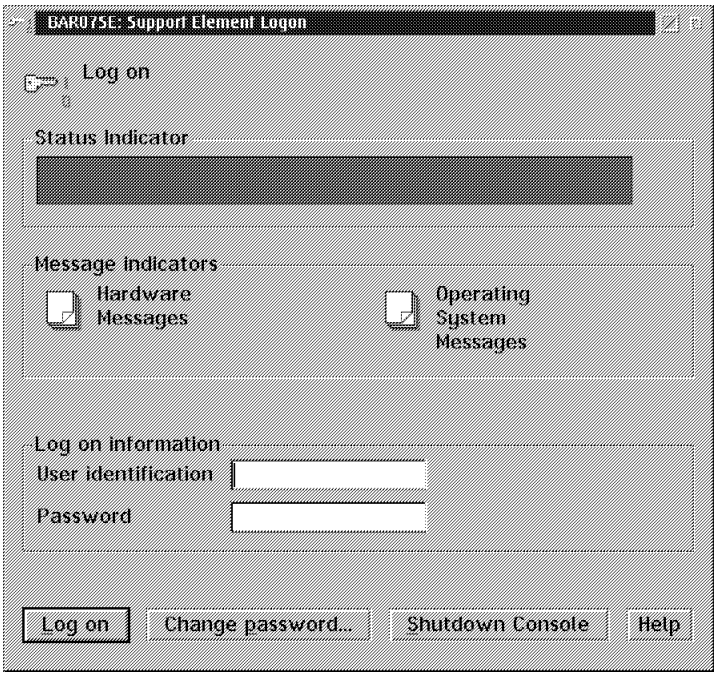
↓ Go to Chapter 2, “Console Information” on page 2-1.

8

Is the Log On the CPC Console window displayed on the support element?

NO **YES**

↓ Go to step 14.

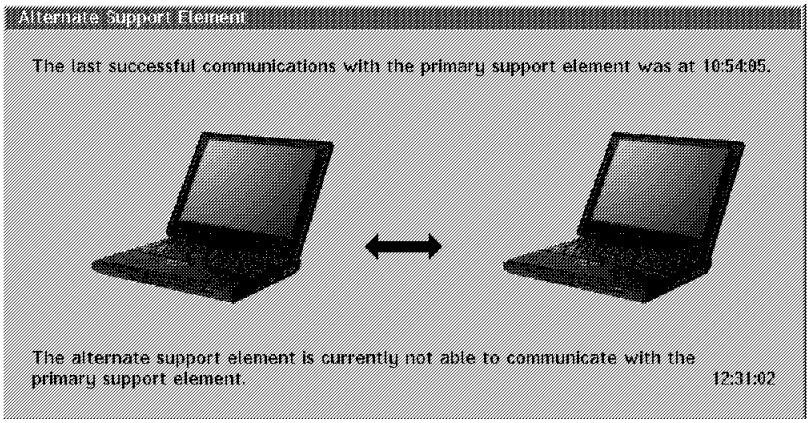


9

Is the Alternate Support Element window displayed?

YES **NO**

↓ Go to step 13.



If the Alternate Support Element window displays on the support element selected in the switch assembly, the support element failed to initialize as the active support element. This can be caused by a failure in the connection to the switch, a licensed internal code error, or a failure in the connection between the switch and the UPC card in the CPC.

10

Check with the instructions in step 2 to ensure that you opened the correct support element.

- If you are **not** on the correct support element, go back to step 2.
- If you are on the correct support element, follow the instructions in the right hand column.

Do the following:

- Return the support element you have open to the operating position.
- Use the procedure from step 2 to place the other support element in the service position.
- Go to step 11.

11

Is the Log On the CPC Console displayed on this support element?

NO **YES**

↓ Go to step 14.

If this support element has the normal support element desktop, use it to logon and work on the problem.

12

Call for assistance

End of procedure

Report that a problem was apparently logged, but neither support element is active.

13

Do the following on the support element:

- Close all windows until the Support Element Workplace window displays.
- Open **Console Actions** from Views.
- Select **Log Off** from the Console Actions area.

Note: If problems on the support element prevent you from going to the Log On the CPC Console window, go to step 19.

Continue on step 14.

To close the windows, click on the icon in the upper left hand corner of the window and select **Close** from the pull-down.

14

On the Log On the CPC Console window:

- Type **SERVICE** in the **User identification** field.
- Type **SERVMODE** in the **Password** field.
- Select **Log on**.

Go to step 15.

If you are unable to type information in the fields, press **Insert** one time and retry. If you still cannot type information, go to Chapter 2, “Console Information” on page 2-1.

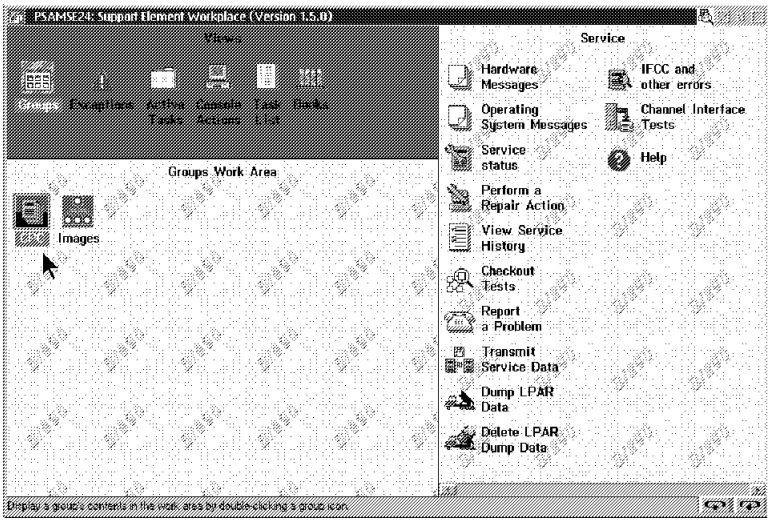
If **invalid user** or **invalid password** displays, get the correct log on information from the customer.

15

Did the Support Element Workplace window display?

YES **NO**

↓ You have a support element problem, go to step 19.



16

Logon in service mode is complete.

- If you are doing any of the following, go to step 17 to set the CPC to service status:
  - Repair a problem
  - Update licensed internal code
  - Run checkout tests
  - You were directed to set service status
- If you were directed to sign on in service mode **and** set service status, continue to step 17.
- If you were directed here from some other procedure in this manual, return to the procedure that directed you here.
- If you are here to perform some other task, go to “Additional Service Activities and Information” on page 1-32

---

17 Setting Service Status

This places the support element in service status. Service status is required for some tasks. Also, if the support element is connected to a Hardware Management Console, commands coming through the LAN will not interrupt service activity and the Hardware Management Console will not detect "communication not active" while the support element is being used for service.

If a Hardware Management Console is available, use the information in the right hand column. Otherwise, place the CPC you will be working on in service status by doing the following at the support element:

- Open **Task List** from **Views**.
- Open **Service** from the **Task List Work Area**..
- Open **Groups** from the Views area.
- Open **CPC** from the Groups Work area.
- Locate the icon for CPC requiring service.
- Drag the CPC icon and drop it on **Service status** under **Service**.
- Select the CPC name from the menu of the Service Status window.
- Select **Options** from the menu bar of the Service Status window.
- Select **Enable service status** from the pull-down.
- Select **Save**.
- Select **OK**.
- Select **Cancel** to return to normal operation.

Go to step 18.

If a Hardware Management Console is available, have the system operator place the CPC in service status as follows:

- Open **Tasks List** from **Views**.
- Open **Service** from the **Task List Work Area**..
- Open **Groups** from the Views area.
- Open **Defined CPCs** from the Groups Work area.
- Locate the icon for CPC requiring service.
- Drag the CPC icon and drop it on **Service status** under **Service**.
- Select the CPC name from the menu of the Service Status window.
- Select **Options** from the menu bar of the Service Status window.
- Select **Enable service status** from the pull-down.
- Select **Save**.
- Select **OK**.
- Select **Cancel** to return to normal operation.

Note: If the CPC cannot be placed in service status because of a communication error, continue with step 18.

Customer jobs can still run on a CPC after it is placed in service status.

The CPC is taken out of service status when you follow the procedure in "Closing a Call" on page 6-49.

18

- If you were directed here from some other procedure in this manual to set service status, return to the procedure that directed you here.
- Otherwise, continue on "CPC and Support Element Problems" on page 1-18.

End of procedure.

19 Unable to Log On

The support element is not working correctly.

- Copy down any information displayed on the support element display.

Go to Chapter 2, “Console Information” on page 2-1.

End of procedure.

Note: The following error information may be displayed:

- Post codes
- Parity check
- Blank display

The following LAN or Token-Ring adapter error information may be displayed:

- LTxxxxx message
- ACSxxxx message

CPC and Support Element Problems

Use the following procedure when a call has been reported on any of the system except a Hardware Management Console.

Note: Ensure you are logged on the support element in service mode. If you are not, go to "Starting Service with the Support Element" on page 1-10 before continuing here.

1

Do you have a problem number?

NO **YES**

↓ Go to "On-line CPC Service" on page 1-22.

Answer "Yes" if you received a customer problem number (CPN) with your service call data **or** you found an open call in Service History.

2

Did the customer report a "Communication not active" failure?

NO **YES**

↓ Go to Chapter 2, "Console Information" on page 2-1.

3

Are you doing a task other than a repair?

NO **YES**

↓ Go to "Additional Service Activities and Information" on page 1-32.

Non-repair tasks include the following:

- Licensed internal code updates
- Safety inspection
- Obtaining dumps or traces
- Closing system problems
- Hardware upgrades

4 Check PA results for recoverable errors

- Ask the customer for the following information:
  - Time and date the problem occurred
  - The content of any operating system message
  - The type of problem (For example: I/O device, support element, power failure.)
- Go to "Viewing Problem Analysis Results" on page 6-2 and look at information available about the problem (if any).

When complete, go to step 5.

This step checks for interface control checks (IFCCs) or recoverable processor errors that might have caused the reported failure.

5

Did you find a recoverable error at the time of the reported failure?

NO **YES**

↓ Follow the instructions in "Viewing Problem Analysis Results" on page 6-2 to force a problem number for the error and record the call information. Then, go back to Chapter 1, "START" on page 1-1 and restart the problem using the Problem Analysis results.

Record the following:

- Machine type and model
- Serial number of the string the CPC is in
- Customer problem number
- FRU list

6

Look through the following table to find a description of the type of problem you are working on.

- If you find the correct description for the problem, go to the information listed under the **Instruction** column.
- If you do not find the correct description for the problem, continue on step 7.

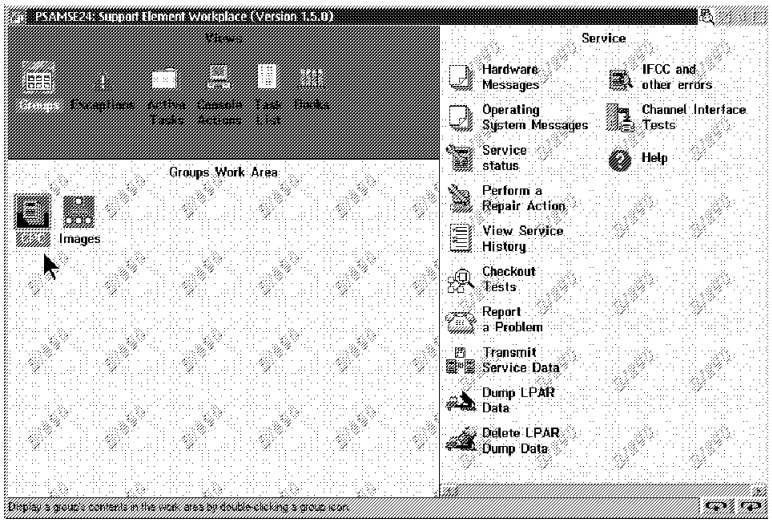
Actions	Instruction
You were directed to analyze an ESCON, FICON, or Coupling Facility channel failure by either *Link Fault Isolation*, SY22-9533 or *Enterprise Systems Connection Converter*, SY27-2590,	Go to "Resolving Channel Problems" on page 7-18.
The customer reported failures on a network (ATM, FDDI, Token-Ring, Ethernet, or Fast Ethernet) attached through an Open Systems Adapter (OSA).	Go to Chapter 11, "Open System Adapter (OSA) Feature" on page 11-1.
The customer reported failures on an Integrated Cluster Bus (ICB)	Go to "Resolving ICB Problems" on page 7-40.
The customer reported failures on a channel, coupling facility channel, or I/O devices connected to a channel	Go to "Resolving Channel Problems" on page 7-18.
You are working on an I/O device problem	Go to the service information for the failing device.
The customer reported an Hardware Management Console message to select the alternate support element.	Go to Chapter 2, "Console Information" on page 2-1.
You are working on a support element problem	Go to Chapter 2, "Console Information" on page 2-1.

Actions	Instruction
The customer reported error messages while running the Input/Output Configuration Program (IOCP)	Go to Chapter 7, “Channel Information” on page 7-1.

7 Failure reported but no call data available

At the support element:

- Close all windows until the Support Element Workplace window displays.
- Open **Task List** from Views.
- Select **Service** from the Task List work area.
- Open **Groups** from Views.
- Open (double-click on) **CPC** from the Groups Work area.
- Use the right mouse button to drag the CPC icon and drop it on **Perform a repair action** in the Service tasks area.

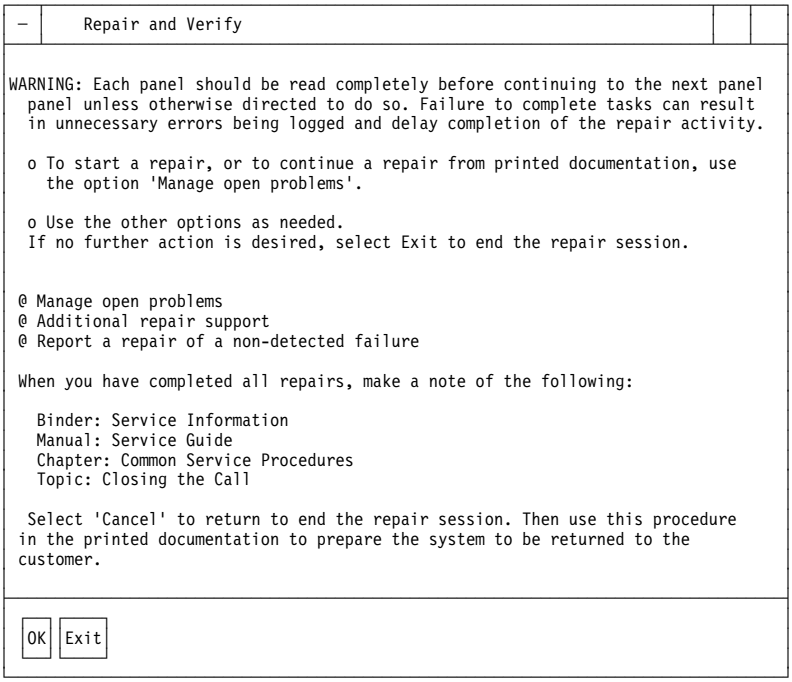


8

A Repair and Verify window displays.

- Select **Additional repair support** from the menu.
- Select **OK**.

Go to step 9.

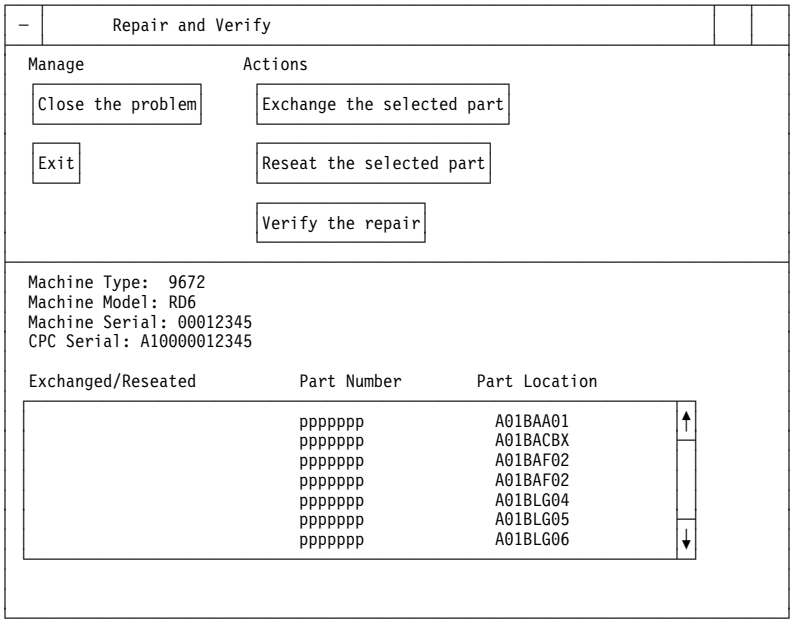


9

A second Repair and Verify window displays.

With the Repair and Verify window displayed, call for assistance.

End of procedure.



On-line CPC Service

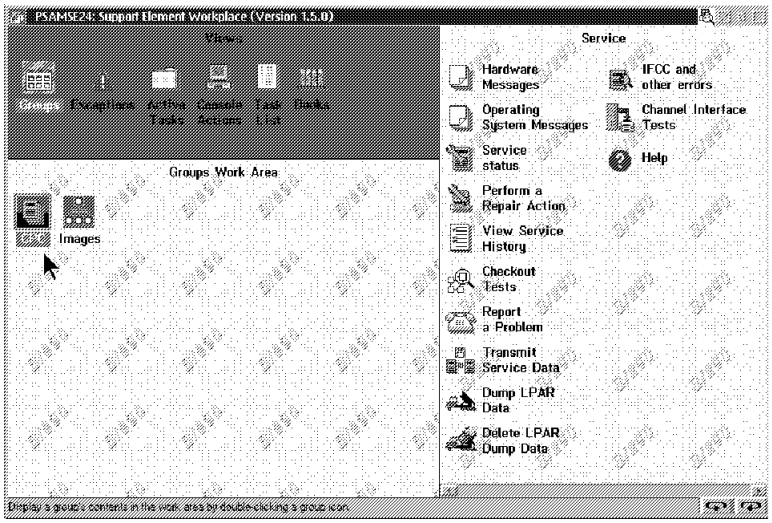
This procedure assists you in selecting the open call to start the repair.

Note: Ensure you are logged on the support element in service mode. If you are not, go to “Starting Service with the Support Element” on page 1-10 before continuing here.

1

At the support element:

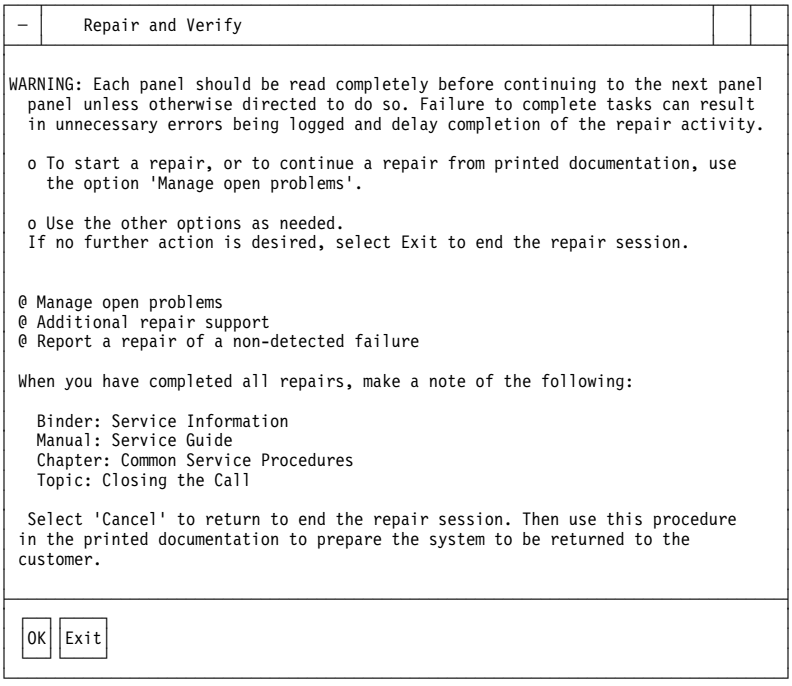
- Close all windows until the Support Element Workplace window displays.
- Open **Task List** from Views.
- Select **Service** from the Task List work area.
- Open **Groups** from Views.
- Open (double-click on) **CPC** from the Groups Work area.
- Use the right mouse button to drag the CPC icon and drop it on **Perform a repair action** in the Service tasks area.



2

A Repair and Verify window displays.

- Select **Manage open problems** from the menu.
- Select **OK**.

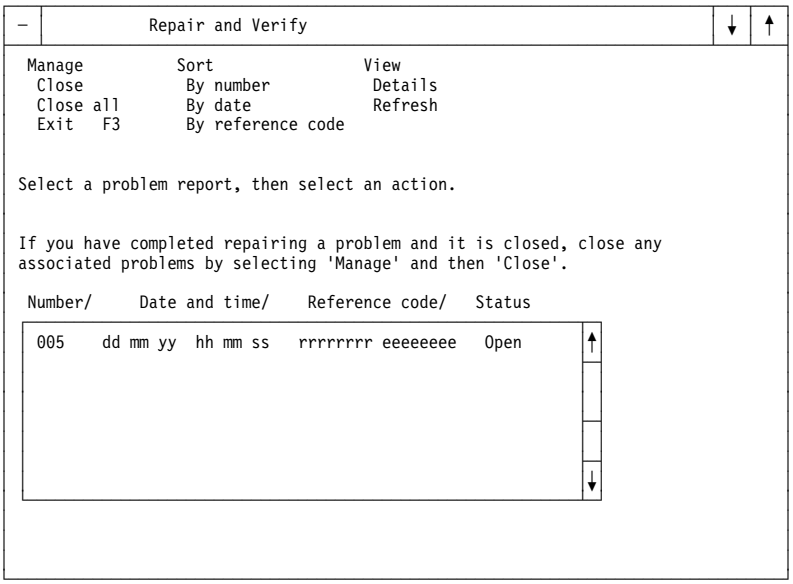


3

Did the Repair and Verify problem selection window display?

YES **NO**

↓ Go to step 6.



4

Is the reported problem number displayed in the **Problem Number** column?

The call status is either “Open” or, if the call was deferred, “Delayed.”

YES **NO**

↓ Go to step 6.

5

On the Repair and Verify problem selection window:

- Select the **Problem Number** from the menu.
- Select **Repair** from the **Manage** menu.

Follow the instructions on the windows to resolve the problem. When complete, go to “Closing a Call” on page 6-49 to prepare the system for customer operation.

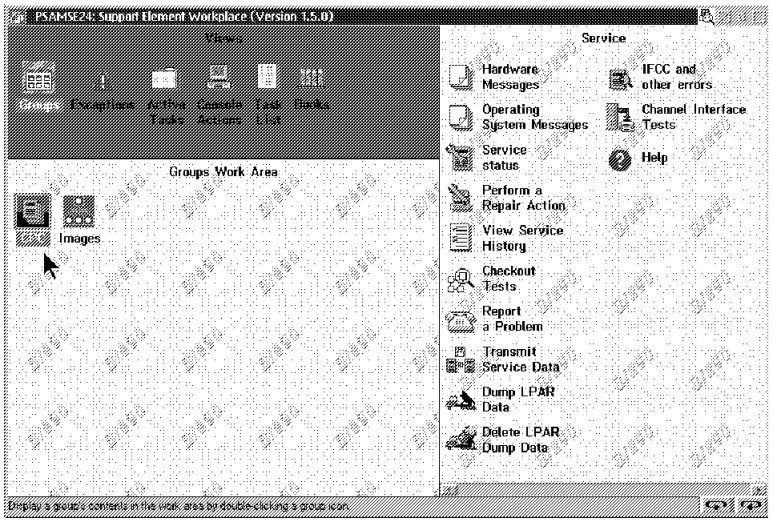
Note: For a CPC failure, windows direct you through the repair until the call is closed. For other problems the windows direct you to printed manuals.

6

Ask the customer for the date and time of the problem.

At the support element:

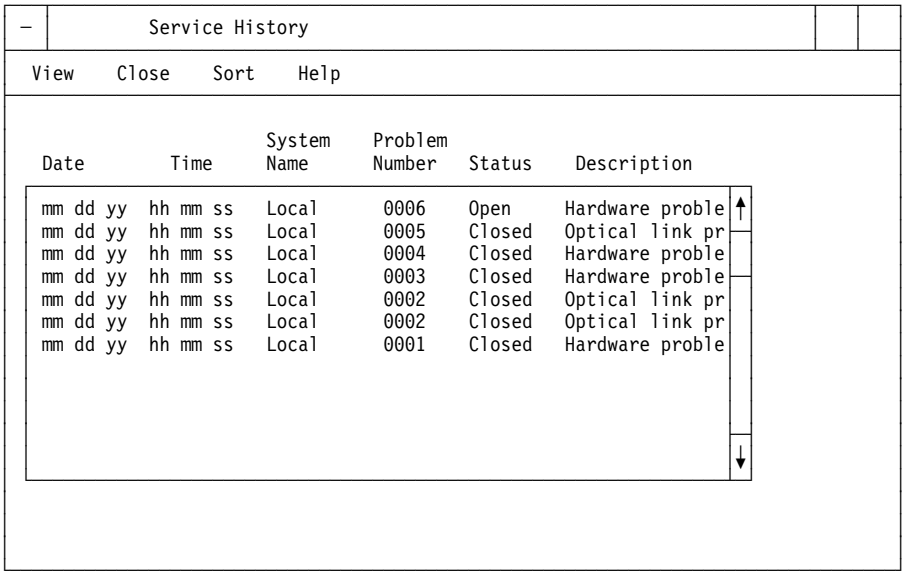
- Close all windows until the Support Element Workplace window displays.
- Open **Task List** from Views.
- Select **Service** from the Task List work area.
- Open **Groups** from Views.
- Use the right mouse button to drag the **CPC** icon and drop it on **View Service History** in the Service tasks area.



7

On the Service History problem selection window: look in the **Date Opened** and **Time Opened** columns to find a problem number near the time of the call reported by the customer.

- If a **different** problem number is displayed for the time and date, and the **Status** column says the call is **Open**, go back to step 1 and use the **new** problem number.
- If the **original** problem number is displayed, the time and date are correct, and the Status column says the call is **Closed**, go to step 8.
- If **no** open problem number is displayed for the time and date, go to step 8.



8

There is no problem number or the original problem number is closed.

Ask the customer for information about the problem. (See **Note**.)

- Go to “Viewing Problem Analysis Results” on page 6-2 and look at information available about the problem (if any).
- Go back to Chapter 1, “START” on page 1-1 and use the new problem information.

If you return to this step, call for assistance.

End of procedure.

Note: Ask for the following information:

- Time and date the problem occurred
- Device or channel addresses.
- The type of problem (For example: I/O device, support element, power failure.)

Starting Service With the Hardware Management Console

Use this procedure when starting a service task on the Hardware Management Console. For information about using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

Notes:

1. If you have more than one Hardware Management Console attached and you are trying to make a remote connection to a support element, ensure that the Hardware Management Console you are using has the support element defined for it.
2. Do not use the Hardware Management Console as a remote console if you are attempting to correct a hardware problem with the CPC. You can use the Hardware Management Console as a remote console for a CPC for all other service tasks.
3. If problems on the Hardware Management Console prevent you from doing any of the following steps, go to Chapter 2, “Console Information” on page 2-1.

1

At the Hardware Management Console:

- Ensure power-on reset of the Hardware Management Console is complete. If you have to do a power-on reset, copy down any messages that display.

  Note: If the Logon window is displayed, go directly to step 3.
- Close any active windows until only the Hardware Management Console Workplace window displays.
- Select **Console Actions** from the **Views** area.
- Select **Log Off** from the **Work** area.

Continue with this procedure, if possible, even if the customer reported a Hardware Management Console problem.

If the Hardware Management Console is at 2.9 or later, select **Log On and launch the Hardware Management Console web application**.

2 (From the HMC Driver 1.8.2 or earlier)

Did the Hardware Management Console Logon window display?

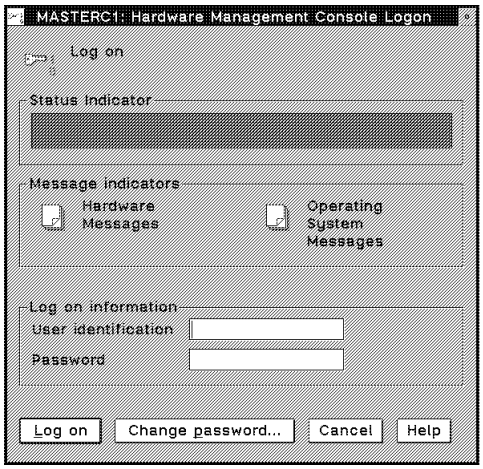
YES **NO**

↓ The Hardware Management Console is not working correctly. Go to Chapter 2, “Console Information” on page 2-1.

(From the HMC Driver 2.9.0 or later)

Select Log on and launch the Hardware Management Console web application.

Did the Hardware Management Console Logon window display?



3

On the Hardware Management Console Logon window:

- Type **SERVICE** in the **User identification** field.
- Type **SERVMODE** in the **Password** field.

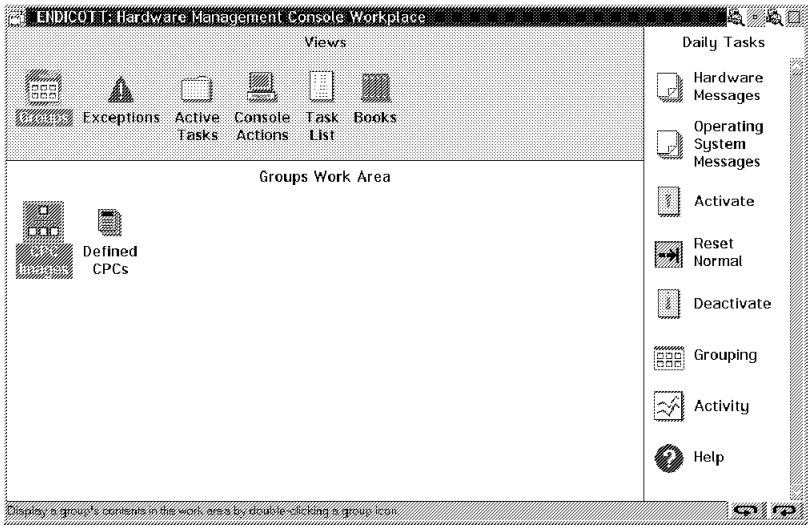
If **invalid user** or **invalid password** displays, get the correct log on information from the customer.

4

Did the Hardware Management Console Workplace window display?

YES **NO**

↓ The Hardware Management Console is not working correctly. Go to Chapter 2, “Console Information” on page 2-1.



5

Logon of the Hardware Management Console in service mode is complete.

- If you are going to use the Hardware Management Console as a remote console for a CPC, continue on step 6.
- If you are going to repair a problem on the Hardware Management Console, go to “Repair Hardware Management Console” on page 1-30.
- For all other service tasks, go to “Additional Service Activities and Information” on page 1-32. Start at the top of the table and find the **first** action that describes what you want to do in the **Action** column. Then, follow the directions in the **Instruction** column.

6

Remote connection to a support element.

Ensure that no activity can take place on the support element by doing the following at the Hardware Management Console:

- Open **Groups** from the Views area.
- Open **Defined CPCs** from the Groups Work area.
- Locate the icon for the CPC you are making the remote connection to.
- Drag the CPC icon and drop it on **Service Status** under Service Tasks.
- Select the CPC name from the menu of the Service Status window.
- Select **Options** from the menu bar of the Service Status window.
- Select **Enable service status** from the pull-down.
- Select **Save**.
- Select **Cancel** to return to normal operation.

Go to step 7.

This places the support element in service status so commands coming through the LAN will not interrupt service activity and the Hardware Management Console will not detect “communication not active” while the support element is being used for service.

The support element is taken out of service status when you follow the procedure in “Closing a Call” on page 6-49. (Follow the procedure to close a call on the CPC or support element.)

Note: Customer jobs can still run on a CPC after it is placed in service status.

7

Make the remote connection to a support element as follows:

- Open **Defined CPCs** from the **Groups Work Area**.
- Use the right-hand mouse button to drag the CPC icon to the **CPC Recovery Tasks** area and drop on **Single Object Operations** in the **CPC Recovery Tasks** area.
- Select **Yes** on the CPC Console Task Confirmation window.
- When the CPC Console Progress window displays a status of “Completed” for the CPC, select **OK**.

End of procedure.

You are automatically logged on the selected CPC console in the same user mode as you are logged on the Hardware Management Console.

Four support elements can be connected remotely at one time. You can drag only one CPC icon at a time to initiate the remote connection.

Repair Hardware Management Console

Use the following procedure when a call has been reported on the Hardware Management Console.

Note: Ensure you are logged on the Hardware Management Console in service mode. If you are not, go to “Starting Service With the Hardware Management Console” on page 1-26 before continuing here.

1

Repair the Hardware Management Console.

Do you have a problem number?

YES NO

↓ **Go to step 5.**

2

On the Hardware Management Console:

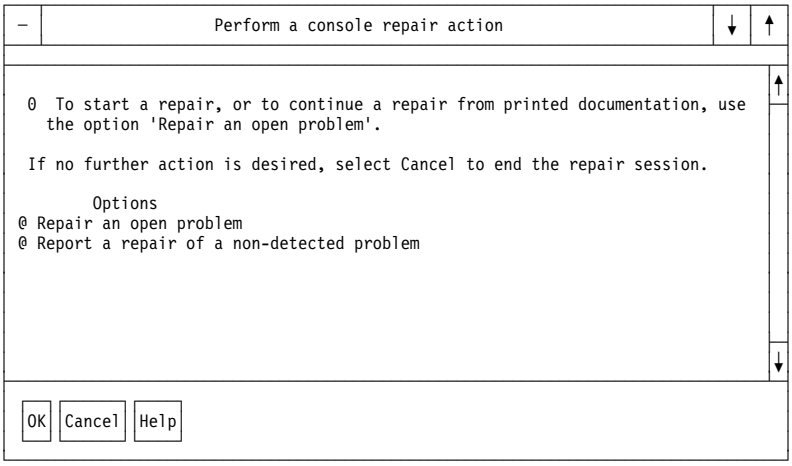
- If the Service History windows are displayed, close them.
- Open **Console Actions** from **Views**.
- Open **Perform a Console Repair Action** from **Console Actions Work Area**.

Go to step 3.

3

On the Perform a console repair action window:

- Select **Repair an open problem** from the menu.
- Select **OK**.



4

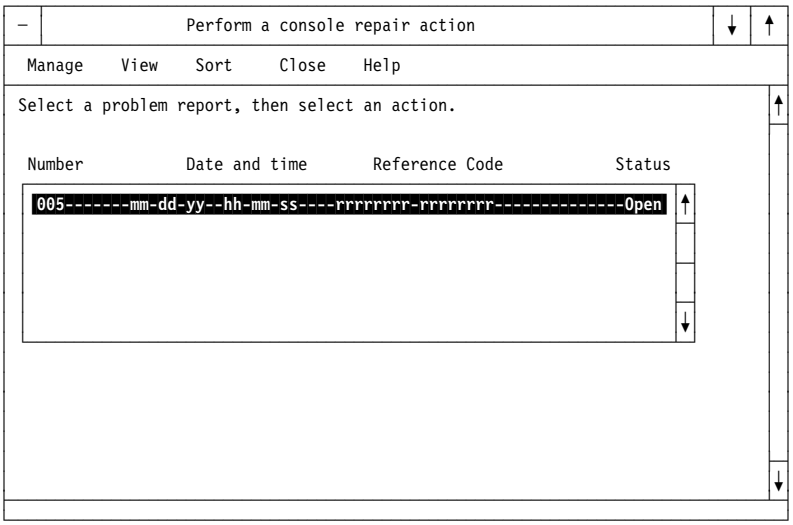
On the Perform a console repair action window:

- Select the **Problem Number** from the menu.
- Select **Manage** from the menu bar.
- Select **Repair** from the pull-down.

Follow the instructions on the windows to resolve the problem.

Note: If you are directed to a printed manual, go to “Closing a Call” on page 6-49 in this manual when the repair is complete.

End of procedure.



5

There is no open problem logged for the Hardware Management Console.

Go to Chapter 2, “Console Information” on page 2-1. Use the information provided by the customer to determine the type of Hardware Management Console problem.

End of procedure

Additional Service Activities and Information

Use this table when you want information about service activities..

Note: If you are required to use a Hardware Management Console for any of the activities, refer to “Starting Service With the Hardware Management Console” on page 1-26.

If you are required to use a support element for any of the activities, refer to “Starting Service with the Support Element” on page 1-10.

Information or Activity	Instruction
Locations	Go to Appendix A, “Locations” on page A-1.
Maintenance information for the support element and Hardware Management Console	Go to Chapter 2, “Console Information” on page 2-1 and the manuals shipped with the PS/2s.
Information on channels, Input/Output Configuration Program (IOCP), or Input/Output Configuration Data Sets (IOCDS).	Go to Chapter 7, “Channel Information” on page 7-1.
Looking at Problem Analysis results	Go to “Viewing Problem Analysis Results” on page 6-2.
Running system checkout tests	Go to “Running Tests” on page 6-9.
Problem status (service history)	Go to “Displaying Service History” on page 6-13.
Closing a system problem	Go to “Closing a Call” on page 6-49.
Dumping logical partition information	Go to “Dumping Logical Partition Data” on page 6-26.
Licensed internal code changes.	Go to Chapter 5, “Licensed Internal Code Changes” on page 5-1.
Installing a new EC level of licensed internal code.	Go to “Upgrading Support Element Internal Code Level” on page 5-43.
Installing traps (fixes) for LPAR and coupling facility licensed internal code.	Go to “Upgrading Support Element Internal Code Level” on page 5-43.
Installing fixes for support element licensed internal code.	Go to “Internal Code Fixes For a Hardware Management Console” on page 5-30.
Installing a hardware upgrade (MES).	Go to the instructions shipped with the MES.
Use Edit Frame Layout to look at device information, add, remove, or move a device in a string.	Go to “Using Edit Frame Layout” on page 6-19.
Description of all Hardware Management Console tasks	Go to Chapter 4, “Task Information” on page 4-1.
Description of all support element tasks	Go to “Support Element Tasks” on page 4-2.
Perform a safety inspection.	Refer to *Processor Safety Inspection*, SY22-9864.

Chapter 2. Console Information

This chapter contains information to assist you in servicing support elements, Hardware Management Consoles, and TKE consoles. You will be directed to determine if a problem is caused by a power problem (system or customer) or a problem within a PC or ThinkPad. Information for all ThinkPad (support element) repairs is found in *Maintenance Information for ThinkPad Consoles*, GC38-3117. Information for all PC (Hardware Management Console or TKE console) repairs is found in *Maintenance Information for Desktop Consoles*, GC38-3115. This chapter also includes information on saving and restoring console hard disk information.

Note: Read the information under "General Information" then go to "Start of Repair for Consoles" on page 2-7.

General Information

ThinkPad Support Elements

For all G5 models, the support elements are ThinkPads mounted in frame A. The ThinkPad Type (Series) are: 2625 (365), 2635 (380), 2645 (600), or 2647 (T2x), and 2366 (T30).

Note:

T2x = T20, T22, and T23.

The ThinkPad support elements are attached by a Token-Ring or Ethernet Local Area Network (LAN) to a Hardware Management Console.

Modifications have been made to the ThinkPads to allow the support elements to power up and down with system power. Table 2-1 on page 2-2 shows what modifications are present for each ThinkPad type. Always verify the correct modification is present for the ThinkPad you are working on.

Table 2-1. Power modifications for ThinkPad support elements.

Type	Series	Modifications Made
2625	365	Internal clip installed to force the On/Off switch to the On position.
2635	380	External clip installed to force the On/Off switch to the On position.
2645 2647 2366	600 T2x T30	External circuit module plugged into the ThinkPad's system expansion connector (the 240 pin connector next to the _/_ symbol). The module is located at the rear of the ThinkPad (near the center). It supplies a power-on signal to the ThinkPad when voltage is detected on the support element power converter. **Notes:** 1. Do not use the power switch for the support element to power it on and off. Instead, unplug the power connector from the rear of the ThinkPad. Then, plug it back in. You will have to remove the bracket at the front of the tray and slide the ThinkPad part way out of the tray to reach the cable. 2. If the support element power converter is supplying the correct voltage to the support element, unplug and plug the power connector to control support element power. 3. To test the external circuit module, unplug the support element power converter cable and plug it back in. The support element should power on. 4. ThinkPads other than series 356 (2625) and 380 (2635) require configuration procedures when they are used as support elements. Refer to “Configuration Procedures for ThinkPad Based Console” in *Maintenance Information for ThinkPad Consoles*, GC38-3117.

Service Tips

Determining ThinkPad Serial Number

The type and serial number information for a ThinkPad support element is stored in the system's vital product data (VPD). The type and serial number are on the bottom of the unit. If you are asked to verify this information, use the following procedure to avoid removing the support element from its tray:

- Power off the ThinkPad.
- Press and hole the **F1** key and power on the ThinkPad.
- Release the **F1** key when the “Easy-Setup” window displays. Record the model, type and serial number from the “Serial-unit serial number” field. The type and model are the first seven characters.

Updating VPD for Support Elements

Use this procedure to update VPD information if you exchange a support element or if the information in VPD is not correct.

- Record the replacement support element's type and serial number. If necessary, use the procedure in “Determining ThinkPad Serial Number” on page 2-2 to determine type and serial number.
- Logon the Hardware Management Console in service mode
- Open **Task List** from **Views**.
- Open **CPC Configuration Tasks** from **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the **Defined CPCs** icon and drop it on **Edit Frame Layout** under **CPC Configuration Tasks**.
- Select the CPC from the Edit Frame Layout window and select **Continue**.
- Select (single-click) on the CPC icon to display the task menu.
- Select **Update Support Element** from the menu.
- Verify that there is an entry for the support element.
- If there is an entry:
  - Select the location for the new support element (A99S for upper or A99B for lower).
  - Select **Update Support Element**
  - Update the information on the Update Support Element window.

    Note: Use all upper case and do not use the “-” for the serial number.
- If there is not an entry:
  - Select **Cancel.**, then select **Add Support Element**.
  - Add the information on the Update Support Element window.

    Note: Use all upper case and do not use the “-” for the serial number.
- On the Edit Frame Layout window select **Save and exit**.

Network Adapters

For T2x (2647) ThinkPads, one of the PC Card Ethernet adapters is replaced by the MiniPCI ethernet adapter. For these ThinkPads, the bottom PCMCIA slot is always empty for any token ring/ethernet adapter configuration.

For T30 (2366) ThinkPads, one of the PC card Ethernet adapters is replaced by the LAN on Board (LOB) Ethernet. Ethernet support is integrated into the T30 motherboard.

The MiniPCI Ethernet adapter in the 2647 ThinkPads is behind a removable plate located at the bottom of the ThinkPad, directly above the Model/Type/Serial Number label. For T2x and T30 ThinkPads, the Ethernet cable socket is located at the rear of the ThinkPad between the modem and DC power connections.

Adapters for customer networks are located in the slots shown in the following tables.

Notes:

1. Location of the adapters depends on S/390 model as well as ThinkPad model/type.
2. (P) indicates Primary communications device
3. (S) indicates Secondary communications device

T2x (2647), T30 (2366) ThinkPads

Token Ring/Ethernet

Location	Adapter
(P) Top slot	Token Ring
(S) MiniPCI slot	PCI bus ethernet
Bottom slot	Not used

Ethernet/Ethernet

Location	Adapter
(P) MiniPCI slot	PCI bus ethernet
(S) Top slot	Ethernet
Bottom slot	Not used

All other ThinkPads

Token Ring/Ethernet

Location	Adapter
(P) Top slot	Token Ring
(S) Bottom slot	Ethernet

Ethernet/Ethernet

Location	Adapter
(P) Top slot	Ethernet
(S) Bottom slot	Ethernet

Removal Procedure for the T2x Support Element

The T20 support element uses a retaining bracket mounted at the rear of the tray and a Velcro® strip under the ThinkPad to mount the support element. Use the following procedure to remove a T20 ThinkPad.

1. At the left side of the tray: disconnect any ethernet or token ring network cables from the upper card slot.

   Notes:

   a. For a token ring connection, you may have to press the button next to the card to release the card, then remove the cable

   b. The bottom slot is empty on all 9672 G5/G6 models.

2. At the front of the tray: unscrew the two captive thumbscrews and lower the retaining bar.
3. the rear of the tray: use the torque tool to remove the two screws that hold the support element retaining bracket to the tray. Then, using the access hole at the rear of the tray, push the support element retaining bracket forward to release the ThinkPad.
4. Lift the support element slowly to disconnect the Velcro strip, then lift the ThinkPad out of the tray.
5. At the rear of the ThinkPad, disconnect the power cable and the ethernet connector

To install a support element ensure the circuit module is securely connected to the bottom of the ThinkPad. Then, reverse the steps shown above.

Alternate Support Element Description

The alternate support element feature is available for all G5 models and a standard feature on all G6 models. This feature allows the customer to manually select a different (alternate) support element when the original is unable to communicate with the CPC or Hardware Management Console. Two ThinkPad support elements are mounted in the front of frame A and a switch is provided at the rear of the frame. Figure 2-1 shows the connections for the alternate support element feature.

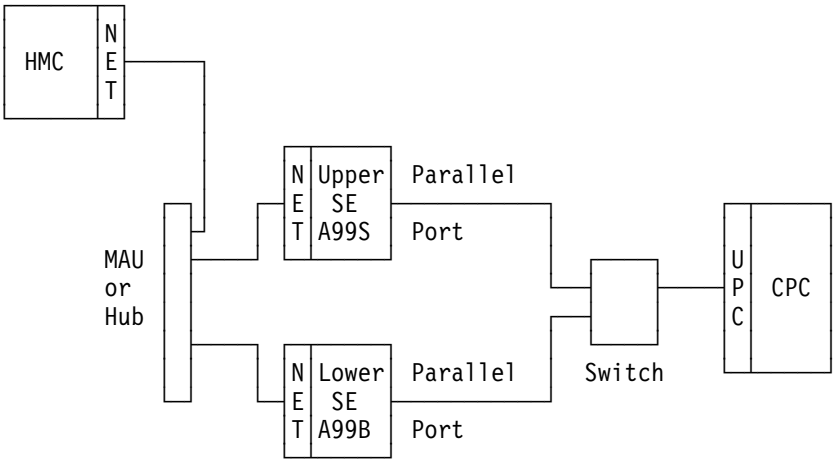


Figure 2-1. Connections for the alternate support element feature

The support elements have FRU locations of A99S (upper) and A99B (lower).

Figure 2-2 shows an example of the window displayed by the alternate support element. This is a message window containing operational status information only, it has no available tasks. The alternate support element is updated daily with any changes to licensed internal code and configuration information that have been made on the active (primary) support element. A manual task is provided at the active support element and at the Hardware Management Console so the update task can be performed at any time.

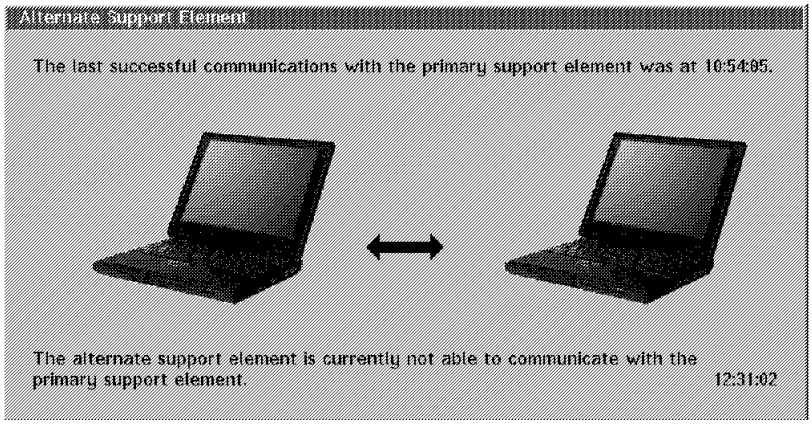


Figure 2-2. Example of window displayed on alternate support element for communication failure

There are two different failures that will instruct the customer to press the switch and select the alternate support element:

- When the support element that is currently active detects a failure to communicate with the CPC, it sends error information to the Hardware Management Console.
- When the Hardware Management Console detects a communication failure with the active support element.

If the active support element detects an error in communications with the CPC and the operator presses the button to select the alternate support element, the alternate support element becomes the active support element only if it can communicate with the CPC. If it cannot communicate with the CPC, it will still have the alternate support element window displayed and the original active support element will continue to display the Support Element Workplace window.

Repair procedures for communication errors between the support element and CPC are provided online from the active support element. For a communications failure between the support element and Hardware Management Console you will be directed to “Alternate Support Element Errors” on page 2-16.

If the active support element cannot communicate with the alternate, you will be directed to “Alternate Support Element Errors” on page 2-16.

The active and alternate support elements must be identical ThinkPad models and types. They must also have identical network adapters installed in the same socket locations. If the ThinkPads do not match, Repair and Verify windows will direct you to “Alternate Support Element Errors” on page 2-16.

Start of Repair for Consoles

Find the task you want to do in the **Action** column of the following table. Then, go to the information in the **Go To** column.

Action	Go To
Repair a Hardware Management Console or support element problem.	"Console Failures" on page 2-8
Save a support element configuration.	"Saving Support Element Configuration" on page 2-26
Restore information to a support element hard disk.	"Restore Support Element Hard Disk Information" on page 2-30.
Backup hard disk information on the Hardware Management Console.	"Saving Hardware Management Console Configuration" on page 2-28
Restore information to a Hardware Management Console hard disk.	"Restore Hardware Management Console Hard Disk Information" on page 2-36
Saving TKE workstation configuration	"Saving the TKE Console Configuration" on page 2-29
Restoring or updating TKE workstation configuration	"Updating and Restoring the TKE Console Hard Disk" on page 2-41
Additional ThinkPad maintenance information.	*Maintenance Information for ThinkPad Consoles*, GC38-3117 and the ThinkPad maintenance information shipped with the system.
Additional PC (Hardware Management Console and TKE console) maintenance information.	*Maintenance Information for Desktop Consoles*, GC38-3115 and the PC maintenance information shipped with the system.

Console Failures

Use this chapter when you are directed here either by a Repair and Verify window (support element), a Perform a Console Repair window (Hardware Management Console or TKE console), or from Chapter 1 of this manual to repair a problem on a console.

1

Were you directed here by a Repair and Verify ***or*** a Perform a Console Repair window that listed one of the reference codes shown at the right?

BC04000x Communications error - primary to alternate

BC04010x Configuration error - primary to alternate

B003x001 Communications error - primary to Hardware Management Console

NO **YES**

↓ Go to “Alternate Support Element Errors” on page 2-16.

2

Were you directed here by any other Repair and Verify ***or*** a Perform a Console Repair window?

NO **YES**

↓ Select a console maintenance manual from the list on the right and go to “Chapter 1.”

- For support element problems, use *Maintenance Information for ThinkPad Consoles*, GC38-3117.
- For Hardware Management Console or TKE console problems, use *Maintenance Information for Desktop Consoles*, GC38-3115.

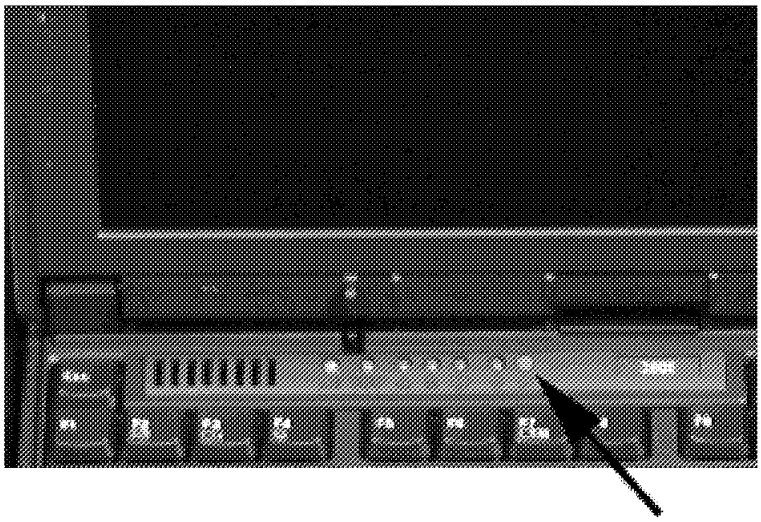
When the call is complete, return to this manual to close the call.

3

If you have not already done so, check the power indicator for the console with the problem.

Note: If the problem is on a ThinkPad, open the display to see the indicators. The figure shows the location of the power indicator on a ThinkPad.

When complete, continue on step 4.



The indicators for the ThinkPad support element are below the display. The power indicator is the farthest to the right. (Circle with a horizontal "Z".)

4

Is the power indicator ***On***?

NO **YES**

↓ Select a console maintenance manual from the list on the right and go to “Chapter 1.”

- For support element problems, use *Maintenance Information for ThinkPad Consoles*, GC38-3117.
- For Hardware Management Console and TKE console problems, use *Maintenance Information for Desktop Consoles*, GC38-3115.

5

Is the power failure indication on the support element?

YES **NO**

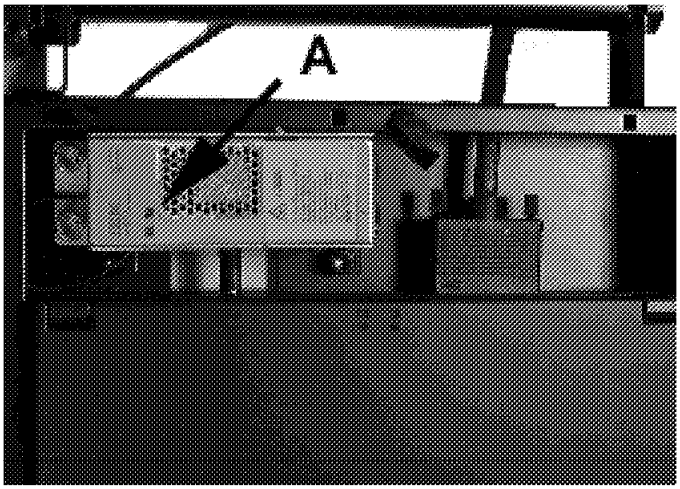
↓ Go to step 20.

---

6 ThinkPad power failure.

Check the indicator on the support element power converter.

Go to step 7.



7

- Open the cover of the support element and look for a label above the keyboard that identifies the ThinkPad series T2x, T30 (365, 380, or 600) that you are working on.
- Review the information in Table 2-1 on page 2-2 to see what power modifications should be present on the support element.
- Check that the modifications are present.

Go to:

- Step 14 if you are working with a series 600 (2645), a T2x (2647), **or** a T30 (2366) ThinkPad.
- Step 8 for all others.

---

8 Series 365, 380

Is the indicator for the support element power converter on?

YES **NO**

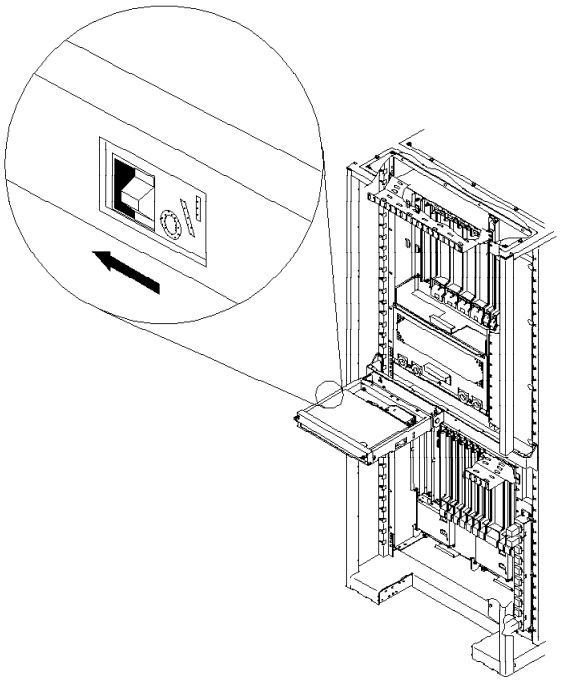
↓ Go to “Resolving Support Element Power Problems” on page 3-5.

9

Check for a retainer on the support element power switch.

Note: The retainer holds the support element power switch toward the rear of the frame. The retainer is installed under the covers of the support element.

Go to step 10.



10

Is the power switch retainer installed?

NO **YES**

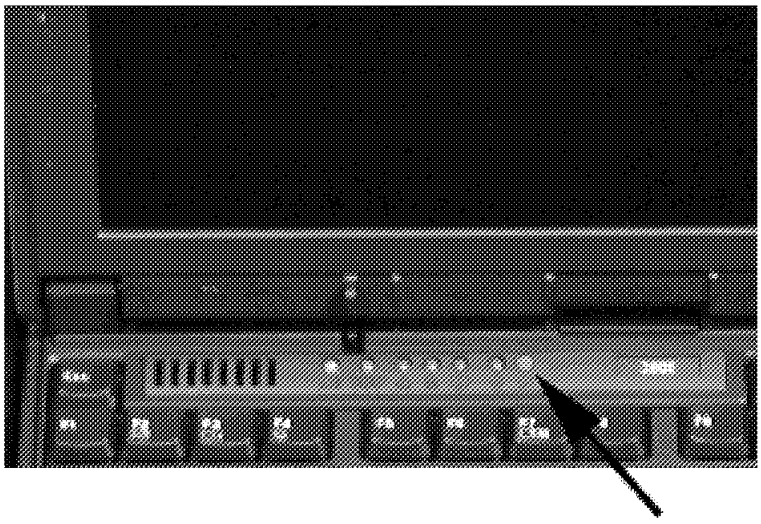
↓ Go to step 17.

Note: The ThinkPad power switch retainer holds the power switch in the On position. If the retainer is missing, the support element will not power on automatically when system power is removed and applied

---

11

- Push and release the support element power switch.
- Check the support element power indicator.
- Go to step 12.



12

Is the support element power indicator on now?

YES NO

↓ Go to step 17.

13

Replace the retainer (see **Note**). Go back to Chapter 1, “START” on page 1-1 and see if there are other problems on the system.

Note: If the retainer is not available, advise the customer that the system should not be powered off until the retainer is replaced.

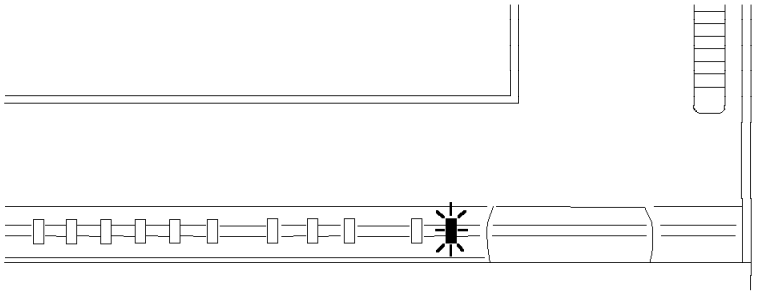
---

14 Series 600, T2x, and T30

- Unplug and then plug the support element power connector.
- Check the support element power indicator.

  Note:

  The T30 power-on LED indicator is directly above the "F8" key.
- Go to step 15.



15

Is the support element power indicator on now?

YES NO

↓ Go to step 17.

16

Ensure that the external module is correctly plugged at the rear of the support element. (Refer to the information in Table 2-1 on page 2-2.)

The series 600 (2645), T2x (2647), and T30 (2366) ThinkPads require special configuration procedures when they are used as support elements. Ensure the support element is configured correctly by referring to "Configuration Procedures for ThinkPad Based Consoles" in *Maintenance Information for ThinkPad Consoles*, GC38-3117.

When complete, go back to Chapter 1, "START" on page 1-1 and see if there are any problems on the system.

If you continue to have power problems with the support element, go to step 17. Otherwise, **end of procedure**.

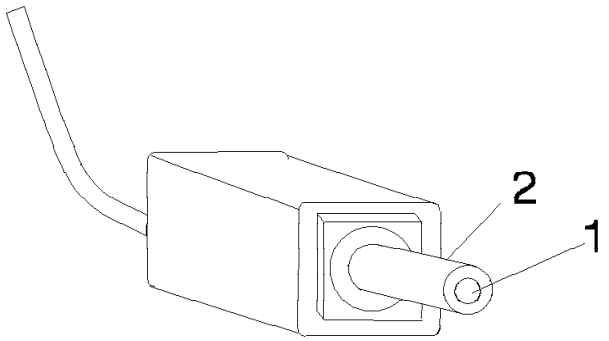
Note: If the external circuit module is not available, advise the customer that the system should not be powered off until the module is replaced.

17

- Set the meter to measure 25 Vdc.
- Unplug the power cable from the support element.
- Measure across pins 1 and 2 on the support element power connector.

When complete, go to step 18.

Connector used for ThinkPad power:



Pin	Voltage Vdc
1	+14.5 to +17.0
2	Ground

18

Did you measure the correct voltage?

NO **YES**

↓ You have a power problem in the ThinkPad support element. Go to "Chapter 1" in *Maintenance Information for ThinkPad Consoles*, GC38-3117.

Maintenance Information for ThinkPad Consoles and the ThinkPad maintenance manuals provide repair information. **When the call is complete, return to this manual to close the call**.

19

You have a system power problem. Go to “System Power Problems” on page 3-9.

End of procedure.

---

20 HMC or TKE power failure.

Press and release the power switch on the failing unit (processor unit or display).

Check the power indicator, then go to step 21.

Power to the console is provided from a customer source **not** from the system.

21

Is the power indicator on now?

NO **YES**

↓ The problem is resolved, close the call. For information, refer to “Closing a Call” on page 6-49.

22

Check the customer power source by either plugging in a known good unit or testing with your meter.

DANGER

> **You will be measuring dangerous voltages in this step.**

When complete, go to step 23

Some PCs have a voltage selection switch. Check that the switch is set for the customer's power source. For the operating range, refer to the Hardware Maintenance Manual shipped with the PC.

23

Is the customer power source correct?

YES **NO**

↓ Notify the customer that the outlet supplying the console needs repair. When complete, close the call. For information, refer to “Closing a Call” on page 6-49.

24

You have a power problem on the Hardware Management Console or TKE console. Go to "Chapter 1" in *Maintenance Information for Desktop Consoles*, GC38-3115.

End of procedure

Maintenance Information for Desktop Consoles and the PC maintenance manual provide repair information.

When the call is complete, return to this manual to close the call.

Alternate Support Element Errors

Use this procedure when you are directed by the online repairs to isolate one of the following problems:

- A communication failure between the Hardware Management Console and the active support element
- A communication failure between the active and the alternate support element
- A configuration error between the active and the alternate support element

Also, use this procedure when directed by one of the procedures in Chapter 1, “START” on page 1-1.

1

Review the information on the alternate console in “Alternate Support Element Description” on page 2-5. When complete, continue on step 2.

2

Were you directed here by a procedure in Chapter 1, “START” on page 1-1 because of one of the following conditions on the alternate support element switch?

- Both indicators on
- No indicators on
- Either indicator blinking

NO **YES**

↓ Go to step 28.

3

Were you directed here by a Repair and Verify ***or*** a Perform a Console Repair window?

YES **NO**

↓ Call for assistance

4

Find the reported reference code in Table 2-2 on page 2-17, then go to the step in this procedure indicated in the table.

Note: The “x” in the reference code can be any hexadecimal digit.

If you have a reference code that is not listed in Table 2-2 on page 2-17, call for assistance.

Table 2-2.

Reference Code	Go To Step
BC04000x Communications error - primary to alternate	5
BC04010x Configuration error - primary to alternate	13
B003x001 Communications error - primary to Hardware Management Console	20

5 RC=BC04000x

There was a failure in the communications between the active and alternate support elements. Do the following:

- Place the support element that you are now using back in the operating (closed) position.
- Use the procedures in "Starting Service with the Support Element" on page 1-10 to move the other (alternate) support element into the service position.
- Check the power indicator for the alternate support element.

Is the power indicator for the alternate support element on?

YES NO

↓ Go to "Console Failures" on page 2-8.

This problem can be caused by:

- A power problem in the support element
- A network adapter problem in the support element
- A problem in the network

The network connection can be either through the MAU inside frame A (Token-Ring) or the Ethernet hub.

6

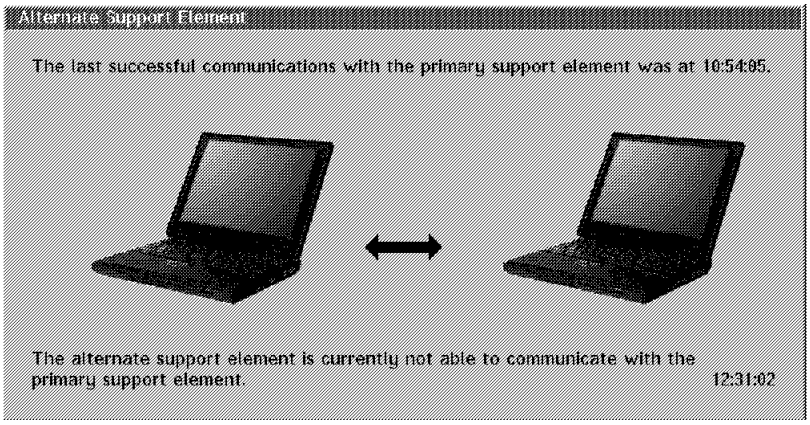
Check the time of day displayed in the lower right hand corner of the Alternate Support Element window.

Note: If this window is not displayed, go to “Console Failures” on page 2-8.

Is the time of day being updated?

YES **NO**

↓ Test the support element processor unit using the procedures in *Maintenance Information for ThinkPad Consoles*, GC38-3117. **When you finish, go to step 8 of this procedure.**



The time of day displays in the lower right hand corner of the Alternate Support Element window. The time of day may be set for some other location. Check to ensure that the minutes and seconds are advancing. If the time of day does not advance, the Alternate Support Element stopped because of an error.

The time in the upper right hand corner indicates the last time the Alternate Support Element communicated with the active support element. In normal operation this time is updated every five minutes.

7

Test the support element network adapter using the procedures in *Maintenance Information for ThinkPad Consoles*, GC38-3117.

Correct any power or network problems found. **When all testing is complete, go to step 8**.

The support element's processor unit is running but it cannot communicate with the active support element.

8

Were you able to find and correct a problem with the alternate support element's power, processor unit, or network adapter?

NO **YES**

↓ Use the procedure in “Closing a Call” on page 6-49 to close the call.

9

There was no problem found with the alternate support element. Go back to the original support element and do the following:

- Place the alternate support element back in the operating (closed) position.
- Use the procedures in “Starting Service with the Support Element” on page 1-10 to move the other support element into the service (open) position.
- Notify the customer that you will be testing the active support element.
- Test the support element network adapter using the procedures in *Maintenance Information for ThinkPad Consoles*, GC38-3117.

Correct any network problems found. **When all testing is complete, go to step 10**.

This problem can be caused by:

- A network adapter problem in the support element
- A problem in the network

The network connection can be either through the MAU inside frame A (Token-Ring) or the customer's Ethernet.

10

Were you able to find and correct a problem with the active support element's network adapter?

NO **YES**

↓ Use the procedure in “Closing a Call” on page 6-49 to close the call.

11

Is Ethernet feature used for the connection between the support elements and Hardware Management Console?

YES **NO**

↓ Call for assistance.

12

If the customer is using an IBM hub, call for assistance.

If the customer owns the hub, have the customer's network administrator test the connections between the hub and both support elements.

- If a problem is found, use the procedures in “Closing a Call” on page 6-49 to close the call.
- If there is no error, call for assistance.

13 RC=BC04010x

There was a hardware configuration mismatch between the active and alternate support element. Do the following:

Use the procedure in "Determining ThinkPad Serial Number" on page 2-2 to determine the type and model for the active **and** alternate support elements.

Are the model and type the same for the active and alternate support element?

NO **YES**

↓ Go to step 15.

This series of steps will have you verify the following for the support elements:

- Models and types are the same.
- Network adapter configurations are the same.
- Network cables are correctly attached.
- Information is correct in Edit Frame Layout.

14

Exchange ThinkPad(s) so the types and models are the same.

If you cannot resolve the problem or no ThinkPad replacement is available, call for assistance.

End of procedure

Ensure that each support element has the same PCMCIA network adapters and that the adapters are in the same slots in both support elements.

The supported network adapter configurations are:

Top slot	Token Ring or Ethernet
Bottom slot	Ethernet

15

Use the procedure in "Using Edit Frame Layout" on page 6-19 to verify that the serial number of the active support element is correct in the system's Vital Product Data VPD).

Is the serial number of the active support element correct in VPD?

YES **NO**

↓ Use the procedure in "Updating VPD for Support Elements" on page 2-3 to change the serial number that is stored in VPD.

End of procedure

In the procedure, single-click on the CPC icon and use the **Support Element Details** selection to display the support element information.

16

Verify that the ThinkPad network adapter (Token Ring and/or Ethernet) configuration for both support elements is identical and that the network cables are properly connected.

Are the network adapter configurations the same?

NO **YES**

↓ Go to step 18.

Ensure that each support element has the same PCMCIA network adapters and that the adapters are in the same slots in both support elements.

The supported network adapter configurations are:

Top slot	Token Ring or Ethernet
Bottom slot	Ethernet (or empty: T2x, T30)

17

Ask the customer's network administrator for assistance in determining the correct network adapter configuration.

If you cannot resolve the problem, call for assistance.

End of procedure

The supported network adapter configurations are:

Top slot	Token Ring or Ethernet
Bottom slot	Ethernet (or empty: T2x, T30)
	Ethernet

18

If the configuration is the same and the network cables properly attached, there may be a problem with one of the adapters. Test the adapters in **both** support elements using the procedures in *Maintenance Information for ThinkPad Consoles*, GC38-3117.

Were you able to find and correct a problem on any of the network adapters?

NO **YES**

↓ Close the call. Use the procedure in “Closing a Call” on page 6-49.

19

Call for assistance. Report that the support elements have the same network configuration and support element information is correct in VPD.

End of procedure

---

20 RC=B003x001

There was a failure in the communications between the support elements and the Hardware Management Console. In the following steps you will be directed to isolate the problem by:

- Determining if all, or only one support element reported “Communication not active.”
- Looking at the status indicators for the Hardware Management Console's network adapter or adapters.

Follow the procedure in “Displaying Service History” on page 6-13 to display the list of open problems on the Hardware Management Console. Display the Problem Analysis panels. Then, select the following:

- **Display Service Information**

Record the information for the **first** FRU in the list. (See **Note**.)

When complete, go to step 21.

The support element may have logged a reference code of BC04000x if the failure was due to the a problem in the support element network adapter preventing communication between active and secondary support elements.

Note: The following information is stored in the first FRU location on the Service History window:

- Frame location for the support element - “xxxx” (first part of Location)
- Customer's name for support element - “yyyyyyyy” (second part of Location).
- First 10 digits in the network adapter address (under Part Number).

21

On the Hardware Management Console Workplace:

- Select **Groups** from Views.
- Select **Defined CPCs** from the Groups Work Area.
- Double click on the CPC icon to open the Details window.
- In the “Instance Information” field, check for the message: **Communication Not Active**.
- Repeat this procedure for each defined CPC.

Is Communication Not Active displayed for **all** CPCs?

YES NO

↓ Go to step 23.

22

On the Hardware Management Console:

- Check the indicators on the network adapter (Token-Ring or Ethernet) used to connect the support elements. (See **Note**.)

Do the network adapter indicators indicate a network error?

Note: If you have only one CPC defined to the Hardware Management Console, answer this question No.

NO **YES**

↓ Go to step 24.

Note: For information on the network adapter indicators, refer to chapter: "Common Information and Procedures" in *Maintenance Information for Desktop Consoles*, GC38-3115. Refer to the following topics:

- "Identifying the ISA-PCI Bus Token-Ring Cards"
- "Ethernet Status LEDs"

23

Single support element failure.

Go to *Maintenance Information for ThinkPad Consoles*, GC38-3117 and test the operation of the network adapters in both the active and alternate support elements.

If there is only one support element defined, go to *Maintenance Information for Desktop Consoles*, GC38-3115 and test the operation of the network adapters in the Hardware Management Console.

When complete, go to step 25.

The Hardware Management Console cannot communicate with one support element The problem is most likely to be:

- Support element hardware
- Support element network adapter
- Support element licensed internal code
- Support element power
- Communications network.

If there is only one support element in the network, the problem can also be:

- Hardware Management Console network adapter

24

All support elements fail.

Go to *Maintenance Information for Desktop Consoles*, GC38-3115 and test the operation of the network adapter in the Hardware Management Console.

When complete, go to step 25.

The Hardware Management Console cannot communicate with any support element The problem is most likely to be:

- Hardware Management Console network adapter
- Communications network.

25

Were you able to find and correct a problem with a network adapter, support element, or Hardware Management Console?

NO **YES**

↓ Use the procedure in "Closing a Call" on page 6-49 to close the call.

26

Is Ethernet feature used for the connection between the support elements and Hardware Management Console?

YES NO

↓ Call for assistance.

27

Have the customer's network administrator test the connections between the hub and the Hardware Management Console.

- If a problem is found, use the procedures in "Closing a Call" on page 6-49 to close the call.
- If there is no error, call for assistance.

End of procedure

---

28 Alternate support element switch errors

At the alternate support element switch, remove the following cables one at a time and look for a change in the indicators:

- Cable from the UPC card.
- Cable from the lower support element
- Cable from the upper support element

When complete, continue on step 29.

The indicator for the selected support element should be on steady, the other indicator should be off. The indicators are powered from each of the support elements and the UPC card. A fault on one of the power sources can cause the indicators to display incorrectly.

29

Were you able to isolate the problem by removing any of the cables?

YES NO

↓ Go to step 31.

30

- If removing a support element cable corrected the problem, ensure that the cable is not damaged. Then, exchange the support element.
- If removing the cable from the UPC corrected the problem, follow the procedure in “Exchanging FRUs” on page 6-16 to exchange the UPC card.

When complete, close the call using the procedures in “Closing a Call” on page 6-49.

If you cannot correct the problem, call for assistance.

End of procedure

31

Follow the procedure in “Exchanging FRUs” on page 6-16 to exchange the alternate support element switch assembly.

If you did not correct the problem, call for assistance.

When complete, close the call using the procedures in “Closing a Call” on page 6-49.

End of procedure

Saving Support Element Configuration

Use the information in this section to copy the configuration information for a CPC and support element from the support element hard disk to the MC/SE backup cartridge (BACKUP-CART) on the Hardware Management Console.

You should back up the CPC information each time you alter the configuration.

Note:

Depending on the level of Hardware Management Console on your system, the MC/SE Backup cartridge can be either a Read/Write optical cartridge **or** a DVD-RAM.

Configuration information for a support element can be saved to or restored from any Hardware Management Console which has the support element defined (in Defined CPCs). When you want to restore configuration information for a support element, ensure that the Hardware Management Console you are using for the restore has the most recent configuration information for the support element on its MC/SE Backup cartridge.

Up to 10 support element configurations can be stored on one MC/SE Backup cartridge.

The backup cartridge uses a volume identifier (VOLID) field of ACTBKP. If a read/write cartridge with a blank VOLID is used, the backup program rewrites it to ACTBKP. A DVD-RAM must be formatted to write the ACTBKP VOLID.

1

Ensure the support element for the CPC is powered on.

At the Hardware Management Console:

- Ensure you are signed on in either System Programmer or Service Mode.
- Open **Task List** in Views.
- Open **Service Tasks** in the Task List Work Area.
- Open **Groups** in Views.
- Open **Defined CPCs** in the Groups Work Area.
- Ensure the BACKUP-CART cartridge or BACKUP-DVD cartridge is installed in the Hardware Management Console.
- Use the right hand mouse button to drag and drop the CPC icon on **Backup Critical Data** in the Service Tasks area.

Go to step 2.

Note: For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

If the Hardware Management Console is not in the correct mode, select **Console Actions** under Views. Select **Log Off** in the Console Actions Work Area.

2

Follow the instructions on the Hardware Management Console windows to complete the backup of information.

When complete, leave the BACKUP-CART cartridge in the Hardware Management Console.

Leave the cartridge installed so the customer can use scheduled operations to periodically update the critical support element and Hardware Management Console data.

End of procedure.

Saving Hardware Management Console Configuration

You should back up the Hardware Management Console each time you alter the system configuration.

A different MC/SE Backup cartridge is used at each Hardware Management Console. Use the same backup cartridge to restore a Hardware Management Console that was used previously to save the information.

Depending on the level of Hardware Management Console on your system, the MC/SE Backup cartridge can be either a Read/Write optical cartridge **or** a DVD-RAM.

The backup cartridge uses a volume identifier (VOLID) field of ACTBKP. If a read/write cartridge with a blank VOLID is used, the backup program rewrites it to ACTBKP. A DVD-RAM must be formatted to write the ACTBKP VOLID.

Note: Newer Hardware Management Consoles use a backup DVD instead of a BACKUP-CART cartridge.

1

At the Hardware Management Console:

- Ensure the BACKUP-CART cartridge or BACKUP DVD is installed in the Hardware Management Console.
- Ensure you are signed on in either System Programmer or Service Mode.
- Open **Console Actions** in Views.
- Open **Backup Console Data** in the Console Actions Work Area.

Go to step 2.

Note: For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

If the Hardware Management Console is not in the correct mode, select **Console Actions** under Views. Select **Log Off** in the Console Actions Work Area.

2

Follow the instructions on the Hardware Management Console windows to complete the backup of information.

When complete, leave the BACKUP-CART cartridge or DVD in the Hardware Management Console.

Leave the cartridge or DVD installed so the customer can use scheduled operations to periodically update the critical support element and Hardware Management Console data.

End of procedure.

Saving the TKE Console Configuration

You should back up the TKE Workstation each time you alter the configuration.

Note: The TKE BACKUP diskette must have a volume identifier (VOLID) field that is either blank or ACTKEBKP. If a diskette with a blank VOLID is used, the backup program rewrites it to ACTKEBKP.

Back up the TKE Workstation configuration as follows:

1

At the TKE Workstation:

- Ensure the TKE BACKUP diskette is installed in the diskette drive.
- Minimize all windows until only the OS/2® workplace displays.
- Open (double-click on) the **TKE Backup** icon on the workplace.

Go to step 2.

2

Follow the instructions on the windows to complete the backup of information.

When complete, give the TKE BACKUP diskette to the customer and direct them to store it in a safe place.

End of procedure.

Restore Support Element Hard Disk Information

Use this procedure to restore the licensed internal code and configuration information to the hard drive on a support element.

You will need the following:

SE Base Code CD-ROM
Backup cartridge (BACKUP-CART)
SE-Restore-TP (diskette for HMC Driver 1.8.2 or earlier)
OR
ALT-SE Restore (diskette for HMC Driver 2.9.0 or higher)
Cryptographic Enablement diskette (if base cryptographic coprocessor is installed)
Function Control Vector (FCV) diskette (if PCI cryptographic coprocessor is installed)

Note:

To restore, the CD-ROM with licensed internal code must be at the same base code EC number **and** the same Control Level as the previous code on the hard drive. (Different Control Numbers indicates patches applied to the base code level). **If the EC number or Control Number is different, you must use the upgrade procedure. For information, refer to "Upgrading Support Element Internal Code Level" on page 5-43** .

Configuration information for a support element can be saved to or restored from any Hardware Management Console which has the support element defined (in Defined CPCs). Ensure that the Hardware Management Console you are using for the restore has the most recent configuration information for the support element on its MC/SE Backup cartridge.

You cannot use more than one Hardware Management Console on the LAN at one time to restore or upgrade licensed internal code.

You can only restore one support element at a time.

Note: When Restoring Code to a SE configured to HMCs Using Both Token Ring (SE Lan0) AND Ethernet (SE Lan1), The Restore Process must Be Performed From an HMC that is configured to the SE using a Token Ring adapter.

Restore a support element hard drive as follows:

1. For HMC Driver 1.8.2 or earlier, go to "From the HMC Driver 1.8.2 or Earlier."
2. For HMC Driver 2.9.0 or later, go to "From the HMC Driver 2.9.0 or Higher" on page 2-34.

From the HMC Driver 1.8.2 or Earlier

1

Ensure that the support element you are restoring is in service position. For instructions, refer to “Starting Service with the Support Element” on page 1-10.

Go to step 2.

2

At the Hardware Management Console:

- Ensure you are signed on in Service Mode.
- Ensure the SE Base Code CD-ROM is installed.
- Select **Task List** in Views.
- Select **Service Tasks** in the Task List Work Area.
- Select **Groups** in Views.
- Select **Defined CPCs** in the Groups Work Area.
- Use the right hand mouse button to drag and drop the icon for the CPC that is to be restored on **Hard Disk Restore** in the Service Tasks area.

Go to step 3.

Note: For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

If the Hardware Management Console is not in the correct mode, select **Console Actions** under Views. Select **Log Off** in the Console Actions Work Area.

3

Does the Restore Engineering Change (EC) window show that ECs are available?

YES **NO**

↓ Follow the instructions in the right hand column. When complete, go to step 4.

Ensure the SE Base Code CD-ROM is installed in the Hardware Management Console.

Select the following on the windows displayed:

- **Customize availability**
- **Base ECs**
- **CD-ROM** or **R/W Optical**

Note: The support element base code is stored on a CD-ROM.

4

On the Restore Engineering Change (EC) window:

- Select **Select changes**.

On the Select Engineering Changes (ECs) window:

- Select the EC to be restored.
- Select **OK**.

Follow the instructions on the windows to install the Backup cartridge (BACKUP-CART), when the in progress message appears go to step 5.

Depending on the level of Hardware Management Console on your system, the MC/SE Backup cartridge can be either a Read/Write optical cartridge **or** a DVD-RAM.

5

At the support element:

- Insert the SE-Restore-TP diskette in the diskette drive.
- Press and hold the **Alt** and **Ctrl** keys. Then, press **Delete** (**Alt+Ctrl+Delete**).
- Release all the keys.
- Follow the instructions on the screen.

  Note: Do not try to use the support element until the restore is complete.

Go to step 6.

6

When the restore is complete:

- Leave the BACKUP-CART cartridge in the Hardware Management Console.
- Remove the SE-Restore-TP diskette from the support element

Go to step 7.

7

Does the system have the alternate support element feature installed?

NO **YES**

↓ Use the information at the right to complete the restore.

All G6 systems have the alternate support element, some G5 models have it.

Ensure that the support element you are working on is selected as the **alternate** support element.

Copy any configuration information, cryptographic enablement and FCV information (if installed) by mirroring the information from the primary support element. To mirror, do the following on the Hardware Management Console Workplace window:

- Open **Task List** from **Views**.
- Open **Change Management** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Open **Defined CPCs** from the **Groups Work Area**.
- Locate the icon for the CPC you are working on, drag it to the **Change Management** tasks area and drop it on **Alternate Support Element**.

When the mirroring ends, the restore is complete. Rotate the support element into the operational position.

End of procedure.

8

Does the customer have the base cryptographic feature installed?

YES NO

↓ Go to step 12.

---

9 Base Crypto Installed

Import the information from the Crypto Enablement diskette to reinitialize the feature. For information, refer to "Cryptographic Coprocessor Configuration" on page 12-3.

When complete, continue on step 10.

Note: Import the information only, do not activate the feature.

10

Does the customer have the PCI cryptographic coprocessor feature installed?

YES NO

↓ Go to step 12.

---

11 PCI Crypto Installed

Import the information from the FCV diskette for each PCI crypto feature installed. For information, refer to "Feature Card Tasks" on page 12-9.

When complete, continue on step 12.

Note: Import the FCV only, do not select it for use.

12

Notify the customer that the support element configuration is restored to the level saved on the SE Restore diskette. **If the customer has made configuration changes to the system since the last time the support element configuration was saved, they must update the configuration**.

Go to step 13.

Configurations that may have been changed include:

- Account information
- Activation profiles
- Activity profiles
- Crypto coprocessor configuration
- Domain security
- IOCDS
- LPAR controls/security

13

Restore is complete. Rotate the support element into the operational position.

End of procedure

From the HMC Driver 2.9.0 or Higher

1

Ensure that the support element you are restoring is in service position. For instructions, refer to "Starting Service with the Support Element" on page 1-10.

Go to step 2.

2

At the Hardware Management Console:

- Ensure you are signed on in Service Mode.
- Select **Task List** in Views.
- Select **Service Tasks** in the Task List Work Area.
- Select **Groups** in Views.
- Select **Defined CPCs** in the Groups Work Area.
- Use the right hand mouse button to drag and drop the icon for the CPC that is to be restored on **Hard Disk Restore** in the Service Tasks area.

Go to step 3.

Note: For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

If the Hardware Management Console is not in the correct mode, select **Console Actions** under Views. Select **Log Off** in the Console Actions Work Area.

3

When the following window displays:

Insert the following DVD-RAM into the drive.

- Backup **DVD-RAM** Cartridge
- Select **Restore**

Go to step 4.

4

When the following window displays:

- Insert the A-ROM into the Hardware Management Console
- Select **OK**

Go to step 5.

5

At the Hardware Management Console:

- Insert the ALT-SE Restore Diskette from HMC Driver 2.9.0 or Higher in the diskette drive.
- Select **OK**
- Wait for the "In Progress" window to display.

Go to step 6.

6

At the ALT Support Element:

- Insert the ALT-SE Restore Diskette from HMC Driver 2.9.0 or Higher in the diskette drive.
- Press and hold the **Alt** and **Ctrl** keys, Then press **Delete (Alt+Ctrl+Delete)**.
- Release all the keys.
- Follow the instructions on the screen.

Note: Do not try to use the Support Element until the restore is complete.

Go to step 7.

7

When the restore is complete:

- Remove the A-ROM and insert the BACKUP-CART cartridge in the Hardware Management Console read/write DVD-RAM drive.
- Remove the “ALT-SE Restore Diskette from HMC Driver 2.9.0 or Higher” from the Support Element.
- Press and hold the **Alt** and **Ctrl** keys. Then, press **Delete** (**Alt+Ctrl+Delete**).
- Release all the keys.

Note: When restoring from a DVD-RAM you must reload Crypto keys.

12

Restore is complete. Rotate the support element into the operational position.

End of procedure

Restore Hardware Management Console Hard Disk Information

Use this section when you need to reload the system licensed internal code on a Hardware Management Console hard drive.

Note: Different procedures are used for Driver 14 and for Drivers 20 and higher. Both procedures are covered in the steps below. Before starting, determine which driver is installed on your Hardware Management Console.

For driver 14 will need:

- Hardware Management Console Restore diskette 1 of 2 (HWMCA - Restore 1)
- Hardware Management Console base code CD-ROM (HWMCA-CD1)
- MC/SE Backup cartridge (BACKUP-CART)

For driver 20 will need:

- Hardware Management Console base code CD-ROM (HWMCA-CD1)
- MC/SE Backup cartridge (BACKUP-CART)

Note: To restore, the CD-ROM with licensed internal code must be at the same base code EC number **and** the same Control Level as the previous code on the hard drive. (Different Control Numbers indicates patches applied to the base code level). **If the EC number or Control Number is different, you must use the upgrade procedure. For information, refer to "Upgrading HMC Internal Code Level from HMC, Driver 1.8.2 or Earlier" on page 5-52**.

The information on the MC/SE Backup cartridge at each Hardware Management Console is different. Use the same backup cartridge to restore a Hardware Management Console that was used previously to save the information.

Restore the Hardware Management Console hard drive from HMC, Driver 1.8.2 or Earlier

1

- If you are restoring **Driver 14**, go to step 2.
- If you are restoring **Driver 20** or above, go to step 4.

---

2 Driver 14

- Ensure power is on.
- Place the MC Restore program diskette 1 of 2 in diskette drive A.
- Press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

Note: Different Restore diskettes are used for the Hardware Management Console and support element.

3

Select **F8** from the menu.

Follow the instructions on the windows to restore information from the following:

- Hardware Management Console CD-ROM with current level of internal code
- MC/SE Backup cartridge (BACKUP-CART)

When complete, remove the cartridge, CD-ROM and diskette from the drives.

To restart the Hardware Management Console press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

Continue on step 6.

Depending on the level of Hardware Management Console on your system, the MC/SE Backup cartridge can be either a Read/Write optical cartridge **or** a DVD-RAM.

---

4 Driver 20 and higher

- Ensure power is on.
- Place the Hardware Management Console base code CD-ROM in the CD-ROM drive.
- Press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

5

Select **F8** from the menu.

Follow the instructions on the windows to restore information from the following:

- Hardware Management Console CD-ROM with current level of internal code
- MC/SE Backup cartridge (BACKUP-CART)

When complete, remove the cartridge, and CD-ROM from the drives.

Continue on step 6.

Hardware Management Console reboot is done automatically.

Note: If the "Hard Disk Upgrade or Reload" Panel does not come up or you get a configuration error indicating the the CD-ROM has been removed from the configuration. Go to *Maintenance Info for desktop consoles* GC38-3115

6

The update of the licensed internal code provides OS/2 a default setting of United States for the country and keyboard. If you require different settings, do the following:

Note: The procedure is different for different levels of OS/2. If the Install/Remove icon does not display, use the procedure in the right hand column.

- Minimize all windows until only the OS/2 Desktop is displayed.
- Open (double-click on) the **OS/2 System** icon.
- Open **System Setup** from the OS/2 System - Icon View window.
- Open **Install/Remove** from the System Setup - Icon View window.
- Open **Selective Install** from the Install/Remove - Icon View window.
- On the System Configuration window:
  - If the country is not correct:
    - Select the **Country** icon.
    - Select the correct country from the menu.
    - Select **OK**
  - If the keyboard is not correct:
    - Select the **Keyboard** icon.
    - Select the correct keyboard from the menu.
    - Select **OK**
- Install the HWMCA-Base Code CD-1 in the CD-ROM drive and follow the instructions on the display to copy the feature information.
- Shut down the Hardware Management Console. For information, refer to “System Shut Down” on page 6-45.
- Power-on reset the Hardware Management Console (**Ctrl**+**Esc**+**Delete**).

Continue on step 7.

- Minimize all windows until only the OS/2 Desktop is displayed.
- Open (double-click on) the **OS/2 System** icon.
- Open **System Setup** from the OS/2 System - Icon View window.
- Open **Selective Install** from the System Setup - Icon View window.
- On the System Configuration window:
  - Select the **Country** icon.
  - Select the correct country from the menu.
  - Select OK.
  - Select the **Keyboard** icon.
  - Select the correct keyboard from the menu.
  - Select OK.
- Install the HWMCA-Base Code CD-1 in the CD-ROM drive and follow the instructions on the display to copy the feature information.
- Shut down the Hardware Management Console. For information, refer to “System Shut Down” on page 6-45.
- Power-on reset the Hardware Management Console (**Ctrl**+**Esc**+**Delete**).

Continue on step 7.

7

Depending on your configuration, you may need to set the display customization. For information, go to “Display Settings” on page 2-43.

End of procedure

Restore the Hardware Management Console hard drive from HMC, Driver 2.9.0 or Higher

Use this procedure to restore the licensed internal code and configuration information to the hard drive on a Hardware Management Console (HMC).

You will need the following:

- HMC Base Code DVD
- Backup DVD

Note: To restore, the DVD with the licensed internal code must be at the same base code EC number and the same Control Level as the previous code on the hard drive that was installed when backup was created. (Different Control Numbers indicate patches applied to the base code level.)

1

At the HMC:

- Insert the HMC Base Code DVD in the DVD drive.
- Press and hold the Alt and Ctrl keys. Then, press Delete (Alt+Ctrl+Delete).
- Release all the keys.
- Follow the instructions on the screen.Note: Do not try to use the HMC until the restore is complete.

2

When the Hard Disk Upgrade or Reload panel is displayed, select F8.

3

When the Hard Disk Restore/Reload panel displays, select F1.

6

When the Hard Disk Reload is Complete panel displays:

- Remove the Base Code DVD and insert the BACKUP DVD in the Hardware Management Console read/write DVD drive.
- Select Enter to continue.

7

When the HMC operating system initializes, the HMC Restore Critical Data panel is displayed.

- Select the latest backup for the HMC being restored.
- Select Restore to continue.

Updating and Restoring the TKE Console Hard Disk

This procedure loads the TKE workstation licensed internal code from a CD-ROM to the workstation's hard disk. Use it when:

- A hardware failure damages the hard drive information
- The hard drive is exchanged
- New licensed internal code is to be loaded on the hard drive

You will need:

- TKE Restore diskette
- Base code CD-ROM
- TKE backup diskette (TKE BACKUP)

Note: Use the same backup diskette to restore a Workstation that was used previously to save the information.

Restore or update the hard drive as follows:

1

- Ensure power is on.
- Place the TKE Restore program diskette in drive A.
- Press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

2

Follow the instructions on the windows to restore or update information from the following:

- CD-ROM with current level of internal code
- Backup diskette (TKE BACKUP)

When complete, remove the CD-ROM and diskette from the drives. Go to step 3.

3

If you were restoring the workstation internal code to the original level, notify the customer that any TKE code updates to the existing base code level will have to be reinstalled.

When complete, go to step 4.

4

Use the information at the right to restart the TKE workstation.

After restarting, do the following:

- Wait for OS/2 to complete loading.
- Ensure the TKE logo window displays.

If OS/2 and the TKE application do not start, use the procedures in this manual to resolve the problem.

To restart: press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

End of procedure.

Display Settings

This procedure sets the Hardware Management Console (version 1.8.2 and earlier) display customization parameters. Use this procedure after restoring the Hardware Management Console hard disk or upgrading the licensed internal code level of the Hardware Management Console **only** if you have **all** of the following:

- Licensed internal code level you are installing is EC12933 ***or higher***
- Hardware Management Console uses an ISA bus based PC model 6885
- Hardware Management Console uses an a 952x display

Note: Use this procedure only if the display is a 17P, 17V, or 21P.

1

After the upgrade or restore is complete and the Hardware Management Console Workplace window displays:

- Minimize the Hardware Management Console Workplace window by "clicking" on the minimize icon in the upper right-hand corner.
- Minimize any other windows until only the OS/2 desktop is displayed.
- Open (double-click on) **OS/2 System**
- Open **System Setup** from the OS/2 System - Icon View window.
- Open **System** from the OS/2 System - Icon View window.
- "Click" on the page advance arrow at the bottom of the System Settings window to select Page 2 of 2.

Continue on step 2.

During Hardware Management Console initialization, the system will reboot automatically. After the reboot, the Hardware Management Console video will be configured as:

```
Selected Monitor:    DEFAULT
Screen Resolution:   1024x768x256
Screen Refresh Rate: 43
```

Note: The Hardware Management Console is operational at this point. The following steps enhance the video settings.

2

On Page 2 of 2 System - Settings window:

- Select the pull-down menu for the Display name field.
- Select the display type used for your Hardware Management Console from the menu list.
- Close the System - Settings window by double-clicking on the icon in the upper left-hand corner.

Continue on step 3.

Display selections include:

```
IBM 17P/XG
IBM 17X
IBM 21P/21X/21XG
```

3

On the SVGA window:

- Select **YES**

Continue on step 4.

The SVGA window prompts you: “System needs to run the SVGA utility to improve video refresh capabilities..”

4

When the OS/2 desktop displays:

- Shut down the PC.

  Note: You can either use the **Shut down** pushbutton on the OS/2 Launchpad, or follow the procedure in “System Shut Down” on page 6-45.

- Press and hold **Ctrl** and **Alt** together, then press **Delete** (**Ctrl+Alt+Delete**).

Continue on step 5.

This reinitializes the Hardware Management Console with the new display settings.

5

After initialization is complete and the Hardware Management Console Workplace window displays:

- Minimize the Hardware Management Console Workplace window by “clicking” on the minimize icon in the upper right-hand corner.
- Minimize any other windows until only the OS/2 desktop is displayed.
- Open (double-click on) **OS/2 System**
- Open **System Setup** from the OS/2 System - Icon View window.
- Open **System** from the OS/2 System - Icon View window.
- On Page 1 of 2, verify that the display selections shown at the right are correct.

Note: If the Screen Refresh Rate is set to “43,” change the value to “75”.

Continue on step 6.

Verify these settings:

```
Selected Monitor:     matches your selection
Screen Resolution:    1024x768x256
Screen Refresh Rate:  75
```

6

Close the System Settings window.

If you changed any value from the previous step:

- Shutdown and reinitialize the Hardware Management Console

(Use the procedure in step 4.)

End of procedure

Chapter 3. Power Information

Use this section to assist in diagnosing power problems.

If you were directed to diagnose system power problems, go to "System Power Problems" on page 3-9 . The following additional information is provided:

Action	Go To
Resolve support element power problems	"Resolving Support Element Power Problems" on page 3-5
Information on battery for Cryptographic Battery Unit (CBU)	"Cryptographic Coprocessor Battery Information" on page 3-3
Additional power information.	"Power System Information" on page 3-2
Replace a Support Element Power Converter	"Support Element Power Converter Removal and Replacement" on page 3-15

Power System Information

This section provides information about bulk DC power generation and distribution.

The highlights of the power system are:

- N+1 power
- A 350 Vdc distributed power system.
- The Bulk Power Assembly (BPA) in frame A supplies power to all frames.
- The CPCs are powered up and down from the support element.
- Power is controlled by the support element, BPA, and the Universal Power Controller (UPC) in each cage.
- Each frame string contains a single Emergency Power Off (EPO) switch in frame A. Setting the EPO switch to Off removes power to all cages, air movement devices (AMD), and the support element.

  Note: Customer AC source to the bulk power supply is **not** removed.

The power system is a dual source, redundant power supply, referred to as N+1 power. This means that the customer can continue to run when one side of the power system fails. The power systems take the customer's dual three-phase AC input power and convert to 350 volts DC. The 350 volts DC is distributed to all components of the system.

The main power supply is called the Bulk Power Assembly (BPA). The BPA is on top of the CPC, the "A" side is in the front, the "B" side is in the rear. For locations, refer to “Bulk Power Assembly (BPA)” on page A-16.

The "A" and "B" sides of the BPA are completely separated. Because power from one side is still available when the other is off, on-line procedures assist you in removing either side.

The major power components of the power system are:

- Bulk Power Assembly (BPA). Converts, controls, and distributes 350 Vdc. The BPA is divided into two independent sides (A and B). Each side contains the following parts:
  - AC Input Assembly (ACI)
  - Bulk Power Regulator (BPR)
  - Bulk Power Controller (BPC)
  - Bulk Power Distributor (BPD)
- Motor Drive Assembly (MDA). The logic card that converts 350 Vdc to the voltage levels required for the Air Moving Devices (AMD).
- Support Element Power Converter (SEPC). Converts 350 Vdc to 20 Vdc for the ThinkPad support element.
- Distributed Converter Assembly (DCA). A DC to DC converter in the CPC or expansion cage. It converts 350 Vdc to logic voltages.
- Integrated Battery Feature (IBF). Provides a backup power source for short term utility outages.

Figure 3-1 on page 3-4 shows the power connections.

Color Coding of Power Cables

The power cables are color-coded to make it easier to determine where the cables go. They have the following color coding on the connectors:

To determine 'A' or 'B' side:

- All A-side power connectors have a striped band.
- All B-side power connectors have a solid band.

To determine cage location in the frame:

- Connectors in the upper cage of frame A (CPC) have a red band.
- Connectors in the lower cage of frame A have a blue band.
- Connectors in the upper cage of frame Z have a green band.
- Connectors from the lower cage in frame Z have a yellow band.

Examples:

- Cables with a striped red band on their connectors come from an A-side power component and plug into a component in the upper cage in frame A (the CPC cage).
- Cables with a solid green band on their connectors come from a B-side power component and plug into a component in the lower cage in frame Z.

Cryptographic Coprocessor Battery Information

Machines with the cryptographic coprocessor feature installed have a Cryptographic Battery Unit (CBU) plugged into the DCA cards in the CPC.

CAUTION:
The Cryptographic Battery Unit (CBU) contains a lithium battery. Do not expose the CBU to heat. Do not attempt to disassemble the CBU or recharge the battery. Dispose of the CBU as required by local ordinances or regulations.

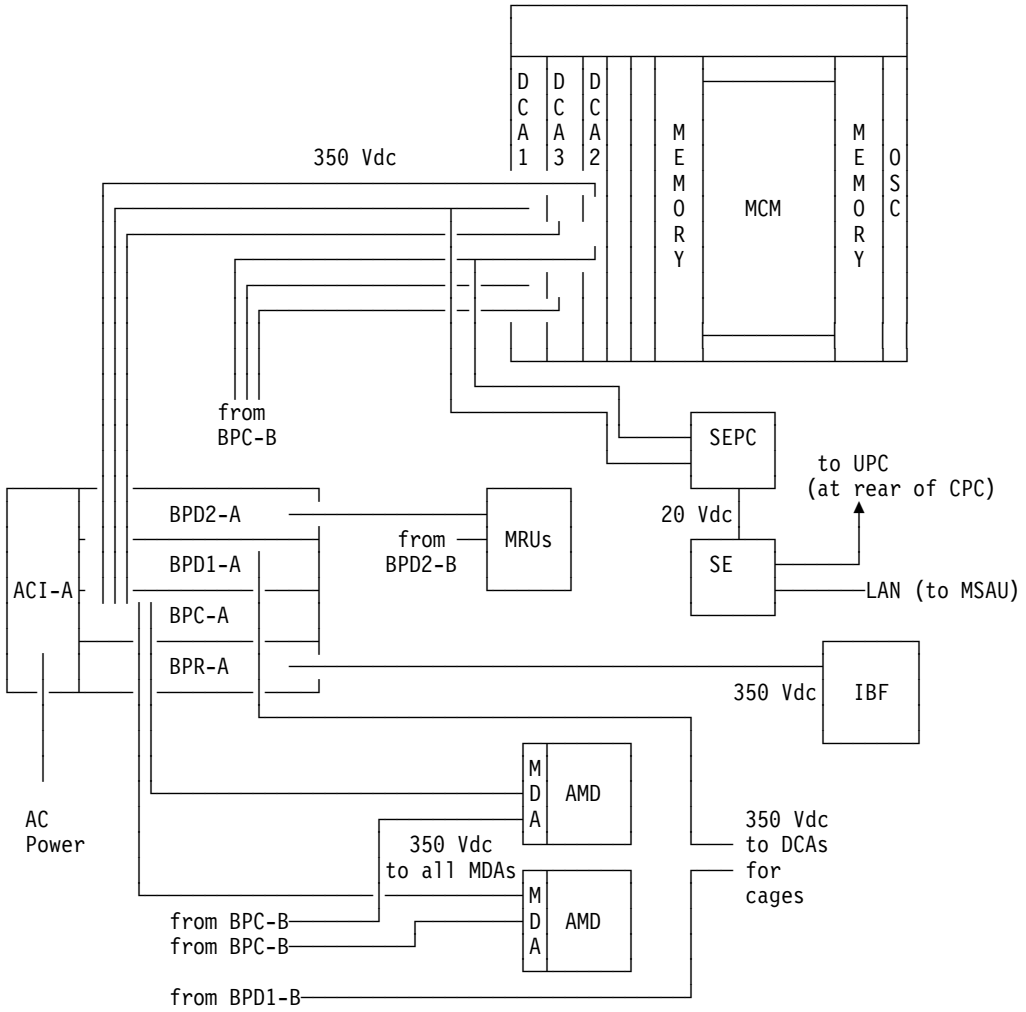


Figure 3-1. PBA power connections

The abbreviations used in the figure are:

AMD	Air Moving Devices (for CPC and BPA)
ACI	AC Input module
BPA-A/B	Bulk Power Assembly, "A" side or "B" side
BPC	Bulk Power Controller
BPD	Bulk Power Distributor
BPR	Bulk Power Regulator
CHA	Channel Adapter card
DCA	Distributed Converter Assembly (5 Vdc supply)
FIBB	Internal Bus Buffer
IBF	Integrated Battery Feature
MDA	Motor Drive Assembly
MEM	Memory card
MRUs	Modular Refrigeration Units (two each - not on all models)
MSAU	Multi-System Access Unit (for LAN connections)
SE	Support Element
SEPC	Support Element Power Converter
UPC	Universal Power Controller

Resolving Support Element Power Problems

Use this section when you are directed to diagnose power problems for a ThinkPad support element.

The problem can be one of the following:

A defective support element power converter
A support element over current condition.
A defective support element DC to DC power converter card.

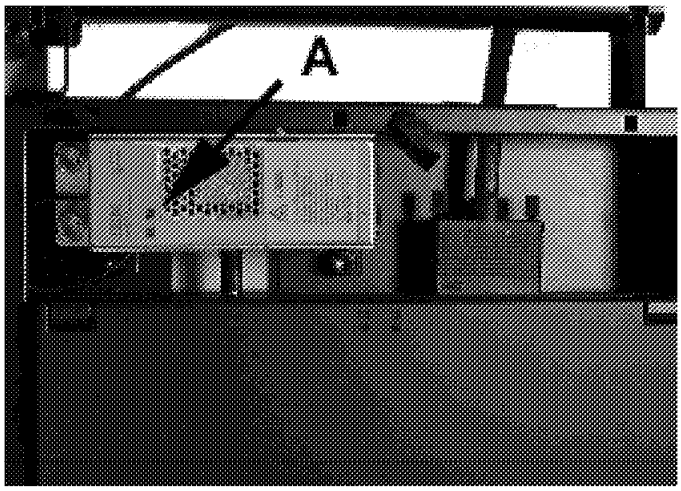
1

Refer to the figure and check the support element power converter indicator.

Is the support element power converter LED on?

NO **YES**

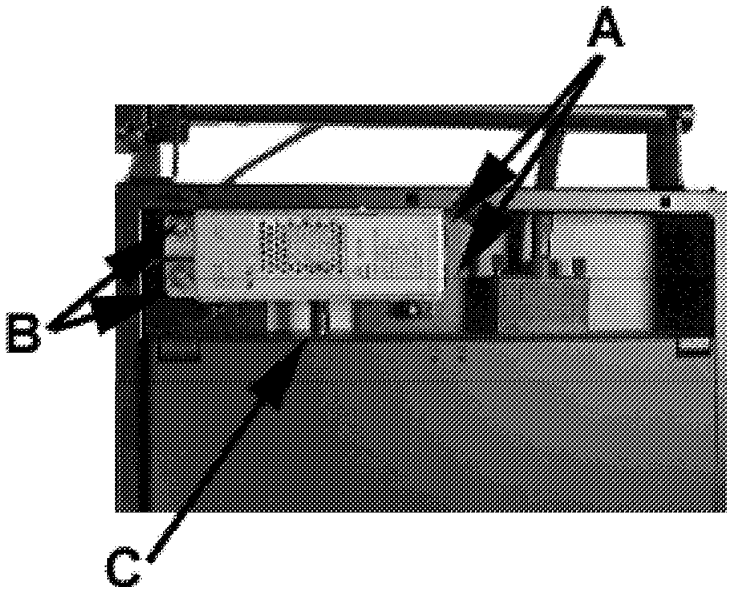
↓ Go to step 6.



2

- Disconnect J1 and J2 (A) on the support element power converter

Go to step 3.



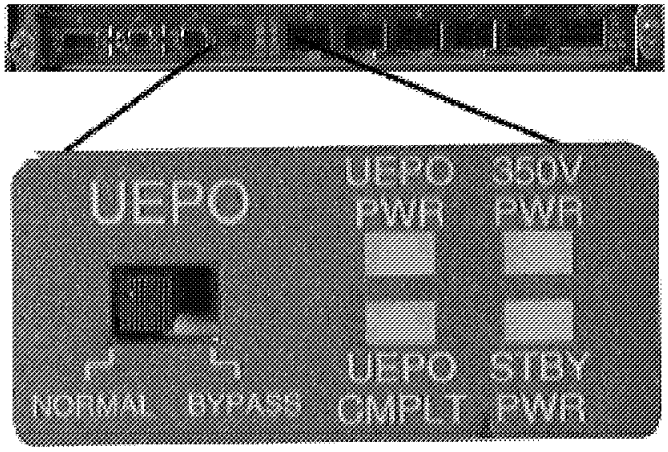
This checks the support element power converter for an over current condition.

3

- Open the rear covers of frame **A**.
- Check both bulk power converter (BPC) standby power indicators (STBY PWR).

  Note: One BPC is located in the front, the other at the rear.

Go to step 4.



For information on power supply locations, refer to “Bulk Power Assembly (BPA)” on page A-16.

4

Are both BPC STBY PWR indicators on steady?

YES **NO**

↓ Go to "System Power Problems" on page 3-9.

5

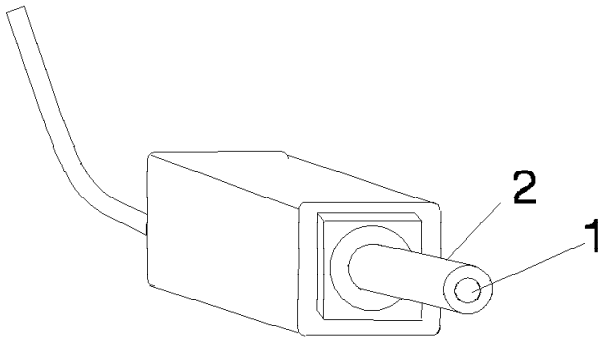
- Reconnect J1 and J2 on the support element power converter
- When the BPC **A** and **B** STBY PWR indicators are on steady, go to step 6.

This procedure resets the support element power converter over current condition.

6

- Prepare a meter to measure 25 Vdc.
- Measure the voltage across pins 1 and 2 on the support element power connector.
- Go to step 7 when complete.

Connector used for ThinkPads:



Pin	Voltage Vdc
1	+14.5 to +17.0
2	Ground

7

Is the voltage at the power connector correct?

YES **NO**

↓ Go to "Support Element Power Converter Removal and Replacement" on page 3-15.

8

- Reconnect the support element power plug.
- Check the support element power converter indicator.

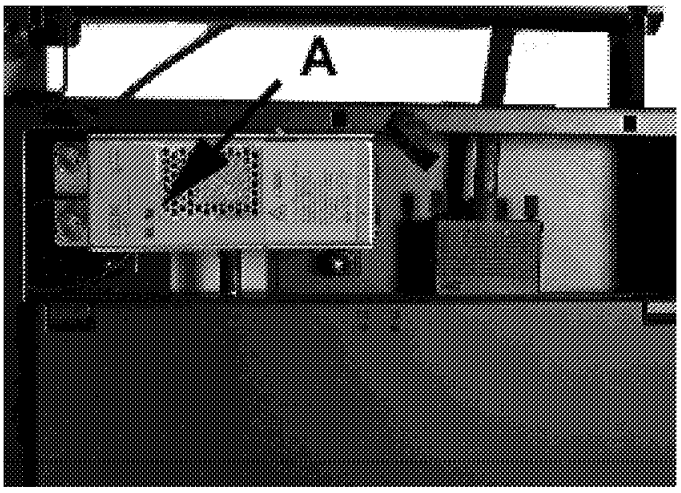
Go to step 9.

9

Is the support element power converter LED on?

NO **YES**

↓ The support element power converter sensed an over current condition and was reset. Close the call. For information, refer to “Closing a Call” on page 6-49.



If the problem occurs again, you have a power problem in the support element. Go to “Chapter 1” in *Maintenance Information for ThinkPad Consoles*, GC38-3117 to resolve the problem.

10

You have a power problem in the support element. Go to “Chapter 1” in *Maintenance Information for ThinkPad Consoles*, GC38-3117 to resolve the problem.

End of procedure

System Power Problems

This is the starting point for system power problems when all system power (N+1) is missing.

You are here because:

- The system is not operational.
- The Universal Processor Controller (UPC) is not operating.
- The support element may or may not be operating.
- You were directed here by Chapter 1, “START” on page 1-1 or an on-line procedure

The problem can be one of the following:

- Customer power is missing
- Switch setting on the UEPO card is wrong
- Switch settings on the BPC cards are wrong
- The UEPO card is defective
- Both cables from the UEPO card assembly to the BPCs are disconnected
- The room temperature exceeds 40 degrees Celsius
- The room UEPO circuit is wired incorrectly

1

Check to insure that the following are true.

- Both line cords are properly connected.
- UEPO panel switch is in the "ON" position.
- The UEPO BYPASS switches on both BPCs are in "NORMAL" position.
- The following cables from the UEPO card to the BPC are properly connected:
  UEPO-J01 to BPCA-J08
  UEPO-J02 to BPCB-J08
- The room temperature is below the maximum of 40 degrees Celsius (104 degrees Fahrenheit).

Are all of the above conditions true?

NO **YES**

↓ Go to step 3.

BPCA is in the front, BPCB is in the rear. For additional information on power supply locations, refer to “Bulk Power Assembly (BPA)” on page A-16.

2

Correct any problems found.

When complete, go to step 14.

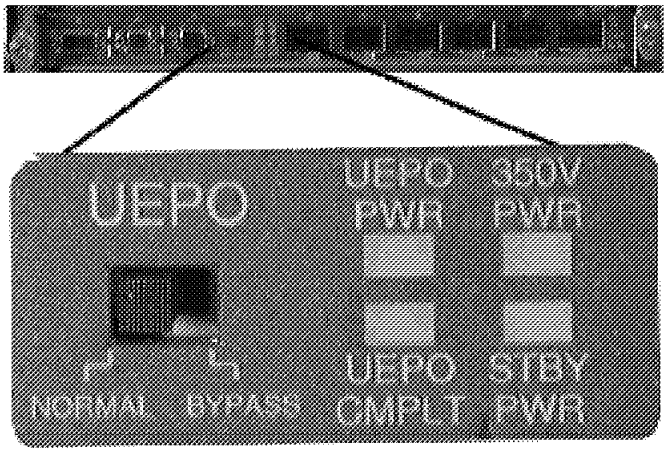
3

Check the state of the LEDs on **both** sides of the BPA.

Are all LEDs off on both sides of the BPA?

NO **YES**

↓ Go to step 11.



For information on power supply locations, refer to “Bulk Power Assembly (BPA)” on page A-16.

4

Check for the following LED state on **both** BPCs:

- UEPO PWR LED on
- BPC GOOD LED on
- All other LEDs are off

Are all the above true?

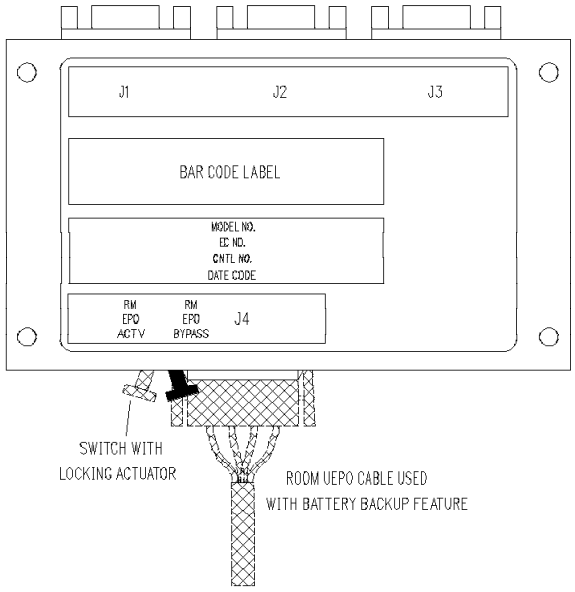
YES **NO**

↓ Go to step 17.

5

Check the UEPO card assembly to see if a cable is plugged into connector J4.

Go to step 6.



The cable in J4 is the customer's room UEPO connector. It is used in conjunction with the integrated battery feature to remove battery voltages when the room EPO switch is activated.

The Room EPO Bypass (RM EPO BYPASS) switch is forced to the Room EPO Active (RM EPO ACTV) position when the room EPO cable is installed in J4. Otherwise, it should be in the Room EPO Bypass (RM EPO BYPASS) position.

Note: The Room EPO Bypass switch “locks” into position. To move it to a different position pull down (away from the card assembly) to unlock it, then move the switch to the new position.

6

Is a room UEPO cable installed in UEPO-J4?

NO **YES**

↓ Go to step 8.

7

Is the Room EPO Bypass switch set to the RM EPO BYPASS position?

YES **NO**

↓ Set the Room EPO Bypass switch to the RM EPO BYPASS position. When complete, go to step 14.

8

Unplug the cable from UEPO-J4 and set the Room EPO Bypass switch to the RM EPO BYPASS position.

Continue on step 9.

9

Is the UEPO COMPLT indicator on for at least one of the BPCs?

NO **YES**

↓ Notify the customer that the room EPO wiring is incorrect.

10

Exchange the following FRU:

- UEPO card assembly

Go to step 14.

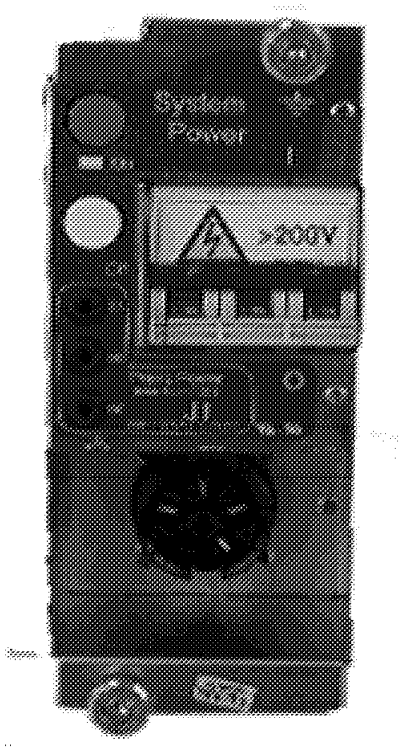
Hold the EPO Bypass switch in the RM EPO ACTV position while you plug the cable in J4.

11

Are both AC input (ACI) A and B circuit breakers, CB1, on?

NO **YES**

↓ Go to step 15.



12

- Set both ACI circuit breakers ON.
- Wait 10 seconds.

Note: A single tripped circuit breaker can not cause this problem. However, any circuit breaker you find tripped must be reset before preceding.

Did either CB1 A or CB1 B trip?

NO **YES**

↓ Go to step 17.

13

Is system power restored?

YES **NO**

↓ Go to step 15.

14

Go to Chapter 1, “START” on page 1-1 and follow the online service procedures to resolve the other power problems.

If there are no other problems, close the call. For information, refer to “Closing a Call” on page 6-49.

End of procedure

15

DANGER

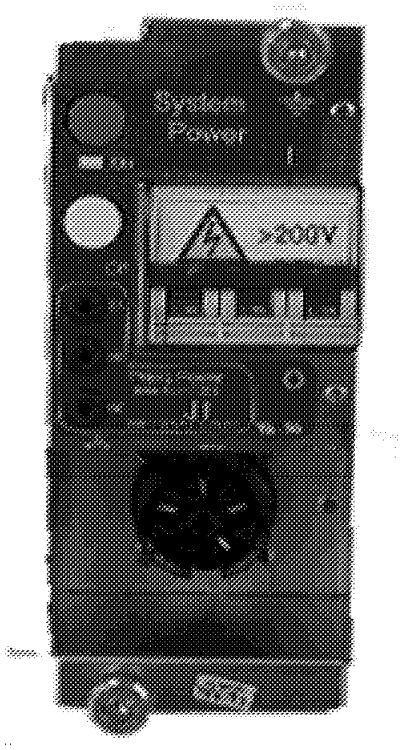
You will be measuring dangerous voltages in this step.

- Prepare a meter to measure up to 600 Vac.
- At the test points on **both** ACIs, measure the voltages between:
  - Phase A and phase B

Are all voltages greater than 180 Vac?

NO **YES**

↓ Go to step 17.



16

Have the customer repair the line voltage problem. Recommend that a qualified electrician make the repairs.

End of procedure

17

There are faults indicated on both sides of the BPA. The problem for each side must be isolated separately.

Call your next level of support for assistance resolving the system power problem.

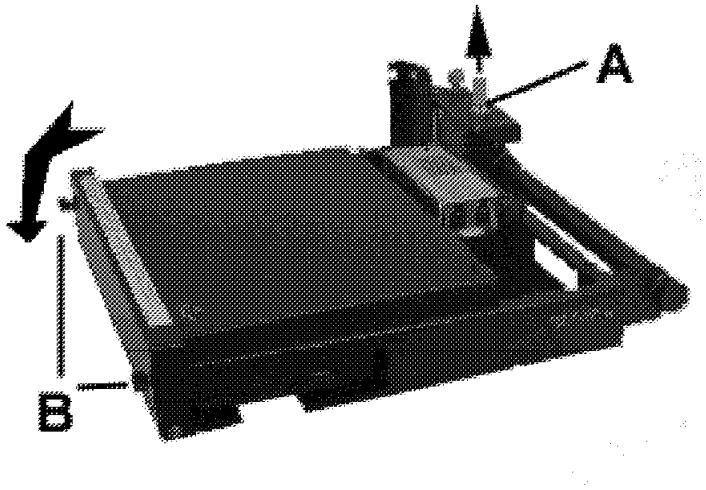
End of procedure

Support Element Power Converter Removal and Replacement

Use this procedure when you are directed to exchange a support element power converter. The support element power converter is located in frame A, on the support element folding tray.

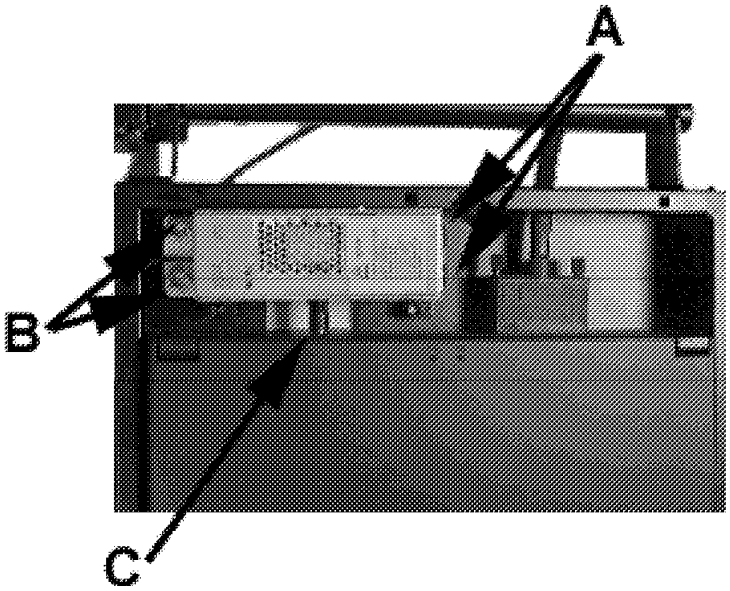
1

- Open the front covers of frame A.
- Pull latch pin (A) and rotate the support element tray down into the service position.



2

- Disconnect P1 and P2 at the support element power converter (A)
- Loosen two support element power converter screws (B).
- Disconnect the support element 20 Vdc power cable (C).
- Remove the support element power converter.



3

Use this procedure to install the support element power converter.

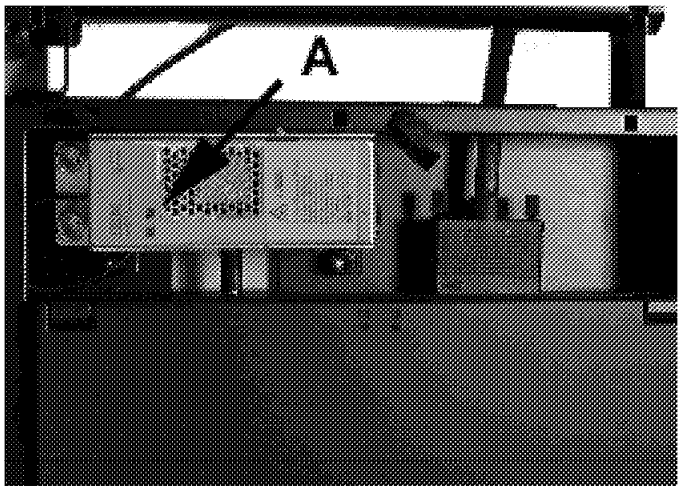
- Place the support element power converter on the folding tray.
- Connect the 20 Vdc power cable.
- Reconnect J1 and J2 on the support element power converter
- Install the two screws that hold the support element power converter.

Go to step 4.

4

Check the support element power converter LED.

- If the LED is off, you have a power problem on the support element or the support element power converter. Go to “Resolving Support Element Power Problems” on page 3-5.
- Otherwise, return to the procedure that directed you here.



End of procedure

Chapter 4. Task Information

This section lists the tasks available on the support element and Hardware Management Console. A brief description of the tasks used for service is provided.

- Support Element tasks are listed in “Support Element Tasks” on page 4-2
- Hardware Management Console tasks are listed in “Hardware Management Console Tasks” on page 4-6
- Service mode tasks available on the support element and Hardware Management Console are described in “Description of Service Mode Tasks” on page 4-14
- Service mode tasks available only on the Hardware Management Console are described in “Tasks Available Only On a Hardware Management Console” on page 4-26
- For information on support element tasks used by the customer, refer to *Operations Guide*, GC38-3119.
- For information on Hardware Management Console tasks used by the customer, refer to *Hardware Management Console Guide*, GC38-0470.

Support Element Tasks

This section lists all support element tasks.

Note: The Console Actions are related to either the support element or the entire system. The various tasks relate to either a CPC, a CP, a CHPID, or an image.

The following abbreviations and symbols are used in Table 4-1.

See References to additional task information within this manual.
X Task available to the userid indicated

Table 4-1 (Page 1 of 4). Tasks on the support element. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Refer to **Note** *on 4-2 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
Console Actions	4-14	X	X	X	X	X
View Console Events	4-14	X	X	X	X	X
Support Element Settings	4-14	X	X	X	X	X
Customize Automatic Logon						X
Domain Security	4-14				X	X
Enable Console Services	4-14		X	X	X	
Customize Date/Time	4-14	X	X	X	X	X
Installation Completion Report	4-15				X	
View support element tasks performed	4-14				X	X
Network Diagnostic Information	4-15		X	X	X	
HSA Estimation Tool	4-15	X	X	X	X	X
Customize User Tasks						X
SNMP Configuration						X
View Security Logs	4-15			X	X	
Log off	4-15	X	X	X	X	X
Daily Tasks	4-16	X	X	X	X	X
Hardware Messages	4-15	X	X	X	X	X
Operating System Messages	4-16	X	X	X	X	X
Activate	4-16	X	X	X	X	
Reset Normal	4-16	X	X	X	X	
Deactivate	4-16	X	X	X	X	
Grouping				X		
Activity	4-16	X	X	X	X	
CPC Recovery	4-17		X	X	X	
Hardware Messages	4-15		X	X	X	
Operating System Messages	4-16		X	X	X	
Start All	4-17		X	X	X	
Stop All	4-17		X	X	X	

Table 4-1 (Page 2 of 4). Tasks on the support element. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Refer to **Note** *on 4-2 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
Reset Normal	4-17		X	X	X	
Reset Clear	4-17		X	X	X	
Load	4-17		X	X	X	
Power On Reset	4-17		X	X	X	
System Power	4-17				X	
Service	4-17	X	X	X	X	
Hardware Messages	4-15	X	X	X	X	
Operating System Messages	4-16	X	X	X	X	
Perform Problem Analysis		X	X	X		
Service status	4-17	X	X	X	X	X
Perform a repair action	4-18				X	
View Service History	4-18	X	X	X	X	
Checkout Tests	4-18	X	X	X	X	
Report a Problem	4-19	X	X	X	X	
Transmit Service Data	4-19	X	X	X	X	
Dump LPAR Data	4-19				X	
Delete LPAR Dump Data	4-19		X	X	X	
IFCC and Other Errors	4-19				X	
Channel Interface Tests	4-19				X	
Change Management	4-19	X	X	X	X	X
Hardware Messages	4-15	X	X	X	X	X
Operating System Messages	4-16	X	X	X	X	X
Change Internal Code	4-19			X	X	
Analyze Internal Code	4-19				X	
System Information	4-19	X	X	X	X	X
Edit LPAR Internal Code Change	4-19				X	
LPAR Internal Code Change Utility	4-20				X	
Force Channel Internal Code Change	4-20			X	X	
Authorize Internal Code Changes	4-20			X	X	
Authorize Concurrent Internal Code Changes	4-20			X	X	
ECD File Recovery	4-20			X	X	
Alternate Support Element	4-20			X	X	
CPC Remote Customization	4-20			X	X	
Hardware Messages	4-15			X	X	
Operating System Messages	4-16			X	X	
Remote Service	4-20			X	X	
Problem Management	4-20			X	X	
Operations Management	4-21			X	X	

Table 4-1 (Page 3 of 4). Tasks on the support element. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Refer to **Note** *on 4-2 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
Account Information	4-21			X	X	
CPC Operational Customization	4-21	X	X	X	X	
Hardware Messages	4-15	X	X	X	X	
Operating System Messages	4-16	X	X	X	X	
Customize Activation Profiles				X		
View Activation Profiles	4-21	X	X		X	
View/Delete Activation Profiles				X		
Automatic Activation				X	X	
Scheduled Operations	4-21			X	X	
Enable TOD	4-21	X	X	X	X	
Change LPAR Controls	4-21			X	X	
Change LPAR Security	4-21			X	X	
Storage information	4-21	X	X	X	X	
System Activity Profiles	4-21	X	X	X	X	
Enable/Disable Dynamic Channel Subsystem	4-21			X	X	
Power Save	4-22			X	X	
Change LPAR Cryptographic Controls	4-22			X	X	
Change LPAR Sysplex Test Date Source	4-22			X	X	
Export/Import Profile Data	4-22			X	X	
CPC Configuration	4-22			X	X	
Hardware Messages	4-15			X	X	
Operating System Messages	4-16			X	X	
Perform Model Conversion	4-22			X	X	
Transmit Vital Product Data	4-22			X	X	
Edit Frame Layout	4-22				X	
View Frame Layout				X		
System Complex (Sysplex) timer	4-22			X	X	
Input/Output (I/O) Configuration	4-22			X	X	
Nondisruptive Hardware Change	4-23				X	
Hardware Configuration Details	4-23			X	X	
View Hardware Configuration	4-23			X	X	
Crypto Coprocessor Configuration	4-23			X	X	
CP Toolbox	4-23		X	X	X	
Hardware Messages	4-15		X	X	X	
Operating System Messages	4-16		X	X	X	
Start	4-23		X	X	X	
Stop	4-23		X	X	X	
Change Operation Rate				X		

Table 4-1 (Page 4 of 4). Tasks on the support element. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Refer to **Note** *on 4-2 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
Display or Alter	4-23			X	X	
PSW Restart	4-23		X	X	X	
Stop on CP Address Match				X		
Stop on I/O Address Match				X		
Stop on I/O Event				X		
Stop on PSW Event				X		
Trace	4-24			X	X	
Interrupt	4-24		X	X	X	
Load Processor from File	4-24				X	
Store Status	4-24		X	X	X	
CHPID Operations	4-24		X	X	X	
Hardware Messages	4-15		X	X	X	
Operating System Messages	4-16		X	X	X	
Configure On/Off	4-24		X	X	X	
Release	4-24		X	X	X	
Service On/Off	4-24		X	X	X	
Reset Error Thresholds	4-24				X	
Reset I/O Interface	4-24		X	X	X	
Advanced Facilities	4-25			X	X	
Swap Channel Path	4-25				X	
Reassign Channel Path	4-25			X	X	
Reset Swapped Channel Path	4-25				X	
Channel Problem Determination	4-25		X	X	X	

Hardware Management Console Tasks

Table 4-2 lists the tasks available to each of the Hardware Management Console user modes. A reference to a task description is provided for tasks available to the service representative. For information on other Hardware Management Console selections used by the operator, refer to *Hardware Management Console Guide*, GC38-0470.

Note: The Console Actions are related to either the Hardware Management Console or the entire system. The various tasks relate to a group of selected CPCs, or group of selected images.

The following abbreviations and symbols are used in Table 4-2.

See References to additional task information within this manual.
X Task available to the userid indicated

HMC Tasks Driver 1.8.2 or Earlier

Table 4-2 (Page 1 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Refer to **Note** *on 4-6 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
Console Actions	4-14	X	X	X	X	X
View Console Events	4-14	X	X	X	X	X
View Console Service History	4-26	X	X	X	X	X
Save/Restore Customer Console Data	4-26				X	X
Customize Console Date/Time	4-14	X	X	X	X	X
Change Console Internal Code	4-26		X	X	X	
Analyze Console Internal Code	4-26				X	
Backup Critical Console Data	4-26			X	X	
Perform a Console Repair Action	4-27				X	
View Console Information	4-27	X	X	X	X	X
Customize Automatic Logon						X
User Profiles						X
Customize Product Engineering Access						X
Hardware Management Console Settings	4-27	X	X	X	X	X
Enable Hardware Management Console Services	4-27		X	X	X	
Customize Scheduled Operations	4-27			X	X	
Remote Support Telephone Queue	4-27	X	X	X	X	X
Transmit Console Service Data	4-27	X	X	X	X	X
Authorize Internal Code Changes	4-20			X	X	
Delete Staging Area Files	4-27			X	X	
Customize Automatic Dialing	4-29			X	X	
Customize Account Information	4-27			X	X	

Table 4-2 (Page 2 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Refer to **Note** *on 4-6 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
Customize Remote Service	4-27			X	X	
Customize Problem Management	4-28			X	X	
Domain Security						X
Enable Pager Notification			X			
Installation Completion Report	4-15				X	
Report a Problem	4-19	X	X	X	X	
IBM Service Support System	4-28				X	
View HMC Task Performed	4-28			X	X	
Network Diagnostic Information	4-15		X	X	X	
Rebuild Vital Product Data	4-28			X	X	
Archive Security Logs	4-15			X	X	
View Security Logs	4-15			X	X	
Log off	4-15	X	X	X	X	X
Daily Tasks	4-16	X	X	X	X	X
Hardware Messages	4-15	X	X	X	X	X
Operating System Messages	4-16	X	X	X	X	X
Activate	4-16	X	X	X	X	
Reset Normal	4-16	X	X	X	X	
Deactivate	4-16	X	X	X	X	
Grouping				X		
Activity	4-16	X	X	X	X	X
CPC Recovery Tasks	4-17 4-28	X	X	X	X	X
Hardware Messages	4-15	X	X	X	X	X
Operating System Messages	4-16	X	X	X	X	X
Single Object Operations	4-28	X	X	X	X	X
Start	4-17		X	X	X	
Stop	4-17		X	X	X	
Reset Normal	4-17	X	X	X	X	
PSW Restart	4-23		X	X	X	
Reset Clear	4-17	X	X	X	X	X
Load	4-17	X	X	X	X	
Service	4-17 4-28	X	X	X	X	X
Hardware Messages	4-15		X	X	X	
Operating System Messages	4-16		X	X	X	
Service status	4-17	X	X	X	X	X
Perform Problem Analysis	4-18		X	X	X	

Table 4-2 (Page 3 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
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Refer to **Note** *on 4-6 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
View Service History	4-18		X	X	X	
Backup Critical Data	4-28			X	X	
Hard Disk Restore	4-29				X	
Checkout Tests	4-18				X	
Report a Problem	4-19	X	X	X	X	X
Transmit Service Data	4-19	X	X	X	X	X
Change Management Tasks	4-19 4-29	X	X	X	X	X
Hardware Messages	4-15	X	X	X	X	X
Operating System Messages	4-16	X	X	X	X	X
Engineering Changes (ECs)	4-30			X	X	
Retrieve Internal Code	4-19		X	X	X	
Change Internal Code	4-19		X	X	X	
Product Engineering Directed Changes	4-30				X	
System Information	4-19	X	X	X	X	X
Alternate Support Element	4-20			X	X	
CPC Remote Customization Tasks	4-29			X	X	
Hardware Messages	4-15			X	X	
Operating System Messages	4-16			X	X	
Remote Service	4-20			X	X	
Problem Management	4-20			X	X	
Operations Management	4-21			X	X	
Account Information	4-21			X	X	
CPC Operational Customization Tasks	4-21 4-30	X		X	X	X
Hardware Messages	4-15	X		X	X	X
Operating System Messages	4-16	X		X	X	X
Customize Activity Profiles				X	X	
View/Delete Activation Profiles				X		
View Activation Profiles	4-21	X	X		X	
Automatic Activation				X		
Scheduled Operations	4-21			X	X	
Customize Date/Time	4-30	X	X	X	X	X
Change LPAR Cryptographic Controls	4-22			X	X	
Configure Channel Path On/Off	4-24		X	X	X	
Reassign Channel Path	4-25			X	X	
Object Definition Tasks	4-29				X	X
Hardware Messages	4-15					X

Table 4-2 (Page 4 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
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AA *Access Administrator*

Refer to **Note** *on 4-6 for the symbols used in the table.*

Icon / Task	See	Op	AO	SP	CE	AA
Operating System Messages	4-16					X
Change Object Definition	4-29				X	X
Add Object Definition	4-29				X	X
Remove Object Definition	4-29					X
Reboot support element	4-29			X	X	
CPC Configuration Tasks	4-22			X	X	
Hardware Messages	4-15			X	X	
Operating System Messages	4-16			X	X	
Perform Model Conversion	4-22				X	
Transmit Vital Product Data	4-22			X	X	
View Frame Layout				X		
Edit Frame Layout	4-22				X	
RPQ Support	4-30				X	

HMC Tasks Driver 2.9.0 or Higher

Table 4-3 (Page 1 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Icon / Task		Op	AO	SP	CE	AA
View Console Events		X	X	X	X	X
View Console Service History		X	X	X	X	X
Save/Restore Customizable Console Data						X
Customize Console Date/Time		X	X	X	X	X
Change Console Internal Code			X	X	X	
Analyze Console Internal Code					X	
Single Step Console Internal Code			X	X	X	
Backup Critical Console Data				X	X	
Perform a Console Repair Action					X	
View Console Information		X	X	X	X	X
User Settings		X	X	X	X	X
Customize Scheduled Operations				X	X	
Transmit Console Services Data		X	X	X	X	X
Authorize Internal Code Changes				X	X	
Domain Security					X	X
Installation Complete Report					X	
Report a problem		X	X	X	X	
View Console Tasks performed					X	
Network Diagnostic Information		X	X	X	X	X
Rebuild Vital Product Data					X	
Archive Security Logs				X	X	
View Security Logs				X	X	
Save Upgrade data					X	
Reassign Hardware Management Console					X	
Enable Electronic Service Agent for zSeries						X
Format Media		X	X	X	X	X
Offload Virtual Retain Data to DVD		X	X	X	X	X
Copy Console Logs to Diskettes					X	
Transmit Vital Product Data				X	X	
Manage Remote Support Requests		X	X	X	X	X
Manage Remote Connections		X	X	X	X	X
Certificate Management				X	X	X
			X			
Change Password		X	X	X	X	X
Copy OS2 SE data					X	
Format Security Logs to DVD				X	X	
Hardware Management Console Settings *			X	X	X	X

Table 4-3 (Page 2 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Icon / Task		Op	AO	SP	CE	AA
*Configure Data Replication						X
*Configure Remote Service				X	X	
*Customize API Settings						X
*Customize Auto Answer Settings			X	X	X	X
*Customize Automatic Logon						X
*Customize Console Services			X	X	X	X
*Customize Customer Information				X	X	
*Customize Modem Settings				X	X	
*Customize Network Settings						X
*Customize Outbound Connectivity				X	X	
*Object Locking Settings			X	X	X	X
*Customize Product Engineering Access						X
Logoff or Disconnect		X	X	X	X	X
Shutdown or Restart		X	X	X	X	X
Monitor System Events				X		
Users and Tasks		X	X	X	X	X
Users Profiles						X
Customize User Controls						X
Password Profiles						X
Enable FTP Access to Mass Storage HMC task				X		
View Licenses				X		X
Task Lists						
Daily Tasks						
Hardware Messages		X	X	X	X	X
Operating System Messages		X	X	X	X	X
Activate		X	X	X	X	
Reset Normal		X	X	X	X	
Deactivate		X	X	X	X	
Grouping				X		
Activity		X	X	X	X	
Configuration						
Hardware Messages				X	X	
Operating System Messages				X	X	
Edit Frame Layout					X	
System Complex (Sysplex) Timer				X	X	
Transmit Vital Product Data				X	X	
View Frame Layout				X		
Object Definition						
Hardware Messages					X	X

Table 4-3 (Page 3 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
CE *Service*
AA *Access Administrator*

Icon / Task		Op	AO	SP	CE	AA
Operating System Messages					X	X
Change Object Definition					X	X
Add Object Definition					X	X
Remove Object Definition						X
Reboot Support Element					X	X
Operational Customization						
Hardware Messages		X	X	X	X	X
Operating System Messages		X	X	X	X	X
Customize/Delete Activation Profiles				X		
Customize Activity Profiles		X	X	X	X	X
View Activation Profiles		X	X		X	
Automatic Activation				X		
Customize Scheduled Operations				X	X	
Customize Support Element Date/Time		X	X	X	X	X
Change LPAR Controls				X	X	
Configure Channel Path On/Off			X	X		
Reassign Channel Path			X	X	X	
OSA Advanced Facilities				X	X	
Enable I/O Priority Queuing				X	X	
Change LPAR I/O Priority Queuing				X	X	
Remote Customization						
Hardware Messages		X	X	X	X	X
Operating System Messages		X	X	X	X	X
Account Information				X	X	
Remote Services				X	X	
Support Element Operations Guide		X	X	X	X	X
Change Management						
Hardware Messages		X	X	X	X	X
Operating System Messages		X	X	X	X	X
Engineering Changes (ECs)				X	X	
Single Step Internal Code Changes			X	X	X	
Retrieve Internal Code			X	X	X	
Change Internal Code			X	X	X	
Product Engineering Directed Changes					X	
System Information		X	X	X	X	X
Alternate Support Element				X	X	
Special Code Load					X	
Alternate Support Element Engineering Changes (ECs)				X	X	
Concurrent Upgrade Engineering Changes (ECs)			X	X	X	

Table 4-3 (Page 4 of 4). Tasks on the Hardware Management Console. Userid abbreviations:

Op *Operator*
AO *Advanced Operator*
SP *System Programmer*
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AA *Access Administrator*

Icon / Task		Op	AO	SP	CE	AA
Service						
Hardware Messages		X	X	X	X	X
Operating System Messages		X	X	X	X	X
Service Status		X	X	X	X	
Perform Problem Analysis		X	X	X	X	
View Service History		X	X	X	X	
Transmit Service Data		X	X	X	X	X
Backup Critical Data				X	X	
Restore Critical Data					X	
Report a Problem		X	X	X	X	
Archive Security Logs to DVD				X	X	
Format Security Logs to DVD				X	X	
Recovery						
Hardware Messages		X	X	X	X	
Operating System Messages		X	X	X	X	
Single Object Operations		X	X	X	X	
Start All			X	X	X	
Stop All			X	X	X	
Reset Normal		X	X	X	X	
PSW Restart			X	X	X	
Reset Clear		X	X	X	X	
Load		X	X	X	X	
Integrated 3270 Console		X	X	X	X	
Integrated ASCII Console		X	X	X	X	

Description of Service Mode Tasks

The following describes the service mode tasks available on either the Support Element Workplace or Hardware Management Console Workplace windows. The tasks available only on the Hardware Management Console are described in “Tasks Available Only On a Hardware Management Console” on page 4-26.

Console Actions

View Console Events

Allows you to view a record of events occurring on the system and the support element.

System events that are recorded include log on, power-on, power-off, system resets, and system errors. The events are displayed from the most recent event to the oldest event.

Pull-downs under the View menu bar item allow you to change to a different time range, or to change how the events display in the summary.

Support Element Settings

Allows you to modify the default colors used to show exception conditions on the support element and to change the Local Area Network (LAN) information.

Domain Security

Provides a method for you to maintain the security of a processor complex by controlling the access of the Hardware Management Consoles to the CPC support elements. Hardware Management Consoles can only communicate with CPC support elements that have the same domain name as the Hardware Management Console. Assigning a unique domain name to a Hardware Management Console and the CPCs that are defined to it will isolate those CPCs from any other Hardware Management Console connected to the same Local Area Network (LAN).

Domain Security allows you to change the name of the LAN domain or set a new LU-LU password for it. This task will also allow you to set the domain name and LU-LU password to the manufacturing default settings.

Enable Console Services

Allows you to enable or disable remote console operations, remote service, and installation of licensed internal code changes from a remote console.

View Console Tasks Performed

Allows you to look at a list of tasks previously performed on the support element.

Customize Date/Time

Allows you to change the time and date of the battery-operated clock, and change the time-zone offset from the universal time coordinate (UTC).

Installation Completion Report

Used by service representatives to report installation information. This information is used by Product Engineering to assess the success of the installation and make improvements in the installation processes. The information can be transmitted directly to Product Engineering from the support element or copied to diskette.

Network Diagnostic Information

Use this task to see information about the system's LAN, TCP/IP, and SNA networks.

HSA Estimation Tool

Use this task to estimate the size of the hardware system area required for the system configuration that has been defined.

Archive Security Logs

Use this task to save the current file containing system security violations.

View Security Logs

Use this task to look at the date and description of any event on the system that violates system security (Example: logon with an incorrect password).

Log off

Ends the current user session and logs off the support element or Hardware Management Console.

Select this operation when you no longer need access to the console (Hardware Management Console or support element). After you log off, the Log On window displays.

Hardware Messages

Hardware Messages are available on each of the Tasks Area selections. Use Hardware Messages to display hardware related messages for CPC, support element, or the “optical network.” The optical network refers to ESCON, ESCON converter, and coupling facility channels.

The Hardware Messages icon flashes cyan when there are new messages pending.

To view the list of pending hardware messages for a CPC, display Groups in the work area, then open the CPC icon. Drag the icon for the CPC and drop it on the Hardware Messages icon.

The icon for Optical Network displays in the Groups Work area only when there are messages pending. To view the list of pending hardware messages for a support element or the optical network, display Groups in the work area, drag the icon and drop it on the Hardware Messages icon.

View explanations of a hardware message by selecting the message, then selecting Details.

Messages are listed from the oldest to the newest message. Only the last one hundred messages are saved.

Some messages are deleted automatically after you view the message details. These messages generally provide information only, and are deleted automatically because no further action is required.

Operating System Messages

Operating System Messages are available on each of the Tasks Area selections. Use Operating System Messages to display messages relating to the operating system for selected central processor complexes or system images. The Operating System Messages window can be used to send commands to the operating system or respond to operating system messages. The Operating System Messages icon flashes blue when there are new messages pending.

To view the list of messages pending for a CPC or image, drag the icon for the CPC or image and drop it on the Operating System Messages icon.

Daily Tasks

Activate

Performs a power-on reset and loads the operating system, bringing selected central processor complexes or images to a load complete state using a specified activation profile.

You may specify an activation profile other than the Default by double-clicking on any of the CPC or image icons in one of the expanded groups to display the Details window. The current activation profile name is displayed.

Reset Normal

Terminates any current operations and clears any interruption conditions in the CPC or image. A reset normal does not clear the processor main storage during initialization.

Note: The Reset Normal task is only supported for image objects or groups of images.

Deactivate

Stops the operating system, deallocates resources, and clears associated hardware for all selected central processor complexes or images. In addition, if a CPC is selected, the deactivate task will perform a power-off.

Activity

Displays the system activity for CPCs or a group of CPCs. For a Hardware Management Console, system activity includes the channel activity and processing activity that has been defined in the default system activity profiles stored on the support elements of the selected CPCs. For a support element, system activity includes the channel activity and processing activity that has been defined in the selected system activity profiles.

The colors in the System Activity display indicate:

Blue Average of CPC processing activity
Green Average of all channel activity
Red Information about the object is not available

Detailed System Activity Display for an object can be displayed by double-clicking on the object's summary bar.

CPC Recovery Tasks

Start All
Ends instruction stop state for selected CPCs or images that were previously stopped. This changes the operational state to Operating.

Stop All
Places all selected CPCs or images in an instruction stop state. This changes the operational state to Stopped.

Reset Normal
Terminates any current operations and clears any interruption conditions in the CPC or image. A reset normal does not clear the processor main storage during initialization.

Note: The Reset Normal task is only supported for a image objects or groups of images.

Reset Clear
Terminates any current operations and clears any interruption conditions in the CPC or image and clears processor main storage.

Note: The Reset Clear task is only supported for a image objects or groups of images.

Load
Enables you to provide or change information used to load the selected image and perform the load (IPL).

Power On Reset
Allows you to select operating mode and IOCDS, then reloads licensed internal code for the CPC. This task is available only on a support element.

System Power
Allows you to power the CPC on or off. This task is available only on a support element.

Service Tasks

Service Status
Many of the CPC service tasks require that the CPC is first placed in Service Status. For example: Repair a problem cannot be selected until the CPC is placed in Service Status.

In Service Status, the CPC status displayed on the Details window is Service (an acceptable status by default). During a service action, status changes (for example:No Power) that would normally cause an exception due to an unacceptable status will not cause an exception.

Service status also prevents messages indicating LAN communications errors from displaying while the support element is powered off or during power-on reset.

Note: Customer jobs can still run on a CPC after it is placed in service status.

Image icons do not display when the CPC is placed in service status.

This task is available only on a Hardware Management Console.

Perform Problem Analysis

Analyzes stored data that is collected at the time of an error and determines the type of problem, if any, that exists. Problem Analysis (PA) informs the user of the steps that are necessary to resolve the problem. Problems that PA handles include: CPC hardware, CPC licensed internal code, channel hardware, channel licensed internal code, channel interface, support element hardware, support element licensed internal code, operating system, and I/O devices.

Problems that are considered to be "hard" errors start PA automatically (this selection is not required). An example of a hard error is a processor check stop.

Problems that can be considered "soft" (recoverable errors) require the operator to select Perform Problem Analysis. This is usually after the operating system reports a problem. Soft errors include interface control checks (IFCCs) and recoverable CPC errors. When the operator selects a CPC and starts PA, a window displays the last 50 recoverable errors on that CPC. The operator can use PA to analyze the error closest to the time of the failure.

Perform a repair action

This pull-down selection is the normal starting point for system repairs. It provides you with a menu of open call numbers on the central processor complex (CPC). Select the open call number you were directed to work on and follow the instructions on the windows that follow.

View Service History

Displays a list of problems for the CPC. The most recent log entry displays at the top of the list. The status of the problems can be either open or closed.

From the Service History window, you can:

Re-display PA windows Re-displays the Problem Analysis windows that were invoked when the selected problem was originally reported.

Show problem summary Displays detailed information about the selected problem including CPC location and FRUs.

Close selected problem Changes the current status of the selected problem to closed.

Close all problems Changes the current status of all open problem to closed.

Checkout Tests

This selection allows you to run the processor checkout tests. For more information about running the test, refer to “Running Tests” on page 6-9.

Report a Problem
This selection allows the customer to request service on a selected CPC when Problem Analysis is not necessary or cannot be run.

Transmit Service Data
Allows you to select the types of data to be transmitted for remote service.

Dump LPAR Data
Use this selection to dump LPAR data to the support element hard disk.

Delete LPAR Dump Data
Use this selection to remove logical partition dump data from the support element hard disk.

IFCC and other Errors
Use this selection to look at detailed information about "soft" errors that occurred on the system. Soft errors are those that the operating system was able to recover from, they include interface control checks (IFCCs) on parallel channels and processor errors that do not cause a check stop. PA stores information on the support element about the last 50 errors that occurred.

Channel Interface Tests
This selection allows you select and run the tests available for channels. For more information about these tests, refer to “Channel Tests” on page 7-14.

Change Management

Change Internal Code
Allows you to modify CPC licensed internal code of selected central processor complexes to provide new operations, or correct or improve existing operations. The steps required to use Change Internal Code are described in “Procedures for Changes” on page 5-8.

Analyze Internal Code
Allows you to install, activate, remove, or edit a temporary internal code fix provided by IBM product Engineering.

System Information
Displays information about: CPC machine type, model numbers, serial numbers, and licensed internal code.

Edit LPAR Internal Code Change
Use this selection when you are directed by IBM Product Engineering to create a fix for the logical partition internal code. The procedure for creating fixes is described in “Logical Partition and Coupling Facility Changes” on page 5-54.

LPAR Internal Code Change Utility
Use this selection when you are directed by IBM Product Engineering to add, delete, or change the activation requirements for a logical partition internal code fix. The procedure for using the utility is described in “Logical Partition and Coupling Facility Changes” on page 5-54.

Force Channel Internal Code Change
Use this selection if channels were busy during an internal code change so the new channel internal code could not be loaded. This disrupts the current operation of the selected channels and forces the internal code update.

Authorize Internal Code Changes
Allows you to enable or disable the ability to install and activate licensed internal code changes to either the Hardware Management Console (on Hardware Management Console only) or CPC.

Authorize Concurrent Internal Code Changes
Allows you to enable or disable the ability to install and activate concurrent (non-disruptive) licensed internal code changes to the CPC.

ECD File Recovery
This task initializes the files controlling which licensed internal code streams should be used for the product.

Alternate Support Element
This task mirrors the vital product information that has been updated in the active support element to the alternate support element. This update is also done once a day as a scheduled operation.

CPC Remote Customization

Remote Service
Allows you to enable or disable remote service for the CPC. When enabled, service call requests and error information to be analyzed by IBM Support may be sent either automatically (if automatic dialing is enabled) or manually by the operator. If you select to do this automatically you are prompted for the IBM Service Support System and service telephone numbers. When disabled, requests for service and error information must be done through voice communications.

One of the selections, **Authorize automatic service call reporting**, will send error information and requests for service automatically to IBM without operator intervention.

Customize Problem Management
Allows you to enable or disable alert generation for CPC problems. When enabled, alerts will be sent to a Problem Management focal point at the LAN address or telephone numbers that you specify. An alert will be generated and sent due to any loss of a Hardware Management Console resource.

Operations Management
Allows you to enable or disable remote operations from central site to a CPC or group of CPCs. When enabled, commands may be sent directly from central site to a support element through the LAN or the telephone network. The LAN address and telephone numbers used to send operations management reports to the focal point are also defined here.

Account Information
Allows you to customize the Account Information for the CPC. Account Information provides a description of the CPC which includes it's physical location; customer name, address, and telephone numbers; IBM customer, sales branch, service branch, region, and country account numbers.

CPC Operational Customization

View Activation Profiles
Allows you to look at the activation profiles the customer has defined for the system.

Scheduled Operations
Allows you to schedule the time and dates for automatic licensed internal code updates and backup of critical hard disk data for the support element.

Change LPAR Cryptographic Controls
Allows you to define the logical partitions for LPAR operation.

Change LPAR Security
Allows you to control which partitions can access system resources.

Enable TOD
This selection signals the operating system to accept the new time of day information from the support element.

Storage information
This selection allows you to view the size of main storage installed on the system. In LPAR mode you can view the storage allocated to the active logical partitions.

System Activity Profiles
System activity profiles determine what information is to be displayed on the system activity window. This selection displays a window with the existing activity profiles. The menu bar selections allow you to create a new profile, and to edit (open) or delete an existing profile. Display the system activity by selecting Activity under Daily Tasks.

Enable/Disable Dynamic Channel Subsystem
This selection determines whether the operating system is allowed to dynamically update the I/O Configuration Data Set (IOCDS). These selections are not available (grayed out) if the activation profile does not allow dynamic update.

Power Save
Allows you to enable or disable coupling facility power save state. If enabled, when a utility power loss occurs CPCs with an active CF partition stop the operation of the Coupling Facility Control Code (CFCC). This reduces the amount of backup power that is used and lengthens the time that CF data is preserved. If disabled, when a utility power loss occurs CPCs with an active CF partition use maximum backup power to keep the CFCC operating.

Change LPAR Sysplex Test Date Source
This selection is used by the customer to provide a different time and date reference for the sysplex for testing.

Export/Import Profile Data
This selection is used at installation to copy the SAD and activation profiles from the system being replaced and store them on the new system.

Change LPAR Controls
This selection is used by the customer to customize how the encryption feature is assigned to the LPAR partitions.

CPC Configuration Tasks

Perform Model Conversions
Automatically updates configuration information for all newly installed CPCs.

Transmit vital product data
Gathers vital product information from all defined CPCs and allows you to either transmit the data to the IBM service support system or to store the information on the hard drive or diskette (Hardware Management Console or support element).

Edit frame layout
Edit frame layout provides a graphic view of the devices in a selected string. By opening (double-clicking on) the image of a device you can determine: machine type, model, serial number, and device location. Edit frame layout shows you the locations in the frames available for adding or moving a selected device. You can also use Edit frame layout to remove devices, change the product information for a device, or add a frame to the string.

The procedure for using Edit frame layout is in “Using Edit Frame Layout” on page 6-19.

System Complex (Sysplex) timer
System complex (Sysplex) timer is used to display the status of the ports on the sysplex timer feature card. the procedure for displaying sysplex timer status is in “Verifying Sysplex Timer Feature (ETR) Port Status” on page 8-29.

Input/Output (I/O) Configuration
Input/Output (I/O) configuration is available only at a support element. It is used to view and edit the system's IOCDS files. For more information, refer to “IOCP Information” on page 7-46.

Nondisruptive Hardware Change
Install a change while operating is available only at a support element. It is used to install system feature cards without affecting customer operation.

Note: Do not use this selection to repair a problem on the system.

Hardware Configuration Details
Hardware configuration details is available only at a support element. It provides information about system I/O (channel and OSA) cards. For more information, refer to “Displaying I/O Card Information” on page 6-38.

View Hardware Configuration
View hardware configuration is available only at a support element. It lists all the FRUs in the CPC with the identifiers and part numbers.

Cryptographic Coprocessor Configuration
This selection is used at installation, MES, or exchange of crypto FRUs to import the crypto module enabling data from diskette. It is also used by the customer to customize the encryption feature. For a description of the procedure, refer to “Cryptographic Coprocessor Configuration” on page 12-3.

CP Toolbox

Note: The CP Toolbox tasks are available only at a support element. To select, first select a CP. To select a CP task:

- Open **CPC** in the Groups Work Area.
- Use the mouse pointer to point at the **CPC** icon in the CPC Work Area and click one time with the right-hand mouse button.
- Select **CPs** from the pop-up menu.
- Drag the icon for the CP you want to work with (using the right-hand mouse button) and drop it on one of the CP Toolbox tasks.

Start
Ends instruction stop state for the selected CP. This changes the operational state to Operating.

Stop
Places all selected CP in an instruction stop state. This changes the operational state to Stopped.

Display or Alter
Allows you to display or alter storage and registers.

PSW Restart
Begins a restart interruption of the selected CP.

A restart interruption will store the current program status word (PSW) at real address 8 and fetch a new PSW from real address 0 in real storage.

Trace
Allows you to trace selected operations occurring in the selected CP.

Interrupt
Allows you to force an interrupt on the selected CP.

Load Processor from File
Allows you to load programs from the support element diskette drive.

Store Status
Allows you to force the selected CP to store clock, register, and PSW information.

CHPID Operations

Note: The CHPID Operations tasks are selected by first selecting a CHPID. To select a CHPID task:

- Open **CPC** in the Groups Work Area.
- Use the mouse pointer to point at the **CPC** icon in the CPC Work Area and click one time with the right-hand mouse button.
- Select **CHPIDs** from the pop-up menu.
- Drag the icon for the CHPID you want to work with (using the right-hand mouse button) and drop it on one of the CHPID Operation tasks.

Configure On/Off
Allows you to place the selected CHPID(s) in standby or online mode. Standby makes the CHPIDs temporarily unavailable to the operating system. Online returns the CHPID to the operating system. For information on the procedure, refer to “Placing a Channel in Standby or Reserved Status” on page 6-30.

Release
Allows you to release a CHPID assigned to a logical partition so it can be used by a different partition.

Service On/Off
Allows you to place the selected CHPID(s) in reserved status, making them permanently unavailable to the operating system. For information on the procedure, refer to “Placing a Channel in Standby or Reserved Status” on page 6-30.

Reset Error Thresholds
Resets the error counters for the selected CHPID.

Reset I/O Interface
Resets the interfaces of the selected CHPIDs to free any attached control units so they can be used by other systems. Reset causes the shared control units attached to the CHPIDs to release any outstanding reserves. The reset temporarily stops all processor clocks in the CPC. This stops processors and interrupts I/O operations on all channels on the CHPID's channel subsystem.

Advanced Facilities
Provides status information and tests for channel cards and OSA. For more information on the OSA tests, refer to “OSA Feature Test Run Procedure” on page 11-13. For more information on the OSA status, refer to “Displaying OSA Status” on page 11-18.

Swap Channel Path
Allows you to swap the CHPIDs assigned to two channel ports Both ports must be the same type (both ESCON or both parallel). For information about channel swap, refer to “Channel Swap Procedure” on page 7-25.

Reassign Channel Path
Allows you to assign a shared CHPID to a different logical partition.

Reset Swapped Channel Path
Allows you to return two swapped channel paths to their original configuration.

Channel Problem Determination
Allows you to view the following channel information: link status, device status, paths to a device, subchannel data, and control unit header.

Tasks Available Only On a Hardware Management Console

The following tasks are available only at a Hardware Management Console.

Console Actions

In service mode, the following console actions are displayed in the Work Area when Task List is selected in Views:

View Console Service History

Displays problems relating to the Hardware Management Console and all optical channels (ESCON, ESCON converter, and coupling facility channels) on the CPCplex. The problems may be opened or closed and will be displayed with the most recent log entry at the top of the list.

From the Service History window, you can:

Re-display PA windows Re-displays the Problem Analysis windows that were invoked when the selected problem was originally reported.

Show problem summary Displays detailed information about the selected problem including machine type, model, and serial number information.

Close selected problem Changes the current status of the selected problem to closed.

Close all problems Changes the current status of all open problem to closed.

For additional information about displaying service history, refer to “Displaying Service History” on page 6-13.

Change Console Internal Code

Allows you to retrieve, install, activate, accept, or remove internal code changes for the Hardware Management Console.

Change management services must be enabled to use options that manage the internal code changes stored on the processor console hard disk.

Save/Restore Customizable Console Data

Allows you save the data you entered in the support element for: object definition, panel preferences, group definitions, and user profiles. You can also use this task to restore this information to the hard drive.

Analyze Console Internal Code

Allows you to install, activate, remove, or edit a temporary internal code fix provided by IBM product Engineering.

Backup Critical Console Data

Copies customization and product information that is stored on you Hardware Management Console hard disk to the optical drive. For information on backing up the data stored on a support element hard disk, see “Backup Critical Data” on page 4-28.

Perform a Console Repair Action
This pull-down selection is the starting point for Hardware Management Console repairs. It provides you with a menu of open call numbers on the Hardware Management Console. Select the open call number you were directed to work on and follow the instructions on the windows that follow.

View Console Information
Displays information about: Hardware Management Console machine type, model numbers, serial numbers, and licensed internal code.

Hardware Management Console Settings
Allows you to modify the default colors used to show exception conditions on the Hardware Management Console and to change the Local Area Network (LAN) information.

Enable Hardware Management Console Console Services
Allows you to enable or disable remote console operations, remote service, and installation of licensed internal code changes from a remote console.

Delete Staging Area Files
Allows you delete Engineering Change (EC) and internal code fix files stored on the Hardware Management Console hard drive to make room for new files. This may be necessary since the area set aside for these files is limited.

Customize Scheduled Operations
Allows you to schedule the time and dates for automatic licensed internal code updates and backup of critical hard disk data.

Remote Support Telephone Queue
Allows you to display any activity occurring in the queue for the remote support facility. You can use this selection to prioritize certain information, delete information, or halt the transmission.

Transmit Console Service Data
Allows you to send Hardware Management Console dump, trace, or customization information to the IBM Service Support System, or store it on an optical drive or diskette.

Customize Account Information
Allows you to customize the Account Information. Account Information provides a description of the Hardware Management Console which includes it's physical location; customer name, address, and telephone numbers; IBM customer, sales branch, service branch, region, and country account numbers.

Customize Remote Service
Allows you to enable or disable remote service for the Hardware Management Console. When enabled, service call requests and error information to be analyzed by IBM Support may be sent either automatically (if automatic dialing is enabled) or manually by the operator. If you select to do this automatically you are prompted for the IBM Service Support System and service telephone numbers. When disabled, requests for service and error information must be done through voice communications.

One of the selections, **Authorize automatic service call reporting**, will send error information and requests for service automatically to IBM without operator intervention.

Customize Problem Management

Allows you to enable or disable alert generation for Hardware Management Console problems. When enabled, alerts will be sent to a Problem Management focal point at the LAN address or telephone numbers that you specify. An alert will be generated and sent due to any loss of a Hardware Management Console resource.

IBM Service Support System

Use this task to link to the IBM Service Support System (RETAIN).

View Console Tasks Performed

Allows you to look at a list of tasks previously performed on the Hardware Management Console.

Rebuild Vital Product Data

Recreates the IQYVPD.DAT file stored on the Hardware Management Console hard drive with current system information. The file contains hardware configuration and FRU information for the system.

Archive Security Logs

Saves the current security log information to a file on the Hardware Management Console hard drive.

CPC Recovery Tasks

The following CPC recovery tasks are available only on a Hardware Management Console.

Single Object Operations

Creates a direct connection to a single object support element. You may need to connect to an individual support element to investigate and resolve exception situations.

Refer to the documentation supplied with the hardware that you want to connect to for a description of the functions that can be performed using this task.

Service Tasks

The following service tasks are available only on a Hardware Management Console.

Backup Critical Data

Copies critical CPC data from the support element to the optical drive on a Hardware Management Console. CPC data should be backed-up when configuration or licensed internal code changes have been made on a CPC. The data can be restored to the support element in the event of a hardware failure by using the procedure in “Hard Disk Restore” on page 4-29.

The steps required to use Backup Critical Data are listed in “Saving Support Element Configuration” on page 2-26.

Hard Disk Restore

Copies critical CPC data from the Hardware Management Console optical drive to the support element of the selected CPC. Use Hard Disk Restore after repairing the support element for a problem that caused the licensed internal code of the support element to be unusable or after reloading licensed internal code. The data restored to the support element is the data that was copied to the optical drive using "Backup Critical Data" on page 4-28.

CPC Remote Customization

Customize Automatic Dialing

Allows you to enable automatic dialing and provide the prefix numbers for dialing outside numbers from the account.

Object Definition Tasks

The following object definition tasks are available only when on a Hardware Management Console. The following icons are available:

Change Object Definition

Allows you to change the name of any object that is defined. During definition the CPC Configuration Information window displays to allow you to change the system name and network (domain) name. When Change Name is complete, the object's name will be changed in all groups that contain the object.

Add Object Definition

Allows you to define a CPC that is currently part of the Undefined group. This is the only object definition task that can be done when logged on in service mode. You cannot change the system name or network name while adding the CPC object. Once a CPC is defined, it is removed from the Undefined Processors group and is added to the Defined group.

Remove Object Definition

Note: Remove Object Definition is available only in access administrator mode, it is included here for reference only.

Allows you to remove (undefine) a CPC that is currently part of the Defined group. During undefine the Remove Task Confirmation window displays to allow you to continue or quit the removal task. Once a CPC is undefined, it is removed from the Defined Processors group. The undefined CPC is added to the Undefined group and must be defined again before it can be activated or grouped.

Reboot Support Element

Allows you to select a CPC and reboot (initialize) its support element from an Hardware Management Console.

Change Management Tasks

The following change management tasks are available only when on a Hardware Management Console.

Engineering Changes (ECs)

Used to copy Engineering Changes (ECs) to the EC staging area and apply to the selected CPCs.

Product Engineering Directed Changes

Allows you to install temporary licensed internal code fixes on the selected CPCs. The procedure for using this selection is described in “Internal Code Fixes for a Support Element” on page 5-35.

CPC Operational Customization Tasks

The following CPC operational customization tasks are available only on a Hardware Management Console.

Customize Date/Time

Allows you to set the date and time in the support elements for the selected CPCs from the Hardware Management Console.

CPC Configuration

The following CPC configuration tasks are available only on a Hardware Management Console.

RPQ Support

Use this task when directed by RPQ or MES to update an R1, R2, R3 or G4 Based model.

Chapter 5. Licensed Internal Code Changes

Use the procedures in this section when you are instructed to install internal code changes, install a new level of licensed internal code, or install temporary licensed internal code fixes.

Find the type of internal code change you want to make in the **Action** column of the following table. Then, go to the pages shown in the **Go To** column.

Action	Go To
General information about licensed internal code changes, EC level changes, and temporary fixes.	"General Information on Licensed Internal Code" on page 5-3
Information about using Scheduled Operations to install licensed internal code changes.	"Using Scheduled Operations to Make Changes" on page 5-4
Installing licensed internal code changes on the Hardware Management Console or Support Element.	"Procedures for Changes" on page 5-8
Installing licensed internal code changes on a TKE console.	"Updating and Restoring the TKE Console Hard Disk" on page 2-41
Selecting specific changes	"Selecting Specific Changes" on page 5-4
Recover from internal code changes on a Hardware Management Console or Support Element	"Removing Internal Code Changes" on page 5-25
Retrieving licensed internal code changes to a removable media to use on a Hardware Management Console that does not connect to the IBM Support System.	"Retrieving Changes to Removable Media" on page 5-28
Install temporary internal code fixes on a Hardware Management Console (direction from IBM Product Engineering).	"Internal Code Fixes For a Hardware Management Console" on page 5-30
Install temporary internal code fixes on a ThinkPad Support Element (direction from IBM Product Engineering).	"Internal Code Fixes for a Support Element" on page 5-35
Install a new Engineering Change (EC) level of Support Element licensed internal code (using a Hardware Management Console)	"Upgrading Support Element Internal Code Level" on page 5-43
Install a new Engineering Change (EC) level of Hardware Management Console licensed internal code.	"Upgrading HMC Internal Code Level from HMC, Driver 1.8.2 or Earlier" on page 5-52
Upgrade the OS/2 partition of the Support Element C: drive to a higher level within the same code driver family.	"Concurrent OS/2 Upgrade" on page 5-40
Create and activate changes for logical partition (LPAR) internal code.	"Logical Partition and Coupling Facility Changes" on page 5-54

Action	Go To
Create and activate changes for coupling facility control code.	“Logical Partition and Coupling Facility Changes” on page 5-54

General Information on Licensed Internal Code

Licensed internal code is contained on the fixed disks of the Hardware Management Consoles and Support Elements

Note: The fixed disk on a Support Element contains internal code for both the central processor complex (CPC) and Support Element This is called Support Element internal code in this chapter.

When a CPC is power-on reset, licensed internal code is loaded from the Support Element to the remainder of the system (includes processor, power subsystem, channels, ETR, and OSA). You may be requested to update a system's licensed internal code by installing:

- A new Engineering Change (EC) level
- Temporary fixes to the existing code
- Formal changes to the existing code

A ***new engineering change (EC) level*** replaces all licensed internal code. This is usually done for a model upgrade. The new EC code is provided on a CD-ROM.

Temporary fixes are installed as an emergency repair until a formal change is available. You will install these under the guidance of IBM Product Engineering. Information about ECs and fixes can be found in the table on page 5-1.

Changes to the licensed internal code are provided to correct problems or provide new functions. Changes are provided from the IBM Support System, on diskette, or on optical disk.

Changes to Support Element internal code are made from a Hardware Management Console. A Hardware Management Console can only apply changes to CPCs and Support Elements that are defined on it (Defined CPCs). If a customer has multiple CPCs controlled by Hardware Management Consoles, it is recommended that the customer have one Hardware Management Console with all CPCs defined to use for making all Support Element internal code changes.

A single Hardware Management Console can retrieve changes for all the Hardware Management Consoles in the domain. A Hardware Management Console cannot be used to apply internal code changes to another Hardware Management Console, each Hardware Management Console has to apply its own changes. You can also load the changes from the retrieving Hardware Management Console to a removable media and use it to install the changes on the other Hardware Management Consoles.

You should recommend that your customer use Scheduled Operations to automatically make the changes. For more information on using Scheduled Operations, refer to “Using Scheduled Operations to Make Changes” on page 5-4. If your customer does not use Scheduled Operations to make the updates refer to “Making Changes Manually” on page 5-6.

Using Scheduled Operations to Make Changes

The customer can customize scheduled operations to periodically apply licensed internal code changes. This is the preferred method for applying changes because:

- The changes fix known problems, it is better to apply them promptly than wait for the problems to disrupt system operations.
- In a multiple CPC environment, changes can be scheduled for one CPC at a time, leaving the rest of the system to operate thus increasing system availability.

The sequence for applying licensed internal code changes using Scheduled Operations is:

1. For the Hardware Management Console and all CPCs:
   - Backup critical data
   - Accept changes that have already been activated
   - Retrieve the latest changes
2. Install concurrent code changes/Activate

   Note: Allow enough time for the retrieve to complete, 24 hours is recommended.
3. After a test period (two weeks recommended), install and activate the changes on the other CPCs. (Do one CPC at a time to maintain system availability.)
4. Repeat the entire sequence every month.

Note: Disruptive changes may have also been retrieved for one or more CPCs. Disruptive changes require a manual, disruptive install and activate on a periodic basis.

For information on using Scheduled Operations, refer to *Hardware Management Console Guide*, GC38-0470.

Authorizing Internal Code Changes

The customer can use Authorize Internal Code Changes on the Hardware Management Console (for all defined CPCs) or the Support Element (for the related CPC) to enable or disable the ability to make licensed internal code changes. When it is set to Disable, no new licensed internal code changes are allowed. There are two ways internal code changes can be disabled:

- Manually selecting the console action of Authorize Internal Code Changes and selecting Disable. This is done if the customer detects problems with a new code level change or when no new changes are desirable.
- Automatically when problems are found in a new licensed internal code change. When this occurs, the system will be activated back to the previous licensed internal code change level.

If Authorize Internal Code Changes are disabled, they must be manually enabled before any new change levels can be applied to the system.

Selecting Specific Changes

Previous models of the 9672/9674 products had only one main licensed internal code EC “stream” for the CPC. There were other streams including: OS/2 on both the Support Element and the Hardware Management Console, and the Hardware Management Console Application. When you retrieved, installed, and activated a CPC change, it might have contained updates for channel, processor (i/390),

Support Element OSA internal code, etc. There was no task available to select changes that only applied to one component of the system (example: an ESCON channel) since most fixes were in one stream.

The **recommended** procedure is to retrieve, install, and activate all changes as you did in the previous models. However, the changes are arranged into multiple streams including: most channel code, i390, OSA internal code, Support Element, OS/2, etc. You can work with IBM Product Engineering to select a set of changes to fix a specific customer problem.

To select specific changes, first retrieve **all** changes for **all** streams. Then use the Check Dependencies task to ensure that the changes you selected to install do not have dependencies on other changes which are not available or you did not select.

Going back to our example of selecting changes for an ESCON channel problem, Checking Dependencies might notify you that the changes you selected for the channel stream require a change for the i/390 stream be installed prior to the channel change. Thus you would have to install the EC from the i/390 string, activate (IML) the system, then install the ECs for the channel string.

Note that although the specific ECs that you select pass the dependency check, this group of ECs may not have been tested by IBM. The testing is done for the entire group that you would install if you retrieved, installed, and activated all changes.

The retrieve and dependency check can be done without disrupting customer operation. You should retrieve all changes, then use Check Dependencies to ensure there are no missing changes before scheduling time to install the changes. For more information on Check Dependencies, refer to “Checking Dependencies” on page 5-12.

Making Changes Manually

Use the following information and procedures to update the licensed internal code when the customer chooses not to use Scheduled Operations to make the automatic updates.

The change licensed internal code functions are:

Accept Installed Changes That Were Activated

Makes changes which are installed and activated a permanent part of the licensed internal code. Once changes are accepted, they cannot be removed.

Check Dependencies

Use this selection to ensure that the changes retrieved have no dependencies on other changes which are not available or not retrieved. Also, select Check Dependencies when activating or removing specific changes (under IBM Product Engineering direction) to ensure the combination of specific changes you are activating have no dependencies on other changes not specified. For more information, refer to “Checking Dependencies” on page 5-12.

Install and Activate Changes

Installs and activates the changes that were retrieved to the Hardware Management Console or Support Element fixed disks.

Support Element internal changes that are concurrent may be installed and activated without disrupting CPC operating systems.

Hardware Management Console internal changes that are disruptive can be installed and activated without affecting to customer CPC operations. Customer applications running on the Hardware Management Console will be disrupted.

Browse System and Internal Code Information

Allows you to select a licensed internal code change and display the engineering change (EC) number. The Display selection displays the date and time the change was retrieved, activated, or removed.

Remove and activate Changes

Removes all changes that have not been accepted and activates the system using the previous level of internal code.

Note: Once changes are accepted, they cannot be removed.

Retrieve Internal Code Changes

Loads changes on the Hardware Management Console or Support Element fixed disk. The changes are retrieved from diskette, optical cartridge, or IBM Support System.

Note: If you have more than one Hardware Management Console and all CPCs are not defined on the Hardware Management Console which can connect to the IBM Support System, use the procedure in “Retrieving Changes to Removable Media” on page 5-28 to copy the changes from one Hardware Management Console to a diskette or optical disk and move them to the other Hardware Management Consoles.

Select the Configuration Specific Changes

This selection is for licensed internal code changes that require special handling because they are intended only for specific machine configurations. An example is a system with an Request Price Quotation (RPQ). This selection is normally not available (greyed out).

The configuration specific changes are retrieved with the other licensed internal code changes. When a configuration specific change is retrieved, the Select the configuration specific changes selection becomes available. It allows you to activate or deactivate the configuration specific changes.

Note: Configuration specific Hardware Management Console changes are selected from Change Console Internal code (a Console Action). For CPC changes, use the Single Object Operations selection (under CPC Recovery Tasks), select Service from the action bar, then select Change internal code from the pull-down.

Delete All Retrieved Changes That Were Not Installed

This selection allows you to delete changes that have been retrieved, but not installed. Use this selection only under the direction of IBM Product Engineering. It is used to delete retrieved changes which are found to contain errors.

Retrieve Changes to Removable Media

Use this selection if your system has more than one Hardware Management Console and all CPCs are not defined on one Hardware Management Console. You can retrieve changes from the IBM Support System then use this selection to copy the changes to a diskette or optical cartridge and take them to the other Hardware Management Consoles. For more information, refer to “Retrieving Changes to Removable Media” on page 5-28.

Procedures for Changes

The following pages describe how to do the Retrieve, Install, Activate, Remove, and Accept tasks for Support Element and Hardware Management Console internal code changes.

Sequence of Change Tasks

There are two sets of changes: those for the Hardware Management Console and those for the Support Elements The steps are the same for either set of changes.

Your customer may have requirements for testing changes on a single Support Element before installing on the entire system. The following is the sequence recommended for changes on a system that is already installed and operating:

1. Ensure the existing configuration information is saved for the Hardware Management Console and all Support Elements. For information, refer to "Saving Support Element Configuration" on page 2-26 and "Saving Hardware Management Console Configuration" on page 2-28.
2. **Accept** any changes already activated and tested. (See "Accepting Internal Code Changes" on page 5-23.)
3. **Retrieve** changes. (See "Retrieving Internal Code Changes" on page 5-9.)
4. **Install and Activate** changes. (See "Installing and Activating Internal Code Changes" on page 5-19.)

   Note: The customer may want to install and activate the changes on a single CPC and test before installing changes on the rest of the CPCs.

   This loads the changes you just retrieved as part of the licensed internal code.
5. Allow the customer to run the system until satisfied that the system is operating correctly.
6. Install and activate the changes on any Support Elements not done in the previous steps.

Retrieving Internal Code Changes

This procedure allows you to retrieve licensed internal code changes from diskette, optical disk, or the IBM Support System. Depending on your system configuration, retrieve can be done either from the Support Element or the Hardware Management Console.

Note: If you are using a Hardware Management Console to retrieve Support Element changes, have a system with more than one Hardware Management Console, and all CPCs are not defined for one Hardware Management Console; you will have to do these steps on each Hardware Management Console.

If only one Hardware Management Console can connect to the IBM Support System, you can either use this procedure to retrieve all Support Element and Hardware Management Console changes or, use the procedure in "Retrieving Changes to Removable Media" on page 5-28.

1

Ensure the existing configuration information is saved for all Support Elements and Hardware Management Consoles.

Go to step 2.

For information, refer to "Saving Support Element Configuration" on page 2-26, and "Saving Hardware Management Console Configuration" on page 2-28.

2

- If you are retrieving changes for a Hardware Management Console only, go to step 3.
- If you are retrieving changes for a Support Element, go to step 5.

If you want to retrieve **all** changes (Support Element and Hardware Management Console) go to step 5 and select the option to retrieve Hardware Management Console changes.

---

3 Retrieving Hardware Management Console changes.

Ensure the Hardware Management Console is in System Programmer, or Service mode.

On the Hardware Management Console Workplace window:

- Open **Console Actions** from the **Views** area.
- Select **Change Console Internal Code** from the Console Actions Work Area.

On the Change Internal Code window:

- Select **Retrieve Internal Code Changes**.

Go to step 4.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

4

On the Retrieve Internal Code Changes window:

- Select the media used to retrieve the changes.
- Select **OK**.

Follow any instructions for installing the selected media.

On the Select Internal Code Change window:

- Select **All changes**. (See **Note**).
- Select **OK**.

Go to step 8.

Media choices are: diskette, optical disk, or IBM Support System.

Note: If you select specific changes, the next window will allow you to select the changes to be retrieved.

---

5 Retrieving Support Element changes.

If you are using a Hardware Management Console, follow the instructions in the right-hand column. If you are using a Support Element continue below.

Retrieving changes using a Support Element.

Prepare the Support Element for service. For information, refer to “Starting Service with the Support Element” on page 1-10.

On the Support Element Workplace window:

- Open **Task List** from **Views** area.
- Open **Change Management Tasks** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Drag and drop the CPC icon on **Change Internal Code** in the **Change Management Tasks** area.

On the Change Internal Code window:

- Select **Retrieve**
- Select **OK** or **Next**

Go to step 6.

Retrieving changes using a Hardware Management Console.

If you are using a Hardware Management Console to retrieve changes, use a Hardware Management Console which has all CPCs defined, if possible. Otherwise, you will have to repeat this procedure for the other Hardware Management Consoles.

Ensure the Hardware Management Console you are using is in System Programmer or Service mode. For information on signing on the Hardware Management Console in service mode, refer to “Starting Service With the Hardware Management Console” on page 1-26.

On the Hardware Management Console Workplace window:

- Open **Task List** from **Views** area.
- Open **Change Management Tasks** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Drag and drop all defined CPCs on **Retrieve Internal Code** in the **Change Management Tasks** area.

Go to step 6.

6

On the Retrieve Internal Code Changes window:

- Select the media used to retrieve the changes.
- If you also want to retrieve Hardware Management Console changes, select the check box for this option.
- Select **OK**.
- Follow any instructions for installing the selected media.
- If you are using a Hardware Management Console, continue on step 8.
- If you are using a Support Element continue on step 7.

Media choices are: diskette, optical disk, or IBM Support System.

7

On the Support Element only:

- Select **All internal code changes**.
- Select **OK**.

Go to step 8.

8

On the Confirm the Action window:

- Select **Retrieve**.

Go to step 9.

9

Follow the instructions on the windows to retrieve the changes.

When the retrieve is complete:

- Select **OK**.

If you only retrieved Hardware Management Console changes and would like to retrieve Support Element changes now, go back to step 5.

End of retrieve task.

Checking Dependencies

The Checking Dependencies task allows you to check the licensed internal code changes that you want to install or remove for dependencies on other changes to ensure the correct changes are available and are being specified for installation or removal. Use the check dependencies selection:

- When directed by procedures in this manual
- When directed by on-line error messages received during a internal code change procedure.
- When you reserve time with a customer to install and activate or to remove and activate internal code changes. This ensures that all required changes are available for installation.
- When you are directed by IBM Product Engineering.

Note: You should check for dependencies any time you install or remove licensed internal code changes but it becomes very important when you select individual ECs since the ones you selected may be dependent on other changes. For information on selecting specific changes, refer to “Selecting Specific Changes” on page 5-4.

Dependency checking can be run concurrent with customer operations. Failure to check for dependencies may cause delays to the customer.

Dependency checking for Hardware Management Console changes must be done from a Hardware Management Console. Dependency checking for Support Element changes can be done from either the Support Element, or from a Hardware Management Console using the Single Object Operations task to connect to the Support Element

- For information about error messages and recovery procedures, refer to “Recovery Actions for Dependency Check Problems:” on page 5-15.

Dependency Checking Procedure

1

- If you are checking dependencies for Support Element changes, go to step 2.
- If you are checking dependencies for Hardware Management Console changes, go to step 3.

---

2 Support Element dependency check

If you are using a Support Element prepare it for service. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using a Hardware Management Console, make a remote connection to the Support Element For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

On the Support Element Workplace window:

- Open **Task List** from the **Views** area.
- Open **Change Management Tasks** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Drag the **CPC** icon and drop on **Change Internal Code** in the **Change Management Tasks** area.

Go to step 4.

The Support Element or Hardware Management Console you are using must be in either System Programmer or Service mode.

---

3 Hardware Management Console dependency check

Ensure the Hardware Management Console is in System Programmer, or Service mode.

On the Hardware Management Console Workplace window:

- Open **Console Actions** from the **Views** area.
- Open **Change Console Internal Code** from the **Console Actions Work Area**.

Go to step 4.

4

On the Change Internal Code window:

- Select **Check dependencies**
- Select **OK** or **Next**

Go to step 5.

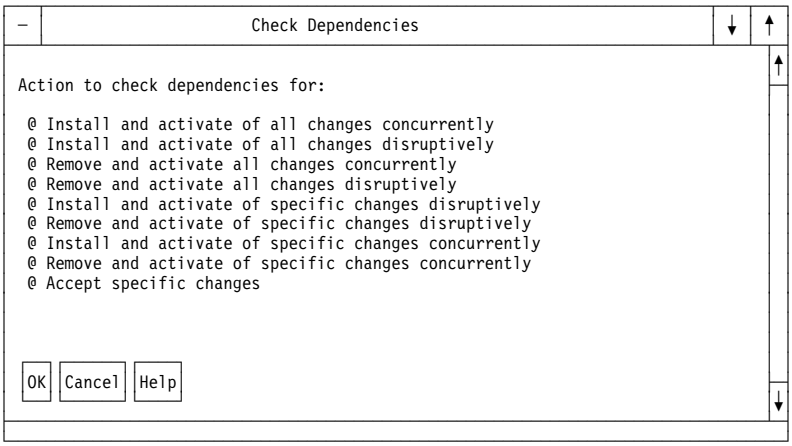
The windows and instructions for the Support Element and the Hardware Management Console are the same from here on.

5

On the Check Dependencies window:

- Select the type of change you plan to make.
- Select **OK** or **Next**

Go to step 6.



Note: The window for the Support Element is shown, the Hardware Management Console window is slightly different.

6

If you selected one of the options for “All changes,” continue on step 7.

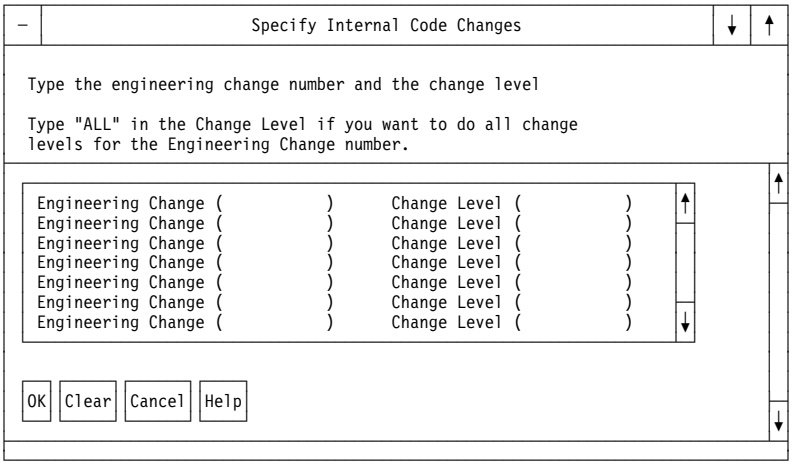
If you selected one of the options for “specific changes”:

- Type in the engineering change and change levels for the selected changes.

  Note: Get this information from IBM Product Engineering.

- Select **OK** or **Next**

Go to step 7.



7

A window will tell you one of the following:

- All dependencies were met.
- No dependencies occurred, but multiple install and activates (or remove and activates) of all changes are required.
- Dependency errors occurred during the check and a list of dependency problems displays. See the information at “Recovery Actions for Dependency Check Problems:” on page 5-15 for a list of the possible error messages.

Correct any errors before continuing installation of code changes.

End of dependency checking task

Recovery Actions for Dependency Check Problems:
Installing Patches

- **Message**: The following changes must be activated prior to or at the same time, but were not specified in the request. Specify the following additional changes, then try the operation again.

  Recovery action(s): Make sure that you specify these additional changes. You may have to specify more Engineering changes and Change levels, and/or increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: One of the following changes must be activated prior to or at the same time, but was not specified in the request. Specify one of the following additional changes, then try the operation again.

  Recovery action(s): One of these changes is valid for your system, the others are probably for other types of systems. Make sure that you specify the change that is valid for your system. You may have to specify more Engineering changes and Change levels, and/or just increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: The following changes must be activated at the same time, but were not specified in the request. Specify the following additional changes, then try the operation again.

  Recovery action(s): Make sure that you specify these additional changes. You may have to specify more Engineering changes and Change levels, and/or increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: One of the following changes must be activated at the same time, but was not specified in the request. Specify one of the following additional changes, then try the operation again.

  Recovery action(s): One of these changes is valid for your system, the others are probably for other types of systems. Make sure that you specify the change that is valid for your system. You may have to specify more Engineering changes and Change levels, and/or just increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: The following changes must be active before attempting the requested operation. Activate the following changes, then try the operation again.

  Recovery action(s): You will have to activate enough changes so that all of the change(s) that must be active are active. Then, activate the remaining changes that you specified. If there are several changes that must be active, it is possible that you may have to do several install and activates.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: One of the following changes must be active before attempting the requested operation. Activate one of the following changes, then try the operation again.

  Recovery action(s): One of the following changes is valid for your system. Activate enough changes so that one change listed that is valid for your system is active. Then, activate the remaining changes that you specified. If there are several changes that must be active, it is possible that you may have to do several install and activates.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: The following changes are missing and must be on the system before attempting the requested operation. Retrieve the following additional changes.

  Recovery action(s): One or more of the changes you asked to be installed requires additional change(s) but these change(s) have not been retrieved. Either alter what you are asking to install or retrieve the missing change(s). It is recommended that you retrieve the missing change(s).

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: One of the following changes is missing and must be on the system before attempting the requested operation. Retrieve one of the following additional changes.

  Recovery action(s): One or more of the changes you asked to install requires additional change(s) but these change(s) have not been retrieved. Probably only one of the listed changes is valid on your system; it is the one missing from your system. Either alter what you asking to install or retrieve the missing change(s) appropriate to your system. It is recommended that you retrieve the missing change(s).

  After performing these action(s), do another dependency check. If necessary, call for assistance.

Removing Patches

- **Message**: The following changes must be removed prior to or at the same time, but were not specified in the request. Specify the following additional changes, then try the operation again.

  Recovery action(s): Make sure that you specify these additional change(s). You may have to specify more Engineering changes and Change levels, and/or just increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check.

- **Message**: One of the following changes must be removed prior to or at the same time, but was not specified in the request. Specify one of the following additional changes, then try the operation again.

  Recovery action(s): One of these changes is valid for your system, the others are probably for other types of systems. Make sure that you specify the change that is valid for your system. You may have to specify more Engineering changes and Change levels, and/or increase the change level(s) for Engineering changes you specified.

After performing these action(s), do another dependency check.

- **Message**: The following changes must be removed at the same time, but were not specified in the request. Specify the following additional changes, and try the operation again.

  Recovery action(s): Make sure that you specify these additional change(s). You may have to specify more Engineering changes and Change levels, and/or just increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check.

- **Message**: One of the following changes must be removed at the same time, but was not specified in the request. Specify one of the following additional changes, then try the operation again.

  Recovery action(s): One of these changes is valid for your system, the others are probably for other types of systems. Make sure that you specify the change that is valid for your system. You may have to specify more Engineering changes and Change levels, and/or just increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check.

- **Message**: The following changes must be fully removed before attempting the requested operation. Remove and activate the following changes, then try the operation again.

  Recovery action(s): You will have to remove and activate enough changes so that all of these changes that must be removed are fully removed. Then you can remove and activate the remaining changes that you specified.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: One of the following changes must be fully removed before attempting the requested operation. Remove and activate one of the following changes, then try the operation again.

  Recovery action(s): You will have to remove and activate enough changes so that the specified change that is valid on your system is fully removed. Then you can remove and activate the remaining changes that you specified.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

Accepting Patches

- **Message**: The following changes must be accepted prior to or at the same time, but were not specified in the request. Specify the following additional changes, then try the operation again.

  Recovery action(s): Make sure that you specify these additional changes. You may have to specify more Engineering changes and Change levels, and/or just increase the change level(s) for Engineering changes you specified.

  After performing these action(s), do another dependency check. If necessary, call for assistance.

- **Message**: One of the following changes must be accepted prior to or at the same time, but was not specified in the request. Specify one of the following additional changes, then try the operation again.

Recovery action(s): One of these changes is valid for your system, the others are probably for other types of systems that what you have. Make sure that you specify the change that is valid for your system. You may have to specify more Engineering changes and Change levels, and/or just increase the change level(s) for Engineering changes you specified.

After performing these action(s), do another dependency check. If necessary, call for assistance.

Installing and Activating Internal Code Changes

This procedure allows you to install and activate licensed internal code changes that are retrieved. You can install all changes or select specific changes to install.

Notes:

1. All Hardware Management Console internal code changes can be installed and activated concurrent to CPC operation. However, most Hardware Management Console changes will disrupt applications running on the Hardware Management Console.
2. Support Element internal code changes may be concurrent or disruptive to the operating system.
3. Concurrent Support Element changes can be installed and activated without disrupting the customer's operating system.
4. Schedule a convenient time with the customer to install and activate disruptive Support Element changes.
5. For disruptive Support Element changes the customer is required to quiesce the CPC from the operating system console.
6. To install a Support Element change, the Support Element and CPC must be powered on and have the licensed internal code loaded (activated).
7. To activate a disruptive Support Element change, a ***reset*** or ***image*** profile must be selected for CPC activation.
8. Always check dependencies before attempting a disruptive install and activate.

1

- If you are installing and activating changes for a Hardware Management Console, go to step 2.
- If you are installing and activating changes for a Support Element, go to step 6.

---

2 Installing and activating Hardware Management Console changes.

Ensure the Hardware Management Console is in System Programmer, or Service mode.

On the Hardware Management Console Workplace window:

- Open **Console Actions** from the **Views** area.
- Select **Change Console Internal Code** from the Console Actions area.

Go to step 3.

For information on signing on the Hardware Management Console in service mode, refer to “Starting Service With the Hardware Management Console” on page 1-26.

For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

3

On the Change Internal Code window:

- Select **Install and activate changes** from the menu.
- Select **OK** or **Next**

Go to step 4.

4

On the Confirm the Action window:

- Select **Install and activate**.

Go to step 5.

Expect the Hardware Management Console to re-boot.

5.

Check on the Change Internal Code menu window to see if the selection **Install and activate changes** is still enabled (not “grayed” out).

- If the selection is still enabled, there are more changes to be installed and activated. Go back to step 3 and repeat the install and activate process.
- If the selection is grayed out, the install and activate on the Hardware Management Console is complete.

If you have Support Element changes to install, go to step 6.

End of Hardware Management Console install and activate task.

---

6 Installing and activating Support Element changes

Ensure the Support Element or Hardware Management Console you are using is in System Programmer, or Service mode.

Note: If you use Service mode to install and activate the changes, have the customer place the CPC in service status. For information, refer to the directions in step 1 of "Starting Service with the Support Element" on page 1-10.

If disruptive changes are to be installed, have the customer ensure that the current activation profile is a reset profile. Also, if the customer does not want the operating system started when the new changes are activated, ensure that the activation profile does ***not*** specify "Load during activation."

If you are using a Support Element, prepare it for service.

On the workplace window for the Support Element or Hardware Management Console:

- Open **Task List** from the **Views** area.
- Open **Change Management Tasks** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Drag the selected **CPC** icon and drop on **Change Internal Code** in the **Change Management Tasks** area.

Go to step 7.

If you are using a Hardware Management Console and have more than one CPCs, use a Hardware Management Console which has all CPCs defined if possible. Otherwise, you will have to repeat this procedure at a different Hardware Management Console for the remaining CPCs.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

For information on preparing a Support Element for service, see "Starting Service with the Support Element" on page 1-10.

Service status is required whenever you are in service mode and request a task that may disrupt customer operation.

Information about activation profiles is available only in System Programmer mode.

7

On the Change Internal Code window:

- Select **Install and activate changes** from the menu.
- Select **OK** or :hp2Next
- If you are using a Hardware Management Console, continue on step 9.
- If you are using a Support Element, continue on step 8.

8

On the Support Element only:

- Select **All internal code changes**.
- Select **OK**.

Go to step 9.

9

On the Request Selection window:

- Select **Do all changes even if they are disruptive** if the customer allows you to disrupt the operating system.
- Select **Do all concurrent changes only** if the customer does not allow you to disrupt the operating system.

Go to step 10.

10

On the Confirm the Action window:

- Select **Install and activate**.

Go to step 11.

11

Follow the instructions on the windows to install and activate the changes on the selected CPCs.

The Change Internal Code Progress window displays during the process.

- If you get a message saying there are more changes to do, select **OK**, go back to step 7 and repeat the install and activate process until a message says you are complete.
- When install and activate is complete: select **OK** or **Next** on the message window.

If error messages display, call for assistance.

End of install and activate task.

Accepting Internal Code Changes

This procedure allows you to accept licensed internal code changes which are installed and activated as a permanent part of the system's licensed internal code.

Notes:

1. Once a change is accepted, it cannot be removed. To return to the level of licensed internal code you had before accepting a change, reload the system from the base code CD-ROM (for the previous level). For information, refer to"Upgrading Support Element Internal Code Level" on page 5-43.
2. To accept a Support Element change, the Support Element and CPC must be powered on and have the licensed internal code loaded (activated).

1

- If you are accepting changes for a Hardware Management Console, go to step 2.
- If you are accepting changes for a Support Element, go to step 3.

If you want to accept **all** changes (Support Element and Hardware Management Console) go to step 2 first, then repeat the procedure for Support Element changes.

---

2 Accepting Hardware Management Console changes.

Ensure the Hardware Management Console is in System Programmer, or Service mode.

On the Hardware Management Console Workplace window:

- Open **Console Actions** from the **Views** area.
- Select **Change Console Internal Code** from the Console Actions area.

Go to step 4.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

---

3 Accepting Support Element changes.

Ensure the Hardware Management Console or Support Element you are using is in System Programmer, or Service mode.

If you are using a Support Element, prepare it for service.

On the workplace window for the Support Element or Hardware Management Console:

- Open **Task List** from the **Views** area.
- Open **Change Management Tasks** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Drag and drop the **CPC** icon on **Change Internal Code** in the **Change Management Tasks** area.

Go to step 4.

Use a Hardware Management Console which has all CPCs defined if possible. Otherwise, you will have to repeat this procedure at a different Hardware Management Console for the remaining CPCs.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

For information on preparing a Support Element for service and signing on in service mode, refer to "Starting Service with the Support Element" on page 1-10.

4.

On the Change Internal Code window:

- Select **Accept all changes that were activated** from the menu.
- Select **OK** or **Next**
- If you are using a Hardware Management Console, continue on step 6.
- If you are using a Support Element, continue on step 5.

Note: If you are making changes to Hardware Management Console internal code, you can select specific changes on this step. You will be prompted to enter the changes you want.

5

On the Support Element only:

- Select **All internal code changes**.
- Select **OK**.

Go to step 9.

6

On the Confirm the Action window:

- Select **Accept**.

Go to step 7.

7

During the accept process the Change Internal Code Progress window displays.

When the accept is complete:

- Select **OK** or **Next**

If the window displays an error when a change is accepted, click on the error message to display details of the error.

End of accept task.

Removing Internal Code Changes

This procedure allows you to remove internal code changes which were previously installed. This allows you to return the system internal code to its previous state.

Notes:

1. Use this procedure only under the direction of IBM Product Engineering.
2. Once a change is accepted, it cannot be removed. To remove an accepted change, the licensed internal code has to be reloaded (restored).
3. To remove a Support Element change, the Support Element and CPC must be powered on and have the licensed internal code loaded (activated).
4. Ensure dependencies are checked before you attempt a disruptive remove task. For information, refer to "Checking Dependencies" on page 5-12.

1

- If you are removing changes for a Hardware Management Console, go to step 2.
- If you are removing changes for a Support Element, go to step 6.

---

2 Removing Hardware Management Console changes.

Ensure the Hardware Management Console is in System Programmer, or Service mode.

On the Hardware Management Console Workplace window:

- Open **Console Actions** from the **Views** area.
- Select **Change Console Internal Code** from the Console Actions area.

Go to step 3.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

3

On the Change Internal Code window:

- Select **Remove and activate changes** from the menu.
- Select **OK**. or **Next**

Go to step 4.

4

On the Confirm the Action window:

- Select **Remove and activate changes**.

Go to step 5.

Expect the Hardware Management Console to re-boot.

5

Check to see if the **Remove and activate changes** task is still available (not "grayed" out).

- If the task is still enabled, go back to step 3 and repeat the remove process.
- If the task is not enabled, removal of Hardware Management Console changes is complete.

End of remove task on Hardware Management Console.

---

6 Removing Support Element changes

Ensure the Hardware Management Console you are using is in System Programmer or Service mode.

On the Hardware Management Console Workplace window:

- Open **Task List** from the **Views** area.
- Open **Change Management Tasks** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Drag and drop the **CPC** icon on **Change Internal Code** in the **Change Management Tasks** area.

Go to step 7.

Use a Hardware Management Console which has all CPC defined if possible. Otherwise, you will have to repeat this procedure at a different Hardware Management Console for the remaining CPCs.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

Service status is required whenever you are in service mode and request a task that may disrupt customer operation.

For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

7

On the Change Internal Code window:

- Select **Remove and activate changes** from the menu.
- Select **OK** or **Next**.
- If you are using a Hardware Management Console, continue on step 9.
- If you are using a Support Element, continue on step 8.

8

On the Support Element only:

- Select **All internal code changes**.
- Select **OK**.

Go to step 9.

9

On the Request Selection window:

- Select **Remove all changes even if they are disruptive** if the customer allows you to disrupt the operating system. **Warning:** If any of the changes to be removed are marked as **Disruptive**, make sure the customer has stopped CPC operations before continuing.
- Select **Remove all concurrent changes only** if the customer does not allow you to disrupt the operating system.
- Select **Remove and activate**.

Go to step 10.

Note: Disruptive changes, when activated, stop all CPC operations.

10

Follow the instructions on the windows to remove the changes on the selected CPCs.

During the removal process the Change Internal Code Progress window displays.

- If you get a message saying there are more changes to be removed, select **OK** or **Next** and go back to step 7. Repeat the remove process until a message says you are complete.
- When remove is complete: select **OK** or **Next** on the message window.

End of remove task

Retrieving Changes to Removable Media

This procedure allows you to retrieve internal code changes from the IBM Support System, load them on either a diskette or optical cartridge, and take them to another Hardware Management Console or Support Element Use this when the second Hardware Management Console or Support Element cannot connect with the IBM Suppor System. For a multiple CPC system, this allows you to update the internal code on either the Hardware Management Console or the CPCs that are defined on it.

1

Ensure the Hardware Management Console that is retrieving the changes is in Service or System Programmer mode.

On the Workplace window for the Support Element or Hardware Management Console:

- Open **Console Actions** from the **Views** area.
- Select **Change Console Internal Code** from Console Actions.

Go to step 2.

The Hardware Management Console has to be able to connect to the IBM Support System.

2

On the Change Internal Code window:

- Select **Retrieve internal code changes**.
- Select **OK** or **Next**.

Go to step 3.

3

On the Retrieve Internal Code window on HMC version 1.8.2 and earlier:

- Select **Retrieve changes to removable media**.
- Select **OK**.

Go to step 4.

On the Retrieve Internal Code window on HMC version 2.9 or later:

- Select **Retrieve code changes from IBM Support System to DVD-RAM**.
- Select **OK**.

Go to step 5.

4

On the Retrieve Changes to Media window:

- Select the media you want to copy the changes to.
- Select **OK** or **Next**.

Go to step 5.

The media choices are: diskette or optical cartridge.

5

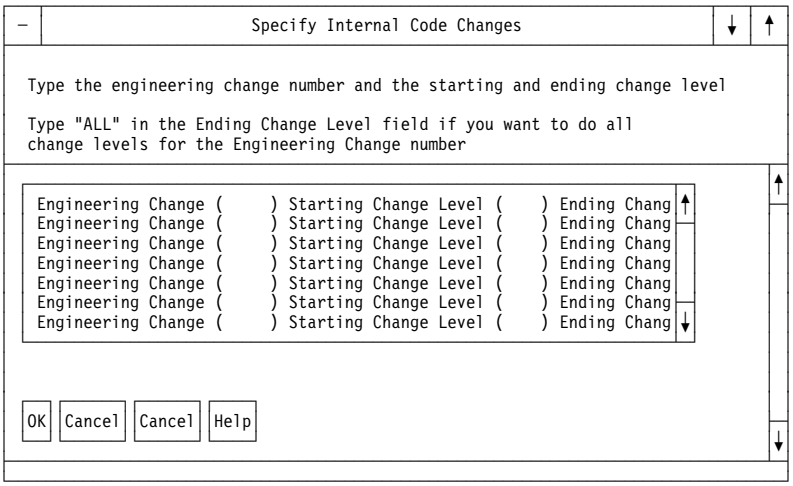
On the Specify Internal Code Changes window:

- Type the EC Change, Starting Change Level, and Ending Change Level of the changes you want to retrieve.

  Note: If you are unsure which changes you want to retrieve, type **ALL** in the Ending Change Level field, or call for assistance.

  This window may have data saved from a previous operation. Ensure that all data entered is correct.

- Select **OK** or **Next**.



- **OK** saves the input fields
- **Cancel** does not save any data

Go to step 6.

6

Follow the instructions on the windows to install the removable media. When complete, select **OK**.

Use the diskette or optical cartridge to install the internal code changes on the rest of the Support Elements For instructions, refer to “Installing and Activating Internal Code Changes” on page 5-19.

When complete, go to step 7.

7

Repeat this procedure until changes for all ECs for the Support Element are retrieved. Failure to retrieve all ECs may prevent the changes from being installed and activated.

The connection to the IBM Support System is completed and the changes are retrieved to the media you selected.

End of procedure

Internal Code Fixes For a Hardware Management Console

Note: The tasks described here are found only on Hardware Management Consoles. If you were directed to retrieve or install internal code fixes on a Support Element, go to “Internal Code Fixes for a Support Element” on page 5-35.

Licensed internal code fixes are used to temporarily fix Hardware Management Console, Support Element, or CPC internal code problems when no formal changes are available.

Note: ***Use this information to install a fix only when you are directed to do so by IBM Product Engineering***.

To work with Hardware Management Console internal code fixes, select **Analyze Console Internal Code** from the **Console Actions** area. After selecting internal code fixes the first window displayed is Manage Internal Code Fixes. The following selections are available on the menu bar: **File**, **Options**, and **View**.

The **File** pull-down items are:

New
Use this pull-down selection to enter the information for a new temporary internal code fix. After entering the file name, file extension, author's name, and a description of the fix; the Edit Internal Code Fix window displays. Use this window to enter the code modules for the fix as supplied by Product Engineering. The line editor used for entering internal code fixes is the same as that used for IOCDS for systems with double-byte character sets. The common operations for the editor are described in “Keyboard Operation” on page B-2.

Open
Use this pull-down selection to change the information for an existing temporary internal code fix. If necessary, change the author's name and fix description. Then request **Edit data** to edit the code module for the fix. The line editor used for changing internal code fixes is the same as that used for IOCDS entry from a remote console or for creating logical partition fixes. The editor is described in Appendix B, “System Editor Functions” on page B-1.

Save
Use this pull-down selection to make a copy of a selected internal code fix and store it by another name or in a different directory.

Move
Use this pull-down selection to copy a selected internal code fix to a different fixed disk or directory location.

Delete
Use this pull-down selection to remove a selected temporary internal code fix from the list of fixes available for the system.

The **Options** pull-down items are:

Activate internal code fix
Use this pull-down selection to replace the system's existing internal code with a selected internal code fix when the system is activated. This changes the status on the Manage Internal Code Fixes window to **PEND** if no syntax errors are found but a re-boot or system activation is required to complete installation of the fix, **ACT** if no syntax errors are found and the fix is installed, or **ERR** if errors are found.

Deactivate internal code fix
Use this pull-down selection when a previously activated internal code fix is **not** to be used as a part of the system's internal code the next time the system is activated. This changes the status on the Manage Internal Code Fixes window to **PEND** if a re-boot or system activation is required, or **DEACT** if the fix is removed. This selection does not remove the fix from the list.

The **View** pull-down items are:

Internal code fix information
This selection provides information the selected fix including: date, status, data, and cyclic redundancy character value.

Internal code fix modules
This selection provides a listing of the fix modules associated with the selected internal code fix.

Accepted internal code fixes
This selection provides a list of the licensed internal code fixes that have been accepted for the system.

Another directory
This selection allows you to enter the name of another directory where internal code fixes are stored.

Installing Internal Code Fixes on a Hardware Management Console

The following procedure is used to retrieve a temporary internal code fix from a diskette and installing it on either a Hardware Management Console or Support Element without a Hardware Management Console.

1

Ensure the Hardware Management Console you are using is in Service mode.

On the Workplace window for the Hardware Management Console:

- Open **Console Actions** from the **Views** area.
- Select **Analyze Console Internal Code** from the Tasks Work Area.

Go to step 2.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

2

If the No Internal Code Fixes window displays, select **OK** or **Next**.

From the HMC, Driver 1.8.2 or Earlier

On the Manage Internal Code Fixes window:

- Select **View** from the menu bar.
- Select **Another directory** from the pull-down menu.

Go to step 3

From the HMC, Driver 2.9.0 or Higher

- Select **View** from the menu bar.
- Select **Another directory** from the pull-down.

Go to step 10

3

On the Another Directory window:

- Type **A:*.*** in the Search path field.
- Select **OK**.

This displays all files on the diskette.

4

On the Manage Internal Code Fixes window:

- Select the temporary internal code fix and associated files from the menu.
- Select **File** from the menu bar.
- Select **Move** from the pull-down.

5

On the Move Internal Code Fixes window:

- Type **C:\MCF** in the Path specification field.
- Select **OK**.

This selects the MCF directory on the Support Element or Hardware Management Console fixed disk.

6

On the Manage Internal Code Fixes window:

- Select the temporary internal code fix and associated files from the menu.
- Select **View** from the menu bar.
- Select **Another directory** from the pull-down.

7

On the Another Directory window:

- Leave the Search path field blank.
- Select **OK**.

This selects the default directory.

8

On the Manage Internal Code Fixes window:

- Select the temporary internal code fix from the menu.
- Select **Options** from the menu bar.
- Select **Activate internal code fix** from the pull-down.

On the Analyze Internal Code Changes window:

- If the status of the fix is **ACT**, the install task is complete.
- If the status of the fix is **PEND**, continue on step 9.

If you are processing multiple fixes, repeat this step for each fix before proceeding.

9

Note: The customer must stop running the Hardware Management Console before continuing.

Press and hold the **Alt** and **Ctrl** keys. Then, press **Delete**. (**Alt+Ctrl+Delete**)

This restarts the Hardware Management Console with the new fix.

End of procedure.

10 On the Manage Internal Code Fixes window: • Select the temporary internal code fix from the menu. • Select **Options** from the menu bar. • Select **Activate internal code fix** from the pull-down. On the Analyze Internal Code Changes window: • If the status of the fix is **ACT**, the install task is complete. • If the status of the fix is **PEND**, continue to Step 11.	If you are processing multiple fixes, repeat this step for each fix before proceeding.
11 **Note:** The customer must stop running the Hardware Management Console before continuing. Press and hold the **Alt** and **Ctrl** keys. Then, press **Delete**. (**Alt+Ctrl+Delete**). **End of procedure**	This restarts the Hardware Management Console with the new fix.

Internal Code Fixes for a Support Element

Note: The tasks described here are found on a Hardware Management Console and are used to retrieve and install licensed internal code fixes on a Support Element If you are trying to install fixes on a Hardware Management Console, go to "Internal Code Fixes For a Hardware Management Console" on page 5-30.

Licensed internal code fixes are used to temporarily fix Support Element and CPC internal code problems when no formal changes are available.

Note: ***Use this information to install a fix only when you are directed to do so by IBM Product Engineering***.

To retrieve or activate an internal code fix for a group of Support Elements or CPCs: select the CPCs, then drag the group and drop it on **Product Engineering Directed Changes** under **Change Management Tasks**. The first window displayed is Product Engineering Directed Changes. The following selections are available from the menu:

Retrieve all internal code fixes

Use this selection to retrieve an internal code fix from either a diskette, an optical cartridge, or a staging area on the Hardware Management Console fixed drive. The fix is then stored on the Support Elements for the selected CPCs and, if retrieved from diskette or optical cartridge, in a staging area on the Hardware Management Console hard drive.

Note: A set of fixes is stored in the Hardware Management Console fixed drive staging area during a retrieve. This set of fixes is available there for other CPCs until a different set of fixes is retrieved.

The fixes may also be placed in the staging area from a remote console.

Activate all internal code fixes

Use this selection to replace the system's existing internal code with the retrieved internal code fixes when the system is activated. This changes the status on the Support Element Manage Internal Code Fixes window to **ACT** if no syntax errors are found or **ERR** if errors are found.

Deactivate and delete all internal code fixes

Use this pull-down selection when a previously activated internal code fix is **not** to be used as a part of a CPC's internal code the next time the system is activated. This changes the status on the Support Element Manage Internal Code Fixes window to **PEND** until the system is activated again. After activation, internal code fixes are deleted from the Manage Internal Code Fixes window.

Installing Internal Code Fixes (On a Support Element)

The following is the procedure used for retrieving a temporary internal code fix from a diskette, optical disk, or the staging area and activating it on the Support Elements for a group of selected CPCs.

1

At a Hardware Management Console which has the CPCs you want to update defined:

- Ensure the Hardware Management Console is in Service mode.
- Open **Task List** from the **Views** area.
- Select **Change Management Tasks** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Open **Defined CPCs** from the **Groups Work** area.
- Select the icons for the CPCs you want to update, then drag them to **Product Engineering Directed Changes** in the **Change Management Tasks** area.

Go to step 2.

For information on signing on the Hardware Management Console in service mode, refer to "Starting Service With the Hardware Management Console" on page 1-26.

For information on using the Hardware Management Console, refer to *Hardware Management Console Guide*, GC38-0470.

---

2 Retrieve the changes

On the Product Engineering Directed Changes window:

- Select **Retrieve all temporary internal code fixes** from the menu.
- Select **OK** or **Next**.

Go to step 3.

3

On the Retrieve All Temporary Internal Code Fixes window:

- Select the source of the changes (diskette, optical cartridge, or staging area).
- Select **OK** or **Next**.

Go to step 4.

After the fixes are retrieved from a diskette or optical cartridge they remain in the staging area on the Hardware Management Console until another set of changes is retrieved.

The fixes may also be placed in the staging area by Product Engineering using a remote console.

4

Follow the instructions on the windows to retrieve the fixes.

When complete, select **OK** to return to the Product Engineering Directed Changes window.

Go to step 5.

5 Activate the changes

On the Product Engineering Directed Changes window:

- Select **Activate all temporary internal code fixes** from the menu.
- Select **OK** or **Next**.

Go to step 6.

6

On the Confirm the Action window:

- Check that the list of CPCs to be activated is correct.
- Select **Activate**.

Go to step 7.

7

On the Product Engineering Directed Changes Progress window:

- Wait until the status of each selected CPC is "Completed."
- Select **OK** or **Next** to return to the Product Engineering Directed Changes window.
- Select **Cancel** to return to the Hardware Management Console Workplace.

Go to step 8.

8

On the Hardware Management Console Workplace window:

- Open **Task List** from **Views**.
- Select **CPC Recovery** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Open **Defined CPCs** from the **Groups Work** area.
- Select the icon for the CPCs you are updating, then drag it to **Single Object Operation** under the **CPC Recovery** area.
- On the Single Object Operation Task Confirmation window, check that the correct CPC is selected and select **Yes**.

Go to step 9.

The Support Element Workplace window for the selected CPC displays at the Hardware Management Console.

9

On the Support Element Workplace window:

- Open **Task List** from the **Views** area.
- Open **Change Management** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag the CPC icon and drop it on **Analyze Internal Code** in the **Change Management** area.

On the Analyze Internal Code Changes window, note the status of the fixes then go to step 10.

10

Close all windows until only the Support Element Workplace window displays.

- Open **Console Actions** from the **Views** area.
- Open **Logoff the Support Element** from the **Console Actions Work** area.

If the status for any of the fixes was **PEND** in the last step, go to step 11. Otherwise, the installation is complete.

11

On the Hardware Management Console Workplace window:

- Open **Task List** from **Views**.
- Select **Object Definition** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Open **Defined CPCs** from the **Groups Work** area.
- Select the icon for the CPC you are updating, then drag it to **Reboot Support Element** under **Objects Definition Tasks Area**
- On the Reboot the Support Element confirmation window check that the correct CPC is selected, then select **Yes**.

Go to step 12.

12

Wait until the Support Element initializes and the Hardware Management Console establish communications

On the Hardware Management Console Workplace window:

- Open **Task List** from **Views**.
- Select **CPC Recovery** from the **Tasks Work Area**.
- Open **Groups** from the **Views** area.
- Open **Defined CPCs** from the **Groups Work** area.
- Select the icon for the CPCs you are updating, then drag it to **Single Object Operation** under the **CPC Recovery** area.
- On the Single Object Operation Task Confirmation window, check that the correct CPC is selected and select **Yes**.

Go to step 13.

The Support Element Workplace window for the selected CPC displays at the Hardware Management Console.

13

On the Support Element Workplace window:

- Open **Task List** from the **Views** area.
- Open **Change Management** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag the CPC icon and drop it on **Analyze Internal Code** in the **Change Management** area.

If the status on the Analyze Internal Code Changes window for any of the fixes is **PEND**, call for assistance. Otherwise, go to step 14.

14

On the Support Element Workplace window:

- Open **Console Tasks** from Views.
- Select **Logoff** from the **Console Actions Work Area**.

Procedure is complete

Concurrent OS/2 Upgrade

Use this procedure to upgrade the Support Element C: drive, OS/2 partition only, to a higher level within the same code driver family. (Example: Driver 26W to Driver 26W with fixes.)

Attention: Before proceeding, ensure that Support Element has all the MCLs available in the IBM Support System, Installed and Accepted. If the Support Element does not have all MCLS Installed and Accepted, see “Internal Code Fixes for a Support Element” on page 5-35.

Note:

This procedure requires the Support Element based code CD-ROM and the correct SE-CODELOAD-OS diskette.

Note: This procedure will update the Support Element C: drive only. This is a non-disruptive upgrade to bring the Support Element Operating System (OS/2) to the level you require.

1

Logon to the HMC in Service Mode (**SERVMODE**). (See “Starting Service With the Hardware Management Console” on page 1-26.)

If MCLs were installed as a prerequisite to performing this upgrade, a mirror of the Primary Support Element to the Alternate Support Element must be performed.

Ensure a current backup of the Support Element to be upgraded exists. If not, perform a backup at this time.

Go to step 2.

For information on backing up CPC configuration, refer to “Saving Support Element Configuration” on page 2-26.

2

Enable **Service Status**.

Install the Support Element Base Code CD-ROM in the CD-ROM/DVD-RAM drive of the Hardware Management Console.

On the Hardware Management Console Workplace window:

- Open **Task List** from the **Views** area.
- Open **Change Management Tasks** from the **Task List Work Area**.

Go to step 3.

This task is available in system programmer and service user modes.

3

- Open **Groups** from the **Views** area.
- Open **Defined CPCs** from the **Groups Work Area**.

Go to step 4.

4

- Select the CPCs to be updated.
- Drag the icon for the selected CPCs and drop on **Special Code Load** in the **Change Management Tasks** area.

Go to step 5.

5

Follow the instructions on the Hardware Management Console window to start the Code Server for the Support Element

- When the **Confirm the Action** window displays click **Load**.
- **Do not** click **Complete** when the **Code Service is Running** window displays.

Go to step 6.

6

Continue the following instructions on the Support Element to perform the OS/2 Upgrade.

- Logon to the Support Element in Service Mode **SERVMODE**.
- Select **Console Actions**.
- Select **Save Upgrade Data**.
- Click **Save to Hard Drive**.
- When the successful message apears:
  - Logoff the Support Element
  - Shutdown the Support Element
  - Install the SE-CODELOAD-OS diskette in the Support Element and re-boot
- Follow the instructions on the Support Element to perform the codeload.
- Remove the diskette and re-boot the Support Element when prompted with the successful completion message.
- Click **Complete** on the Hardware Management Console.
- When the Support Element is finished rebooting, determine if any MCL updates need to be installed in the new OS/2 version. If necessary, perform a MCL update. (See “Installing Internal Code Fixes (On a Support Element)” on page 5-36.)

Go to step 7.

7

Alternate Support Element

For the Alternate Support Element, repeat this procedure by inserting the boot diskette in the Alternate Support Element when prompted.

End of procedure.

Upgrading Support Element Internal Code Level

Use this procedure when you receive an optical disk to change the licensed internal code for a Support Element to a higher level within the same code driver family. (Example: Driver 26W to Driver 26W with fixes.)

Note: If you received a Miscellaneous Equipment Specification (MES) with instructions to upgrade the licensed internal code level, follow the instructions provided by the MES. (Example: Driver 88 to Driver A02).

Attention: Before proceeding, ensure that the system stream are current and accepted. If they are not current and accepted, see “Internal Code Fixes for a Support Element” on page 5-35.

To upgrade, the CD-ROM with licensed internal code must be at a later base code EC number **or** Control Level than the previous code on the hard drive. (Different Control Numbers indicates patches applied to the base code level). **If the EC number and Control Numbers are the same, you must use the restore procedure. For information, refer to “Restore Support Element Hard Disk Information” on page 2-30** .

You cannot use more than one Hardware Management Console on the LAN at a time to restore or upgrade Support Element licensed internal code.

You can select more than one CPC for the licensed internal code upgrade, but all CPCs selected must be in the same model groups (Example: all R2/R3 based or all G3 Enterprise Server (9672)).

From the HMC, Driver 1.7.3 or Earlier, to the Support Element

1

Logon to the HMC in Service Mode (**SERVMODE**). (See “Starting Service With the Hardware Management Console” on page 1-26.)

Before continuing, ensure that the cartridge (BACKUP-CART) containing CPC configuration information is up to date. If it is not, save the current configuration. See “Saving Support Element Configuration” on page 2-26.

For some internal code levels the TCI/IP configuration is returned to the default settings. If your customer uses a customized TCP/IP configuration, record the values used.

For information on backing up CPC configuration, refer to “Saving Support Element Configuration” on page 2-26.

Depending on the level of the Hardware Management Console, BACKUP-CART can be either a read/write optical **or** a DVD-RAM cartridge.

To view the TCP/IP configuration, logon in Access Administrator. Use **TCP/IP Configuration** under **Console Actions**.

2

Enable **Service Status**.

Install the Support Element Base Code CD-ROM in the CD-ROM drive of the Hardware Management Console.

On the Hardware Management Console Workplace window:

- Open **Task List** from the **Views** area.
- Open **Change Management Tasks** from the **Task List Work Area**.

This task is available in system programmer and service user modes.

3

- Open **Groups** from the **Views** area.
- Open **Defined CPCs** from the **Groups Work Area**.

Go to step 4.

4

- Select the CPCs to be updated.
- Drag the icon for the selected CPCs and drop on **Engineering Changes (ECs)** in the **Change Management Tasks** area.

Go to step 5.

5

Follow the instructions on the Hardware Management Console window to complete the installation of the changes.

Go to step 6.

6

On the Engineering Change (EC) Information window:

- Select **Customize Availability**.

Go to step 7.

7

On the Engineering Change Availability window:

- Select **Base ECs**.
- Select **OK**.

Go to step 8.

8

On the Insert EC Source window:

- Select **CD-ROM**.
- Select **OK**.

Go to step 9.

8

On the EC Progress window:

- Select **OK**.

Go to step 10.

10

On the Engineering Change (EC) Information window:

- Select **Select changes**.

On the Select Specific Engineering Changes window:

- Initially all changes are selected, if there are changes on the list you do not want to install, deselect them.
- When the list of selected changes is correct, select **OK**.

To deselect an item from a list, point to the item with the mouse cursor and "click" the left mouse button.

11

Follow the instructions on the Hardware Management Console windows to complete the installation of the changes.

During the install, the Engineering Change Progress window displays the status of the CPCs being updated. When complete, the Complete the Change Process window displays a list of tasks that you must perform. The tasks include:

- Install internal code changes for the ECs just installed.
- Activate each CPC
- Backup data from the Support Element fixed disk

12

If you have an Alternate Support Element and have performed the task in the right column of step 10 go to “Restore Support Element Hard Disk Information” on page 2-30 to update the Alternate Support Element

Procedure is complete.

From the HMC, Driver 2.9.0 or Higher, to the Support Element

1

Logon to the HMC in Service mode (**SERVMODE**). (See “Starting Service With the Hardware Management Console” on page 1-26.)

If MCLs were installed as a prerequisite to performing this upgrade, a mirror of the Primary Support Element to the Alternate Support Element must be performed. Ensure that there is a current backup of the Support Element to be upgraded. If not, perform backup at this time.

For information on backing up CPC configuration, refer to “Saving Support Element Configuration” on page 2-26.

2

Enable **Service Status**.

Install the Support Element Base Code CD-ROM in the CD-ROM drive of the Hardware Management Console.

On the Hardware Management Console Workplace window:

- Open **Task List** from the **Views** area.
- Open **Change Management Tasks** from the **Task List Work Area**.

This task is available in system programmer and service user modes.

3

- Open **Groups** from the **Views** area.
- Open **Defined CPCs** from the **Groups Work Area**.

Go to step 4.

4

- Select the CPCs to be updated.
- Drag the icon for the selected CPCs and drop on **Engineering Changes (ECs)** in the **Change Management Tasks** area.

Go to step 5.

5

- Select the type of Engineering Change you want to make.

  Note:

  - Select **Upgrade Primary SE** to perform a full code upgrade. This updates the Support Element. This is a disruptive upgrade that will cause the CPC to be deactivated.
  - The **Upgrade Primary SE Operating System** option is not available from the procedure.

- Ensure that the SE-CDROM CD is in the DVD drive.
- Select **Next**.

6

The Upgrade Engineering Change (EC) Information window displays.

- Select the EC to apply.
- Select **OK**.

7

The Apply Changes Confirmation window displays.

- Select **OK**.

8

Follow the instructions on the Hardware Management Console windows to complete the installation of the changes.

During the install, the Engineering Change Progress window displays the status of the CPCs being updated. When complete, the Complete the Change Process window displays a list of tasks that you must perform. The tasks include:

- Install internal code changes for the ECs just installed.
- Activate each CPC
- Backup data from the Support Element fixed disk

9

If you have an Alternate Support Element and have performed the task in the right column of step 10 go to “Restore Support Element Hard Disk Information” on page 2-30 to update the Alternate Support Element

Procedure is complete.

Upgrading HMC Internal Code Level from HMC, Driver 1.8.2 or Earlier

Use this procedure when you receive an optical disk to change the licensed internal code for a Hardware Management Console to a higher level within the same code driver family. (Example: Driver 84 to Driver 84 with fixes or to Driver 88.)

Note: Different procedures are used for the 1x Drivers and for 2x Drivers (where x is any digit). Both procedures are covered in the steps below. Before starting, determine which driver is installed on your Hardware Management Console.

For 1x drivers you will need:

- MC Restore diskette 1 of 2 (HWMCA - Restore 1)
- MC Restore diskette 2 of 2 (HWMCA - Restore 2)
- Hardware Management Console base code CD-ROM (HWMCA CD-1)
- MC/SE Backup cartridge (BACKUP-CART)

For 2x drivers you will need:

- Hardware Management Console base code CD-ROM (HWMCA CD-1)
- MC/SE Backup cartridge (BACKUP-CART)

Note: If you received a Miscellaneous Equipment Specification (MES) with instructions to upgrade the licensed internal code level, follow the instructions provided by the MES. (Example: Driver 88 to Driver A02).

To upgrade, the CD-ROM with licensed internal code must be at a later base code EC number **or** Control Level than the previous code on the hard drive. (Different Control Numbers indicates patches applied to the base code level). **If the EC number and Control Numbers are the same, you must use the restore procedure. For information, refer to "Restore Hardware Management Console Hard Disk Information" on page 2-36**.

1

- If you are upgrading **Driver 1x**, go to step 2.
- If you are upgrading **Driver 2x**, go to step 4.

Note: the "x" refers to any digit.

2 1x Drivers

At the Hardware Management Console you are upgrading:

- Ensure power is on.
- Place the MC Restore diskette 1 of 2 in diskette drive A.
- Press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

3

Select **F1** from the menu.

Follow the instructions on the windows to insert the following:

- MC Restore diskette 2 of 2
- Hardware Management Console Base Code CD-ROM
- MC/SE Backup cartridge (BACKUP-CART) (If required, see **Note**.)

When complete, remove the CD-ROM and diskette from the drives.

To restart the Hardware Management Console press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

Go to step 6.

Note: You will be instructed to insert the MC/SE Backup cartridge only if ESCON Manager or Sysplex Timer is installed on the Hardware Management Console.

---

4 2x Drivers

At the Hardware Management Console you are upgrading:

- Ensure power is on.
- Select **Console Actions** from **Views**.
- Select **Save Upgrade Data** from **Console Actions**
- Ensure the MC/SE Backup cartridge is in the optical drive.
- Select **Save to optical disk**.
- Follow the instructions on the windows to complete the save.
- When the save is complete, place the Hardware Management Console base code CD-ROM in the CD-ROM drive.
- Press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

5

Select **F1** from the menu.

Follow the instructions on the windows.

When complete, remove the CD-ROM from the drive.

To restart the Hardware Management Console press and hold **Ctrl** and **Alt**; then press **Delete** (**Alt+Ctrl+Delete**). Release them all.

Go to step 6.

6

The update of the licensed internal code provides OS/2 a default setting of United States for the country and keyboard. If you require different settings, do the following:

Note: The procedure is different for different levels of OS/2. If the Install/Remove icon does not display, use the procedure in the right hand column.

- Minimize all windows until only the OS/2 Desktop is displayed.
- Open (double-click on) the **OS/2 System** icon.
- Open **System Setup** from the OS/2 System - Icon View window.
- Open **Install/Remove** from the System Setup - Icon View window.
- Open **Selective Install** from the Install/Remove - Icon View window.
- On the System Configuration window:
  - If the country is not correct:
    - Select the **Country** icon.
    - Select the correct country from the menu.
    - Select **OK**
  - If the keyboard is not correct:
    - Select the **Keyboard** icon.
    - Select the correct keyboard from the menu.
    - Select **OK**
- Install the HWMCA-Base Code CD-1 in the CD-ROM drive and follow the instructions on the display to copy the feature information.
- Shut down the Hardware Management Console. For information, refer to “System Shut Down” on page 6-45.
- Power-on reset the Hardware Management Console (**Ctrl**+**Esc**+**Delete**).

End of procedure

- Minimize all windows until only the OS/2 Desktop is displayed.
- Open (double-click on) the **OS/2 System** icon.
- Open **System Setup** from the OS/2 System - Icon View window.
- Open **Selective Install** from the System Setup - Icon View window.
- On the System Configuration window:
  - Select the **Country** icon.
  - Select the correct country from the menu.
  - Select OK.
  - Select the **Keyboard** icon.
  - Select the correct keyboard from the menu.
  - Select OK.
- Install the HWMCA-Base Code CD-1 in the CD-ROM drive and follow the instructions on the display to copy the feature information.
- Shut down the Hardware Management Console. For information, refer to “System Shut Down” on page 6-45.
- Power-on reset the Hardware Management Console (**Ctrl**+**Esc**+**Delete**).

End of procedure

Upgrading HMC Internal Code Level from HMC, Driver 2.9.0 or Later

Use this procedure when you receive a CD-ROM to upgrade your level of Hardware Management Console (HMC) code without changing the driver level (example: Driver 55K to Driver 55K with fixes).

Note: If you received a Miscellaneous Equipment Specification (MES) with instructions to upgrade the licensed internal code level, follow the instructions the MES provides (example: Driver 38 to Driver 3G).

1

Logon to the HMC in Service mode (SERVMODE).

2

Install the New HMC Base Code CD in the DVD drive of the Hardware Management Console.

On the Hardware Management Console Workplace window:

- Open Console Actions from the Views area.
- Open Save Upgrade Data from the Console Actions Work Area.
- Select Save to hard drive.
- Select Next.
- When the Save Upgrade Data Completed panel displays, select Next. This task is available in system programmer and service user modes.

This task is available in system programmer and service user modes.

3

- Open Shutdown or Restart from the Console Actions Work Area.
- Select Restart Console.
- Select Next.
- Select Yes on the information window.

4

- When the Hardware Management Console Hard Disk Install/Upgrade panel displays, select F1 to upgrade the HMC.
- When the Hardware Management Console Hard Disk Upgrade panel displays, select F1 to continue.

5

- When the Hardware Management Console Hard Disk Upgrade Complete panel displays, remove the CD within 10 seconds.
- Allow the HMC to reboot (two times).

Logical Partition and Coupling Facility Changes

Use this procedure when directed by IBM Product Engineering to create and activate a change for logically partitioned mode or coupling facility control code. The fix is created using the system editor. After creating the fix use the logical partition utility options to activate it.

To create and activate a change provided by Product Engineering:

1 Select a console

If you are using the Support Element for this task, prepare the Support Element for service. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using the Hardware Management Console for this task, make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

2 Create the fix

Note: If you were directed to activate or deactivate an existing fix, go to step 5.

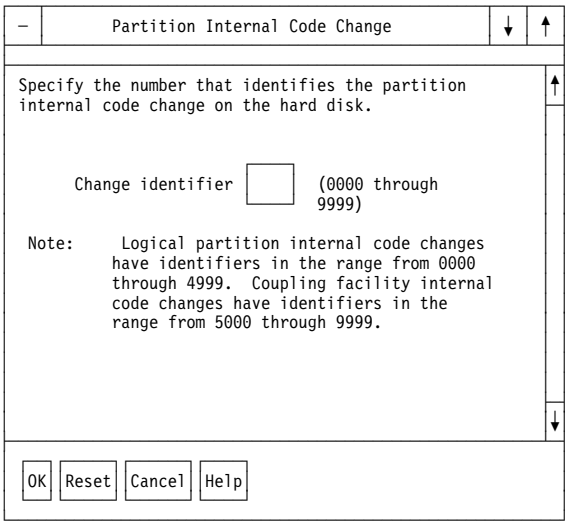
On the Support Element Workplace window:

- Open **Task List** from **Views**.
- Open **Change Management** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the **CPC** icon (using the right-hand mouse button) to **Edit LPAR Internal Code Change** under the **Change Management** area.

3

On the Partition Internal Code Change window:

- Type in the four digits to identify the fix file you are creating.
  (Fixes files are named IQZQxxxx.TRM where xxxx is any numeric value from 0000 to 9999.)
- Select **OK** or **Next**.



4

On the Editor window:

- Use the information in Appendix B, “System Editor Functions” on page B-1 to enter the fix provided by product engineering.
- When complete, press **F9** to store the fix on the Support Element fixed disk.

5

On the Support Element Workplace window:

- Open **Task List** from **Views**.
- Open **Change Management** from the **Task List Work Area**.

Target the physical system or logical partition as follows:

For an LPAR change, select the physical system.

- Open **Groups** from **Views**.
- Select **CPC Images** from the **Groups Work Area**.

For an coupling facility change, select the logical partition.

- Open **Groups** from **Views**.
- Open **CPC Images** from the **Groups Work Area**.
- Select the icon for the LPAR partition from the **Groups Work Area**.

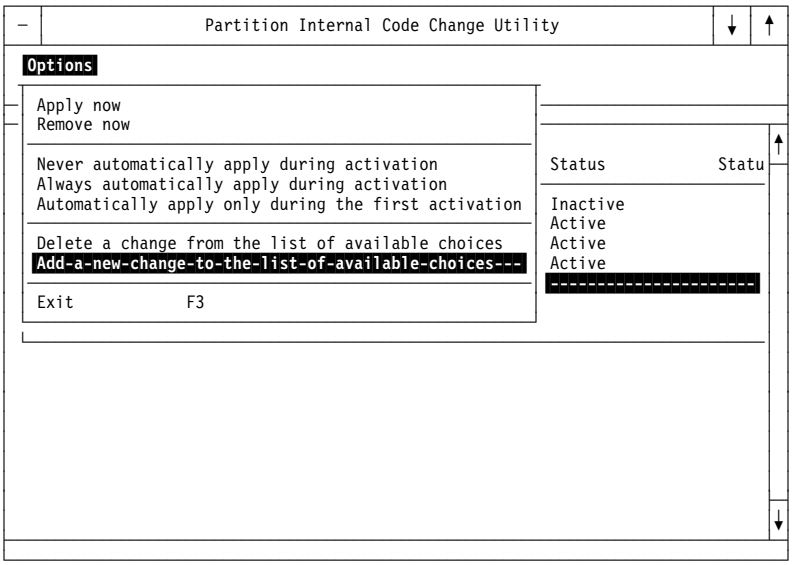
Then, do the following:

- Drag the selected image and drop it on **LPAR Internal Code Change Utility** under **Change Management**.

6

On the Partition Internal Code Change Utility window:

- Select an unused slot on the menu.
- Select **Options** from the menu bar.
- Select **Add a new change to the list of variable choices** from the pull-down.



7

On the Partition Internal Code Change window:

- Type in the four digits to identify the fix file you are adding.
- Select **OK** or **Next**.

There are only slots available for 10 fixes. If there is no slot available, delete an existing slot that is no longer used.

---

8 Activate the change

On the Partition Internal Code Change Utility window:

- Select the change from the menu.
- Select **Options** from the menu bar.
- Select the pull-down directed by Product Engineering.

The **Status** field on the Partition Internal Code Change Utility window (see step 6) displays **Active** when the trap is activated. The **Status Reason** field displays **Applied by request**.

End of procedure

Chapter 6. Common Service Procedures

This chapter describes some of the service procedures that are not discussed elsewhere.

Start at the top of the following table and find the information you want in the **Action** column. Then, follow the directions in the **Go To** column.

Action	Go To
Analyzing errors.	"Viewing Problem Analysis Results" on page 6-2
Description of tests.	"Running Tests" on page 6-9.
Running checkout test	"Test Run Procedure" on page 6-10
Exchanging FRUs in a CPC or expansion cage.	"Exchanging FRUs" on page 6-16.
Displaying service history	"Displaying Service History" on page 6-13.
Displaying information about devices in a frame string.	"Using Edit Frame Layout" on page 6-19.
Adding, deleting, or moving devices in a frame string.	"Using Edit Frame Layout" on page 6-19.
Dumping logical partition information.	"Dumping Logical Partition Data" on page 6-26.
Placing a parallel, ESCON, OSA-2, ICB, or coupling facility channel in single channel service	"Placing a Channel in Standby or Reserved Status" on page 6-30.
Enabling or disabling an STI port used for Integrated Cluster Bus (ICB).	"Enabling or Disabling STIs" on page 6-35.
Viewing information about I/O cards (CHPIDs, card types)	"Displaying I/O Card Information" on page 6-38.
Configuring the cryptographic coprocessor.	"Cryptographic Coprocessor Configuration" on page 12-3.
Shutting down the system for power off	"System Shut Down" on page 6-45.
Closing the call	"Closing a Call" on page 6-49.

Viewing Problem Analysis Results

Use this section to look at Problem Analysis (PA) information recorded for a “soft” or recoverable error. Examples of these errors are interface control checks (IFCCs) on parallel, ESCON, or FICON channels and recoverable processor errors.

1

- If you are using a Hardware Management Console, see the information at the right.
- If you are using a support element:
  - Rotate the support element and tray into the service position and open the ThinkPad lid and display. For information, refer to “Starting Service with the Support Element” on page 1-10.
  - Log on the support element in Service mode, then go to step 2.

To display PA information for a CPC from the Hardware Management Console Workplace window:

- Drag the CPC icon from Groups and drop it on **Perform Problem Analysis** under **Service Tasks**.

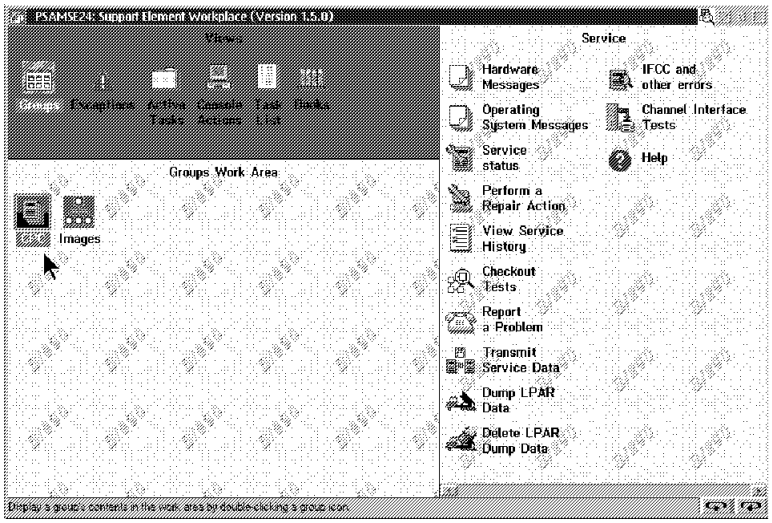
The PA windows displayed at the Hardware Management Console are similar to the ones shown in this procedure on steps 3 and 7.

2

On the Support Element Workplace window:

- Ensure the support element is in service mode.
- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) to **IFCC and other errors** under the **Service Tasks** area.

Go to step 3.

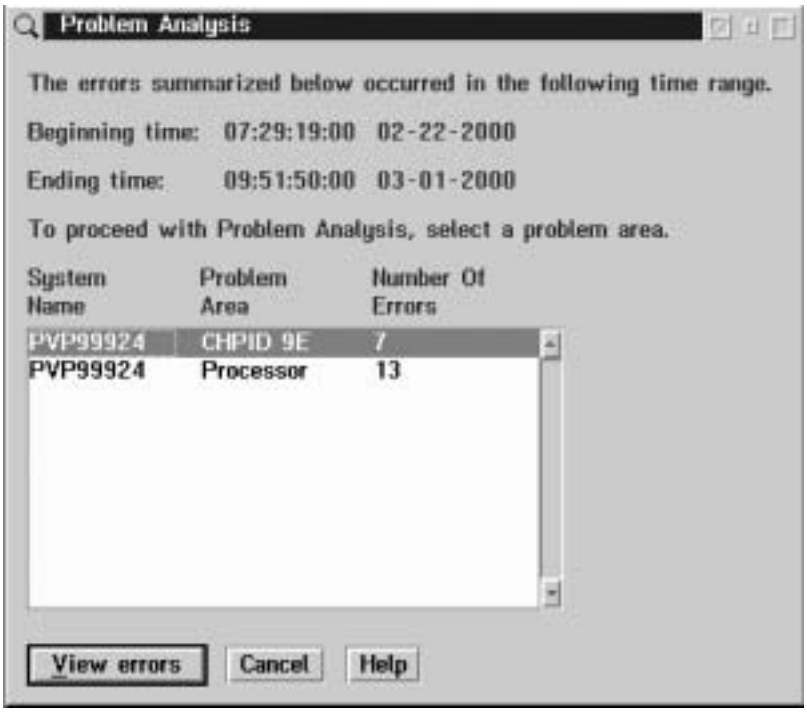


3

The Problem Analysis window displays recoverable errors:

- Select the error you want to analyze.
- Select **View errors**.
- If you are analyzing a channel error, go to step 4.
- If you are analyzing any other error, go to step 7.

Note: If you were directed here by another procedure and there are no errors, return to the procedure that directed you here.



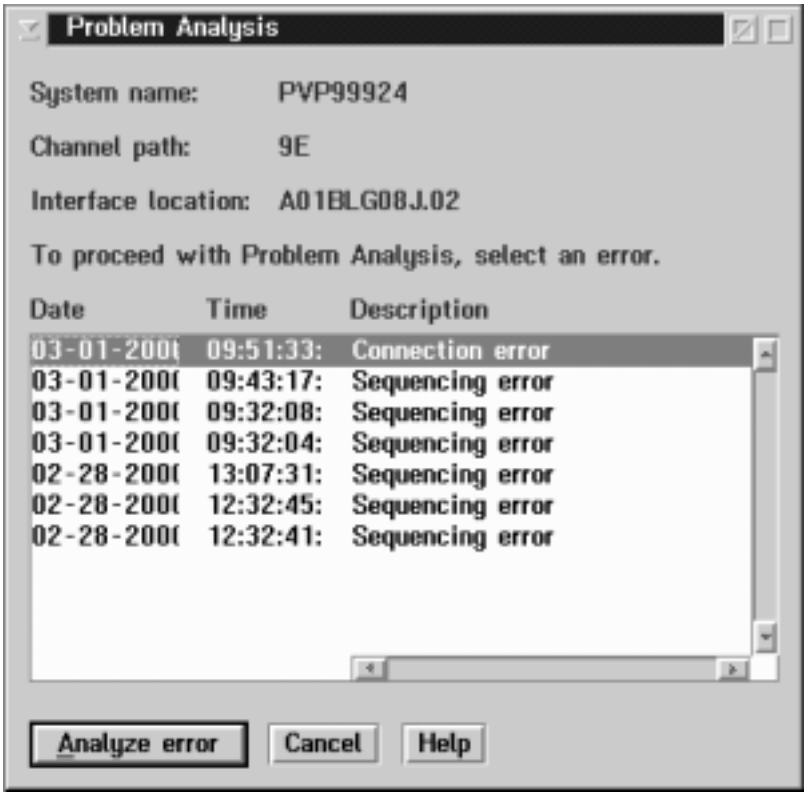
---

4 Channel errors

The Problem Analysis window displays the times errors occurred on the selected channel.

- Select the error you want to look at. (Usually the one nearest the time of the reported failure.)
- Select **Analyze error**.

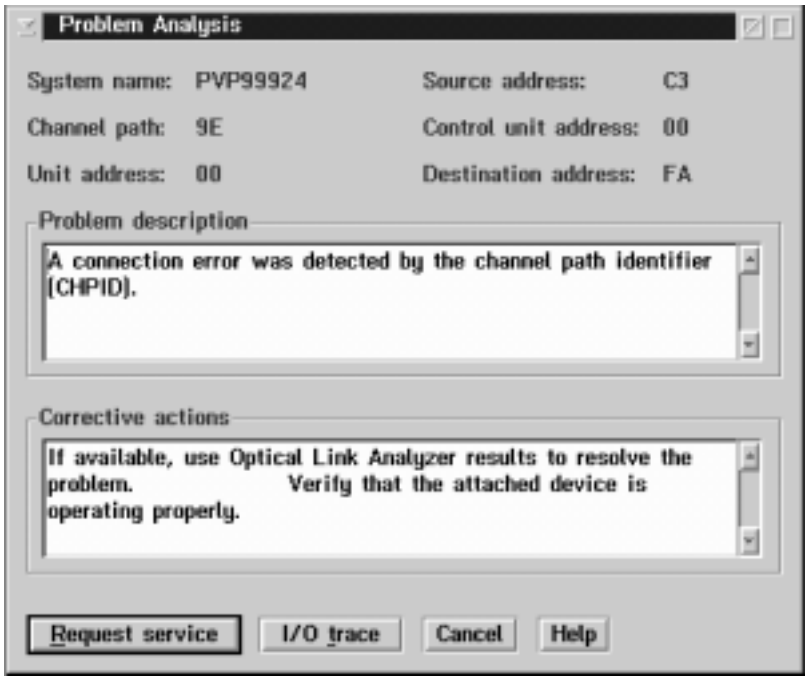
Go to step 5.



5

The Problem Analysis window gives a description of the causes of the error and a possible corrective action. For detailed meanings, see “Analyzing Interface Control Checks” on page 7-29.

- To force a problem number and continue working on this IFCC:
  - Select **Request Service**.
  - Go to step 9.
- To see the trace taken at the time of the error:
  - Select **I/O Trace** or **More information** depending on the panel.
  - Go to step 6.



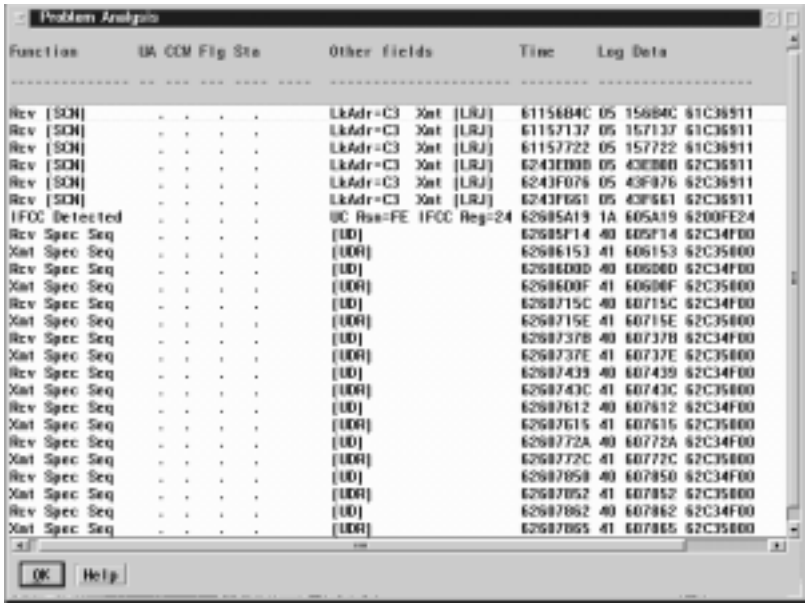
6

The Input/Output (I/O) Trace Results window provides a trace of the interface at the time of the error. For a description of the window, see “Analyzing Interface Control Checks” on page 7-29.

Use the information from this procedure and Chapter 7, “Channel Information” on page 7-1 to fix the problem.

- When you complete the repair, go to “Closing a Call” on page 6-49.
- If you cannot complete the repair, call for assistance.

End of procedure.



---

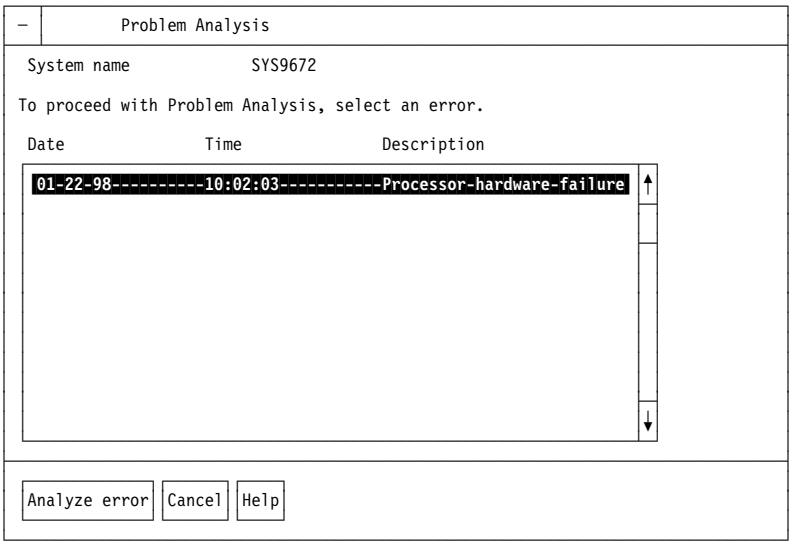
7 Other errors

The Problem Analysis window displays the times the selected processor error occurred.

- Select the error you want to look at. (Usually the one nearest the time of the reported failure.)
- Select **Analyze error**.

Note: If you were directed here from another procedure and there are no errors near the time of the reported failure, return to the procedure that directed you here.

Go to step 8.

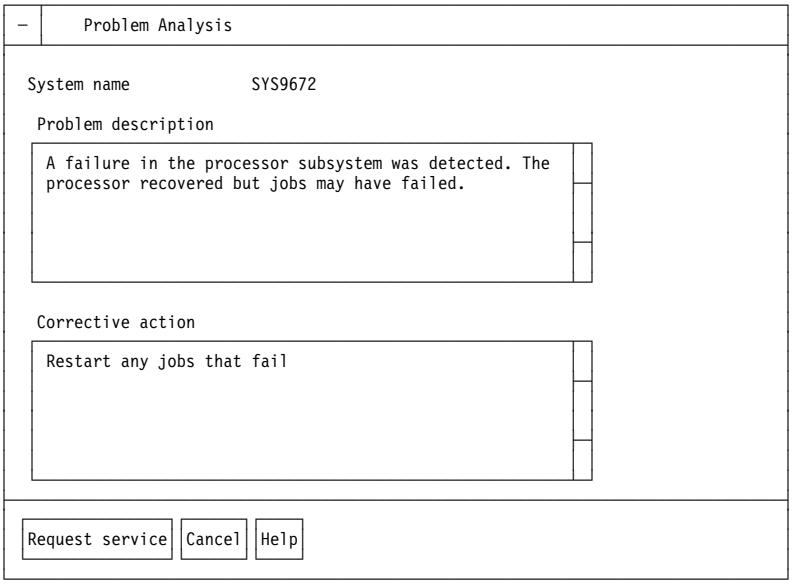


8

A description of the error and the recovery procedures are displayed.

To continue, select **Request service**.

Go to step 9.

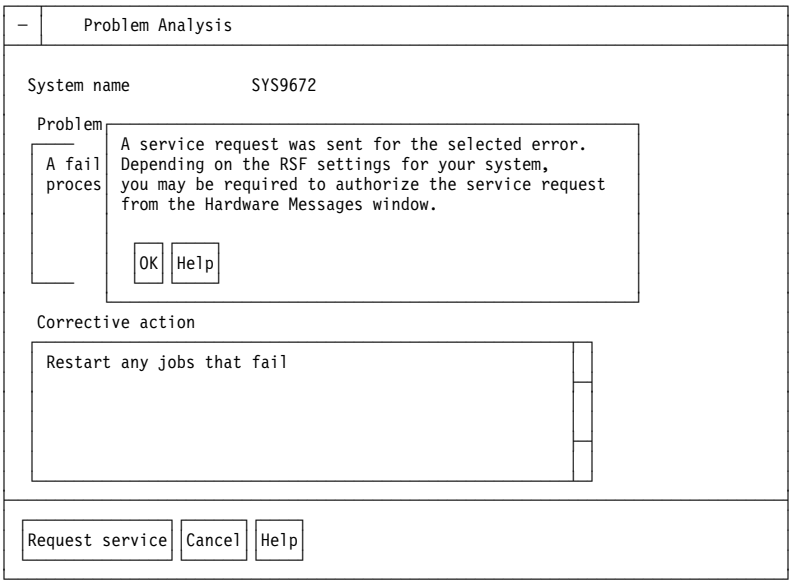


9

A message window displays directing you to look at the hardware messages window.

Select **OK**.

Go to step 10.



10

The Problem Analysis window from step 5 displays again. Select **Cancel** until the Support Element Workplace window displays again.

On the Support Element Workplace window:

- Drag the CPC icon (using the right-hand mouse button) to **Hardware Messages** under the **Service Tasks** area.

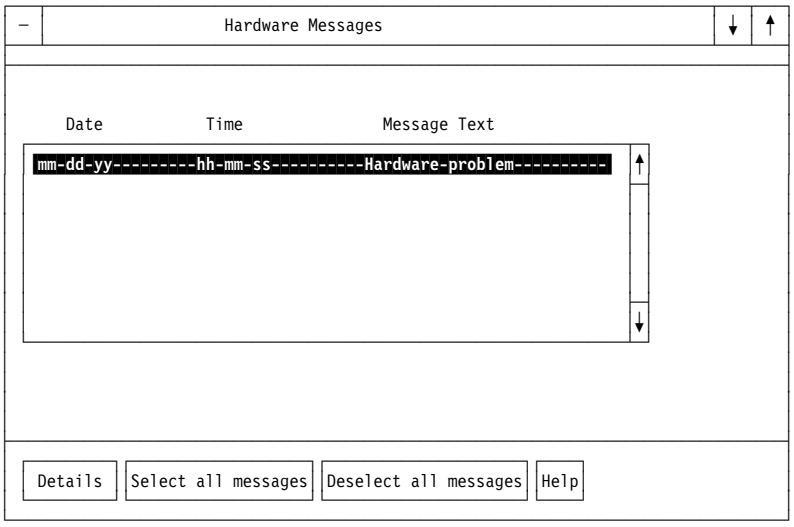
When the Hardware Messages window displays, go to step 11.

11

On the Hardware Messages window:

- Select the message for your service request from the menu.
- Select **Details**.

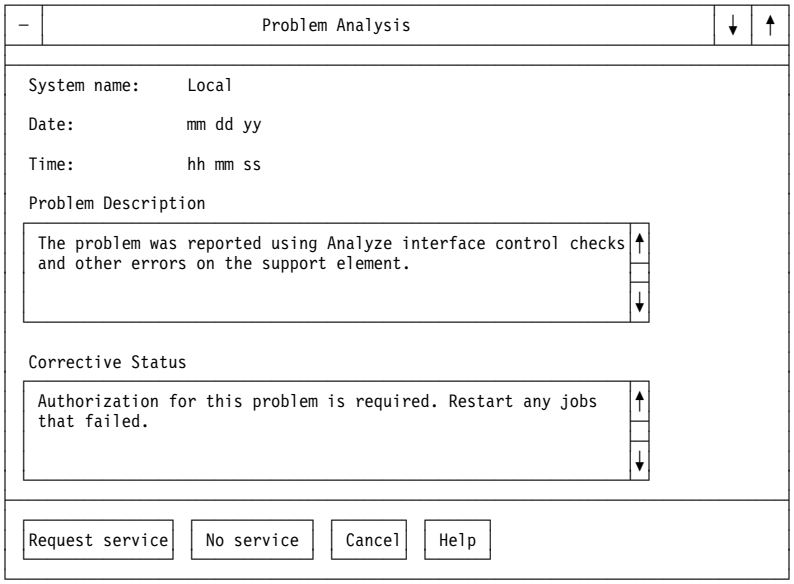
Go to step 12.



12

A Problem Analysis window with a description on the problem displays.

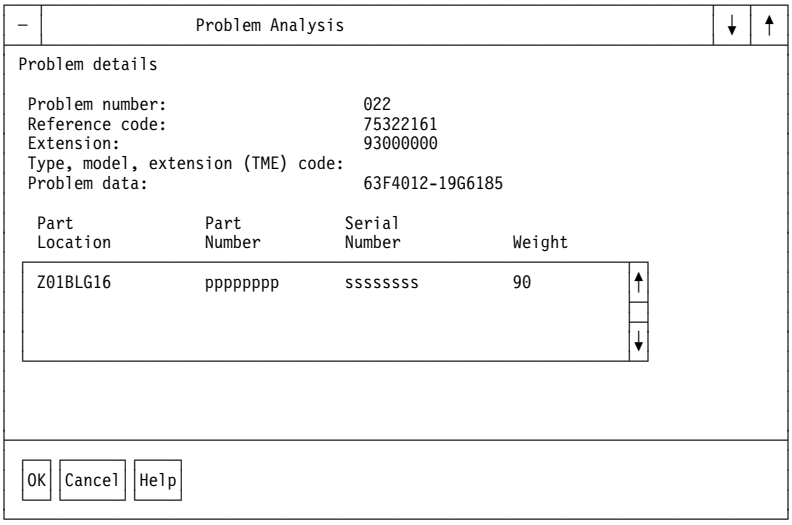
- Select **Request service**.
- Go to step 13.



13

A Problem Analysis window displays the problem number, reference code, and FRU information.

- Record the information on this window.
- Select **Cancel**.
- Select **Cancel** or **Exit** on the remaining PA windows.
- Minimize the Hardware Messages window by clicking on the minimize icon in the upper right-hand corner.



Go to Chapter 1, “START” on page 1-1 with the new problem information.

End of procedure.

Running Tests

This section describes the processor and channel checkout tests and the procedures for running them.

On the support element there are two different sets of checkout tests under the **Service** tasks:

- Checkout Tests (for processor hardware)
- Channel Interface Tests (for channels)

Checkout Tests

This test does a power-on reset using base S/390® mode and diagnostic (D0) IOCDS. It tests the processor, memory, and runs internal wrap tests on the channels. No drivers, receivers, interface cables, control units, or I/O devices are tested.

The test requires the entire available resources of the CPC and thus cannot be run concurrently with any other program or operating system. The system must be power-on reset before continuing normal operation. The test can be run only from the support element.

At the end of the test, pass or fail results are displayed on a support element window. If failures occur, use the Hardware Messages task to display Problem Analysis results.

Channel Interface Tests

This selection provides tests for parallel, ESCON, ESCON converter, coupling facility, FICON, ICB and OSA channels. The menu of tests presented depends on the type of channel you selected for testing. The tests include:

- Port/interface logic (all channel types)
- Wrap (all channel types)
- Fiber extended channel (ESCON converter)
- Optical power measurement (ESCON, FICON, coupling facility channel, OSA-ATM, OSA-FDDI)
- Linktest (ESCON, coupling facility channel)
- Looptest (coupling facility channel)

“Test Run Procedure” on page 6-10 has the information to run the tests. For additional information about the channel interface tests, refer to:

- “Channel Tests” on page 7-14 (for parallel, ESCON, ESCON converter, FICON, coupling facility channels, and ICB)
- “Tests for OSA Features” on page 11-10 (for OSA-FDDI and OSA-ATM)

For information about the setup required for Linktest, refer to: “Running Linktest (ESCON)” on page 7-15 and “Running Linktest (Coupling Facility Channel)” on page 7-15.

Test Run Procedure

Checkout Tests are available only from the support element. To run the checkout tests :

---

1 Running Tests

- Rotate the support element and tray into the service position and open the ThinkPad lid and display. For information, refer to “Starting Service with the Support Element” on page 1-10.
- Log on the support element in Service mode, then go to step 2.

2

- If you are running CPC Checkout Tests, go to step 3.
- If you are running Channel Interface Tests, go to step 6.

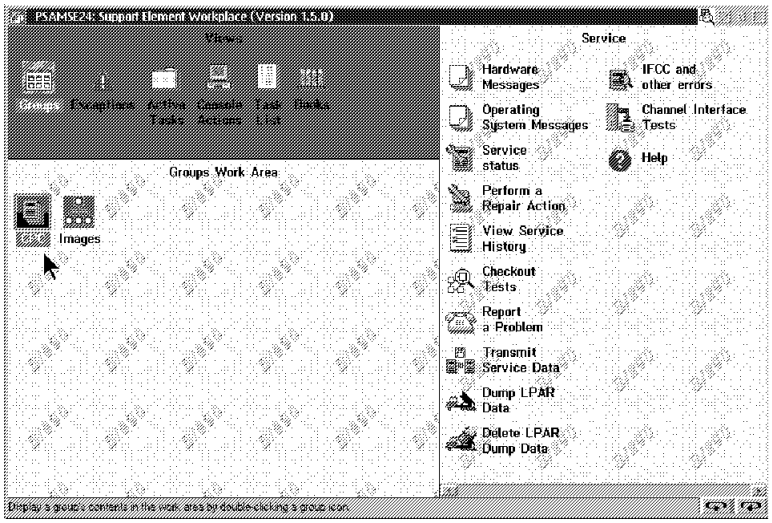
---

3 CPC Checkout Tests

On the Support Element Workplace window:

- Ensure the support element is in service mode.
- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) to **Checkout Tests** under the **Service** area.

Go to step 4.



4

On the Run Checkout Tests window:

- Select **Run test**.

Go to step 5.

---

5 Checkout Test Results

The Checkout Tests Progress window shows the following status for the test:

- In progress - while the test is running
- Test completed - when the test detected no errors
- Failed - when the test detected errors

When the test ends, follow the instructions on the windows to restart the system.

When either “Failed” or “Test completed” displays, use the procedure in “Viewing Problem Analysis Results” on page 6-2 to look at the Problem Analysis results and see if any errors were detected.

End of procedure.

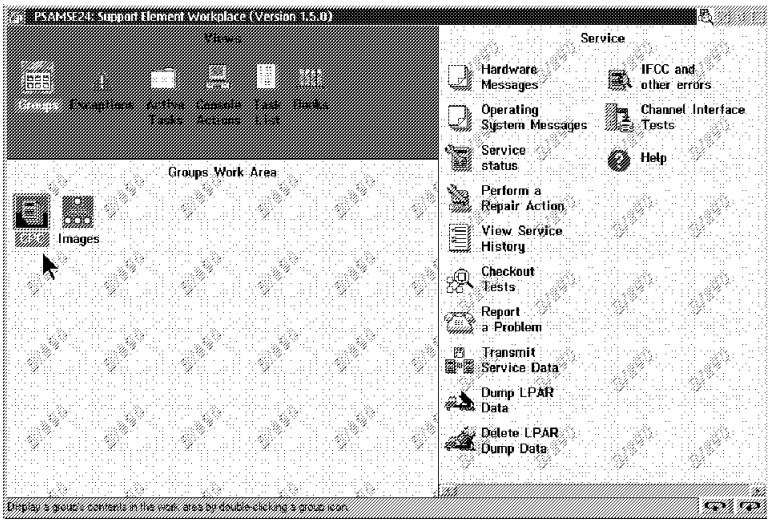
---

6 Running Channel Interface Tests

On the Support Element Workplace window:

- Ensure the support element is in service mode.
- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the **CPC** icon (using the right-hand mouse button) to **Channel Interface Tests** under the **Service** area.

Go to step 7.



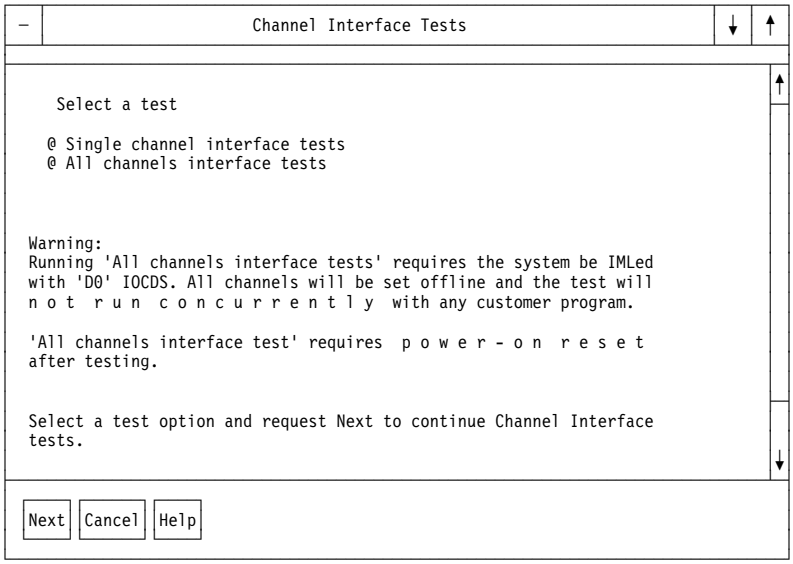
7

- If you are testing all channels, select **All channels interface tests** and request **Next**.

  Note: The “All channels interface test” requires that the system is power-on reset with the D0 IOCDS.

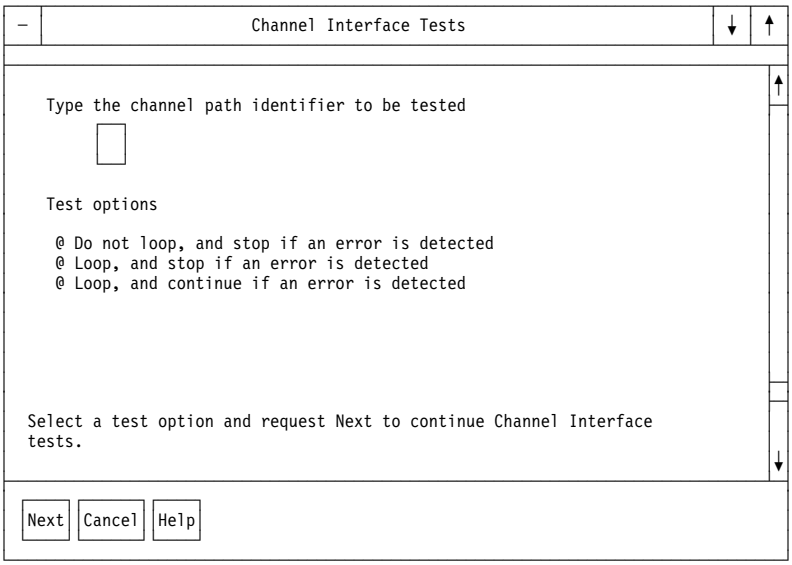
- If you are testing a single channel, select **Single channel interface tests** and request **Next**.

Go to step 8.



8

- If you are testing all channels, read the warnings and follow the directions on the windows to complete the tests.
- If you are testing a single channel, enter the CHPID you want to test and a test option. Select **Next** and go to step 9.



9

If the CHPID has not been varied offline to the operating system, the next windows allow you to do so.

Note: Be sure you inform the customer.

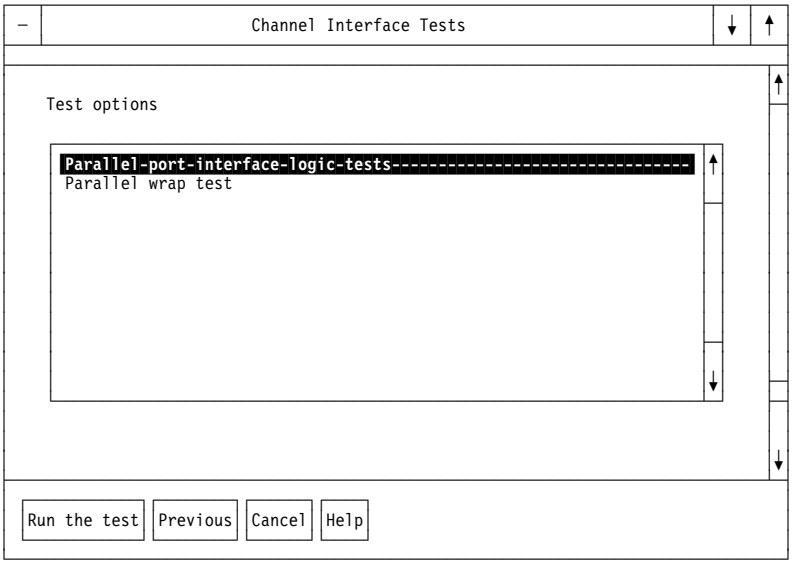
When complete, continue on step 10.

10

A Channel Interface Tests window displays with the menu of tests that are available for the type of channel you are testing.

Note: For a description of the tests for parallel, ESCON, coupling facility channels, and ICB, refer to "Channel Tests" on page 7-14.

For a description of the tests for OSA CHPIDs, refer to "Tests for OSA Features" on page 11-10.



Select the test you want to run and select **Run the test**. Follow the directions on the test windows to complete the tests.

End of procedure

Displaying Service History

There are several ways to display service history. The information includes:

- service history for a single CPC can be displayed from the support element connected to the CPC
- service history for each CPC defined on a Hardware Management Console can be displayed from the Hardware Management Console
- service history for a Hardware Management Console can be displayed from that Hardware Management Console
- service history for all optical links (ESCON, ESCON converter, FICON, and coupling facility channels) attached to the CPCplex can be displayed from any Hardware Management Console on the CPCplex.

Display or change the status of problems in the Service History log as follows:

1

- If you want to use a Hardware Management Console to display service history for optical links or the Hardware Management Console, go to step 2.
- If you want to use a Hardware Management Console to display service history for a CPC or group of CPCs, go to step 3.
- If you want to use a support element to display service history for the CPC, go to step 4.

2 Using a Hardware Management Console to display optical link and Hardware Management Console service history

At the Hardware Management Console:

- Ensure the Hardware Management Console is in service mode.
- Open **Console Actions** from the **Views** area.
- Open **View Console Service History** from the **Console Actions Work Area**.

Go to step 5.

3 Using a Hardware Management Console to display service history for a CPC or group of CPCs

- Ensure the Hardware Management Console is in service mode.
- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Open **Defined CPCs** from the **Groups Work Area**.
- Select the icons for the CPCs you want to look at.
- Drag one of the selected CPC icons (using the right-hand mouse button; using the left mouse on the HMC version 2.9.0) to **View Service History** under the **Service Tasks** area.

Go to step 5.

Note: If you want to display service history for **all** CPCs defined on this Hardware Management Console, do not open **Defined CPCs**. Drag **Defined CPCs** and drop it on **View Service History** under the **Service Tasks** area.

Go to step 5.

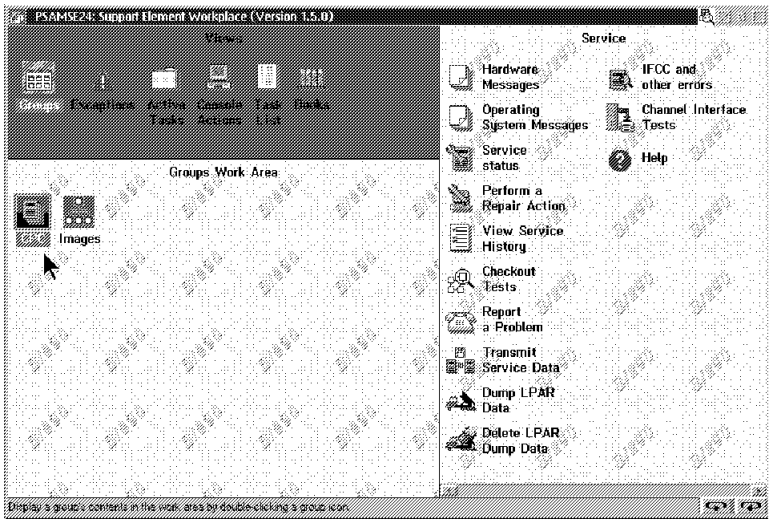
---

4 Displaying CPC service history from a support element

Prepare the support element for service. For information, refer to “Starting Service with the Support Element” on page 1-10.

- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) to **View Service History** under the **Service Tasks** area.

Go to step 5.



5

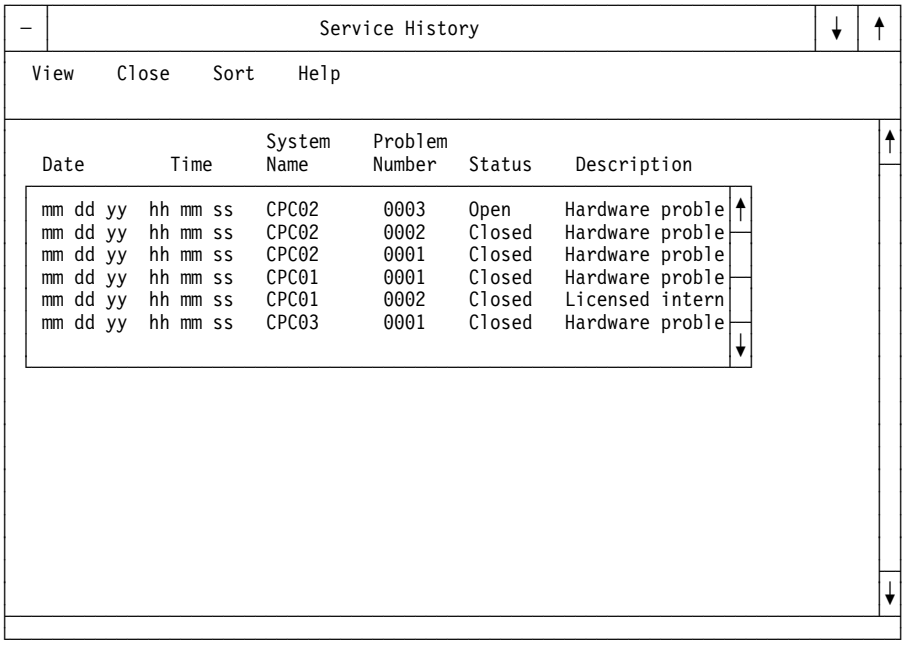
The figure shows an example of a Service History window. The machine type, date opened, and status of each problem is displayed.

For CPCs the problems are grouped by CPC and the CPC name is displayed under the System Name column. The newest problem is listed first.

ESCON, ESCON converter, FICON, and coupling facility problems have a description of "Optical link problem." "Local" is displayed under the System Name column.

If you displayed CPC service history from a Hardware Management Console and a support element was unable to communicate with the Hardware Management Console, a message displays.

To see what tasks can be performed from the Service History window, go to step 6.



Note: The windows for Hardware Management Console and support element are similar, the example shown is service history for CPCs from a Hardware Management Console.

6

To view the Problem Analysis windows for the problem:

- Select the problem from the menu.
- Select **View** on the menu bar.
- Select **Problem Analysis panels** from the pull-down.

To display additional information about a problem:

- Select the problem from the menu.
- Select **View** on the menu bar.
- Select **Problem summary** from the pull-down.

To close a problem:

- Select the problem from the menu.
- Select **Close** on the menu bar.
- Select **Close selected problems** from the pull-down.

End of procedure

Exchanging FRUs

Use the following procedure only when you are directed to exchange a FRU in the CPC by:

A procedure in this manual
The Support Center
IBM Product Engineering

Note: The following FRUs may be exchanged while the system is operating:

Power - ACI, BPC, BPD, BPR, and DCA modules
Channel cards (ESCON, FICON, and parallel)
Coupling Facility link adapter
OSA-2 feature card
OSA Express feature card
Backup battery for encryption modules

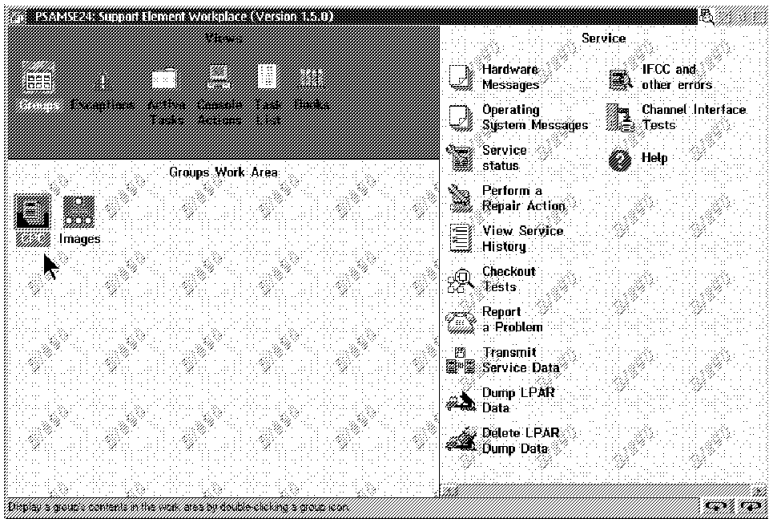
If a channel card is exchanged, all CHPIDs assigned to the card have to be varied off line.

1

If you were directed to exchange a coupling facility channel card, read the safety information in "Safety Precautions" on page 9-1 before continuing.

Prepare the support element for service. For information, refer to "Starting Service with the Support Element" on page 1-10.

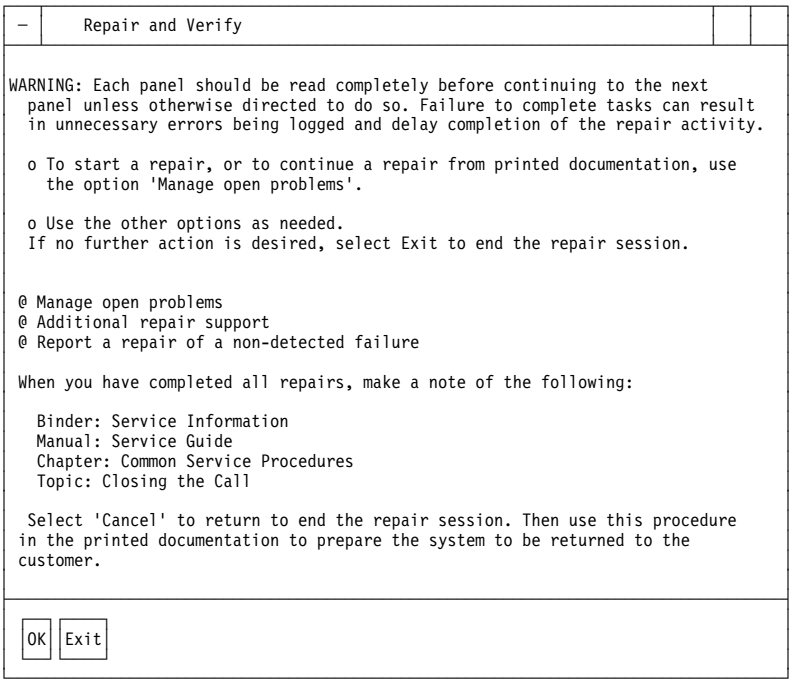
- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) to **Perform a Repair Action** under the **Service Tasks** area.



2

On the Repair and Verify window:

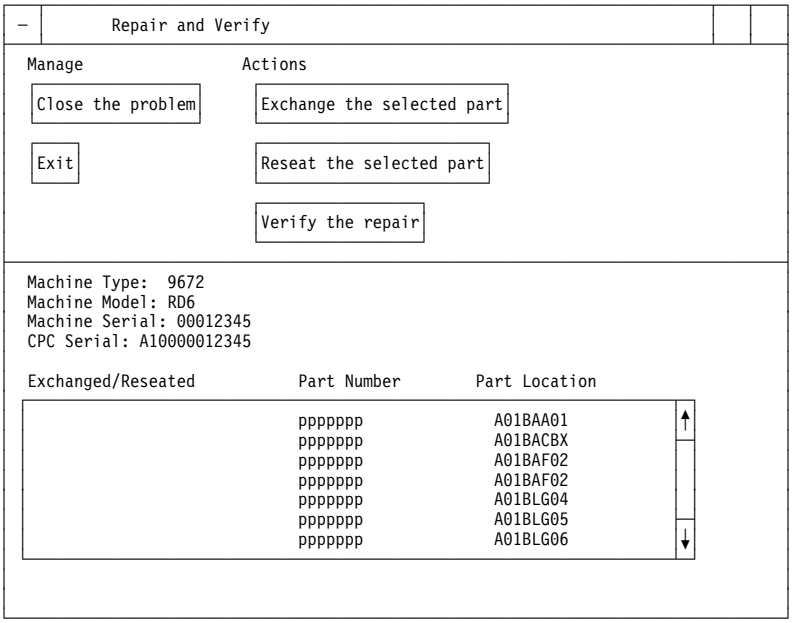
- Select **Additional repair support** from the menu.
- Select **OK**.



3

On the second Repair and Verify window:

- Select the part location to be exchanged from the menu.
- Select **Exchange the selected part** from the Actions menu.



4

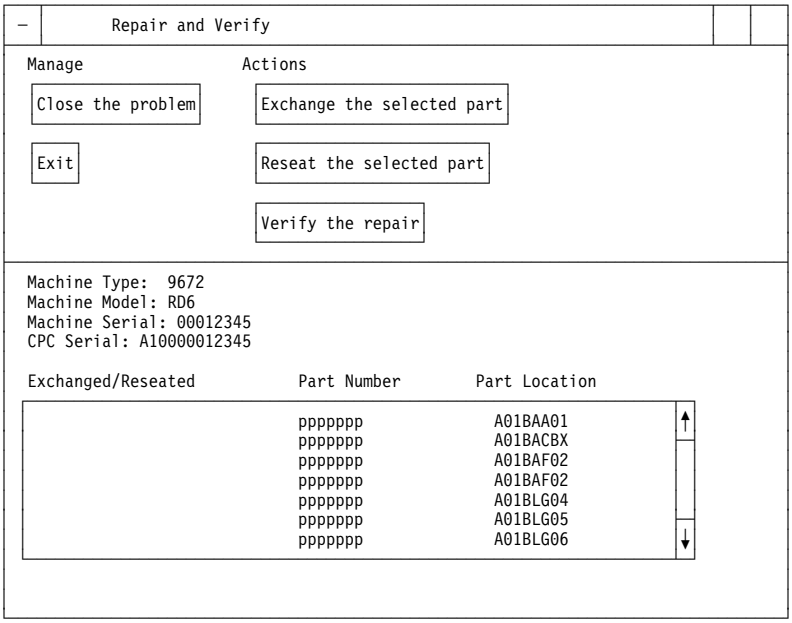
Follow the instructions on the windows to exchange the part. When complete, the Repair and Verify window displays again.

To test the FRU you installed:

- Select the part location you just exchanged.
- Select **Verify a repair** from the Actions menu.

If you were directed here by a procedure in this manual, return to that procedure.

End of procedure.



Using Edit Frame Layout

Edit Frame Layout provides a graphic view of the devices in a selected string. By opening (double-clicking on) the image of a device you can determine: device type, serial number, and device location. Edit Frame Layout shows you the locations in the frames available for adding a new device or moving a selected device. You can also use Edit Frame Layout to remove devices, change the product information for a device, or add a frame to the string.

If you are adding, moving, or removing devices; follow the instructions provided in the MES.

Notes:

1. You can look at Edit Frame Layout from a Hardware Management Console that has all the CPCs defined for the string you are working on.
2. Edit Frame Layout does not have information about the FRUs inside a device. The procedure in "Exchanging FRUs" on page 6-16 shows how to display the FRUs in a CPC or expansion cage.

1

At the Hardware Management Console:

- Ensure the Hardware Management Console is in service mode.
- Open **Task List** from **Views**.
- Open **CPC Configuration Tasks** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag the **Defined CPCs** icon (using the right-hand mouse button) to **Edit Frame Layout** under the **CPC Configuration Tasks** area.

Go to step 2.

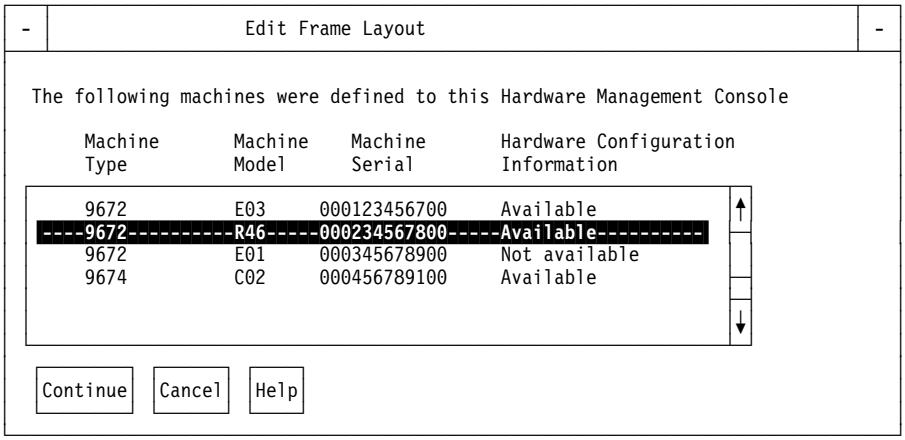
2

The Edit Frame Layout window shows the machines defined on the Hardware Management Console.

On the Edit Frame Layout window:

- Select the machine that you want to work on.
- Select **Continue**.

Go to step 3.



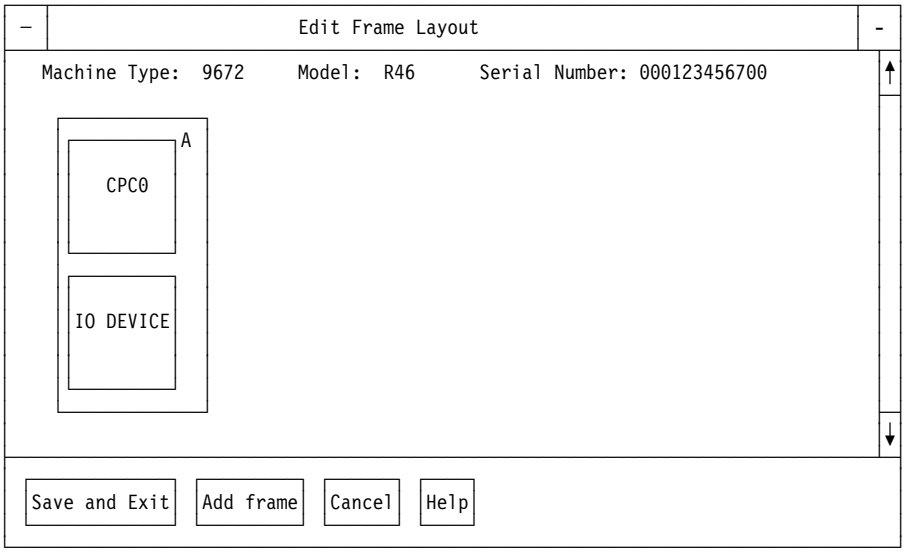
Note: A “Not supported” in the Hardware Configuration Information column indicates that this function does not support the selected machine. A “Not available” message indicates the Hardware Management Console cannot communicate with all of the machine's support elements.

3

The Edit Frame Layout window displays a graphic representation of the selected machine.

Note: Some devices are visible from only one side of the frame. These include integrated battery (IBF) and power sequence controller (PSC). Scroll the window to see the devices at the rear of the frame.

- To add a frame, go to step 4.
- To add, move, delete, or display information about a device, go to step 5.



---

4 Add a frame

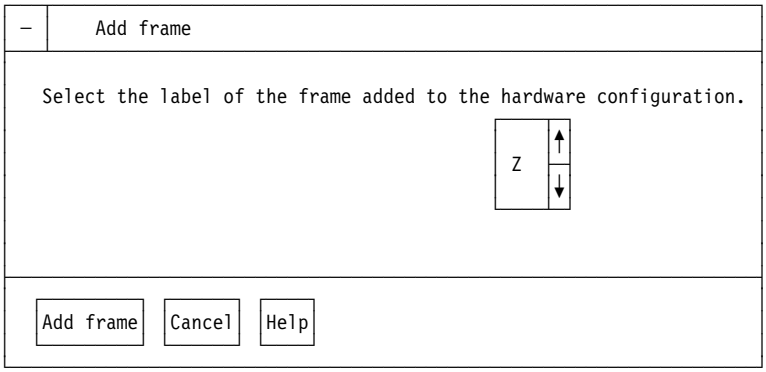
On the Edit Frame Layout window:

- Select **Add frame**

On the Add a Frame window:

- Spin to the label of the frame to be added.
- Select **Add frame**

This returns you to the Edit Frame Layout window with the new frame added to the string. Continue on step 5 to add or move devices.



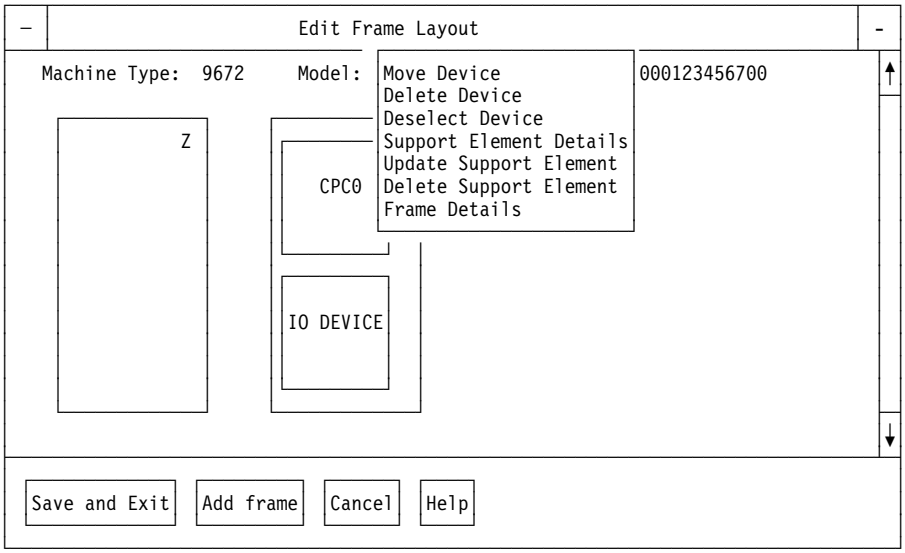
5

If you want to add a device:,

- Go to step 10.

For all other tasks:

- On the Edit Frame Layout window select (single-click on) the device you want to work with. (This displays the task menu.)
- Select the task from the menu.
- If you want to display device information, go to step 6.
- If you want to move a device, go to step 7.
- If you want to delete a device or frame, go to step 9.



Scroll down to display devices that are in the rear of the frame.

---

6 Display device information

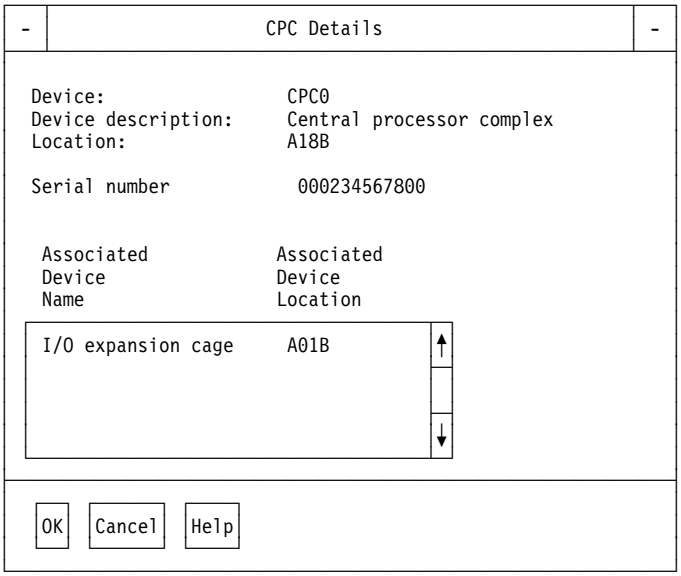
On the Edit Frame Layout window:

- Select **Device details**

If a CPC was selected, the CPC Details window provides information about the selected CPC and any associated devices. No changes can be made to the information in the window, select **OK** to end the task.

If the selected device is not a CPC, the Device Details window provides information about the device. The serial number of the device can be changed and a different CPC can be selected as the “Associated CPC.” If changes are made, select **OK**.

End of procedure



---

7 Move a device

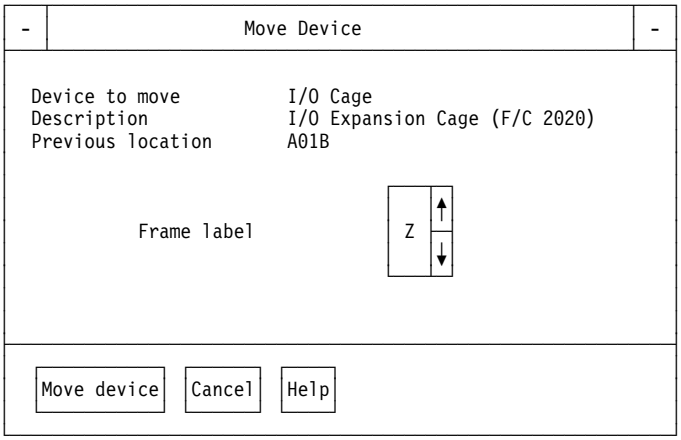
On the Edit Frame Layout window:

- Select **Move device**

On the first Move Device window:

- Spin to the label of the frame the device is to be moved to.
- Select **Move device**

Go to step 8.

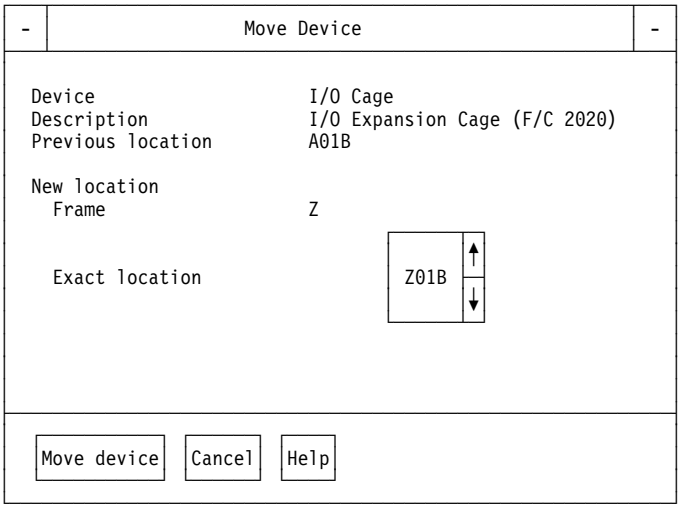


8

On the second Move Device window:

- Spin to the exact location within the frame the device is to be moved to.
- Select **Move device**

End of procedure



---

9 Delete a device or frame

On the Edit Frame Layout window:

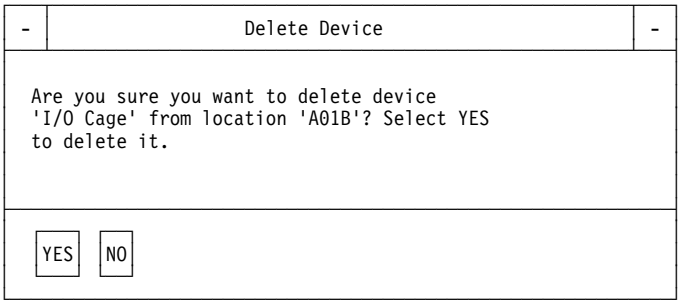
- Select **Delete device**

  Note: If you selected an empty frame, the selection is "Delete an empty frame." This selection is available only if the frame is empty. The rest of the procedure is similar.

On the Delete Device window:

- Check the device and location in the text.
- Select **Yes**

End of procedure



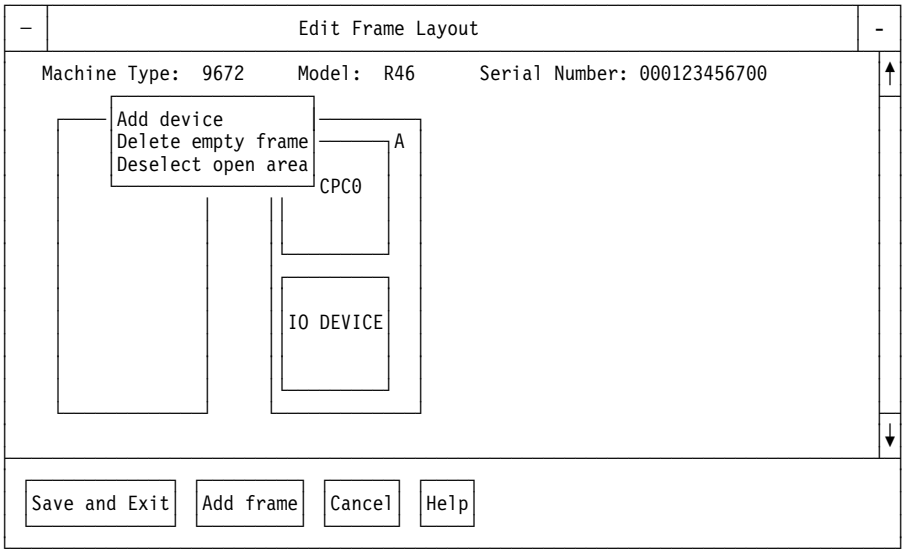
---

10 Add a device

On the Edit Frame Layout window:

- Select (single-click on) an open area in the frame you want to add the device to.
- Select **Add device** from the menu.

Go to step 11.

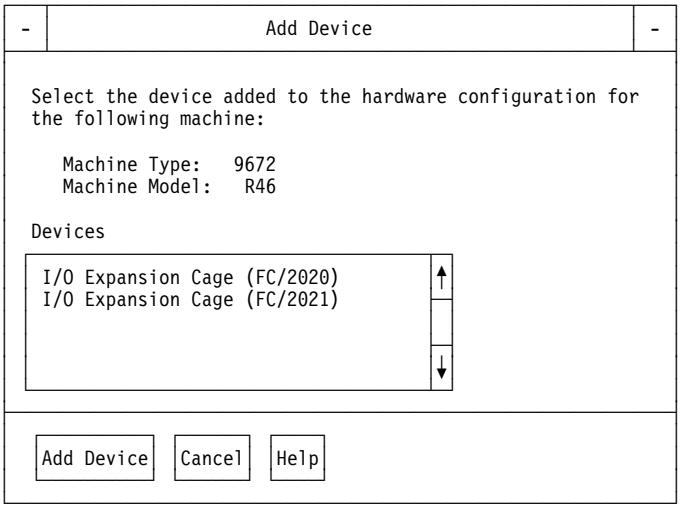


11

On the Add Device window:

- Select the device type to be added from the menu.
- Select **Add Device**.

Go to step 12.

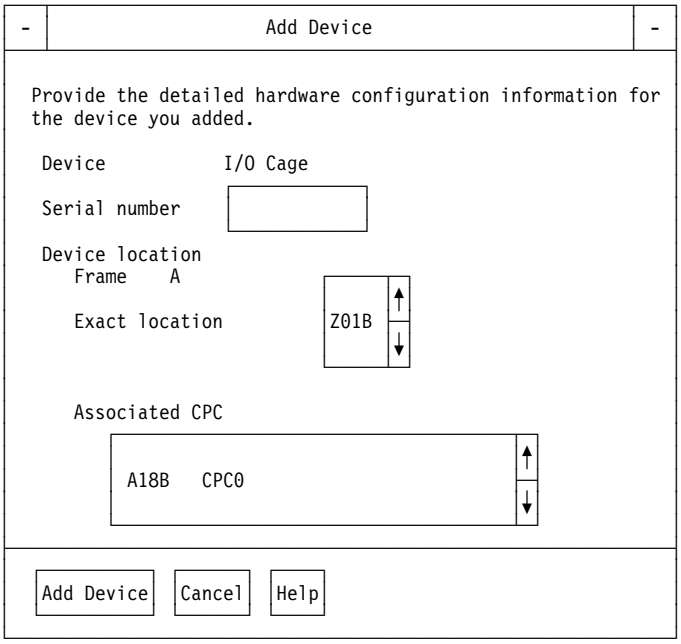


12

On the second Add Device window:

- Spin to the location the device is to be added to.
- Type in the device serial number.
- Select the identifier for the associated CPC from the menu.
- Select **Add Device**.

End of procedure



Dumping Logical Partition Data

Use this procedure when directed by IBM Product Engineering to obtain a dump of a selected coupling facility logical partition or physical system when the system is operating in logically partitioned mode. The dump information is stored on the support element hard disk.

Note: For a selected coupling facility logical partition, either of the dump selections (disruptive or non-disruptive) will disrupt control program operation of other images currently using the coupling facility control program. Disruptive dumps also stop the logical processors and leave the partition in a check stopped state after the dump completes.

When the physical system is selected, the disruptive dump will stop the physical processors which disrupts the logical partitions using them. A non-disruptive dump does not disrupt the logical partition operations.

1

Rotate the support element into the service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

Ensure the support element is in service mode.

Go to step 2.

2

On the Support Element Workplace window:

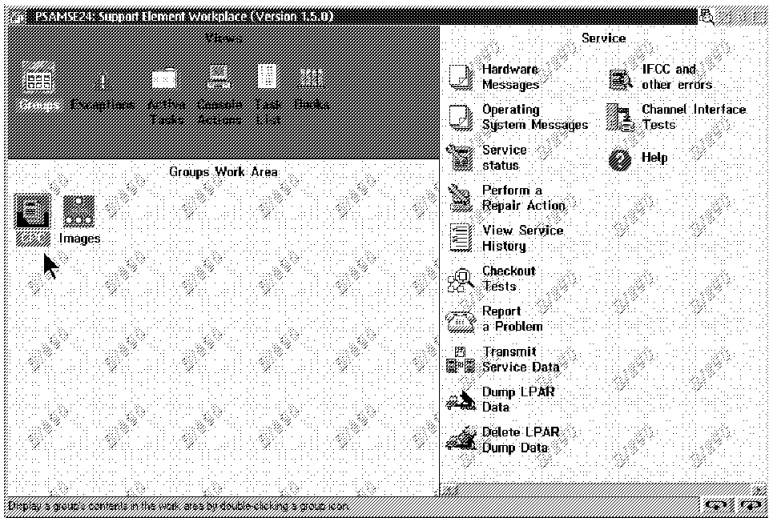
- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work** area.

To dump the data for the physical system:

- Open **Groups** from **Views**.
- Open the **CPC** icon in the **Groups Work Area**.
- Drag the **CPC** icon (using the right-hand mouse button) to **Dump LPAR Data** under the **Service Tasks** area.

To dump the data for a partition:

- Open **Groups** from **Views**.
- Open the **Images** icon in the **Groups Work Area**.
- Drag the icon for the image (using the right-hand mouse button) to **Dump LPAR Data** under the **Service Tasks** area.



3

If the area on the hard disk with dump information is already full, you may write over one of the existing dumps.

- If the dump information already stored is to be sent to IBM Product Engineering, go to "Sending Service Data" on page 6-28.
- If you were directed to obtain **new** dump information, select the appropriate type of dump you are requesting and select **Dump**. This replaces the old dump with a dump of current logically partitioned control data.

Go to step 4.

4

- Select the type of dump you were instructed to do (disruptive or non-disruptive).
- See the **Note** at the beginning of this procedure, if a disruptive dump is selected, notify the customer and get permission to continue.
- Select **Dump**

Note: After sending the dump information, use the **Delete LPAR Dump Data** task under **Service** to erase the dump area.

The dump information is captured and stored on the support element hard disk.

To send the dump information to the IBM service support system, use the information in "Sending Service Data" on page 6-28 and select **Logical partition dump data**.

After sending the dump, erase the data on the support element hard disk using the **Delete logical partition dump data** task.

End of procedure.

Sending Service Data

Use this procedure when directed by IBM Product Engineering to send service information from a support element or Hardware Management Console to the IBM Service Support System.

If remote support is available, the data is transmitted from the Hardware Management Console to the IBM service support system. If remote support is not available on the system, this procedure can be used to load the information on an optical cartridge (at the Hardware Management Console). The cartridge can then be mailed to Product Engineering.

1

Are you sending CPC or support element service data?

YES NO

↓ Go to step 5.

2 Sending support element data.

Rotate the support element into the service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

Log on the support element in service mode.

Go to step 3.

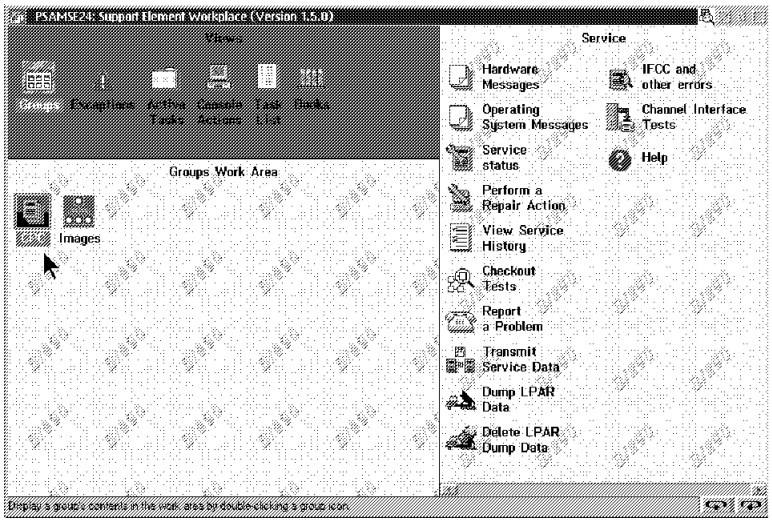
Note: Sending service information for a CPC or group of CPCs can also be requested directly from the Hardware Management Console Workplace window by dragging the CPC icon from Groups and dropping it on Transmit Service Information under Service Tasks. The remainder of the procedure is similar to step 4.

3

On the Support Element Workplace window:

- Open **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) to **Transmit Service Data** under **Service Tasks** area.

Go to step 4.



4

On the Transmit Service Data to IBM window:

- Select the data you were directed to send by IBM Product Engineering from the menu.
- Select the method for transmitting the data from the menu.
- Select **Send**.

Note: The selection **IBM service support system** sends the information directly to the IBM Support System it is greyed out if remote support is not available.

If optical cartridge is selected, follow the instructions from IBM Product Engineering for mailing the information.

End of procedure.

---

5 Sending Hardware Management Console data

On the Hardware Management Console Workplace window:

- Select **Console Actions** in the **Views** area.
- Select **Transmit Console Service Data** from the **Console Actions Work Area**.

Go to step 6.

6

On the Transmit Service Data window:

- Select the data you were directed to send by IBM Product Engineering from the menu.
- Select the method for transmitting the data from the menu.
- Select **Send**.

Note: The selection **IBM service support system** sends the information directly to the IBM Support System it is greyed out if remote support is not available.

If optical cartridge is selected, follow the instructions from IBM Product Engineering for mailing the information.

End of procedure.

Placing a Channel in Standby or Reserved Status

Use this procedure to place a CHPID into or out of “Standby” or “Reserved” (single channel service) status.

Standby status makes the channel hardware unavailable to the operating system. The channel remains unavailable until the status is changed or the system is activated. Reserved status makes the channel hardware unavailable even after activation. Normally this is done when channel maintenance is deferred so the channel cannot become available to the operating system.

Note: This procedure is not required when you run any of the channel diagnostics. The test program places the channel being tested in the correct state.

The procedure shown is for service mode, it is available in other user modes but the windows are slightly different.

1

- Rotate the support element into the service position. For information, refer to “Starting Service with the Support Element” on page 1-10.
- Ensure that the CPC is placed in service status (see **Note**).
- Log on the support element in Service mode, then go to step 2.

Note: The CPC must be placed in Service Status mode before continuing. If you are using the Hardware Management Console for this task (using Single Object Operations), refer to step 1 of “Starting Service with the Support Element” on page 1-10 for the Service Status procedure. If you are using the support element, refer to the procedure in “Starting Service with the Support Element” on page 1-10.

2

If you are placing the channel in single channel service, continue on step 3.

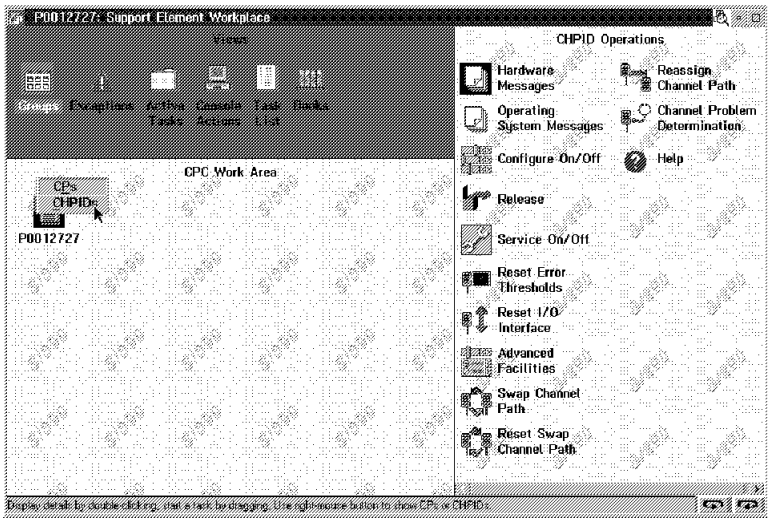
If you are taking the channel out of single channel service, go to step 9.

3

On the Support Element Workplace window:

- Open **Task List** from **Views**.
- Open **CHPID Operations** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Open **CPC** from the **Groups Work Area**.
- Set the mouse pointer on the CPC icon and click one time with the right hand mouse button to display the CP/CHPIDs popup menu.
- Select **CHPIDs** from the menu.

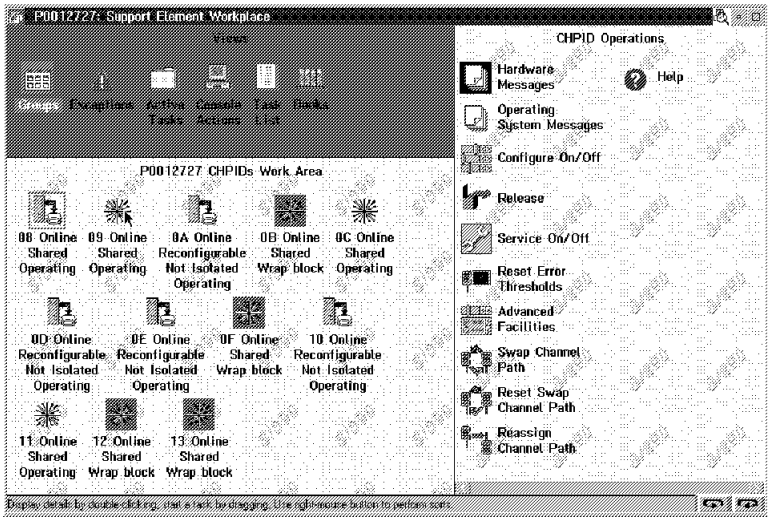
Go to step 4.



4

Find the CHPID you are working with in the CHPID Work Area and determine the CHPID's status.

- If the status of the CHPID is “Standby,” go to step 7.
- If online, continue on step 5.



5

Normally, the customer places the CHPID in standby status by varying it off-line to the operating system. Have the operator do this now. Or, if the operator cannot, see **Note** and place the CHPID in standby as follows:

On the Support Element Workplace window:

- Drag the icon for the CHPID (using the right-hand mouse button) to **Configure On/Off** under the **CHPID Operations** area.

Continue on step 6.

Note: The operating system will not be notified when CHPIDs are configured off. The next operation from the operating system to the CHPIDs will cause an error.

6

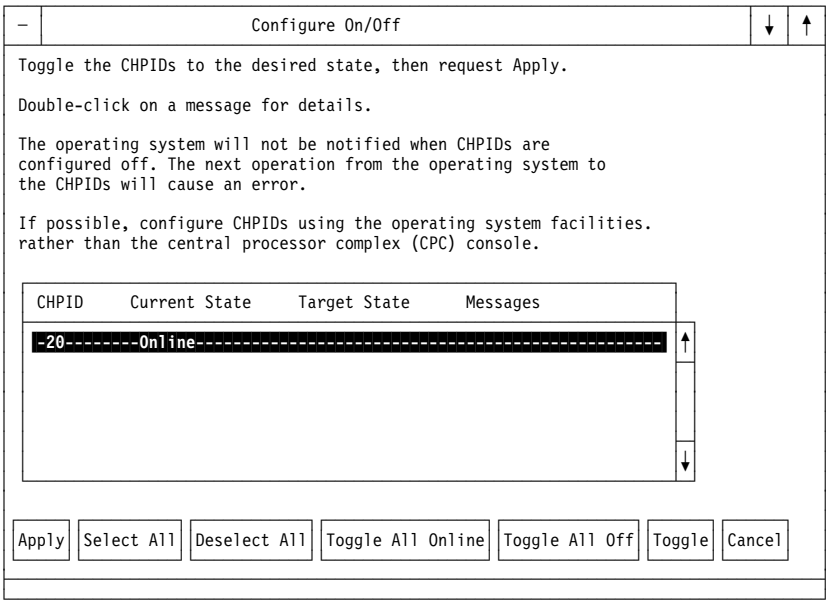
On the Configure On/Off window:

Note: The window shown is for basic mode. If in LPAR mode, one line will display for each partition the CHPID is assigned to. The partition information displays in the right-hand column.

- Select the CHPID from the menu.
- Select the **Toggle All Offline** pushbutton.
- Select **Apply**.

When the message box displays stating the operation is complete, select **OK**.

If you were directed to put the channel in “single channel service” or “reserved” status, go to step 7. Otherwise, the procedure is complete.



If the operation is not allowed, the message “NOT ALLOWED” is displayed in the Configure On/Off window. Double-click on the message to see why it is not allowed.

If not successful, a panel displays showing the failed CHPID and partition (if in LPAR).

If the CHPID is shared by LPAR partitions, on line displays on the Configure On/Off window for each partition. To set a CHPID offline for individual partitions by selecting only these partition and following the information in this step.

7

Set the channel to “Reserved” status as follows:

On the Support Element Workplace window:

- Drag the icon for the CHPID (using the right-hand mouse button) to **Service On/Off** under the **CHPID Operations** area.

Go to step 8.

8

On the Service On/Off window:

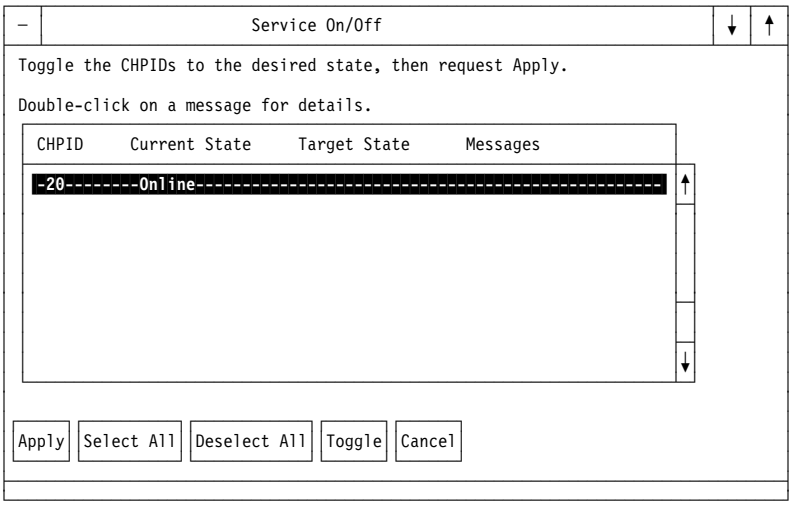
- Select the CHPID from the menu.
- Select the **Toggle** pushbutton until **Reserved** displays in the **Target Status** column.
- Select **Apply**.

On the Service On/Off Progress window wait until the status is "Completed," then:

- Select **OK**.

This changes the status of the selected CHPID to "Reserved."

End of procedure.



If the operation is not allowed, the message "NOT ALLOWED" is displayed in the Service On/Off window. Double-click on the message to see why it is not allowed.

If not successful, a panel displays showing the failed CHPID and partition (if in LPAR).

---

9 Remove a channel from single channel service

On the Support Element Workplace window:

- Open **Task List** from **Views**.
- Open **CHPID Operations** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Open **CPC** from the **Groups Work Area**.
- Set the mouse pointer on the CPC icon and click one time with the right hand mouse button to display the CP/CHPIDs popup menu.
- Select **CHPIDs** from the menu.

Go to step 10.

10

Set the channel to "Reserved" status as follows:

On the Support Element Workplace window:

- Drag the icon for the CHPID (using the right-hand mouse button) to **Service On/Off** under the **CHPID Operations** area.

Go to step 11.

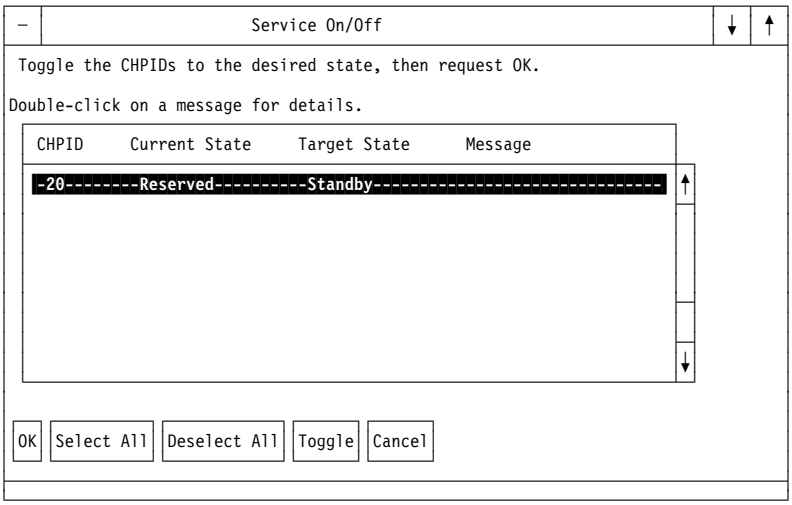
11

On the Service On/Off window:

- Select the CHPID from the menu.
- Select the **Toggle** pushbutton until **Standby** displays in the **Target Status** column.
- Select **OK**.
- Select **OK** on the message window saying the task is complete.

This changes the status of the selected CHPID to “Standby.”

To place the CHPID on-line, continue on step 12.



If the CHPID is not defined or has definitions errors, this function will not work.

12

Normally, the customer places the CHPID on-line by varying it on-line to the operating system. Have the operator do this now. Or, if the operator cannot, place the CHPID on-line as follows:

On the Support Element Workplace window:

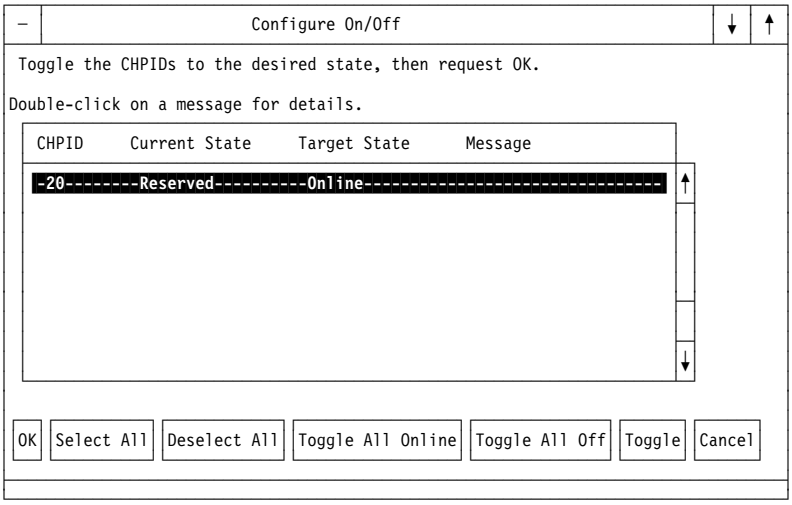
- Drag the icon for the CHPID (using the right-hand mouse button) to **Configure On/Off** under the **CHPID Operations** area.

Continue on step 13.

13

- Select the CHPID from the menu.
- Select **Toggle All Online**.
- Select **OK**.
- Select **OK** on the message window saying the task completed

Procedure is complete



Enabling or Disabling STIs

The following procedure shows how to enable or disable an STI port used for Integrated Cluster Bus (ICB). Disabling the port will make it unavailable to the operating system and allow you to run ICB diagnostics or unplug the ICB cable without causing system errors.

1

Ensure that the CHPID for the STI is in either Standby or Reserved (single channel service). If not, use “Placing a Channel in Standby or Reserved Status” on page 6-30.

If you are using the support element for this task, ensure the support element is in service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using the Hardware Management Console for this task, make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

Go to step 2.

2

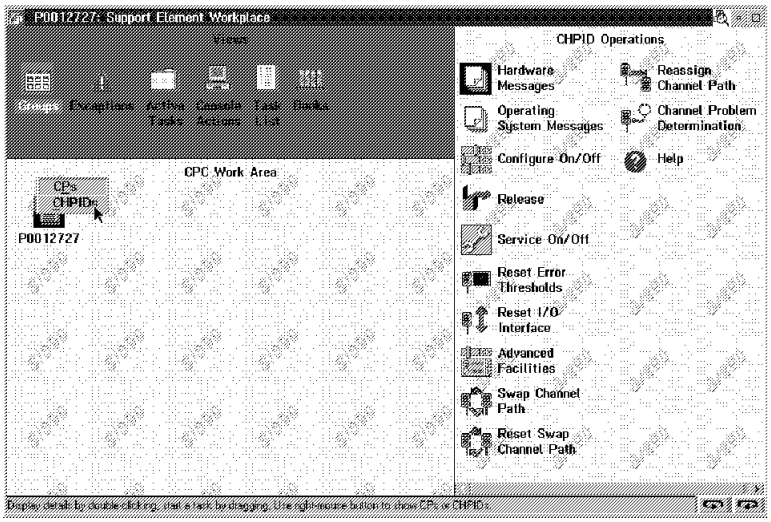
Ensure the support element is in service mode.

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CHPID Operations** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Open (double-click on) the **CPC** icon in the **Groups Work Area**.
- In the **CPC Work Area**, use the right-hand mouse button and click one time on the CPC icon to open the CPs/CHPIDs pop-up menu.
- Select CHPIDs from the menu.

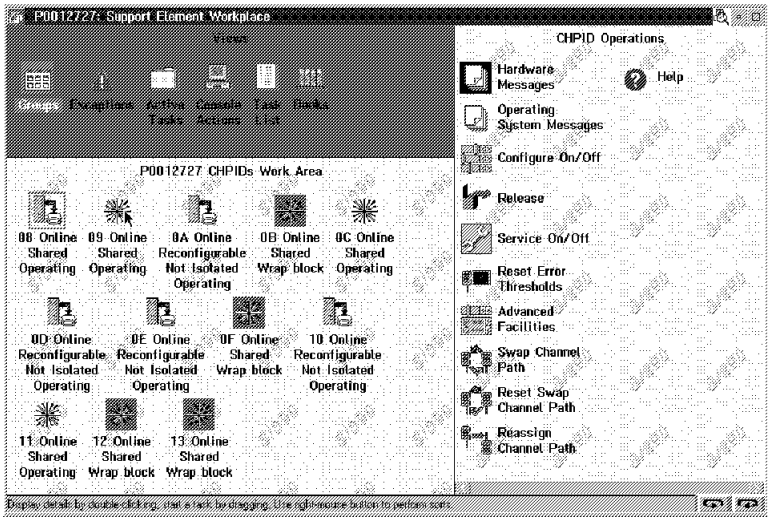
Go to step 3.



3

- Drag the icon for the CHPID for the ICB you are working with (using the right-hand mouse button) and drop it on **Advanced Facilities** under **CHPID Operations**.

Go to step 4.

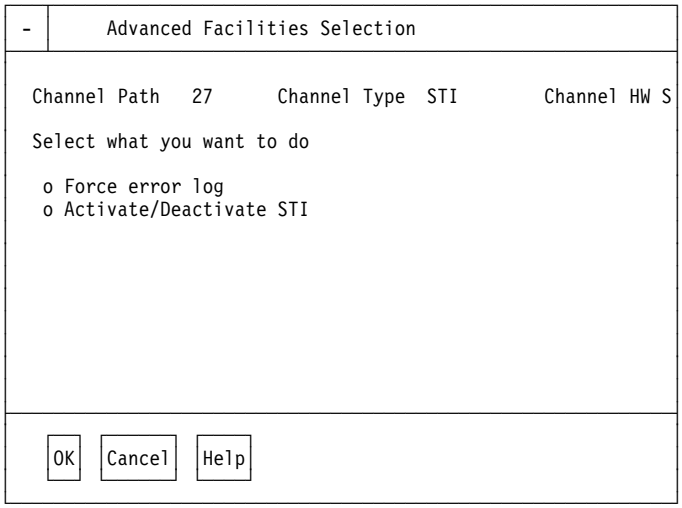


4

On the first Advanced Facilities window:

- Select **Activate/Deactivate STI** from the menu.
- Select **OK**.

Go to step 5.



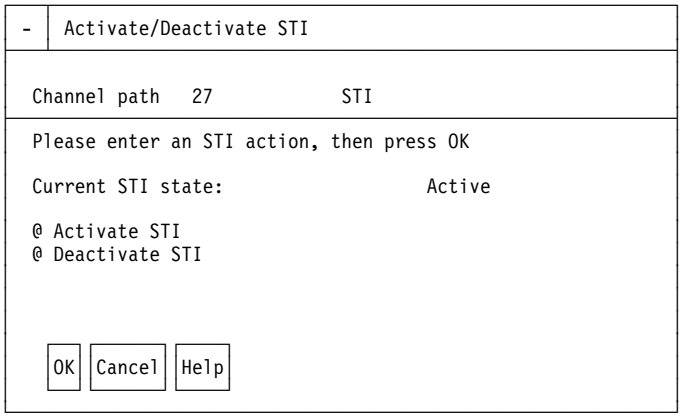
5

On the Activate/Deactivate STI window select one of the following from the menu:

- **Activate STI**
- **Deactivate STI**

Select **OK**.

End of procedure



Displaying I/O Card Information

Use this procedure to display information about the I/O cards (channels, ICB, and OSA) in any of the system's cages.

Note: The support element and system must be powered on and the licensed internal code must be loaded.

1

Rotate the support element and tray into the service position and open the ThinkPad display. For information, refer to “Starting Service with the Support Element” on page 1-10.

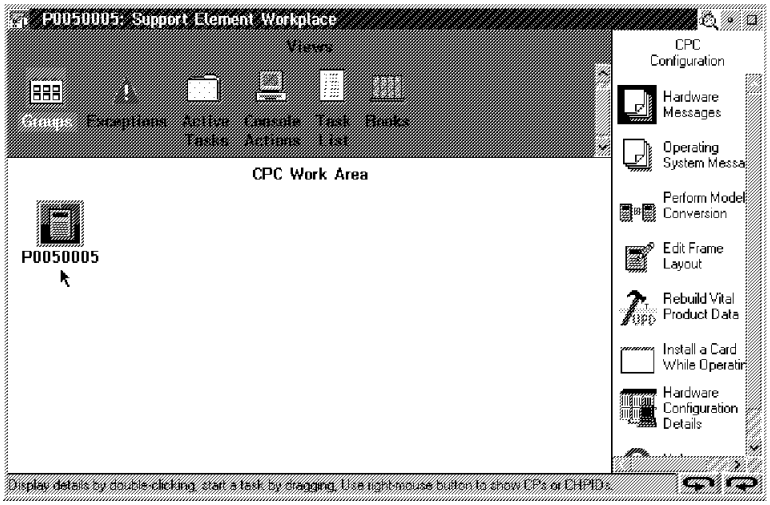
Log on the support element in Service mode, then go to step 2.

I/O card information can also be displayed from the Hardware Management Console Workplace window by dragging the CPC icon from Groups and dropping it on Single Object Operations under CPC Recovery Tasks.

2

On the Support Element Workplace window:

- Open **Task List** from **Views**.
- Open **CPC Configuration** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Open **CPC** from the **Groups Work Area**.
- Drag the CPC icon (using the right hand mouse button) and drop it on **Hardware Configuration Details** under the CPC Configuration task area.



Go to step 3.

3

From the System window there are two paths that can be taken to view system information. The first path presented will offer you the most detailed information.

  – Logical System View.

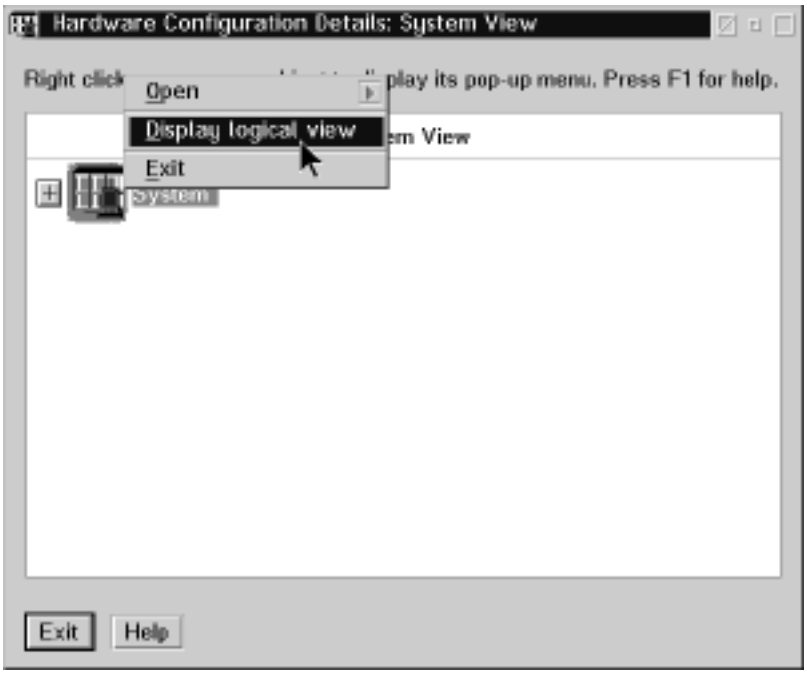
  – Cage View.

- The first path presents all of the information required for the majority of scenarios, while the second method provides additional Hardware information.

  1. Move your cursor to the system ICON. Click with the right mouse button to display option.

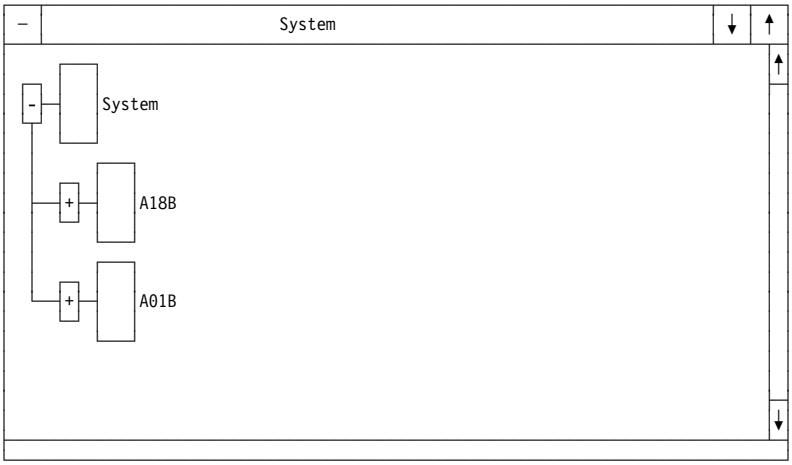
  2. Choose **Display Logical View** Go to step 8.

- To view the system information with the second method Go to step 4.



4

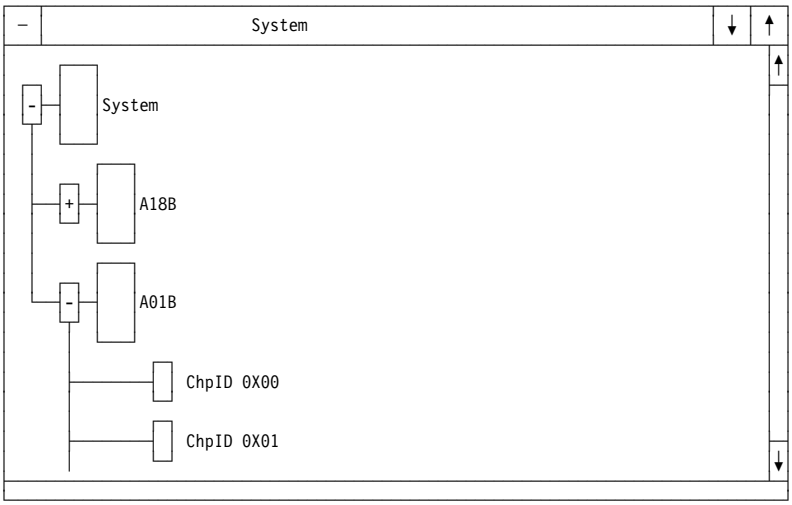
- Move your cursor to the + next to the system icon and click one time with the left mouse button.
- Click one time on the + next to the icon for the cage you want to look at. (A01B used in the example) Go to step 5.



5

The System window displays the CHPIDs for the cage selected. This allows you to determine if the CHPID you are looking for is in the cage. (This helps you locate the CHPID when there are several cages).

Double-click on the **System** icon and go to step 6.

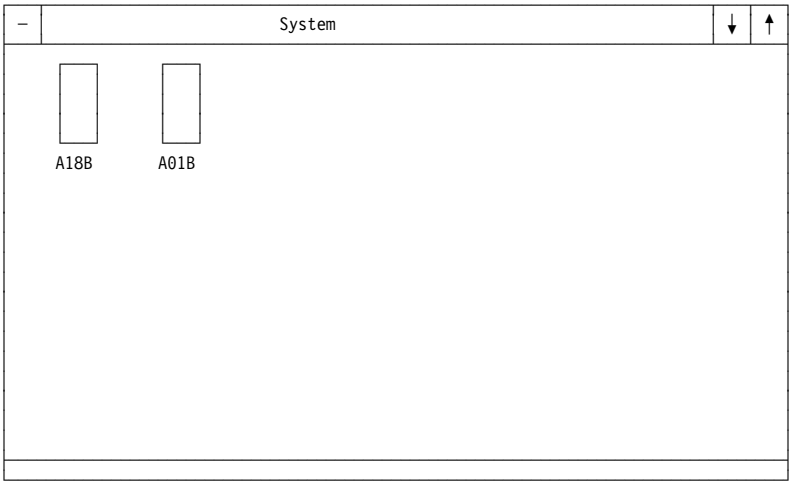


6

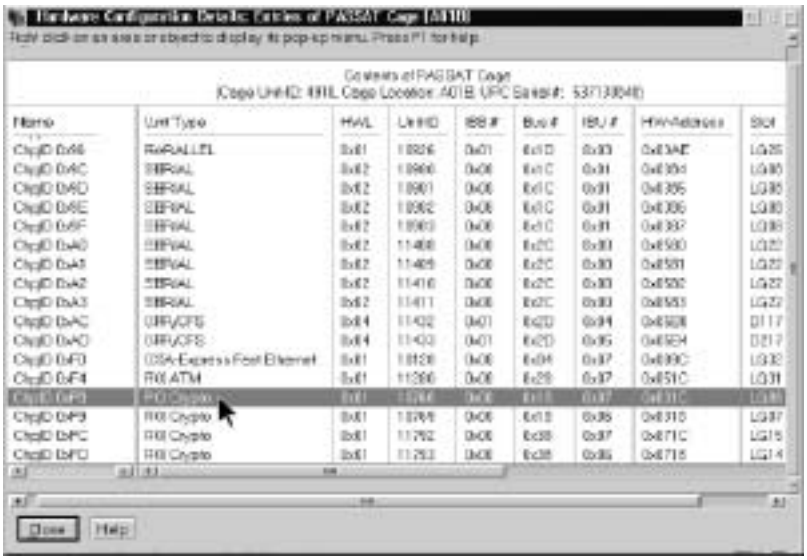
The System window displays an icon for each cage and CPC in the system.

Double-click on the icon of the cage containing the CHPID you want to look at, then go to step 7.

Note: Use the CPC icon for ICBs.



7

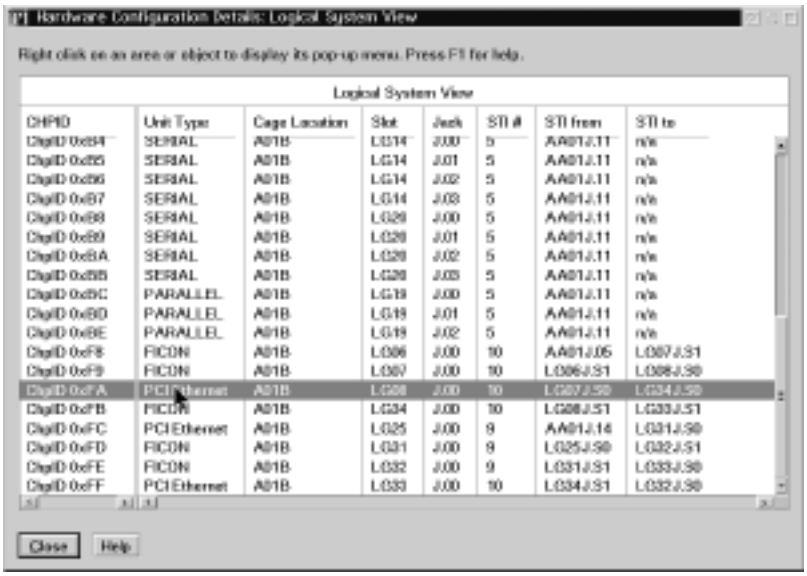


The Entry window displays the CHPIDs (in hex) for the I/O cards in the selected cage or CPC. The Unit Type column shows what type of I/O card is installed. The abbreviations used are:

```
CFR/CFS (CF receiver/sender)
ICBE (ICB - external)
ICBI (ICB - internal)
OSA2 ATM150mm (ATM multimode)
OSA2 ATM150sm (ATM single mode)
OSA2 FI
OSA2 ENTR (Token-Ring/Ethernet)
OSA2 Fast Ethernet
PARALLEL
SERIAL (ESCON)
FICON Fiber Chn (FICON)
PCI Ethernet (Gigabit Ethernet)
PCI CRYPTO
PCI ATM
PCI Fast Ethernet
```

Go to step 9 when finished view the information.

8



The Hardware Configuration Details Logical System View widow displays.

- Scroll down to the CHPID you want information on.

9

To return to the Support Element Workplace window, click on the close button in the lower left-hand corner of the windows.

End of procedure

Displaying Chain Status

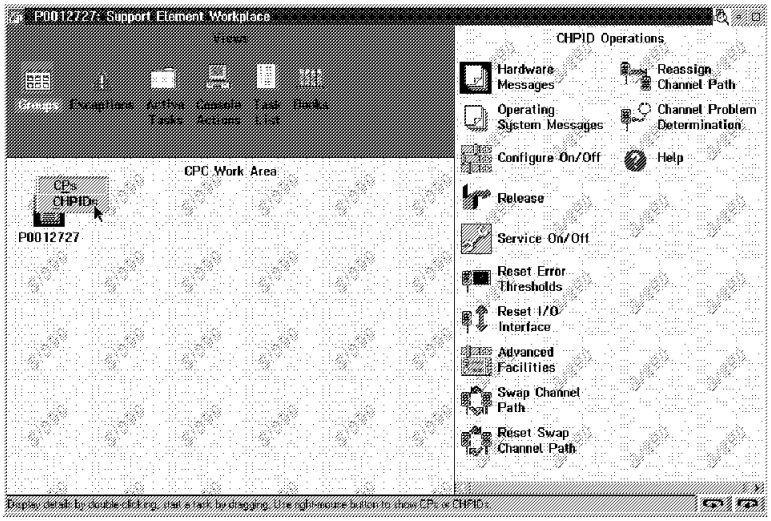
There is a task available from Advanced Facilities that will help you determine whether all the links in one of the chains we just described are operating. The following describes the procedure you will be using:

Begin by logging on the Support Element Workplace Window in service mode and ensure that the CPC is in Service Status.

1

On the Support Element Workplace window:

- Open (double-click on) Task List from Views.
- Open CHPID Operations from the Task List Work area.
- Open Groups from Views.
- Open (double-click on) CPC from Groups Work Area.
- Use the right-hand mouse button and click on time on the CPC icon to open the CPs/CHPIDs/PCI crypto pop-up menu. Select CHPIDs from the menu.



2

On the CHPIDs Work Area

- Drag the icon for the CHPID related to the feature you are working with, in this case it is CHPID FB (an OSA-Express Ethernet card), and drop it on Advanced Facilities under CHPID Operations.

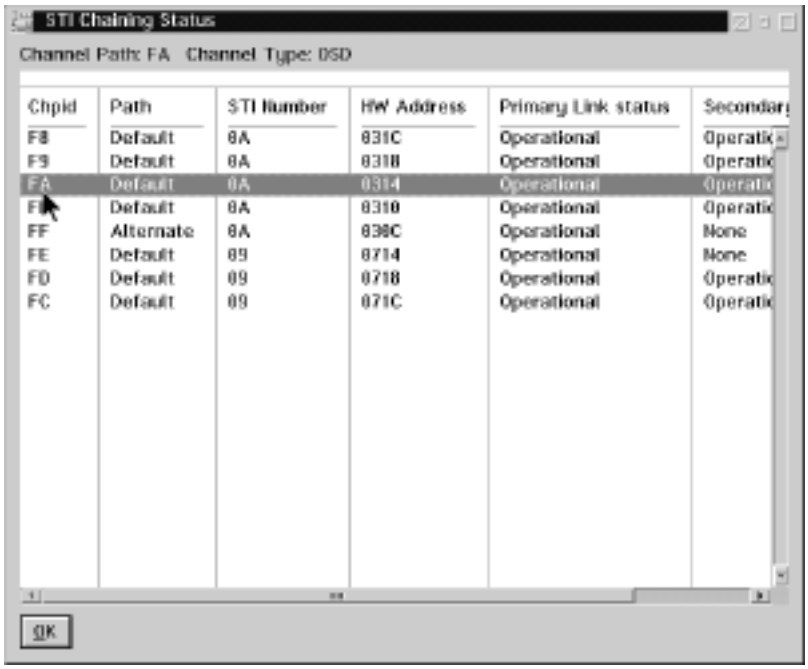
3

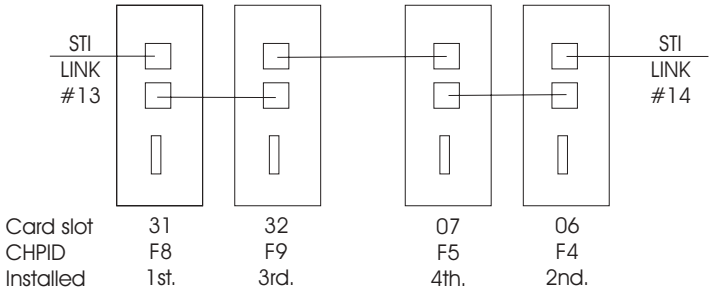
On the Standard Channel Advanced Facilities window

- Select STI Chaining Status
- Select OK

4

The STI Chaining Status window displays. The STI Chaining Status window provides the status of the chain associated with the CHPID selected and the status of the connected chain. In other words, the status of the links for the cluster. In the example shown there are five feature cards in one chain (STI 0A) and three feature cards in the other (STI 09). Primary Link Status indicates the status of the "upstream" link and Secondary Link Status indicates the status for the "downstream" link. If we look again at the example shown, the Primary link for card 31 (CHPID F8) is the cable from STI link 13 and the secondary link for the same CHPID is the cable to card 32. The status of the secondary link for the last card in the chain (CHPIDs FB and FF in the screen example or CHPIDs F9 and F5 in the drawing) is always "None".





System Shut Down

Use this procedure to avoid loss of data on the Hardware Management Console or support element hard disks when AC power must be removed from a Hardware Management Console or CPCplex.

Prepare the Hardware Management Consoles and support elements for power off as follows:

1

Were you directed by an on-line procedure to shut down a ThinkPad support element and power off the system?

NO **YES**

↓ Go to step 7.

2

This step prepares the CPCs and support elements for power off.

Have the customer verify that operations are complete on all the CPCs to be powered off.

Have the customer deactivate the CPCs from the Hardware Management Console as follows:

- Open **Task List** from the Views area.
- Open **Daily Tasks** from the Tasks Work area.
- Open **Groups** from the Views area.
- Drag the **Defined CPCs** from the Groups Work area drop it on **Deactivate** under Daily Tasks.

If you have CPCs defined on more than one Hardware Management Console, deactivate CPCs defined on the other Hardware Management Consoles.

When all CPCs to be powered off are deactivated, go to step 3.

3 Logging off Version 1.8.2 and Earlier

On each Hardware Management Console that is to be powered off:

- Open **Console Actions** from the Views area.
- Select **Log Off** from the Console Actions Work Area.

When the Logon window displays on each console that is to be powered off, go to step 4.

Logging off Version 2.9.0 and Later

On each Hardware Management Console that is to be powered off:

- Open **Console Actions** from the **Views** area.
- Select **Log Off** or **Shutdown or Restart** from the **Console Actions Work Area**.

When the Logon window displays on each console that is to be powered off, Go to Step 6.

4 Logging off from the HMC, Driver 1.8.2 or Earlier

On the Logon window:

- Select **Cancel**.

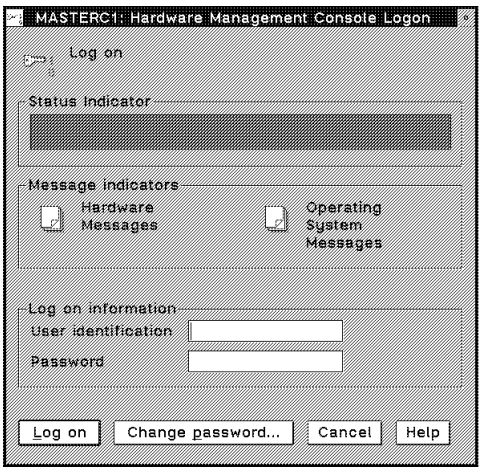
On the Cancel Confirmation window:

- Select **Yes**.

Wait at least 90 seconds for all Hardware Management Console hard disk activity to complete.

Minimize all windows displayed by clicking on the minimize icons (in the upper right corner of the windows).

When only the OS/2 Desktop displays, go to step 5.



Logging off from the HMC, Driver 2.9.0 or Later

On the Shutdown or Restart window:

- Select **Power-off/shutdown console**.

Select **OK**.

Go to Step 5.

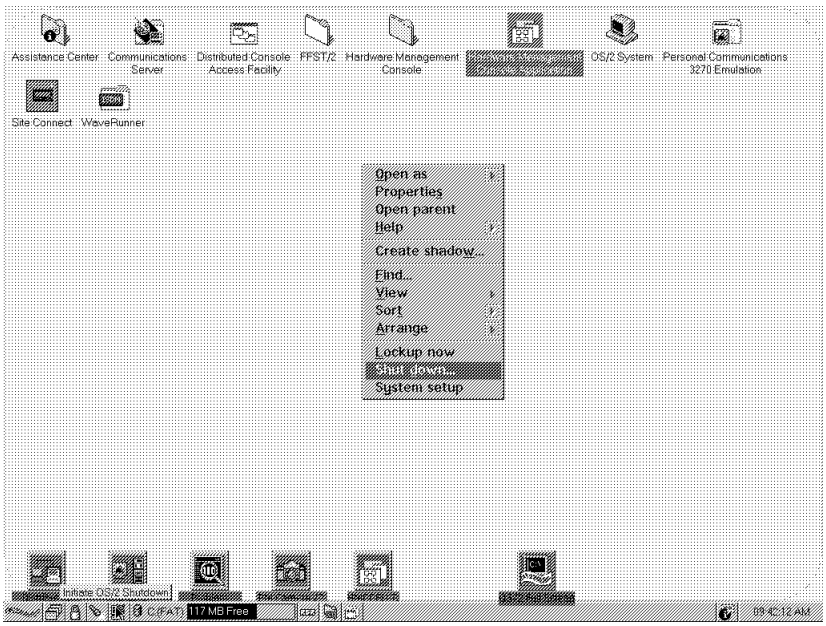
5 OS/2 shut down

On the OS/2 Desktop:

- Use the mouse to position the pointer in a part of the screen away from the Desktop icons.
- Click the right mouse button one time to display the OS/2 Desktop's system menu.
- Select **Shut down** from the menu.
- Select **OK** on any confirmation window displayed.

When a message indicates shut down is complete, wait at least two minutes for all **support element** hard disk activity to complete.

Go to step 6.



OS/2 Desktop with system menu.

Note: Shut down is also available from the OS/2 LaunchPad or Warp Center.

---

6 Remove System Power

At frame A:

- Set the Emergency Power Off switch to the Off position.

At the customer power panel:

- Set the circuit breakers for both sides of the customer-supplied power to Off.

At frame A:

- Return the Emergency Power Off switch to the On position.

Power off the system units and displays for all Hardware Management Consoles.

Procedure is complete.

Set the Emergency Power Off switch to the Off position so the support element will not detect missing input power. Return the switch to the On position so the system will power on when customer power is reapplied.

---

7 ThinkPad support element shutdown

On the support element:

- Close all windows until only the Support Element Workplace window displays.

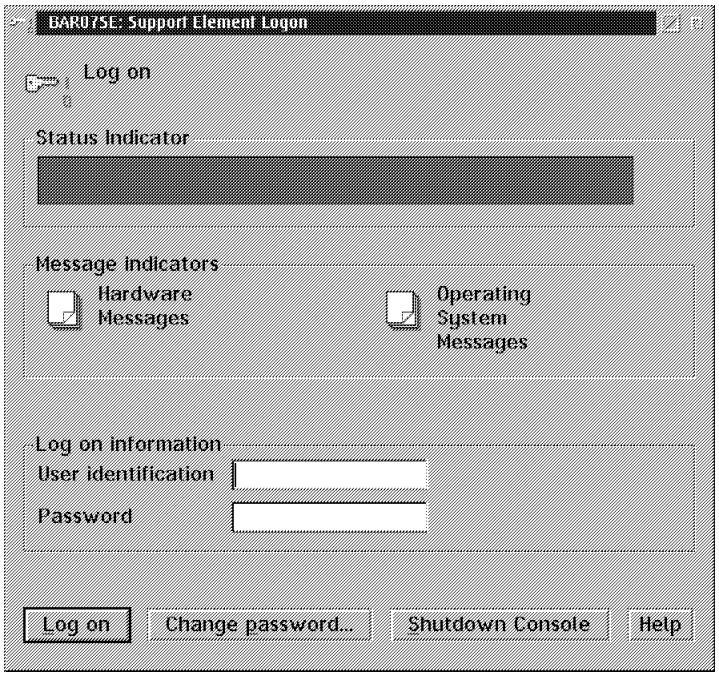
On the Support Element Workplace window:

- Open **Console Actions** from the Views area.
- Select **Log Off** from the Console Actions Work Area.

On the Support Element Logon window:

- Select **Shutdown Console**.

Wait until a message window displays “Shutdown is complete” Then, go to step 8.



---

8 Power off the CPC

At frame A:

- Set the Unit Emergency Power Off (UEPO) switch to the Off position.

Go to the information provided by the on-line procedure.

Procedure is complete.

Closing a Call

Use the information in this chapter to close problem numbers, clear hardware messages, put the support element into the operational position, and prepare the system for customer operation.

Note: If the repair was done using the on-line procedures, the original call is now closed.

Other problem numbers may have been opened by Problem Analysis while you were working on the original call. For example: if power-on reset failed after FRU exchange, a new problem number was opened.

In addition to the original call, close all problem numbers that were opened as a result of your service activity. **Attention:** When completing a call it is imperative that you logout of Service mode. If a machine is left logged on in Service mode it will automatically place a call for service every two hours.

Close the call as follows:

Mirroring alternate support element

On all systems with an alternate support element it is a good practice to mirror the alternate support element at the end of all service calls.

The following is a list of conditions when mirroring is necessary.

1. LIC updates, including MCM, storage card, EBU/CBU replacements and capacity on demand.
2. Patches.
3. IOCDS changes.
4. HCD changes.
5. Dynamic I/O changes
6. Dynamic load address/parm changes (HDC)
7. Dynamic Sim changes (ie: LPAR)
8. LPAR data
9. LPAR dump data
10. Service history data for open problems
11. VPD rebuild
12. Edit frame layout changes

Use the following procedure to close a call. Once the call is closed ensure that support element mirroring is done.

1

Are you closing a call for a repair on the Hardware Management Console?

YES **NO**

↓ Go to step 6.

---

2 Closing a Hardware Management Console call

On the Hardware Management Console:

- Ensure power-on reset is complete.

  Note: If the Hardware Management Console Logon window is already displayed go directly to step 3.

- Press **Ctrl+Esc** to display the Window list.
- Select **Hardware Management Console Workplace** from the list, then press **Enter**.

On the Hardware Management Console Workplace window:

- Select **Console Actions** in the **Views** area.
- Select **Log Off** in the **Work** area.

Go to step 3.

If the Hardware Management Console Workplace or Hardware Management Console Logon windows do not display, you still have a Hardware Management Console problem. Go to Chapter 2, “Console Information” on page 2-1 to resolve the problem.

3

On the Hardware Management Console Logon window:

- Type **SERVICE** in the **User identification** field.
- Type **SERVMODE** in the **Password** field.

Go to step 4.

If you are unable to type information in the fields, press **Insert** one time and retry.

If **invalid user** or **invalid password** displays, get the correct log on information from the customer.

4

On the Hardware Management Console Workplace window:

- Select **Console Actions** in the **Views** area.
- Select **Perform a Console Repair Action** in the **Work** area.

On the Perform a console repair action window:

- Select **Repair open problems** from the menu.
- Select **OK**.

Go to step 5.

5

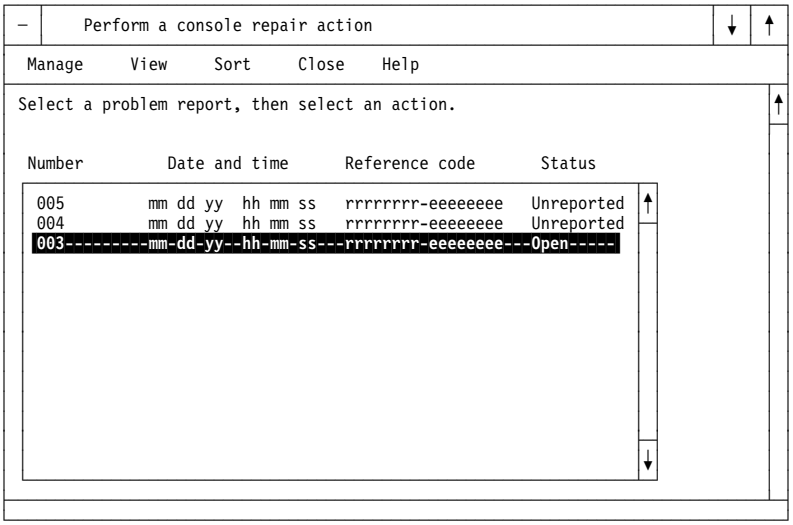
Note: If a message states that there are no open problems, go to step 11.

On the window with a list of open and delayed problems:

- If you started your call with a Problem Number, select it from the list. (The status is **Delayed** or **Open**.)
- Select **Close** from the menu bar.
- Select **Selected problems** from the pull-down.
- Follow the instructions on the windows to provide the information to close the problem number.

If other problem numbers were opened while you were repairing the problem (see the **Note** at the beginning of this procedure and look for a status of **Unreported**), close these calls also.

When all problem numbers associated with the problem you were working on are closed, go to step 11.



6 Closing a call on the CPC or support element

Rotate the support element tray into the service position and open the support element lid. For information, refer to “Starting Service with the Support Element” on page 1-10.

Go to step 7.

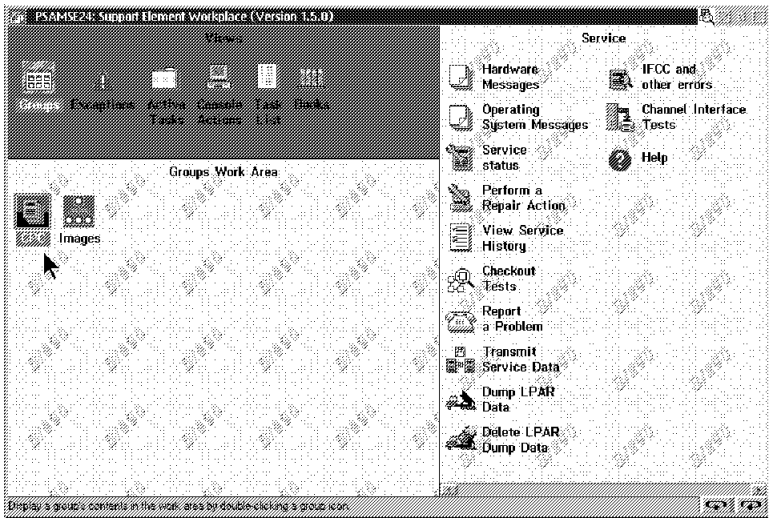
Note: If the support element is already in the service position, go to step 7.

7

On the Support Element Workplace window:

- Ensure the support element is in service mode.
- Open **Task List** from **Views**.
- Open **Service** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the **CPC** icon (using the right-hand mouse button) to **Perform a repair Action** under the **Service** area.

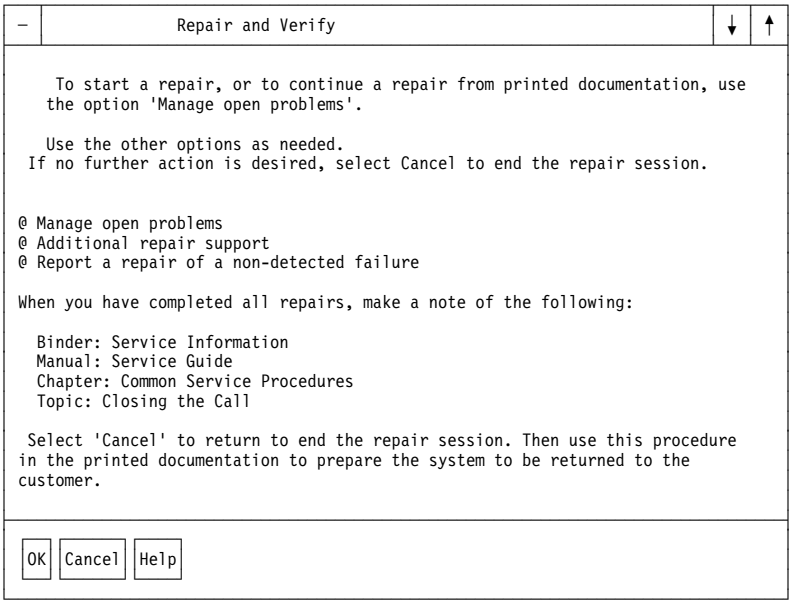
Go to step 8.



8

On the Repair and Verify menu window:

- Select **Manage open problems** from the menu.
- Select **OK**.



9

Are there any **open** problems associated with the call you are working on displayed on the Repair and Verify window?

YES **NO**

↓ Go to step 16.

If a message window states that there are no open problems, select **OK** to close the message window. Then, go to step 16.

10

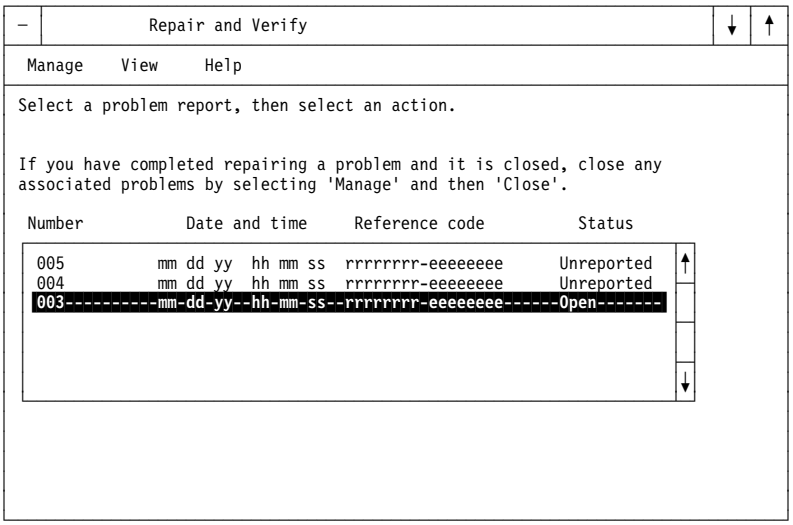
On the window with a list of open and delayed problems:

- If you started your call with a Problem Number, select it from the list. (The status is **Delayed** or **Open**.)
- Select **Close** from the Manage menu.
- Follow the instructions on the windows to provide the information to close the problem number.

When all problem numbers associated with the problem you were working on are closed:

- Select **Exit** from the Manage menu.

Go to step 11.



If other problem numbers were opened while you were repairing the problem (see the **Note** at the beginning of this procedure and look for a status of **Unreported**), close these calls also.

11

Did the menu in the previous step contain the Problem Number that you were working on?

NO **YES**

↓ Go to step 14.

This is the call with a status of **Open** or **Delayed** that you closed in step 5 or step 10.

If there was no Open or Delayed call, you will have to enter repair information manually starting in step 12

12

Note: The windows displayed on the Hardware Management Console and support element are similar. Examples of support element windows are shown in the remainder of this procedure.

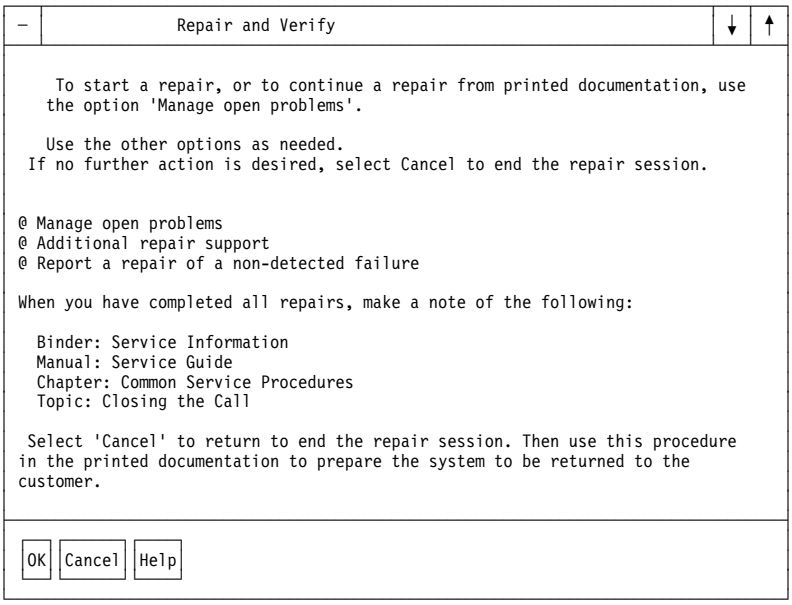
For support element calls:

- Press **Esc** until first Repair and Verify window displays.
- Select **Report a repair of a non-detected failure**.
- Select **OK**.

For Hardware Management Console calls:

- On the window displaying the problem numbers select **Manage** from the menu bar, then select **Exit** from the pull-down.
- On the Perform a console repair action window: select **Report a repair of a non-detected failure**.
- Select **OK**.

Go to step 13.

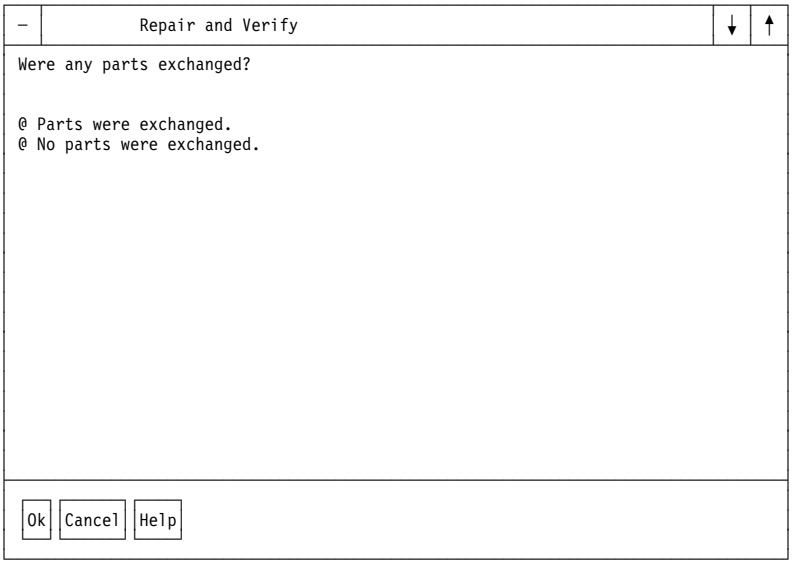


13

On the Repair and Verify window for parts exchange:

- Answer the question about parts usage.
- Select **OK**

Follow the instructions on the windows to provide FRU and repair information. When you finish, go to step 14.



14

Were you using the Hardware Management Console to close the call?

YES NO

↓ Go to step 16.

Answer YES if you were either closing a Hardware Management Console call or using a remote connection from the Hardware Management Console to close a CPC or support element call

---

15

On the Hardware Management Console:

- Close or cancel the windows until the Hardware Management Console Workplace window displays.

On the Hardware Management Console Workplace window:

- Select **Console Actions** in the **Views** area.
- Select **Log Off** in the **Work** area.

Return the console the customer.

Tell the operator that any hardware messages relating to the problem you were working on should be deleted.

End of procedure.

16

At the support element:

- Press **Cancel** until the Support Element Workplace window displays.

Go to step 17.

17

Is the Hardware Messages icon highlighted? (See **Note**.)

YES NO

↓ Go to step 19.

Note: When there are messages the Hardware Messages icon has a flashing background. When there are no messages, a white icon displays.

18

Delete any hardware messages as follows:

- Open Hardware Messages by double clicking on the icon.
- Select **Select all messages**.
- Select **Delete**.
- Select **OK** on the confirmation window.
- Double-click on the icon in the upper left hand corner to close the window.

Go to step 19.

19

If you are working on a model with the Modular Refrigeration Units (MRUs), go to step 20.

For all other models, logoff as follows:

- Select **Console Actions** from **Views**.
- Select **Log off** from **Console Actions Work Area**.
- Select **Yes** to answer the question about cancelling service mode.
- Close the support element display lid.
- Rotate the support element tray to the operational position.
- Check all filters in the CPC and expansion cages. (See **Note**)
- Close the frame covers.

End of procedure.

Note: The filters in the CPC and expansion cages should be checked once a year and on every service call. Clean or exchange the filters as required. To locate the filters, refer to “Location of System Filters” on page A-12.

---

20 Models with MRUs only

The desiccant container is shown in Figure A-7 on page A-13. Locate the desiccant container at the rear of the CPC (just below the logic cards). Look through the inspection window and check the color of the desiccant material. The color is normally blue, if **any** of the material in the container has changed to a pink color, use the procedure in “Exchanging FRUs” on page 6-16 and exchange the FRU identified as A24B_DESICCANT.

When complete, go to step 21.

21 Models with MRUs only

Logoff as follows:

- Select **Console Actions** from **Views**.
- Select **Log off** from **Console Actions Work Area**.
- Select **Yes** to answer the question about cancelling service mode.
- Close the support element display lid.
- Rotate the support element tray to the operational position.
- Check all filters in the CPC and expansion cages. (See **Note**)
- Close the frame covers.

End of procedure.

Note: The filters in the CPC and expansion cages should be checked once a year and on every service call. Clean or exchange the filters as required. To locate the filters, refer to “Location of System Filters” on page A-12.

Chapter 7. Channel Information

This chapter provides information about channel locations, configuration, and resolving problems. Channel in this chapter refers to ESCON, parallel, coupling facility, Integrated Cluster Bus (ICB), and S/390 Fiber Connection (FICON).

Find the information you want in the following table and go to the page indicated.

Information On	Go To
Description and location of channel features.	"Channel Card Features and Locations" on page 7-3.
Locations of channel cards, and CHPIDs.	"Channel Locations by CHPID" on page 7-4.
Locations of ports on channel cards.	• "Locations of Ports on Channel and ETR Adapter Cards" on page A-14 (for parallel, ESCON, and coupling facility) • "OSA-2 Cards" on page 11-5 (for OSA-2) • "OSA-Express Cards" on page 11-8 (for Gigabit Ethernet) • "Card Layout" on page 7-38 (for FICON)
Resolving problems on parallel, ESCON, FICON or coupling facility channels.	"Resolving Channel Problems" on page 7-18.
Resolving problems on Integrated Cluster Bus (ICB) feature.	"Resolving ICB Problems" on page 7-40.
Placing a channel in single channel service.	"Placing a Channel in Standby or Reserved Status" on page 6-30.
Enabling/Disabling STI ports (for ICB service).	"Enabling or Disabling STIs" on page 6-35
Resolving problems on Enterprise Systems Connection Converter (9034).	Chapter 10, "ES Conversion Channel Information" on page 10-1.
Channel tests.	"Channel Tests" on page 7-14.
Fiber Trunk system information.	"Fiber Trunk System" on page 7-12.
Parallel channel wrap plug wiring.	"Pin Assignments for Wrap Connectors" on page 7-32.
Parallel channel pin designations.	"Pin Assignments for OEMI Bus and Tag Cables" on page 7-31 or "Pin Assignments for 78 Pin "D" Cables" on page 7-31.
Channel swap.	"Channel Swap Procedure" on page 7-25.
Information about FICON feature	"Information for FICON Feature" on page 7-37.
Error messages when running Input/Output Configuration Program (IOCP).	"Resolving IOCP Errors" on page 7-55.
Editing I/O configuration source.	"Editing I/O Configuration Source" on page 7-51.
Viewing channel configuration.	"Viewing I/O Configuration Data Set" on page 7-47.

Information On	Go To
Card exchange procedure for channel feature cards.	“Exchanging FRUs” on page 6-16.
Optical measurement procedure for ESCON and coupling facility channels.	“Optical Power Measurement (ESCON and ETR)” on page 9-2 and “Optical Power Measurement (Coupling Facility Channel)” on page 9-8.
Optical measurement procedure for FICON channels.	*Maintenance Information for Fiber Optic Channel Links (ESCON, FICON, Coupling Links, and Open System Adapter)*, SY27-2597

General Information

Safety

Coupling Facility channels use a laser module as a light source. Observe the following when working on any fiber channel (ESCON, FICON, or coupling facility):

CAUTION:

Although the IBM module is safe, there may be other Laser modules in the system link that may not be safe under all conditions. For this reason it is advised to never view the end of the optical fiber cable or open receptacle. However, some repair activities of optical fiber cable assemblies may require the use of special viewing devices. In such cases, disconnecting both ends of the fiber is mandatory. As an additional precaution, viewing equipment with the proper Laser viewing protection filters must be used.

Channel Card Features and Locations

This section describes the feature cards necessary to support the channels and the locations of the cards.

Model R06 (9672)

There are two-bus and four-bus features available in this model. There are no I/O card locations in the CPC for any of the R06 features. The following channel cards can be plugged into a feature 2020 expansion cage:

- Features 0016 and 0216 provide a HiPerLink adapter card for coupling facility channels. Each adapter card provides for plugging one or two link cards (feature 0007 or feature 0008). They plug in the following slots of an expansion cage: 10, 29, 28, 21, 18, 17, 06, 34, and 33.
  - Each feature 0007 link card provides one multi-mode link.
  - Each feature 0008 link card provides one single-mode link.

  Note: Feature 0216 required for systems with greater than 16GB of memory.

  Feature 0007 is available only on older systems that are upgraded to a Generation 5. It is not available on new Generation 5 systems.

  Feature 0008 with a Coupling Facility Mode Conditioner (FC0107) allows use of the customer's existing multi-mode link cables.
- Feature 0992 provides an Integrated Cluster Bus (ICB) connection. The ICB allows an STI bus to STI bus connection between two CPCs or within a CPC. No feature cards are required.

Remaining G5 and G6 Enterprise Server Models (9672)

There are no I/O card locations in the CPC for any of these models. The following channel cards can be plugged into a feature 2020 or 2021 expansion cage:

- Feature 2303 cards provide three parallel channels.
- Feature 2304 cards provide four parallel channels.
- Feature 2313 cards provide four ESCON channels.
- Feature 2314 cards provide one FICON long wavelength (LX) channel.
- Feature 2316 cards provide one FICON short wavelength (SX) channel.
- Features 0016 and 0216 provide a HiPerLink adapter card for coupling facility channels. Each adapter card provides for plugging one or two link cards

(feature 0007 or feature 0008). They plug in the following slots of an expansion cage: 10, 29, 28, 21, 18, 17, 06, 34, and 33.
  – Each feature 0007 link card provides one multi-mode link.
  – Each feature 0008 link card provides one single-mode link.

Note: Feature 0216 required for systems with greater than 16GB of memory.

Feature 0007 is available only on older systems that are upgraded to a Generation 5 or 6. It is not available on new systems.

Feature 0008 with a Coupling Facility Mode Conditioner (FC0107) allows use of the customer's existing multi-mode link cables.

- Feature 0992 provides an Integrated Cluster Bus (ICB) connection. The ICB allows an STI bus to STI bus connection between two CPCs or within a CPC. No feature cards are required.
- OSA-2 cards are features 5201, 5202, 5204, 5205, 5206, 5207 and 5208.
- Gigabit Ethernet cards are features 2350 and 2351.
- A CHAx card (feature 0018 or 0029) is required for every four ESCON channel, parallel channel and OSA-2 cards.
- A FIBB card (feature 2337 or 2339) is required for every two CHAx cards. For information on how FIBB, CHAx and channel adapters are associated, refer to “Expansion Cages FC2020 and FC2021” on page A-19.

Channel Locations by CHPID

The Channel Path Identifier (CHPID) is used by the IOCDS to define each physical path to a device. **The available CHPIDs for a particular machine are dependent on the model type and I/O configuration for that machine**.

Notes:

1. Channels are also referred to by the port location on a channel card. The ports are: J.00 (top), J.01, J.02, and J.03 (bottom). For an explanation of port locations refer to:
   - “Locations of Ports on Channel and ETR Adapter Cards” on page A-14 (for parallel, ESCON, and coupling facility)
   - “OSA-Express Cards” on page 11-8 (for Gigabit Ethernet, ATM, and Faster Ethernet)
   - “OSA-2 Cards” on page 11-5 (for OSA-2)
   - “Card Layout” on page 7-38 (for FICON)
2. If the channel swap procedure is used, the CHPIDs for the two channels are reversed from those shown in the following figures.
3. To see which CHA card support a channel card, refer to **Notes** in “Expansion Cages FC2020 and FC2021” on page A-19.
4. To determine the CHPIDs assigned to an I/O card location when the system is powered on, use the procedure in “Displaying I/O Card Information” on page 6-38 and “Displaying Chain Status” on page 6-42 to display the chain status.
5. To determine the CHPIDs assigned to an I/O card location when the system is not powered on, use the CHPID tables on the following pages. To use the CHPID tables you must know:
   - What type of processor
     – R06 two-bus models

  - R06 four-bus models
  - remaining G5 two-bus models (RA6, R16, RB6, R26, RC6, RD6)
  - remaining G5 four-bus models (R36 to RX6, T16, T26, Y16 to YX6)
  - G6 models (X17 to XZ7, Z17 to ZZ7) are all four-bus

  If you don't know which model you are working on, check the memory cards in the CPC as follows:
  - A two-bus model has memory cards in slots 7 and 28 only (airflow cards in slots 15 and 20).
  - A four-bus model has memory cards in slots 7, 15, 20, and 28.
- Which STI is assigned to the I/O domain

See the following pages for CHPID information:

- To see the CHPID ranges for the two-bus models, refer to Table 7-1 on page 7-6.
- To see the CHPID ranges for the four-bus models, refer to Table 7-2 on page 7-7.

For parallel, ESCON, coupling facility and OSA-2 channel cards:

- To see the CHPIDs assigned to the card locations for the first expansion cage on a 9672, refer to Table 7-3 on page 7-8.
- To see the CHPIDs assigned to the card locations for the second expansion cage, refer to Table 7-4 on page 7-8.
- To see the CHPIDs assigned to the card locations for the third expansion cage, refer to Table 7-5 on page 7-8.

For ICBs, Gigabit Ethernet, and FICON channels:

- Refer to “CHPID Assignments for Direct Attachment” on page 7-9.

STI Assignments

STIs can be connected:

- To the FIBB cards in I/O expansion cages to support parallel, coupling facility, ESCON, and OSA-2 channel cards. This is called “FIBB attach.”
- Directly to FICON, PCI cryptographic coprocessor, and Gigabit Ethernet cards
- Directly as ICBs

The FICON, PCI cryptographic coprocessor, nGigabit Ethernet, and ICB connections are called “Direct attach.”

Table 7-1 on page 7-6 and Table 7-2 on page 7-7 show the locations of the STI links, the CHPID ranges assigned, and the sequence in which the STIs are assigned for direct attachments. To see what STIs are used for FIBB attachment and what CHPIDs are assigned to the card slots for parallel channels, coupling facility channels, ESCON, and OSA-2, refer to “CHPID Assignments for FIBB Attachment” on page 7-7. For an explanation of how CHPIDs are assigned for direct attachments, refer to “CHPID Assignments for Direct Attachment” on page 7-9.

Table 7-1. STI Links and CHPID ranges for the two-bus models.

STI Link #	Connector Location	FIBB Link CHPID Range	Sequence Used for Direct Attachment
0	J.00	00-1F	12
1	J.10	20-3F	11
2	J.02	40-5F	10
3	J.12	60-7F	9
4	J.04	80-9F	8
5	J.14	A0-BF	7
6	J.06	C0-D7	6
7	J.16	D8-EF	5
8	J.08	F0-FF	4
9	J.18	--	1
10	LG31J.00	--	2
11	LG31J.02	--	3

Notes:

1. Connectors for STI links 0-9 are on the rear of the CPC board behind the MCM (AA01J.00 to AA01J.09 on the top row, AA01J.10 to AA01J.19 on the bottom row)
2. Connectors for STI links 10 and 11 are on logic card 31 (LG31J.00 is at the top).
3. Use the FIB Link Range for STIs connected to a FIBB card in an I/O expansion cage.
4. For STIs connected as Integrated Cluster Busses (ICBs) and FICON or Gigabit Ethernet channels, refer to"CHPID Assignments for Direct Attachment" on page 7-9 .
5. When STIs from 09 through 11 are used for direct attachment, the corresponding CHPIDs and card slots are not available. For I/O card slot assignments, refer to the tables starting on page 7-8.
6. The Sequence Used for Direct Attachment column shows the sequence used in assigning STI ports to the ICBs and FICON or Gigabit Ethernet channels.
7. STIs are reserved in pairs for FICON channels.

Table 7-2. STI links and CHPID ranges for the four-bus models.

STI Link #	Connector Location	FIBB Link CHPID Range	Sequence Used for Direct Attachment
0	J.00	00-1F	24
1	J.10	20-3F	23
2	J.02	40-5F	22
3	J.12	60-7F	21
4	J.01	80-9F	20
5	J.11	A0-BF	19
6	J.03	C0-D7	18
7	J.13	D8-EF	17
8	J.04	F0-FF	16
9	J.14	--	1
10	J.05	--	2
11	J.15	--	3
12	J.06	--	4
13	J.16	--	5
14	J.07	--	6
15	J.17	--	7
16	J.08	--	8
17	J.18	--	9
18	J.09	--	10
19	J.19	--	11
20	LG31J.00	--	12
21	LG31J.02	--	13
22	LG31J.01	--	14
23	LG31J.03	--	15

Notes:

1. Connectors for STI links 0 to 19 are on the rear of the CPC board behind the MCM (AA01J.00 to AA01J.09 on the top row, AA01J.10 to AA01J.19 on the bottom row)
2. Connectors for STI links 20 to 23 are on logic card 31 (LG31J.00 is at the top).
3. Use the FIBB Link Range for STIs connected to a FIB card in an I/O expansion cage.
4. For STIs connected as Integrated Cluster Busses (ICBs) or to FICON or Gigabit Ethernet channels, refer to"CHPID Assignments for Direct Attachment" on page 7-9 .
5. When STIs from 09 through 23 are used for direct attachment, the corresponding CHPIDs and card slots are not available. For card slot assignments, refer to the tables starting on page 7-8
6. The Sequence Used for Direct Attachment column shows the sequence used in assigning STI ports to the ICBs and FICON channels.
7. STIs are reserved in pairs for FICON channels.

CHPID Assignments for FIBB Attachment

Use Table 7-3 on page 7-8 through Table 7-5 on page 7-8 to determine the CHPID values for parallel, ESCON, coupling facility, and OSA-2 channels. For FICON channels and ICBs, refer to the information in "CHPID Assignments for Direct Attachment" on page 7-9.

Table 7-3. CHPID numbers for the first feature code 2020 or 2021 expansion cage

FIBB Card Slot	STI Link	I/O Card Slot and associated CHPID range							
		11	**10**	**29**	**28**	**27**	**26**	**25**	**8**
12	4	80–83	84–87	88–8B	8C–8F	90–93	94–97	98–9B	9C–9F
FIBB Card Slot	STI Link	**I/O Card Slot and associated CHPID range**							
		22	21	18	17	15	14	20	19
13	5	A0–A3	A4–A7	A8–AB	AC–AF	B0–B3	B4–B7	B8–BB	BC–BF
FIBB Card Slot	STI Link	**I/O Card Slot and associated CHPID range**							
		7	6	34	33	32	31	–	–
5	7	D8–DB	DC–DF	E0–E3	E4–E7	E8–EB	EC–EF	–	–

Table 7-4. CHPID numbers for the second feature code 2020 expansion cage

FIBB Card Slot	STI Link	I/O Card Slot and associated CHPID range							
		11	**10**	**29**	**28**	**27**	**26**	**25**	**8**
12	0	00–03	04–07	08–0B	0C–0F	10–13	14–17	18–1B	1C–1F
FIBB Card Slot	STI Link	**I/O Card Slot and associated CHPID range**							
		22	21	18	17	15	14	20	19
13	1	20–23	24–27	28–2B	2C–2F	30–33	34–37	38–3B	3C–3F
FIBB Card Slot	STI Link	**I/O Card Slot and associated CHPID range**							
		7	6	34	33	32	31	–	–
5	6	C0–C3	C4–C7	C8–CB	CC–CF	D0–D3	D4–D7	–	–

Table 7-5. CHPID numbers for the third feature code 2020 expansion cage

FIBB Card Slot	STI Link	I/O Card Slot and associated CHPID range							
		11	**10**	**29**	**28**	**27**	**26**	**25**	**8**
12	2	40–43	44–47	48–4B	4C–4F	50–53	54–57	58–5B	5C–5F
FIBB Card Slot	STI Link	**I/O Card Slot and associated CHPID range**							
		22	21	18	17	15	14	20	19
13	3	60–63	64–67	68–6B	6C–6F	70–73	74–77	78–7B	7C–7F
FIBB Card Slot	STI Link	**I/O Card Slot and associated CHPID range**							
		7	6	34	33	32	31	–	–
5	8	F0–F3	F4–F7	F8–FB	FC–FF	–	–	–	–

CHPID Assignments for Direct Attachment

Unlike for I/O cages, STIs used for direct attachments (ICB, FICON, PCI cryptographic coprocessor,and Gigabit Ethernet) will not have fixed CHPID numbers assigned to each card slot. CHPID numbers are assigned as follows:

- Table 7-1 on page 7-6 and Table 7-2 on page 7-7 show the the STI sequence used for direct attachments.
- CHPID numbers are always used from the high end of the range starting with modulo-4 ('FC', 'FD', 'FE', 'FF', 'F8', ...)
- The 1st, 5th, 9th, 13th, and 17th STI used for an ICB will reserve the next available block of four CHPID numbers. Example: if there are no direct attachment features installed, the first STI used for an ICB will get assigned CHPID number 'FC', the 5th will get assigned 'F8'.
- The next three STIs used for ICBs will be assigned consecutive CHPID numbers. For example, if the 1st ICB is CHPID 'FC', the 2nd, 3rd, and 4th ICBs will be assigned CHPID numbers 'FD', 'FE', and 'FF'.
- Four-bus machines reserve STIs in groups of four for the first eight ICBs.
- ICB links can be added to the system using the **Non-disruptive hardware change** under **CPC Configuration**.
- STIs are reserved in pairs for the direct attachment features.
- Each STI attached to a direct attachment feature card is assigned the next available modulo-4 CHPID number and that STI is assigned all four CHPID numbers. The first (modulo-4) CHPID number is assigned to the feature card that is directly attached to the STI. The following CHPID numbers are assigned to the cards chained to the first card. If there are no cards chained, the remaining CHPIDs are reserved.
- When the system is powered on, use the procedure in “Displaying I/O Card Information” on page 6-38 to determine the CHPIDs assigned to direct attachments and the procedure in “Displaying Chain Status” on page 6-42 for displaying chain status.

Note: This means that two Generation 5 or 6 servers with the same numbers of ICB, FICON, and Gigabit Ethernet features may have different CHPID values assigned depending on the sequence of ICB and FICON upgrades.

An Example of Direct Attachments with Chaining

The FICON and Gigabit Ethernet feature cards are connected in STI “chains.” Figure 7-1 on page 7-10 shows an example with two chains of directly attached feature cards. The card locations and CHPID assignments are shown in the figure.

- Up to 24 direct attachment feature cards are allowed per system. A maximum of eight can be plugged in each I/O cage.
- The sequence in which the I/O expansion cages are used for direct attachment feature cards is:

  1. Expansion cage 3 at Z18B (if installed)
  2. Expansion cage 1 at A01B
  3. Expansion cage 2 at Z01B

  The first six direct attachment cards are plugged in a cage before starting on the strings in the next cage.

- For the first six direct attachment cards The sequence in which the I/O expansion cage card slots are used is: 31, 06, 32, 07, 33, and 34. Slots 31 and 06 are connected directly to an STI port. The others are connected in chains.
- After the first 18 direct attachment cards are installed, two more cards can be added to the cages following the same cage sequence (cage 3, cage 1, and cage 2). To do this, the existing card at slot 34 is moved to slot 08 and new cards are added to slot 34 and then to slot 25.
- If both strings in a cage are used, the last cards in each string are connected. (Cards 07 and 32 in the example shown in Figure 7-1). This connection provides an alternate path to the CHPIDs in each string.

  For example: if the card in slot 31 of Figure 7-1 is removed, the licensed internal code can still address CHPID FD (card slot 32) by using the connections from STI link 10.

  Note: Alternate path requires Driver 22 plus an MCF. For the availability of the MCF, refer to the Service Support System.

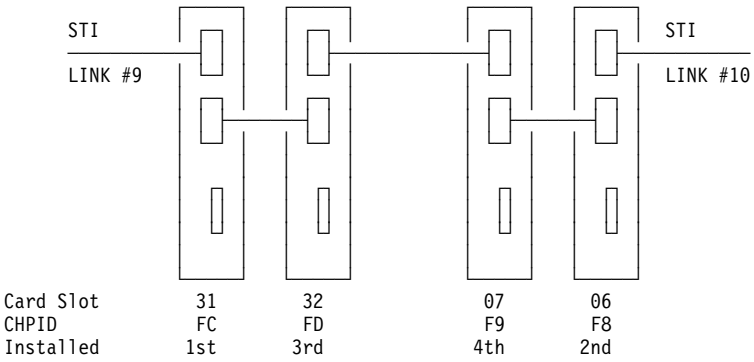


Figure 7-1. Example of two direct connect chains.

An Example of CHPID Assignments

Because of the way the STIs are assigned, systems with the same numbers of direct attach feature cards may have different CHPIDs. The example below shows this.

For the example System A had two FICON features installed when it was manufactured and six ICBs added later. System B had six ICBs configured when it was manufactured and had two FICON features added later. Table 7-6 on page 7-11 shows the configuration of the two systems (both are four-bus models).

Note: Since CHPIDs F0 through FF are assigned to direct attachments, none of the expansion card slots assigned to STI link 8 are available for channel cards (slots 6, 7, 33, and 34 of the third expansion cage).

Table 7-6. Examples of STI and CHPID assignments for direct attachment on four-bus models.

System A			System B		
Feature	**STI Link**	**CHPID**	**Feature**	**STI Link**	**CHPID**
FICON	9	FC (FD-FF reserved for chained cards)	ICB	9	FC
FICON	10	F8 (F9-FB reserved for chained cards)	ICB	10	FD
ICB	11	F4	ICB	11	FE
ICB	12	F5	ICB	12	FF
ICB	13	F6	ICB	13	F8
ICB	14	F7	ICB	14 (15-16 reserved)	F9 (FA-FB reserved)
ICB	15	F0	FICON	17	F4 (F5-F7 reserved for chained cards)
ICB	16 (17-18 reserved)	F1 (F2-F3 reserved)	FICON	18	F0 (F1-F3 reserved for chained cards)

Fiber Trunk System

The Fiber Trunk System consists of a harness that connects the ESCON CHPIDs to a tailgate, and a fiber trunk cable for convenient attachment of ESCON I/O devices. There is a harness and a tailgate at the front and at the rear of each I/O expansion cage.

Note: The description here only applies to the following factory-installed features: 7903 (front tailgate), 7931 (rear tailgate), and 7932 (harness). There may be other fiber trunk systems available.

The harness has six duplex (ESCON) connectors at the card end and a single MTP connector at the tailgate end. Each tailgate connector contains the 12 fiber strands required for the six ESCON channels. Use the tables on pages 7-12, and 7-13 to locate the ESCON channel connections at the fiber trunk tailgates.

Note: Unplugging a trunk cable connector will disrupt the six CHPIDs connected to that tailgate location. Use the tables to determine which CHPIDs will be affected and, before unplugging the cable for cleaning or troubleshooting, notify the customer to vary the CHPIDs offline. Example: If you are working on CHPID 'DD', Table 7-7 shows that CHPID 'DD' is in position 1 of the tailgate at location A07 of frame A. CHPIDs 'DC', 'DE', 'DF', 'D9', and 'DA' are also in position 1 of the tailgate connector.

There are no special tests available for the fiber trunk feature, use the normal procedures to resolve ESCON channel problems.

Table 7-7. Expansion cage at location A01B

I/O Slot	CHPID	Tailgate Connector	CHPID	Tailgate Connector	CHPID	Tailgate Connector	CHPID	Tailgate Connector
				Front connector - location A07				
6	DC	1-1	DD	1-2	DE	1-3	DF	1-4
7	D8	1-5	D9	1-6	DA	2-1	DB	2-2
8	9C	2-3	9D	2-4	9E	2-5	9F	2-6
10	84	3-1	85	3-2	86	3-3	87	3-4
11	80	3-5	81	3-6	82	4-1	83	4-2
14	B4	4-3	B5	4-4	B6	4-5	B7	4-6
15	B0	5-1	B1	5-2	B2	5-3	B3	5-4
17	AC	5-5	AD	5-6	AE	6-1	AF	6-2
18	A8	6-3	A9	6-4	AA	6-5	AB	6-6
				Rear connector - location Z07				
19	BC	1-1	BD	1-2	BE	1-3	BF	1-4
20	B8	1-5	B9	1-6	BA	2-1	BB	2-2
21	A4	2-3	A5	2-4	A6	2-5	A7	2-6
22	A0	3-1	A1	3-2	A2	3-3	A3	3-4
25	98	3-5	99	3-6	9A	4-1	9B	4-2
26	94	4-3	95	4-4	96	4-5	97	4-6
27	90	5-1	91	5-2	92	5-3	93	5-4
28	8C	5-5	8D	5-6	8E	6-1	8F	6-2
29	88	6-3	89	6-4	8A	6-5	8B	6-6
31	EC	7-1	ED	7-2	EE	7-3	EF	7-4
32	E8	7-5	E9	7-6	EA	8-1	EB	8-2
33	E4	8-3	E5	8-4	E6	8-5	E7	8-6
34	E0	9-1	E1	9-2	E2	9-3	E3	9-4

Table 7-8. Expansion cage at location Z01B

I/O Slot	CHPID	Tailgate Connector	CHPID	Tailgate Connector	CHPID	Tailgate Connector	CHPID	Tailgate Connector
				Front connector - location A07				
6	C4	1-1	C5	1-2	C6	1-3	C7	1-4
7	C0	1-5	C1	1-6	C2	2-1	C3	2-2
8	1C	2-3	1D	2-4	1E	2-5	1F	2-6
10	04	3-1	05	3-2	06	3-3	07	3-4
11	00	3-5	01	3-6	02	4-1	03	4-2
14	34	4-3	35	4-4	36	4-5	37	4-6
15	30	5-1	31	5-2	32	5-3	33	5-4
17	2C	5-5	2D	5-6	2E	6-1	2F	6-2
18	28	6-3	29	6-4	2A	6-5	2B	6-6
				Rear connector - location Z07				
19	3C	1-1	3D	1-2	3E	1-3	3F	1-4
20	38	1-5	39	1-6	3A	2-1	3B	2-2
21	24	2-3	25	2-4	26	2-5	27	2-6
22	20	3-1	21	3-2	22	3-3	23	3-4
25	18	3-5	19	3-6	1A	4-1	1B	4-2
26	14	4-3	15	4-4	16	4-5	17	4-6
27	10	5-1	11	5-2	12	5-3	13	5-4
28	0C	5-5	0D	5-6	0E	6-1	0F	6-2
29	08	6-3	09	6-4	0A	6-5	0B	6-6
31	D4	7-1	D5	7-2	D6	7-3	D7	7-4
32	D0	7-5	D1	7-6	D2	8-1	D3	8-2
33	CC	8-3	CD	8-4	CE	8-5	CF	8-6
34	C8	9-1	C9	9-2	CA	9-3	CB	9-4

Table 7-9. Expansion cage at location Z18B

I/O Slot	CHPID	Tailgate Connector	CHPID	Tailgate Connector	CHPID	Tailgate Connector	CHPID	Tailgate Connector
				Front connector - location A15				
6	F4	1-1	F5	1-2	F6	1-3	F7	1-4
7	F0	1-5	F1	1-6	F2	2-1	F3	2-2
8	5C	2-3	5D	2-4	5E	2-5	5F	2-6
10	44	3-1	45	3-2	46	3-3	47	3-4
11	40	3-5	41	3-6	42	4-1	43	4-2
14	74	4-3	75	4-4	76	4-5	77	4-6
15	70	5-1	71	5-2	72	5-3	73	5-4
17	6C	5-5	6D	5-6	6E	6-1	6F	6-2
18	68	6-3	69	6-4	6A	6-5	6B	6-6
				Rear connector - location Z15				
19	7C	1-1	7D	1-2	7E	1-3	7F	1-4
20	78	1-5	79	1-6	7A	2-1	7B	2-2
21	64	2-3	65	2-4	66	2-5	67	2-6
22	60	3-1	61	3-2	62	3-3	63	3-4
25	58	3-5	59	3-6	5A	4-1	5B	4-2
26	54	4-3	55	4-4	56	4-5	57	4-6
27	50	5-1	51	5-2	52	5-3	53	5-4
28	4C	5-5	4D	5-6	4E	6-1	4F	6-2
29	48	6-3	49	6-4	4A	6-5	4B	6-6
33	FC	8-3	FD	8-4	FE	8-5	FF	8-6
34	F8	9-1	F9	9-2	FA	9-3	FB	9-4

Channel Tests

This section gives you a basic understanding of what channel tests are available. For information on running the tests, see “Running Tests” on page 6-9.

The following channel tests are available:

- Port/interface logic
- Wrap
- Fiber extended channel
- Optical power measurement
- Linktest
- Looptest

The **port/interface test** is for all channel types. The test checks all channel circuits except the receivers and drivers.

The **serial wrap test** is for ESCON channels. The test checks the optical receiver and driver by wrapping the optical signal through a special wrap connector plugged on the card.

The **FICON link test** is for FICON channels. The test checks the integrity of the fiber optic cable by wrapping an optical signal through a special wrap connector plugged on the end of the cable.

The **ISC wrap test** is for coupling facility channels. The test checks the optical receiver and driver by wrapping the optical signal through a special wrap connector plugged on the card.

The **ICB wrap test** is for ICB feature. The test wraps data from the internal CPC hardware to the STI port.

The **parallel wrap test** is available only for parallel channels. The test first ensures each line can be reset, then sends signals out through the cables to wrap connectors where the signals are sent back to the channel card. The wrap connectors can be installed at the tailgate or on the ends of the channel cables going to the first control unit on the interface.

Note: You can verify the entire interface by installing the wrap connectors in place of the terminators. However, some control units do not handle the test tag sequences correctly so errors may occur without an actual problem on the interface.

The **fiber extended channel test** is available only if the selected ESCON channel has an ES Conversion Channel attached. The test sends information to the ES Conversion Channel and checks the responses.

The **optical power measurement** tests are available for ESCON, FICON, and coupling facility channels and OSA features FDDI and ATM. It initializes the channels (where necessary) and provides instructions for measuring feature card optical output power.

Linktest is available for ESCON, and coupling facility channels. It provides the ability to wrap a signal over an entire link. For details about how the test is to be used and the setup required, refer to “Running Linktest (ESCON)” on page 7-15 and “Running Linktest (Coupling Facility Channel)” on page 7-15.

Looptest is available only for coupling facility channels. Coupling Facility channels on two CPCs are used in a master/slave relationship. The one running Looptest is used to wrap the signal back to coupling facility channel at the other end of the link. That coupling facility channel runs the Linktest. For details about how the test is to be used and the setup required, refer to "Running Linktest (Coupling Facility Channel)."

Running Linktest (ESCON)

Use the information in this section to setup an optical link and run linktest.

Linktest is used to verify an ESCON channel link and test for bit errors. For an ESCON channel, test wraps a signal from the ESCON channel card to any of the following:

- a wrap plug (connected on the channel card)
- a wrap plug connected to the end of the channel cable
- an ESCON director with the director port in wrap mode
- through an ESCON director (static) to a wrap plug connected to the end of the channel cable
- through an ESCON director (static) to another ESCON director with the director port in wrap mode

Note: Optical links normally have bit errors. Linktest is not fault tolerant, the failure rate of the test depends upon the length of the link and the quality of the connections. If you loop the test, it will eventually fail.

For information on setting up an optical link to run Linktest, search the Technical Data Records (TDR) in the IBM Support System for the keyword "LINKTEST." For instructions on starting the test, follow the instructions in "Running Tests" on page 6-9. Use the following selections:

- **Channel interface tests**
- **Single channel interface tests**
- CHPID for the channel being tested
- **Do not loop, and stop if an error is detected**
- **Linktest**

Running Linktest (Coupling Facility Channel)

Use the information in this section to setup an optical link and run linktest.

Linktest is used to verify a coupling facility channel link and test for bit errors. The following scenarios are supported:

- Channels on both sides placed into single channel service, one running Linktest, the other running Looptest.
  - This is the preferred mode for testing installation and is the least disruptive and safest method for testing the customer's system when both channels can be placed in single channel service
- One side placed in single channel service and running Linktest, the other channel remains in normal operation.
  - This is the preferred mode for quick tests or testing to older channels or non-IBM equipment that do not provide Linktest.

  - Works from either sender (OS/390) side or receiver (CF) side.

- Wrap modes
  - Runs into a local wrap plug, or to a fiber wrap installed at the other end of the cable. This helps isolate problems to the card, or the cable. Errors with a wrap plug attached indicate local card problems. Errors with a link wrap indicate fiber problems, or marginal optical receiver/drivers on the card. The test with the fiber cable may indicate more bit errors due to having to travel twice the distance.

Notes:

1. Optical links normally have bit errors. Linktest is not fault tolerant, the failure rate of the test depends upon the length of the link and the quality of the connections. If you loop the test, it will eventually fail.
2. If the Coupling Facility Mode Conditioner (FC0107) is installed, use the wrap plug for multi-mode (FC0007) at the end of the link. (For part numbers refer to Appendix C, “Tools” on page C-1.) Also, ensure that the cable you are testing is less than 550 meters (1800 ft.). The test will not run reliably if the combined length of the multimode coupling facility cable plus two Mode Conditioner cables is greater than 550 meters.

For instructions on starting the test, follow the instructions in “Running Tests” on page 6-9. If the attached system can run Looptest, use the following selections at that side to run Looptest (slave side):

- **Channel interface tests**
- **Single channel interface tests**
- CHPID for the coupling facility channel being tested
- **Do not loop, and stop if an error is detected**
- **Looptest**

The side running Looptest runs until it is stopped, an error is detected, or until a timeout interval is reached.

After the Looptest is started, go to the side designated to run Linktest (master side) and select:

- **Channel interface tests**
- **Single channel interface tests**
- CHPID for the coupling facility channel being tested
- **Do not loop, and stop if an error is detected**
- **Linktest**

The side running the Linktest will always report the errors. If the other side is running Looptest, it will report errors.

If the other side of the link is not in single channel service mode (not running Looptest), Linktest will run and either complete or indicate a failure. Normal mode operational channels respond to the test sequences sent out from the Linktest, allowing the test to be run to non-IBM machines, or to older IBM machines that do not have Linktest/Looptest diagnostic capability. The other side must be operating for this to work. If the other side is not yet operational (installs or fiber changes), go to the other side of the link, and begin the Linktest from the other side (if available).

Another method of problem determination is to install wrap plugs either on the local card or at the opposite end of the fiber optic cable, then start the Linktest.

Resolving Channel Problems

Use the information in this section to assist in resolving difficult or intermittent problems with ESCON, FICON, parallel, or coupling facility channels. For Integrated Cluster Bus (ICB) problems, refer to “Resolving ICB Problems” on page 7-40.

Note: The I/O exerciser referred to in step 5 is not shipped with the product. The service representative must provide a suitable exerciser. Depending on which exerciser is available to you, the exerciser may or may not run concurrently. For more information, call for assistance.

1

Were you directed to run channel tests by the *Link Fault Isolation* manual?

NO **YES**

↓ Go to step 12.

2

Does the Hardware Management Console have an entry in View Console Service History

Note: The status for a link incident problem is always set to **Closed**

NO **YES**

↓ Go to step 12.

3

Do you have a new device or new I/O configuration that is failing?

NO **YES**

↓ Use the information in the right-hand column to correct the problem.

Ensure the following:

- The control units and devices are defined in the operating system **and** the IOCDS.
- The addresses supplied for the devices/control units agree with those in the operating system and IOCDS.
- Subsystem configuration was completed for all I/O controller subsystems **before** the IOCDS was created for the system. If not, the IOCDS will have only the subsystem default values.

Note: Some devices require special considerations when defining IOCDS. For more information, refer to “Special IOCDS Requirements” on page 7-58

If the devices are configured correctly, continue with step 4.

4

Did you get an operating system message of “device not available” (Condition Code=3)?

YES **NO**

↓ Go to step 10.

5

Ensure the following:

- Device that you are testing and its control unit are powered on.
- Interface is not disabled at the control unit.
- Device is correctly defined in the operating system - see the system programmer.
- The address range and model type assigned to the control unit for the device are correct in the I/O Configuration Data Set (IOCDS).

If you find and correct the problem, close the call. For instructions, refer to “Closing a Call” on page 6-49.

If all of the above conditions are correct, ensure the device is ready, then run an I/O exerciser (see **Note**). When the exerciser run is complete, go to step 6.

Note: The I/O exerciser is not shipped with the product. The service representative must provide a suitable exerciser.

For a description of how to view the IOCDS, refer to “Viewing I/O Configuration Data Set” on page 7-47.

6

Was the device tested by the I/O exerciser?

YES NO

↓ Go to step 8.

7

The device is not configured correctly in either the IOCDS or the system. If you have not already done so, ensure the following:

- Device and control unit are powered on.
- Interface is not disabled at control unit.
- Device is correctly defined in the operating system.
- The address range and model type assigned to the control unit for the device are correct in the IOCDS.

Work with the system programmer to ensure these are all correct.

If you find and correct the problem, close the call. For instructions, refer to “Closing a Call” on page 6-49.

If all of the above conditions are correct, go to step 8.

For a description of how to view the IOCDS, refer to “Viewing I/O Configuration Data Set” on page 7-47.

8

Run the wrap test on the channel.

Did the wrap test detect any errors?

YES **NO**

↓ Call for assistance.

For information on channel wrap test, see “Channel Tests” on page 7-14.

9

Follow the information on the windows to isolate the problem.

End of procedure

10

Did the operating system or Problem Analysis report an interrupt from a device that is not defined in the I/O Configuration Data Set (IOCDS).

NO **YES**

↓ Use the information in the right-hand column to correct the problem.

Ensure the following:

- The address range and model type assigned to the control unit for the device are correct in the I/O Configuration Data Set (IOCDS).
- The device or device control unit has the correct address information.

Work with the system programmer to ensure these are all correct. For a description of how to view the IOCDS, refer to “Viewing I/O Configuration Data Set” on page 7-47.

- If you find and correct the problem, close the call. For instructions, refer to “Closing a Call” on page 6-49.
- If you cannot find the problem, call for assistance.

End of procedure

11

Did the operating system report a problem on a **parallel channel**?

NO **YES**

↓ Follow the instructions in the right-hand column.

Use the information in “Analyzing Interface Control Checks” on page 7-29 to see if an interface control check (IFCC) occurred on a parallel channel at the time of the system error.

- If an IFCC occurred, use the information to repair the problem.
- If no IFCC occurred at the time of the system error, the problem may be intermittent. Attempt to swap two channels to see if the problem remains with the channel card or with the I/O devices and cables. For information on swapping channels, refer to “Channel Swap Procedure” on page 7-25. If you cannot resolve the problem, call for assistance.

---

12 Running optical channel tests for ESCON, FICON, or Coupling Facility channel problem

The following steps will direct you to run the optical channel tests. If you are swapping or resetting coupling facility channels, read “Safety” on page 7-3.

- Before connecting fiber optic cables or connectors, clean the fiber optic cable connectors according to the instructions in the optical cleaning kit.

At the Hardware Management Console:

- Have the customer place the CPC you will be working on in service status.

At the CPC:

- Prepare the support element for service.

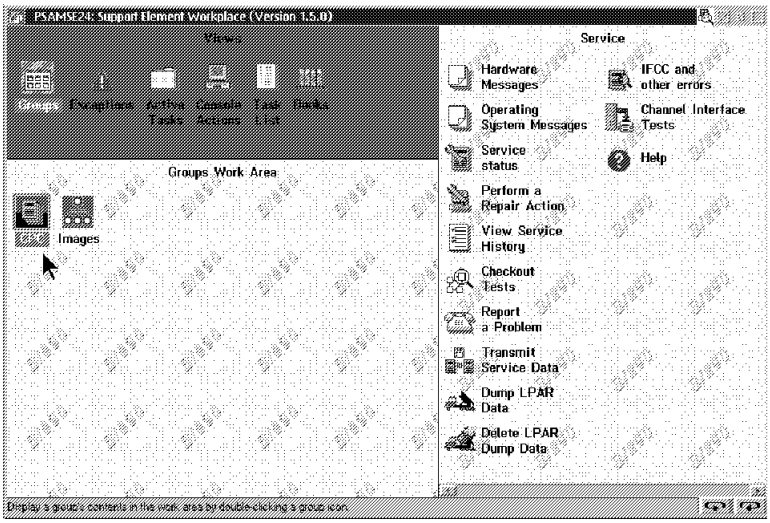
For information on placing the CPC in service status and connecting to the support element, refer to “Starting Service with the Support Element” on page 1-10.

13

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **Service Tasks** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Open **Defined CPCs** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) and drop it on **Channel Interface Tests** under Service.



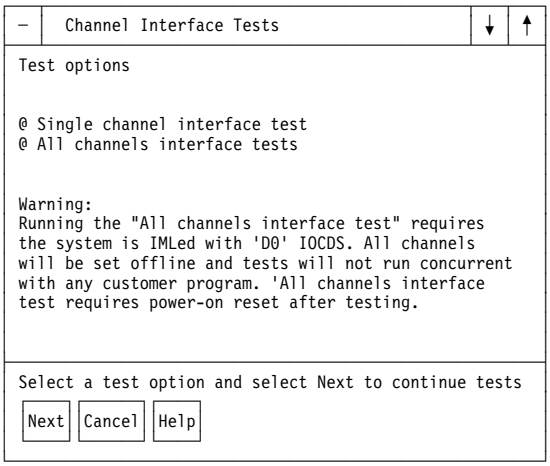
Go to step 14.

14

On the first Channel Interface Tests window:

- Select **Single channel interface tests** from the menu.
- Request **Next**.

Go to step 15.

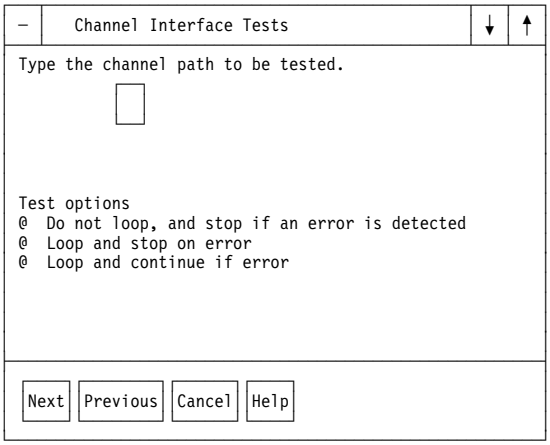


15

On the next Channel Interface Tests window:

- Type in the CHPID you want to test.
- Select **Do not loop, and stop if an error is detected** from the menu.
- Request **Next**.

Follow the directions on the panels to vary the CHPID off line. When complete, go to step 16.



16

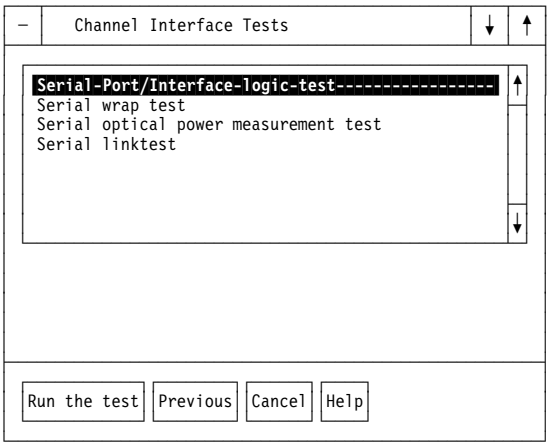
Run the following channel tests one at a time:

- Port/interface test
- Wrap test
- Optical power measurement test
- Linktest (ESCON and coupling facility channels only)

To run the tests from the Channel Interface Tests window:

- Select the test to be run from the menu.
- Request **Run the test**.
- Follow the directions displayed on the test windows.

When a failure occurs or the tests have all run, go to step 17.



Test selection window for an ESCON channel shown.

17

Were any errors detected by the channel tests?

NO **YES**

↓ Go to "On-line CPC Service" on page 1-22 and use the first problem number opened during the tests.

18

Are you testing a FICON channel?

NO **YES**

↓ Use the information in the right hand column to do additional FICON testing.

Test the fiber optic cable attached to the FICON channel as follows:

Follow the procedures outlined in steps 12 through 16 to rerun the FICON wrap test. **This time, test with the wrap plug at the end of the fiber optic cable (see Note)**.

- If there are no failures, continue on step 20.
- If the test fails and the total path length is greater than 1000 meters, continue on step 20.
- If the test fails and the total path length is less than 1000 meters, the fiber optic cable is the probable cause of the problem. Exchange the cable and run the test again. If the test runs correctly, close the call. For information, refer to "Closing a Call" on page 6-49. If the test still fails, continue on step 20.

Note: The FICON wrap test with the wrap plug on the fiber optic cable should run without errors if the **total** fiber path is less than 1000 meters. Errors may occur if the total fiber path is greater than 1000 meters.

With the wrap plug installed the total fiber path is the fiber length from the FICON card to the wrap plug plus the fiber length from the wrap plug back to the card.

19

The problem is either in the attached device or fiber optic cable.

Run port interface diagnostics at the other attached node using the product specific maintenance package.

Use the product maintenance package and *Link Fault Isolation*, SY22-9533 to isolate and repair the failure.

When complete, close any calls that were opened as a result of the service activity on the CPC you are working on now. Then, prepare the support element for normal operation. For information, refer to "Closing a Call" on page 6-49.

End of procedure

---

20 Channel tests run without error

Do you have an intermittent channel problem?

NO **YES**

↓ Use the information in the right-hand column to correct the problem.

Attempt to swap two channels to see if the problem remains with the channel card or with the I/O devices and cables. For information on swapping channels, refer to “Channel Swap Procedure” on page 7-25.

If you cannot resolve the problem using channel swap, continue on step 22.

21

Were you directed to run channel tests by the *Link Fault Isolation* manual?

NO **YES**

↓ Continue in *Link Fault Isolation*, SY22-9533.

22

Use the following references to attempt to isolate the failure:

- Status information for channels is available in the CHPIDs Work Area on the Support Element Workplace window.
- System error information is available using **IFCCs and Other Errors** under the **Service** tasks. For more information, refer to “Viewing Problem Analysis Results” on page 6-2.
- Link isolation information is available in *Link Fault Isolation*, SY22-9533.

If you cannot resolve the problem using this information, call for assistance.

For information about the tasks, use the on-line Help information.

End of procedure.

Channel Swap Procedure

This procedure can be used to help isolate difficult or intermittent channel problems. The procedure allows you to swap the CHPIDs assigned to two channel card ports and their cables. After swapping port assignments and cables, test using either the system test exerciser or normal customer operation.

Notes:

1. Up to four pairs of channels swapped at the same time.
2. To do the channel swap, the pair of channels selected must be the same type (both are 2303, or 2304, or 2313, or 2314, or 2316, or 0007, or 0008). Note. Do not use channel swap for OSA subsystems or Integrated Cluster Bus (ICB).
3. If the channel swap procedure is used, the CHPIDs for the two channels are reversed from those shown in “Channel Locations by CHPID” on page 7-4.
4. After two channels are swapped the CHPIDs Work Area initially displays their status as “Swapped.”

1

If the customer is operating the system, have the operator vary the channels pairs to be swapped or reset offline.

If you are testing with the system test exerciser, start the program after the cable swap is complete.

2

- Ensure system activation is complete.
- If you are using the support element for this task, prepare the support element for service. For information, refer to “Starting Service with the Support Element” on page 1-10.
- If you are using the Hardware Management Console for this task, make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.
- Ensure the support element is in service mode.

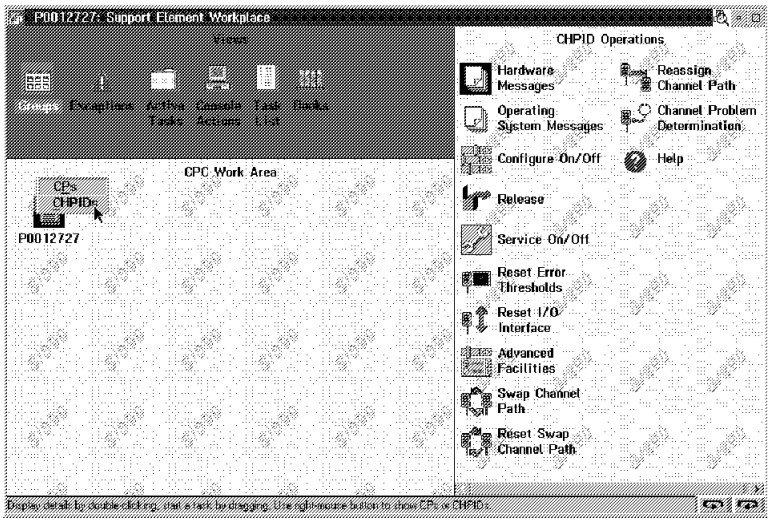
3

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CHPID Operations** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Open **CPC** from the **Groups Work Area**.
- Set the mouse pointer on the system icon and click one time with the right hand mouse button to display the CP/CHPIDs popup menu.
- Select **CHPIDs** from the popup menu.

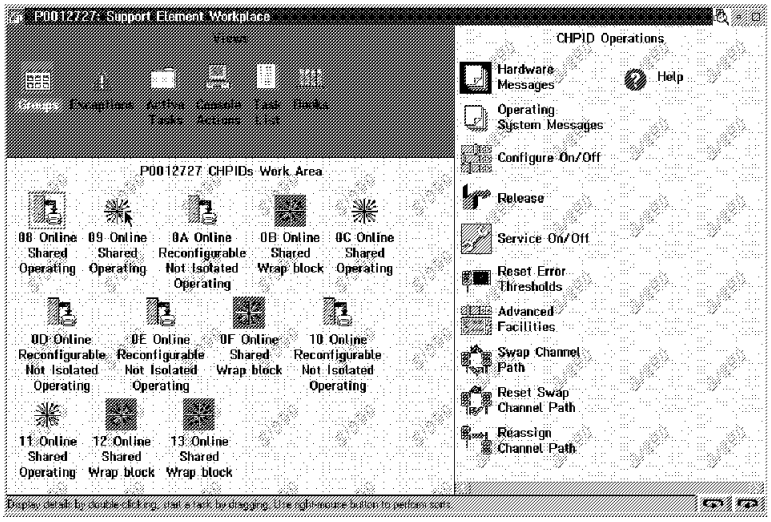
Go to step 4.



4

Find the CHPIDs you are working with in the CHPID Work Area and determine their status.

- If the status of the CHPID is “Swapped,” double-click on the CHPID icon with the left mouse button. The CHPID Details window displays which CHPID was swapped with the one you selected. Continue on step 5.
- If the status of the CHPID is “Standby” or “Reserved,” go to step 6.
- For any other status, continue on step 5.



5

The status of the two channels must be either "Standby" or "Reserved." If the customer could not vary the channels offline, use the procedure in "Placing a Channel in Standby or Reserved Status" on page 6-30 to place the channels in "Standby" status. When complete, return to step 6.

6

Note: To reset swapped channel paths, use the information at the right.

To swap the channel paths:

- Select the two channels you are going to swap by clicking once on each CHPID icon (use the left-hand mouse button).
- Ensure that no other CHPIDs are selected.
- Drag one of the CHPID icons (using the right-hand mouse button) and drop it on **Swap channel path** under **CHPID Operations**.

Continue on step 7.

To reset a swapped channel pair:

- Select the two channels you are going to reset by clicking once on each CHPID icon (use the left-hand mouse button).
- Ensure that no other CHPIDs are selected.
- Drag one of the CHPID icons (using the right-hand mouse button) and drop it on **Reset swapped channel path** under **CHPID Operations**.
- Follow the directions on the windows to reset the channel pair.

Continue on step 7.

7

If you are swapping or resetting coupling facility channels, read "Safety" on page 7-3.

Swap the two channel cables.

Select **OK** on the System Message windows.

Note: Before connecting fiber optic cables or connectors, clean the fiber optic cable connectors according to the instructions in the optical cleaning kit.

8

The licensed internal code for the two channels is loaded automatically.

If you are swapping a channel pair, the status of the channels initially displays "Swapped" in the CHPID Work Area.

Note: The status may be changed later. See the notes at the beginning of this procedure.

Repeat steps 6 and 7 for additional channel pairs. (See **Notes** at the beginning of this procedure.)

Have the operator vary the two channels online.

9

If you are using channel swap to isolate an error, after isolation is complete use the **Reset Swapped Channel Path** task (see step 6) to swap the channels back, then return the cables to their original positions.

Note: If the customer is operating the system, have the operator vary the two channels offline before you swap the channels and cables back.

End of procedure

Analyzing Interface Control Checks

This section gives you extra information to assist you in analyzing Parallel, ESCON, and FICON interface control checks (IFCCs). IFCCs indicate that an invalid signal was received by the channel while communicating with a control unit or device.

Parallel IFCCs can be caused by any of the following:

- The address or status byte received from a device has invalid parity. (An even number of bus-in lines are active when Address In, Data In, Status In, or Service In are active).
- The device being selected by the channel responded with a different address on bus in than the channel sent on bus out.
- During command chaining the selected device became not operational (timed out).
- A control unit raised Disconnect In (I/O error alert).
- A control unit raised a tag in line at the wrong time. Any of the tag sequences listed below are invalid:

  Address In ***and*** Service In ***or*** Data In ***or*** Select In ***or*** Status In
  Status In ***and*** Service In ***or*** Data In ***or*** Select In ***or*** Address In
  Select In ***and*** Service In ***or*** Data In ***or*** Status In ***or*** Address In ***or*** Operational In

For detailed information about tag sequences, refer to *IBM System/360 and System/370 Interface Channel to Control Unit Original Equipment Manufactures' Information*, GA22-6974.

Use the procedure in “Viewing Problem Analysis Results” on page 6-2 to look at the information recorded by Problem Analysis at the time of an IFCC is detected. Then, use the following additional information to correct the problem:

Parallel IFCC Trace Information

The procedure for viewing IFCC information, including the trace is given in “Viewing Problem Analysis Results” on page 6-2. Figure 7-2 shows an example of an IFCC trace window. In this example the Address In line remains active when Status In becomes active during a selection sequence. For detailed information on interface sequences and voltage levels, refer to *IBM System/360 and System/370 Interface Channel to Control Unit Original Equipment Manufacturers' Information*, GA22-6974.

The meanings of the abbreviations used are shown below.

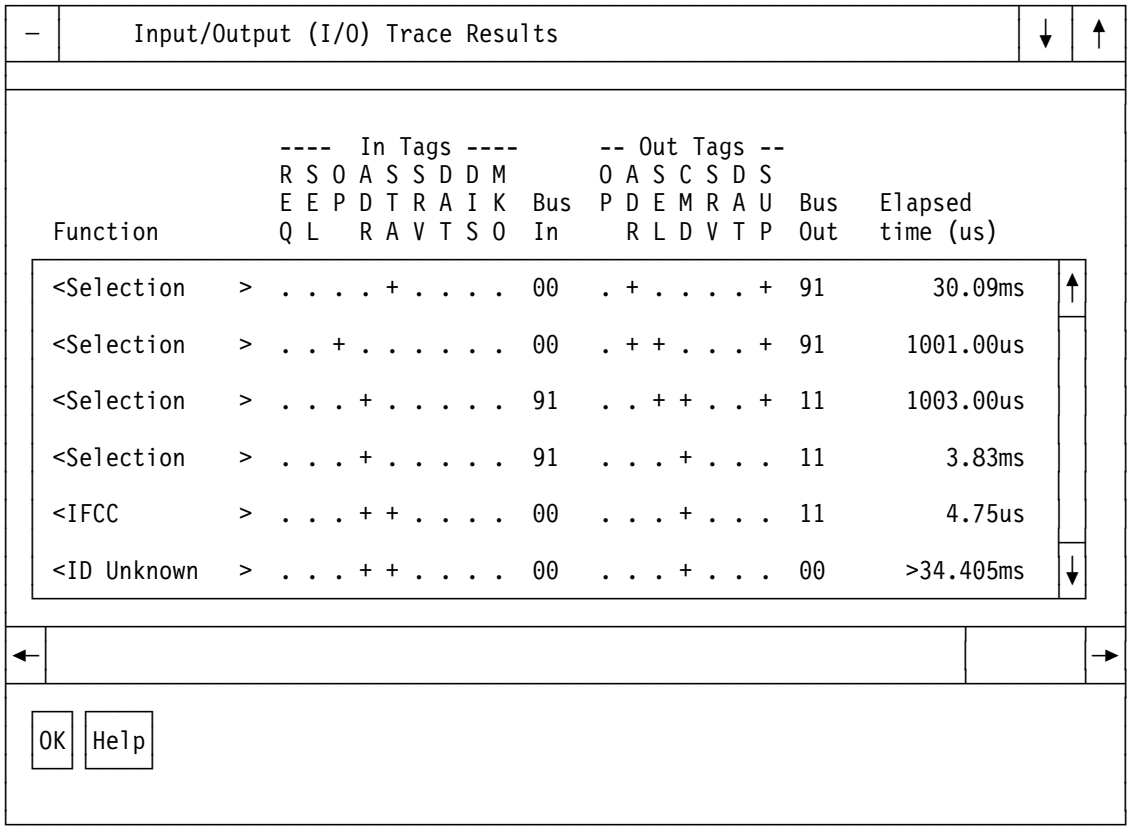


Figure 7-2. Example of IFCC error trace.

The abbreviations used are:

In Tags		Out Tags		Tag levels	
REQ	Request In	OP	Operational Out	.	Inactive level
SEL	Select In	ADR	Address Out	+	Active level
OP	Operationa	SEL	Select Out		
ADR	Address In	CMD	Command Out		
STA	Status In	SRV	Service Out		
SRV	Service In	DAT	Data Out		
DAT	Data In	SUP	Suppress Out		
DIS	Disconnect				
MK0	Mark In 0				

Pin Assignments for OEMI Bus and Tag Cables

Bus Connector				Tag Connector			
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
B02	shield	G02	shield	B02	shield	G02	shield
B03	Bus Out P	G03	Bus In P	B03	Operational In	G03	Clock Out
B04	shield	G04	shield	B04	shield	G04	shield
B05	Bus Out 1	G05	Bus In 1	B05	Address In	G05	Metering In
B06	unused	G06	unused	B06	unused	G06	unused
B07	shield	G07	shield	B07	shield	G07	shield
B08	Bus Out 3	G08	Bus In 3	B08	Select In	G08	Data In
B09	shield	G09	shield	B09	shield	G09	shield
B10	Bus Out 5	G10	Bus In 5	B10	Address Out	G10	Data Out
B11	shield	G11	shield	B11	shield	G11	shield
B12	Bus Out 7	G12	Bus In 7	B12	Suppress Out	G12	Hold Out
B13	shield	G13	shield	B13	shield	G13	shield
D02	unused	J02	unused	D02	unused	J02	unused
D03	shield	J03	shield	D03	shield	J03	shield
D04	Bus Out 0	J04	Bus In 0	D04	Status In	J04	Metering Out
D05	shield	J05	shield	D05	shield	J05	shield
D06	Bus Out 2	J06	Bus In 2	D06	Service In	J06	Request In
D07	shield	J07	shield	D07	shield	J07	shield
D08	shield	J08	shield	D08	shield	J08	shield
D09	Bus Out 4	J09	Bus In 4	D09	Select Out	J09	special use
D10	shield	J10	shield	D10	shield	J10	shield
D11	Bus Out 6	J11	Bus In 6	D11	Command Out	J11	Disconnect In
D12	shield	J12	shield	D12	shield	J12	shield
D13	Mark Out	J13	Mark In	D13	Service Out	J13	Operational Out

Pin Assignments for 78 Pin "D" Cables

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
9	Bus Out P	47	Bus In P	59	Operational In	70	Clock Out
10	Bus Out P rtn	46	Bus In P rtn	58	Operational In rtn	50	Clock Out rtn
7	Bus Out 1	67	Bus In 1	39	Address In	11	Metering In
8	Bus Out 1 rtn	66	Bus In 1 rtn	38	Address In rtn	12	Metering In rtn
27	Bus Out 3	45	Bus In 3	57	Select In	15	Data In
28	Bus Out 3 rtn	44	Bus In 3 rtn	56	Select In rtn	16	Data In rtn
63	Bus Out 5	3	Bus In 5	17	Address Out	33	Data Out
62	Bus Out 5 rtn	4	Bus In 5 rtn	18	Address Out rtn	32	Data Out rtn
1	Bus Out 7	41	Bus In 7	75	Suppress Out	71	Hold Out
2	Bus Out 7 rtn	40	Bus In 7 rtn	76	Suppress Out rtn	72	Hold Out rtn
69	Bus Out 0	5	Bus In 0	77	Status In	31	Meter Out
68	Bus Out 0 rtn	6	Bus In 0 rtn	78	Status In rtn	12	Meter Out rtn
49	Bus Out 2	25	Bus In 2	55	Service In	13	Request In
48	Bus Out 2 rtn	26	Bus In 2 rtn	54	Service In rtn	14	Request In rtn
21	Bus Out 4	23	Bus In 4	19	Select Out	35	Sync
22	Bus Out 4 rtn	24	Bus In 4 rtn	20	Select Out rtn	34	Sync rtn
43	Bus Out 6	65	Bus In 6	37	Command Out	53	Disconnect In
42	Bus Out 6 rtn	64	Bus In 6 rtn	36	Command Out rtn	52	Disconnect In rtn
29	Mark Out	61	Mark In	73	Service Out	51	Operational Out
30	Mark Out rtn	60	Mark In rtn	73	Service Out rtn	50	Operational Out rtn

Note: Clock Out and Operational Out return lines are common. Meter Out and Meter In return lines are common.

Pin Assignments for Wrap Connectors

Wrap Plug (P/N 5547283) Wiring

BUS Connector					TAG Connector				
Signal	Pin	wraps to	Signal	Pin	Signal	Pin	wraps to	Signal	Pin
Bus Out 0	D04	-->	Bus In P	G03	Select Out	D09	-->	Operational In	B03
Bus Out 1	B05	-->	Bus In 0	J04	Hold Out	G12	-->	Address In	B05
Bus Out 2	D06	-->	Bus In 1	G05	Address Out	B10	-->	Select In	B08
Bus Out 3	B08	-->	Bus In 2	J06	Suppress Out	B12	-->	Status In	D04
Bus Out 4	D09	-->	Bus In 3	G08	Data Out	G10	-->	Service In	D06
Bus Out 5	B10	-->	Bus In 4	J09	Command Out	D11	-->	Disconnect In	J11
Bus Out 6	D11	-->	Bus In 5	G10	Service Out	D13	-->	Data In	G08
Bus Out 7	B12	-->	Bus In 6	J11	Metering Out	J04	-->	Metering In	G05
Bus Out P	B03	-->	Bus In 7	G12	Special use	J09	-->	Request In	J06
			Mark In	J13	--> Operational Out	J13			
			Ground	J08	--> Ground	J08			

Wrap Plug (P/N 6473024) Wiring

Signal	Pin	wraps to	Signal	Pin	Signal	Pin	wraps to	Signal	Pin
Bus Out 0	69	-->	Bus In P	47	Select Out	19	-->	Operational In	59
Bus Out 1	7	-->	Bus In 0	5	Hold Out	71	-->	Address In	39
Bus Out 2	49	-->	Bus In 1	67	Address Out	17	-->	Select In	57
Bus Out 3	27	-->	Bus In 2	25	Suppress Out	75	-->	Status In	77
Bus Out 4	21	-->	Bus In 3	45	Data Out	33	-->	Service In	55
Bus Out 5	63	-->	Bus In 4	23	Command Out	37	-->	Disconnect In	53
Bus Out 6	43	-->	Bus In 5	3	Service Out	73	-->	Data In	15
Bus Out 7	1	-->	Bus In 6	65	Metering Out	31	-->	Metering In	11
Bus Out P	9	-->	Bus In 7	41	Sync	35	-->	Request In	13
					Mark 0 Out	61	-->	Operational Out	51
					Mark 0 In rtn	60	-->	Sync rtn	34

Hex Representation of Channel Tag and Bus Lines

The values used on the Problem Analysis windows to represent the Tag lines active at the time an interface control check occurred are in the table below:

Bit	Tags In	Bit	Tags Out
0	Operational	0	Operational
1	Address	1	Address
2	Status	2	Select/Hold
3	Select	3	Data streaming
4	Request	4	Service
5	Service or Data (see Note)	5	Data
6	Data or Mark (see Note)	6	Suppress
7	Disconnect	7	Command

Note: Bits 5 and 6 for Tags In have the values shown below:

Bit 5	Bit 6	Data In	Service In	Mark In
1	1	On	Off	Off
1	0	Off	On	Off
0	1	Off	Off	On
0	0	Off	Off	Off

Example: A Tags-In value of 86 indicates that Operational In and Data In are both active.

ESCON IFCC Information

Use the procedure in “Viewing Problem Analysis Results” on page 6-2 to look at the information recorded by Problem Analysis at the time of an IFCC is detected. Then use the information in Table 7-10 to correct the problem.

Table 7-10 (Page 1 of 3). ESCON IFCC

Reason code	IFCC	Description
5	DEVICE_LEVEL_ERROR	A device-level error was detected by the channel path identifier (CHPID)
6	DEVICE_LEVEL_PROTOCOL_ERROR	A device-level protocol error was detected by the (CHPID)
24	FRAME_SIZE_ERROR	A frame-size error was detected by the (CHPID)
28	LINK_LEVEL_PROTOCOL_ERROR	A link-protocol error was detected by the (CHPID)
2B	CONNECTION_ERROR	A connection error was detected by the (CHPID)
3B	SOURCE_LOGICAL_ADDRESS_ERROR	A source logical address error was detected by the (CHPID)
3C	LINK_CONTROL_FUNCTION_ERROR	A link-control-function error was detected by the (CHPID)
3F	LINK_LEVEL_REJECT_TRANSMITTED	A link-level-reject was transmitted by the (CHPID)
5B	DEVICE_LEVEL_CONNECTION_ERROR	A device-level connection error was detected by the (CHPID)
87	CONNECTION_PROTOCOL_ERROR	A connection protocol error was detected by the (CHPID)
9D	DESTINATION_ADDRESS_ERROR	A destination-address error was detected by the (CHPID)
AB	DEVICE_LEVEL_TIMEOUT	A device-level time-out was detected by the (CHPID).
B5,B7 BD,BF	TRANSMISSION_ERROR	A transmission error was detected by the (CHPID)
C5	DESTINATION_ADDRESS_INVALID	A destination-address-invalid error was detected by the (CHPID)
C6	LOGICAL_PATH_NOT_ESTABLISHED	A logical-path-not-established error was detected by the (CHPID)
C7	RESERVED_FIELD_ERROR	A reserved-field error was detected by the (CHPID)

Table 7-10 (Page 2 of 3). ESCON IFCC

Reason code	IFCC	Description
C8	UNRECOGNIZED_LINK_CONTROL_FUNCTION	An unrecognized link-control function was detected by the (CHPID).
CA	AQUIRE_LINK_ADDR_ERROR	An acquire-link-address error was detected by the (CHPID).
CB	UNRECOGNIZED_DEVICE_LEVEL_ERROR	An unrecognized-device-level error was detected by the (CHPID).
D0	ADDRESS_INVALID_ERROR	An address-invalid error was detected by the (CHPID).
D1	UNDEFINED_DEST_ADDR	An undefined-destination-address was detected by the (CHPID).
D2	DESTINATION_PORT_MALFUNCTION	A destination-port malfunction was detected by the (CHPID).
D3	DYNAMIC_SWITCH_PORT_INTVEN_REQD	A dynamic-switch-port error condition where intervention is required was detected by the (CHPID).
F0	TOO_MANY_LINK_ERRORS	The (CHPID) received too many link errors.
F0	INFRAME_BUFFER_OVERRUN	An in-frame buffer overflow was detected by the (CHPID)
F1	BIT_ERROR_RECEIVED	A bit error in a frame was detected by the (CHPID).
F3	INVALID_SEQUENCE_OF_CHARS	A sequencing error was detected. The (CHPID) received an unrecognized sequence of characters.
F4	RESERVED_K_CHAR	A sequencing error was detected. A reserved K character was received by the (CHPID).
F5	RECVD_MORE_DATA_THAN_REQUESTED	A device-level error was detected. The (CHPID) received more data than was requested.
F5	DIB_SIZE_ERROR	A device information block (DIB) size check was detected by the (CHPID).
F6	COUNT_EQUAL_ZERO	The condition of count field = 0 was detected by the (CHPID).

Table 7-10 (Page 3 of 3). ESCON IFCC

Reason code	IFCC	Description
F7	ZERO_LENGTH_DATA_FRAME	The (CHPID) received a zero length data frame.
F8	FRAME_HEADER_GT_15_BYTES	The (CHPID) received a frame header that exceeded 15 bytes.
F9	CRC_ERROR	A cyclic redundancy check (CRC) error was detected by the (CHPID).
FA	LT_3_CHARS_BETWEEN_DELIMITERS	The (CHPID) received less than 3 characters between delimiters.
FB	SECOND_START_WO_TERMINATOR	The (CHPID) received a second start frame without a frame terminator.
FC	ABORT_EOF_RECEIVED	An abort delimiter was received by the (CHPID)
FD	FRAME_EXCEEDING_1035_BYTES	The (CHPID) received a frame exceeding 1035 bytes in length.
FE	SEQUENCING_ERROR	A sequencing error was detected by the (CHPID)
FF	LOSS_OF_SIGNAL_OR_SYNC	A loss-of-signal or loss-of-synchronization was detected by the (CHPID).

FICON IFCC Information

Use the procedure in “Viewing Problem Analysis Results” on page 6-2 to look at the information recorded by Problem Analysis at the time of an IFCC is detected. Use table Table 7-11 for FC errors and for FCV errors that were generated and detected by the FCV channel side of the link. Use Table 7-10 on page 7-33 for errors that were detected by the FCV channel, but were generated on the ESCON side of the link.

Table 7-11 (Page 1 of 2). ESCON IFCC

SRC	Problem	Action if the problem is persistent
79432005	FICON licensed internal code error has occurred.	Request Service' and Contact next level of support.
79432001 79432012	Internal channel error threshold exceeded.	Request Service' and perform Fault Isolation on the Channel
79432001 79432012	A hardware error has occurred on the channel.	Request Service' and perform Fault Isolation on the Channel.

Table 7-11 (Page 2 of 2). ESCON IFCC

SRC	Problem	Action if the problem is persistent
79432020	A timeout was detected by the FICON channel.	Request Service' and perform Fault Isolation on the device attached to the channel.
79432021	A protocol error was detected by the FICON channel.	Request Service' and perform Fault Isolation on the device attached to the channel.
79432023	An interface control check (IFCC) was detected by the FICON channel.	Request Service' and perform Link Fault Isolation on the Channel and attached device.
79432024	The switch attached to the FCV channel detected an error on the ESCON interface.	Request Service' and perform Fault Isolation on the Switch.
79432025	The switch attached to the FCV channel detected an error on the FICON interface.	Request Service' and perform Fault Isolation on the Channel.
79432026	The control unit attached to the FICON channel detected an error.	Request Service' and perform Fault Isolation on the device attached to the channel.
79432027	A frame size error was detected by the FICON channel.	Request Service' and perform Link Fault Isolation on the Channel and attached device.
79432028	A longitudinal-redundancy-check (LRC) error was detected by the FICON channel.	Request Service' and perform Link Fault Isolation on the Channel and attached device.
79432029	A cyclic-redundancy-check (CRC) error was detected by the FICON channel.	Request Service' and perform Link Fault Isolation on the Channel and attached device.
7943202A	A frame out of sequence error was detected by the FICON channel.	Request Service' and perform Link Fault Isolation on the Channel and attached device.
7943202B	An inappropriate status was received by the FICON channel.	Request Service' and perform Fault Isolation on the device attached to the channel.
7943202C	The Fiber-Channel PCI Adapter card in the FICON channel has detected an error.	Request Service' and perform Link Fault Isolation on the Channel and attached device.
7943202E 7943202F	A central storage error has been detected by the channel.	Request Service' and perform Fault Isolation on the System.

Information for FICON Feature

This section contains general information about the FICON feature.

This section contains information about FICON CHPIDs and links. There are several types and combinations of FICON CHPIDs and links available. FICON CHPIDs can be FICON Channel conVerted (FCV) or FICON Channel (FC). Lasers can be either Longwave (LX) or Shortwave (SX). Fiber optic links can be SingleMode (SM) fiber (yellow cables) or MultiMode (MM) fiber (orange cables). Table 7-12 shows the supported configurations for FICON.

Table 7-12. FICON supported configurations

CHPID	Laser	Cable	Maximum Point to Point Distance Without Redrive
FCV	LX	SM(9/125um)	10km,20km w/RPQ, 100km w/repeaters
FCV	LX	MM(62.5/125um)*	550 meters
FCV	LX	MM(50/125um)*	550 meters
FC	LX	SM(9/125um)	10km,20km w/RPQ, 100km w/repeaters
FC	SX	MM(62.5/125um)	250 meters
FC	SX	MM(50/125um)	500 meters

Note: * MM support requires that the link be all MM fiber with special optical mode conditioners on both ends of the link.

The FICON link is a fiber optic cable that connects two nodes. Nodes can be the channel, switches, or devices.

FCV can **ONLY** be attached to a 9032-005 switch with a Bridge card feature installed. No other configuration is supported. The Bridge card in the 9032-005 converts the link from the FICON protocol into the ESCON protocol. After being converted, links function as standard ESCON links.

You can differentiate between the FICON link combinations by the cable color, CHPID descriptions on the support element and Hardware Management Console, and the channel definitions in I/O Configuration Data Set (IOCDS).

Regardless of the type of FICON CHPID, the physical card is identical and is serviced in the same manner.Figure 7-3 on page 7-38 shows the FICON feature card.

- For information about CHPID and STI assignments, refer to “CHPID Assignments for Direct Attachment” on page 7-9.
- For information about tests, refer to “Channel Tests” on page 7-14.
- For information about problem resolution, refer to “Resolving Channel Problems” on page 7-18.

Card Layout

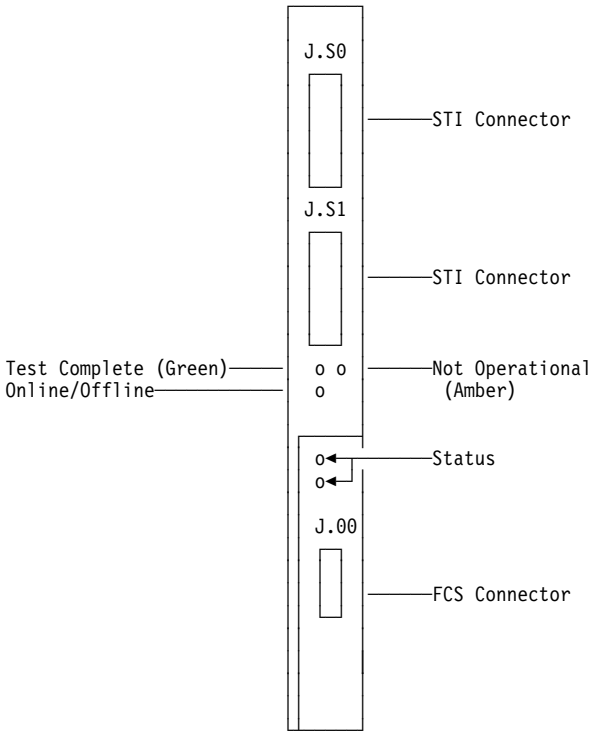


Figure 7-3. FICON card layout.

FICON Card Indicators

The Not Operational, Test Complete, On Line/Off Line, and Status indicators are used in combination to indicate the condition of the FICON adapter card. Table 7-13 and Table 7-14 on page 7-39 show the meanings of these indicators.

Online/Offline Indicator

Table 7-13. Meanings of Online/Offline indicator

Online/Offline Indicator	FICON Status
Off	CHPID for FICON adapter is online and card is communicating with PU
On	CHPID offline for maintenance OR external wrap test running
Blinking rapidly	Power on tests running

Not Operational and Test Complete Indicators

Table 7-14. Meanings of Not Operational and Test Complete indicators

Test Complete Indicator (Green)	Not Operational Indicator (Amber)	FICON Status
off	off	No power to the card, or processor in a loop.
off	blinking	Power-on self tests running
blinking	off	Tests complete, CHPID on-line
blinking	on	Hardware error detected
on	blinking	Invalid indication

Note: Any combination where neither indicator is blinking (both on, both off, or one on and the other off), indicates either that the card is powered off or the processor on the card is in a loop.

Additional Status Indicators

Table 7-15. Meanings of Status Indicators

Green	Yellow	Status
off	off	Wakeup failure or card cannot communicate
off	slow blink	Wakeup failure or card cannot communicate
off	irregular blink	Power On Self Test (POST) in progress
off	on	POST error
off	fast blink	POST error
on	off	Failure while in operation
on	on	Failure while in operation
on	slow blink	Normal, link initialization complete or wrap block installed
on	irregular blink	Normal operation - busy
on	fast blink	Normal operation - busy
blinking	off	Link initialization not complete or, no fiber or wrap block installed

Notes:

1. Slow blinking indicates that the indicator is “On” approximately one time per second.
2. Fast blinking indicates that the indicator is “On” approximately four times per second.
3. Irregular blinking indicates that there is no fixed pattern for the indicator. The indicator blinks at the rate data is being processed.

Resolving ICB Problems

If you were directed here by an on-line procedure, use the Figure 7-4 and the notes that follow to understand what you are going to test, then go to step 1.

If the customer reported an error and there is no open call, continue on step 1.

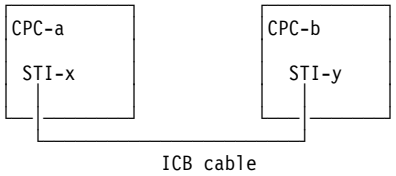


Figure 7-4. Two CPCs with an ICB connection

Figure 7-4 shows two CPCs coupled with an ICB cable. The cable is connected to STI port 'x' of CPC-a and to STI port 'y' of CPC-b.

Notes:

1. Either of the STI ports can be on an extender card.
2. You can have the ICB cable between two STI ports in one CPC.
3. Either or both of the CPCs may have reported a call.
4. To find the location of the STI connector assigned to a CHPID, refer to “Displaying I/O Card Information” on page 6-38. (Look at the CHPIDs assigned to the CPC.)
5. To prevent system errors, disable the corresponding STI port before unplugging an ICB cable or running ICB tests. The disable is done automatically if you are using the on-line procedures. If you are working on a problem without using the on-line procedures, use the information at “Enabling or Disabling STIs” on page 6-35 to disable the port.

To isolate the failure you will start at the support element for the CPC that reported the call (CPC-a for our example) and open the problem number.The on-line procedures will have you:

- Vary the CHPID for CPC-a offline if it has not been varied off already because of the error.
- Disconnect STI-x at CPC-a and install the wrap plug at port STI-x.
- Run the ICB wrap test (from CPC-a)
- Remove the wrap plug from the STI port STI-x and plug the cable back into the port.

You will then be directed to this procedure. This procedure will direct you to do the following:

- Disconnect the cable from STI-y at CPC-b and install the wrap plug at STI port STI-y.
- Run the wrap test manually (from the support element for CPC-b).
- **At the support element for CPC-a**, answer the question about the test results. You will be directed by the support element at CPC-a as follows:
  - If the failure is found in CPC-a, you will be directed to close any open calls at CPC-b and then directed to exchange FRUs at CPC-a.
  - If the failure is found in CPC-b, you will be directed to use the problem opened by the wrap test failure to repair the problem in CPC-b.
  - If no failure is found, you will be directed to exchange the ICB cable.

1

Were you directed here by an on-line procedure?

NO **YES**

↓ Go to step 5.

If you were directed by an on-line procedure, be sure that you are familiar with the information at the beginning of this section before you continue.

2

Ask the customer which CPCs and CHPIDs are assigned to the ICB connection.

If you have not already done so, check the Service History of **both** CPCs for open problems at or near the reported time of the failure.

When complete, continue on step 3.

Note:

Use the procedure in "Displaying Service History" on page 6-13.

You should have followed the procedure in Chapter 1, "START" on page 1-1 which already directed you to check Service History for one of the CPCs.

You may have a configuration with two STIs connected within one CPC. If you already checked Service History for that CPC, continue on step 3.

3

Did you find an **open** problem in Service History for either of the CPCs?

NO **YES**

↓ Follow the instructions in the right-hand column.

Use the procedure in "Displaying Service History" on page 6-13 to get the call information for the problem. Then, go back to Chapter 1, "START" on page 1-1 and repair the problem on the CPC with the open call.

4

Do you have a **new** configuration that is failing?

NO **YES**

↓ Follow the instructions in the right-hand column.

Ensure the following:

- The ICB link is defined correctly in the IOCDS on both systems. The link must be defined as CBS (sender) in the ESA partition, and as CBR (receiver) in the coupling facility partition.
- The CHPIDs on both systems are defined as ICBs. Use the procedure in "Displaying I/O Card Information" on page 6-38 to display the CHPIDs for the CPC. They should have either ICBI or ICBE as the Unit Type.

  Note: ICBI (internal) indicates two STIs within the same CPC are connected. ICBE (external) indicates two CPCs are connected

  If the data in the Hardware Configuration Details windows is not correct, the data may have been incorrectly entered when installing the ICB using the **Non-disruptive hardware changes** task under **CPC Configuration**. If an ICB is installed using this task, the corresponding STI link will not display when the task is selected again. (It will display if the Remove option is selected).

- The ICB cable is connected to the correct STI ports. (If the connection is between two CPCs, check the connection in both CPCs).
- The ICB connection is correctly defined in the operating system and IOCDS for **both** systems. (Work with the customer to determine this).

If the CHPIDs are not defined correctly, call for assistance.

When the devices are configured and connected correctly, continue with step 5.

---

5 Testing the connection

Do the following:

- Have the customer vary the CHPID you will be working on offline (see **Note** 1).
- Prepare the support element for service and place the CPC in service status (see **Note** 2).

Go to step 6.

Notes:

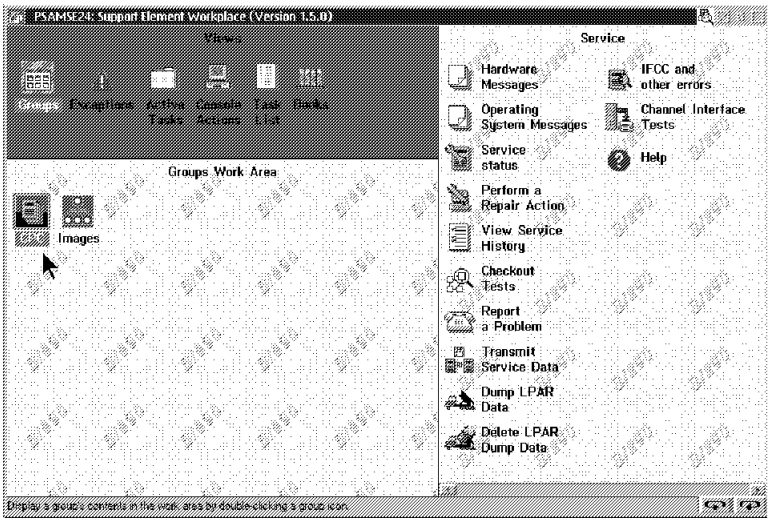
1. If you were sent here after using the on-line procedures on the attached system, make sure you are familiar with the information at the beginning of this procedure. You should be on what is referred to as "CPC-b." The tasks in this step may have already been completed.
2. For information on placing the CPC in service status and connecting to the support element, refer to "Starting Service with the Support Element" on page 1-10.
3. To find the location of the STI connector assigned to a CHPID, refer to "Displaying I/O Card Information" on page 6-38. (Look at the CHPIDs assigned to the CPC.)

6

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **Service** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Open **CPC** from **Group Work Area**.
- Drag the CPC icon (using the right-hand mouse button) and drop it on **Channel Interface Tests** under **Service**.



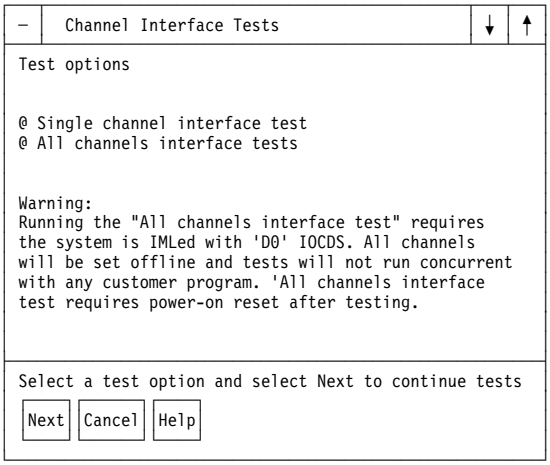
Go to step 7.

7

On the first Channel Interface Tests window:

- Select **Single channel interface tests** from the menu.
- Request **Next**.

Go to step 8.



8

On the next Channel Interface Tests window:

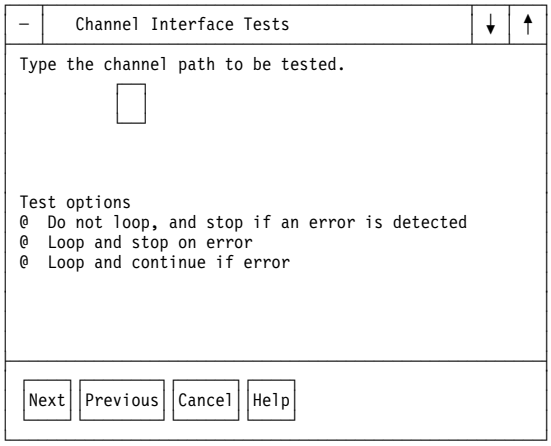
- Type in the CHPID you want to test.

  Note: To find the location of the STI connector assigned to a CHPID, refer to "Displaying I/O Card Information" on page 6-38. (Look at the CHPIDs assigned to the CPC.)

- Select **Do not loop, and stop if an error is detected** from the menu.
- Request **Next**.

If the CHPID is not already off line, follow the directions on the panels to vary it off line. When complete, go to step 9.

If you have to vary the CHPID offline manually, refer to the procedure in "Placing a Channel in Standby or Reserved Status" on page 6-30.



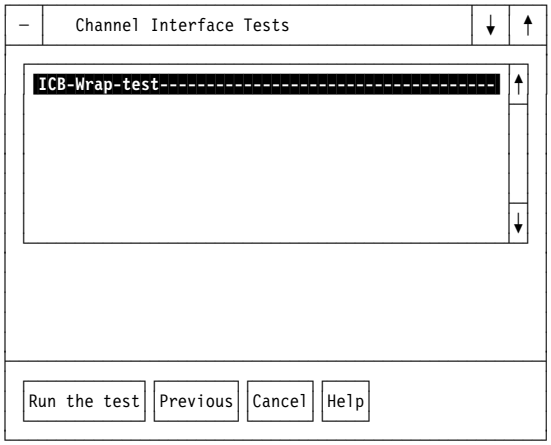
9

Select and run the ICB Wrap test.

To run the tests from the Channel Interface Tests window:

- Select the ICB Wrap test from the menu.
- Request **Run the test**.
- Follow the directions displayed on the test windows.

When complete, go to step 10.



10

Were you directed here by an on-line procedure to test one of the CPCs?

YES **NO**

↓ Follow the instructions in the right-hand column.

Use the procedure in "Displaying Service History" on page 6-13 to see if a problem was opened during the testing.

- If a call was opened, use the procedure in "Displaying Service History" on page 6-13 to get the call information for the problem. Then, go back to Chapter 1, "START" on page 1-1 and start the problem on the CPC with the logged call.
- If no call was opened, use the procedure in "Placing a Channel in Standby or Reserved Status" on page 6-30 to take the channel out of reserved state and vary it on line. When complete, repeat the procedure in steps 5 through 9 to test the ICB connection **from the other CPC**.
- If there are no errors on either side, call for assistance.

11

- Go back to the support element that directed you to this procedure and answer the question about the test results.
- Follow the directions on the support element for repairing the problem and closing calls.

If you are instructed to close calls, use the procedure in “Closing a Call” on page 6-49.

If you are instructed to go to the other CPC, repair the problem opened by the wrap test failure.

End of procedure

IOCP Information

This section contains information about working with IOCP. Find the information you want in the following table and go to the page indicated.

Information On	Go To
Definitions of IOCP terms.	"Definitions of Terms"
Viewing I/O Configuration Data Set	"Viewing I/O Configuration Data Set" on page 7-47
Editing I/O configuration source data	"Editing I/O Configuration Source" on page 7-51
Information about I/O devices with special IOCDS requirements.	"Special IOCDS Requirements" on page 7-58
Information about the editor.	"Common IOCP Editor Functions" on page 7-53
Information about the special editor used for double-byte character sets.	Appendix B, "System Editor Functions" on page B-1
Information to assist in resolving IOCP errors.	"Resolving IOCP Errors" on page 7-55

Definitions of Terms

These are the terms used when configuring the channels. For additional information, refer to the following:

Input/Output Configuration Program User's Guide, SC38-0401
Standalone I/O Configuration Program User's Guide, GC38-0455.

I/O Configuration Data Set (IOCDS): The IOCDS defines the configuration of I/O devices on the system to the licensed internal code used by the channels. The IOCDS is stored on the support element fixed disk. Only one IOCDS can be used during system activation but up to four IOCDSs can be defined. A "view" option is available for the IOCDS. If the IOCDS is not correct, edit the I/O configuration source file and use the I/O Configuration Program to generate a new IOCDS.

I/O Configuration Program (IOCP): The IOCP is a stand-alone program on the support element that is used to create the IOCDS for the system. The input to the IOCP is the I/O configuration source file.

I/O Configuration Source: The I/O configuration source used as input to the IOCP when the IOCDS is created. The I/O configuration source is 80-column card image and is initially provided on either a system tape, or a 3.5 inch diskette. The file is then "imported" to the support element fixed disk. Creating the I/O configuration source is the customer's responsibility, however the service representative can edit the file to correct errors in syntax.

Viewing I/O Configuration Data Set

Use the "View" option to check that the information for the following is correct in the IOCDS:

- Channel path identifier (CHPID)
- Control unit data
- Device data.

Examples of the windows you will see are given at the end of this procedure.

Note: The IOCDS information cannot be changed. If the information is not correct, edit the I/O configuration source and create a new IOCDS using the updated source. For information on editing the source, see "Editing I/O Configuration Source" on page 7-51.

1

If you are using the support element for this task, prepare the support element for service. For information, refer to "Starting Service with the Support Element" on page 1-10.

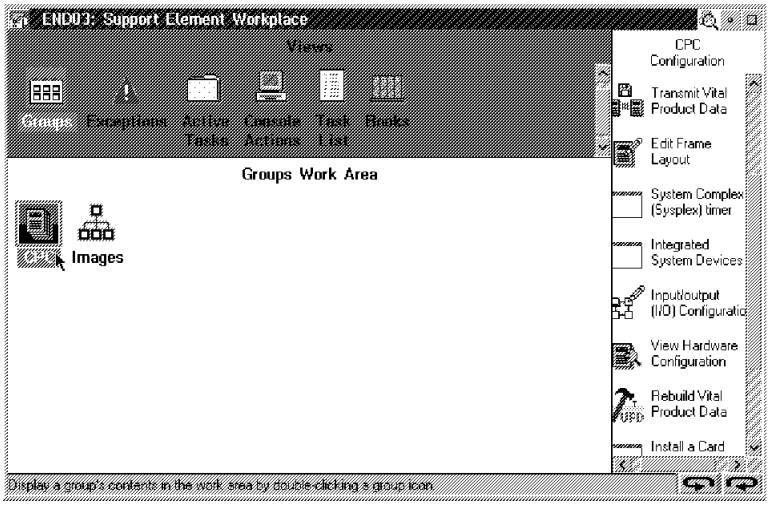
If you are using the Hardware Management Console for this task, make a remote connection to the CPC. For information, refer to "Starting Service With the Hardware Management Console" on page 1-26.

2

Ensure the support element is in either service or system programmer mode.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CPC Configuration** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) and drop it on **Input/Output (I/O) Configuration** under **CPC Configuration**.

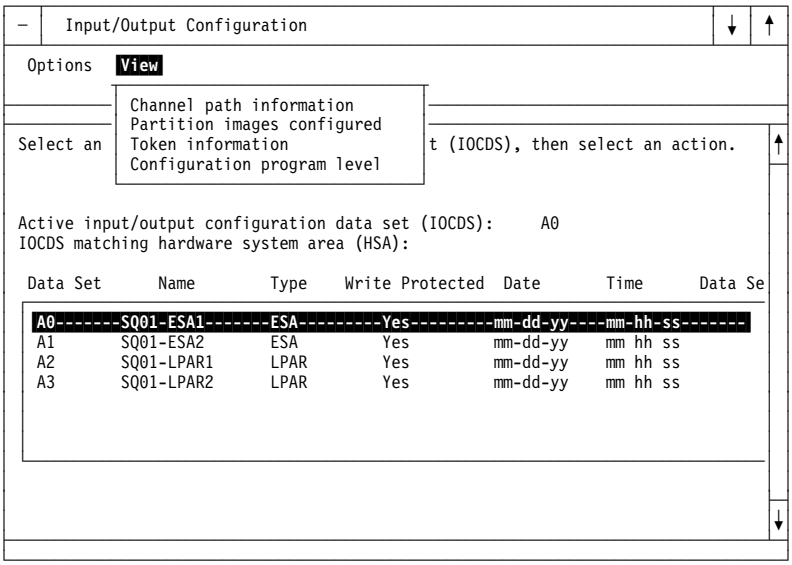


3

On the Input/Output Configuration window: scroll right to see the status of the IOCDS data sets.

To see information on devices and control units defined in the IOCDS data sets:

- Select the IOCDS data set you want to view.
- Select **View** from the menu bar.
- Go to step 4.



4

Device or Control unit information.

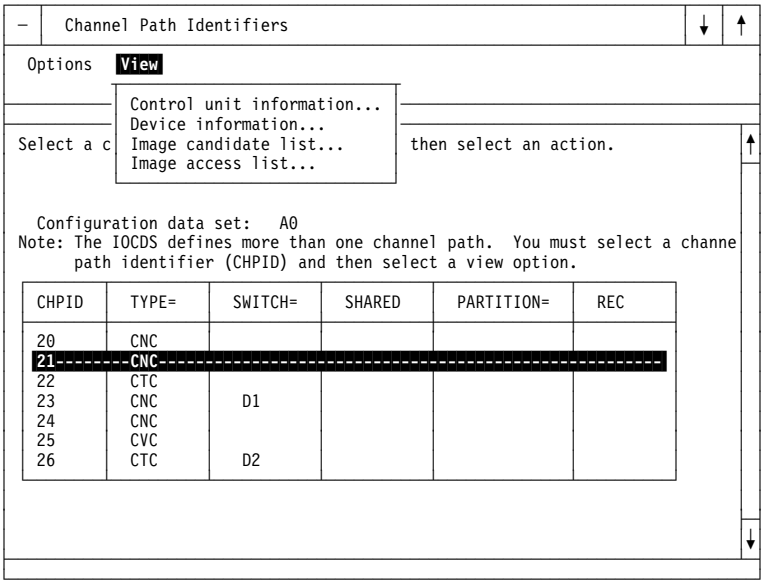
On the Input/Output Configuration window:

- Select **Channel path information** from the pull-down.

On the Channel Path Identifiers window:

- Select the **CHPID** from the menu.
- Select **View** from the menu bar.
- Select either **Control unit information** or **Device information** from the pull-down.

Go to step 5.



5

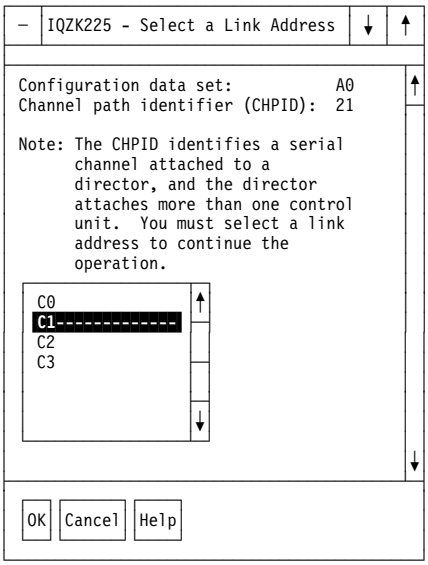
If the selected CHPID is an ESCON channel attached to a director, the Select a Link Address window displays.

Note: If this window does ***not*** display, continue on step 6.

On the Select a Link Address window:

- Select the link address you want to view.
- Select **OK**.

Go to step 6.



6

The window for control unit or device data displays.

- For control unit data, see “Window for Control Unit Data” on page 7-50.
- For device data, see “Window for Device Data” on page 7-50.

End of procedure.

Window for Control Unit Data

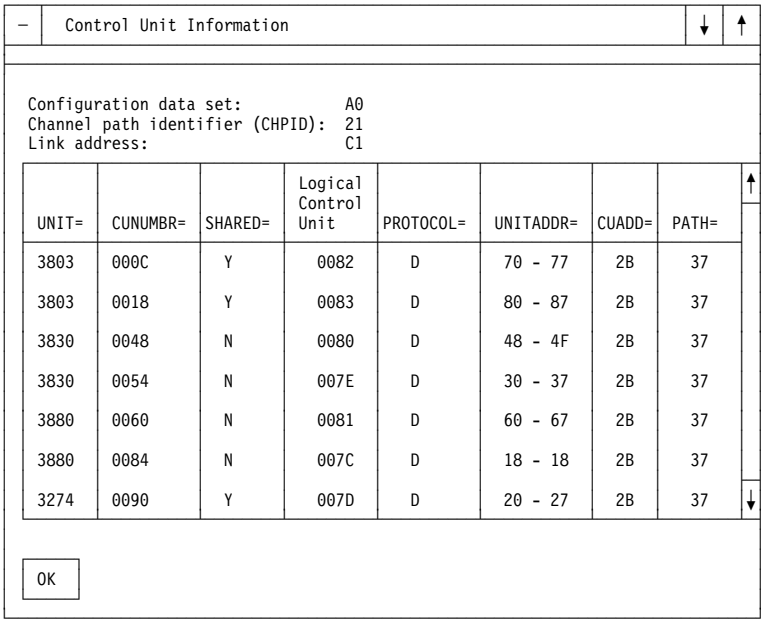


Figure 7-5. Example of window for control unit data.

Window for Device Data

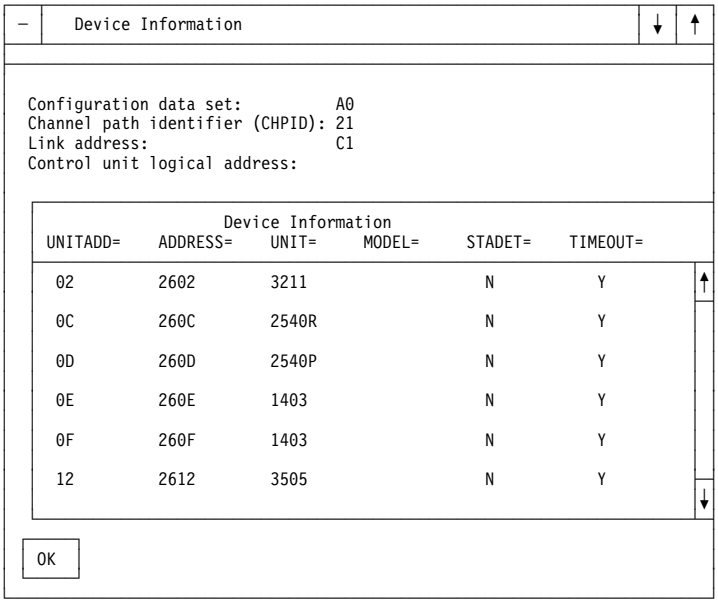


Figure 7-6. Example of window for device data.

Editing I/O Configuration Source

Use the "Open source file" option to check and correct the information for the IOCDS source files stored on the support element fixed disk.

Note: If the IOCDS source information is updated, a new IOCDS must be created and the system activated using the new IOCDS. To create the new IOCDS, go to the Input/Output Configurations window select **Options** from the menu bar and **Build data set** from the pull-down.

If you edit a dynamic I/O configuration source file (a file that has been built using the Hardware Configuration Definition (HCD) or the VM IOCP utility with the DYN option and has been imported to the support element hard disk), stand-alone IOCP disables the dynamic capability of the I/O configuration source file.

1

If you are using the support element for this task, prepare the support element for service. For information, refer to "Starting Service with the Support Element" on page 1-10.

If you are using the Hardware Management Console for this task, make a remote connection to the CPC. For information, refer to "Starting Service With the Hardware Management Console" on page 1-26.

2

Log on the support element in either service or system programmer mode.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CPC Configuration** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag the CPC icon (using the right-hand mouse button) and drop it on **Input/Output (I/O) Configuration** under **CPC Configuration**.

3

On the Input/Output Configurations window:

- Select the IOCDS data set you want to edit.
- Select **Options** from the menu bar.
- Select **Open source file** from the pull-down.

Note: If a window displays stating that the IOCDS you selected is write protected, get the customer's permission to change the file, select **OK** on the message window, select **Options** from the menu bar, then select **Disable write protection** from the pull-down.

4

The editor window displays.

Maximize the window by clicking on the ▲ in the upper right corner of the editor window.

Some of the editor functions are described in “Common IOCP Editor Functions” on page 7-53. For additional information on using the editor, refer to *Stand-Alone Input/Output Configuration Program User's Guide*, SA24-4348.

If you are editing the IOCP source to correct a problem, refer to “Resolving IOCP Errors” on page 7-55.

End of procedure.

Note: If the edit window states the IOCDS you selected is empty, press **F3** to return to the Input/Output Configurations window, select **Options** from the menu bar, then select **Disassemble data set** from the pull-down. This builds the IOCP source statements from the IOCDS.

Common IOCP Editor Functions

You will be required to make only minor changes in the IOCP source files so an extensive knowledge of the editor is not necessary. This section gives general information about editor functions. For additional information on using the editor, refer to *Stand-Alone Input/Output Configuration Program User's Guide*, GC38-0455.

General Information

An example of an edit window is shown in Figure 7-7. The edit window is shown maximized for ease of use.

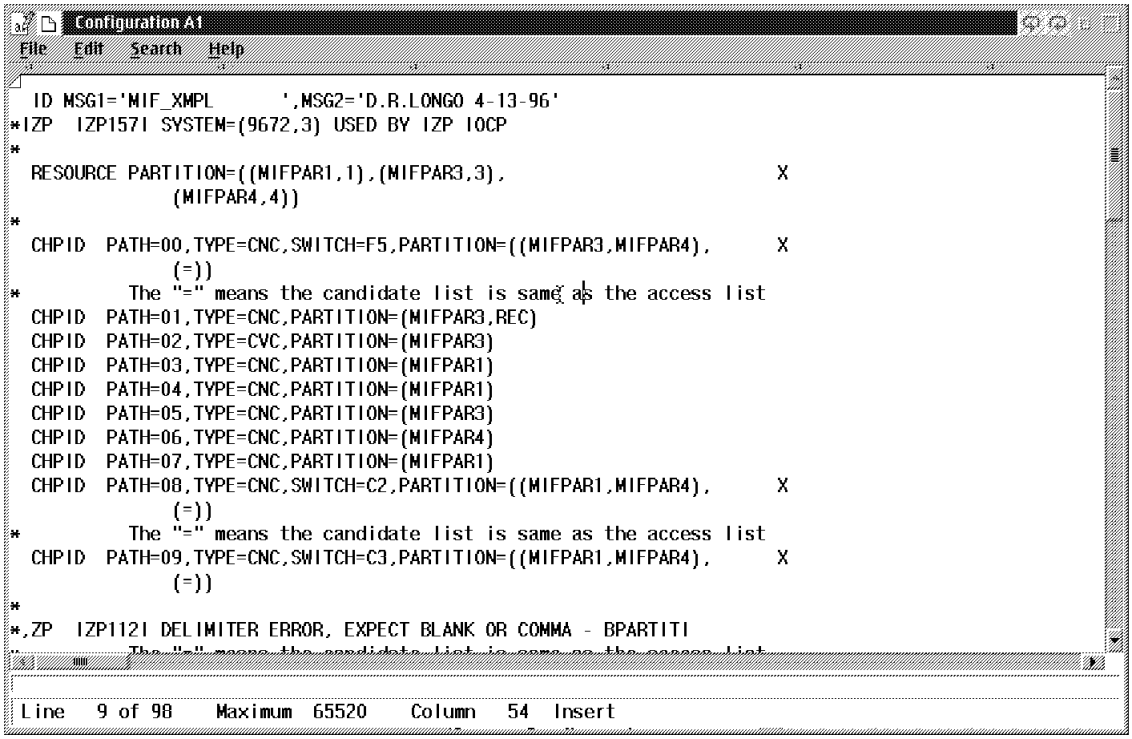


Figure 7-7. Edit window for IOCP source files.

Title Line: The top line of the editor window contains the identification for the IOCP source configuration you are editing. (Configuration A1 for the example.)

Action Bar: The second line of the edit window contains action bar items used for editing. Select a menu bar item by pointing the mouse cursor at the item and "clicking" the left-hand mouse button. Select the pull-down choices in the same way. Most of the pull-down items do the same function as combinations of keys. The common key combinations are listed in "Keyboard Operation" on page 7-54.

Information Line: The last line of the edit window contains the location of the cursor within the file you are editing. For the example shown, the cursor is in line nine (of a 98 line file) and column 54. "Insert" is displayed when the editor is in insert mode and "Replace" is displayed when insert is reset.

Keyboard Operation

The common key operations are listed below.

Function	Action
Insert	**Insert** (The cursor displays as a ■.)
Reset Insert	**Insert** (The cursor displays as a _.)
Delete a character	Position cursor on character and press **Delete**.
Mark a line	Position cursor on line and press **Alt+L**.
Mark a block	Position cursor on upper left corner of block and press **Alt+B**, repeat at the lower right corner of block.
Copy marked area	Use Mark a line or Mark a block, then move the cursor to the upper left corner for new block and press **Alt+C**.
Move marked area	Use Mark a line or Mark a block, then move the cursor to the upper left corner of new position and press **Alt+M**.
Delete marked area	Use Mark a line or Mark a block, then press **Alt+D**.
Search	**Ctrl+S** then type in the string of characters you want to search for on the window displayed, select the options desired (for example **Ignore case**), and select **Find**. The cursor is positioned at the next character string that is the same as the one you specified.
Find Next	After a search, press **Ctrl+F** to find the next string of characters that is the same as the one you specified.
File (Quit and Save)	**F9**
Quit (No change to file.)	**F3**

Sizing the Edit Panel

When the edit function is started, only 61 columns of the 80-column file are displayed. To make the file easier to use, maximize the window by clicking on the ▲ in the upper right corner of the editor window. This enlarges the edit window so 78 columns can be displayed at one time. If you have to edit the remaining columns, see “Scrolling the Edit Panel.”

Scrolling the Edit Panel

The length of the IOCP source file usually exceeds the amount of information that can be displayed at one time. You can scroll the information one line at a time by using the ↓ and ↑. To scroll an entire window of information at a time, use **Page Up** and **Page Down**.

To scroll the remaining columns of data (right to left) one column at a time, use the → and ← keys.

Resolving IOCP Errors

If errors are found in the IOCP source file when you try to run IOCP, error and warning messages are written in the file on the line following the statement with the error. The error and warning messages have identifiers starting with ***IZP**. For a description of the errors, refer to *Input/Output Configuration Program User Guide*, GC38-0401. To correct the errors, edit the IOCDS source file. Refer to “Editing I/O Configuration Source” on page 7-51 for information on editing an IOCDS source file.

You may either scroll through the IOCP source file looking for error and warning statements, or use the search function in the editor. Most of the errors are missing parentheses or commas. Look at similar statements without errors to determine the changes needed to correct the file. An example starting at the Input/Output Configurations window:

- Select the IOCP source
- Select edit
- Press **Ctrl+S** (for search)
- Type ***IZP** on the Search and Replace window
- Select **Ignore case**
- Request **Find** (This will search for the error statements which start with “*IZP.”)
- Correct the statement causing the first error indication
- Press **Ctrl+F** to search for the next error
- Continue to correct statements causing error and warning messages
- When complete, press **F9** to save the changes and try to create the IOCDS again.

Note: If the IOCDS source information is updated, a new IOCDS must be created and the system activated using the new IOCDS. To create the new IOCDS, go to the Input/Output Configurations window select **File** from the menu bar and **Build** from the pull-down.

The example shown in “An Error Example” on page 7-56 shows an example of a file with incorrect statements and error messages.

An Error Example

The following shows an example of an IOCP source file after a IOCDS build was attempted. The file contains several syntax errors. The error messages inserted by IOCP are emphasized.

For an explanation of the errors in the file, refer to “Explanation of Errors in Example” on page 7-57.

```
  ID MSG1='ERR_XMPL      ',MSG2='Bob Smith       3-25-98'
*IZP  IZP157I SYSTEM=(9672,5) USED BY IZP IOCP
*
  CHPID  PATH=(00),(01),(02),                                          *
               (04),(05),(06),TYPE=BL
*IZP  IZP127I UNKNOWN KEYWORD - (01),(02
  CHPID  PATH=(10,11,12,                                               *
               14,15,16),TYPE=BL
  CHPID  PATH=((20),(21),(22),                                         *
               (24),(25),(26)),TYPE=BL
*IZP  IZP109I PATH KEYWORD SYNTAX ACCEPTED

*IZP  IZP101I OPERATION FIELD NOT FOUND
  CHPID  PATH=23,TYPE=BL
  CHPID  PATH=(28,29,2A),TYPE=BL
*
  CNTLUNIT CUNUMBR=0004,UNIT=3803,UNITADRD=((70,8)),                   *
               PATH=(22,16),PROTCL=D,SHARED=Y
*IZP  IZP127I UNKNOWN KEYWORD - UNITADRD
  CNTLUNIT CUNUMBR=0005,UNIT=3803,UNITADD=(70,8)),                     *
               PATH=(24),PROTOCL=D,SHARED=Y
*IZP  IZP116I DELIMITER ERROR, EXPECT LEFT PARENTHESIS - 70,8)),P
*
  CNTLUNIT CUNUMBR=0006,UNIT=3803,UNITADD=((70,8)),                    *
               PATH=(25),PROTOCL=D,SHARED=Y
*
  CNTLUNIT CUNUMBR=0009,UNIT=3803,UNITADD=((70,8)),                ******
               PATH=(28,PROTOCL=D,SHARED=Y
*IZP  IZP126I PARAMETER CONTAINS NON-HEXADECIMAL CHARACTERS
*
  CNTLUNIT CUNUMBR=000A,UNIT=3803,UNITADD=((70,8)),                    *
               PATH=(29),PROTOCL=D,SHARED=Y
*
  CNTLUNIT CUNUMBR=000B,UNIT=3803,UNITADD=((70,8)),                    *
               PATH=(2A),PROTOCL=DSHARED=Y
*IZP  IZP112I DELIMITER ERROR, EXPECT BLANK OR COMMA - SHARED=Y
*
  CNTLUNIT CUNUMBR=000C,UNIT=3803,UNITADD=((70,8)),                    *
               PATH=(2B),PROTOCL=D,SHARED=Y
                           .
                           .
                           .
```

Explanation of Errors in Example

The following corrections are required to make the IOCP source file shown in “An Error Example” on page 7-56 build an IOCDS without errors.

First error	The parenthesis around each CHPID is not accepted. You can use either: (00,01,...) or ((00),(01),...)).
Second error	Not an error, just a message indicating the double parenthesis notation used in the example ((---)) is not necessary but is accepted.
Third error	A blank line was found in the source file.
Fourth error	UNITADD is spelled incorrectly.
Fifth error	Add a left parenthesis after UNITADD= --> UNITADD=((70,8)),
Sixth error	Add a right parenthesis after PATH=(28 --> PATH=(28)
Seventh error	Insert a comma between PROTOCL=D and SHARED=Y

Special IOCDS Requirements

Many failures are a result of incorrect control unit and device definitions. If you have a new device or new I/O configuration, ensure that:

- The control units and devices are defined in the operating system **and** the IOCDS.
- The addresses supplied for the devices/control units agree with those in the operating system and IOCDS.
- The correct fixed address ranges are specified in the CNTLUNIT macro for DASD and tape devices. For information on devices requiring special address ranges, refer to "Appendix D. List of Input/Output Devices and Control Units" in *Input/Output Configuration Programmer User's Guide and ESCON Channel-to-Channel Reference*, GC38-0401 or the manuals for the specific device or control unit.

Some devices have special IOCP requirements. These devices are listed in Table 7-16.

Table 7-16. Devices with special IOCP requirements.

Device	Shared	Data Streaming	Also See
3480	No	Yes	Note 1
3490	No	Yes	Note 2
3880	No	Yes	Note 3
3880CJ2	No	Yes	Note 4
3990	No	Yes	
3174	Yes	No	Note 5

Notes:

1. Define 3480s as ESCON or block and assign full range of 16 addresses assigned regardless of the actual number of devices installed.
2. Define 3490s as ESCON or block, and assign a full range of 16 addresses assigned regardless of the actual number of devices installed. Exception: for 3490 models Cxx, D31, D32, D41 and D42 assign only two addresses (0 and 1).
3. Assign 3880 all available addresses in **a single entry**. Example:

   Model 11 32 addresses
   Model 13 16 or 32 addresses
4. Devices 0 and 1 do not exist for 3380CJ2, however they must be assigned.
5. Incorrectly defining 3174 gateway can result in a variety of symptoms including no communication, long response time, and hangs. Use the information in "IOCDS for 3174" on page 7-59 to define the 3174s on your system.

IOCDS for 3174

CNTLUNIT macro (Only one defined for a 3174 and its associated devices.)

CUNUMBR	Any number between 0000 and FFFE
UNIT	3791L
UNITADD	Must include all devices attached. Format: ((base device number, number of devices in decimal)) This includes all DSPUs attached to the gateway.
PROTOCL	Depends on answer to customization question 224. D (DCI) if question 224 is either 0 or 2 S or S4 (data streaming) if question 224 is either 1 or 3.
SHARED	Y

IODEVICE macro (Only one defined for a 3174 and its associated devices.)

CUNUMBR	Same as the CUNUMBR specified above.
UNIT:	3791L
ADDRESS	(base device number, number of devices in decimal).

Example:
For a 3174 gateway with the following:

Base address of B0
63 Token-Ring DSPUs attached
Customization question 104=B0

The IOCP macros are:

```
CNTLUNIT CUNUMBR=B0,UNITADD=((B0,64)),UNIT=3791L,SHARED=Y,PROTOCL=D,   *
         PATH=(the CHPIDs that attach to the control unit)
IODEVICE ADDRESS=(1B0,64),UNIT=3791L,CUNUMBR=B0
```

Chapter 8. Sysplex Timer Feature (ETR) Card Information

This chapter provides information about resolving problems with the Sysplex Timer* feature card.

Note: Some documents may also refer to the Sysplex Timer feature as External Timer Reference (ETR).

Precautions

Important! Read this before continuing:

1. The distribution of ETR signals in models that have multiple CPCs is **significantly** different than most other machines. It is therefore strongly recommended that you review “Sysplex Timer Feature (ETR) Description” on page 8-2 before proceeding with any repair actions.
2. **Disconnecting** the fiber optic cables to the Sysplex Timer Feature cards without correct problem determination can **severely impact** the customer's operation.

Find the information you want in the following table and go to the page indicated.

Information On	Go To
Description of feature	“Sysplex Timer Feature (ETR) Description” on page 8-2.
Resolving problems	“Resolving Sysplex Timer Feature (ETR) Problems” on page 8-6.
Procedure for verifying Sysplex Timer Feature port status	“Verifying Sysplex Timer Feature (ETR) Port Status” on page 8-29.
Procedure for running optical wrap test	“Sysplex Timer Feature (ETR) Optical Wrap Test” on page 8-26.
Procedure for measuring optical power	“Optical Power Measurement (ESCON and ETR)” on page 9-2.
Procedure for exchanging the Sysplex Timer feature card	“Exchanging FRUs” on page 6-16.

Sysplex Timer Feature (ETR) Description

The Sysplex Timer feature (ETR) card allows attachment to an IBM 9037 Sysplex Timer. The 9037 Sysplex Timer synchronizes the time-of-day clocks among multiple processors. The Basic 9037 configuration includes a single 9037 and associated console. The Expanded Availability 9037 configuration includes one console and two 9037s synchronized with each other. For more information, refer to Planning for the 9037 Sysplex Timer, GA23-0365.

Types of cards

Three different types of Sysplex Timer attachment cards can be used, depending on the number of CPCs installed. They are:

- Dual fiber port or standalone card (feature 6152)
- Master card (feature 6150)
- Slave card (feature 6151)

The ETR cards are plugged in the following CPC card slots:

Note: Since the models may be interconnected, the card locations for all models is included.

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

Dual fiber port or standalone card: This card is always used for 9672/9674/2003 models that have only one CPC. It has two fiber optic ports, each of which is attached to a 9037 Sysplex Timer through a fiber optic cable. In an Expanded Availability 9037 configuration, each fiber optic port should be attached to a different 9037. This card does not have any output ports to redistribute the 9037 signals.

Master card: This card is always used for 9672 models that have more than one CPC and is installed in the **first two CPCs** in each string. Each Master card has two input ports and one output port. The master input port is a fiber optic port, which is attached to a 9037 Sysplex Timer through a fiber optic cable. The slave input port is an electrical port, which receives redriven 9037 signals from the other Master card's output port. In an Expanded Availability 9037 configuration, each Master card should be attached to a different 9037. The Master card's **output port** distributes the 9037 signals to the other Master card and all the Slave cards in the string through wire cables.

One master card is always found in the CPC at location A18B (upper location in frame A). The master output port of this card is connected to the upper distribution block in frame A. In this repair procedure this master card is referred to as the ***first master card*** and this distribution block is referred to as the ***first distribution block***. Because of the different system configurations possible, the second master card can be found in the CPC at location A01A, Z18A, or Y18A. The master output port of this card is connected to the distribution block in the same frame as it is located. In this repair procedure this master card is referred to as the ***second***

master card and this distribution block is referred to as the ***second distribution block***.

Note: The distribution blocks are located at the rear of frame A, on the right-hand side.

Slave card: This card is always used for 9672 models that have more than two CPCs and is installed in the **last six CPCs** in each string. Each Slave card has two electrical input ports, each receiving signals from a different Master card's output port. The Slave card does not have any output ports to redistribute the 9037 signals.

LED indicators

Each type of card has two LED indicators (P0 and P1) to indicate a loss of input signal to a port. The loss of a signal is always referred to as “Loss of Light,” whether the connection is through a fiber or a wire. Figure 8-1 on page 8-4 shows the location of ports and indicators on all three types of cards. It also shows the relationship between the LEDs and the ports on each type of card.

Note: A “Loss of light” indication at port J0 of a master card will result in “loss of light” indications on all attached slave ports on both the other master card and slave cards.

Example of configuration

Figure 8-2 on page 8-5 is an example showing the Sysplex Timer connections for **one possible configuration** of a multiple CPC model. Note that the locations of the CPCs containing the Master and Slave cards as well as the distribution blocks are different for different configurations.

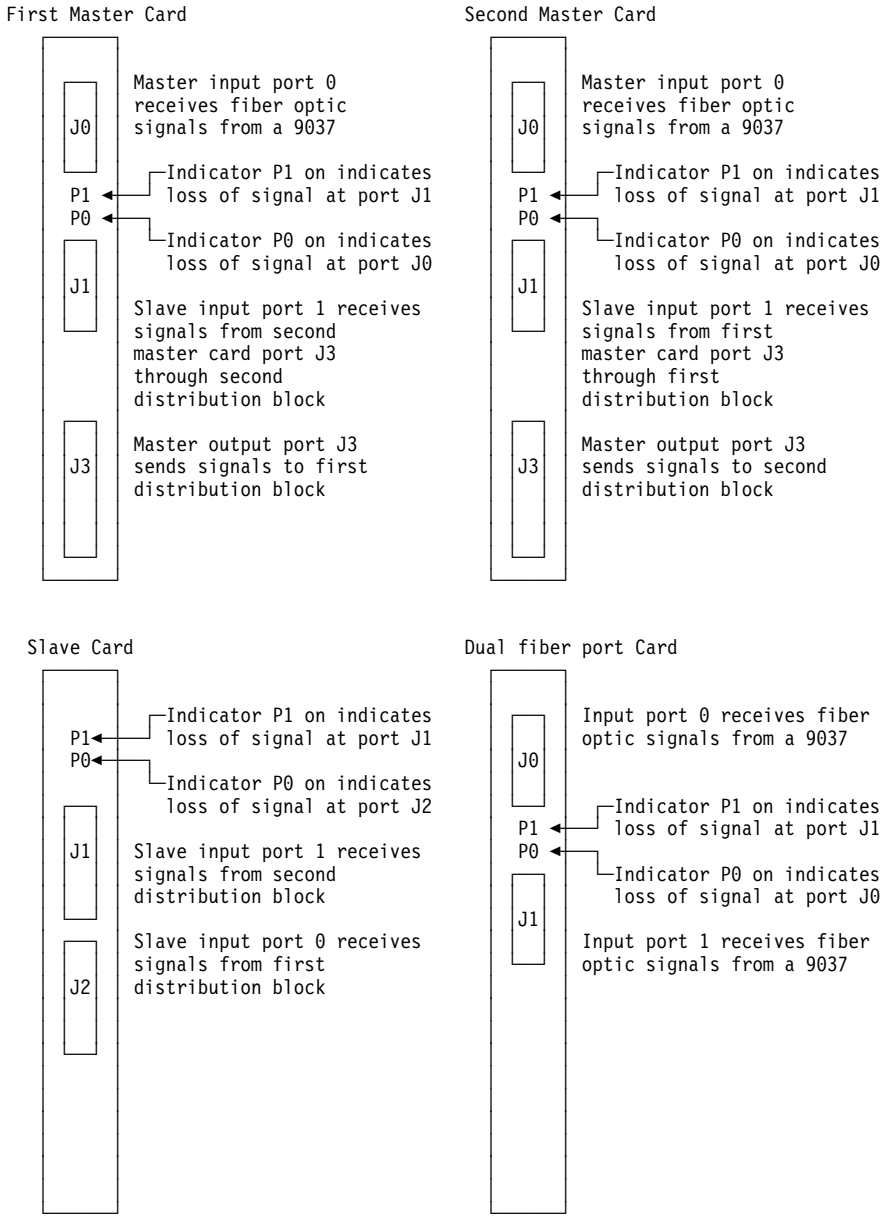


Figure 8-1. Locations of ports and indicators on Sysplex Timer feature cards

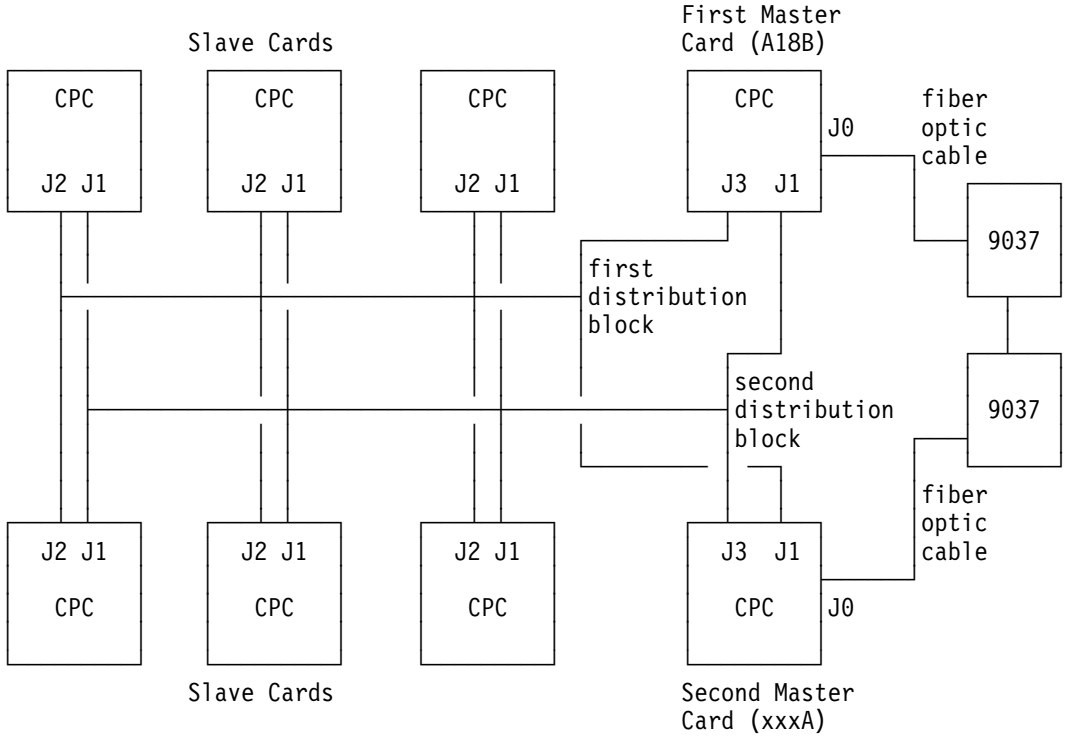


Figure 8-2. Example of Sysplex Timer feature card wiring for a multiple CPC model.

Notes:

1. This is only **one possible** configuration of a Model E08.
2. The locations of the second master card, the second distribution block, and the slave cards depend on the configuration of the CPCplex.

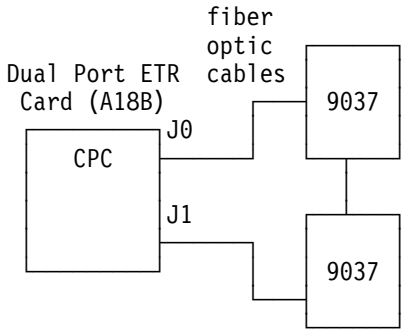


Figure 8-3. Example of Sysplex Timer cabling for a single CPC model.

Resolving Sysplex Timer Feature (ETR) Problems

Use this information if you are here for **one** of the following reasons:

- The customer reported a Sysplex Timer message on one or more CPCs.
- The maintenance information manual (MIM) for the Sysplex Timer directed you to the processor maintenance information.
- A Repair and Verify window directed you here.

Note: If a 9037 Sysplex timer is not installed or the fiber optic cables from the ETR are not connected, ensure the wrap connectors are ***not*** installed (dual fiber port or master card).

1

Read the information in "Sysplex Timer Feature (ETR) Description" on page 8-2 before continuing.

Is the problem on a single CPC model that has two fiber optic ports on the ETR card?

YES **NO**

↓ Go to step 39.

2 Single CPC Models

This is the starting point for Sysplex Timer Feature problems in 9672 models with a single CPC that uses the dual fiber optic port ETR card (feature 6152).

Review the information in the right hand column, then continue on step 3.

Note: The Sysplex Timer Feature (ETR) card is in the CPC (location A18A or A18B). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

should have a fiber link attached to each of its two fiber ports.

3

Were you directed here from the maintenance information manual (MIM) of the Sysplex Timer?

NO **YES**

↓ Go to step 6.

4

Record the port status of each port using the LED indicators on the card.

Important!

Notes:

1. Refer to Figure 8-1 on page 8-4 for an explanation of the relationship between the LED indicators and the ports.
2. "LED on" indicates that the port is non-operational.

Were you able to locate one or more LED indicators on?

YES NO

↓ Go to step 29.

5

Go to the maintenance information manual (MIM) of the 9037 for problem determination, then return to step 6.

6

After completing problem determination at the 9037 Sysplex Timer, answer the following question:

Did you find and repair the problem related to the failing port, using the 9037 Sysplex Timer maintenance information manual (MIM)?

YES NO

↓ Go to step 10.

Note:

If you are not sure which port is detecting the failure, use the LED indicators on the card to confirm the failure. ("LED on" indicates that the port is non-operational.)

Refer to Figure 8-1 on page 8-4 for an explanation of the relationship between the LED indicators and the ports.

7

Using the procedure outlined in "Verifying Sysplex Timer Feature (ETR) Port Status" on page 8-29, obtain the status of the ports.

When complete, go to step 8.

8

Are both ports reporting a status of **Operating**?

YES NO

↓ Go to step 10.

9

Close the call. For instructions, refer to “Closing a Call” on page 6-49.

End of procedure.

10

Run the optical wrap test at the failing port of the Sysplex Timer feature (ETR) card. For instructions, see “Sysplex Timer Feature (ETR) Optical Wrap Test” on page 8-26.

When complete, go to step 11.

Note:

If you are not sure which port is detecting the failure, use the LED indicators on the card to confirm the failure. (“LED on” indicates that the port is non-operational.)

Refer to Figure 8-1 on page 8-4 for an explanation of the relationship between the LED indicators and the ports on each type of card.

11

Did the optical wrap test fail?

YES NO

↓ Go to step 16.

12

Use the procedure in “Exchanging FRUs” on page 6-16 to exchange the Sysplex Timer feature card.

When complete, go to step 13.

The Sysplex Timer Feature (ETR) card is in the CPC (location A18A or A18B). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

13

Run the optical wrap test at the port of the Sysplex Timer feature (ETR) card that was failing previously. For instructions, see “Sysplex Timer Feature (ETR) Optical Wrap Test” on page 8-26.

When complete, go to step 14.

14

Did the optical wrap test fail on the new card?

NO **YES**

↓ Call for assistance

15

Close the call. For instructions, refer to "Closing a Call" on page 6-49.

End of procedure.

16

Measure and record the ***transmit power*** at the failing port of the Sysplex Timer feature card. For instructions, refer to "Optical Power Measurement (ESCON and ETR)" on page 9-2.

When complete, go to step 17.

17

Is the transmit power within specification? (See **Note**.)

NO **YES**

↓ Go to step 22.

Note: The power reading should be ***equal to or greater than*** -21.0 dBm.

Example: -22.0 dBm is ***less*** than -21.0 dBm.

18

Use the procedure in "Exchanging FRUs" on page 6-16 to exchange the Sysplex Timer feature card.

When complete, go to step 19.

The Sysplex Timer Feature (ETR) card is in the CPC (location A18A or A18B). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

19

Measure and record the ***transmit power*** at the port of the Sysplex Timer feature card that was failing previously. For instructions, refer to "Optical Power Measurement (ESCON and ETR)" on page 9-2.

When complete, go to step 20.

20

Is the transmit power within specification?

YES NO

↓ Call for assistance

Note: The power reading should be ***equal to or greater than*** -21.0 dBm.

Example: -22.0 dBm is ***less*** than -21.0 dBm.

21

Close the call. For instructions, refer to "Closing a Call" on page 6-49.

End of procedure.

22

Measure and record the ***receive power*** to the failing port of the Sysplex Timer feature card. For instructions, refer to "Optical Power Measurement (ESCON and ETR)" on page 9-2.

When complete, go to step 23.

23

Is the receive power within specification?

YES NO

↓ Go to step 25.

Note: The receive power reading should be ***equal to or greater than*** -29.0 dBm.

Example: -28.0 dBm is ***greater*** than -29.0 dBm.

24

Use the information you obtained doing problem determination at the 9037 to answer the following question:

Is the receive power **measured at the 9037** within specification?

Note: If you do not have this measurement, go to the 9037 Sysplex Timer maintenance information manual (MIM), then return here.

NO YES

↓ Call for assistance

Note: The receive power reading should be ***equal to or greater than*** -29.0 dBm.

Example: -28.0 dBm is ***greater*** than -29.0 dBm.

25

If you already determined that the 9037 transmit power is within specification, the most probable cause of failure is the fiber link,

Note: If you do not have this measurement go to the 9037 Sysplex Timer maintenance information manual (MIM), then return here.

Go to step 26 after the repair is complete.

Note: If the transmit power at the 9037 is not correct, use the 9037 MIM to correct the problem. If the transmit power at the 9037 is correct, repair or replace the fiber optic cable to the ETR card.

26

Measure and record the ***receive power*** to the port of the Sysplex Timer feature card that was failing previously. For instructions, refer to “Optical Power Measurement (ESCON and ETR)” on page 9-2.

When complete, go to step 27.

27

Is the receive power within specification?

YES NO

↓ Call for assistance

Note: The receive power reading should be ***equal to or greater than*** -29.0 dBm.

Example: -28.0 dBm is ***greater*** than -29.0 dBm.

28

Close the call. For instructions, refer to “Closing a Call” on page 6-49.

End of procedure.

29

Has the customer reported one of the following MVS messages?

- IEA272I ETR service is requested. Reason Code=rcc
- IEA285I The link from Port x to the ETR is not tuned

YES NO

↓ Go to step 34.

30

Go to the 9037 Sysplex Timer maintenance information manual (MIM) for problem determination, then return to step 31.

31

Did you find and repair the problem using the 9037 Sysplex Timer maintenance information manual (MIM)?

YES NO

↓ Call for assistance

32

Using the procedure outlined in "Verifying Sysplex Timer Feature (ETR) Port Status" on page 8-29, obtain the status of the ports.

When complete, return to step 33.

33

If you have correct operation, close the call. For instructions, refer to "Closing a Call" on page 6-49.

If you are still experiencing a problem, call for assistance.

34

Has the customer reported the following MVS message?

- IEA262I ETR port n is not operational

YES NO

↓ Call for assistance

35

Use the procedure in "Exchanging FRUs" on page 6-16 to exchange the Sysplex Timer Feature card.

When complete, go to step 36.

The Sysplex Timer Feature (ETR) card is in the CPC (location A18A or A18B). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

36

Using the procedure outlined in "Verifying Sysplex Timer Feature (ETR) Port Status" on page 8-29, obtain the status of the ports.

When complete, go to step 37.

37

Is the port reporting **Not operating** status previously, now displaying **Operating** status?

YES NO

↓ Call for assistance

38

Close the call. For instructions, refer to "Closing a Call" on page 6-49.

End of procedure.

---

39 Multiple CPC Models

This is the starting point for Sysplex Timer Feature problems in 9672 models with multiple CPCs, that use the Master and Slave ETR cards (features 6150 and 6151 respectively).

Review the information in the right hand column, then go to step 40.

Note: The Sysplex Timer Feature (ETR) card is in the CPC (location A18A or A18B). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

In this repair procedure, this master card is referred to as the ***first master card*** and the associated distribution block is referred to as the ***first distribution block***.

Because of the different system configurations possible, the second master card can be found in the CPC at either location A01A, Z18A, or Y18A. In this repair procedure, this master card is referred to as the ***second master card*** and the associated distribution block is referred to as the ***second distribution block***. For more information, refer to "Sysplex Timer Feature (ETR) Description" on page 8-2.

40

Were you directed here from the maintenance information manual (MIM) of the Sysplex Timer?

NO YES

↓ Go to step 43.

41

Record the port status of each Master and Slave Sysplex Timer Feature card in the customer's configuration, using the LED indicators on each card.

Important!

Notes:

1. Refer to Figure 8-1 on page 8-4 for an explanation of the relationship between the LED indicators and the ports on each type of card.
2. “LED on” indicates that the port is non-operational.

Were you able to locate one or more Sysplex Timer Feature cards with an LED indicator on?

YES NO

↓ Go to step 73.

42

Go to Table 8-1 on page 8-24 with the port status data you have recorded and follow the action for the non-operational port condition that matches.

End of procedure.

43

Did you repair a problem related to the failing port?

YES NO

↓ Go to step 46.

Note:

If you are not sure which port is detecting the failure, use the LED indicators on each card to confirm the failure. (“LED on” indicates that the port is non-operational.)

Refer to Figure 8-1 on page 8-4 for an explanation of the relationship between the LED indicators and the ports on each type of card.

Refer to Table 8-1 on page 8-24 for assistance.

44

Using the procedure outlined in "Verifying Sysplex Timer Feature (ETR) Port Status" on page 8-29, obtain the status of the ports of the **suspected Master card**.

When complete, go to step 45.

45

- If Port 0 reported a status of **Not operating**, go to 46.
- If Port 1 reported a status of **Not operating**,

  Verify you are monitoring the correct central processor complex.
  If you are, call for assistance.
- If both ports reported a status of **Operating**, close the call. For instructions, refer to "Closing a Call" on page 6-49.

  End of procedure.

46

Run the optical wrap test at the failing port of the Sysplex Timer feature (ETR) card. For instructions, see "Sysplex Timer Feature (ETR) Optical Wrap Test" on page 8-26.

When complete, go to step 47.

Note:

If you are not sure which port is detecting the failure, use the LED indicators on each card to confirm the failure. ("LED on" indicates that the port is non-operational.)

Refer to Figure 8-1 on page 8-4 for an explanation of the relationship between the LED indicators and the ports on each type of card.

Refer to Table 8-1 on page 8-24 for assistance.

47

Did the optical wrap test fail?

YES **NO**

↓ Go to step 52.

48

Use the procedure in "Exchanging FRUs" on page 6-16 to exchange the Sysplex Timer feature card.

When complete, go to step 49.

The Sysplex Timer Feature (ETR card is in the CPC at location A18B (upper location in frame A). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

49

Run the optical wrap test at the port of the Sysplex Timer feature (ETR) card, that was failing previously. For instructions, see "Sysplex Timer Feature (ETR) Optical Wrap Test" on page 8-26.

When complete, go to step 50.

50

Did the optical wrap test fail on the new card?

NO **YES**

↓ Call for assistance

51

Close the call. For instructions, refer to "Closing a Call" on page 6-49.

End of procedure.

52

Measure and record the ***transmit power*** at the failing port of the Sysplex Timer feature card. For instructions, refer to "Optical Power Measurement (ESCON and ETR)" on page 9-2.

When complete, go to step 53.

53

Is the transmit power within specification? (See **Note**.)

NO **YES**

↓ Go to step 58.

Note: The power reading should be ***equal to or greater than*** -21.0 dBm.

Example: -22.0 dBm is ***less*** than -21.0 dBm.

54

Use the procedure in "Exchanging FRUs" on page 6-16 to exchange the Sysplex Timer feature card.

When complete, go to step 55.

The Sysplex Timer Feature (ETR card is in the CPC at location A18B (upper location in frame A). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

55

Measure and record the ***transmit power*** at the port of the Sysplex Timer feature card that was failing previously. For instructions, refer to "Optical Power Measurement (ESCON and ETR)" on page 9-2.

When complete, go to step 56.

56

Is the transmit power within specification?

YES NO

↓ Call for assistance

Note: The power reading should be ***equal to or greater than*** -21.0 dBm.

Example: -22.0 dBm is ***less*** than -21.0 dBm.

57

Close the call. For instructions, refer to "Closing a Call" on page 6-49.

End of procedure.

58

Measure and record the ***receive power*** to the failing port of the Sysplex Timer feature card. For instructions, refer to "Optical Power Measurement (ESCON and ETR)" on page 9-2.

When complete, go to step 59.

59

Is the receive power within specification?

YES NO

↓ Go to step 61.

Note: The receive power reading should be ***equal to or greater than*** -29.0 dBm.

Example: -28.0 dBm is ***greater*** than -29.0 dBm.

60

Use the information you obtained doing problem determination at the 9037 to answer the following question:

Is the receive power **measured at the 9037** within specification?

Note: If you do not have this measurement go to the 9037 Sysplex Timer maintenance information manual (MIM), then return here.

NO **YES**

↓ Call for assistance

Note: The receive power reading should be ***equal to or greater than*** -29.0 dBm.

Example: -28.0 dBm is ***greater*** than -29.0 dBm.

61

If you already determined that the 9037 transmit power is within specification, the most probable cause of failure is the fiber link.

Note: If you do not have this measurement, go to the 9037 Sysplex Timer maintenance information manual (MIM), then return here.

Go to step 62 after the repair is completed.

Note: If the transmit power measurement at the 9037 is not correct, use the 9037 MIM to correct the problem. If the transmit power measurement at the 9037 is correct, repair or replace the fiber optic cable to the ETR card.

62

Measure and record the ***receive power*** to the port of the Sysplex Timer feature card that was failing previously. For instructions, refer to “Optical Power Measurement (ESCON and ETR)” on page 9-2.

When complete, go to step 63.

63

Is the receive power within specification?

YES **NO**

↓ Call for assistance

Note: The receive power reading should be ***equal to or greater than*** -29.0 dBm.

Example: -28.0 dBm is ***greater*** than -29.0 dBm.

64

Close the call. For instructions, refer to “Closing a Call” on page 6-49.

End of procedure.

65

You are here because a **single** slave port was diagnosed in the non-operational state.

Using "Verifying Sysplex Timer Feature (ETR) Port Status" on page 8-29, obtain the status of **this non-operational port.**

When complete, go to step 66.

Note: Refer to Table 8-1 on page 8-24 for assistance.

66

Is one of the ports reporting **Not operating** status, **and** is this the **same** port as the one determined previously, using Table 8-1 on page 8-24?

YES NO

↓ Verify that you are monitoring the correct central processor complex.
If you are, call for assistance.

67

Ensure that the cable from the distribution block to the failing slave port is seated correctly.

If it is, and you still have a non-operational port, use the procedure in "Exchanging FRUs" on page 6-16 to exchange the Sysplex Timer feature card.

If you still have a non-operational port, replace the cable from the distribution block to the failing slave port.

Is the port reporting **Not operating** status previously, now displaying **Operating** status?

YES NO

↓ Call for assistance

Note: Use "Verifying Sysplex Timer Feature (ETR) Port Status" on page 8-29, to obtain or refresh the status of the non-operational port.

The Sysplex Timer Feature (ETR card is in the CPC at location A18B (upper location in frame A). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

68

Close the call. For instructions, refer to "Closing a Call" on page 6-49.

End of procedure.

69

You are here because **multiple** slave ports receiving signals from the **first Master card** were diagnosed in the non-operational state.

Ensure that the cable from the **first Master card** to the distribution block is seated correctly.

If it is, and you still have a non-operational port, use the procedure in “Exchanging FRUs” on page 6-16 to exchange the **first Master card.**

If you still have a non-operational port, replace the cable from the **first Master card** to the distribution block.

Is the port reporting **Not operating** status previously, now displaying **Operating** status?

YES **NO**

↓ Call for assistance

Note:

The **first master card** is always found in CPC at location A18B (upper location in frame A). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

Use the LED indicators on the cards to determine the status of the non-operational ports.

Use Table 8-1 on page 8-24 for assistance.

70

Close the call. For instructions, refer to “Closing a Call” on page 6-49.

End of procedure.

71

You are here because **multiple** slave ports receiving signals from the **second Master card** were diagnosed in the non-operational state.

Ensure that the cable from the **second Master card** to the distribution block is seated correctly.

If it is, and you still have a non-operational port, use the procedure in “Exchanging FRUs” on page 6-16 to exchange the **second Master card.**

If you still have a non-operational port, replace the cable from the **second Master card** to the distribution block.

Is the port reporting **Not operating** status previously, now displaying **Operating** status?

YES NO

↓ Call for assistance

Note:

The **second master card** can be found in the CPC at either location A01A, Z18A, or Y18A. Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4 and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

Use the LED indicators on the cards to determine the status of the non-operational ports.

Use Table 8-1 on page 8-24 for assistance.

72

Close the call. For instructions, refer to “Closing a Call” on page 6-49.

End of procedure.

73

Has the customer reported one of the following MVS messages?

- IEA272I ETR service is requested. Reason Code=rcc
- IEA285I The link from Port x to the ETR is not tuned

YES NO

↓ Go to step 78.

74

Go to the 9037 Sysplex Timer maintenance information manual (MIM) for problem determination, then return to step 75.

75

Did you find and repair the problem using the 9037 Sysplex Timer maintenance information manual (MIM)?

YES NO

↓ Call for assistance

76

Using the procedure outlined in “Verifying Sysplex Timer Feature (ETR) Port Status” on page 8-29, obtain the status of the ports of the Sysplex Timer Feature card in the CPC reporting this MVS message.

When complete, return to step 77.

77

If you have correct operation, close the call. For instructions, refer to “Closing a Call” on page 6-49.

If you are still experiencing a problem, call for assistance.

78

Has the customer reported the following MVS message?

- IEA262I ETR port n is not operational

YES NO

↓ Call for assistance

79

Use the procedure in "Exchanging FRUs" on page 6-16 to exchange the Sysplex Timer Feature card in the CPC reporting this MVS message.

When complete, go to step 80.

The Sysplex Timer card is in the CPC (location A18A or A18B). Card location is :

Slot 16 for R1 Based 9672/9674 models
Slot 35 for R2 Based 9672/9674 models
Slot 12 for R3 Based 9672/9674 models
Slot 35 for G3, G4, and G5 Enterprise Server (9672)
Slot 35 for Coupling Facility Models C04 and C05 (9674)
Slot 35 for Multiprise 2000 (2003)

80

Using the procedure outlined in "Verifying Sysplex Timer Feature (ETR) Port Status" on page 8-29, obtain the status of the ports of the Sysplex Timer Feature card in the CPC reporting this MVS message.

When complete, go to step 81.

81

Is the port reporting **Not operating** status previously, now displaying **Operating** status?

YES **NO**

↓ Call for assistance

82

Close the call. For instructions, refer to "Closing a Call" on page 6-49.

End of procedure.

---

1. Find the row that matches the **"Port Status"** columns for all master cards and slave cards in the string.

   Note: NOP = Not OPerational

2. Read the description in the **"Probable error/FRU list"** column.
3. Perform the action indicated in the **"Action"** column.

Table 8-1 (Page 1 of 2). Repair actions for ETR indications

Port Status						Probable error / FRU list	Action
First Master card		Second Master card		Slave card			
P0	P1	P0	P1	P0	P1		
NOP	See **Note**	See **Note**	NOP	NOP		**First Master card Port 0 not operational** See Figure 8-1 on page 8-4 Possible FRU list: • 9037 port • First Master card • ETR Fiber link **Note:** If both P0 and P1 are NOP, both Master cards may be defective.	Go to the maintenance information manual (MIM) of the 9037 for problem determination, then return to **step 43 on page 8-14.**
See **Note**	NOP	NOP	See **Note**		NOP	**Second Master card Port 0 not operational** See Figure 8-1 on page 8-4 Possible FRU list: • 9037 port • Second Master card • ETR Fiber link **Note:** If both P0 and P1 are NOP, both Master cards may be defective.	Go to the maintenance information manual (MIM) of the 9037 for problem determination, then return to **step 43 on page 8-14.**
	NOP See **Note**		NOP See **Note**	NOP See **Note**	NOP See **Note**	**Single slave port not operational.** See Figure 8-1 on page 8-4 **Note:** Only one slave port will indicate non-operational status. Possible FRU list: • Card detecting NOP • Cable from distribution block to slave port not seated correctly. • Cable from distribution block to slave port.	Go to **step 65 on page 8-19.**
			NOP See **Note**	NOP See **Note**		**Multiple slave ports receiving signals from first Master card not operational.** See Figure 8-1 on page 8-4 **Note:** All slave ports may not indicate non-operational status. Possible FRU list: • First Master card • Cable from first Master card to distribution block not seated correctly. • Cable from first Master card to distribution block.	Go to **step 69 on page 8-20.**

Table 8-1 (Page 2 of 2). Repair actions for ETR indications

Port Status						Probable error / FRU list	Action
First Master card		Second Master card		Slave card			
P0	P1	P0	P1	P0	P1		
	NOP See **Note**				NOP See **Note**	**Multiple slave ports receiving signals from second Master card not operational.** See Figure 8-1 on page 8-4 **Note:** All slave ports may not indicate non-operational status. Possible FRU list: • Second Master card. • Cable from second Master card to distribution block not seated correctly. • Cable from second Master card to distribution block.	Go to **step 71 on page 8-21.**

Sysplex Timer Feature (ETR) Optical Wrap Test

Use the optical wrap test procedure when you are directed by one of the steps in "Resolving Sysplex Timer Feature (ETR) Problems" on page 8-6.

The following tools are required:

Tool	Part Number
Fiber optic cleaning kit	5453521
Optical wrap connector	5605670

To perform the optical wrap test:

1

- Before connecting fiber optic cables or connectors, clean the fiber optic cable connectors according to the instructions in the optical cleaning kit.
- Install the wrap connector to the ***failing port*** of the Sysplex timer feature (ETR) card in the CPC.

Figure 8-4 on page 8-28 shows the wrap plug installed on port 0 of a Sysplex Timer feature card.

Go to step 2.

2

If you are using a ThinkPad support element for this task, rotate the support element into the service position and start service. Refer to "Starting Service with the Support Element" on page 1-10 for more information.

If you are using the Hardware Management Console for this task, make a remote connection to the central processor complex (CPC). For information, refer to "Starting Service With the Hardware Management Console" on page 1-26.

Go to step 3.

3

.Ensure system activation is complete.

On the Support Element Workplace window:

- Ensure the support element is in service mode.
- Open **Task List** from **Views**.
- Open **CPC Configuration** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the **CPC** icon (using the right-hand mouse button) to **System Complex (Sysplex) timer** under the **CPC Configuration** area.

Go to step 4.

4

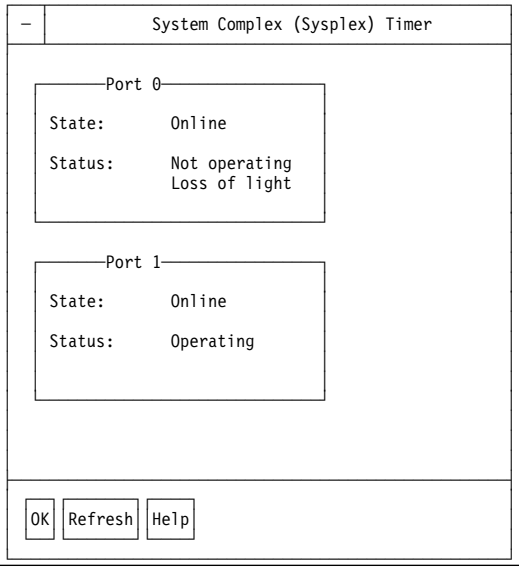
On the System Complex (Sysplex) Timer window check the status for the two ports on the Sysplex Timer feature card.

- If a status of **Loss of phase** or **Bi-Phase error** displays for the port being tested, the optical wrap test ran without failures.
- If a status of **Loss of light** displays for the port being tested, the optical wrap test failed.

Note: If you want to test again, select **Refresh**.

Remove the wrap connector, reconnect the fiber optic cable, and return to the procedure that directed you here.

End of procedure.



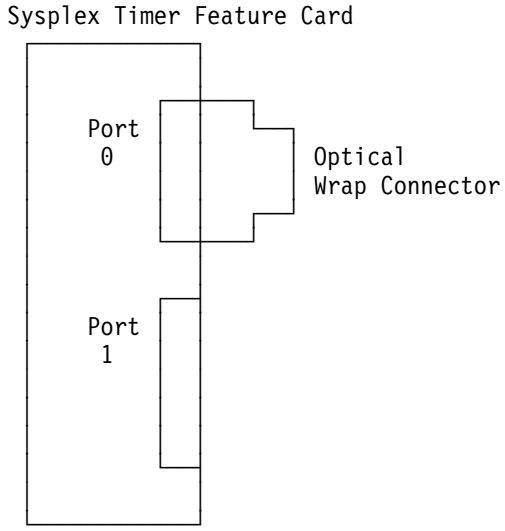


Figure 8-4. Sysplex Timer feature card with the optical wrap connector installed on port 0.

Verifying Sysplex Timer Feature (ETR) Port Status

Use this section to collect data pertaining to the state and status of Sysplex Timer Feature ports.

1

- If you are using a ThinkPad support element for this task, rotate the support element into the service position. For information, refer to "Starting Service with the Support Element" on page 1-10.

  Go to step 2.

- If you are using the Hardware Management Console for this task, make a remote connection to the central processor complex (CPC). For information, refer to "Starting Service With the Hardware Management Console" on page 1-26.

  Go to step 2.

- If you are using the MVS console, go to step 4.

2

Ensure system activation is complete.

On the Support Element Workplace window:

- Ensure the support element is in service mode.
- Open **Task List** from **Views**.
- Open **CPC Configuration** from the **Task List Work Area**.
- Open **Groups** from **Views**.
- Drag the **CPC** icon (using the right-hand mouse button) to **System Complex (Sysplex) Timer** under the **CPC Configuration** area.

Go to step 3.

3

On the System Complex (Sysplex) Timer window check the state and the status for the two ports on the Sysplex Timer feature card.

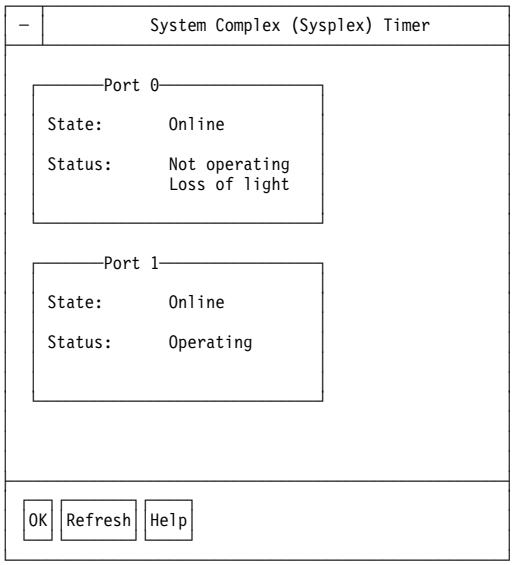
Record the state and the status of the two ports, and return to the procedure that directed you here.

Note:

This panel is just an example of a possible state and status of the two ports. Biphase error and Checkstop are other possible indicators reported.

The loss of a signal is always referred to as “Loss of Light,” whether the connection is through a fiber or a wire.

If you want to test again, select **Refresh**.



End of procedure.

4

With MVS running you can also display the status of the Sysplex Timer Feature ports from the MVS console, by typing the following command:

```
D ETR
```

MVS reports ETR information for the CPC as follows:

```
SYNCHRONIZATION MODE = ETR      CPC SIDE=0
   CPC PORT 0        Active ==►   CPC PORT 1
   OPERATIONAL                    OPERATIONAL
   ENABLED                        ENABLED
```

For correct operation the synchronization mode should be ETR. If Local displays, the internal CPC clock is used. Both ports should be enabled and operational. Active points at the current stepping port (either can be used). CPC side is always 0.

Record the state and the status of the two ports, and return to the procedure that directed you here.

End of procedure.

Chapter 9. Special Optical Tests

This chapter provides information on the optical tests required for the Sysplex Timer*, ESCON channel, coupling facility channel, and ES Conversion Channel features.

Note: Optical measurements for the OSA FDDI and ATM features are included in the maintenance procedures for OSA.

Optical measurements for the FICON feature is included in *Maintenance Information for S/390 Fiber Optic Channel Links*, SY27-2597,(Appendix C).

"Diagnosing OSA Problems" on page 11-28.

Safety Precautions

Observe the following safety information while working on the ESCON channel, coupling facility channel, or ES Conversion Channel features:

CAUTION:

Although the IBM module is safe, there may be other Laser modules in the system link that may not be safe under all conditions. For this reason it is advised to never view the end of the optical fiber cable or open receptacle. However, some repair activities of optical fiber cable assemblies may require the use of special viewing devices. In such cases, disconnecting both ends of the fiber is mandatory. As an additional precaution, viewing equipment with the proper Laser viewing protection filters must be used.

Find the information you want in the following table and go to the page indicated.

Information On	Go To
Procedure for measuring optical input or output power on FICON channels	*Maintenance Information for S/390 Fiber Optic Channel Links*, SY27-2597, (Appendix C).
Procedure for measuring optical input or output power on ESCON channels or Sysplex Timers	"Optical Power Measurement (ESCON and ETR)" on page 9-2.
Procedure for measuring optical input or output power on coupling facility channels	"Optical Power Measurement (Coupling Facility Channel)" on page 9-8.
Procedure for measuring optical power for a ES Conversion Channel (9034) connected to an ESCON channel.	"Optical Power Measurement (ESCON and ETR)" on page 9-2.
Procedure for running the optical wrap test on a Sysplex Timer.	"Sysplex Timer Feature (ETR) Optical Wrap Test" on page 8-26.
Description of the optical link interface tests.	"Channel Tests" on page 7-14
Procedure for exchanging a Sysplex Timer, ESCON, or coupling facility channel card.	"Exchanging FRUs" on page 6-16.

Optical Power Measurement (ESCON and ETR)

Use the optical power measurement procedures when you are directed by one of the steps in “Resolving Sysplex Timer Feature (ETR) Problems” on page 8-6, or when you are directed to measure optical power for an ESCON channel or ES Conversion Channel (9034).

- If you were directed to test ***transmit power*** or ***output power***, go to “Transmit Power Measurement.”
- If you were directed to test ***receive power*** or ***input power***, go to “Receive Power Measurement” on page 9-6.

Transmit Power Measurement

1

- Before continuing, read the information in “Safety Precautions” on page 9-1.
- Before connecting fiber optic cables or connectors, clean the fiber optic cable connectors according to the instructions in the fiber optic cleaning kit.

2

- Ensure that the power meter is set up correctly. For instructions, refer to “Optical Power Meter Setup” on page 9-13.
- Set the power meter for 1300 nm.
- Disconnect the fiber optic cable from the failing port of the feature card.
- Connect the duplex connector of the test cable to the failing port of the feature card. See “Output Power Meter Connection” on page 9-5 for the connections.
- Connect the black biconic connector of the test cable to the biconic receptacle on the top of the power meter. Figure 9-1 on page 9-5 shows the connections for the test.

3

Are you testing an ESCON or ES Conversion channel?

NO **YES**

↓ Initialize the channel by selecting **Optical link interface test** and running the optical power measurement tests. For instructions, refer "Running Tests" on page 6-9.

When the optical power measurement test starts, go to step 4.

No initialization is required for the Sysplex Timer.

4

Record the power meter reading.

- If you were directed here by "Resolving Sysplex Timer Feature (ETR) Problems" on page 8-6, return to that procedure.
- Otherwise, select **Stop the power measurement test** and go to step 5.

The correct range of values for the transmit measurement is:

ESCON (card label CH4S)	-14.0 to -21.0 dBm
ESCON (card label CH3S)	-14.0 to -21.0 dBm
ESCON (card label CH3SEDF)	- 2.7 to - 9.0 dBm
ETR	greater than -21.0 dBm

Example: -18.0 dBm is ***greater than*** -21.0 dBm.

Note: When IBM cables are used, black connectors are used with card label CH3S and gray connectors are used with card label CH3SEDF (extended distance). Different color coding may be used for cables from other manufacturers.

5

Was the transmit power value recorded in step 4 correct?

NO **YES**

↓ Select **The power measurement is within specification** from the menu. Then, go to "Receive Power Measurement" on page 9-6.

If the transmit power is correct, follow the directions on the test windows to test receive power.

6

Correct the problem as follows:

- Disconnect the test cable from the feature card.
- Reconnect the fiber optic cable to the feature card.
- Select **The power measurement is not within specification** from the menu.
- Record the Problem Number from the window.
- Go to “On-line CPC Service” on page 1-22 and use the ***new*** problem number opened during the channel test to complete the repair.

When the repair is complete:

- If you were directed here by *Link Fault Isolation*, return to that manual.
- If you were directed here from a window on the support element, follow the directions on the screen for completing the call.
- If you were directed here by “Resolving Channel Problems” on page 7-18, go to “Closing a Call” on page 6-49.

End of procedure.

Problem Analysis opens a problem number if errors are detected during the channel test.

Output Power Meter Connection

Figure 9-1 shows the meter connections used to measure transmit power. The connection for ESCON and Sysplex Timer cards are similar except that the ESCON feature card has three ports. Use the chart in “Channel Card Features and Locations” on page 7-3 to determine the card location and port for the CHPID you are testing.

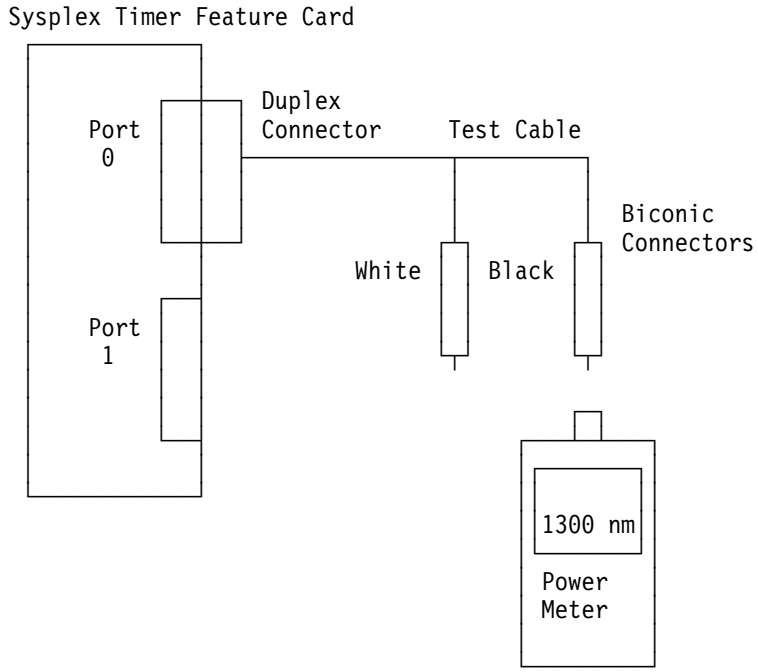


Figure 9-1. Connections for measuring Sysplex Timer feature card output power from port 0.

Receive Power Measurement

1

- Before continuing, read the information in "Safety Precautions" on page 9-1.
- Before connecting fiber optic cables or connectors, clean the fiber optic cable connectors according to the instructions in the optical cleaning kit.

2

- Ensure that the power meter is set up correctly. For instructions, refer to "Optical Power Meter Setup" on page 9-13.
- Set the power meter for 1300 nm.
- Disconnect the fiber optic cable from the failing port of the feature card.
- Connect the fiber optic cable to one side of the duplex-to-duplex test coupler.
- Connect the duplex connector of the test cable into the other side of the duplex-to-duplex coupler.
- Connect the black biconic connector of the test cable to the biconic receptacle on the top of the power meter.

Figure 9-2 on page 9-7 shows the connections for testing the Sysplex Timer feature card.

For information on the tools required, refer to "Optical Measurements" on page C-3.

3

Record the power meter reading.

The correct range of values for the receive measurement is:

```
ESCON (card label CH4S)          -14.0 to -29.0 dBm
ESCON (card label CH3S)          -14.0 to -29.0 dBm
ESCON (card label CH3SEDF)       - 2.7 to -24.6 dBm
ETR                              greater than -29.0 dBm
```

Example: -28.0 dBm is ***greater than*** -29.0 dBm.

Note: When IBM cables are used, black connectors are used with card label CH3S and gray connectors are used with card label CH3SEDF (extended distance). Different color coding may be used for cables from other manufacturers.

4

- Disconnect the fiber optic cable from the duplex-to-duplex coupler.
- Disconnect the test cable from the duplex-to-duplex coupler.
- Reconnect the fiber optic cable to the feature card.
- Follow the directions on the test windows to complete the test.

When the test is complete:

- If you were directed here by *Link Fault Isolation*, return to that manual.
- If you were directed here from a window on the support element, follow the directions on the screen for completing the call.
- If you were directed here by "Resolving Channel Problems" on page 7-18, return to that procedure.

End of procedure.

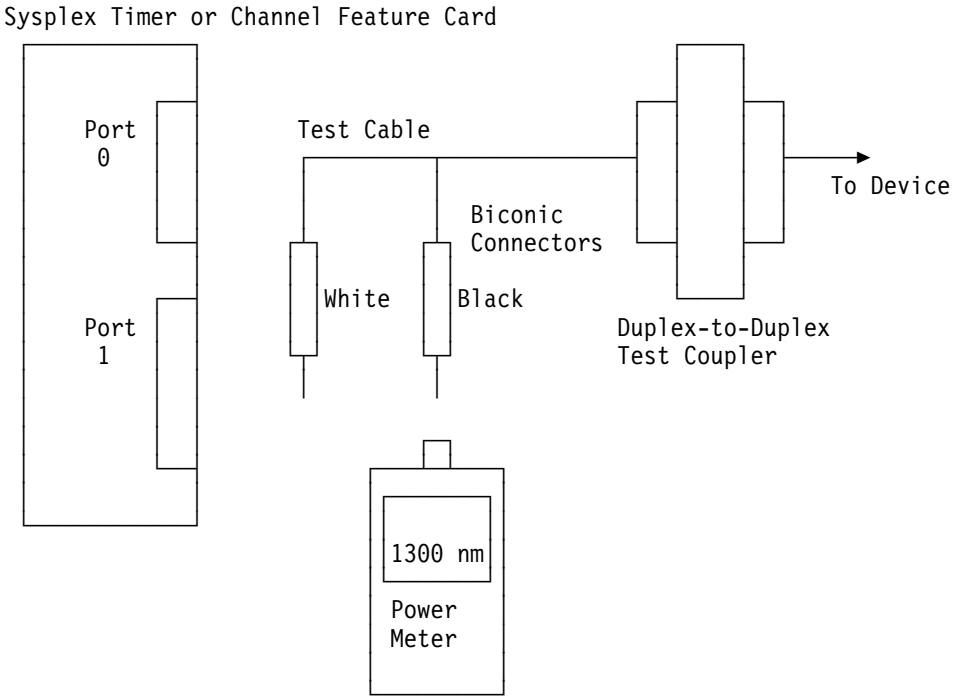


Figure 9-2. Connections for measuring input power to the Sysplex Timer card.

Optical Power Measurement (Coupling Facility Channel)

Use the optical power measurement procedures when you are trying to resolve a problem on an Coupling Facility channel.

The transmitters on both ends of the coupling facility channel will only function if there is a complete fiber link between both pairs of transmitters and receivers. If the link is opened at any point (such as unplugging a connector or breaking a fiber) both transmitters automatically shut down as a safety measure. The transmitters will automatically turn on again within 10 seconds after the link is re-established. In order to maintain a complete link while measuring the power levels, it is necessary to use a fiber optic splitter to tap off a small amount of light from an operating link.

For information on the tools required, refer to "Optical Measurements" on page C-3.

- If you were directed to test ***output power***, go to "Transmit Power Measurement."
- If you were directed to test ***input power***, go to "Receive Power Measurement" on page 9-11.

Transmit Power Measurement

1

- Before continuing, read the information in "Safety Precautions" on page 9-1.
- Before connecting fiber optic cables or connectors, clean the fiber optic cable connectors according to the instructions in the fiber optic cleaning kit.

2

Switch on the power meter, and allow approximately 5 minutes for warm-up.

- If you are measuring a multi-mode coupling facility channel (feature 0007), set the power meter to 850 nm.
- If you are measuring a single-mode coupling facility channel (feature 0008), set the power meter to 1300 nm.

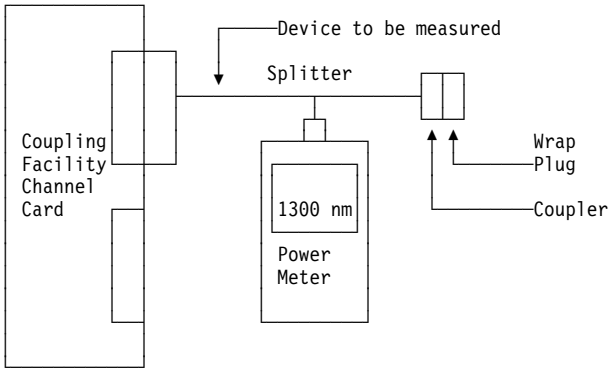
Ensure that the power meter is zeroed correctly. For instructions, refer to "Optical Power Meter Setup" on page 9-13.

If IBM cables are installed, a multi-mode cable is orange and a single-mode cable is yellow.

3

Connect the power meter to the link as follows:

- Attach the connector of the splitter marked “POWER METER” to the power meter.
- Remove the fiber optic cable from the coupling facility channel card.
- Attach the splitter connector marked “DEVICE TO BE MEASURED” to the coupling facility channel card.
- Attach the unmarked splitter connector to the wrap connector using the coupler.



Note: Different splitters, wrap connectors, and couplers are used for single-mode and multi-mode measurements. For information on the tools required, refer to “Optical Measurements” on page C-3.

4

Wait at least 10 seconds after completing the connections for the link to re-establish transmitting, and for the power meter reading to stabilize.

Record the transmit power reading.

- If you are measuring a multi-mode coupling facility channel (feature 0007), the power meter reading should be between - 16.5 dBm and - 8.7 dBm.
- If you are measuring a single-mode coupling facility channel (feature (0008), the power meter reading should be between - 22.0 dBm and - 13.0 dBm.

Go to step 5.

The optical power meter reading taken with the splitter represents 10% of the true optical power in the link, minus some loss associated with the splitter tool. To get the actual power: add +10.0 dBm to the meter reading, then add the splitter loss shown on the label of the splitter.

5

Was the transmit power value recorded in step 4 correct?

NO **YES**

↓ Select **The power measurement is within specification** from the menu. Then, go to "Receive Power Measurement" on page 9-11.

Follow the directions on the test windows to test receive power.

6

Correct the failure as follows:

- Disconnect the splitter from the feature card and cable.
- Reconnect the fiber optic cable to the feature card.
- Select **The power measurement is not within specification** from the menu.
- Record the Problem Number from the window.
- Go to "On-line CPC Service" on page 1-22 and use the ***new*** problem number opened during the channel test to complete the repair.

When the repair is complete:

- If you were directed here by *Link Fault Isolation*, return to that manual.
- If you were directed here by "Resolving Channel Problems" on page 7-18, go to "Closing a Call" on page 6-49 to remove the service cart and prepare the system for customer operation.

End of procedure.

A low reading on the transmit power indicates a defective coupling facility channel feature card. A low reading on the receive power can be either the feature card at the other end or a damaged cable.

Receive Power Measurement

1

- Before continuing, read the information in “Safety Precautions” on page 9-1.
- Before connecting fiber optic cables or connectors, clean the fiber optic cable connectors according to the instructions in the optical cleaning kit.

2

Switch on the power meter, and allow approximately 5 minutes for warm-up.

- If you are measuring a multi-mode coupling facility channel (feature 0007), set the power meter to 850 nm.
- If you are measuring a single-mode coupling facility channel (feature 0008), set the power meter to 1300 nm.

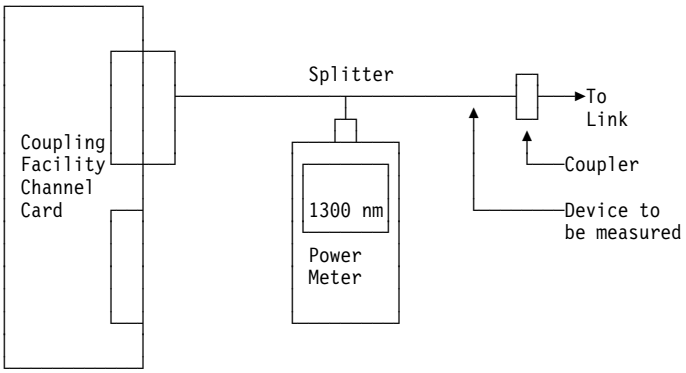
Ensure that the power meter is zeroed correctly. For instructions, refer to “Optical Power Meter Setup” on page 9-13.

If IBM cables are installed, a multi-mode cable is orange and a single-mode cable is yellow.

3

Connect the power meter to the link as follows:

- Disconnect the fiber optic cable from the coupling facility channel card port.
- Attach the unmarked end of the splitter to the coupling facility channel card.
- Attach the duplex connector of the splitter labeled “DEVICE TO BE MEASURED” to the link, using the duplex coupler.
- Attach the splitter connector marked “POWER METER” to the power meter.



Note: Different splitters, wrap connectors, and couplers are used for single-mode and multi-mode measurements. For information on the tools required, refer to “Optical Measurements” on page C-3.

4

Wait at least 10 seconds after completing the connections for the link to re-establish transmitting, and for the power meter reading to stabilize.

Record the receive power meter reading.

- If you are measuring a multi-mode coupling facility channel link, the power meter reading should be between - 26.5 dBm and - 8.7 dBm.
- If you are measuring a single-mode coupling facility channel link, the power meter reading should be between - 31.0 dBm and - 13.0 dBm.

The optical power meter reading taken with the splitter represents 10 % of the true optical power in the link, minus some loss associated with the splitter tool. To get the actual power reading: add +10.0 dBm to the meter reading, then add the splitter loss shown on the label of the splitter.

5

If the level is not within the specified range, the device transmitter optical port could be dirty, or the transmitter could be defective.

- Disconnect the splitter from the feature card and cable.
- Reconnect the fiber optic cable to the feature card.
- Follow the directions on the test window to end the test.

When the test is complete:

- If you were directed here by *Link Fault Isolation*, return to that manual.
- If you were directed here by “Resolving Channel Problems” on page 7-18, return to that procedure.

End of procedure.

Optical Power Meter Setup

Use this procedure if the optical power meter has not previously been turned on, zeroed, and set to the proper scale.

Note: Do not hold down a pushbutton on the power meter for more than 0.5 seconds. After holding a pushbutton down for more than approximately three seconds, the readings are not reliable.

1

- Ensure the black cap is over the biconic receptacle at the top of the power meter.
- Press **On/Off**, **AUTO OFF** displays.
- Allow two minutes for warm up.

Note: If no pushbutton is pressed within 10 minutes, the power meter powers off automatically.

2

If the meter does not display 1300 nm (nanometers), repeatedly press the λ pushbutton until 1300 nm displays.

3

Press **Zero**.

If the meter is correctly zeroed, the following displays:

A value between 0.30 and 0.70 nW (nanowatts) followed by **ZERO**.
After a short time ZERO blinks to indicate that the meter is zeroed.

If the meter is ***not*** zeroed correctly, **HI** or **LO** displays.

- If the meter is correctly zeroed (ZERO blinks), go to step 5.
- If the meter is ***not*** correctly zeroed (**HI** or **LO** displays), continue with step 4.

If the reading is measured in dBm (decibels based on one milliwatt) press **dBm/Watt**.

4

- Press **ZERO** again and adjust the potentiometer next to the biconic receptacle at the top of the meter until a value between 0.30 and 0.70 nW (nanowatts) displays. (Try to get a reading of 0.50 nW.)
- Press **ZERO** again to zero the meter.
- Go to step 5.

5

To get the meter to measure in dBm (decibels based on one milliwatt) press **dBm/Watt**.

Return to the procedure that directed you here.

End of procedure.

Chapter 10. ES Conversion Channel Information

This chapter provides information about resolving problems with the Enterprise Systems Connection Converter (9034).

Safety Information

CAUTION:

Although the IBM module is safe, there may be other Laser modules in the system link that may not be safe under all conditions. For this reason it is advised to never view the end of the optical fiber cable or open receptacle. However, some repair activities of optical fiber cable assemblies may require the use of special viewing devices. In such cases, disconnecting both ends of the fiber is mandatory. As an additional precaution, viewing equipment with the proper Laser viewing protection filters must be used.

The fiber extended channel test is available for testing ESCON channels with a 9034 attached. For a description of the test, refer to "Channel Tests" on page 7-14.

In the following table, find the reason code listed on the Problem Analysis window that directed you here, then go to the page indicated.

Note: If a second error is detected after the reason for a previous error is set, "+ other" is also displayed in the reason text.

Reason Code	Description	Go to
	Detected by channel	
82	Data In/Service In while in control unit initiated sequence. (Invalid in-tag change)	"Invalid Service In or Data In Change" on page 10-10
84	Device status check (see the device status byte).	"Inappropriate Status Combination Errors" on page 10-12
86	Short busy status error (see the device status byte).	"Short Busy Status Error" on page 10-11
88	I/O interface has a bus-in or tag-in signal that is active at reset.	"Interface Hang During System Reset" on page 10-11
	Detected by 9034 ES Connection Converter Model 1	
30	Operational In not active or dropped early.	"Invalid Operational In" on page 10-11
31	Address In not active or dropped early. (Invalid in-tag change)	"Invalid Address In Change" on page 10-10
32	Bus-in parity error.	"Bus In Parity Error" on page 10-7
33	Unit address miscompare (Address In does not match Address Out)	"Unit Address Compare Error" on page 10-11
34	Status In not active or dropped early. (Invalid in-tag change)	"Invalid Status In Change" on page 10-10
35	Multiple in tags.	"Multiple In Tag Errors" on page 10-4

Reason Code	Description	Go to
36	Data In/Service In active while not transferring data. (Invalid in-tag change)	“Invalid Service In or Data In Change” on page 10-10
37	Disconnect In active. (I/O error alert)	“Disconnect In and Invalid Disconnect In” on page 10-8
38	Select In/Status In instead of Address In while in command chain reselection.	“Command Chain Reselection Errors” on page 10-11
39	Status In instead of Operational In while in a control unit initiated sequence.	“Invalid Status In Change” on page 10-10
40	Bus in parity error while transferring data.	“Bus In Parity Error” on page 10-7
41	Short tag (Address In, Status In, or Data In).	“Short Tag Detected” on page 10-11
42	Data In/Service In fell before out tag rise (data interlock).	“Invalid Service In or Data In Change” on page 10-10
43	Data In and Service In active or not alternating (data streaming).	“Invalid Service In or Data In Change” on page 10-10
4E	ES Connection Converter (Master IFCC alone).	Call for assistance
6E	ES Connection Converter (Master IFCC alone).	Call for assistance
70	Time out while in initial selection sequence.	“Interface Time Out Error” on page 10-12
71	Time out while transferring data.	“Interface Time Out Error” on page 10-12
72	Time out while in control unit initiated sequence.	“Interface Time Out Error” on page 10-12
73	Time out waiting for Operational In and Address In to rise in command chaining.	“Interface Time Out Error” on page 10-12
74	Time out waiting for Status In to drop during an interface disconnect.	“Interface Time Out Error” on page 10-12
75	In tag active before initial selection sequence.	“Invalid Interface Active” on page 10-10
76	Time out while in initial selection sequence.	“Interface Time Out Error” on page 10-12
77	No Operational In/Select In rise in initial selection sequence.	“Interface Time Out Error” on page 10-12
78	Bus in check at Status In of short busy sequence.	“Bus In Parity Error” on page 10-7
79	Status In did not drop while in short busy sequence.	“Interface Time Out Error” on page 10-12
7A	Bus in check while Address In active.	“Bus In Parity Error” on page 10-7
7B	Unit address miscompare (Address In does not match Address Out)	“Unit Address Compare Error” on page 10-11

Reason Code	Description	Go to
7C	Interface disconnect sequence did not clear the tags in.	Call for assistance
7D	Selective reset did not clear the tags in.	Call for assistance
7E	Selective reset did not clear the tags in and bus in.	Call for assistance
7F	ES Connection Converter IFCC lookup error.	Call for assistance
FE	ES Connection Converter IFCC forced.	Call for assistance
All other	Undefined IFCC code XX from ES Connection Converter.	Call for assistance

Multiple In Tag Errors

This reason code is forced when any of the following combinations of interface tag lines are active simultaneously:

Address In ***and*** Service In
Address In ***and*** Data In
Status In ***and*** Service In
Status In ***and*** Data In
Status In ***and*** Address In
Operational In ***and*** Select In
Select In ***and*** Address In
Select In ***and*** Data In
Select In ***and*** Status In
Select In ***and*** Service In

1

Use the trace detail information for this problem to identify the in tags and bus in data time of the error. Scroll through the trace data and look for an invalid tag combination. For information on viewing the trace information, refer to "Viewing I/O Trace Information" on page 10-16.

Is the combination of in tags invalid?

NO **YES**

↓ Go to step 4.

The following combinations of ***In Tags*** are invalid:

ADR+DAT
ADR+SEL
ADR+SRV
ADR+STA
SEL+DAT
SEL+SRV
SEL+STA
STA+SRV
STA+DAT
OPL+SEL

2

Use the I/O trace data to identify a tag line that is always active.

Is any tag line always active?

NO **YES**

↓ Go to step 4.

3

Use the I/O trace data to check for an in tag that is active at the start of the initial selection sequence.

Is Operational In, Select In or Status In active?

YES **NO**

↓ Go to step 5.

The initial tag sequence at initial selection is:

ADR Out	+
Hold Out	+
SEL Out	+
OPL Out	+
ADR Out	-
ADR In	+
Bus In	+ (lines with device address)
Hold Out	-
SEL Out	-

Note: + indicates a signal goes active, - indicates a signal goes inactive.

At the beginning of the initial selection sequence, Address Out should not become active if Operational In, Select In or Status In is active. For detailed information about initial selection sequence, refer to *IBM System/360 and System/370 I/O Interface Channel to Control Unit Original Equipment Manufacturers' Information*, GA22-6974.

4

Disable the control units, one at a time, to eliminate the possibility of multiple control units responding at the same time.

Error isolated to a control unit or I/O device?

NO **YES**

↓ Repair the I/O device. When complete, close the call. For instructions, refer to “Closing a Call” on page 6-49.

Test using the customer program or system test exerciser program. For information on using the system test exerciser program, refer to “Test Run Procedure” on page 6-10.

5

Test the interface cabling and connections using one of the following methods:

- Customer operation
- System test exerciser program. For information, refer to “Test Run Procedure” on page 6-10.
- 9034 interface isolation. For instructions, refer to “Interface Fault Isolation” on page 10-18.

Did a failure occur?

YES **NO**

↓ Call for assistance

If a scope is available, scope the tag lines to determine if the voltage levels of the signals or the noise on the lines are outside the following specifications:

active level (nominal)	+2.25 Vdc
inactive level (nominal)	+0.15 Vdc
maximum noise level	+0.400 Vdc
minimum active level (including noise)	+1.70 Vdc
maximum inactive level (including noise)	+0.70 Vdc

For detailed information on signal levels, refer to *IBM System/360 and System/370 I/O Interface Channel to Control Unit Original Equipment Manufacturers' Information*, GA22-6974.

6

Go to “Resolving Channel Problems” on page 7-18.

Bus In Parity Error

An even number of bus in lines were active 100 nanoseconds after Address In, Status In, Data In, or Service In was active.

1

Use the trace detail information in the Problem Analysis window for this problem to identify the bus in lines active 100 nanoseconds after Address In, Status In, Data In, or Service In was active. For information on viewing the trace information, refer to "Viewing I/O Trace Information" on page 10-16.

Did the error occur at Address In time?

NO **YES**

↓ Go to step 4.

2

Check the interface cabling and connections.

Did you resolve the problem?

YES **NO**

↓ Call for assistance

Suggested methods for testing:

- Customer operation
- 9034 interface isolation. For instructions, refer to "Interface Fault Isolation" on page 10-18.

3

Close the call. For information, refer to "Closing a Call" on page 6-49.

4

- Check the control unit address wiring (both in and out) for all control units on the interface.
- Check the interface cabling and connections.

Did you resolve the problem?

NO **YES**

↓ Close the call. For information, refer to "Closing a Call" on page 6-49.

Suggested methods for testing:

- Customer operation
- 9034 interface isolation. For instructions, refer to "Interface Fault Isolation" on page 10-18.

5

Call for assistance

Disconnect In and Invalid Disconnect In

The Summary Log window shows two Disconnect In values:

- **Invalid Disconnect In** - two possible causes are:
  - Disconnect In without Operational In at initial selection time.
  - Disconnect In rises at initial selection time ***and*** Address In has dropped ***and*** Operational In is inactive.
- **Disconnect In** - is always the result of a control unit detected error. Run the channel diagnostics if the problem cannot be isolated to a control unit.

  DASD control units have special uses of Disconnect In including:
  - The control unit detected an incorrect interface operation from the channel such as bus out parity check or invalid tags.
  - An internal error in an interval timer.
  - Trace function trigger (selected). The trace function can be set to trigger on a condition such as the fault symptom code. When the selected condition occurs, Disconnect In may be activated and the channel stopped.

1

Is only one control unit failing?

NO **YES**

↓

- Use the maintenance information for the control unit and attached devices to correct the problem.
- Scope the interface with the channel operating and check for incorrect levels.
- Some control units provide relevant sense data after a Disconnect In sequence. Use the sense data to analyze the problem.

When complete, close the call. For information, refer to “Closing a Call” on page 6-49.

2

- Check to see if one control unit or interface switch is causing the others to fail.
- Disable or turn off the power to the control units one at a time, if possible.

Did you isolate the problem to one control unit?

NO **YES**

↓

- Use the maintenance information for the control unit and attached devices to correct the problem.
- Scope the interface with the channel operating and check for incorrect levels.
- Some control units provide relevant sense data after a Disconnect In sequence. Use the sense data to analyze the problem.

When complete, close the call. For information, refer to “Closing a Call” on page 6-49.

3

Scope the interface with the channel operating and check for the correct signal levels (shown at the right). The interface lines can be scoped by inserting a CMEX interface connector paddle in the slot at the right side of the tailgate connector for the channel. Interface connector pins are available on the paddle.

When complete, close the call. For information, refer to “Closing a Call” on page 6-49.

	Driver	Receiver
Logical 1	+2.25 Vdc Min	+1.70 Vdc Min
Logical 0	+0.15 Vdc Max	+0.70 Vdc Max

For more information on voltage levels and interface sequences, refer to *IBM System/360* and System/370* Interface Channel to Control Unit Original Equipment Manufacturers' Information*, GA22-6974.

Invalid Interface Active

The interface is considered inactive only when all of the following interface lines are inactive:

- Operational In, Address In, and Status In
- Service In and Data In
- Select In
- Disconnect In
- Mark In bit 0
- The nine bus in lines.

If any of the interface lines in the list are active just before Address Out rises during initial selection sequence, an interface error occurs.

Go to “Isolating the Failure” on page 10-14.

Invalid Address In Change

Invalid Address In occurs for the following condition:

- Address In going active without a Command Out or Address Out response.

Go to “Isolating the Failure” on page 10-14.

Invalid Status In Change

Invalid Status In occurs for any of the following conditions:

- Operational In ***and*** Status In before Command Out
- Status In inactive before Service Out, Command Out, or Address Out go active
- Status In active ***and*** not in a new selection sequence
- Status In going inactive during a short busy sequence
- Short busy response during a Request In sequence
- Status In becomes active after Select In is active.

Go to “Isolating the Failure” on page 10-14.

Invalid Service In or Data In Change

Invalid Service In or Data In occurs for any of the following conditions:

- Service In or Data In go active without being in data transfer mode (DX on the I/O Trace window)
- Service In or Data In go active while in the control unit initiated sequence (before Status In)
- Service In or Data In go inactive before the associated out tag goes active while transferring data in interlock mode
- Service In and Data In are active together or are not alternating while transferring data in streaming mode.

Go to “Isolating the Failure” on page 10-14.

Short Tag Detected

A short tag is detected for the following condition:

- An Address In, Status In, Service In, or Data In tag became inactive too soon.

Go to “Isolating the Failure” on page 10-14.

Invalid Operational In

Invalid Operational In occurs with the following conditions:

- Operational In going inactive while Select Out is active
- Operational In goes inactive ***and*** no response to Status In
- Operational In goes inactive before a command out or command out proceed
- Operational In goes inactive then active after a channel stopped interface sequence (final status, accepting or stacking status).

Go to “Isolating the Failure” on page 10-14.

Command Chain Reselection Errors

The device being selected by the channel must respond in a normal selection sequence to a command chain reselection sequence. Select In or a short busy sequence to Select Out, Hold Out, and Address Out are not normal responses and causes an interface error.

Go to “Isolating the Failure” on page 10-14.

Short Busy Status Error

When a device responds to a channel initiated selection sequence by using the short busy sequence, it must present a status of device busy (10), control unit busy (50), or temporary control unit busy (70). Any other status is considered inappropriate and an interface error is presented. Bus in shows the status that the device attempted to present.

Go to “Isolating the Failure” on page 10-14.

Unit Address Compare Error

The device being selected by the channel must respond with the same address as the channel sent on bus out. If not, an interface error is presented.

Go to “Isolating the Failure” on page 10-14.

Interface Hang During System Reset

During a system reset the following signals did not become inactive:

- Mark 0 In, Address In, Status In, Service In, Data In, Operational In, Select In, Disconnect In, and the nine bus in signals.

Go to “Isolating the Failure” on page 10-14.

Inappropriate Status Combination Errors

These errors are detected by licensed internal code if the Enable Device Status Check bit is set in the IOCDS. If this bit is set, the channel monitors status presented by the devices and, depending on the state of the I/O operation, the status is considered appropriate or inappropriate.

If appropriate, the operation is continued as usual. If inappropriate, command chaining is suppressed and a licensed internal code detected IFCC is recognized. The device status check is set in the Extended Status Word (ESW bit 2 in byte 3) to distinguish this type of error for the operating system. The inappropriate status presented by the device is displayed on the summary window. Use the reason code to determine why the status is inappropriate. Information on inappropriate status combinations is presented in Chapter 2 and Appendix D of *IBM System/360* and System/370* Interface Channel to Control Unit Original Equipment Manufacturers' Information*, GA22-6974.

Go to “Isolating the Failure” on page 10-14.

Interface Time Out Error

This error is forced when the I/O interface times out. There are two different time out intervals used in the ES Conversion Channel. The first interval (4 seconds) is used for all selection sequences. The second interval (30 seconds) is used for data transfers and depends on the setting of the TIMEOUT parameter specified for the I/O DEVICE macro in the IOCDS.

- During selection sequences (no data transfer occurs), all interface sequences are timed for an interval of 4±0.125 seconds.
- When data transfer is occurring ***and*** Enable Timeout is active, the interface is timed for an interval of 30±0.125 seconds. If no activity (Service In, Data In, or Status In) occurs for the interval, the interface will time out.

The TIMEOUT parameter is in the IOCDS for a device and is specified active or inactive in the I/O DEVICE macro. This is shown in the ES Conversion Channel Summary window as the **Enable Timeout** field. The channel times the devices as follows:

- If TIMEOUT=Y, the channel times all I/O tag sequences and delays between both channel-initiated and control unit-initiated sequences. Some examples are:
  - The initial sequence resulting from a start subchannel instruction
  - A Request In tag sequence initiated by the control unit for reconnection to the I/O interface
  - Delays between the data transfer tag sequences.
- If TIMEOUT=N, timeout is inhibited for data transfer and only selection routines are timed.

  For a block multiplexer channel operating in selector mode, the time delay that occurs between channel end and device end is not timed by the timeout function.

If a time out condition is detected, the channel terminates the I/O operation to the control unit by issuing a selective reset to the control unit and generating an

Interface Control Check (IFCC) interruption. For additional information on timeout, refer to *I/O Configuration Program User Guide*, SC38-0097.

Some control units and devices have valid operational conditions that exceed the timeout limits. If this condition occurs, the channel ends the I/O operation and generates an IFCC interruption even though no malfunction exists. Two examples of this condition are:

- A read command is issued to a tape drive with a blank or wrong density tape. The 30 second timeout limit can be reached while the tape unit searches for a data byte or end of tape. This results in an IFCC before a unit check. Timeouts on other than read commands should be considered errors. TIMEOUT=Y is recommended for troubleshooting tape drive errors.
- Two processors connected through a channel-to-channel adapter can reach the 30 second timeout limit if one processor attempts to communicate with another processor which is stopped.

Check for interface cables that are disconnected, then go to “Isolating the Failure” on page 10-14,

Isolating the Failure

Use this procedure to isolate the failing interface problem.

1

Use the procedure in "Interface Fault Isolation" on page 10-18.

- If the procedure isolates a failure, follow the instructions to repair the problem. When you complete the repair, close the call. For information, see "Closing a Call" on page 6-49.
- If the failure cannot be isolated, continue with step 2. of this procedure.

2

You have an intermittent problem. Use the description of the problem you were given and "Viewing I/O Trace Information" on page 10-16 to get information about the condition of the interface at the time of failure. When complete, go to step 3.

3

Test the interface cabling and connections using one of the following methods:

- Customer operation
- System test exerciser program. For information, refer to "Test Run Procedure" on page 6-10.

Did a failure occur?

YES **NO**

↓ Call for assistance

If a scope is available, scope the tag lines to determine if the voltage levels of the signals or the noise on the lines are outside the following specifications:

active level (nominal)	+2.25 Vdc
inactive level (nominal)	+0.15 Vdc
maximum noise level	+0.400 Vdc
minimum active level (including noise)	+1.70 Vdc
maximum inactive level (including noise)	+0.70 Vdc

For detailed information on signal levels, refer to *IBM System/360 and System/370 I/O Interface Channel to Control Unit Original Equipment Manufacturers' Information*, GA22-6974.

4

Isolate to a failing control unit or cable by powering off devices one at a time until the failure disappears.

- If you isolate the problem, use the maintenance information for the device to repair the problem. When you complete the repair, close the call. For information, see “Closing a Call” on page 6-49.
- If you cannot find the problem, call for assistance.

End of procedure.

Viewing I/O Trace Information

Use this procedure when you are directed to use the detail information in the Problem Analysis windows to identify the tags and bus in data at the time an error occurred.

1

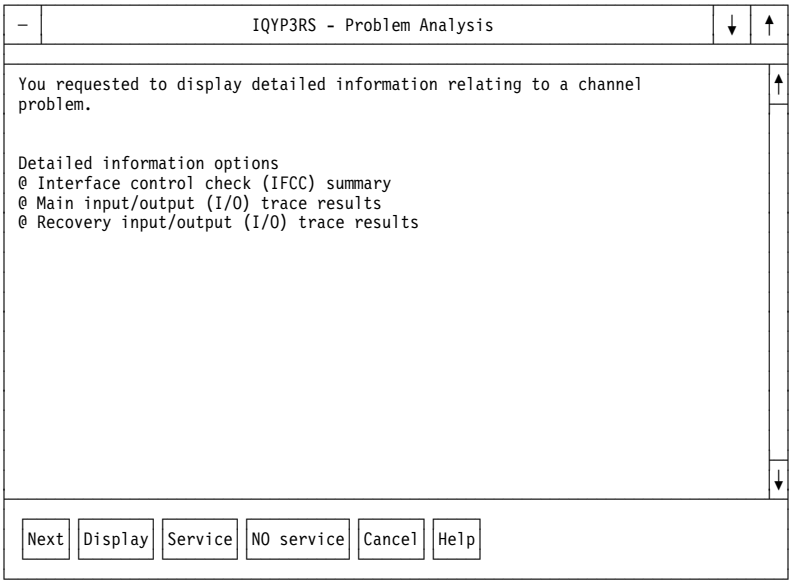
At the Problem Analysis window for this problem:

- Request **Details**.

2

On the Problem Analysis menu window:

- Select **Main input/output (I/O) trace results**.
- Request **Display**.



3

Scroll the information on the Input/Output (I/O) Trace Results window to find the status of the tag and bus lines at the time of the failure.

An example of the Input/Output (I/O) Trace Results window with a description of the abbreviations is given in Figure 10-1 on page 10-17.

End of procedure.

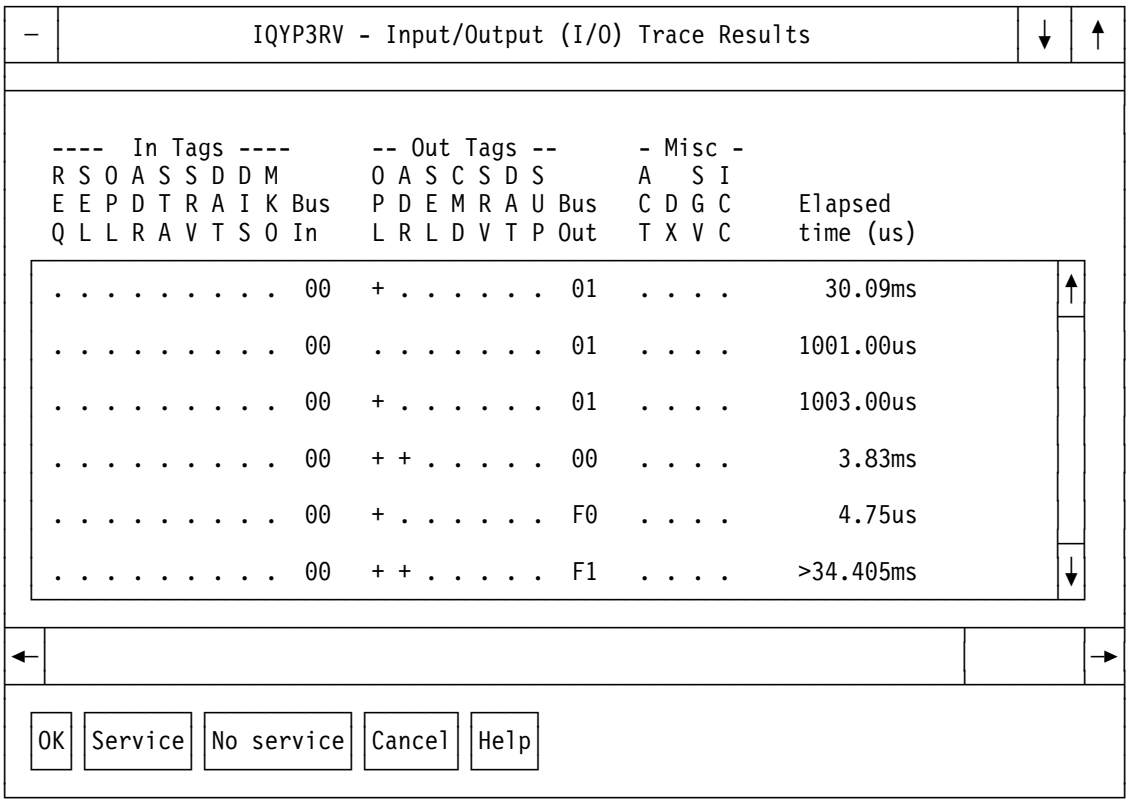


Figure 10-1. Example of I/O Trace Results window.

The abbreviations used are:

Tag levels

. Inactive level
+ Active level

In Tags

REQ Request In
SEL Select In
OPL Operational In
STA Status In
STA Operational In
SRV Service In
DAT Data In
DIS Disconnect In
MK0 Mark In 0

Out Tags

OPL Operational Out
ADR Address Out
SEL Select Out
CMD Command Out
SRV Service Out
DAT Data Out
SUP Suppress Out

Miscellaneous

ACT Interface active
DX Parallel data transfer mode
SGV Stop given flag - indicates a PARDX command out was issued
ICC Interface control check.

Interface Fault Isolation

Use this procedure when you are directed to test the 9034 Enterprise Systems Connection Converter interfaces.

1

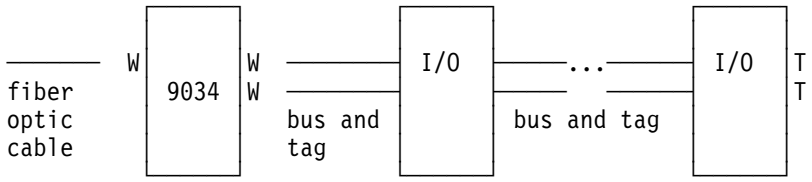
Read the safety information on page 10-1, then continue with this procedure.

2

Ensure that the I/O controllers attached to the 9034 interface are not being used by another system, then either disable the interface or power them off.

At the 9034:

- Ensure all bus, tag, and fiber optic cables in the 9034 I/O window are labeled.
- Remove the bus, tag, and fiber optic cables from the 9034 I/O window.
- Install the fiber optic wrap plug, and the bus and tag wrap blocks in the 9034 I/O window.



W indicates wrap block or connector, T indicates terminator.

3

At the 9034 operator window:

- Set the power switch Off.
- Observe the Power-On indicator and set the power switch On.

Did the power indicator go on and stay on?

YES **NO**

↓ Go to *Maintenance Information for the 9034, Enterprise Systems Connection Converter*, SY27-2590 to continue analysis for a power problem.

4

At the 9034 operator window:

- Set the power switch Off.
- Observe the Power-On indicator and set the power switch On.

Did the Not Operational indicator go on for 1 second, then off, on for 1 second, then off and remain off?

YES **NO**

↓ Go to *Maintenance Information for the 9034, Enterprise Systems Connection Converter*, SY27-2590 to continue analysis of this problem.

The indicator sequence described indicates the check of the interface at power on was correct.

5

At the 9034 I/O window:

- Remove the bus and tag wrap blocks.
- Reconnect the bus and tag cables.

Go to the last I/O controller on the interface

- Remove the bus and tag terminators.
- Connect the bus and tag wrap blocks.

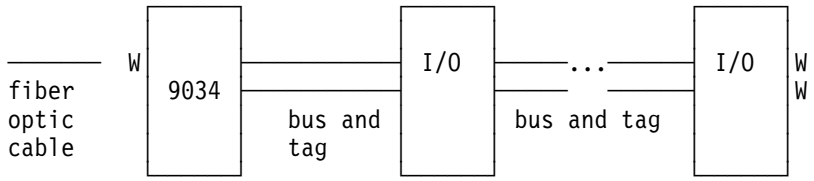
At the 9034 operator window:

- Set the power switch Off.
- Observe the Power-On indicator and set the power switch On.

Did the Not Operational indicator go on for 1 second, then off, on for 1 second, then off and remain off?

NO **YES**

↓ The interface tests did not fail. Return to the procedure that directed you here.



W indicates wrap block or connector, T indicates terminator.

6

There is a problem in a cable or I/O controller on the interface causing the failure.

At the next I/O controller:

- Remove the bus out and tag out cables.
- Connect the bus and tag wrap blocks.

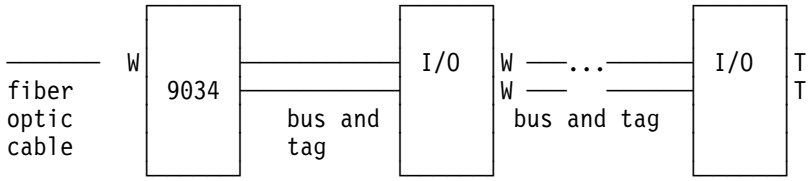
At the 9034 operator window:

- Set the power switch Off.
- Observe the Power-On indicator and set the power switch On.

Did the Not Operational indicator go on for 1 second, then off, on for 1 second, then off and remain off?

NO **YES**

↓ Go to step 8.



W indicates wrap block or connector, T indicates terminator.

7

Continue removing I/O controllers from the interface and testing as in step 6 until a failing I/O controller is isolated.

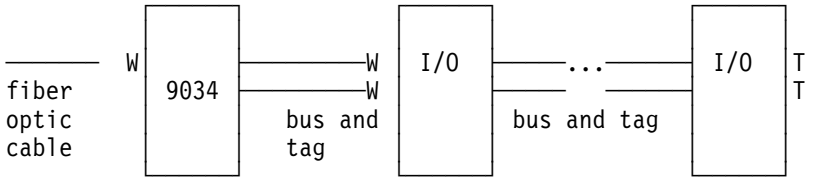
When the test isolates the failure to a control unit or cable, go to step 8.

8

The I/O controller or cables just removed from the interface are causing the failure.

Move the bus and tag wrap blocks to the ends on the cables entering the I/O controller you just isolated. Then, rerun the test.

- If the test runs correctly, the controller is causing the problem. Use the controller maintenance information to resolve the problem.
- If the test still fails, one of the interface cables is causing the error. Exchange the failing cable.



End of procedure.

Chapter 11. Open System Adapter (OSA) Feature

This chapter has information for Open System Adapter 2 (OSA-2) and OSA-Express network features.

Repair information for most OSA feature problems is provided by on-line procedures on the support element. This section provides a procedure for diagnosing problems reported ***only*** by the operating system or the customer. Also included is reference information for the OSAs.

Find the information you want in the following table and go to the page indicated.

Information On	Go To
Diagnosing OSA problems.	"Diagnosing OSA Problems" on page 11-28.
OSA-2 feature description	"General Information for OSA-2 Features" on page 11-2.
OSA-Express feature description	"General Information for OSA-Express Feature" on page 11-7.
Diagnostic descriptions	"Tests for OSA Features" on page 11-10
Running diagnostics	"OSA Feature Test Run Procedure" on page 11-13.
Displaying status and configuration information on OSA adapters	"Displaying OSA Status" on page 11-18.
Additional maintenance information for Fiber Distributed Data Interface (FDDI), Asynchronous Transfer Mode (ATM), and Gigabit Ethernet	*Maintenance Information for S/390 Fiber Optic Links*, SY27-2597
Additional information on OSA-2 features.	*Planning for the System/390 Open Systems Adapter Features*, GC23-3870
Additional information on OSA-Express features.	*OSA-Express Customer's Guide and Reference*, SA22-7403

General Information for OSA-2 Features

One OSA-2 feature card is shipped with each 9672 system. The OSA-2 feature cards are plugged in a feature 2020 or 2021 expansion cage. They use the first (lowest) CHPID for that card location. The maximum number of OSA-2 feature cards that can be installed per system is 12. A customer-supplied cable is used to connect an OSA port directly to the customer's network.

The following features are available:

- Feature 5201 (ENTR OSA-2) provides one card with two LAN ports. Each port provides connectors for a Token-Ring or an Ethernet LAN.
- Feature 5202 (FDDI OSA-2) provides one Fiber Distributed Data Interface (FDDI) connection.
- Features 5204 and 5206 (ATM OSA-2) provide one multimode Asynchronous Transfer Mode (ATM) connection
- Features 5205 and 5207 (ATM OSA-2) provide one single-mode Asynchronous Transfer Mode connection
- Feature 5208 (FENET) provides one Fast Ethernet connection

OSA-2 Feature Connections and Configuration

An OSA-2 feature must be defined in the IOCDS, to the S/390 operating system, and generally through OSA/SF. Definition of an OSA-2 depends on the mode or modes of operation in which it will run. Some general and feature specific information on connections and configuration is included below. For more information, refer to *Planning for the System/390 Open Systems Adapter Feature,* GC23-3870.

Each OSA-2 must be defined in the system I/O configuration data set (IOCDS) as type=OSA with one logical control unit associated with it.

A number of S/390 device numbers must also be defined. The OSA-2 relates each device number with one of its ports. The SNA mode requires one device per port; the other OSA modes require a read/write, even/odd pair of devices per port. These device numbers can be shared across logical partitions if the OSA CHPID is so defined.

Each OSA-2 must be defined to the appropriate TCP/IP or VTAM, depending on the OSA mode in which it is to run and the S/390 operating system.

In most cases each OSA-2 feature is managed by the OSA Support Facility (OSA/SF), which is a S/390 program. Specific exceptions are listed below:

- ENTR, FDDI, and Fast Ethernet features do not require OSA/SF if the OSA-2 is run in TCP/IP Passthru mode, if the OSA port is not shared across logical partitions, and the default unit addresses for the ports are defined in the IOCDS. In this case, the IBM-supplied default OSA address table (OAT) is used.
- For all other OSA modes on a ENTR, FDDI, or Fast Ethernet, and all modes on an ATM, OSA/SF is required to configure the OAT, and set port parameters and other user data.
- In all OSA installations, regardless of the default configuration or the OSA/SF configuration, a unit address of X'FE' **must** be defined in the IOCDS.

Ethernet/Token-Ring (ENTR)

The ENTR feature has two ports allowing concurrent attachment of up to two Ethernet or Token-Ring LAN cables, in any combination. The Ethernet feature runs at 10 Mbps. Each ENTR port has 3 connectors. For the OSA-2 to be operational, one connector must either be connected to a LAN network or have a wrap plug attached. The other two connectors for the port must **not** have a LAN cable or a wrap plug.

The port connectors are:

- The top RJ-45 connector of each port attaches the OSA-2 through an unshielded twisted pair (UTP) interface to a 10 Mbps Ethernet switch.

  Both half-duplexing (default) and full-duplexing modes are supported, but not auto-negotiate mode. For full-duplexing, the mode must be set at the support element. Full duplex does not support logical partition (LP)-to-LP communications on the same physical system through a single OSA card port.
- The middle connector is a standard Ethernet Attachment Unit Interface (AUI) that attaches the OSA-2 to a 10 Mbps Ethernet LAN. The AUI connector supports only half-duplexing, no auto-negotiate and no LP-to-LP communications on the same physical system through a single OSA card port.
- The bottom RJ-45 connector attaches the OSA-2 to a 4 Mbps or 16 Mbps Token-Ring LAN, autosensing the ring or entering the ring at the speed of the last successful entry. Half-duplex and full-duplex are supported. The switch, but not the OSA-2 port, must be set for full-duplexing. Full-duplex does not support LP-to-LP communications on the same physical system through a single OSA card port.

The ENTR feature requires special handling for configuration. The card is shipped with wrap connectors on all six LAN connectors. Configuration of a LAN port is done each time the card is powered on **and** only a single wrap connector or LAN cable is plugged on each port. Each port will be configured to match the wrap plug or LAN cable that is plugged. If there is not a single wrap connector or LAN cable plugged for a port, no configuration takes place.

If the configuration of the Ethernet/Token-Ring card is incorrect, it may be reset in two ways:

- Remove power from the card (deactivate the system), and power on with the correct wrap connectors or LAN cable plugged (one for each port).
- Connect the correct wrap connector or LAN cable and select the following:
  - **Enable auto sense on next reset event** from **Advanced facilities** under **CHPID Operations** on the Support Element Workplace window
  - **Configure off** under **CHPID Operations** on the Support Element Workplace window
  - **Configure on** under **CHPID Operations** on the Support Element Workplace window

    Note: Do not run diagnostics before configuring the CHPID on.

FDDI

The FDDI feature allows connection to either a dual-ring or single-ring FDDI LAN of 100 Mbps.

- The customer's concentrator or switch determines which port will be used.

  For most FDDI configurations an OSA port B to switch port A and/or OSA port A to switch port B will be used. An OSA port A connection to a switch port A is normally not valid. Also, a OSA port B to a switch port B is normally not valid.

- One customer-supplied cable is required for a single-ring attachment. Most attach to port B. The unused port must have a wrap plug.
- Two customer-supplied cables are needed for a dual-ring attachment (uses Ports A and B).

  Note: The two connectors are called Port A and Port B in the port statistics windows, but “port” indicates a FDDI path, not a FDDI LAN.

- An optical bypass switch can be connected to the FDDI feature card to provide optical isolation from the attached LAN. The bypass connection is optional.

ATM

The customer-supplied cables for an ATM feature are different for single-mode (FC5205 or FC5207), or multi-mode (FC5204 or FC5206).

After an ATM feature is installed, or after an ATM feature card is exchanged the operational code must be downloaded to make the feature functional. Configuration and code download are customer responsibilities. Instructions are provided in *OSA/SF User's Guide*, SC28-1855.

Figure 11-1 on page 11-5 shows the ATM feature card.

Note: The ATM feature card is a single FRU. Do not attempt to disassemble the card.

Fast Ethernet

The Fast Ethernet feature card has a single port for connection to 10Mbps or 100Mbps LAN configurations in either half or full duplex.

Figure 11-1 on page 11-5 shows the Fast Ethernet feature card.

Note: The Fast Ethernet feature card is a single FRU. Do not attempt to disassemble the card.

Exchanging OSA-2 Feature Cards

The exchange information for OSA-2 feature cards is in the on-line procedures on the support element. After exchanging an OSA-2 feature card, you will be directed by the on-line procedures to tell the customer to issue the OSA/SF INSTALL command to the CHPID assigned to the feature card. The OSA/SF INSTALL command places the proper configuration files and operating system on the CHPID. If OSA/SF is not installed, the OSA-2 features use the default values.

OSA-2 Cards

On-line procedures are provided for the removal and replacement of OSA-2 feature cards. The positions of connectors and indicators for the OSA-2 feature cards are shown in Figure 11-1. The meanings of the indicators are described in “OSA-2 Card Indicators” on page 11-6.

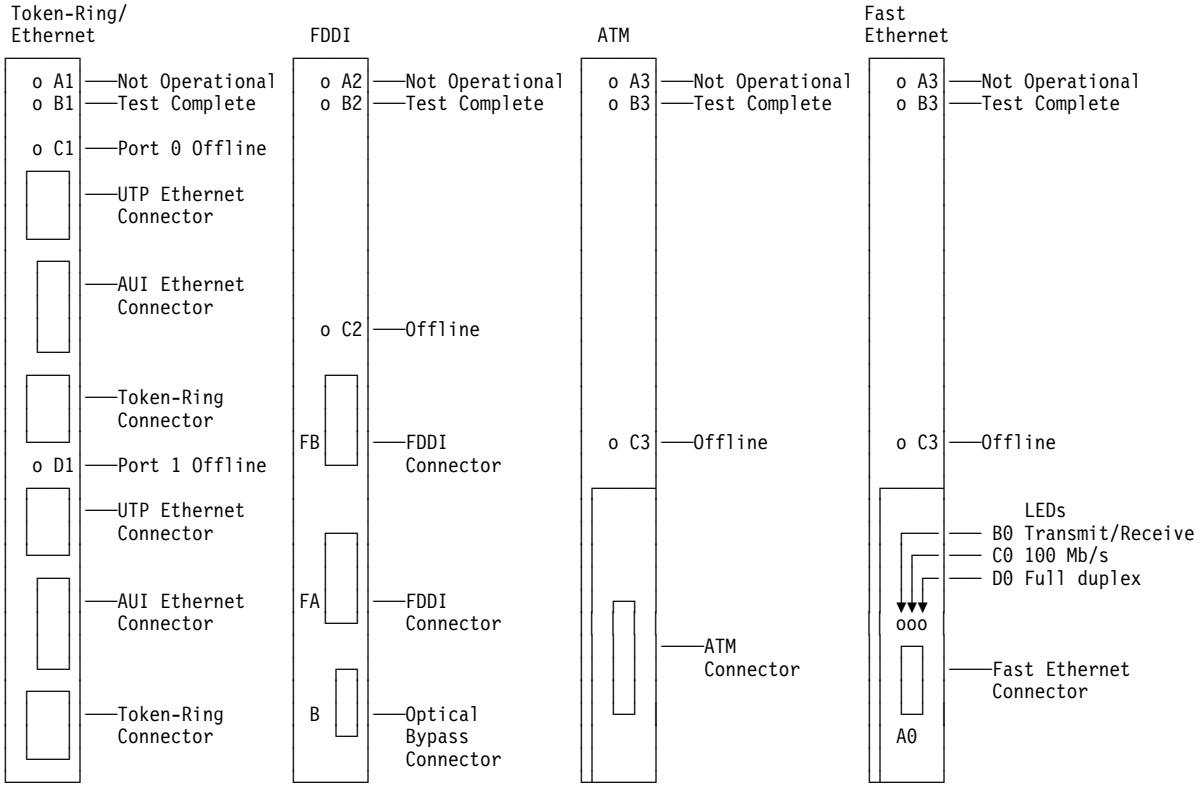


Figure 11-1. OSA-2 feature card indicators and connectors.

OSA-2 Card Indicators

Not Operational and Test Complete Indicators: The Not Operational, Test Complete, and On Line/Off Line indicators are used in combination to indicate the condition of the OSA adapter card. Table 11-1 shows the meanings of these indicators.

On Line/Off Line Indicator: The On Line/Off Line indicator is normally off when the CHPID for the adapter is online and the card is communicating with the LAN. The indicator is on when the CHPID is taken offline for maintenance. The indicator is also on when the external wrap test is running successfully (card communicates with itself). The indicator blinks rapidly when LAN tests run after power on.

Adapter Card Status

Table 11-1. Meanings of Not Operational and Test Complete indicators

Not Operational Indicator	Test Complete Indicator	Online Offline Indicator	OSA Adapter Status
off	flashing	off	OSA is operational and at least one port and control unit are on line
off	flashing	on	OSA is operational, but port or control unit is not on line
off	off	on	OSA channel path is offline
off	off	off	Either no power to the card or a severe hardware error was detected
flashing	off	off	Power-on self test (POST) is running
on	flashing	(any)	Hardware error detected
on	on or off (not flashing)	(any)	Severe hardware error, OSA stopped

Additional Indicators for Fast Ethernet: Figure 11-1 on page 11-5 shows the additional indicators on the Fast Ethernet adapter. The indicators are:

B0 On or flashing indicates transmit or receive activity
C0 On indicates adapter operating at 100 Mbits/second
D0 On indicates adapter operating in full duplex mode

General Information for OSA-Express Feature

The following OSA-Express features are available:

- Feature 2350 provides one Gigabit Ethernet port, short wavelength (SX), multi-mode.
- Feature 2351 provides one Gigabit Ethernet port, long wavelength (LX), single-mode.
- Feature 2360 provides one single mode ATM port.
- Feature 2361 provides one multi-mode ATM port.
- Feature 2340 provides one Fast Ethernet port.

The OSA-Express feature cards are plugged into a feature 2020 or 2021 expansion cage. The feature card is cabled to an STI link (direct attach). A customer-supplied cable is used to connect an Gigabit Ethernet port directly to the customer's network. The rules for Gigabit Ethernet CHPIDs and STI assignments is the same as the FICON card. For information, refer to the information starting at “Channel Locations by CHPID” on page 7-4. The maximum total number of Gigabit Ethernet and FICON feature cards that can be installed per system is 12.

OSA-Express Feature Connections and Configuration

A OSA-Express feature must be defined in the IOCDS, and to the S/390 operating system.

Detailed instructions for customer setup of the OSA-Express are provided in *OSA-Express Customer's Guide and Reference*, SA22-7403.

Note: OSA-Express Gigabit Ethernet requires a channel path TYPE=OSD.

Note: OSA-Express ATM requires a channel path TYPE=OSE or OSD.

Note: OSA-Express Fast EtherNet requires a channel path TYPE=OSE or OSD.

OSA-Express Cards

The exchange information for OSA-Express cards is in the on-line procedures on the support element. The OSA-Express feature cards are shown in Figure 11-2. The meanings of the indicators are described in “OSA-Express Card Indicators.”

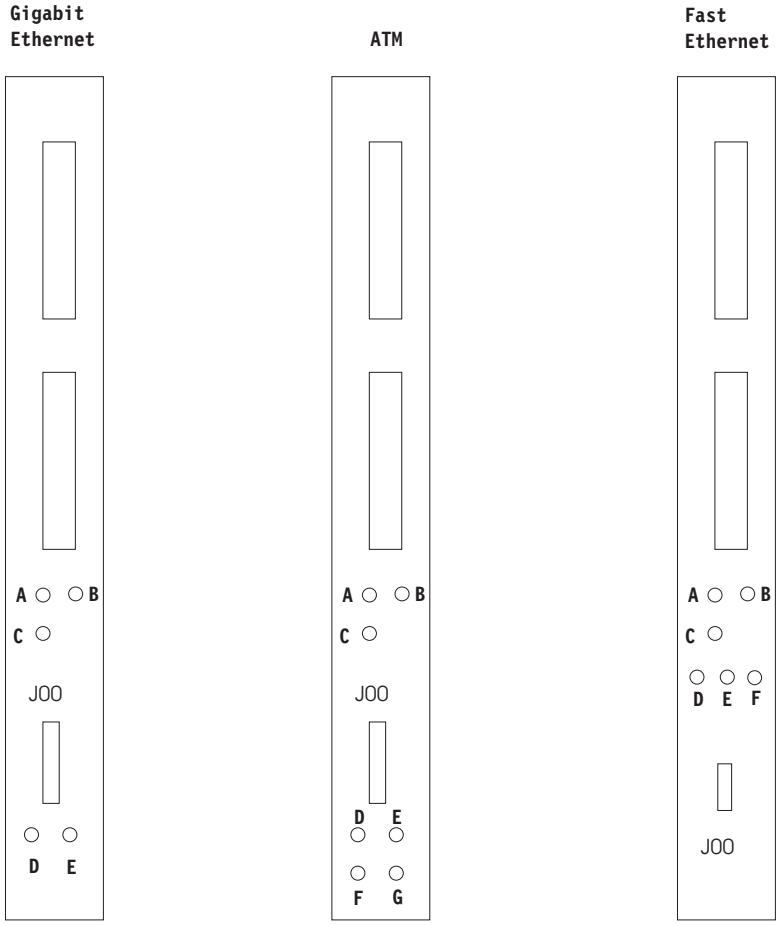


Figure 11-2. Gigabit Ethernet feature card indicators and connectors.

OSA-Express Card Indicators

The Not Operational, Test Complete, On Line/Off Line, and Status indicators are used in combination to indicate the condition of the OSA-Express feature cards. Table 11-2 on page 11-9 and Table 11-3 on page 11-9 show the meanings of these indicators.

The Link indicators display the activity on the link. Table 11-4 on page 11-9 shows the meanings of these indicators.

Table 11-2. Meanings of On Line/Off Line indicator

On Line/Off Line Indicator "C"	OSA-Express Status
Off	CHPID for OSA-Express adapter on line and card is communicating with PU.
On	CHPID off line for maintenance OR external wrap tests running.
Blinking rapidly	Power on tests running.

Table 11-3. Meanings of Not Operational and Test Complete indicators

Test Complete Indicator "A" (Green)	Not Operational Indicator "B" (Amber)	OSA-Express Status
off	off	No power to the card or card processor in a loop.
off	flashing	OSA-Express diagnostics are running
flashing	off	Tests complete, CHPID on line
flashing	on	Hardware error detected
on	flashing	Invalid combination

Note: Any combination where neither indicator is flashing (both on, both off, or one on and the other off), indicates either that the card is powered off or the processor on the card is in a loop.

Table 11-4. Meanings of Link and Data indicators

Feature	D LED	E LED	F LED	G LED
Gigabit EtherNet	On = transmitting or receiving	On = Port active	N/A	N/A
Fast EtherNet	On = transmitting or receiving	On = 100Mb/ps Off = 10Mb/ps	On = Full duplex Off = Half duplex	N/A
ATM	On = transmitting or receiving	On = Singlemode Off = Multimode	N/A	N/A

Tests for OSA Features

For OSA-2 features, control unit and complete feature card tests run at power up. For OSA-Express features some basic function tests are run at power up. Power-on test results for all OSA features are displayed in the card indicators.

In addition to the power-on tests, there are two sets of tests available for the individual ports. Checkout tests run on the entire subsystem associated with the CHPID. Feature tests run only the logic associated with a single port.

Checkout Tests

The checkout tests are selected for a particular CHPID in the same way as the tests available for channels. The CHPID is not available to the operating system while the test is running. The following information gives you a basic understanding of the checkout tests.

The checkout tests are:

- Port/interface logic tests
- Wrap test
- Optical power measurement

The **OSA port/interface test** checks the circuits on the adapter cards associated with the selected CHPID except for the card's receivers and drivers.

Note: When the port tests are run on a Gigabit Ethernet, the network cable attached to the card must be removed to eliminate signals coming from the network.

The **OSA wrap test** checks the card's receivers and drivers on the OSA adapter card by wrapping a signal through wrap connectors plugged on the card. Wrap connectors are required on the configured port type of the adapter card.

The **OSA optical power measurement** initializes the feature card and provides instructions for measuring optical output power on a FDDI, ATM or Gigabit Ethernet features.“Running Checkout Tests” on page 11-11 describes how to run the test.

Running Checkout Tests

To run the OSA checkout tests:

1

If you are using the support element for this task, ensure the CPC is placed in service status and the support element is in the service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using the Hardware Management Console for this task, ensure the CPC is placed in service status then make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

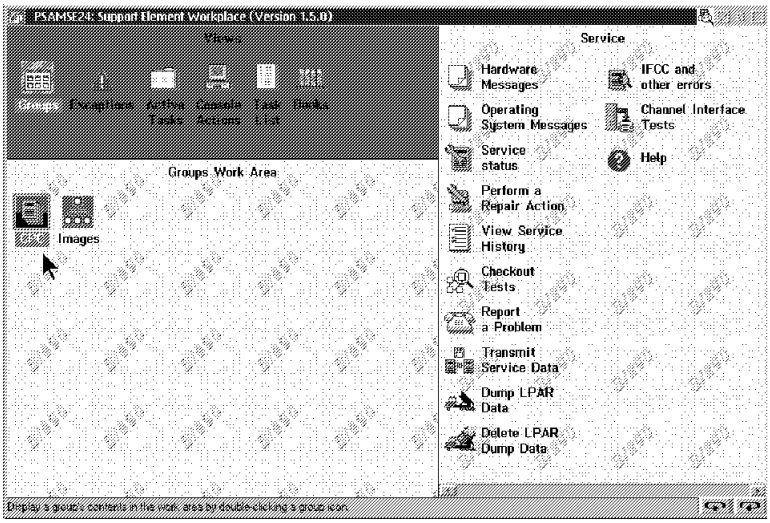
Go to step 2.

2

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **Service** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Drag the **CPC** icon (using the right-hand mouse button) and drop it on **Channel Interface Tests** under **Service**.



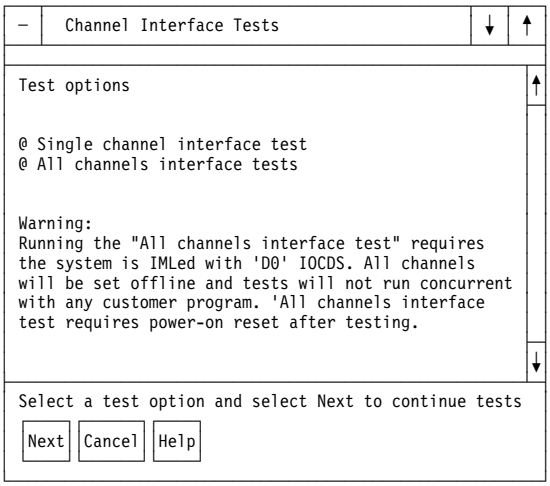
Go to step 3.

3

On the first Channel Interface Tests window:

- Select **Single channel interface tests** from the menu.
- Request **Next**.

Go to step 4.

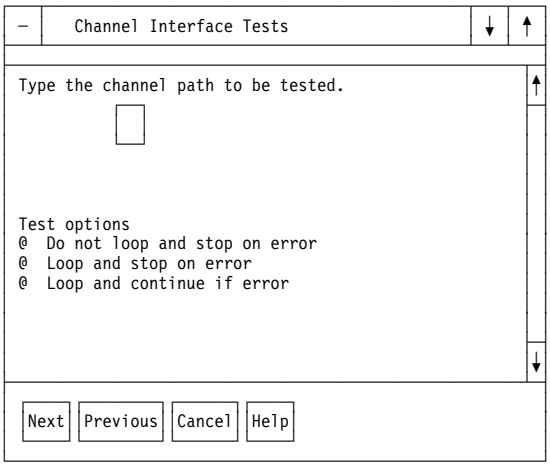


4

On the next Channel Interface Tests window:

- Type in the CHPID you want to test.
- Select **Do not loop, and stop if an error is detected** from the menu.
- Request **Next**.

Go to step 5.



5

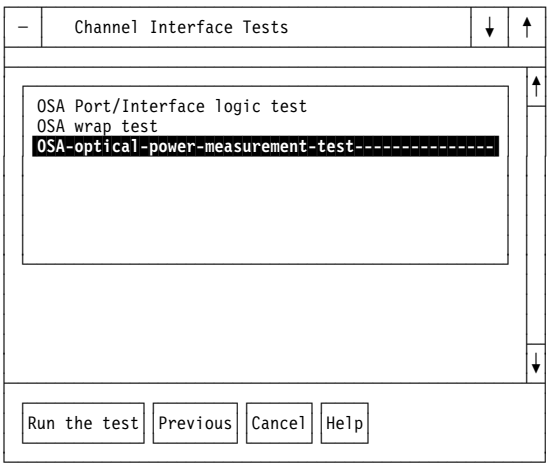
On the next Channel Interface Tests window:

- Select the test you want to run from the menu.
- Select **Run the test**.

Follow the directions displayed on the test windows.

Note: When the port tests are run on a Gigabit Ethernet, the network cable attached to the card must be removed to eliminate signals coming from the network.

End of procedure



Feature Tests

The feature tests check all the logic associated with a port. The selected port is not available to the operating system while the test is running but the remaining ports on the feature card are available. Two different OSA feature tests are available:

- Normal
- Wrap plug test

Normal Test: The **normal test** checks all circuits on the OSA feature card associated with the selected port except the receiver and driver.

Wrap Plug Test: The **wrap plug test** checks the receivers and drivers by wrapping a signal through a wrap connector plugged on the adapter card.

OSA Feature Test Run Procedure

To run the OSA feature tests:

1

If you are using the support element for this task, ensure the CPC is placed in service status and the support element is in the service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using the Hardware Management Console for this task, ensure the CPC is placed in service status then make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

Go to step 2.

2

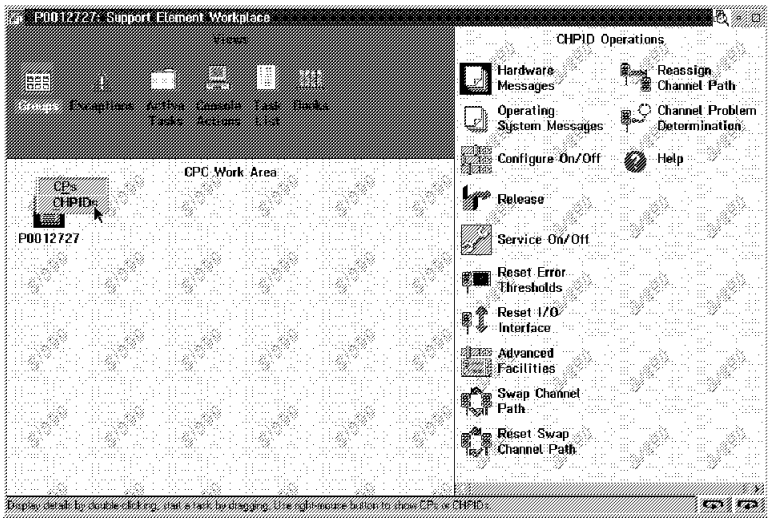
Ensure the support element is in service mode.

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CHPID Operations** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Open (double-click on) **CPC** from **Groups Work Area**.
- Use the right-hand mouse button and click on time on the **CPC** icon to open the CPs/CHPIDs pop-up menu.
- Select CHPIDs from the menu.

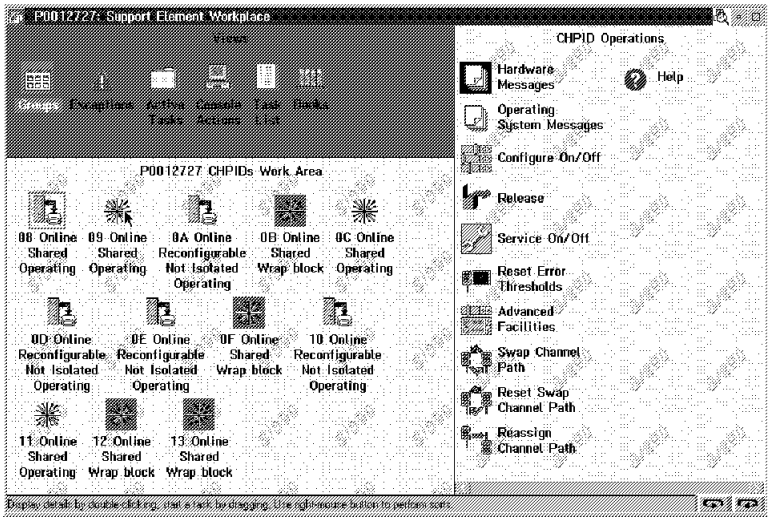
Go to step 3.



3

- Drag the icon for the CHPID you are working with (using the right-hand mouse button) and drop it on **Advanced Facilities** under **CHPID Operations**.

Go to step 4.

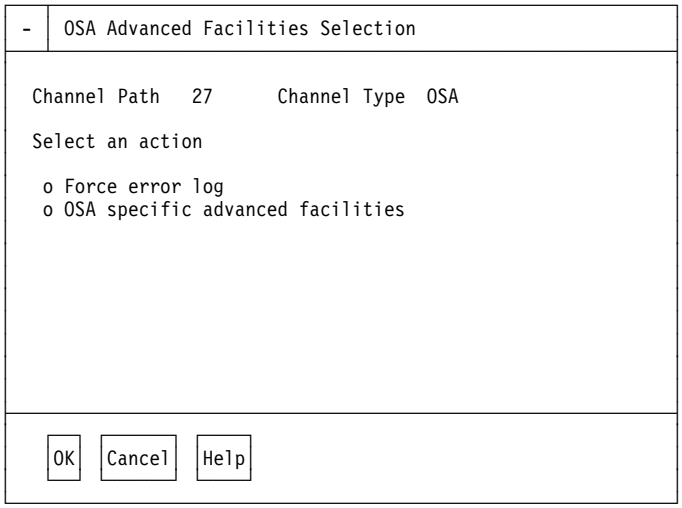


4

On the first Advanced Facilities window:

- Select **OSA specific advanced facilities** from the menu.
- Select **OK**.

Go to step 5.

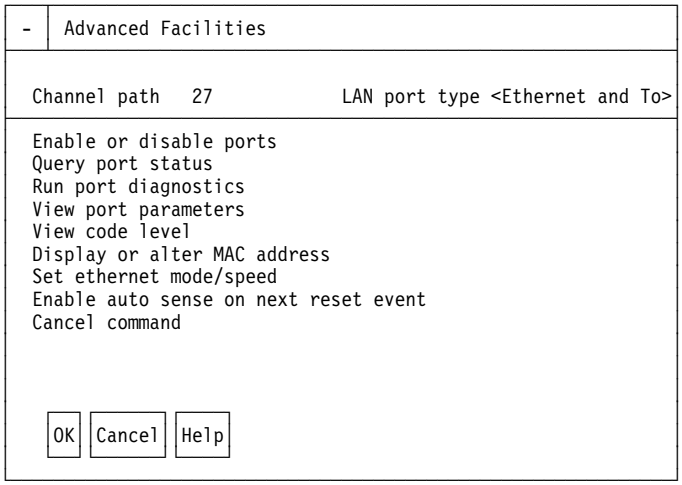


5

On the second Advanced Facilities window:

- Select **Enable/disable ports** from the menu.
- Select **OK**.

Go to step 6.



6

On the Enable/Disable Ports window:

- For Ethernet or Token-Ring features, type in the port address of the LAN feature you want to test.
- Select **Disable** from the menu.
- Select **Set control mode on** from the menu.
- Select **Apply**.

On the Enable or Disable Ports window:

- Select **OK**.

If the Enable/Disable Ports window displays the second time:

- Select **Complete**.

Go to step 7.

The Enable/Disable Ports window displays twice only when disabling Ethernet or Token-Ring ports.

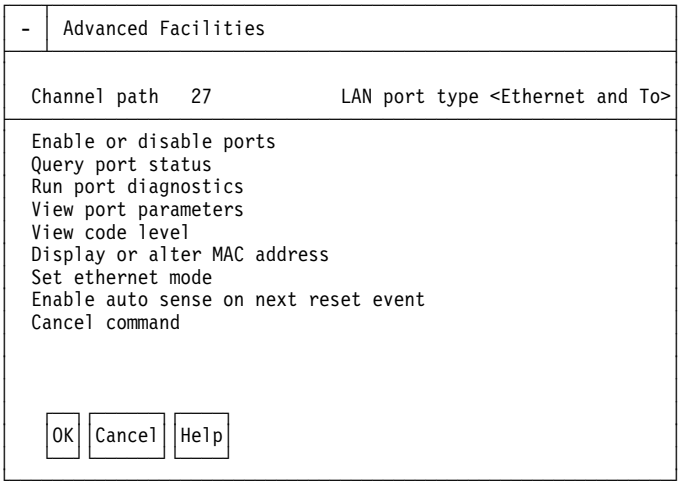
7

The second Advanced Facilities window displays again.

On the second Advanced Facilities window:

- Select **Run port diagnostics** from the menu.
- Select **OK**.

Go to step 8.



8

On the Port Tests window:

- Type in the port address of the LAN feature you want to test. (Only required for ENTR).
- Select the test you want to run from the menu.
- Select **Apply**.

Go to step 9.

The tests are:

- Normal
- Wrap plug test

9

Follow the instructions on the windows to run the test.

A window displays the test results after the test is complete.

When testing is complete, go to step 10.

When directed, plug a wrap plug in the port you are testing. The following are the wrap plugs for the features:

Token-Ring	08J5792
Ethernet (AUI connector)	71F1167
Ethernet (UTP connector)	00G2380
FDDI OSA-2	16G5609
ATM Multimode	16G5609 or 21H3547
ATM Single-mode	16G5609 or 78G9610 or 86F1180 or 21H3547
Fast Ethernet	00G2380
Gigabit Ethernet	78G9610

10		
Select **OK** to cancel the window showing test status. Before the port you are testing is returned to the customer, ensure control mode is set off as follows: • Follow the procedures in steps 2 through 5 to display the Enable/Disable Ports window. • Follow the procedure in step 6 except use the **Set control mode off** selection.		This removes exclusive control of the OSA port from the support element.

End of procedure.

Displaying OSA Status

The following procedure shows how to look at the status of the OSA ports, port configuration, and MAC addresses.

1

If you are using the support element for this task, ensure the support element is in service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using the Hardware Management Console for this task, make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

Go to step 2.

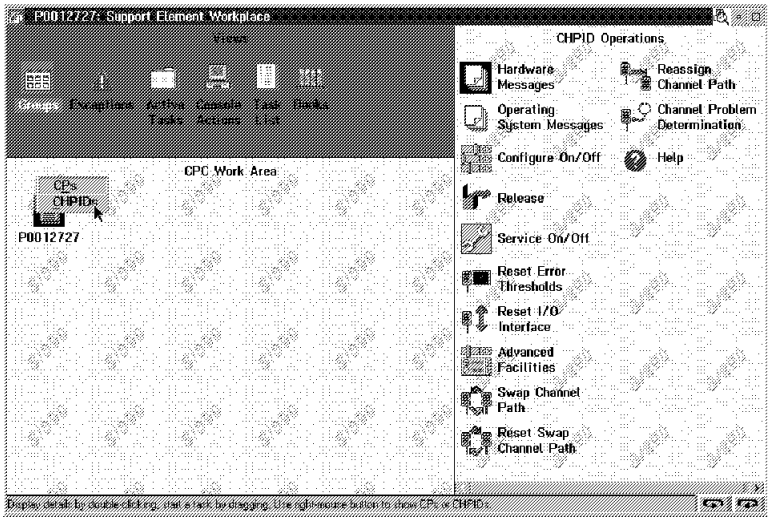
2

Ensure the support element is in service mode.

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CHPID Operations** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Open (double-click on) the **CPC** icon in the **Groups Work Area**.
- In the **CPC Work Area**, use the right-hand mouse button and click one time on the CPC icon to open the CPs/CHPIDs pop-up menu.
- Select CHPIDs from the menu.

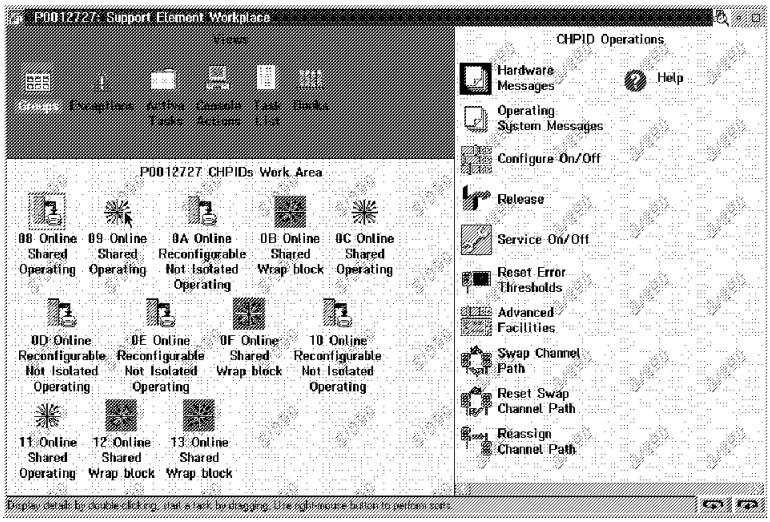


Go to step 3.

3

- Drag the icon for the CHPID you are working with (using the right-hand mouse button) and drop it on **Advanced Facilities** under **CHPID Operations**.

Go to step 4.

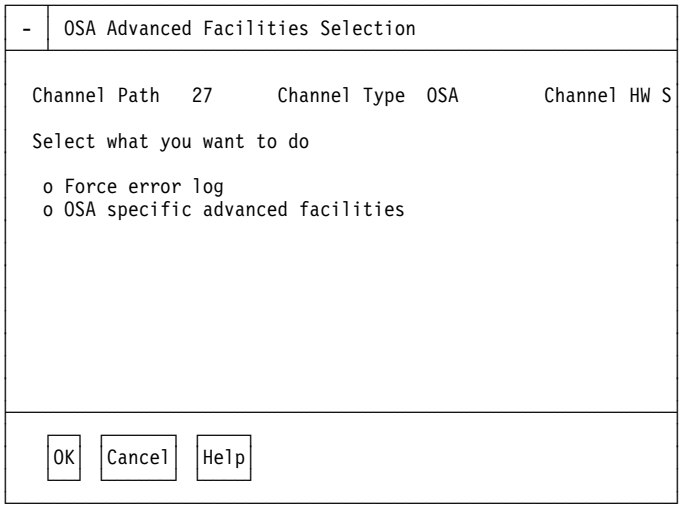


4

On the first Advanced Facilities window:

- Select **OSA specific advanced facilities** from the menu.
- Select **OK**.

Go to step 5.



Note: For Gigabit Ethernet this window is called Standard Channel Advanced Facilities, use the **Card specific advanced facilities** selection.

5

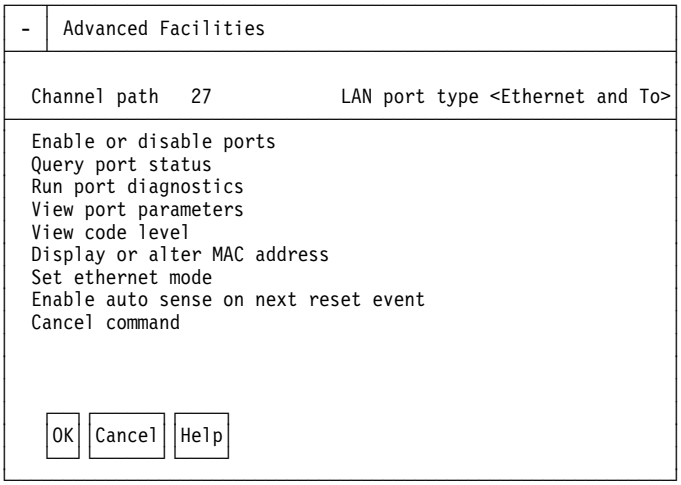
On the second Advanced Facilities window select one of the following from the menu:

- **Query port status**
- **View port parameters**
- **Display or alter MAC address**

Select **OK**.

Go to the step indicated:

- If you selected Query port status, go to step **6**
- If you selected View port parameters, go to step **7**
- If you selected Display or alter MAC address, go to step **9**



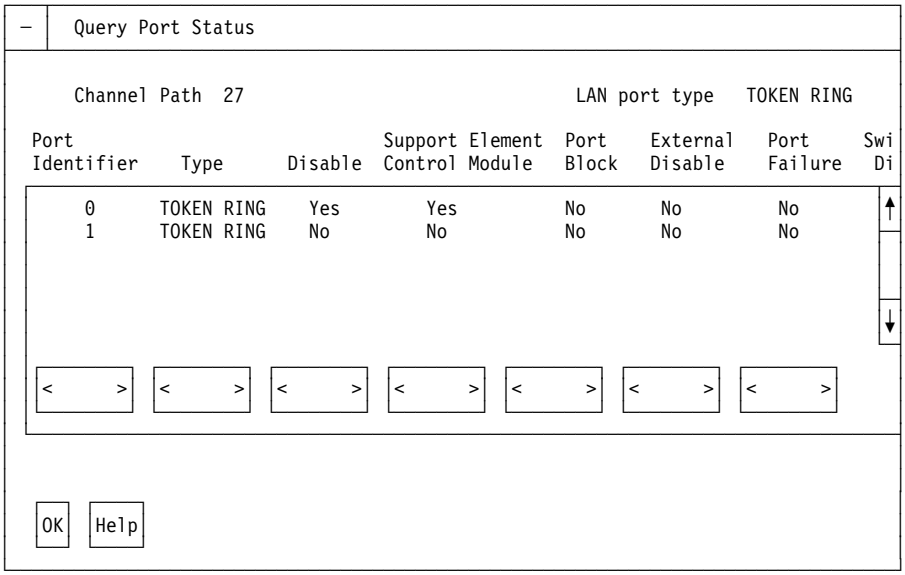
---

6 Query Port Status

The Query Port Status window shows the status of all LAN ports on the adapter card. Use the Help facility for the meanings of the fields.

When complete, select **OK** to return to the second Advanced Facilities window.

End of procedure.



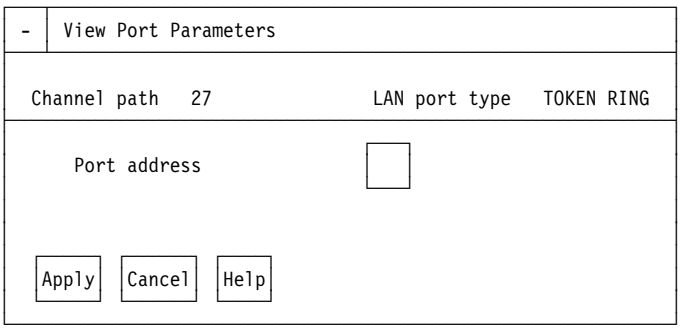
---

7 View Port Parameters

The first View Port Parameters window displays only if a Token-Ring or Ethernet subsystem is selected:

- Type in the number of the port you want to view (0 to 4).
- Select **Apply**.

Go to step 8.



8

The second View Port Parameters window shows the information for the selected port. Use the Help facility for the meanings of the fields. See the information at the right to see a representation of the window for the feature you are testing.

When complete, select **OK** to return to the second Advanced Facilities window.

End of procedure.

To see a representation of the windows go to one of the following:

ATM	"ATM Port Parameters" on page 11-22
Ethernet	"Ethernet Port Parameters" on page 11-25
FDDI	"FDDI Port Parameters" on page 11-24
Fast Ethernet	"Fast Ethernet Port Parameters" on page 11-26
Token-Ring	"Token-Ring Port Parameters" on page 11-23
Gigabit Ethernet	"Gigabit Ethernet Port Parameters" on page 11-27

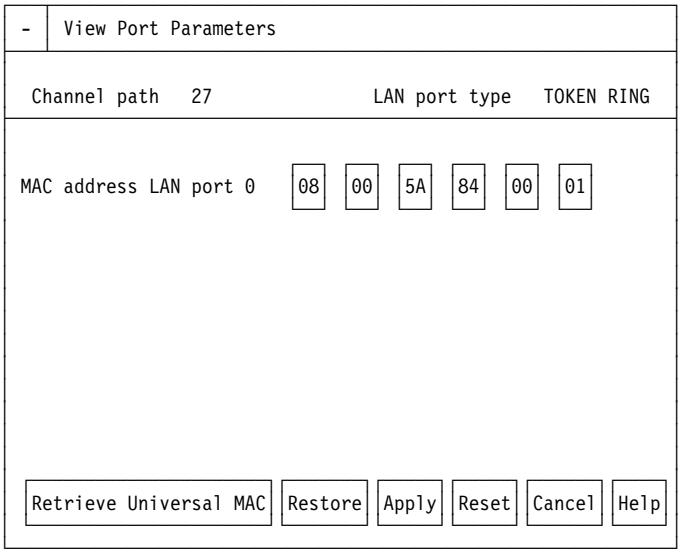
9 MAC Address

The MAC Address window displays the current MAC address.

To change the address, use the Help facility for the meanings of the fields.

When complete, select **OK** to return to the second Advanced Facilities window.

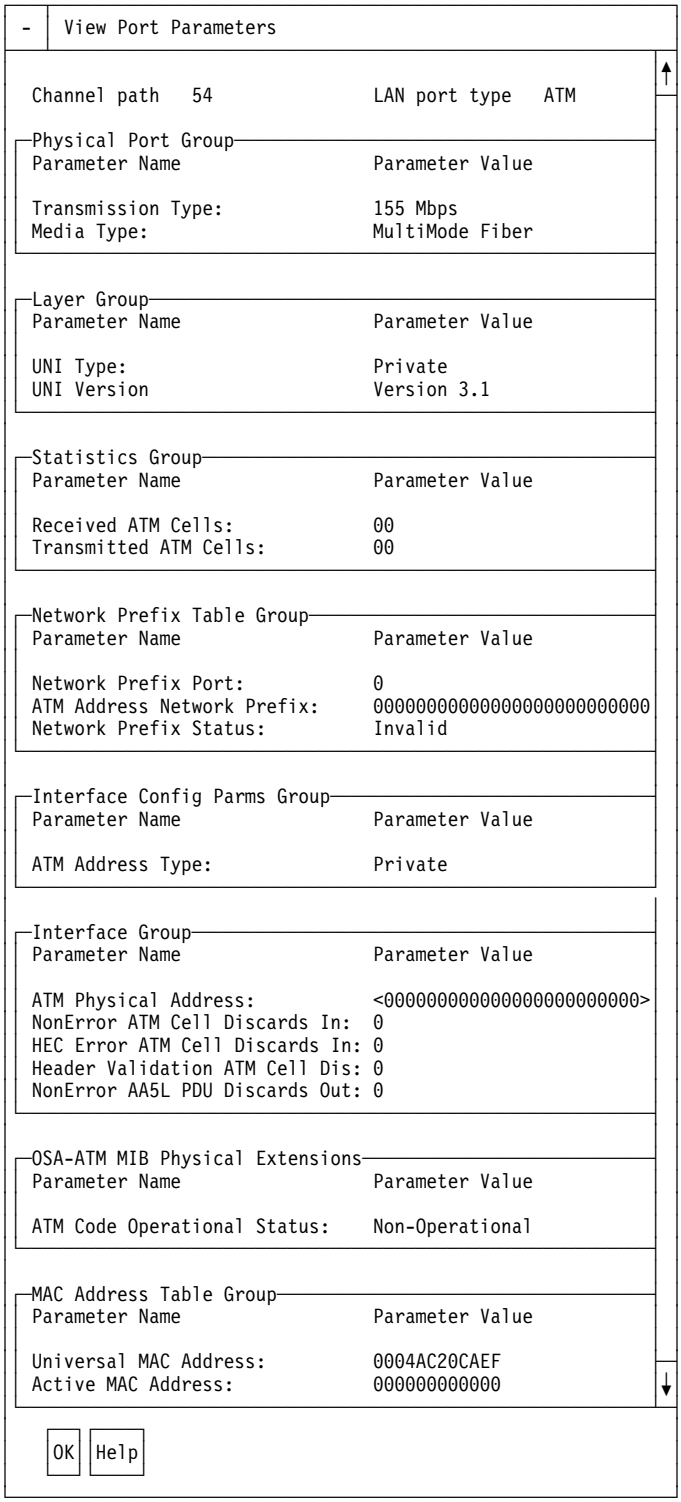
End of procedure.



Note: The MAC address is checked for validity by LAN type.

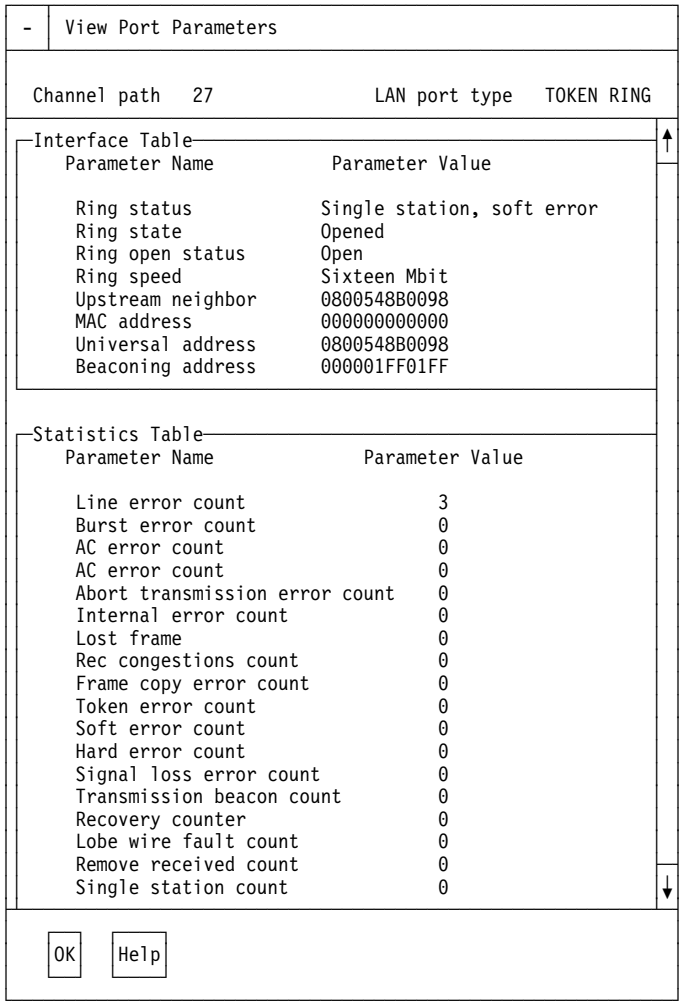
For ENTR changing the LAN type resets the MAC addresses to the universal address. All customer MAC addresses are lost.

ATM Port Parameters



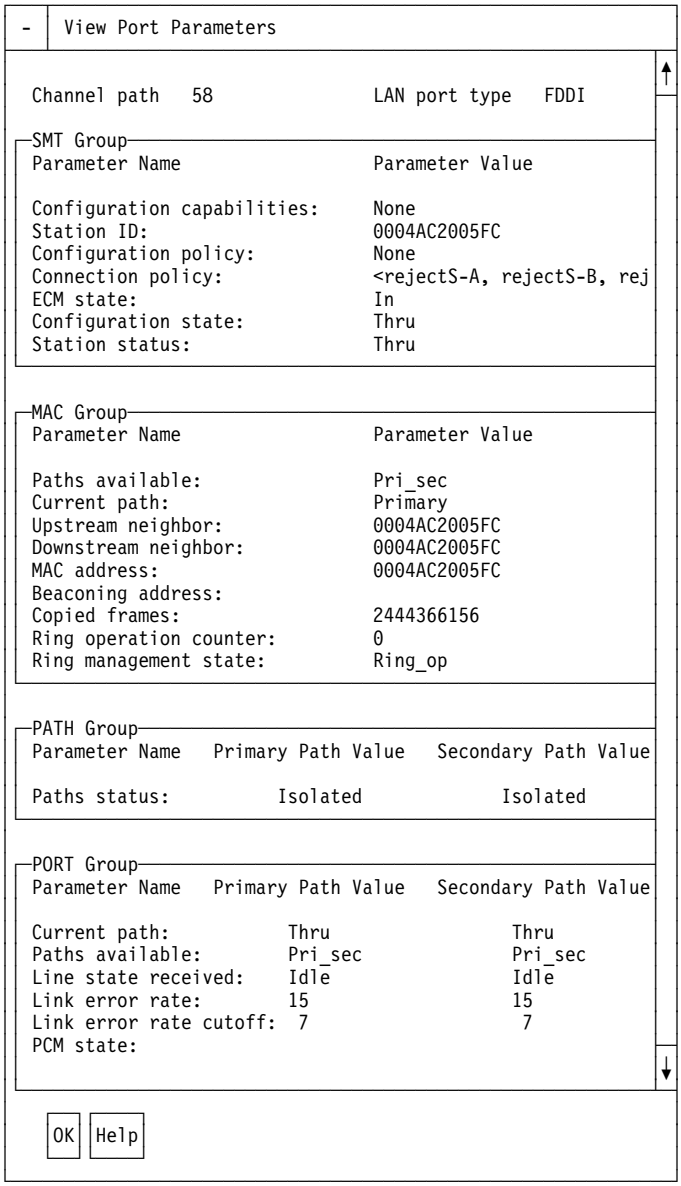
Note: The parameter values are customer and LAN dependent. To review or set these parameters, contact the customer's network administrator.

Token-Ring Port Parameters



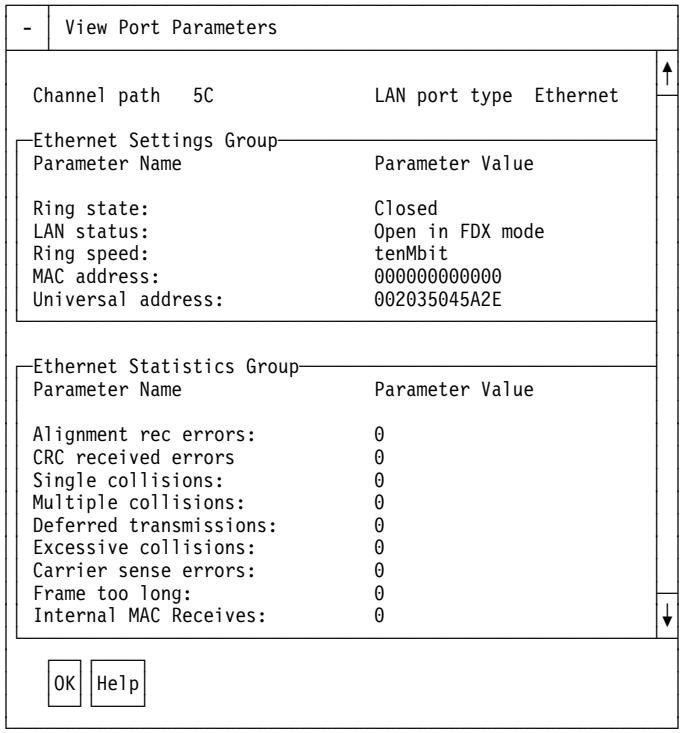
Note: The parameter values are customer and LAN dependent. To review or set these parameters, contact the customer's network administrator.

FDDI Port Parameters



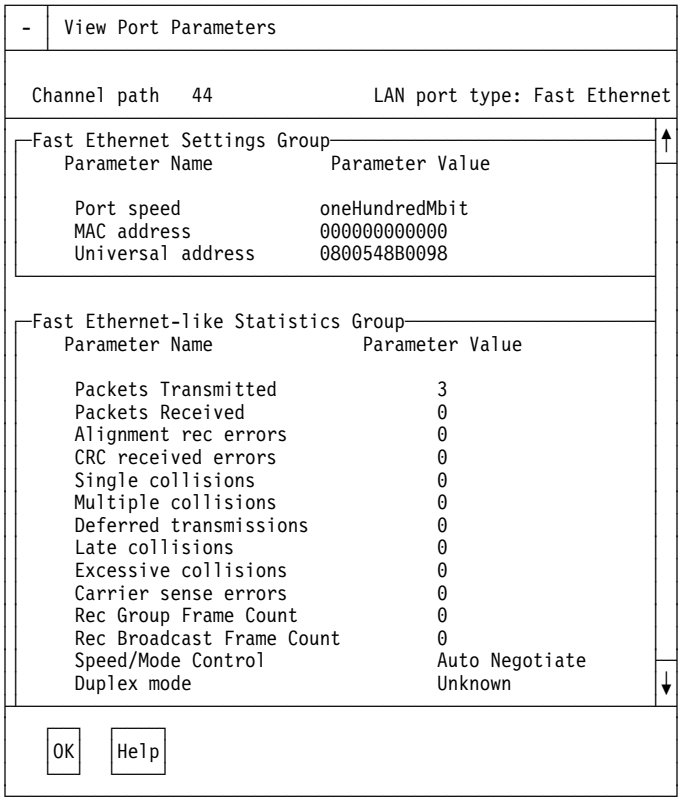
Note: The parameter values are customer and LAN dependent. To review or set these parameters, contact the customer's network administrator.

Ethernet Port Parameters



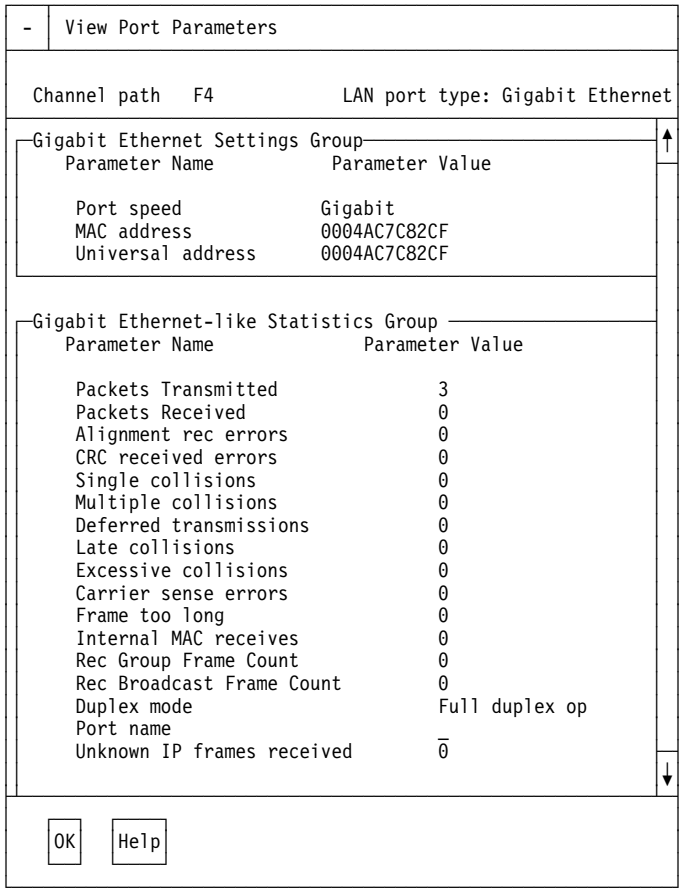
Note: The parameter values are customer and LAN dependent. To review or set these parameters, contact the customer's network administrator.

Fast Ethernet Port Parameters



Note: The parameter values are customer and LAN dependent. To review or set these parameters, contact the customer's network administrator.

Gigabit Ethernet Port Parameters



Note: The parameter values are customer and LAN dependent. To review or set these parameters, contact the customer's network administrator.

Diagnosing OSA Problems

Use this procedure only when the operating system or customer reports problems with one of the OSA features.

Read the following before starting.

Prior to problem diagnosis, it is important to understand the configuration you are working on. Obtain the information requested in step 1 for use in the remaining steps and to answer questions asked by the support center and product engineering.

If this is a new installation, or the customer's first use of OSA the problem is very likely caused by configuration. Diagnostics and wraps will not detect configuration problems. You must follow the sequence specified to find a configuration problem. Hardware support is not responsible for identifying and correcting configuration problems. You should insure that the OSA is defined properly in the IOCDS and that the OSA hardware is operating normally. Then, direct the customer to contact software support group for review of their portion of the configuration, TCP/IP profile, OAT configuration, SNA image, OSA/SF levels.

Do not make statements or direct your customer to make statements that the OSA has been checked out and the problem must be in software. Only ask for assistance in checking the configuration.

1

Ask the customer for the following information about the failing OSA subsystem:

- What indicators are on or flashing now
- What indicators are on or flashing when the failure occurs
- Does this system run in LPAR or Basic Mode
- Is the CHPID shared
- Are any ports shared
- Does the customer run SNA, TCP/IP, or both
- What type of LAN(s) is(are) connected to the card
- Does Query Port Status match the LAN type for the card
- From Advanced Facilities, check and record the OSA Code level
- If the customer uses OSA/SF, you may be required to obtain a copy of the OAT
- If the card is FDDI, is it single ring or dual ring
- Record the port parameters If servicing an ENTR card, you must know the speed and duplex mode for each port. If servicing a Fast Ethernet card, you must also record the small indicators adjacent to the port connector.

When complete, continue on step 2.

Note:

Use the information in "Channel Locations by CHPID" on page 7-4 to determine the location of the OSA feature card.

Port parameters are the only place you can see errors in configuration and LAN media.

For ATM LANs, the ATM image as well as configuration and port settings are loaded into the card through OSA/SF. If these are wrong, the card will run diagnostics, but the LAN will not work. Support must have a query from the ATM channel or a forced log to begin problem determination.

2

For the failing subsystem verify the following are connected:

- The cables from the OSA feature card to the network.

When complete, continue on step 3.

For OSA-2 features:

- See "OSA-2 Cards" on page 11-5 for the location of the ports.
- Refer to "General Information for OSA-2 Features" on page 11-2 for information on cabling.

For OSA-Express features:

- Refer to "General Information for OSA-Express Feature" on page 11-7 for port and cabling information.

3

Were you able to find and correct a cabling error?

NO **YES**

↓ Close the call. For information go to "Closing a Call" on page 6-49.

4

Is the failure on a FDDI subsystem?

YES NO

↓ Go to step 12.

5

FDDI feature failure

Do you have a cable plugged into the optical bypass connector of the FDDI card?

YES NO

↓ Go to step 13.

Note: This is a customer supplied cable. In most applications this bypass connector is not used.

For the locations of the feature card connectors, refer to “OSA-2 Cards” on page 11-5.

6

Do the following to determine if the FDDI bypass is enabled:

- Follow the procedure in “Displaying OSA Status” on page 11-18 to display the Query Port Status window.
  - Check to see if the port is enabled.
- Follow the procedure in “Displaying OSA Status” on page 11-18 to display the View Port Parameters window.
  - Find: Upstream neighbor, Downstream neighbor, and MAC address. Check to see if all three addresses are the same.

When complete, continue on step 7.

7

In step 6 is the port enabled ***and*** the addresses all the same?

YES NO

↓ Go to step 13.

Note: Having no cables in FA and FB or wrap cables installed results in all addresses being the same.

If the port is enabled and all addresses are the same, the FDDI bypass is activated.

8

The FDDI optical bypass switch is activated and should not be.

Verify that the LAN administrator did not activate the bypass.

Was the optical bypass activated by the customer?

NO **YES**

↓ Inform the customer of the problem and close the call. For information, see to "Closing a Call" on page 6-49.

The bypass switch can be activated by:

- the customer's LAN administrator
- a problem on the FDDI card
- a problem on the network bypass switch

9

- Unplug the optical bypass cable from the FDDI card.
- Install the 9-pin D shell test connector (85X0991) on the card.
- On the test connector, measure the voltage between pins D02 and D03 and between pins D01 and D04. The voltage should be between 4.5 Vdc and 5.25 Vdc.
- Measure the current between pins D02 and D03 and between pins D01 and D04. The current should be greater than 120mA.

When the voltage and current measurements are complete, go to step 10.

10

Were the measurements taken in step 9 correct?

YES **NO**

↓

Exchange the FDDI card following the procedure in "Exchanging FRUs" on page 6-16. When complete, close the call. For information, refer to "Closing a Call" on page 6-49.

11

Inform the customer that the optical bypass is being activated by another device or network problem and close the call. For information, refer to "Closing a Call" on page 6-49.

End of procedure

12

Check the OSA feature card to determine if it is an OSA-2 or OSA-Express card.

Is the feature card an OSA-2?

YES NO

↓ Go to step 14.

If necessary, use Figure 11-1 on page 11-5 and Figure 11-2 on page 11-8 to determine which OSA type you are working on.

13

OSA-2 subsystem problem

Find the **Not Operational**, **Test Complete**, and Online/Offline indicators (LEDs) on the OSA-2 feature card with the problem. Compare the values of the indicators on card with those in Table 11-5.

- If the indicators match one of the combinations shown in the table, go to the step shown in the **Go to Step** column.
- If the indicators do not match any combination shown in the table, go to step 14.

Note: Wait several minutes after a card reset before checking the indicators.

Table 11-5. OSA-2 indicators

Not Operational Indicator (A)	Test Complete Indicator (B)	Online Offline Indicator (C or D)	Description	Go to Step
off	flashing	off	Good status - ports enabled.	27
off	flashing	on	Good status - ports disabled.	20
off	off	off	Bad card status, possible loss of power to card slot.	14
on	flashing	(any)	Bad card status	14
on	on or off (not flashing)	(any)	Bad card status	14

14

Is the failing card a new feature in the system **or** did the customer change the IOCDS?

NO **YES**

↓ See the instructions at the right.

Check the following:

- If the failing card is an EN/TR, all wraps or no wraps or network cables may have been installed when the card was power-on reset the first time. Refer to the special handling required for this card in the ENTR section under "General Information for OSA-2 Features" on page 11-2 and attempt to correct the configuration.
- For all OSA-2 features, work with the system programmer to ensure that the OSA CHPID has TYPE=OSA in the IOCDS.

If you find and correct a problem, close the call. For information, refer to "Closing a Call" on page 6-49.

If you can not find the problem, continue on step 15.

15

Was the licensed internal code on the system updated just prior to the reported failure?

NO **YES**

↓ Call for assistance.

Check for licensed internal code activity using the **System Information** task under **Change Management**. On the System Information window, select an internal code EC then select **Details** to display the status and times of the EC.

16

Check the **Test Complete** indicator for the failing subsystem.

Is the Test Complete indicator flashing (flashing)?

NO **YES**

↓ Go to step 31.

A flashing Test Complete indicates that OSA licensed internal code is operational.

17

- For a Token-Ring, Ethernet, or Fast Ethernet subsystem, disconnect the LAN cables from the port and replace with the proper wrap plugs.
- For a FDDI subsystem, disconnect the network cables from ports FA and FB on the FDDI card.
- For an ATM subsystem, disconnect the network cable from the port.

When each cable is removed, wait several seconds then check the Test Complete indicator to see if it starts flashing.

When complete, continue on step 18.

Note: For ENTR only one connector per port gets a wrap plug. Put the wrap plug in the same connector as the customer's cable was removed from.

18

Did the Test Complete indicator start flashing when a port cable was removed?

YES NO

↓ Go to step 31.

19

Inform the customer that the LAN network is causing the problem. Close the call. For information, refer to “Closing a Call” on page 6-49.

End of procedure

---

20 Ports Disabled

Read the information at the right. When complete, continue on step 21.

If the port is disabled, the customer will not be able to get the OSA Unit Addresses (UAs) online to the System Control Program.

Indicator status is:

- Not Operational - Off
- Test Complete - Blinking
- Online/Offline - On

The Online/Offline (Cx or Dx for ENTR) status indicates the OSA port is disabled. The port should be enabled when a good network connection is sensed by the card even if the OSA/SF or IOCDS addresses are not correct.

Note: A wrap plug in the port will be sensed by the card as a good port connection and, except for ATM, should enable the port.

21

Is the failing card a Token Ring/Ethernet (ENTR) feature?

YES NO

↓ Go to step 24.

---

22 ENTR

Follow the procedure in "Displaying OSA Status" on page 11-18 to query port status on the ENTR card. Check the values displayed under the Type column for both ports. Compare the values displayed with the port types the customer wants configured.

Is the port type correct (Token Ring or Ethernet) for each port?

NO YES

↓ Go to step 24.

23

Do the following to reset the card and correct the port type:

Note: **Both** ports are required for this procedure.

- Remove all LAN cables from the card and install one wrap connector for each of the two ports.

  The type of wrap connector used will determine the IML mode for the port. Use Token-Ring wrap connector (TR) for Token-Ring IML mode, use Ethernet wrap connector for Ethernet IML mode.

- Follow the procedure in "Displaying OSA Status" on page 11-18 to get to the Advanced Facilities window.
- Select **Enable auto sense on next reset event**
- Select **OK**
- Exit the Advanced Facilities windows.
- Have the customer configure the CHPID off then on from the system control program.

  Note: If CHPID is shared, this must be done for each shared LPAR.

- Use the procedure from step 22 to display the port status. The port type must match the network type desired by the customer for the OSA to be usable.
  - If the port type is correct now, close the call. For information, refer to "Closing a Call" on page 6-49.
  - If the port type is still not correct, perform this step again. If the port type is not correct after the second try, call for assistance.

End of procedure

While the customer configures the card, watch the Not Operational indicator. It should blink on, then go off.

24

Follow the procedure in “Displaying OSA Status” on page 11-18 to query port status on the card. Check the values displayed under the Support Element Control Module column.

Is Support Element Control set to Yes?

NO **YES**

↓ Use the information at the right to set the Support Element Control to No.

Follow the procedure in “Displaying OSA Status” on page 11-18 and select **Enable or disable ports** on the Advanced Facilities window. Check query port status again to ensure the Support Element Control is set to No. If you can not reset it, call for assistance.

25

If you are working on an ATM problem, go to step 31.

Remove the customer's network cable from the failing port and install the correct wrap connector. Check the card indicators.

Does the Online/Offline indicator (LED) for the port go off?

YES **NO**

↓ Go to step 31.

Note: This procedure can not be used for ATM.

Ensure that you are using the correct wrap plug. The older Token Ring wrap plug with a “W” stamped on it will not enable the port, use the plug with “TR” on it.

26

Notify the customer that a problem on the network is causing the problem.

Close the call. For information, refer to “Closing a Call” on page 6-49.

End of procedure

Note: There is network problem determination information provided for each network type under “Network Problem Determination” on page 11-44.

---

27 Ports Enabled

The feature card indicators are correct but the customer reported a problem with the subsystem. Select one of the following:

- Customer reported problems varying OSA devices online - go to step 28.
- Customer reported OSA devices online but OSA is not operational - go to step 29.
- Customer reported OSA performance problems - go to step 30.
- All other problems - go to step 31.

28

The customer reported problems varying OSA-2 devices online. Use the checklist provided in "Devices Not Varying Online" on page 11-45 to check for possible problems.

- If you can find the problem, close the call. For information, refer to "Closing a Call" on page 6-49.
- If you cannot find the problem, continue on step 31.

End of procedure

29

The customer reported the OSA-2 was not operational. Use the checklist provided in "OSA-2 Not Operational" on page 11-46 to check for possible problems.

- If you can find the problem, close the call. For information, refer to "Closing a Call" on page 6-49.
- If you cannot find the problem, continue on step 31.

End of procedure

30

The customer reported performance problems with the OSA-2. Use the checklist provided in "OSA-2 Performance Problems" on page 11-47 to check for possible problems.

- If you can find the problem, close the call. For information, refer to "Closing a Call" on page 6-49.
- If you cannot find the problem, continue on step 31.

End of procedure

31

OSA-2 and OSA-Express

Have the customer stop all traffic on the failing port.

Run the OSA feature **Normal** test. For information, refer to “Feature Tests” on page 11-13.

- If the test runs without errors, continue on step 32.
- If the test fails, go to Chapter 1, “START” on page 1-1 and use the Service History to find the call information.

If OSA Support Facility (OSA/SF) is installed the customer can use the OSA Address Table (OAT) displayed in the OSA/SF user interface . If a 486 application is using the port, issue an UNBIND at OSA/SF.

32

Run the OSA feature **Wrap plug test**. For information, refer to “Feature Tests” on page 11-13.

- If the test runs without errors, continue on step 33.
- If the test fails, go to Chapter 1, “START” on page 1-1 and use the Service History to find the call information.

33

- For an ATM subsystem, go to step 38.
- For a FDDI subsystem, go to step 34.
- For a Gigabit Ethernet subsystem, go to step 43.

If you are working on an Ethernet or Token-Ring problem, have the customer stop all traffic on all ports of the failing subsystem.

Use the procedure in “Running Checkout Tests” on page 11-11 to run **OSA port/interface logic tests**.

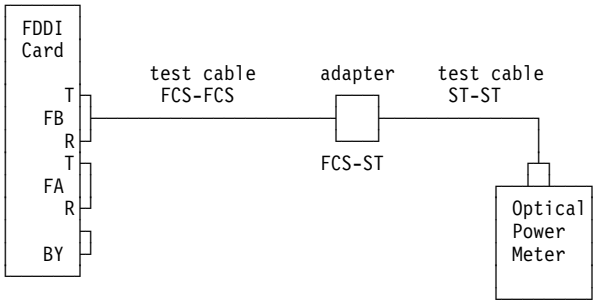
- If the test runs without errors:
  - For an Ethernet, Token-Ring, or Fast Ethernet subsystem, call for assistance.
- If the test fails, go to Chapter 1, “START” on page 1-1 and use the Service History to find the call information.

---

34 Optical tests - FDDI

Follow the instructions in "Running Checkout Tests" on page 11-11 to run **Optical power measurement tests**. Measure the optical transmit power for the FA and FB ports on the FDDI card. The setup for the optical power meter is shown on the right.

When measurements are complete, go to step 35.



Note: Set the power meter for 1300 nm. For information on zeroing the power meter, refer to "Optical Power Meter Setup" on page 9-13.

For information on the test cables, adapters, and optical meter, refer to "Optical Measurements" on page C-3.

The figure shows the position of the transmit (T) and receive (R) modules in the fiber optic connectors. Ensure that you check the output of the transmit (T) side.

Connect the cable from the device to the FCS-ST adapter to measure the receive (R) side of the fiber optic connectors.

35

Was the transmitter output for ports FA and FB between -14 dBM and -20 dBM?

NO **YES**

↓ Go to step 37.

36

Exchange the FDDI feature card. Use the procedure in "Exchanging FRUs" on page 6-16. When complete, close the call. For information, refer to "Closing a Call" on page 6-49.

End of procedure

37

Was the receive input form the device between -14 dBM and -29 dBM?

NO **YES**

Go to step 48. Call for assistance.

---

38 Optical tests - ATM

Before starting the optical tests, use the procedure in “Displaying I/O Card Information” on page 6-38 to determine whether the ATM feature card is single mode or multi-mode.

When you determine the feature type, continue on step 39.

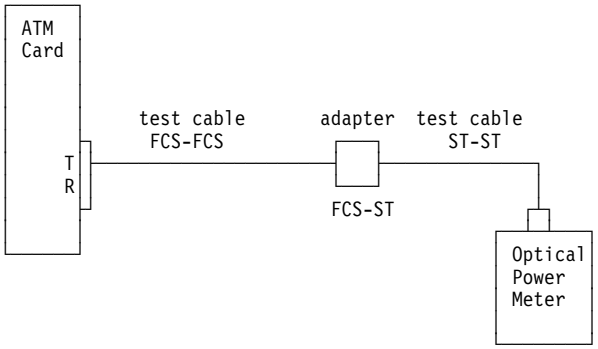
The feature cards are indicated as:

OSA2 ATM150mm (multi-mode)
OSA2 ATM150sm (single mode)

39

Follow the instructions in “Running Checkout Tests” on page 11-11 to run **Optical power measurement tests**. and measure the optical transmit power at the ATM card.

When measurements are complete, go to step 40.



Note: Set the power meter for 1300 nm. For information on zeroing the power meter, refer to “Optical Power Meter Setup” on page 9-13.

Different cables and adapters are used for single-mode and multimode. For information on the test cables, adapters, and optical meter, refer to “Optical Measurements” on page C-3.

The figure shows the position of the transmit (T) and receive (R) modules in the fiber optic connectors. Ensure that you check the output of the transmit (T) side.

Connect the cable from the device to the FCS-ST adapter to measure the receive (R) side of the fiber optic connectors.

40

The correct optical power readings are shown at the right.

Single-mode ATM	-8 dBm to -15 dBm
Multimode ATM	-14 dBm to -20 dBm

Was the transmitter output correct?

NO **YES**

↓ Go to step 42.

41

Exchange the feature card. Use the procedure in “Exchanging FRUs” on page 6-16. When complete, close the call. For information, refer to “Closing a Call” on page 6-49.

End of procedure.

42

The correct optical power readings are shown at the right.

Single-mode ATM	-8 dBm to -15 dBm
Multimode ATM	-14 dBm to -20 dBm

Was the receive input correct?

NO YES

Go to step 48. Call for assistance.

43 Optical tests - Gigabit Ethernet

Before starting the optical tests, use the procedure in "Displaying I/O Card Information" on page 6-38 to determine which Gigabit Ethernet card is installed.

When you determine the feature type, continue on step 44.

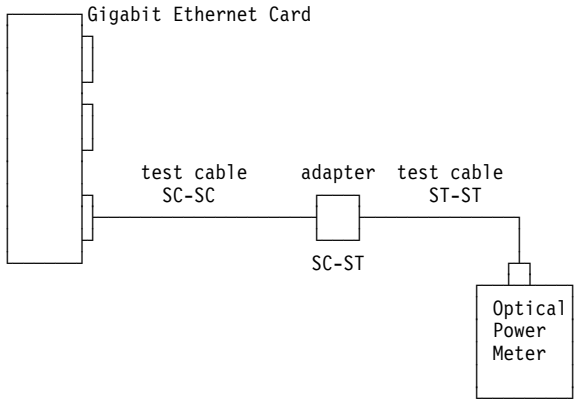
The feature cards are indicated as:

850nm card is QD9G
1300nm card is QD9H

44

- Ensure that the optical power meter is set to measure the correct frequency (850nm or 1300nm).
- Follow the instructions in "Running Checkout Tests" on page 11-11 to run **Optical power measurement tests**. and measure the optical transmit power at the Gigabit Ethernet card.

When measurements are complete, go to step 45.



Note: For information on zeroing the power meter, refer to "Optical Power Meter Setup" on page 9-13.

For detailed test information, refer to "Appendix C. Measuring Device Transmit and Receive Levels" in *Maintenance Information for Fiber Optic Links*, SY27-2597.

For information on the test cables, adapters, and optical meter, refer to "Optical Measurements" on page C-3.

45

The correct optical power readings are shown at the right.

850nm	-4 dBm to -10 dBm
1300nm	-14 dBm to -21 dBm

Was the transmitter output correct?

YES **NO**

↓ Go to step 42.

46

The correct optical power readings are shown at the right.

850nm	-4 dBm to -10 dBm
1300nm	-14 dBm to -21 dBm

Was the receive input correct?

NO **YES**

↓ Go to step 48.

47

Exchange the feature card. Use the procedure in "Exchanging FRUs" on page 6-16. When complete, close the call. For information, refer to "Closing a Call" on page 6-49.

End of procedure.

48

Continue analysis in "MAP 300: START" of *Maintenance Information for S/390 Fiber Optic Links*, SY27-2597.

Note: Use the SY27-2597 only at the -05 or higher level. For systems with older documentation, the information can be found in MAP 200 of *Maintenance Information for Fiber Distributed Data Interface (FDDI) Links and Asynchronous Transfer Mode (ATM) Links*, SY27-0331.

End of procedure.

OSA-2 Service Aids

Use the following checklists when you are directed to assist in network problem determination.

Network Problem Determination

Select the checklist for the adapter type you are working with.

Token-Ring Mode on ENTR Card

- Customer cable must be plugged into a working MAU port. The Ring-In (RI) and Ring-Out (RO) ports are for interconnecting MAUs, not for LAN or OSA port connections. Connecting an OSA port to RI or RO will disable the port.
- Adapters can not be connected without using a MAU. Connecting OSA ports directly will disable the ports.
- Port MAC addresses must be unique. A duplicate MAC address will disable the port. To check for this, start with only the OSA-2 port on the ring and keep adding cables back until the port disables.

Ethernet Mode on ENTR Card

- OSA ENTR in Ethernet mode does not support auto-negotiate. If the switch/hub connected to the OSA is set for auto-negotiate, the results are unpredictable. The port may disable when the OSA is reset. Performance problems may also result. At other times the OSA may run correctly.
- The Ethernet port must be connected either to a working hub/switch or directly to another adapter. To connect directly, an RJ45 crossover adapter is required. The adapter will not enable without the connection.
- Half duplex is the default setting. The ENTR feature does not auto-negotiate between half and full duplex, it must be set using Advanced Facilities. For information, refer to “Displaying OSA Status” on page 11-18. Display the setting using View Port Parameters. Use Set Ethernet Mode on the Advanced Facilities window to change the setting. The port must be configured on then off as follows:
  - Select **Set Ethernet mode**
  - Select the required mode and then **Apply**
  - From Enable/Disable Ports disable the port and then select **Apply**
  - From Enable/Disable Ports enable the port and then select **Apply**
- The AUI connector can be used for half duplex only.

Fast Ethernet

- Fast ethernet supports auto-negotiate of full or half duplex and 10 Mbps or 100 Mbps.
- Some fast ethernet hardware does not support auto-negotiate the same way. In this case, Advanced Facilities must be used to override auto-negotiate. Refer to “Displaying OSA Status” on page 11-18 and use the following:
  - Select **Set Ethernet mode**
  - Select the required mode and then **Apply**
  - From Enable/Disable Ports disable the port and then select **Apply**
  - From Enable/Disable Ports enable the port and then select **Apply**

- Use “OSA-2 Cards” on page 11-5 to identify the fast ethernet indicators and the description of the indicators which show the duplex mode and speed being used.

FDDI

- FDDI port can only be specified as A-type or B-type.
- FDDI has two connections: FA and FB. Either or both of these can be used. Cabling both provides ring redundancy.
- Typical connection is FA connected to FB on a different adapter. Cabling FA to FA or FB to FB is incorrect.

ATM

- Unlike other OSA-2 adapters, the ATM port will not enable with a wrap plug installed.
- Connection to a working ATM switch is required to enable the port.
- ATM configuration variables are set through OSA/SF.

Devices Not Varying Online

If the port is disabled, the customer will not be able to get the devices on line. Use the following checklist when you are directed to determine why OSA devices will not go online.

- Feature cards configured with OSA/SF retain this configuration even if powered off or moved to another system. In most cases OSA/SF must be used to install a new customized OAT.
- Use the procedure in “Displaying OSA Status” on page 11-18 to check the values displayed under the Support Element Control Mode column. For customer operation the value should be set to “No.”

  To set the Support Element Control to No: follow the procedure in “Displaying OSA Status” on page 11-18 and select **Enable or disable ports** on the Advanced Facilities window.
- If the customer is using the default OSA Address Table (OAT), look for a mismatch between the IOCDS and the OAT. The default OAT shipped with all OSA cards is setup for TCPIP passthru mode. TCPIP requires two UA's per OSA port. They are UA=00, 01 for port-0 (if EN/TR card UA=02, 03 for port-1). If the customer is trying to vary path for Device address 0x45 (X=any number), there is a good chance the IOCDS is wrong.

  Note: It is possible, but not likely, that device address 0x45 could be equated to the UA=00, if the 'UNITADD' parameter was used in the 'IODEVICE' macro. Example:

  ```
  IODEVICE ADDRESS=(0x45,2),CUNUMBR=0x00,UNIT=OSA,UNITADD=00"
  ```

  Most customers will not use the 'UNITADD' and the device addresses they will try to vary will be 0x00 and 0x01 (or 0x02 and 0x03 for ENTR port-1). Another problem is a customer trying to vary device 0x05 and the IOCDS looks like:

  ```
  IODEVICE ADDRESS=(0x00,16),CUNUMBR=0x00,UNIT=OSA
  ```

  Address 0x05 is a valid IOCDS address, but there is no real OSA UA=05. In this case the vary of 0x00 and 0x01 should work and they may need to change some TCPIP definitions to match.

- If using a customized OAT, look for IOCDS and OSA mismatch. The OAT and IOCDS are checked when the OAT is loaded on the OSA card. Obtain a printout of the OAT and look for a field called Valid Data Indicator. The following are examples:

```
          ALL DATA VALID = GOOD STATUS = UA DEFINED IN OAT AND IOCDS
          OSA DATA VALID = BAD STATUS  = UA DEFINED IN OAT NOT IOCDS
CHANNEL SUBSYSTEM VALID = BAD STATUS  = UA DEFINED IN IOCDS NOT OAT
```

- A common cause for OSA UA's not coming online, is for customers who run in LPAR mode, have defined the OSA CHPID as SHARED and have not used OSA/SF (using default OAT) and have not used the “partition keyword” in the IODEVICE statement. In this case the OSA port(s) become **dedicated** to one and only one partition. This LPAR will be the first LPAR the OSA card communicates with after a reset. The OSA Control unit part of the card ties it's resources to, and remembers, only this one LPAR. This will be the **only** LPAR these ports will ever communicate with until the OSA card is reset again. You can configure the OSA CHPID to any of it's shared LPARs but the UA's will not come online except to the correct LPAR partition the OSA card 'remembers'.

  The customer will not be successful in attempts to configure the OSA CHPID off from one LPAR and onto another LPAR unless the card goes through a reset. An OSA card will only go through a reset after **all** the shared LPARs, configure this CHPID offline.

  Watch the hardware (not image) icon to ensure you see it change to "STANDBY STOPPED" state, or watch the LEDs on the OSA card to ensure the OSA card goes through a reset after config on. If no other problems, the ports will now come online to the first LPAR that configures the CHPID online, out of Standby Stopped state and into Online Operating state.

  Customers get into this problem often after a power-on reset. During power-on reset in LPAR mode the CPC normally will automatically start activation of LPARs. The first LPAR activated that is defined as shared for this OSA CHPID gets the OSA UA's. That may not be the LPAR the customer was running the OSA on prior to the power-on reset.

OSA-2 Not Operational

Use the following checklist when you are directed to determine why OSA features are not operational. UA's online but OSA not operational checklist:

- TCP/IP for MVS manages it's own outstanding responses and requires that the MIH value (in IOS of MVS) for the OSA UA's be disabled. This can be done temporarily till next IPL with:

  ```
  SETIOS,MIH,TIME=00:00,DEV=(0xxx-0xxx)
  ```

  where 0xxx - 0xxx are the OSA device numbers. To make a permanent change that takes effect at next IPL:

  ```
  Change PARMLIB IECIOSXX MIHTIME=00:00,DEV=(0xxx-0xxx)
  ```

  TCP/IP will have to be restarted after a dynamic MIH change. To display the current MIH value for an address range use the command:

  ```
  D IOS,MIH,DEV=(0xxx-0xxx)
  ```

- TCP/IP requires OSA UA's have DYNAMIC=NO set when using HCD or HCM.
- Whenever OSA/SF is used to customize a card to use SNA and TCP/IP together, IP addresses must be specified in the OAT. Do not leave them as

0.0.0.0. If shared CHPID, IP addresses must be specified for each shared LPAR.

- If SNA/VTAM is used for an ENTR card in EtherNet mode, EtherNet Version 2 (also called EtherNet V2 or EtherNet II) cannot be used. The ENTR card must use Ethernet 802.3 frame types. Other adapters in the network sending V2 type frames will not be able to talk with the ENTR.
- When sharing a port between LPARs, a default LPAR must be specified in the OSA table. This is not needed for software, but hardware needs this specified to offload informational LAN frames or data to the default LPAR. If this is not specified, intermittent hangs may occur.
- Have the customer's network administrator review the Port Parameter windows under Advanced Facilities. For details, refer to “Displaying OSA Status” on page 11-18.

If customer has used OSA/SF, the addresses are online, the above material has been reviewed and there is still a problem, attempt to get the information in “Getting Additional Information” on page 11-48 and call for assistance.

OSA-2 Performance Problems

Use the following checklist when you are directed to look at OSA feature performance problems.

- In Ethernet Mode (on the ENTR card) the AUI connector cannot be used for full duplex. Only the UTP connection supports full duplex (FDX).

  The ENTR card does not auto negotiate between full and half duplex. Half duplex is the default setting. If FDX is required, it must be checked and set using Advanced Facilities. Look in the LAN Status field for the View Port Parameters window. Full Duplex will display “Opened in FDX mode,” Half Duplex will display “None.” For more information, refer to “Displaying OSA Status” on page 11-18.

  Severe performance problems can result if there is a full/half duplex mismatch between the OSA card and the rest of the network.

- Some ENTR cards using the UTP (RJ45) port for Ethernet may show a performance problem because of excessive collisions being detected.

  Note: In most installations excessive collisions indicates greater than 300 collisions per minute. If this occurs, get a copy of the log showing the numbers of collisions and call for assistance.

- The Fast Ethernet card supports auto-negotiate of FDX (Full Duplex) or HDX (Half Duplex) or 100Mbit or 10Mbit. The ENTR cards do not support auto-negotiate of these settings.
- Not all manufacturers of EtherNet hardware have implemented the auto-negotiate sequences for Ethernet the same. When connections are made between two Ethernet boxes that do not share the same auto-negotiate sequences, the connection may be degraded or fail completely. If this happens, refer to “Displaying OSA Status” on page 11-18 and try using the Advanced Facility windows to override auto-negotiate and set specific speed and duplex settings as follows:
  - From Advanced Facility select **Set EtherNet Mode**.
  - Select desired mode then **Apply**.
  - From Enable/Disable Ports disable the port then **Apply**.

  - From Enable/Disable Ports enable the port then **Apply**.

- The Fast Ethernet card has three indicators near the UTP connector that indicate card speed and duplex settings. Refer to “OSA-2 Cards” on page 11-5 for the indicator locations and “OSA-2 Card Indicators” on page 11-6 for the meanings of the indicators.

  Note: Indicators on other Fast Ethernet adapters may not be correct.

If the above information has been reviewed and you still have performance problems, attempt to get the information outlined in “Getting Additional Information,” then call for assistance.

Getting Additional Information

When additional information is requested for the customer's OSA configuration, use the procedures below to find: OAT table, TCP/IP configuration, and the IOCDS source files.

OAT Table: When requested for OAT table information, use the OS/SF Query command with parameter DEVICE INFORMATION from the operating system. The OSA CHPID and OSAD device must be online to get good data. This will result in a readable file that has detailed information followed by the OSA OAT table.

For an MVS system, OSA/SF has a dataset called xxxx.SIOASAMP (Where xxxx=the high level qualifier). In OS/390 the file is called SYS1.SIOASAMP. Within SIOASAMP is another dataset called xxxx.IOACMD and within that dataset is the QUERY EXEC. Details of the QUERY EXEC are in the *OSA/SF User's Guide*, SC28-1855.

From the READY prompt of a TSO logon that has access to OSA/SF datasets enter:

```
ISPF
6
```

Then on the EXEC line enter the following:

```
EX 'SYS1.SIOASAMP(IOACMD)' 'QUERY' EXEC
```

Note: In the above example SYS1 is the high level qualifier, It is account dependant.

The recommended parameters are:

- Select 1 for Channel
- Enter the OSA CHPID
- Select ALL ports
- Enter a DATA SET NAME (Example: A.A)
- Select YES for Device Information

To VIEW the output data set starting from the ISPF main menu:

- Select 3
- Then, select 4
- Type your DataSet name
- Move your cursor to the line of your dataset and type 'B' for browse.

Upload the files to VM in ASCII format and follow instructions from your support group for file names and file transfer.

Note:

When you review the OSA OAT entries that are configured via OSA/SF the only data required is for the fields marked s- on the right in the comment section.

When OAT unit address data matches the current IOCDS the field Valid Data Indicator will have ALL DATA IS VALID or just ALL on newer levels of OSA/SF.

OSA DATA VALID (just OSA on newer levels) indicates that the unit address has been specified in the OAT but not in the IOCDS.

CHANNEL SUBSYSTEM DATA VALID (just CSS in newer levels) indicates the unit address is in the IOCDS but not in the OAT.

OSA DATA VALID or CHANNEL SUBSYSTEM DATA VALID indicate that the IOCDS does not match the OAT unit address for that address entry.

TCP/IP Configuration File (PROFILE.TCP/IP): From TSO logon that can access TCP/IP for MVS datasets:

- Enter ISPF at the READY prompt.
- Select 3
- Select 4

Search for file XXXX.XXXX.TCP/IP (Example: TCP/IP.S07.TCP/IP where S07 is the LPAR partition identifier or XXXX.XXXX.PROFILE.TCP/IP).

The configuration file is readable and contains many TCP/IP profile settings including host IP addresses. note: A ";" (semicolon) is used to comment out some definitions and also to enable and disable some fields that are in the file.

IOCDS Files: The IOCDS data files are located in the D:\IOCP subdirectory on the support element. File names are IQZKDSAx.DAT where x is the IOCDS number.

For information on transmitting the IOCDS data, refer to "Sending Service Data" on page 6-28. Enter the following into the Product Engineering Files field (available only on the support element):

```
D:\IOCP\IQZKDSxx.DAT  (where xx=Active IOCDS A0, A1, A2 or A3)
```

Note: Use the actual file names, do not try to use an "*."

Chapter 12. Cryptographic Coprocessor Features

This chapter has information for the Cryptographic Coprocessor and PCI Cryptographic Coprocessor features.

Repair information for any of the Cryptographic Coprocessor features is provided by on-line procedures on the support element. This section provides information for running tests, checking feature card status, and importing a new Function Control Vector (FCV). Also included is reference information for how to protect the customer's cryptographic settings while troubleshooting the system.

Find the information you want in the following table and go to the page indicated.

Information On	Go To
Basic cryptographic coprocessor feature description	“General Information on Basic Cryptographic Coprocessor Feature” on page 12-2
Configuration procedure for basic cryptographic coprocessor feature	“Cryptographic Coprocessor Configuration” on page 12-3
PCI cryptographic coprocessor feature description	“General Information for PCI Cryptographic Coprocessor Feature” on page 12-5
STI direct connect attachment	“CHPID Assignments for Direct Attachment” on page 7-9
Procedures for displaying status and configuration information for PCI cryptographic coprocessor feature	“Feature Card Tasks” on page 12-9
Procedures for importing a Function Control Vector (FCV) for PCI cryptographic coprocessor feature	“Feature Card Tasks” on page 12-9
Procedures for deleting an Adjunct Processor (AP) from the system configuration	“Using the AP Manager” on page 12-12

General Information on Basic Cryptographic Coprocessor Feature

For 9672 Generation 5 and 6 servers the base cryptographic coprocessor feature logic is contained on the CPC's MCM. There are two cryptographic chips on the MCM that are used as cryptographic coprocessors. Each of the chips is connected to a CP. Some models also have spare CPs assigned for use if there is a failure. Table A-1 on page A-3 and Table A-2 on page A-4 show which CPs are used for the different G5 and G6 models.

The feature is activated by licensed internal code. In addition to the internal code feature, a customization file is necessary to establish what level of cryptographic protection the customer is to use. The configuration files are provided on a diskette that is loaded through the support element. The configuration files are loaded at installation and must be reloaded whenever a service procedure completely removes power from the MCM. Both cryptographic coprocessors must have the same customization file loaded. The procedures for loading the configuration files is described in “Cryptographic Coprocessor Configuration” on page 12-3.

Before the cryptographic coprocessor feature can be used, the customer must load the keys.

There are Crypto Backup Batteries (CBUs) on the CPC's DCAs which provide power to keep the customer's keys and configuration information stored when system power is removed. Removal and replacement procedures for the CBUs are on-line on the support element. There are special handling procedures for the batteries. For details, refer to the following notice:

Notice:

The Cryptographic Battery Unit (CBU) contains a lithium battery. Recycle or discard the CBU as instructed by local regulations. In the United States IBM has a battery collection program. For information, call 1-800-426-4333.

Cryptographic Coprocessor Configuration

Use this procedure to configure the cryptographic feature. Configuration is necessary when:

- CPC cage is exchanged
- MCM is exchanged
- Support element hard disk information is restored
- The cryptographic feature is installed (MES)
- Some CPC upgrades

Note: When the cage or MCM is exchanged, cryptographic coprocessor configuration is done as part of the on-line procedure.

---

1 Configuration

Ensure the CPC is powered on.

On the Support Element Workplace window:

- Open **Task List** from the **Views** area
- Open **CPC Configuration** from the **Task List Work Area**
- Open **Groups** from the **Views** area.
- Drag and drop the selected **CPC** onto **Cryptographic Coprocessor Configuration** in the **CPC Configuration** area.

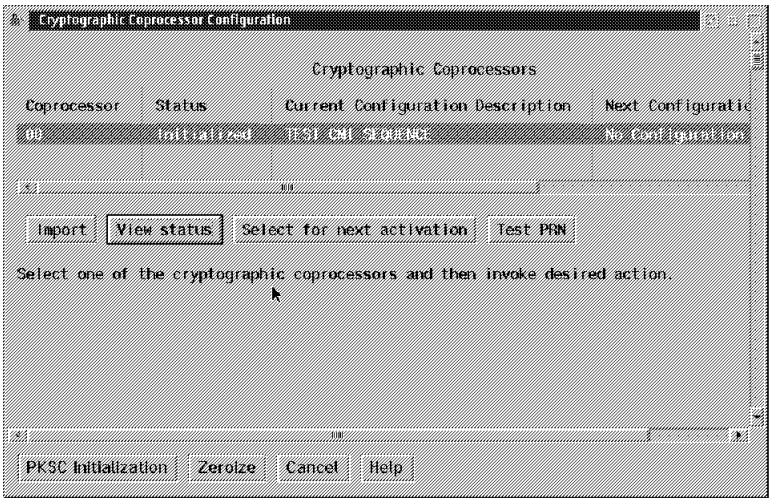
Go to step 2.

2

From the Cryptographic Coprocessor Configuration window:

- Select a coprocessor from the menu.
- Select **Import**
- Insert the Cryptographic Enablement diskette in drive A
- Select **Import**
- If a warning appears select **Enter**
- Select **OK**
- Repeat this step until the configurations for both Cryptographic coprocessors have been imported.
- Remove all diskettes from drive A.

When complete, go to step 3.



Advise the customer to store the Cryptographic Enablement diskette in a secure area.

3 Select for Activation

On the Cryptographic Coprocessor Configuration window:

- Select a **coprocessor** from the list.
- Select **Select for next activation**
- Select the drop down arrow to select a Cryptographic Configuration.
- Check **Auto initialize**
- Select **Save**
- Select **Enter**
- Select **OK**
- Repeat this step until both Cryptographic Coprocessor activations have been saved.
- Select **Cancel** to exit Cryptographic Configuration.

Note: If you were directed here because you are restoring data to a support element hard drive, do not do this step. Return to "Restore Support Element Hard Disk Information" on page 2-30.

Inform the customer that the cryptographic coprocessor configurations have been loaded and queued for the next activation. It is the customer's responsibility to load the keys. This is done through ICSF windows.

End of procedure

General Information for PCI Cryptographic Coprocessor Feature

The PCI Cryptographic Coprocessor feature is used as an enhancement to the base cryptographic features described in “General Information on Basic Cryptographic Coprocessor Feature” on page 12-2. To use the PCI Cryptographic Coprocessor feature cards, the base cryptographic features must be enabled. One to eight PCI Cryptographic Coprocessor cards are available. The feature code is: FC 0860.

The PCI Cryptographic Coprocessor feature cards are installed in the I/O cage slots and connected as STI direct connection adapters. Each feature card is assigned a CHPID depending on which STI is used and where it appears in the STI chain. For general information about STI direct connect features, refer to “CHPID Assignments for Direct Attachment” on page 7-9.

Customization

The PCI Cryptographic Coprocessor features have a customization diskette to load a Function Control Vector (FCV) similar to the customization diskette for the base cryptographic feature. All the PCI Cryptographic Coprocessor feature cards are loaded with the same FCV. The procedure for loading the FCV is described in “Feature Card Tasks” on page 12-9.

As with the base cryptographic coprocessor, the customer must load the keys. This is again through ICSF panels.

AP Management

The function of the cryptographic coprocessor is called an “Adjunct Processor” or AP. There is a number assigned to each AP and it is related to the card serial number. A feature card can be moved in the system (possibly by MES) without changing the AP to card serial number relationship. However, if a PCI Cryptographic Coprocessor feature card is removed from the system (by MES or repair), the AP Manager window must be used to remove the relationship between AP and the serial number of the original card before a different card can be assigned to the AP function. For instructions on using the AP Manager window, refer to “Using the AP Manager” on page 12-12.

Special Feature Considerations

There are batteries within the PCI Cryptographic Coprocessor feature cards which provide power to keep the customer's keys and configuration information stored when system power is removed. Only the PCI Cryptographic Coprocessor feature cards are FRUs, the batteries cannot be exchanged.

There is an intrusion latch within the PCI Cryptographic Coprocessor card logic which is set any time the card is removed from the system. If the card is reinstalled and the customer attempts to activate the card using ICSF, ICSF will detect the intrusion latch and zeroize the customer keys which prevents activation. The customer must reenter the keys to make the card available for use.

If a defective card must be returned, there is an additional level of protection offered to the customer. The intrusion latch is set after card removal. However, the customer keys remain in card memory. If the customer requests the keys be erased, battery power must be removed from the card. There is an access window on the card to allow the service representative to cut the battery lead wire. Cutting this wire removes power so all stored data is lost immediately and the card is destroyed. For details, refer to “Procedure for Disabling Feature Card” on page 12-8.

Note: This procedure should only be performed by customer request. Cutting the wire will prevent engineering from performing any failure analysis on the defective card.

Tests

The PCI Cryptographic Coprocessor Configuration window provides a go/no go test for either a selected feature card, or for all feature cards. For information on how to run the test, refer to “Feature Card Tasks” on page 12-9.

PCI Cryptographic Coprocessor Card

The following figure shows the locations on the PCI Cryptographic Coprocessor feature card.

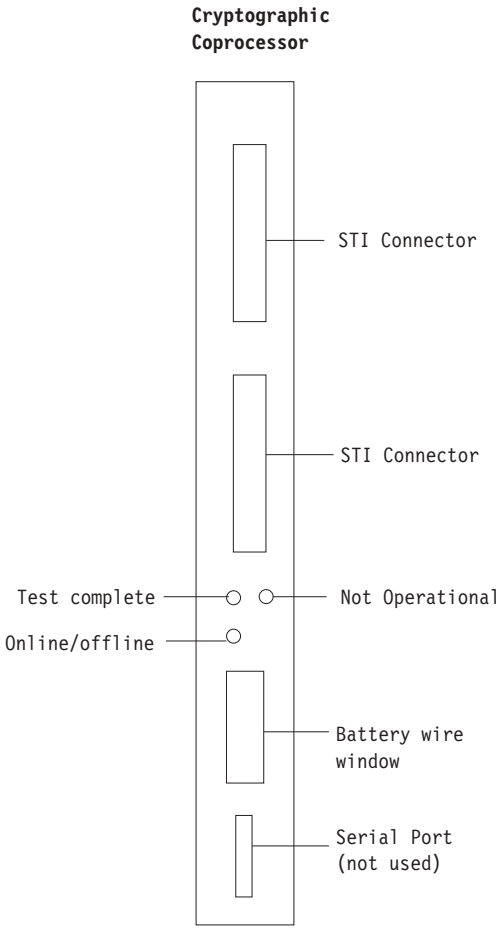


Figure 12-1. End view of the PCI cryptographic coprocessor feature card.

Card Indicators: The Not Operational, Test Complete, On Line/Off Line, and Status indicators used on the PCI Cryptographic Coprocessor feature cards have the same meanings as those on the FICON and OSA-Express cards. They are used in combination to indicate the condition of the feature cards. Table 12-1 and Table 12-2 on page 12-8 show the meanings of these indicators.

Table 12-1. Meanings of On Line/Off Line indicator

On Line/Off Line Indicator "C"	Status
Off	CHPID for PCI crypto adapter on line and card is communicating with PU.
On	CHPID off line for maintenance OR external wrap tests running.
Blinking rapidly	Power on tests running.

Table 12-2. Meanings of Not Operational and Test Complete indicators

Test Complete Indicator "A" (Green)	Not Operational Indicator "B" (Amber)	Status
off	off	No power to the card or card processor in a loop.
off	flashing	Diagnostics are running
off	on	Normal after FRU exchange from power on until diagnostics start. Otherwise, card processor in a loop.
flashing	off	Tests complete, CHPID on line
flashing	on	Hardware error detected
on	flashing	Invalid combination
on	off	Normal after FRU exchange and diagnostics complete until customer activates card. Otherwise, card processor in a loop.

Procedure for Disabling Feature Card

Use this procedure after a defective PCI Cryptographic Coprocessor feature card has been exchanged in your system to permanently disable the defective card being returned. This will remove battery power from the logic and erase customer key data.

Note: Use this procedure only when requested by the customer. Cutting the wire will prevent engineering from performing any failure analysis on the defective card.

If you are directed by your customer to disable a defective PCI crypto feature card, do the following:

1. Use Figure 12-1 on page 12-7 to locate the Battery Wire Window on the feature card's bezel.
2. Locate the battery wire loop inside the window.
3. Cut the battery wire.

The procedure is complete. The battery power is now removed from the feature cards logic modules.

Feature Card Tasks

The following procedure shows how to display CHPID status, feature card status, feature card configuration, run feature tests, and import a Function Control Vector (FCV) for the PCI cryptographic coprocessor feature.

1

If you are using the support element for this task, ensure the CPC is placed in service status and the support element is in the service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using the Hardware Management Console for this task, ensure the CPC is placed in service status then make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

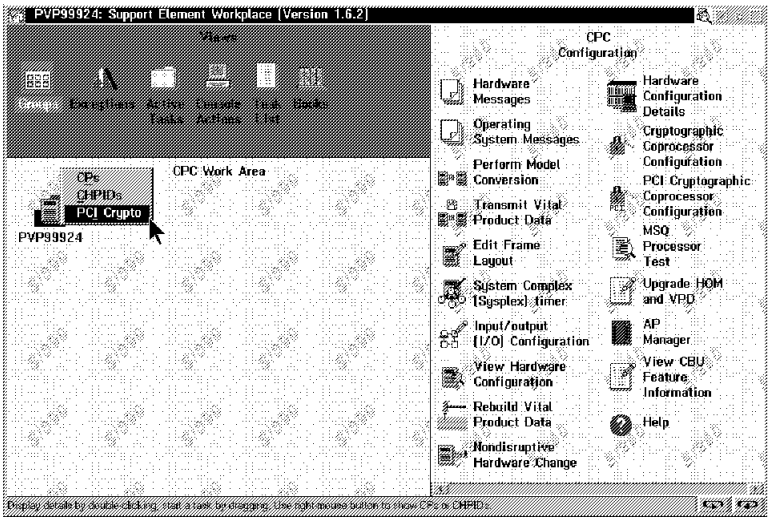
Go to step 2.

2

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CPC Configuration** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Double-click on the system icon to open the CPC Work Area.



Go to step 3.

3

- If you want to display feature CHPID status, go to step 4.
- If you want to run display PCI Cryptographic Coprocessor feature configuration, run tests, or import an FCV, go to step 6.

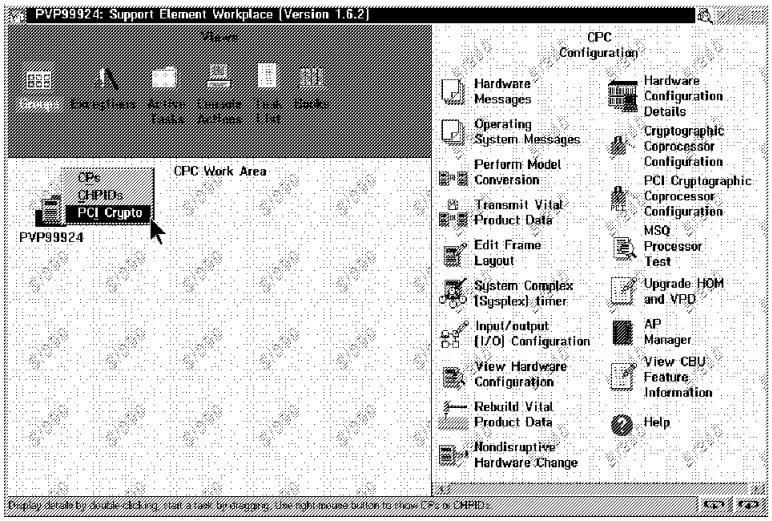
---

4 CHPID and Feature Status

In the CPC Work Area:

- Right-click on the CPC icon.
- Select **PCI Crypto** from the pull-down.

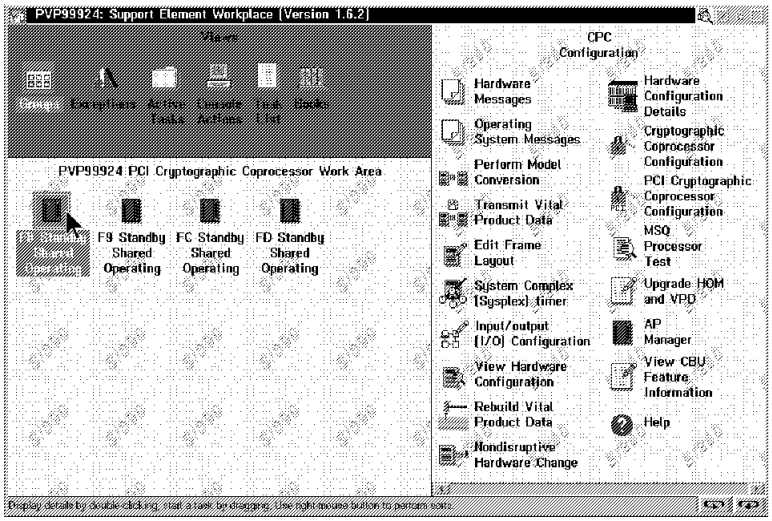
Go to step 5.



5

The PCI Cryptographic Coprocessor Work Area displays (as shown) on the Support Element Workplace window.

End of procedure Go back to step 3 to start the other procedures.



---

6 Other Tasks

In the CPC Work Area:

- Right click on the CPC icon and drag it to **PCI Cryptographic Coprocessor Configuration** under CPC Configuration.

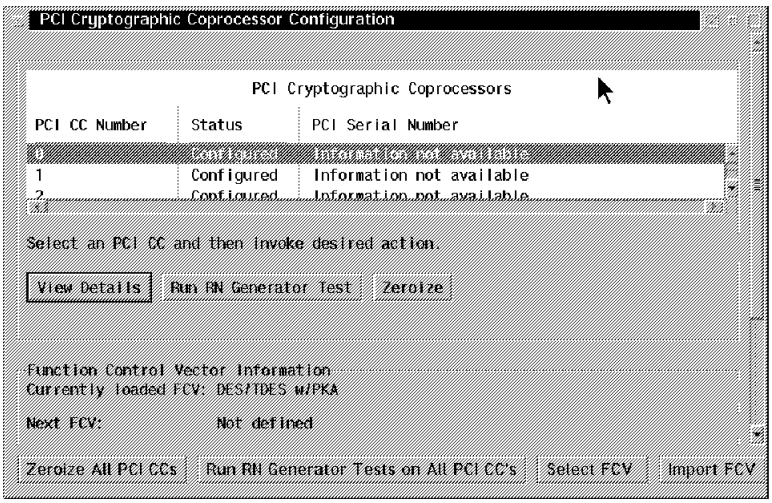
Go to step 7.

7

The PCI Cryptographic Coprocessor Configuration window displays.This window allows the following:

- Run tests on one feature card or all cards.
- Zero out customer key data.
- Display feature card details.
- Import a new FCV.
- Select an FCV to use for the feature cards.

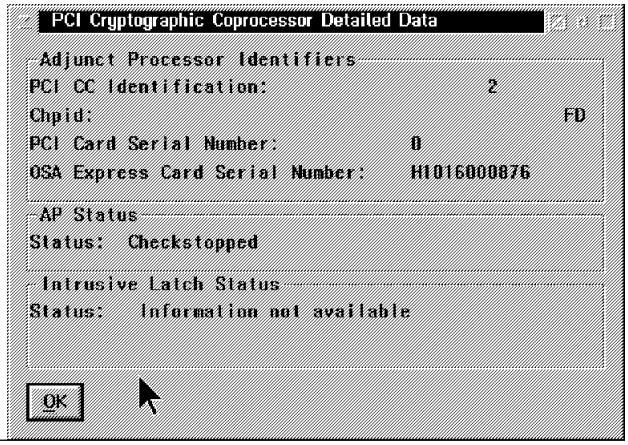
If you want to see the card detail data, go to step 8.



8

The PCI Cryptographic Coprocessor Detailed Data window displays.

End of procedure



Using the AP Manager

The following procedure shows how to remove the relationship between a PCI Cryptographic Coprocessor feature card serial number and the Adjunct Processor (AP) it is assigned. Use this procedure when a PCI crypto feature card is permanently removed from the system to allow the AP number to be assigned to a new card serial number.

1

If you are using the support element for this task, ensure the CPC is placed in service status and the support element is in the service position. For information, refer to “Starting Service with the Support Element” on page 1-10.

If you are using the Hardware Management Console for this task, ensure the CPC is placed in service status then make a remote connection to the CPC. For information, refer to “Starting Service With the Hardware Management Console” on page 1-26.

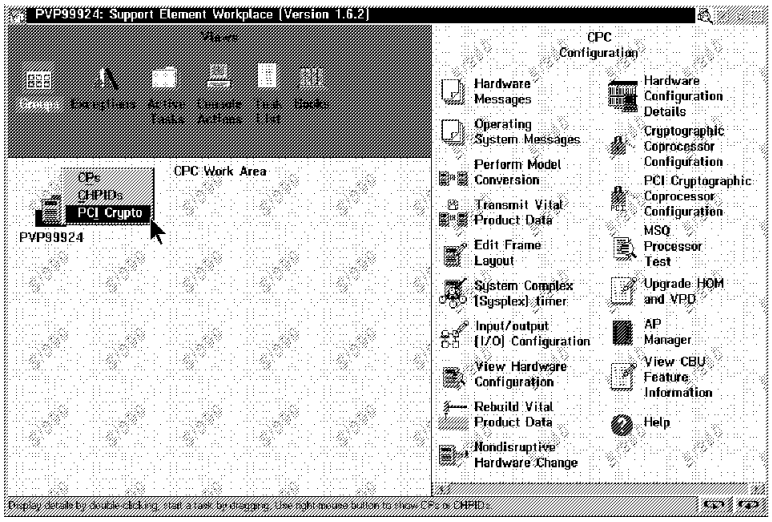
Go to step 2.

2

Close any windows that are active until only the Support Element Workplace window displays.

On the Support Element Workplace window:

- Open (double-click on) **Task List** from **Views**.
- Open **CPC Configuration** from the **Task List Work** area.
- Open **Groups** from **Views**.
- Double-click on the system icon to open the CPC Work Area.



Go to step 3.

3

In the CPC Work Area:

- Right click on the CPC icon and drag it to **AP Manager** under CPC Configuration.

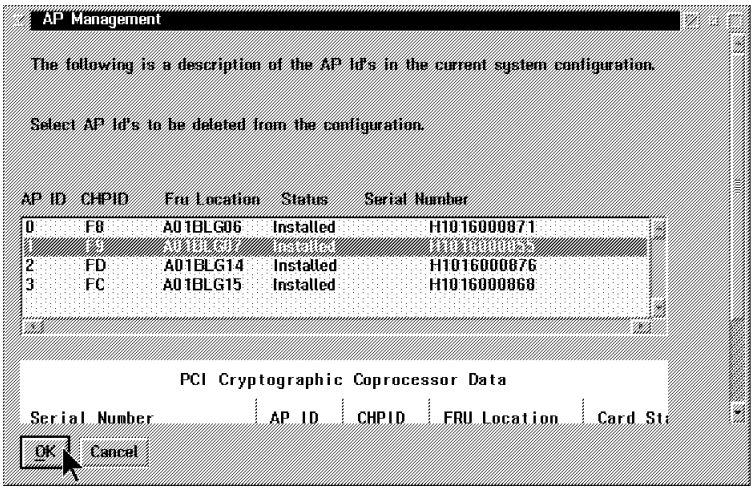
Go to step 4.

4

On the first AP Management window:

- Select the removed card from the menu list.
- Select **OK**.

Go to step 5.



5

On the second AP Management window:

- Check that the correct card was selected.
- Select **Confirm**.

Go to step 6.

6

The third AP Manager window indicates that the update is successful.

If the update is not successful, a message window provides details about the failure.

- Select **OK**.

Procedure is complete

Appendix A. Locations

This chapter provides an overview of the models, and shows how to determine FRU locations within the system.

Model Overview

This manual covers G5 and G6 Enterprise Servers type 9672. All models of these use Module on Board (MOB) technology with processor modules mounted directly on the logic board.

All models contain Processing Units (PUs) used as Central Processors (CPs) and System Assist Processors (SAPs). Each model has a “standard” configuration of CPs and SAPs. The configuration can be modified for I/O intensive workloads and to add Integrated Coupling Facilities (ICFs). When modified, the PUs normally used as CPs are reconfigured as SAPs or (ICFs).

“Model Summary” on page A-2 summarizes the products. “Overview of System Configurations” on page A-6 shows some of the possible frame configurations. For locations within the frames, refer to the material starting at “Locations in the Frames” on page A-7.

Model Summary

Model Summary for the Model R06

The R06 models can be either two-bus or four-bus. There are no CPs, the PUs are specified as Integrated Coupling Facilities (ICFs).

Model Summary for 9672 G5 Models RA6 through YX6

Table A-1 on page A-3 summarizes the 9672 Generation 5 general purpose models.

Model Summary for 9672 G6 Models X17 through ZZ7

Table A-2 on page A-4 summarizes the 9672 Generation 6 general purpose models.

Table A-1. CP, SAP, and ICF CP assignments for S/390 G5 Servers

Model	Initial Configuration w/o ICF	Initial Configuration w/ ICF	Optional Orderable SAPs w/o ICF	Optional Orderable ICFs
RA6	CssssS	CsFssS	0	3 (see note 5)
R16	CssssS	CsFssS	0	3 (see note 5)
RB6	CCsssS	CCFssS	1	2 (see note 5)
R26	CCsssS	CCFssS	1	2 (see note 5)
RC6	CCCssS	CCCFsS	1 (see note 4)	1 (see note 5)
RD6	CCCCsS	N/A	0 (see note 4)	0 (see note 5)
R36	CCCs sssS	CCCs ssFS	2	3 (see note 5)
R36 w/ FC 7990	CCCsss ssssssS	CCCsss ssssFs	2	7 (see note 5)
R46	CCCC sssS	CCCC ssFS	2 (see note 4)	2 (see note 5)
R46 w/ FC 7990	CCCCss ssssssS	CCCCss ssssFS	3	6 (see note 5)
R56	CCCC ssCS	CCCC sCFS	1	1 (see note 5)
R56 w/ FC 7990	CCCCCs ssssssS	CCCCCs ssssFS	4	5 (see note 5)
R66	CCCC sCCS	N/A	0	0 (see note 5)
R66 w/ FC 7990	CCCCCC ssssssS	CCCCCC ssssFS	4 (see note 4)	4 (see note 5)
R76	CCCCCC sssCSS	CCCCCC ssCFSS	2 (see note 4)	2 (see note 5)
R86	CCCCCC ssCCSS	CCCCCC sCCFSS	1 (see note 4)	1 (see note 5)
R96	CCCCCC sCCCSS	N/A	0 (see note 4)	0 (see note 5)
RX6	CCCCCC CCCCSS	N/A	0	0
T16	Csssss ssssssS	Csssss sssFSS	0	8 (see note 5)
T26	CCssss ssssSS	CCssss sssFSS	0	7 (see note 5)
Y16	Csssss ssssSS	Csssss sssFSS	0	8 (see note 5)
Y26	CCssss ssssSS	CCssss sssFSS	0	7 (see note 5)
Y36	CCCsss ssssSS	CCCsss sssFSS	1	6 (see note 5)
Y46	CCCCss ssssSS	CCCCss sssFSS	2	5 (see note 5)
Y56	CCCCCs ssssSS	CCCCCs sssFSS	3	4 (see note 5)
Y66	CCCCCC ssssSS	CCCCCC sssFSS	3 (see note 4)	3 (see note 5)
Y76	CCCCCC sssCSS	CCCCCC ssCFSS	2 (see note 4)	2 (see note 5)
Y86	CCCCCC ssCCSS	CCCCCC sCCFSS	1 (see note 4)	1 (see note 5)
Y96	CCCCCC sCCCSS	N/A	0 (see note 4)	0 (see note 5)
YX6	CCCCCC CCCCSS	N/A	0	0

Notes:

1. The CPs are identified by the “C”s in the table. The assigned SAPs are identified by the “S”s in the table. The spare PUs are identified by the “s”s in the table. The ICFs are identified by the “F”s in the table.

   CPs which have been defined as ICFs in LPAR mode are not available for reassignment as SAPs.

2. The following limitation exists for the SAPs:

   ```
   # SAPs ≤ # CPs
   AND
   # SAPs ≤ # used Self Timed Interfaces (STIs)
   ```

3. The processor positions shown above are based on physical PU numbers. The CP addresses for the CPs will always start at 0 and ascend in continuous sequential order.

4. One additional orderable SAP available through utilization of the spare PU, effective 3/99.

5. Maximum number of ICFs will be increased by 1, through utilization of the spare PU, effective 3/99.

Table A-2 (Page 1 of 2). CP, SAP, and ICF assignments for S/390 G6 servers

Model	Base	with ICF	With Extra SAP	With 2 Extra SAPs/ICFs	With 3 Extra SAPs/ICFs	With 4 Extra SAPs/ICFs
X17	csssssss KssssSX	csssssss KsssFSX	------- -------	csssssss Kss21SX	csssssss Ks321SX	csssssss K4321SX
X27	ccsssss KKsssSX	ccsssss KKssFSX	------- -------	ccsssss KKs21SX	ccsssss KK321SX	ccssss4 KK321SX
X37	ccCs--- KKSX---	ccCF--- KKSX---	ccCS--- KKSX---	cC21--- KKSX---	ccCssss KK321SX	ccCsss4 KK321SX
X47	ccCC--- KKSX---	cCCF--- KKSX---	cCCS--- KKSX---	ccCCsss KKs21SX	ccCCsss KK321SX	ccCCss4 KK321SX
X57	cCCS--- KKCX---	ccCCsss KKCsFSX	ccCCsss KKCsSSX	ccCCsss KKC21SX	ccCCss3 KKC21SX	ccCCs43 KKC21SX
X67	ccCCCss KKCssSX	ccCCCss KKCsFSX	ccCCCss KKCsSSX	ccCCCss KKC21SX	ccCCCs3 KKC21SX	ccCCC43 KKC21SX
X77	ccCCCss KKCCsSX	ccCCCss KKCCFSX	ccCCCss KKCCSSX	ccCCCs2 KKCC1SX	ccCCC32 KKCC1SX	cCCC432 KKCC1SX
X87	ccCCCCs KKCCsSX	ccCCCCs KKCCFSX	ccCCCCs KKCCSSX	ccCCCC2 KKCC1SX	cCCCC32 KKCC1SX	CCCC432 KKCC1SX
X97	ccCCCCs KKCCCSX	ccCCCCF KKCCCSX	ccCCCCS KKCCCSX	cCCCC21 KKCCCSX	CCCC321 KKCCCSX	
XX7	ccCCCCC KKCCCSX	cCCCCCF KKCCCSX	cCCCCCS KKCCCSX	CCCCC21 KKCCCSX		
XY7	cCCCCCS KKCCCCX	CCCCCFS KKCCCCX	CCCCCSS KKCCCCX			
XZ7	CCCCCCS KKCCCCX					
Z17	csssssss KssssSX	csssssss KsssFSX	------- -------	csssssss Kss21SX	csssssss Ks321SX	csssssss K4321SX
Z27	ccsssss KKsssSX	ccsssss KKssFSX	------- -------	ccsssss KKs21SX	ccsssss KK321SX	ccssss4 KK321SX
Z37	ccCssss KKsssSX	ccCssss KKssFSX	ccCssss KKssSSX	ccCCsss KKsssSX	ccCssss KK321SX	ccCsss4 KK321SX
Z47	ccCCsss KKsssSX	ccCCsss KKssFSX	ccCCsss KKssSSX	ccCCsss KKs21SX	ccCCsss KK321SX	ccCCss4 KK321SX
Z57	ccCCsss KKCssSX	ccCCsss KKCsFSX	ccCCsss KKCsSSX	ccCCsss KKC21SX	ccCCss3 KKC21SX	ccCCs43 KKC21SX
Z67	ccCCCss KKCssSX	ccCCCss KKCsFSX	ccCCCss KKCsSSX	ccCCCss KKC21SX	ccCCCs3 KKC21SX	ccCCC43 KKC21SX
Z77	ccCCCss KKCCsSX	ccCCCss KKCCFSX	ccCCCss KKCCSSX	ccCCCs2 KKCC1SX	ccCCC32 KKCC1SX	cCCC432 KKCC1SX
Z87	ccCCCCs KKCCsSX	ccCCCCs KKCCFSX	ccCCCCs KKCCSSX	ccCCCC2 KKCC1SX	cCCCC32 KKCC1SX	CCCC432 KKCC1SX
Z97	ccCCCCs KKCCCSX	ccCCCCF KKCCCSX	ccCCCCS KKCCCSX	cCCCC21 KKCCCSX	CCCC321 KKCCCSX	
ZX7	ccCCCCC KKCCCSX	cCCCCCF KKCCCSX	cCCCCCS KKCCCSX	CCCCC21 KKCCCSX		
ZY7	cCCCCCS KKCCCCX	CCCCCFS KKCCCCX	CCCCCSS KKCCCCX			
ZZ7	CCCCCCS KKCCCCX					

Table A-2 (Page 2 of 2). CP, SAP, and ICF assignments for S/390 G6 servers

Model	Base	with ICF	With Extra SAP	With 2 Extra SAPs/ICFs	With 3 Extra SAPs/ICFs	With 4 Extra SAPs/ICFs

Notes:

1. Legend:
   - K = crypto CP
   - C = CP
   - X = XSAP
   - S = other SAP
   - F = ICF
   - c = crypto spare
   - s = other spare
   - 1 = 1st spare to assign as additional SAP/ICF
   - 2 = 2nd spare to assign as additional SAP/ICF
   - 3 = 3rd spare to assign as additional SAP/ICF
   - 4 = 4th spare to assign as additional SAP/ICF

   CPs which have been defined as ICFs in LPAR mode are not available for reassignment as SAPs.
2. The following limitation exists for the SAPs:

   ```
   # SAPs ≤ # CPs (except on X17 & Z17)
   ```

   AND

   ```
   # SAPs ≤ # used Self Timed Interfaces (STIs)
   ```

3. The processor positions shown above are based on physical PU numbers.

Overview of System Configurations

This section shows some frame configurations used in the systems.

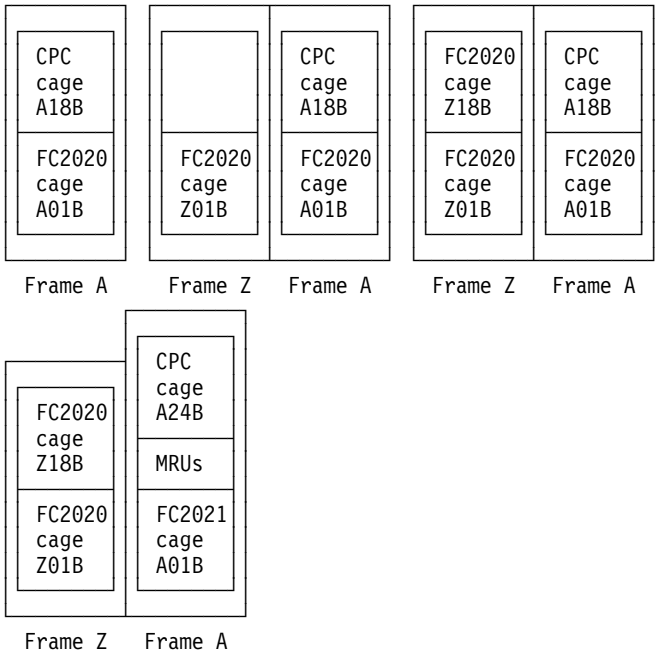


Figure A-1. Examples of some of the possible frame configurations for G5 models

Notes:

1. Top row shows the G5 general purpose models without refrigeration (RA6 to RX6, T16, and T26). CPCs are always at A18B, expansion cages are all FC 2020 and are at x01B or x 18B, where x is the frame.
2. Lower row shows G5 models with refrigeration units (models Y16 to YX6) and all G6 models. CPC is at A24B, the Modular Refrigeration Units (MRUs) are below the CPC. Expansion cage FC 2021 is required in position A01B under the MRUs. Optional expansion cages (FC2020) can be at Z01B and Z18B.
3. The R06 models have only two configurations, a CPC at A18B and a 2020 expansion cage at A01B with an optional 2020 expansion cage at position 01B of frame Z.

Locations in the Frames

The location of components in the system is identified using part or all of the following 12-character code:

Field 1	Field 2	Field 3
anna	aann	aann

Where 'a' represents an alphabetic character and 'n' represents a numeric character.

Field 1 contains a one-character frame identifier, a two-digit vertical position identifier, and a one-character horizontal position identifier. The vertical and horizontal location is referred to as “Unit.” Frame is described in “Frame,” and unit is described in “Unit.”

Field 2 contains a two-character code to identify the component type followed by two numeric characters to identify the value.

Field 3 is used when further information about Field 2 is required. It also uses a two-character code to identify the component type followed by two numeric characters to identify the value. The codes for Field 2 and Field 3 are defined in “Field 2 and 3 Location Codes” on page A-8.

Additional symbolic location designations are used for system components that cannot be described using the 12-digit scheme or that are outside of the frame. These are defined in “Locations Outside of Grid” on page A-9.

Frame

Each frame string has a unique serial number which applies to all frames and CPC in the string. The frame with the CPC is always frame A. New frames are added to the left of the frame A and are designated by going backward through the alphabet (X-Y-Z-A).

Examples of frame locations are given in: Figure A-1 on page A-6.

Unit

The unit is a three-digit code to specify the vertical and horizontal position of a component within a frame. Unit identifies the position of a component's lower left hand corner (when viewed from the front of the frame).

The first two digits specify the height from the bottom of the rack in Electronic Industries Association (EIA) units.

Note: One EIA unit is 44.45 mm (1.75 inches).

The next digit specifies horizontal position by an alphabetic character (excluding I and O). Positions A through M are at the front of the frame, positions N through Z are at the rear. The horizontal position is used to locate components that are not the full width of the frame (do not start at “A.”) Locating strips inside of the frame show the horizontal and vertical positions. Figure A-2 on page A-8 shows the horizontal positions.

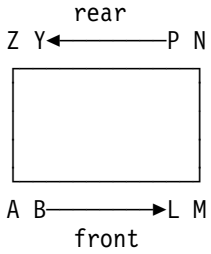


Figure A-2. Horizontal frame positions (viewed from top of frame).

Different methods are used for specifying the locations of components in the frame subsystem. CPC and expansion cage card connector locations are expressed as:

```
Frame: _ Unit: ___ Card: __ Jack: __
```

Card

Card uses two numeric digits to specify the location of a logic card in a unit. For card locations in the processing unit, refer to Figure A-11 on page A-17.

Jack

Jack uses one to three numeric digits to specify a jack or plug position on a card. The jacks are numbered from top to bottom but the location and number of jacks depends on the card.

Field 2 and 3 Location Codes

The codes for Field 2 and Field 3 are:

AA01	Central Processor Complex housing or logic board (support element and Hardware Management Console)
AA02-AA03	Second and third logic boards in a cage
AMnn	Air moving device
BAnn	Battery (for crypto feature - mounted on DCA)
C.nn	Capacitor
CAnn	Cable
CBnn	Circuit breaker
CSnn	Logic card
D1nn	Coupling facility channel link card upper (nn indicates adapter card slot)
D2nn	Coupling facility channel link card lower (nn indicates adapter card slot)
DCA1-DCA3	Distributed Converter Assemblies (DCA)
F.nn	Fuse
J.nn	Jack
K.nn	Relay
LAnn	Lamp/light/indicator
LGnn	Logic card (nn indicates slot)
LPnn	Light panel (“hot plug” indicator)
PLnn	Panel
P.nn	Plug
PSnn	Bulk power supply, DCA card, UPC card
R.nn	Resistor
SWnn	Switch
SWnn	Switch
SWnn	Switch
TBnn	Terminal block

TR0n	Terminator (internal disk subsystem)
T.nn	Transformer
UPnn	Unit panel (CPC)

Locations Outside of Grid

Some of the system components are outside of the frame location grid. These components are assigned fixed unit locations. The fixed unit locations are:

Unit A00M	Hardware Management Console
Unit A99S	Support element (upper support element if alternate support element is installed)
Unit A99B	Lower support element (only used with alternate support element)
Unit EPOX	UEPO Card (upper or lower)
Unit FCPX	Frame power switch (frame A only)
Unit x22N	First I/O Power Sequence Controller (front of frame "x")
Unit x22M	Second I/O Power Sequence Controller (front of frame "x")
LAN_CONNECTOR_DEVICE	MSAU

FRU lists containing FRUs in the Hardware Management Console and support elements use character strings following the fixed location identifier.

```
A00M_3270_ADAPTER

A99S_FIXED_DISK
```

The two examples indicate the 3270 feature card in the Hardware Management Console and the fixed drive in the support element.

Cable Location Labels

System cables have a label on each end to specify where they attach to the system. The labels use R, U, C, and J fields for frame, unit, card, and jack. Figure A-3 shows an example of a label.

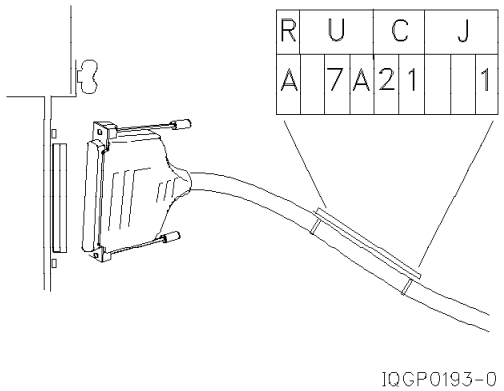


Figure A-3. Label on a system cable.

Front View of System in Frame

This section shows the locations of the major components in a frame. The method for locating other components within the frame starts at “Locations in the Frames” on page A-7.

Figure A-4 shows an example of the front view of a frame with a G5 Server. Special configurations are: 9672 models with refrigeration units (see Figure A-5 on page A-11)..

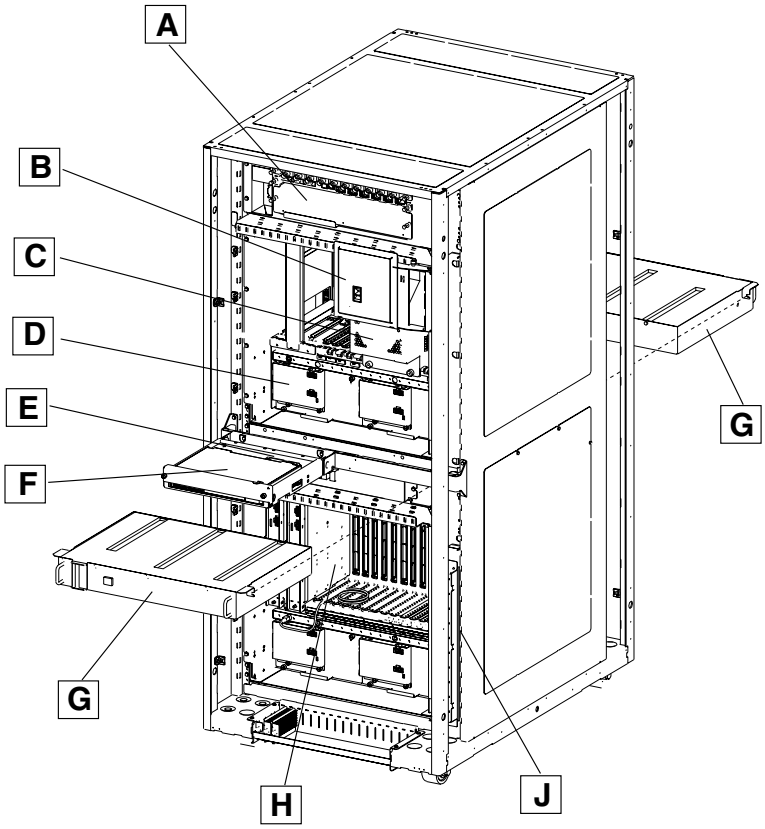


Figure A-4. Front of frame showing major units.

The major components are:

(A) Bulk Power Assembly (BPA) - front or “A” side
(B) Frame UEPO switch and card - location EPOX
(C) Central Processing Complex (CPC) - location A18B
(D) Air Moving Devices (AMDs) - AM01 left, AM02 right
(E) Support Element Power Converter - location SEPC
(F) Support Element - location A99S

Note: Single support element model shown. For alternate support element feature the locations are A99S for the upper support element and A99B for the lower.

(G) Integrated Battery Feature (IBF) - A15BIBF1 (front), A15PIBF2 (rear).
(H) I/O cage (FC 2020) - location A01B
(J) Multistation Access Unit (MAU), location LAN_CONNECTOR_DEVICE

9672 Models With Refrigeration Units - Front View

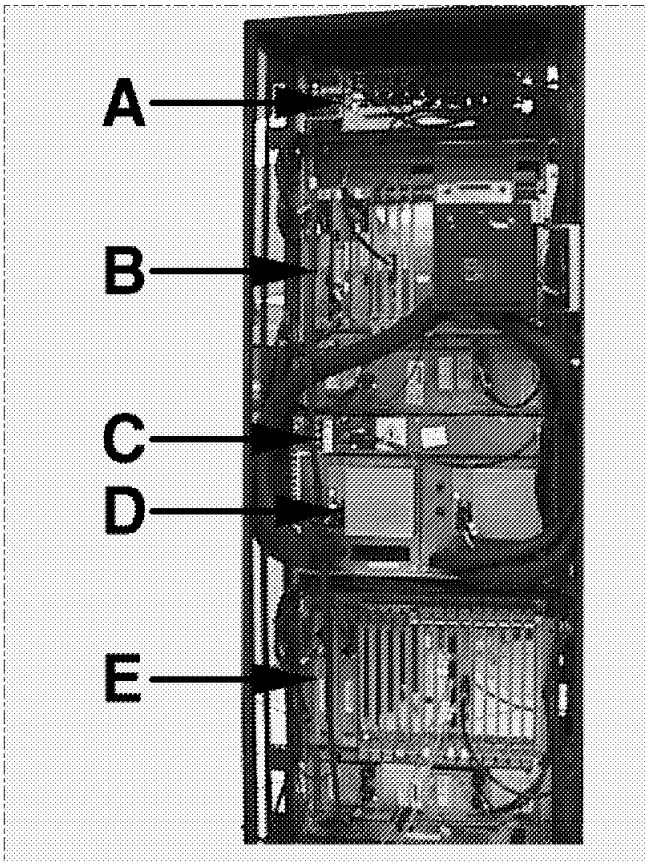


Figure A-5. Front of 9672 model with refrigeration units

The major components are:

(A) Bulk Power Assembly (BPA) - front side is A38B rear side is A38P
(B) Central Processing Complex (CPC) - location A24B

Note: All 9672 models use a ThinkPad support element, it is not shown in the picture

(C) Integrated Battery Feature (IBF) - A22BIBF1 (front), A22PIBF2 (rear).
(D) Modular Refrigeration Units (MRU) - A16B (left), A16G (right)
(E) I/O Expansion cage FC2021 - A01B

Note: The desiccant container (A24B_DESICCANT) is shown in “Refrigeration Desiccant Container” on page A-13.

Location of System Filters

Figure A-6 shows the positions of the filters in the CPC (2 filters) and the 2020 or 2021 expansion cage (1 filter). The filters should be checked on every service call or at least once a year. The filters can be changed without disrupting customer operation.

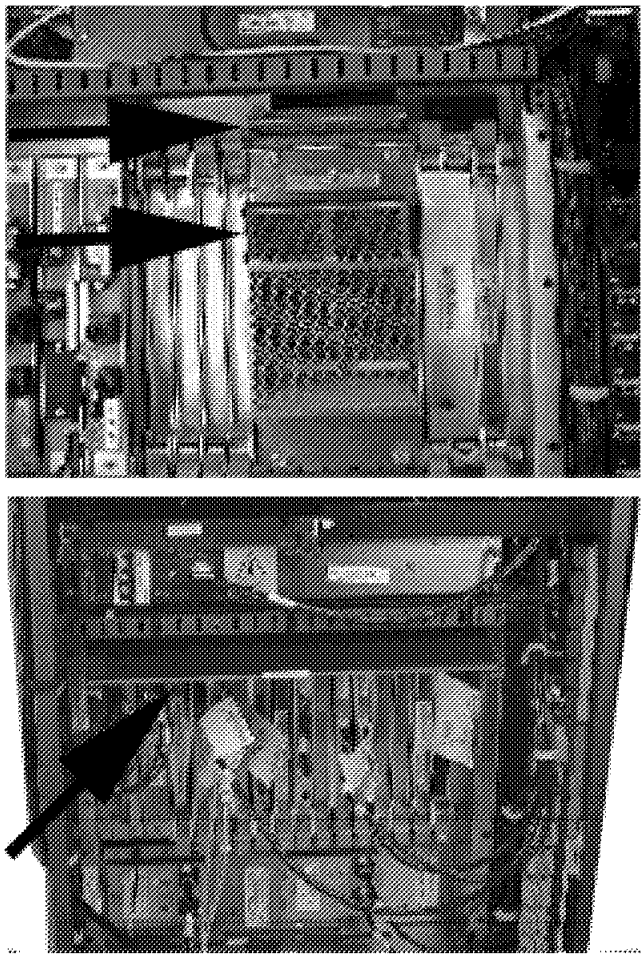


Figure A-6. Filters in CPC and expansion cage

Refrigeration Desiccant Container

The desiccant container for 9672 models with refrigeration systems is shown in figure Figure A-7. The container is located at the rear of the CPC, below the logic cards. The desiccant material can be seen through the inspection window. The normal color of the desiccant is blue, exchange the container if any pink color shows in the material. To exchange, use the procedure in “Exchanging FRUs” on page 6-16, exchange the FRU identified as A24B_DESICCANT.

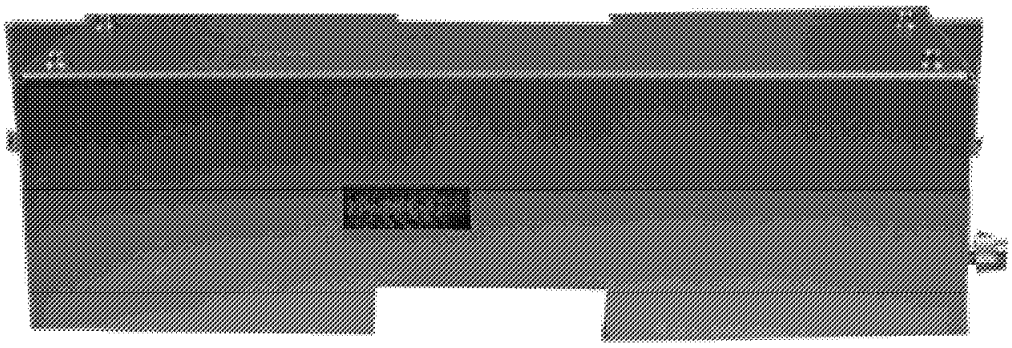


Figure A-7. Desiccant container for 9672 models with MRUs (at the rear of the CPC).

Locations of Ports on Channel and ETR Adapter Cards

Figure A-8 shows where the ports and indicators are located on channel and ETR cards. Ports and indicators on OSA adapter cards are shown in “OSA-2 Cards” on page 11-5. Ports and indicators on FICON channel cards are shown in “Information for FICON Feature” on page 7-37.

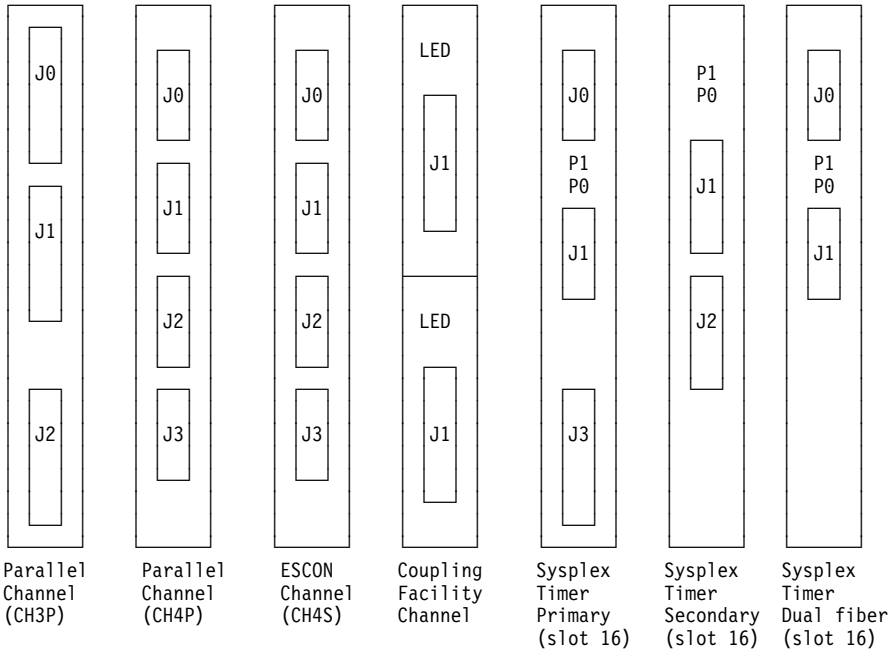


Figure A-8. Port locations on channel and ETR cards

Examples of Frame Locations

Figure A-9 shows how Field 1 specifies the locations of the CPCs or expansion cages in the upper and lower frame locations. The units are identified by the position of the lower left-hand corner (when viewed from the front of the frame). The two examples are:

(A) Upper unit location A18A
(B) Lower unit location A01A

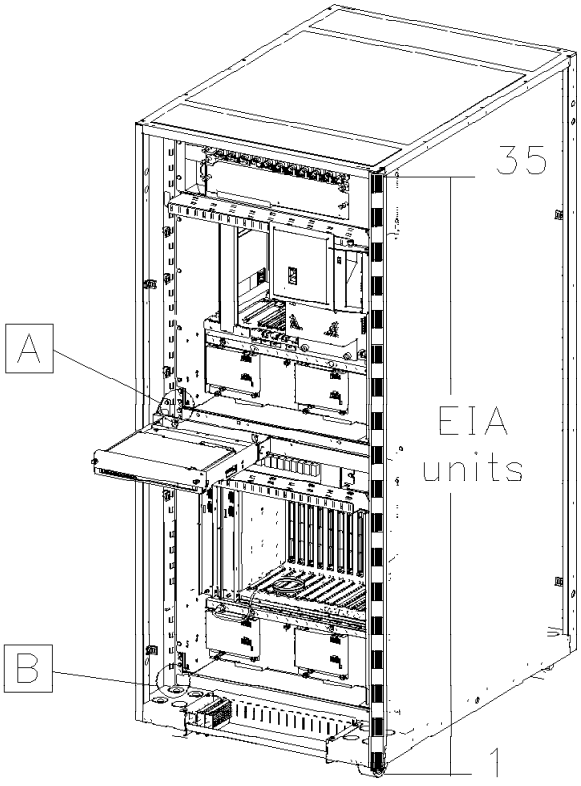
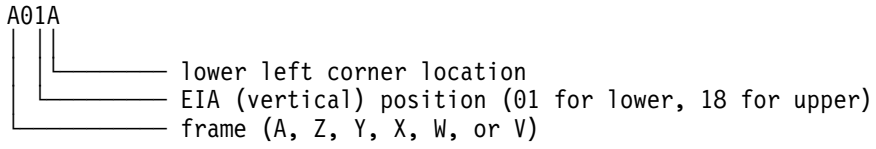


Figure A-9. Front of frame showing CPC and lower expansion cage.



Bulk Power Assembly (BPA)

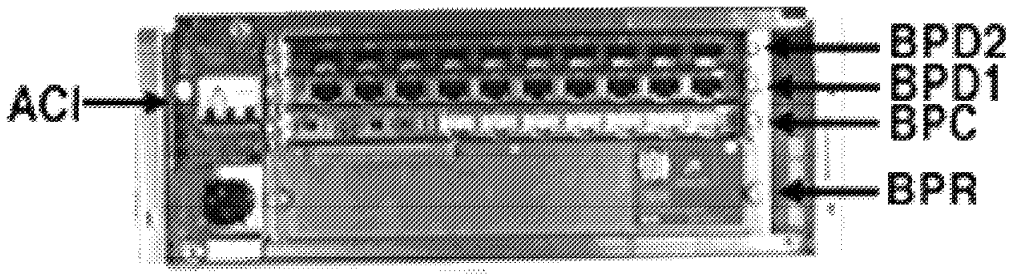


Figure A-10. Locations on the BPA

The BPA used is on top of the CPC. It has two identical sides. Side "A" is in the front of the frame, side "B" is in the rear. Some of the BPA FRUs are identified by Problem Analysis as PSxx. The following table shows the meanings of the FRU identifiers shown in Figure A-10 and how the FRUs are identified by Problem Analysis.

Symbol Shown	Function	Location Code Used
ACI	AC Input - "A" side	AxxBACIA
	AC Input - "B" side	AxxBACIB
BPD2	Bulk Power Distributor - "A" side	AxxBPS01
	Bulk Power Distributor - "B" side	AxxBPS15
BPD1	Bulk Power Distributor - "A" side	AxxBPS02
	Bulk Power Distributor - "B" side	AxxBPS14
BPC	Bulk Power Controller - "A" side	AxxBPS03
	Bulk Power Controller - "B" side	AxxBPS13
BPR	Bulk Power Regulator - "A" side	AxxBPS04
	Bulk Power Regulator - "B" side	AxxBPS10

Note: The BPA FRUs are assigned the location of the CPC. Example: the "B" side BPD2 location is A24BPS15 for model YX6, A18BPS15 for all other models.

The Bulk Power Distributors (BPD1 and BPD2) are added when required by the system configuration.

FRU Locations in CPC and Expansion Cages

This section has FRU information for the following CPCs and expansion cages:

- CPC for two-bus models: “CPC Locations in Two-Bus Models”
- CPC for four-bus models: “CPC Locations in Four-Bus Models” on page A-18
- “CPC Locations in Two-Bus Models”
- “Expansion Cages FC2020 and FC2021” on page A-19
- “Bulk Power Assembly (BPA)” on page A-16

CPC Locations in Two-Bus Models

Figure A-11 shows the location of cards plugged in the two-bus CPCs.

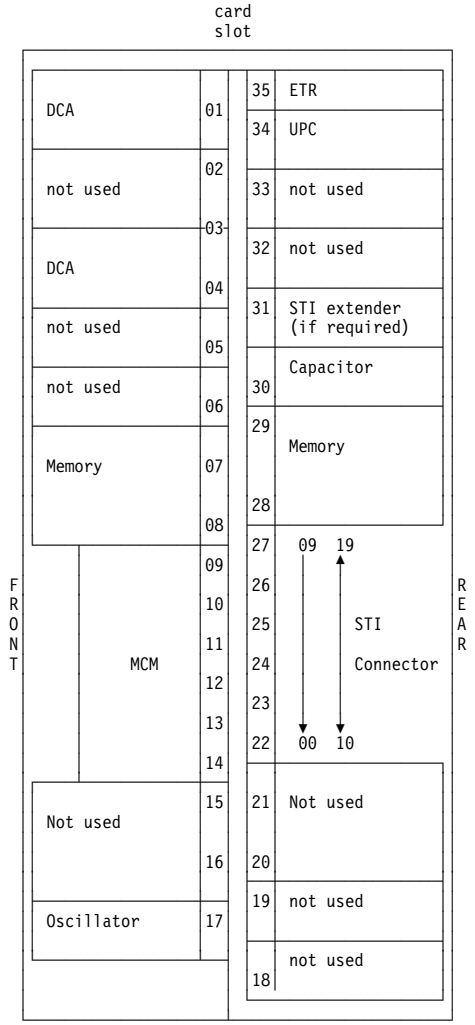


Figure A-11. Card layout for CPC on two-bus models

CPC Locations in Four-Bus Models

Figure A-11 on page A-17 shows the location of cards plugged in the four-bus CPCs.

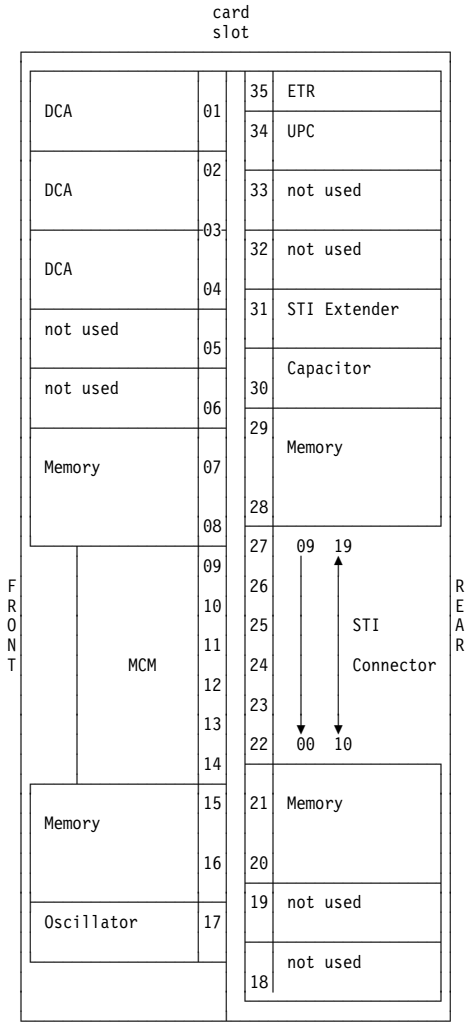


Figure A-12. Card layout for CPC on four-bus models

Expansion Cages FC2020 and FC2021

Figure A-13 on page A-20 shows the location of cards plugged in the feature code 2020 and feature code 2021 I/O expansion cages.

Notes:

1. Expansion cages attached to 9672 RA6 through YX6 G5 models and all G6 models support OSA-2, ESCON and parallel channels cards in all the I/O slots.
2. Expansion cages attached to RA6 through YX6 G5 models and all G6 models support FICON and Gigabit Ethernet cards in slots 31, 6, 32, 7, 33, 8, 34, and 25.
3. Expansion cages attached to RA6 through YX6 G5 models and all G6 models also support coupling facility channel (CFCA) cards in slots 34, 33, 6, 29, 28, 10, 21, 18, and 17. CHA cards are not required if only coupling facility channel cards are plugged in the slots the CHA cards support
4. Expansion cages attached to R06 models support only coupling facility channels in the I/O slots, no CHA cards are used
5. The FIBB card in slot 12 supports the channel driver cards in slots 9 and 24.
6. The FIBB card in slot 13 supports the channel driver cards in slots 16 and 23.
7. The FIBB card in slot 5 supports the channel driver cards in slots 4 and 30.
8. The channel driver card (CHA) in slot 24 supports cards in slots 10, 11, 25, and 26
9. The channel driver card (CHA) in slot 23 supports cards in slots 14, 15, 21, and 22
10. The channel driver card (CHA) in slot 9 supports cards in slots 8, 27, 28, and 29
11. The channel driver card (CHA) in slot 16 supports cards in slots 17, 18, 19, and 20
12. The channel driver card (CHA) in slot 4 supports cards in slots 31, 32, 33, and 34
13. The channel driver card (CHA) in slot 30 supports cards in slots 6, and 7

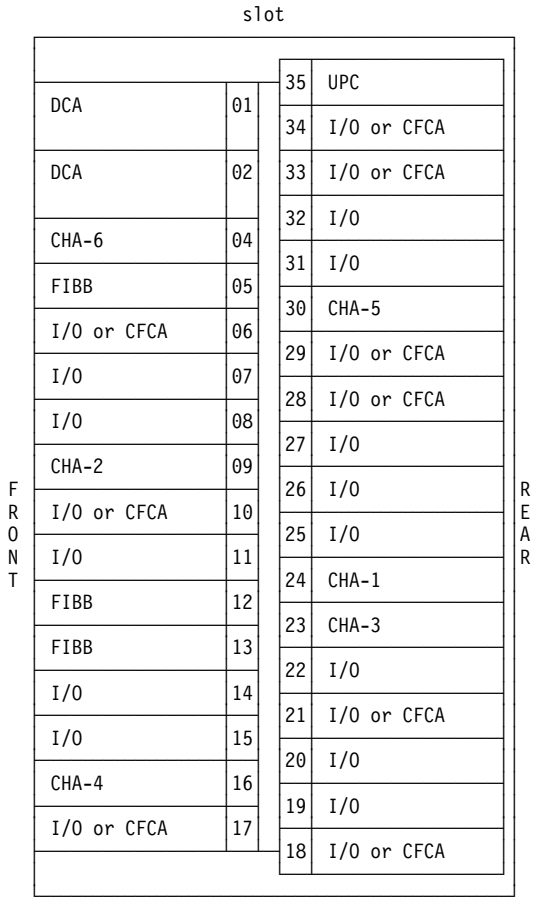


Figure A-13. Card layout for features 2020 and 2021 expansion cages.

Appendix B. System Editor Functions

This section has the information on the editor used for internal code fixes and remote entry of IOCDS. An example of the editor window is shown in Figure B-1. The configuration of the menu bar and pull-down choices depends on user mode and the task selected. A description of how to use the editor window is given below.

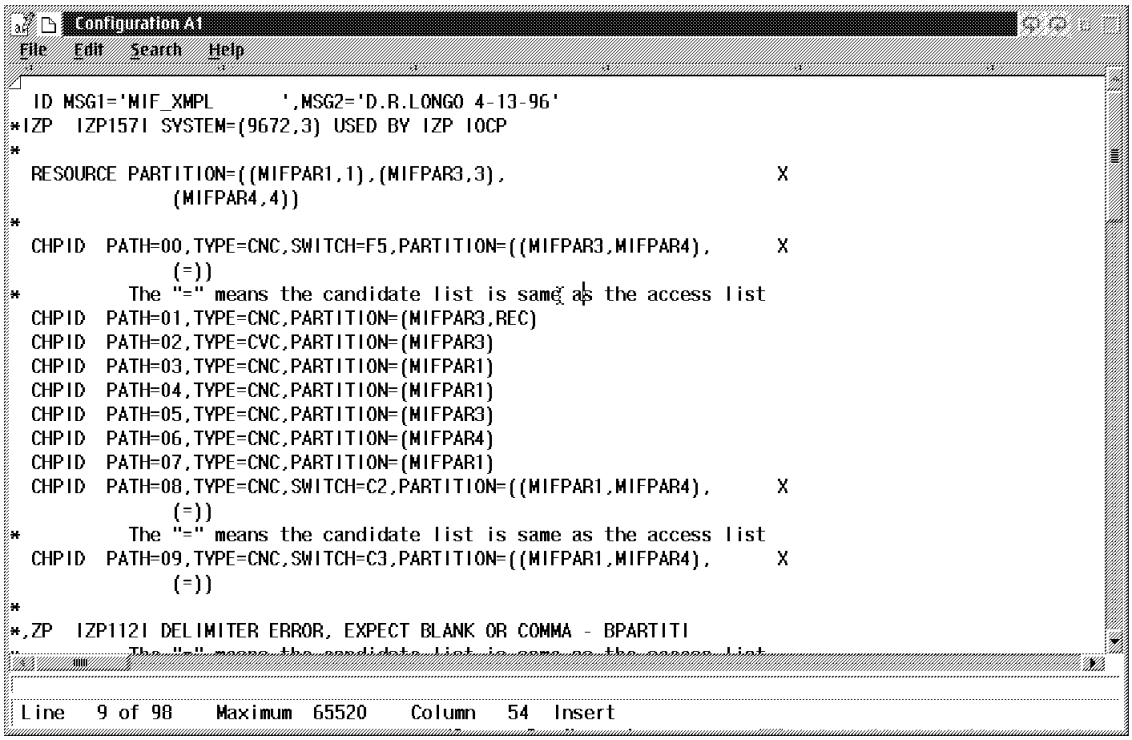


Figure B-1. Edit window example showing IOCP source file.

Action Bar: The second line of the edit window contains action bar items used for editing. Select an menu bar item by pointing the mouse cursor at the item and “clicking” the left-hand mouse button. Select the pull-down choices in the same way. Most of the pull-down items do the same function as combinations of keys. The common key combinations are listed in “Keyboard Operation” on page B-2.

Information Line: The third line of the edit window contains information about the line the cursor is on and the length of the file you are editing.

Scale: The next line contains a horizontal scale to identify cursor position. Note that the character size used to display the file may not be the same as the scale. If necessary, use the → and ← keys to move the cursor and count the positions.

Identifier: The next line contains the identifier for the file being edited. The first line of the file follows the identifier.

Keyboard Operation

The common key operations for the editor are listed below.

Function	Action
Add (Insert) a line	Position the cursor at the previous line and press **Alt+F1**
Insert mode	**Insert** (The cursor displays as a ■.)
Reset Insert mode	**Insert** (The cursor displays as a _.)
Delete a character	Position cursor on character and press **Delete**.
Mark a line	Position cursor on line and press **Alt+F2**. A > displays next to the marked line.
Unmark a line	Position cursor on marked line and press **Alt+F3**.
Mark a block of lines	Position cursor on each line of group and press **Alt+F2**. A > displays next to each marked line.
Copy marked area	Use Mark a line or Mark a block of lines, then move the cursor to the upper left corner for new block and press **Shift+F9**.
Move marked area	Use Mark a line or Mark a block, then move the cursor to the upper left corner of new position and press **Alt+F11**.
Delete marked area	Use Mark a line or Mark a block, then press **Alt+F12**.
Search	**Shift+F2** then type in the string of characters you want to search for on the window displayed. and select **Enter**. The cursor is positioned at the next character string that is the same as the one you specified.
Find Next	After a search, press **Shift+F4** to find the next string of characters that is the same as the one you specified.
File (Quit and Save)	**F9**
Quit (No change to file.)	**F3**

Scrolling the Edit Panel

The length of the file may exceed the amount of information that can be displayed at one time. To scroll an entire window of information at a time, use **F7** and **F8**.

Appendix C. Tools

This section has information on special tools required to maintain the 9672 Parallel Servers.

Tools Shipped With System

Setup Aid for MAU

The following tool is required to reset the relays in the MAU:

Tool	Part Number
Setup aid	6091004

Channel Wrap Connectors

The following wrap connectors are required to run channel wrap tests:

Tool	Part Number
Coupling facility channel (feature 007)	81G3185
Coupling facility channel (feature 008)	78G9610 or 86F1180
ESCON channel (feature 2313)	5605670
Duplex connector for ESCON cable	31G9177
Parallel channel (OEMI cables)	5547283
Parallel channel (78 pin "D" cables)	6473024
Integrated Cluster Bus (ICB)	51H8807
FICON (LX)	78G9610
FICON (LX)	78G9610

Sysplex Timer Wrap Connector

The following wrap connector is required to run sysplex timer (ETR) wrap tests:

Tool	Part Number
Sysplex Timer wrap	5605670

OSA Wrap Connectors

The following wrap connectors are required to run wrap tests on the OSA extender and OSA adapter cards:

Tool	Part Number
FDDI for OSA-2	16G5609
Ethernet AUI connector	71F1167
Ethernet UTP connector	00G2380
Token-Ring for OSA-2	08J5792
ATM for OSA-2 Multimode (feature 5204)	16G5609 or 21H3547
ATM for OSA-2 Single mode (feature 5205)	16G5609 or 78G9610 or 86F1180 or 21H3547
Fast Ethernet	00G2380
Gigabit Ethernet Singlemode	16G5609
Gigabit Ethernet Multimode	97H7526

Tools for Removal of a Multichip Module (MCM)

The following tools are required to remove the MCM. They are found in B/M 07H6958.

Tool	Part Number
ESD Kit	6428316
Lint free cloth	2108930
MCM pin gauge	10G8357
MCM cam tool	54H4217
MCM cam checking gauge	1726757
MCM handle	7333093
MCM pin aligner	2360424
MCM carrier	7333835
MCM cushion	7333160
Sleeve	4154955

The following additional tools are required to remove the MCM. They are found in B/M 08J5797.

Tool	Part Number
Sleeve	08J5630
Clutch (50 inch pounds)	08J5798
Ratchet (3/8 inch)	6428140
Hex rod (3/8 inch)	6422725
Thermal oil applicator	83F7906
Alcohol pad	9900679
Screw packet	07H0182

Tools for Modular Cooling Unit (MCU)

The following tools and supplies are required for the MCU. They are shipped in B/M 21L2446.

Tool	Part Number
Evaporator plug	21L3584
Desiccant pack (small)	21L2438
Desiccant pack (large)	21L2439
Fitting insulator covers	21L2441
Seal verification tool	21L2442
Insulator	21L2443
Needle valve cap	21L2445
Refrigeration line wrench	21L2687

The desiccant canister is ordered and exchanged as a FRU. For the part number, refer to *Parts Catalog*, S123-1152.

Other Tools Shipped

The following tools are shipped with the system. They are shipped in the following B/Ms: 92G9939, 07H6837, and 07H6838.

Tool	Part Number
Screwdriver, cable	4437445
Socket adapter (1/4" to 3/8")	2108746
Torque wrench, adjustable	5449944
Torque tool	6422789
T10 Torx driver	47H0182

Additional Tools Required

Tools for Removal of a CPC or Expansion Cage

The following tools are required to remove the cages.

Tool	Part Number
Cage lift tool	48G7150
Leveling pad	07H5184

The cage lift tool and leveling pad are shipped with the Bill of Material (B/M) for a replacement CPC or expansion cage.

Optical Measurements

Note: For a complete listing of tools and tool kits required for optical power measurement, refer to Technical Services Letter (TSL) 147.

Combined tool kit part number 46G6839 contains the basic optical power measurement tools as well as the adapters necessary to test ESCON channels and ETR.

Tool	Part Number
Multimode wrap plug extraction tool	02G4958
ESCON duplex test cable	02G4982
LED optical source module	02G6154
Laser optical source module	02G6155
Biconic adapter	02G6156
ST adapter	02G6157
FC test cable	02G6158
ST test cable	02G6159
FC coupler	02G6160
ST coupler	02G6161
Optical power source base	12G8813
Optical power meter	12G8814
ESCON duplex-biconic test cable	18F6948
ESCON duplex-duplex test cable	18F6951
Biconic coupler	18F6989
Biconic-biconic test cable	18F6990
FC adapter	31G8088
ESCON duplex coupler	42F8604
Fiber optic cleaning kit	5453521

The following tools are required for optical power measurements on coupling facility channels:

Tool	Part Number
Splitter, single-mode	54G3427
Coupler, single-mode	54G3430
Splitter, multimode	54G3426
Coupler, multimode	54G3421

The couplers and splitter required are in supplemental tool kits FBM 46G6836 (multimode) and FBM 46G6837 (single-mode).

The following tools are required for optical power measurements on the OSA-2 FDDI LAN adapters (feature 5202) and the OSA-2 ATM multimode feature (feature 5204):

Tool	Part Number
MIC coupler	92F9008
MIC-to-ST adapter	92F9009
MIC-to-FC adapter	92F9004
MIC to-MIC test cable	92F8977
FCS-to-FC adapter	46H9294
FCS-to-FCS coupler	54G3421
FCS-to-ST adapter	54G3381
FCS-to-FCS test cable	51H8620

The adapters are in FDDI Test Support Upgrade Kit (FBM 47H0160).

The following tools are required for optical power measurements on the OSA-2 ATM single-mode LAN (feature 5205) and FICON channel:

Tool	Part Number
SC-to-SC cable	54G3407
FCS-to-ST adapter	54G3424
FCS-to-FCS adapter	54G3430
FCS-to-FCS test cable	54G3409
FCS-to-FC adapter	46H9294

The adapters and manual are in ATM single-mode Upgrade Kit (FBM 51H8876).

Ground Check

The following tool is verify ground path during installation and safety inspection:

Tool	Part Number
ECOS model C7106	6428164

The CE analog meter (73G5404) can be used if the ECOS tester is not available.

ThinkPad Support Element

The following tools are used to maintain the ThinkPad support element. They are not shipped with the system. It is recommended that you add these to your tool kit:

Tool	Part Number
Tri-connector wrap plug	72X8546
PC test card	35G4703
Screwdriver kit	95F3598

Appendix D. Cage Removal

This section has information on removal and replacement of the CPC and expansion cages.

General Information

The following information is included here to give you an idea of what is required in the procedure and an approximate time to schedule the change with the customer.

Note: Do not attempt to use this information to do the actual removal and replacement of a CPC or expansion cage. Use the on-line removal/replacement information.

If you were directed to exchange a cage, ***and*** you have a problem number for the call, use the procedure in Chapter 1, "START" on page 1-1. If you were directed to exchange a cage, and there is ***no*** problem number for the call, follow the procedure in "Exchanging FRUs" on page 6-16 and select the cage identified on the menu as xxxxAA01 where xxxx is the EIA location (frame-unit) of the cage.

Tools Required

For a list of the tools required, see the following:

- "Tools for Removal of a Multichip Module (MCM)" on page C-2
- "Other Tools Shipped" on page C-2
- "Tools for Removal of a CPC or Expansion Cage" on page C-3
- "Tools for Modular Cooling Unit (MCU)" on page C-2 (If you are removing the CPC for a 9672 model with a refrigeration system)

Time Required

Actual exchange times for a cage depends on the features installed on the cage. Use an estimate of 4 to 6 hours for your planning.

Removal Steps

The following steps are required for removal of a cage:

1. Remove front and rear frame doors
2. For the CPC only: remove the power modules from the front BPA.
3. Label and remove all cables.
4. Remove all logic cards and store in an ESD container.
5. Remove the air moving devices.
6. If you are removing the CPC for a 9672 model with a refrigeration system, remove the refrigeration lines from the evaporator plate.
7. If you are removing a module on board (MOB) CPC cage, remove the MCM.
8. If you are removing the CPC cage and have a ThinkPad support element, the support element will have to be powered off here. The on-line procedure will direct you to use the printed information in "Printed Procedure for CPCs" on page D-3 to complete the removal.
9. Install the cage lift tool.
10. Remove the cage using the lift tool.
11. Remove the cage top cap from both the old and new cages.
12. Install the cage top cap on both cages.

Replacement

The replacement of the cage follows the removal steps in reverse order. In addition, you also are directed to do the following:

- Clean all fiber optic cables.
- Check for correct cage to frame grounding.

Printed Procedure for CPCs

This section contains information and procedures for removing and installing the cage for a CPC. Online information is used to start the cage removal. During the procedure you will be directed to remove the power from the support element (ThinkPad) and to continue the removal/replacement using the information here. **Use this information only when directed here from the online procedure.**

Read the following information, then go to step 1 of the procedure.

Several components must be removed from the old cage and installed on the new cage. These components are (refer to Figure D-1):

A	Inlet baffle plates (1 for module on board, 2 for card on board)
B	DCA key plates (2)
C	BPE retention brackets (4)
D	Exhaust baffle plate (1)

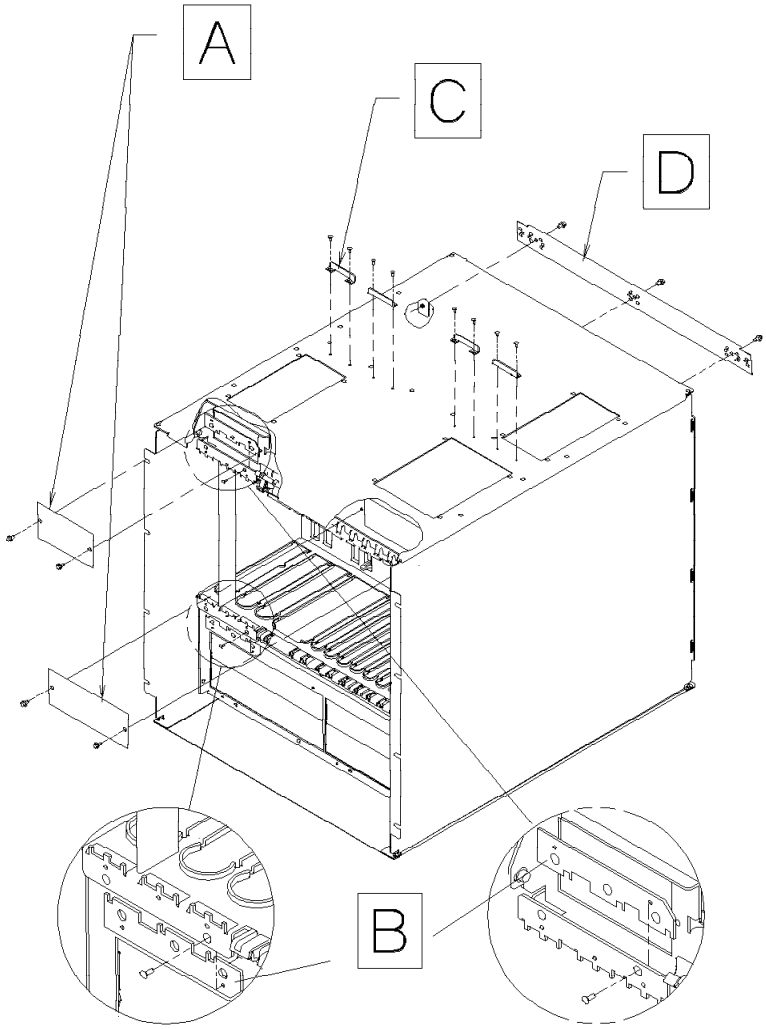
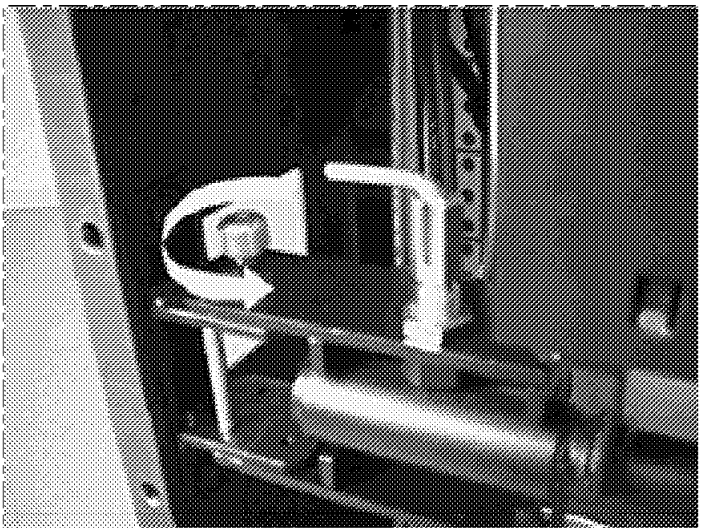


Figure D-1. CPC cage showing components that must be removed and installed on new cage.

1 Relocating the support element

- Turn the locking screw to release the support element tray.
- Swing the tray to the side of the frame.

Go to step 2.



2

Find the instructions provided for the cage lift tool. Use the instructions to install the lift tool on the frame.

Go to step 3.

3

At the front of the frame:

- Using an 8 mm socket, remove the 8 mounting bolts from the front of the cage.

Go to step 4.

4

At the rear of the frame:

- Using an 8 mm socket, remove 8 mounting bolts from the rear of the cage.
- Remove the rear cage mounting brackets.

Go to step 5.

5

Use the instructions provided with the lift tool to attach the cage and remove it from the frame.

Set the cage on the packing material shipped with the new cage.

Go to step 6.

6

Remove the following components from the old cage and install them on the new cage:

- BPE retention brackets (4)
- Exhaust baffle plate (1)
- Inlet baffle plates (2)
- DCA key plates (2)

Use the instructions provided with the lift tool to place the cage in the packing crate.

End of the removal procedure Go to step 7 for replacement instructions.

For component locations, refer to Figure D-1 on page D-3.

Note the locations of the retention plates.

A T10 Torx tool is required for the retention plates and the key plates.

7

Use the instructions provided with the lift tool to attach the new cage and remove it from the packing crate.

Note: Make sure the BPE retention brackets are installed in the same positions they were on the old cage.

Use the lift tool to place the new cage in the frame. For information, use the procedures shipped with the lift tool.

Reinstall the mounting brackets and bolts removed in steps 3 and 4.

Go to step 8.

8

Move the support element back to the normal service position.

Set the ACI-B circuit breaker to the On position. Wait until the support element completes power on reset, then log on in service mode.

When the Support Element Workplace window displays, go to “On-line CPC Service” on page 1-22 and use your **original problem number** to restart the on-line procedures which will complete the replacement of the cage.

End of printed instructions for cage removal and replacement.

Appendix E. Material Handling Precautions

This section has information on material handling precautions that must be used when working on specific products and the Material Safety Data Sheets (MSDS) for the special materials used.

For details about the characteristics and potential health hazards of the materials used, refer to the information starting at “Material Safety Data Sheets (MSDS).”

IBM Service Representatives can find MSDSs for these materials on-line at http//w3-1.ibm.com/chq/chemical/cimcam.nsf.

All Module-On-Board (MOB) Models

Synthetic oil is used in all 9672 Generation 5 and Generation 6 models to assist in conducting heat from the MCMs. Refer to the MSDS for safety precautions.

9672 Models With Refrigeration Systems

Some 9672 Generation 5 models (Example: model YX6) and all Generation 6 models have a refrigeration unit which contains R134a refrigerant and a compressor pump oil. This refrigerant must not be released or vented to the atmosphere. Skin contact with refrigerant may cause frostbite. Wear appropriate eye and skin protection. Refrigeration units are sealed and must not be opened or maintained.

The refrigeration system is pressurized, wear eye protection when disconnecting refrigeration lines.

Material Safety Data Sheets (MSDS)

MSDS are included for the following:

Synthetic Oil

```
------------------------------------------------------------------------------
SECTION 1     CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
------------------------------------------------------------------------------

INTERNATIONAL BUSINESS MACHINES CORPORATION     EMERGENCY TELEPHONE NUMBER:
OLD ORCHARD ROAD                                1-800-424-9300 (NORTH AMERICA)
ARMONK, NEW YORK 10504 U.S.A.                   1-703-527-3887 (INTERNATIONAL)
1-800-IBM-4333

SUBSTANCE: IBM,OIL,SYNTHETIC
TRADE NAMES/SYNONYMS:
IBM P/N: 83F7906; IBM P/N: 95X5342; IBMYP334

PRODUCT USE: oils

CREATION DATE: Oct 19 1993
REVISION DATE: Nov 12 1997

Product name: SYNTON„ PAO 40;100
Chemical name: 1-decene homopolymer hydrogenated
Supplier: Crompton Corporation
199 Benson Road
Middlebury, CT 06749, USA
Emergency telephone number: CHEMTREC (24 hours) 800-424-9300
Crompton Corporation Emergency Response (24 hours)
800-292-5898
For MSDS, Product Safety, or regulatory
inquiries, call:
866-430-2775

------------------------------------------------------------------------------
SECTION 2     COMPOSITION, INFORMATION ON INGREDIENTS
------------------------------------------------------------------------------

COMPONENT: 1-DECENE HOMOPOLYMER HYDROGENATED
CAS NUMBER: 68037-01-4
EC NUMBER: Not assigned.
PERCENTAGE: 99

COMPONENT: TETRAKIS(METHYLENE(3,5-DI-TERT-BUTYL-4-HYDROXYHYDROCINNAMATE))
METHANE
CAS NUMBER: 6683-19-8
EC NUMBER (EINECS): 229-722-6
PERCENTAGE: 0.06

Note(s): This is not a dangerous substance

------------------------------------------------------------------------------
SECTION 3     HAZARDS IDENTIFICATION
------------------------------------------------------------------------------

NFPA RATINGS (SCALE 0-4):  HEALTH=1  FIRE=1  REACTIVITY=0

EC CLASSIFICATION (CALCULATED): No classification assigned.

EMERGENCY OVERVIEW: NONE OF THE COMPONENTS OF THIS PRODUCT POSE A HEALTH
```

```
                    HAZARD.
PHYSICAL DESCRIPTION: Clear, viscous liquid with a mild odor.
MAJOR HEALTH HAZARDS: No significant target effects reported.

POTENTIAL HEALTH EFFECTS:
INHALATION:
  Remove to fresh air. Obtain medical attention if symptoms persist.
SKIN CONTACT:
  Wash skin with soap and water.
EYE CONTACT:
  Flush eyes thoroughly with water for several minutes. Obtain medical
  attention if discomfort persists.
INGESTION:
  SHORT TERM EXPOSURE: no information on significant adverse effects
  LONG TERM EXPOSURE: no information on significant adverse effects
SWALLOWING
  Do not induce vomiting. Rinse mouth with water. Obtain medical
  attention.
CARCINOGEN STATUS:
OSHA: N
NTP: N
IARC: N
-------------------------------------------------------------------------------
SECTION 4     FIRST AID MEASURES
-------------------------------------------------------------------------------

INHALATION: If irritation, headache, or nausea occurs, remove to fresh
  yourself to fresh air. Get medical attention if breathing becomes
  difficult or symtoms persist.

SKIN CONTACT: Wash skin thoroughly with soap and water for at least 15
  minuttes. Launder contaminated clothing.
  Get medical attention if skin irritation develops or persists.

EYE CONTACT: Wash eyes with fresh water for at least 15 minutes.
  Get medical if eye irritation persists.

INGESTION: If swallowed, give a large amount of water to drink and call
  a doctor immediately. Consult medical personnel before inducing
  vomiting.

-------------------------------------------------------------------------------
SECTION 5     FIRE FIGHTING MEASURES
-------------------------------------------------------------------------------

Flash point: >200 (COC)
Autoignition temperature: N.D.A.
Flammability Limits: Not determined.
EXTINGUISHING MEDIA: CO2, dry chemical foam (Do not use water)

-------------------------------------------------------------------------------
SECTION 6     ACCIDENTAL RELEASE MEASURES
-------------------------------------------------------------------------------
Procedures in case of accidental release, breakage or leakage:
Stop the source of the leak or release. Clean up releases as soon as
possible. Contain liquid to prevent further contamination of soil,
surface water or groundwater. Clean up small spills using
appropriate techniques such as sorbent materials or pumping. Where
```

feasable and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

SECTION 7 HANDLING AND STORAGE

Do not weld, heat or drill container. Replace cap or bung. Emptied container still contais hazardous material which may ignite with explosive violence if heated sufficiently. Minimum feasable handling temperatures should be maintained. Periods of exposure to high temperatures should be minimized. Water contamination should be avoided.
CAUTION: Do not use pressure to empty drum or drum may rupture with explosive force.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS: No exposure limits have been established
IBM,OIL,SYNTHETIC:
No occupational exposure limits established.

VENTILATION: No special ventilation is usually necessary. However, if operating conditions create high air borne concentrations of this material, special ventilation may be needed.

EYE PROTECTION: Chemical type goggles or face shield optional.

CLOTHING: Protective clothing is not required under normal conditions.

GLOVES: No special equipment required.

RESPIRATOR: No respirator is required under normal conditions of use. Under conditions of frequent use or heavy exposure, respiratory protection may be needed.

Respiratory protection
Wear a breathing mask.

Skin protection
Avoid prolonged or frequently repeated skin contact by wearing impervious protective clothing including gloves.

Other protective equipment
No special clothing or equipment is usually necessary. Work practices, hygienic practices: No information is available.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION: Clear, viscous liquid with a mild odor.
BOILING POINT: Not determined
FREEZING POINT: Not available
VAPOR PRESSURE: Negligible
VAPOR DENSITY: Not available

SPECIFIC GRAVITY (water=1): 0.85
WATER SOLUBILITY: Insoluble
PH: Not available
VOLATILITY: Not available
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
Solubility in organic solvents: Soluble
Flash point: 280 °C (536 °F)

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: See the Handling and storage section.

INCOMPATIBILITIES: Avoid: acids, oxdizing agents, halogens and
halogenated compounds.

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE ORAL: N.D.A.: Believed to be greater than 5 g/kg
Practically non-toxic
DERMAL: N.D.A.: Practically non-toxic

SECTION 12 ECOLOGICAL INFORMATION

Bioegradation: N.D.A
Environmental Fate: This material is not expected to present any
environmental problems other than those associated with oil spills.

SECTION 13 DISPOSAL CONSIDERATIONS

Place contaminated materials in disposable containers and dispose
of in a manner consistent with applicable regulations. Contact local
environmental or health authorities for approved disposal of this
material.

SECTION 14 TRANSPORT INFORMATION

NFPA Class 1 assigned.

LAND TRANSPORT ADR/RID: N/A

AIR TRANSPORT IATA/ICAO: N/A

MARITIME TRANSPORT IMDG: N/A

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:
TSCA INVENTORY: All components of this material are on the US TSCA inventory.

The EC EINECS INVENTORY:
All components of this material are on the US TSCA inventory.

SECTION 16 OTHER INFORMATION

Compressor Lubricant

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| ------------------------------------------------------------------------
| SECTION 1     CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
| ------------------------------------------------------------------------------

| INTERNATIONAL BUSINESS MACHINES CORPORATION     EMERGENCY TELEPHONE NUMBER:
| OLD ORCHARD ROAD                                1-800-424-9300 (NORTH AMERICA)
| ARMONK, NEW YORK 10504 U.S.A.                   1-703-527-3887 (INTERNATIONAL)
| 1-800-IBM-4333

| SUBSTANCE: POLYOL ESTER REFRIGERATION OIL
| TRADE NAMES/SYNONYMS:
| IBM P/N: 11J6039; IBMYU365

| PRODUCT USE: oils

| CREATION DATE: Oct 22 1997
| REVISION DATE: Nov 12 1997

| ------------------------------------------------------------------------------
| SECTION 2     COMPOSITION, INFORMATION ON INGREDIENTS
| ------------------------------------------------------------------------------

| COMPONENT: SYNTHETIC ESTER
| CAS NUMBER: Not assigned.
| EC NUMBER: Not assigned.
| PERCENTAGE: >1

| ------------------------------------------------------------------------------
| SECTION 3     HAZARDS IDENTIFICATION
| ------------------------------------------------------------------------------

| NFPA RATINGS (SCALE 0-4):  HEALTH=0  FIRE=1  REACTIVITY=0

| EC CLASSIFICATION (CALCULATED): No classification assigned.

| EMERGENCY OVERVIEW:
| PHYSICAL DESCRIPTION: Colorless to straw color depending on supplier's
| non-hazardous additives with a faint, petroleum odor.
| MAJOR HEALTH HAZARDS: No significant target effects reported.

| POTENTIAL HEALTH EFFECTS:
| INHALATION:
|   Usually vapor is not generated at high concentrations from this
|   product.
| SKIN CONTACT:
|   May cause moderate irritation
| EYE CONTACT:
|   May cause moderate irritation
| INGESTION:
|   If more than several mouthfuls are swallowed, abdominal discomfort,
|   nausea and diarrhea may occur.

| CARCINOGEN STATUS:
| OSHA: N
| NTP: N
| IARC: N
```

```
| ------------------------------------------------------------------------------
| SECTION 4     FIRST AID MEASURES
| ------------------------------------------------------------------------------

| INHALATION: If irritation, headache, or nausea occurs, remove to fresh
|   yourself to fresh air. Get medical attention if breathing becomes
|   difficult or symtoms persist.

| SKIN CONTACT: Wash skin thoroughly with soap and water for at least 15
|   minuttes. Launder contaminated clothing.
|   Get medical attention if skin irritation develops or persists.

| EYE CONTACT: Wash eyes with fresh water for at least 15 minutes.
|   Get medical if eye irritation persists.

| INGESTION: If swallowed, give a large amount of water to drink and call
|   a doctor immediately. Consult medical personnel before inducing
|   vomiting.

| ------------------------------------------------------------------------------
| SECTION 5     FIRE FIGHTING MEASURES
| ------------------------------------------------------------------------------

| Flash point: >200 (COC)
| Autoignition temperature: N.D.A.
| Flammability Limits: Not determined.
| EXTINGUISHING MEDIA: CO2, dry chemical foam (Do not use water)

| ------------------------------------------------------------------------------
| SECTION 6     ACCIDENTAL RELEASE MEASURES
| ------------------------------------------------------------------------------

| Procedures in case of accidental release, breakage or leakage:
| Stop the source of the leak or release. Clean up releases as soon as
| possible. Contain liquid to prevent further contamination of soil,
| surface water or groundwater. Clean up small spills using
| appropriate techniques such as sorbent materials or pumping. Where
| feasable and appropriate, remove contaminated soil. Follow prescribed
| procedures for reporting and responding to larger releases.

| ------------------------------------------------------------------------------
| SECTION 7     HANDLING AND STORAGE
| ------------------------------------------------------------------------------

| Do not weld, heat or drill container. Replace cap or bung. Emptied
| container still contais hazardous material which may ignite with
| explosive violence if heated sufficiently. Minimum feasable handling
| temperatures should be maintained. Periods of exposure to high
| temperatures should be minimized. Water contamination should be
| avoided.
| CAUTION: Do not use pressure to empty drum or drum may rupture with
| explosive force.

| ------------------------------------------------------------------------------
| SECTION 8     EXPOSURE CONTROLS, PERSONAL PROTECTION
| ------------------------------------------------------------------------------
```

```
| EXPOSURE LIMITS: No exposure limits have been established
| IBM,OIL,SYNTHETIC:
|   No occupational exposure limits established.

| VENTILATION: No special ventilation is usually necessary. However,
|   if operating conditions create high air borne concentrations of this
|   material, special ventilation may be needed.

| EYE PROTECTION: Chemical type goggles or face shield optional.

| CLOTHING: Protective clothing is not required under normal conditions.

| GLOVES: No special equipment required.

| RESPIRATOR: No respirator is required under normal conditions of use. Under
|   conditions of frequent use or heavy exposure, respiratory protection may
|   be needed.

| Respiratory protection
| Wear a breathing mask.

| Skin protection
| Avoid prolonged or frequently repeated skin contact by wearing
| impervious protective clothing including gloves.

| Other protective equipment
| No special clothing or equipment is usually necessary. Work practices,
| hygienic practices: No information is available.

| ------------------------------------------------------------------------------
| SECTION 9     PHYSICAL AND CHEMICAL PROPERTIES
| ------------------------------------------------------------------------------

| APPEARANCE: Transparent liquid
| BOILING POINT: N.D.A.
| MELTING POINT: N.D.A.
| VAPOR PRESSURE: Not determined
| VAPOR DENSITY: Not determined
| WATER SOLUBILITY: Insoluble in water
| PH: Neutral
| VISCOSITY: @40 degress C mm2/s        65.6
| ODOR: None
| DENSITY: @15 degrees C  g/cm3        0.968
| POUR POINT:  <-40 degrees C
| PERCENT VOLATILE:  0

| ------------------------------------------------------------------------------
| SECTION 10    STABILITY AND REACTIVITY
| ------------------------------------------------------------------------------

| REACTIVITY: Stable at normal temperatures and pressure.

| CONDITIONS TO AVOID: See the Handling and storage section.

| INCOMPATIBILITIES: Avoid: acids, oxdizing agents, halogens and
|   halogenated compounds.

| POLYMERIZATION: Will not polymerize.
```

```
| ---------------------------------------------------------------------------
| SECTION 11    TOXICOLOGICAL INFORMATION
| ---------------------------------------------------------------------------

| ACUTE ORAL: N.D.A.: Believed to be greater than 5 g/kg
|                     Practically non-toxic
| DERMAL:     N.D.A.: Practically non-toxic

| ---------------------------------------------------------------------------
| SECTION 12    ECOLOGICAL INFORMATION
| ---------------------------------------------------------------------------

| Bioegradation:    N.D.A
| Environmental Fate:  This material is not expected to present any
|    environmental problems other than those associated with oil spills.

| ---------------------------------------------------------------------------
| SECTION 13    DISPOSAL CONSIDERATIONS
| ---------------------------------------------------------------------------

| Place contaminated materials in disposable containers and dispose
| of in a manner consistent with applicable regulations. Contact local
| environmental or health authorities for approved disposal of this
| material.
| Dispose in accordance with all applicable regulations.

| ---------------------------------------------------------------------------
| SECTION 14    TRANSPORT INFORMATION
| ---------------------------------------------------------------------------

| NFPA Class 1 assigned.

| LAND TRANSPORT ADR/RID: N/A

| AIR TRANSPORT IATA/ICAO: N/A

| MARITIME TRANSPORT IMDG: N/A

| ---------------------------------------------------------------------------
| SECTION 15    REGULATORY INFORMATION
| ---------------------------------------------------------------------------

| U.S. REGULATIONS:
|   TSCA INVENTORY: All components of this material are on the US TSCA
|                   inventory.

| The EC EINECS INVENTORY:
|                   All components of this material are on the US TSCA
|                   inventory.

| ---------------------------------------------------------------------------
| SECTION 16    OTHER INFORMATION
| ---------------------------------------------------------------------------

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R134A Refrigerant

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| ------------------------------------------------------------------------------
| SECTION 1     CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
| ------------------------------------------------------------------------------

| INTERNATIONAL BUSINESS MACHINES CORPORATION     EMERGENCY TELEPHONE NUMBER:
| OLD ORCHARD ROAD                                1-800-424-9300 (NORTH AMERICA)
| ARMONK, NEW YORK 10504 U.S.A.                   1-703-527-3887 (INTERNATIONAL)
| 1-800-IBM-4333

| SUBSTANCE: REFRIGERANT 134A (<5 LB CONTAINERS)
| TRADE NAMES/SYNONYMS:
| ETHANE, 1,1,1,2-TETRAFLUORO-; 1,1,1,2-TETRAFLUOROETHANE;
| 1,2,2,2-TETRAFLUOROETHANE; R 134A; GENETRON(R) 134A; IBM P/N: 11J6039;
| C2H2F4; IBMYU364

| CHEMICAL FAMILY: halogenated, aliphatic

| CREATION DATE: Oct 24 1997
| REVISION DATE: Nov 12 1997

| ------------------------------------------------------------------------------
| SECTION 2     COMPOSITION, INFORMATION ON INGREDIENTS
| ------------------------------------------------------------------------------

| COMPONENT: 1,1,1,2-TETRAFLUOROETHANE
| CAS NUMBER: 811-97-2
| EC NUMBER (EINECS): 212-377-0
| PERCENTAGE: 100.0

| ------------------------------------------------------------------------------
| SECTION 3     HAZARDS IDENTIFICATION
| ------------------------------------------------------------------------------

| EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint
| sweetish odor. Non-flammable material. Overexposure may cause
| dizziness and loss of concentration. At higher levels, CNS depression
| and cardiac arrhythmia may result from exposure. Vapors displace air
| and can cause asphyxiation in confined spaces. At higher temperatures
| (>250 degrees C), decomposition products may include Hydrofluoric
| Acid (HF) and carbonyl halides.

| POTENTIAL HEALTH EFFECTS:
| INHALATION:
|   Acute toxicity is low in animals. When oxygen levels in air are
|    may cause CNS depression or heart irregularities
|    reduced to 12-14% by displacement, symptoms of asphyxiation, loss
|    of coordination, increased pulse rate and deeper respiration will
|    occur. At high levels, cardiac arrhythmia may occur.
| SKIN CONTACT:
|   Irritation would result from a defatting action on tissue.
|   Liquid contact could cause frostbite.
| EYE CONTACT:
|   Liquid contact can cause severe irritation and frostbite.
|   Mist may irritate.
| INGESTION:
|   Ingestion is unlikely because of the low boiling point of the
```

material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and onsequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

CARCINOGEN STATUS:
OSHA: N
NTP: N
IARC: N

SECTION 4 FIRST AID MEASURES

INHALATION: Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

SKIN CONTACT: Promply flush skin with water until all chemical is removed. If evidence of frostbite, bathe (do not rub) affected area in lukewater (not hot). If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

EYE CONTACT: Immediatley flush with large amounts of water for at 15 minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical atention if symptoms persist.

INGESTION: It is unlikely because of the physical properties and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a physician.

NOTE TO PHYSICIAN: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources.

Contact with certain reactive metals may result in formation of explosive or exothermic reaactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

EXTINGUISHING MEDIA: Use any standard agent. Choose the one most appropriate for type of surrounding fire (material itself is not flammable).

FIRE FIGHTING PRECAUTIONS: Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should

be provided. Use water spray to keep fire-exposed containers cool.

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

(Always wear recommended personal protective equipment.)
Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return until air has been tested and determined safe, including lowlying areas.
Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

SECTION 7 HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)
Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.
Genetron 134a should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

STORAGE RECOMMENDATIONS:
Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

ENGINEERING CONTROLS:
Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

PERSONAL PROTECTIVE EQUIPMENT
SKIN PROTECTION:
Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

EYE PROTECTION:
For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

RESPIRATORY PROTECTION:
None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH - approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH-approved gas mask with organic vapor canister.

ADDITIONAL RECOMMENDATIONS:
Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High doselevel warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
1,1,1,2-Tetrafluoroethane	None	None	*1000 ppm TWA (8hr) **1000 ppm TWA (8hr)

* = Limit established by Honeywell.
** = Workplace Environmental Exposure Level (AIHA).
*** = Biological Exposure Index (ACGIH).

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
APPEARANCE: clear
COLOR: colorless
ODOR: faint ethereal odor
MOLECULAR WEIGHT: 102
MOLECULAR FORMULA: F3CCH2F
BOILING POINT: -17 to -15 F (-27 to -26 C)
FREEZING POINT: -141.9 F (-92.5 C)
VAPOR PRESSURE: 85.8 psia@70 degrees F
213.4 psia @130 degrees F
VAPOR DENSITY (air=1): 3.5
SPECIFIC GRAVITY (water=1): <1.22
DENSITY: 1.21 g/mL @ 25 C
WATER SOLUBILITY: 0.15% @ 25 C
PH: neutral
VOLATILITY: 100%
EVAPORATION RATE: >1 (carbon tetrachloride=1)
FLASH POINT: N/A (Flash point method and additional flammability data are found in section 5)

SECTION 10 STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
The product is stable.

| Do not mix with oxygen or air above atmospheric pressure. Any source of
| high temperature, such as lighted cigarettes,
| flames, hot spots or welding may yield toxic and/or corrosive
| decomposition products.

| INCOMPATIBILITIES:
| (Under specific conditions: e.g. very high temperatures and/or
| appropriate pressures) ↓ Freshly abraded aluminum surfaces
| (may cause strong exothermic reaction). Chemically active metals:
| potassium, calcium, powdered aluminum, magnesium
| and zinc.

| HAZARDOUS DECOMPOSITION PRODUCTS:
| Halogens, halogen acids and possibly carbonyl halides.

| HAZARDOUS POLYMERIZATION:
| Will not occur.

| ---
| SECTION 11 TOXICOLOGICAL INFORMATION
| ---

| IMMEDIATE (ACUTE) EFFECTS:
| LC50 : 4 hr. (rat) - > 500,000 ppm
| Cardiac Sensitization threshold (dog) 80,000 ppm. NOEL ↓ 50,000 ppm

| DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:
| Not mutagenic in four tests
| Teratogenic NOEL (rat and rabbit) - 40,000 ppm
| Subchronic inhalation (rat) NOEL - 50,000 ppm
| Chronic NOEL ↓ 10,000 ppm

| OTHER DATA:
| Metabolism <0.5% as CO2 in tests at 50,000 ppm, late developing benign
| tumors were found.

| ---
| SECTION 12 ECOLOGICAL INFORMATION
| ---

| Degradability (BOD): Genetron 134a is a gas at room temperature;
| therefore, it is unlikely to remain in water.
| Octanol Water Partition Coefficient: Log Pow = 1.06

| ---
| SECTION 13 DISPOSAL CONSIDERATIONS
| ---

| RCRA
| Is the unused product a RCRA hazardous waste if discarded? Not a
| hazardous waste
| If yes, the RCRA ID number is: Not applicable

| OTHER DISPOSAL CONSIDERATIONS:
| Disposal must comply with federal, state, and local disposal or discharge
| laws. Genetron 134a is subject to U.S.
| Environmental Protection Agency Clean Air Act Regulations Section 608 in
| 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

SECTION 14 TRANSPORT INFORMATION

US DOT HAZARD CLASS: US DOT PROPER SHIPPING NAME:
1,1,1,2-Tetrafluoroethane
US DOT HAZARD CLASS: 2.2
US DOT PACKING GROUP: Not applicable
US DOT ID NUMBER: UN3159

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

SECTION 15 REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)
TSCA INVENTORY STATUS: Listed on the TSCA inventory
OTHER TSCA ISSUES: None

SARA TITLE III/CERCLA
"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb.)	SARA EHS TPQ (lb.)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center ⅛(800) 424-8802‘ and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE
PRESSURE

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
No ingredients listed in this section	

STATE RIGHT-TO-KNOW
In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:
Genetron 134a is subject to U.S. Environmental Protection Agency Clean
Air Act Regulations at 40 CFR Part 82.

WARNING: Contains 1,1,1,2-Tetrafluoroethane (HFC-134a), a greenhouse gas
which may contribute to global warming
Do Not vent to the atmosphere. To comply with provisions of the U.S.
Clean Air Act, any residual must be recovered.

WHMIS CLASSIFICATION (CANADA):
This product has been evaluated in accordance with the hazard criteria of
the CPR and the MSDS contains all the information
required by the CPR.

FOREIGN INVENTORY STATUS:
  Canada " Listed on DSL
  EU " EINECS # 223770

SECTION 16 OTHER INFORMATION

Appendix F. Notices

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Electronic Emission Notices

The following statement applies to this IBM product. The statement for other IBM products intended for use with this product will appear in their accompanying manuals.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in the installation manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors, by installation or use of this equipment other than as specified in the installation manual, or by any other unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communications Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformlté aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe A est conform à la norme NMB-003 du Canada.

The United Kingdom Telecommunications Act 1984

This apparatus is approved under General Approval number NS/G/1234/J/100003 for indirect connections to public telecommunications systems in the United Kingdom.

Taiwan Class A compliance Statement

Warning. This is a Class A product. In a domestic environment this product may cause radio interference in which case the user will be required to take adequate measures.

警告使用者:
這是甲類ń 會訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

European Union (EU) Electromagnetic Compatibility Directive

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

EC Declaration of Conformity (In German)

Zulassungsbecheinigung laut dem Deutschen Gestez über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 18. September 1998 (bzw. der EMC EG Richtlinie 89/336).

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

En 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: “Warnung: dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohn-bereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber

verlangt werden angemessene Maßnahmen durchzuführen and dafür aufzukommen.”

Anmerkung:

Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den IBM Handbüchern angegeben zu installieren und zu betreiben.

Japan Class A Compliance Statement

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