9121 Service Training
(Course Code 13740)

Student Laboratory Notebook

Atlanta Education Center
IBM Corporation, Department 460
3100 Windy Hill Road
Marietta, Georgia 30067

Education

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Comments concerning this notebook and its usefulness for its intended purpose are welcome. You may send written comments to:

Atlanta Education Center
IBM Corporation, Department 460
3100 Windy Hill Road
Marietta, Georgia 30067

Attention: Tony Braggs (**VNET Node:** ATLEDCTR **User ID:** BRAGGS)

Safety Precautions and Housekeeping

Refer to your CE Safety Practices card (Form S229-0230) for general safety precautions.

This device meets IBM safety standards. The safety information printed here is to remind service personnel of their responsibility in regard to safety. The information has been extracted from the booklet Electrical Safety for IBM Service Representatives S229-8124 available from IBM.

General Safety Guidelines

1. Maintain good housekeeping in the area of the machines while performing and after completing maintenance.

2. Do not use solvents, cleaners, or oils that have not been approved by IBM.

3. Lift by standing or pushing up with stronger leg muscles. This takes strain off back muscles. Do not attempt to lift any parts or equipment which you feel uncomfortable with.

4. Service personnel are responsible for making certain that no action on his or her part renders a product unsafe or exposes the customer to hazards.

5. Place removed machine covers in a safe out-of-the-way location while servicing the machine. These covers must be back in place on the machine before the machine is returned to the customer.

6. Always place tool kit away from walk areas where no one can trip over it (i.e., under desk or table).

7. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled up above the elbow. Long hair and scarves must be secured.

8. When servicing a machine, ties must be tucked in shirt or have a tie clasp (preferably non-conductive) approximately three inches from the end.

9. Before starting equipment, make sure that other service or customer personnel are not in a hazardous position.

10. Do not place books, tools, or test equipment on top of the machine.

ELECTRICAL SAFETY GUIDELINES

1. You should not work alone under hazardous conditions or around equipment which could expose you to hazardous voltages. Always advise your manager if there is a potential problem or if you must work alone.

2. Disconnect all power before removing or assembling major components, working in the immediate area of power supplies, performing mechanical inspection of power supplies, or installing changes to machine circuitry.

3. Unplug the machine's power cord whenever possible before working on the machine. The wall box switch when turned off should be locked in the off position or tagged with a "Do Not Operate" Tag (Z229-0237). Be aware that a non-IBM attachment to an IBM machine may be powered from another source and be controlled by a different disconnect or circuit breaker.

4. When it is absolutely necessary to work on equipment having exposed electrical circuitry, observe the following precautions:

   - Another person familiar with power off controls must be in the immediate vicinity. (Someone must be there to turn off the power if it should become necessary.)
   - Do not wear jewelry, chains, metallic frame eyeglasses, or metal cuff links. (In the event of contact, more current can flow because of the greater contact area afforded by the metal.)
   - Use only those tools and test equipment that are appropriate to the task to be performed.
   - Cushioning grips, on IBM hand tools, are made for comfort and do not provide adequate insulation for working with live electrical circuits.
   - Use only one hand when working on energized equipment. Keep the other hand in your pocket or behind your back. (Remember, there must be a complete circuit to cause electrical shock. This procedure will help prevent a current path through vital organs of the body.)
   - When using test equipment, be certain that controls are set correctly and that insulated probes of the proper capacity are used.
   - Avoid contacting ground potential (metal floor strips, machine frames, etc.); use suitable rubber mats purchased locally, if necessary.

   Note: Many customers use rubber floor mats near their equipment which contain tiny carbon or metal fibers to help reduce static discharges. Be especially cautious of this type of mat and do not use it to provide protection from electrical shock.

5. Follow special safety instructions when working with extremely high voltages. These instructions are outlined in IBM safety service memorandums (SMs) and

the safety portions of the maintenance documentation. Use extreme care when measuring high voltage.

6. Avoid use of tools and test equipment which have not been approved by IBM. (Electrical hand tools like wire wrap guns, drills, etc., should be inspected periodically.)

7. Do not use worn or broken tools and test equipment.

8. After maintenance, restore all safety devices such as shields, guards, signs, and ground leads. Replace any safety device which is worn or defective. (These safety devices are there to protect you from hazards. You can defeat their purpose by not replacing them at the completion of the service call.)

9. Safety glasses must be worn when:

   - Using a hammer to drive pins, etc.
   - Power hand drilling
   - Using spring hooks, attaching springs
   - Soldering, wire cutting, removing steel bands
   - Parts cleaning, using solvents, chemicals, and cleaners
   - All other conditions which might be hazardous to your eyes

10. Never assume that a circuit is de-energized, check it first.

11. Always be alert to potential hazards in your working environment (i.e., damp floors, non-grounded extension cords, power surges, missing safety grounds, etc.)

12. Do not touch live electrical circuits with the surface of the plastic dental mirrors. The glass surface, of the mirror, is conductive and can result in machine damage and personal injury.

13. Power supplies, pumps, blowers, motor generators, and other similar units must not be serviced with power on them when they are removed from their normal operating position within the machine unless specifically prescribed in the general maintenance documentation. (This is done to assure that proper grounding is maintained.)

14. Four steps that should be taken in the event of an electrical accident:

    Use Caution - Don't become a victim yourself.

    Turn power off.

    Have someone else get medical help.

    If the victim is not breathing, have a qualified person administer rescue breathing.

Emergency First Aid

When implementing rescue procedures in an electrical accident, one must:

- USE CAUTION - If the victim is still in contact with the electrical current source, it may be necessary to use the room EPO (Emergency Power Off) or disconnect switch to remove the electrical current. If the EPO or disconnect cannot be located, use a dry stick or some other non-conducting object to pull or push the victim away from contact with the electrical equipment.
- ACT QUICKLY - If the victim is unconscious, he or she may need rescue breathing. If the heart has stopped beating, the victim may also need external cardiac compression. (External Cardiac Compressions should only be performed by a qualified person. Persons interested in becoming certified in Cardio-Pulmonary Resuscitation (CPR) should contact the American National Red Cross or the American Heart Association in your area.)
- GET PROFESSIONAL HELP - Have someone summon medical aid immediately. (Rescue Squad, Emergency, Ambulance, Hospital, etc.).

REPORTING ACCIDENTS AND NEAR MISSES

Report all accidents, potential hazards, and "near miss" accidents to your manager or appropriate IBM location. Remember, a near miss accident might indicate a machine problem and prompt reporting assures that the situation can be resolved quickly. It's important to report even a minor shock since the conditions which caused it need only be varied slightly to cause serious injury.

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Materials Available to You

Manuals You Should Have

- *Student Manual Title*, xxx-xxxx

Manuals Your Team Should Have

- *Team Manual Title*, xxx-xxxx

Manuals Available in the Classroom

- *Class Manual Title*, xxx-xxxx

Exercises

Exercise 1. Local Safety Procedures

What This Exercise is About

Refer to your CE Safety Practices card (Form S229-0230) for general safety precautions. Additional instructions on safety and housekeeping procedures will be supplied to you by your instructor. At the end of each lab session check your machine and verify all Trouble Analysis Problems have been removed, and run the Processor Complex Exerciser to verify proper operation. You are responsible for the condition of the lab. All tools, test equipment, and documentation should be returned to their proper places. Your lab areas must be free of debris and common consideration is expected at all times. All personnel are NOT permitted to wear rings, wrist watches or other jewelry while in the lab. There is NO smoking, food, or drinks allowed in lab at any time. If there are any problems adhering to this practice, see your class manager.

What You Should Be Able to Do

After completing this exercise, you should be able to adhere to Safety Practices in the 9121 Laboratory

Introduction

Required Materials

You will need the following materials to complete this exercise:

- *E02 9121 Service Information: Safety Inspection Guide, SY27-2618*

SAFETY PRECAUTIONS AND HOUSEKEEPING

In the 9121 lab area, locate the following items:

_ ***Step 1*** Evacuation Route Diagram

_ ***Step 2*** Red Colored Emergency Pillar (In center of lab)

_ ***Step 3*** EPO for 9121 Lab

_ ***Step 4*** First Aid Kit

_ ***Step 5*** Fire Extinguisher

_ ***Step 6*** Telephone - Emergency number dial "83111"

Remember, each time you enter the lab, to remove all watches, rings, chains and loose jewelry.

Never work alone in the lab. Never work alone around equipment with dangerous voltages.

Safety glasses shall be worn when working under conditions that might be hazardous to your eyes.

If you remove the covers of a machine, place them in a safe out-of-the-way location.

Never assume anything about a machine.

If you see a safety hazard, notify your instructor.

1. Obtain *E02 9121 Service Information: Safety Inspection Guide*, SY27-2618. Locate and read the section dealing with Servicing the Power Subassembly (Remove and Replace) .

   Locate and read the sections dealing with Power-Off Maintenance and Power-On Maintenance .

2. Locate on 9121 frames the RED UEPO switches. These UEPO switches latch in the off position when switched. To reset the switch, it will be necessary to pull out on the plunger located on the rear of the switch while switching it to the on position. THE UEPO's ARE PART OF YOUR BASIC PROTECTION ON THE 9121 !

Exercise 2. Locations

What This Exercise is About

General 9121 locations

What You Should Be Able to Do

After completing this exercise, you should be able to locate FRUs in the 9121 processing complex. You will be given a 9121, the on site documentation, tools, and 45 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with the physical locations of the 9121 processing complex.

Take a minute to look at the overall physical setup of the CPC (Central Processing Complex) and the attached IOSP (Input Output Support Processor).

The IOSP is connected to the CPC by two cables. The two cables control IOSP power sequencing and provide an interface for communication.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide*, SY27-2609
- *B02 9121 Service Information: Processor Service Guide Part 1, General*, SY27-2610
- *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611
- *B04 9121 Service Information: Processor Service Guide Part 3, Input/Output*, SY27-2612
- *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613

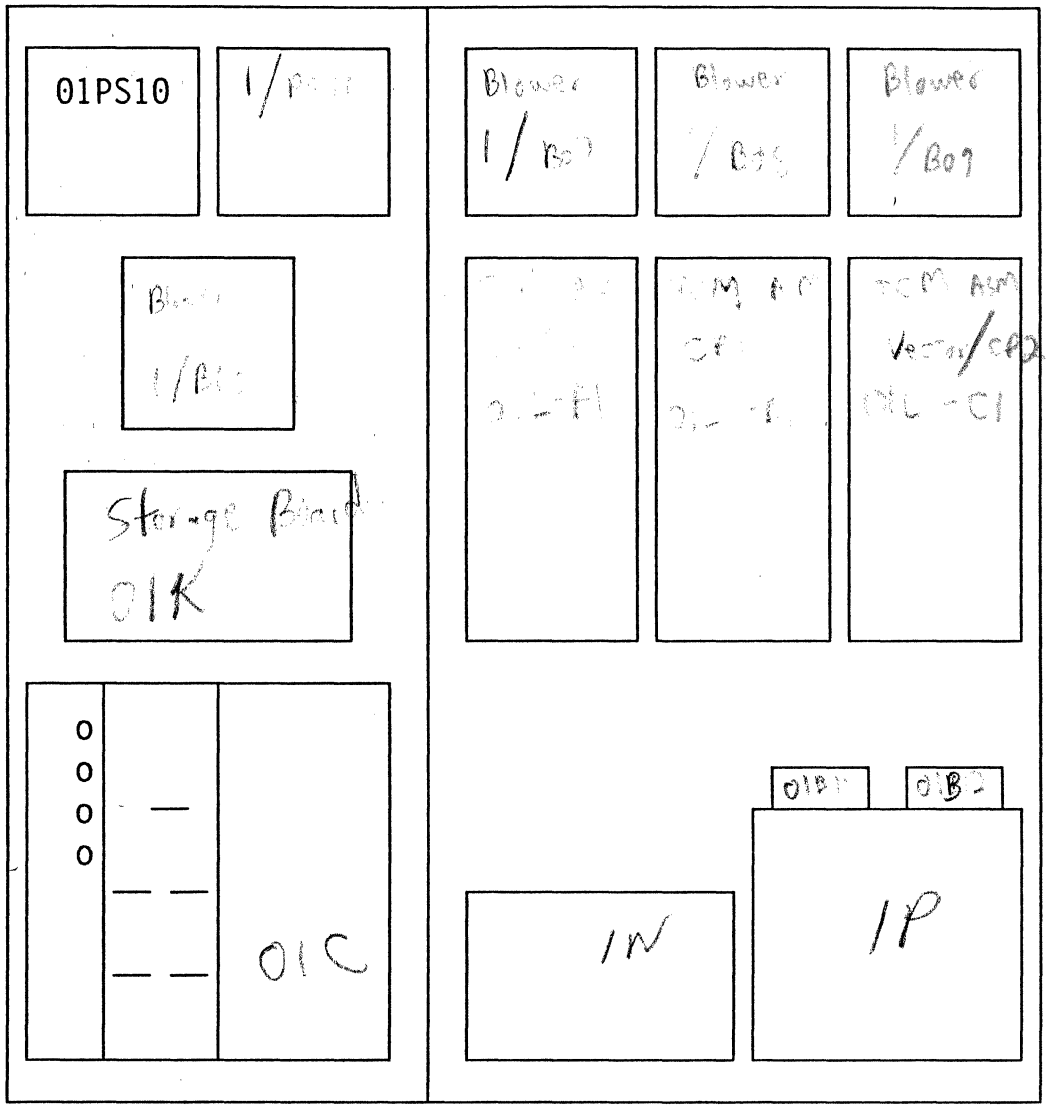
_ ***Step 1*** If not already done, read the introduction for this Lab Exercise.

_ ***Step 2*** At the **System Power Panel** (refer to *B01 9121 Service Information: Service Guide*, SY27-2609 Control Panel) turn off system power by pushing the power off pushbutton and wait for the **PCE Power Available** LED to be the only LED on (ignore Refcode display and Service Mode Enabled LEDs if they are still on).

_ ***Step 3*** Open the front cover on the Service Power Panel side of the 9121 and locate **CB1** at the lower left, and turn it **OFF**.

_ ***Step 4*** Open the System Power Panel by loosening the thumb screw and pulling on the right hand side (**NOTE** the PCE Service Panel on the lower half).

_ ***Step 5*** Use the 9121 documentation to locate the items in the following figures and fill in their names and location IDs.



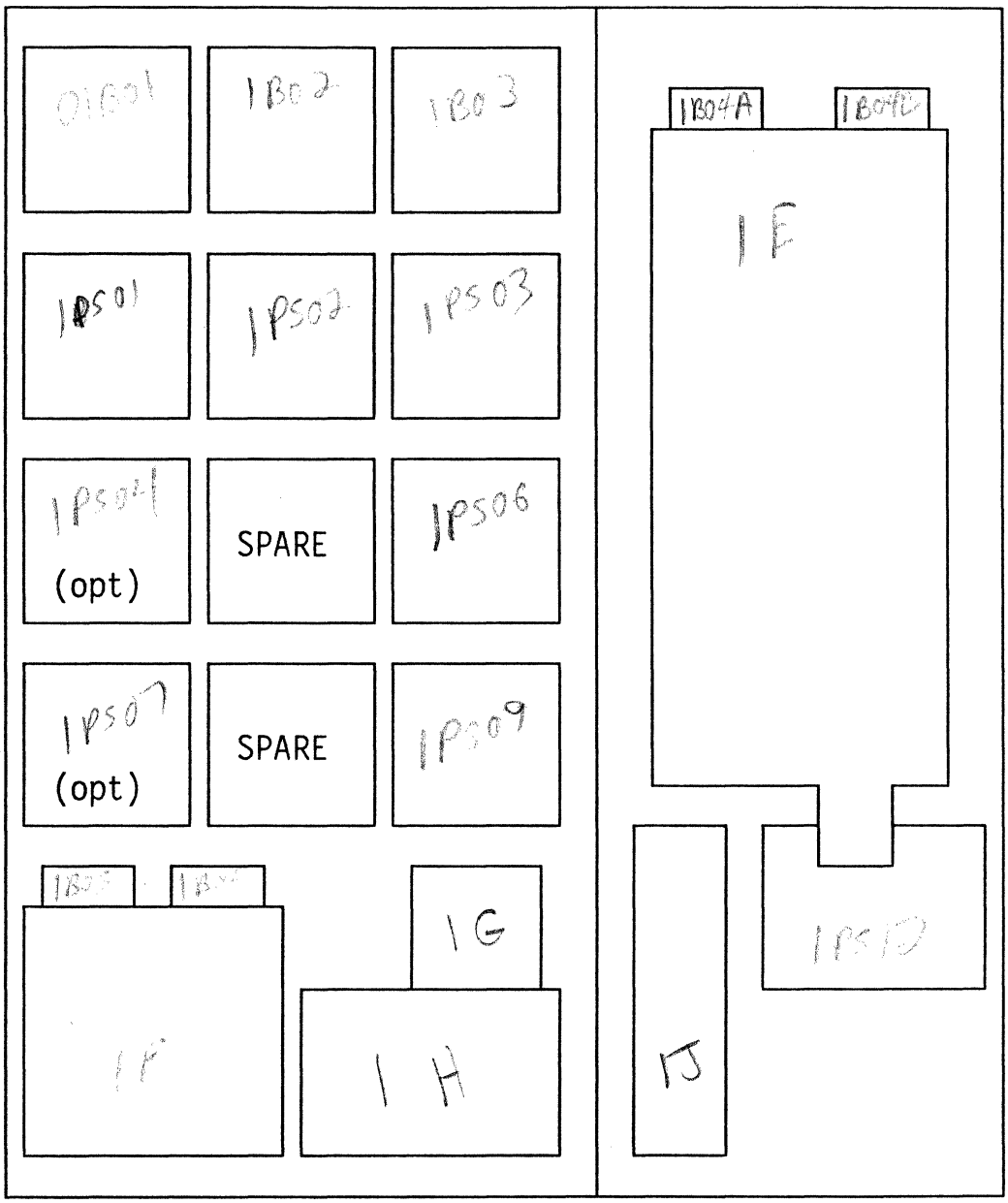
You should be able to identify all these items on this page:

✓ 01PS10	✓ 01B07	✓ 01B11	✓ 01LA1 Plenum *
✓ 01PS11	✓ 01B08	✓ 01B12	✓ 01LB1 Plenum *
✓ 01B10	✓ 01B09	01P	✓ 01LC1 Plenum *
✓ 01K	✓ 01C	✓ 01N	

* Air Duct from Cold Plate to Blower

Figure 2-1. 9121 Front View

__ ***Step 6*** Now move to the rear of the machine and open the covers



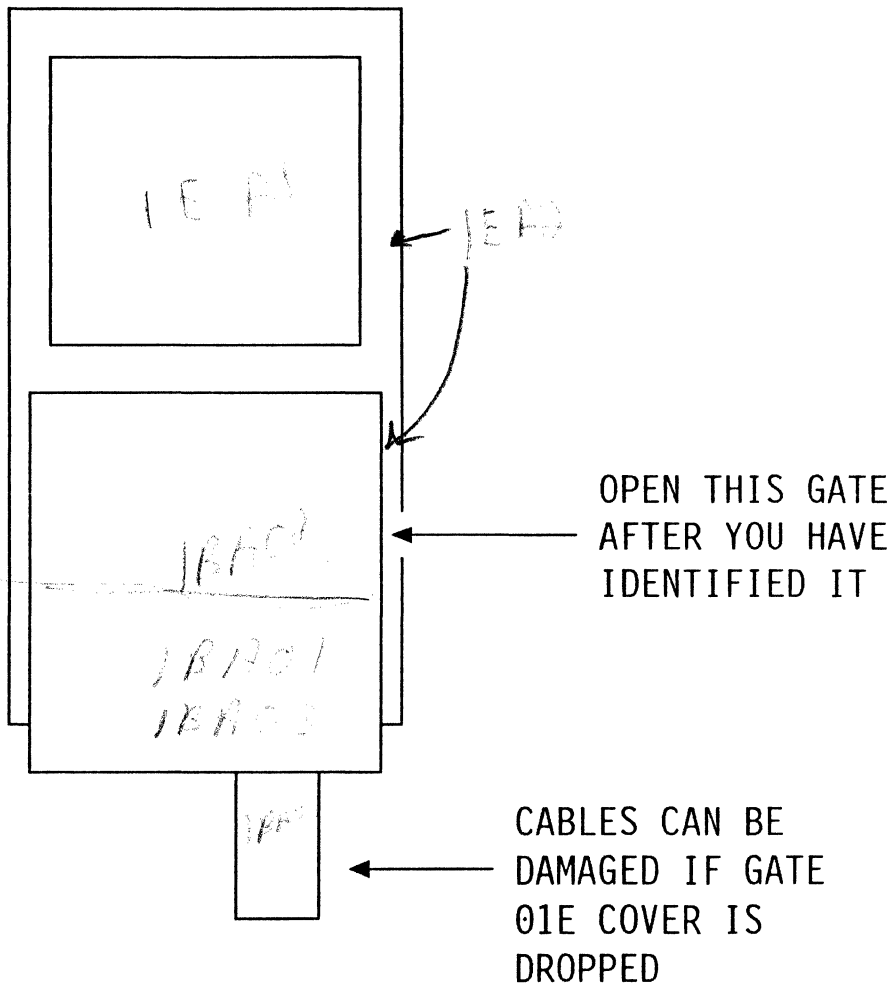
You should be able to identify all these items on this page:

__ 01B01	__ 01B04B	__ 01PS02	__ 01PS07	__ 01F
__ 01B02	__ 01B05	__ 01PS03	__ 01PS09	__ 01G
__ 01B03	__ 01B06	__ 01PS04	__ 01PS12	__ 01H
__ 01B04A	__ 01PS01	__ 01PS06	__ 01E	__ 01J

Figure 2-2. 9121 Rear View

CAUTION:
When performing the next task be careful not to let the cover drop. Damage to the Service Channel cables may occure.

_ **Step 7** Remove the cover on the 01E Gate (refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613) and locate the following items.



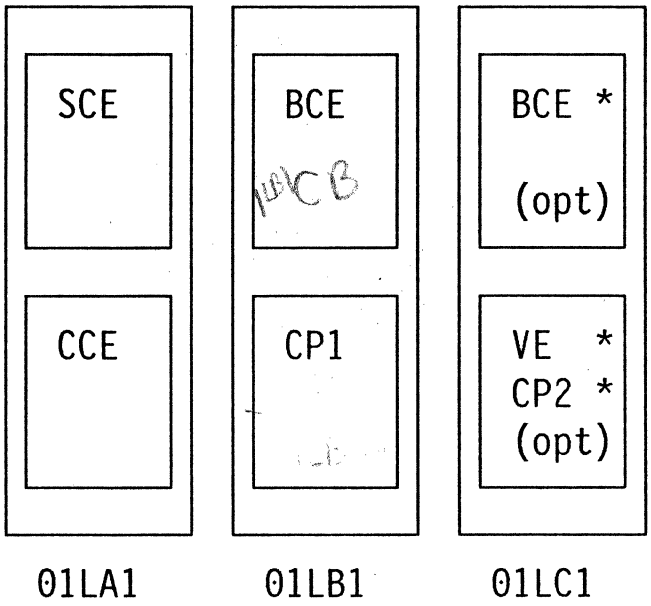
You should be able to identify all these items on this page:

_ 01EA1	_ 01BA01	_ 01BA04
_ 01EA2	_ 01BA03	_ 01BA02

Note: Contact an Instructor for help locating these items if needed.

Figure 2-3. 9121 PCE and Service Gate

_ ***Step 8*** Go back to the front of the 9121 and remove **one** of the TCM Plenums (refer to *B02 9121 Service Information: Processor Service Guide Part 1, General*, SY27-2610). Take a look at the TCM Board,TCM, and Cold Plate layout. Identify these items.



IDENTIFY THE TCMs IN YOUR MACHINE

You should be able to identify all these items on this page:

_ 01LA1CB	_ 01LB1CB	_ 01LC1CB
_ 01LA1CE	_ 01LB1CE	_ 01LC1CE

NOTE:
* The Vector TCM in location 01LC1CE is associated with CP1. 01LC1CB will be empty with the Vector TCM installed (CP2 not installed).
* CP2 will also require the BCE TCM, The Vector TCM (if part of the configuration) would be put in the Expansion Frame.

Figure 2-4. 9121 TCM Board

_ **Step 9** Now lets take a look at the **IOSP** (it looks like a PS2). Remove the side cover by turning the key and loosening the two screws.

_ **Step 10** Refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 and visually locate the following i tems at the IOSP.

- _ • Power Supply
- _ • Diskette Drive
- _ • Tape Drive
- _ • Battery and Speaker Asm
- _ • Logic Card Sockets
- _ • Fixed-Disk Drives (2)
- _ • System Board

_ **Step 11** Locate the IOSP Display. It is cabled directly to the IOSP.

_ **Step 12** Locate the IOSP **Power Sequencing Unit** (IOSP PSU). It is under the IOSP Display. The PSU will power the IOSP up and down from the System Power Panel.

_ **Step 13** Locate the Modem. It is cabled up to the IOSP through an adapter card.

_ **Step 14** Answer the questions on the next page about the 9121 locations.

1. There are two cables that leave the CPC at tailgate 01G, what are they connected to at the other end? (Refer to the introduction of this lab for a hint). _____

2. What Gate is located inside the 01E Gate? (That's right, a Gate within a Gate!). _____

_ Step 15

Replace the TCM Plenum and 01E Gate cover.

(This page skipped to align the following page.)

Answers to Questions

1. The IOSP and IOSP PSU
2. 01B

Exercise 3. Power On Sequence

What This Exercise is About

9121 Power On Sequence

What You Should Be Able to Do

After completing this exercise, you should be able to describe the events that occur during a normal power on sequence. You will be given a 9121, the on site documentation, and 30 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with the normal power on sequence up to Power On Reset.

You will power up the system and record the events during the power up sequence.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide, SY27-2609*
- *C01 9121 Service Information: Processor Controller Element Service Guide, SY27-2613*

_ **Step 1** If not already done, read the introduction for this Lab Exercise.

_ **Step 2** The system should already be powered off with all hardware in its normal state. Ensure that the Service Mode Enabled switch is in the Disabled position and reset CB1.

_ **Step 3** Be prepared to record the events during the power up sequence. Have one lab partner watching the System Power Panel and another watching the IOSP display. Also listen for contactors picking in the Primary Power compartment.

Note: You can use *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 Chapter 6 **Power On/Off Relative Timing** as a reference for the power on sequence.

_ **Step 4** Press the System Power On button!

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g.

h. _____

i. _____

j. _____

k. _____

l. _____

m. _____

n. _____

o. _____

p. _____

q. _____

You should have seen the IOSP do its Power On Self Test (POST) and IOSP initialize. Then the Primary Support Processor was initialized and IPLed.

During all this time Progress codes were displayed on the System Power Panel starting at 3050 and ending at 3151. The PCE Power Com-

plete LED blinked until the IPL started. The LED display eventually went blank.

After the Primary Support Processor was IPLed the Power On Reset was started from the CONFIG frame and the Central Processing Complex was powered up and initialized. The System Power Complete LED blinked until the System was powered up.

_ **Step 5** Use *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 section 2 for a description of the Progress Codes you recorded. If you were alert and fast enough you will find that the Progress Codes you recorded should match the codes listed starting with 3050 to 3151 and included all the ones in between.

Exercise 4. Console Familiarization

What This Exercise is About

9121 Console Familiarization

What You Should Be Able to Do

After completing this exercise, you should be able to operate the IOSP Console. You will be given a 9121, the on site documentation, and 90 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with Console operations.

Make sure that all lab partners get a chance to operate the console.

You should have a good feel for Console operations at the end of this exercise so don't take any short cuts. Good console skills is a necessity to effectively service the 9121 Processor Complex.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide*, SY27-2609
- *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613
- *D02 9121 Service Information: Frames, Part 1*, SY27-2617
- *D03 9121 Service Information: Frames, Part 2*, SY27-2622

Consoles

_ **Step 1** If not already done, read the introduction for this Lab Exercise.

_ **Step 2** **Warning:** Make sure you read the entire step before performing any actions within that step to prevent missed information and mistakes!

_ **Step 3** Take a couple of minutes and look over the keyboard attached to the IOSP (that thing that looks like a PS/2). Be sure to note that many keys have alternate functions when used with the ALT key.

Many of the PF keys also perform a labeled function ("END" is also PF3 - no upper case key needed).

B01 9121 Service Information: Service Guide, SY27-2609 Chapter 3 has information on Console oper ations and functions of individual keys if you need a reference.

Assigning Consoles

_ **Step 1** Find the Assign Console key labeled "AsCon" and press it (with the "ALT" key). The Console Assignment frame should be displayed.

IMPORTANT

This is the only way the Console Assignment frame can be displayed, with one exception. If the "SwCon" key is pressed and no other Console is assigned, the Console Assignment frame will be displayed.

_ **Step 2** Note the PHYSICAL DEVICE PORT. It should be "A."

_ **Step 3** There should already be an arrow next to the "A1 system" selection and the port should be "A."

_ **Step 4** At the COMMAND line enter "A1." The arrow should have gone away and the Port should be blank. You just "de-assigned" the System Console.

De-assign any other Consoles that may be assigned to port "A" (no arrow beside the selection)

_ **Step 5** The Console selections on this screen can all be assigned to this Port as they represent a logical console assigned to a physical Port.

Assign the System Console again by entering "A1" at the COMMAND line.

Activate the System Console by following the instruction at the lower part of the screen. A System Console frame should now be displayed.

_ **Step 6** Press the "SwCon" key along with the "ALT" key.

This is that exception mentioned earlier! The Console Assignment frame should be displayed again.

Assign the Service Console (do not de-assign the System Console).

Press the "SwCon" a few times and note that the console name (in the instruction to activate by using the "END" key at the lower part of the screen) will alternate between the two assignments.

Assign the Program Mode Console and use the "SwCon" key a few more times and watch the results.

De-assign the Program Mode Console **ONLY**.

_ **Step 7** Use the "SwCon" key if necessary and activate the System Console.

Press the "INDEX" key.

Note the name of the frame at the upper right hand of the screen. It is surrounded by parentheses (INDEX0).

Now use the "SwCon" key. You should be looking at a Service Console frame.

Press the "INDEX" key.

Note the name of this frame. It is surrounded by brackets <INDEX0>.

Handy Note

Later on you will find out that many of the same frames can be displayed on both the System and Service Consoles and the parentheses or brackets around the frame name can tell you what console you are working with.

_ ***Step 8*** You should now be able to assign Consoles or swap between Consoles with no problems. Take a minute and review any steps you are not sure about.

Service Console Frames

_ ***Step 1*** At this point you should be looking at the <INDEX0> frame of the Service Console. Make the appropriate assignment and select the INDEX0 frame if necessary.

_ ***Step 2*** Select each of the frames by entering the number of the frame at the COMMAND line. Take a quick look at each of the frames.

You will notice that some of these frames are indexes to even more frames. Don't go to deep into them yet as you will be using many of these later in the course to shoot bugs and complete Lab Exercises.

The "END" key will back out of the frames you are in until the INDEX0 screen is displayed again or you can use the "INDEX" key to get back immediately.

_ ***Step 3*** Take another look at the INDEX0 frame and note that under the heading "Service Mode" the indication is "OFF." This means that the System Console **Owns** the configuration (CP, Storage, Channels, etc). If Service Mode was **ON** the Service Console would **Own** the configuration and be available for **Servicing** (customer not running).

_ ***Step 4*** At the COMMAND line enter "F MPINDX." The "F" is a frame command that can be used to go directly to a frame instead of going through several indexes to get to a specific frame.

Note on the MPINDX frame that several options are X'ed out.

_ ***Step 5*** Use the F command to go back to the INDEX0 frame (F INDEX0). Find *D01 9121 Service Information: Service Language Commands*,

SY27-2615 and look up the description for the Service Language Command "SERVMODE." All Service Language Commands (SLCs) are entered at the COMMAND line.

_ **Step 6** Use the information in the SLC volume to turn SERVMODE **ON**.

Re-display the MPINDX frame. You should see a difference.

_ **Step 7** Display the INDEX0 frame on the Service Console.

Select the "ACCESS" frame. Access level 2 is the normal operating mode but like SERVMODE, Access Level 1 will enable even more functions and frames (not a whole lot more but a few).

Select the MANSVC frame, use the "F MANSVC" at the COMMAND line to get there or select it from the INDEX0 frame. This frame is another Index, look at "PTINDX." Here is an example that requires both SERVMODE **AND** Access Level 1 to be on.

_ **Step 8** Select the INDEX1 frame and take a quick look at the available frames this Index has to offer.

Now select the OPRCTL frame. This is the frame the Customer uses to IPL their operating system from.

Remember that with SERVMODE ON the Service Console **OWNS** the configuration.

Select the CONFIG frame.

_ **Step 9** Press the "VIEW LOG" key. This is the ConLog for the Service Console. The "Bkwd" and "Fwd" can be used to scroll through this log and you should recognize many of the entries in this log.

Priority Messages will also get put into this log as well as many other messages that you may need to see by displaying this log.

Use the "END" key to exit the ConLog.

System Console Frames

_ **Step 1** You should be starting to feel comfortable with selecting frames.

Select the "INDEX0" frame on the **System** Console.

Many of the frames are not available, such as CONFIG and OPRCTL.

What Console owns the configuration? Service

Use the SLCs volume if necessary to change SERVMODE to **OFF** (you can use the "END" key to end the "CERF" function for now).

_ ***Step 2*** Re-display the INDEX0 frame on the **System** Console. (this Frame has 2 parts - use the "FWD" and "BKWD" keys). You will be able to get to the CONFIG and OPRCTL frames now that the configuration has been returned to the System Console.

_ ***Step 3*** Take a quick look at the frames available to you from the System Console Index.

_ ***Step 4***

IMPORTANT!

With the Customer up and running the configuration can be given to the Service Console by turning SERVMODE **ON**. The Customer will **not** go down until you perform a diagnostic function however it is very dangerous to poke around with SERVMODE ON and the Customer running.

The Channel Swap procedure is used concurrently with Customer operations and SERVMODE ON, but is the **only** procedure we have SERVMODE ON with the Customer running.

_ ***Step 5*** The System Console also has its own ConLog (separate from the Service ConLog) and is accessed by using the "View Log" key also.

PCE Service Consoles

_ ***Step 1*** So far you have looked at the System and Service Console frames. These frames control and display information for the **Central Processing Complex** (CPC). Now we will look at Console frames that will control and display information for the **Processor Controller Element** (PCE). The PCE is another 370 Processor that gets IML'ed and IPL'ed. Its job is to **CONTROL** the CPC (the PCE IML's the CPC, for example).

Press the "SvPCE" key.

_ **Step 2** This menu allows you to select different sessions. The "PCE Consoles " session is what you have been working in prior to coming to this menu.

Select the "PCE Consoles" session. This is the screen you were at before pressing the "SvPCE" key.

_ **Step 3** Press the "SvPCE" key and select the "PCE Service Mode" session. This is the Processor Controller Operational Main Menu.

_ **Step 4** Look at each of the screen selections available from this Menu. Do **NOT** perform any of the functions available from the screens you look at. This is only a quick look at what is available to you and some of the functions can take the Customer **DOWN**.

_ **Step 5** One function you can do without taking the customer down is running "History Log Analysis." Use *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 Chapter 3 a nd find the procedure "How To Run History Log Analysis" Contact the Instructor if you have any questions or problems.

_ **Step 6** The format for selecting screens at the COMMAND line is now different in this session. The "F FRAME" does not work and SLCs do not work either in this session. You simply keep adding at the COMMAND line the next screen you are selecting.

Also note the "PF" keys functions at the lower portion of the screens. "PF2" will take you back to the Operational Main Menu.

_ **Step 7** Use the "SvPCE" key to go back to the session selection screen.

Handy Note

The "SvPCE" key is the **ONLY** way to exit a session and select another. Don't forget about this key when you need to change from one session to another. (System/Service Consoles to PCE Service Console for example).

_ **Step 8** Use the "SvPCE" key and bounce around a little bit between the sessions to get used to its operation.

The Takecons Command

_ Step 1 Select the "PCE Consoles" session (if not already in this session).

This session will allow you to select the "Console Assignment Frame"

Select the "Console Assignment" Frame.

_ Step 2 Use *D01 9121 Service Information: Service Language Commands*, SY27-2615 and look up the description of the SLC "TAKECONS" command. It only works when the Console Assignment Frame is displayed.

When there are optional displays installed they can be very far away from the IOSP display and it may be necessary to use this command to activate a console at the Port you are working from.(take the System Console to turn SERVMODE ON for example).

Try this command a few times using the alternate display to take a System or Service console from one display to another.

Handy Note

All service should be performed using the IOSP Display (Port A Display). The optional displays will allow the Service Console to be assigned but many of the functions will be restricted! Even with SERVMODE ON!).

Configuring the System

_ Step 1 Use your Console skills to:

- "Release the Configuration" using the "CONFIG" frame (Power On Reset will be "Required").
- Set the Mode to "LPAR"
- Select the "A2" IOCDS using the "IOCDSM" frame (the active IOCDS will change to "A2").
- Perform a "Power On Reset" using the "CONFIG" frame (Power On Reset will change to "Complete").

_ **Step 2** Now take the necessary steps to activate and do a POR with the "A1" IOCDS active.

Use the Account Book for your system and IPL the Customer Operating System (MVS).

Consoles Summary

_ **Step 1** Good Console skills are a necessity to effectively service the 9121 Processor Complex. You have now been exposed to the majority of Console screens and how to move around in them.

Later you will run diagnostics on the IOSP that will have even **MORE** screens specific to the IOSP.

Here are the KEY things to remember from this exercise:

- Console Assignment use.
- Frame selection use (from Index's or F FRAME).
- SLC use (there are a bunch and you don't put the "F" in front of them).
- SvPCE use (select a specific session).
- TAKECONS use. (may need it when optional displays are attached).
- The ConLogs (selected by the VIEW LOG key).
- General Keyboard use. (key locations and alternate functions).

Exercise 5. Concurrent Maintenance Mode

What This Exercise is About

9121 Concurrent Maintenance Mode Operations

What You Should Be Able to Do

After completing this exercise, you should be able to describe the events that occur during automatic disconnect and reconnect of the IOSP and also manually disconnect the IOSP. You will be given a 9121, the on-site documentation, and 30 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with Concurrent Maintenance Mode operations.

CMM may be entered automatically from error detection or manually. The IOSP may also be reconnected automatically depending on the type of error (recoverable or non-recoverable error). The Initial Power Controller card will power off and on the IOSP and reconnect it for recoverable type errors. In this exercise you will cause a recoverable error in the IOSP and also enter CMM manually.

Required Materials

You will need the following materials to complete this exercise:

- *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613

_ ***Step 1*** If not already done, read the introduction for this Lab Exercise.

_ ***Step 2***

> **IMPORTANT!**
>
> Make sure that the Operating system is running and the System and PCE Power Complete indicators are on and the Service Mode Enabled indicator is **off**!

_ ***Step 3*** Ensure Service Mode Switch is in the disabled position.

_ ***Step 4*** Use *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 as a reference and locate the PSPI card LC01. Locate a plunger type switch at the left side (near the cable connection) of this card. **DO NOT PUSH IT YET!**

_ ***Step 5*** Be prepared to watch what happens after you push the switch. Write down the different indications as they occur. Pay particular attention to the LEDs on the System and Service panel as well as the IOSP display. The switch causes a recoverable type error and the IOSP should reconnect automatically.

_ ***Step 6*** Press the switch!

a. 3000

b. 1. 3401

c. IOSP disconnected

d. display went blank

IML

3151

e. Up

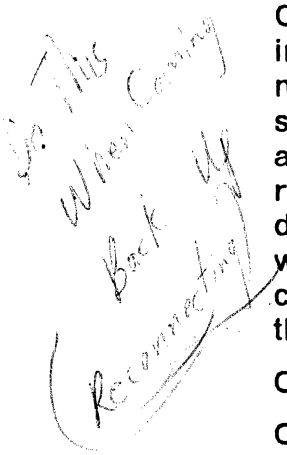
f.

You should have seen a few Reference Codes and Progress Codes during the disconnect and reconnection time. Use *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 and look up the codes in section 2 for a description of each code.

You should have also noted several messages indicated on the IOSP display. These messages let you know where the IOSP is at in the disconnect and reconnect sequence.

_ **Step 7** After the reconnection is complete (the IOSP Disconnected indicator will stop blinking and go off - and a message on the IOSP Display will indicate that the reconnection is complete also).

_ **Step 8** Use the "How To" section in Vol C01 to manually enter CMM. From the customer's Operating System Master Console, enter "CF CHP(XX),OFFLINE" while the IOSP Disconnect is in process. What is the result? The IOSP Disconnected indicator on the System Power Panel should go on solid. At this point the PCE is not in a "stall" condition and the system will continue to run with minimum PCE control (It was in this state during the auto exit and reconnect process as well). At the Operating System Master Console config a CHPID off and then back on (do not take the system down).



CF CHP(xx),OFFLINE

CF CHP(xx),ONLINE

_ **Step 9** **Continue to the next Lab Exercise**

Exercise 6. Remove/Replace

What This Exercise is About

This Lab Project will acquaint you with the documentation and procedures required to remove and replace FRU's in the IOSP.

What You Should Be Able to Do

After completing this exercise, you should be able to remove and replace the IOSP Fixed Disk Drives and SCSI Adapter using the correct procedures in the machine documentation.

Introduction

The Fixed Disks used in the IOSP are each 320 MB, 1/2 height drives. The drives are very sound in comparison to their usage in other applications and should not give you any problems in the IOSP. As with any hardware that is subject to failure, the main thing to keep in mind is that they are packaged very dense and must be handled carefully as per the WARNING on page 4-35 of PCE Service Guide 1 - Procedures. Be sure to follow all ESD procedures when working with electronic components of the IOSP.

Required Materials

You will need the following materials to complete this exercise:

Maintenance Library

- On-site Documentation

Fixed Disk Drive Assembly Remove and Replace.

_ *Step 1*

Refer to the ***Fixed Disk Drive (IOSP-FD01 or IOSP-FD02)*** removal procedures in ML Vol. C01.

Warning: Read the first warning under ***Fixed Disk Electronics Assy. Removal.*** This note should be in any area which mentions handling the drives. Then return to ***Fixed Disk Drive (IOSP-FD01 or IOSP-FD02)*** Removal Procedures.

Fixed Disk Drive

Warning: Before beginning this procedure, do the following:

- Review ***Safety*** in ML Vol. C01.
- One of the most important things involving IOSP maintenance is the fact that you can perform most functions concurrent with customer operations. The reference to this fact was omitted from this level of Documentation.

  The System should already be in Concurrent Maintenance Mode from the previous Lab Exercise. Refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 ; Chapter 3, to enter Concurrent Maintenance Mode (CMM) if necessary and to power off the IOSP. After the power is disconnected to the IOSP continue with the procedure.

_ *Step 2*

Perform the necessary steps to remove the Fixed Disk Drive (rear bay).

_ *Step 3*

Return to the Fixed Disk Drive (IOSP-FD01 or IOSP FD02) removal procedure and read the following note.

Note: Once you have the Drive Assembly out of the machine, refer to Fixed Disk Drive (Rear Bay) and Fixed Disk Drive Electronics Removal procedures. Read the WARNINGS and NOTES carefully as

you go through the procedures using the assembly as reference. Please DO NOT take the assembly apart.

Now return to the ***Fixed Disk Drives (IOSP FD01 or IOSP FD02)*** procedure and replace the assembly.

Do not take the IOSP out of CMM or power up until the project is complete.

Part 2 of this Lab Project is to remove and replace the IOSP SCSI adapter.

IOSP SCSI Removal/Replacement

Refer to the locations section of ML Vol. C01 and locate the SCSI adapter.

Using the procedures under ADAPTERS in ML Vol. C01 "Removals and Replacements", remove and replace the SCSI adapter.

Note: Read all warnings prior to beginning this procedure.

Adapter Removal.

Ensure the IOSP is still in Concurrent Maintenance Mode (CMM) and power is off.

_ ***Step 1*** Perform the first 4 bullets.

You have now removed the adapter. Take a look at the card and into the IOSP and locate the contacts and guides used.

IOSP SCSI Adapter Replacement

_ ***Step 1*** Perform bullet 5 (reverse the steps of the removal procedure).

Be sure all covers are replaced and all tools are removed from the machine. Be sure no one is endangered when power is applied.

PLEASE LEAVE IOSP IN CONCURRENT MAINTENANCE MODE AND CONTINUE WITH NEXT PROJECT.

Study Questions

1. IOSP power is turned off from the _____ .

2. T F The terminator must be installed on Drive 2.

3. From the following, select the correct statements concerning Adapter Removal and Replacement in the IOSP.

   1. There is one screw to be loosened.
   2. To remove the adapter, grip the card at both ends and lightly rock it out of the contacts.
   3. Leave any cables attached to the adapter as there is room remove it with the cables.
   4. Make a note of the adapter and cables for reference when replacing.

   a. 2,4
   b. 1,2,4
   c. 1,3,4
   d. all of the above

4. The IOSP may be powered off and on anytime while in _____ .

Answers to Questions

1. service panel
   Ref. IOSP Concurrent Maintenance Mode Vol. C01.

2. F
   Ref. DASD Replace Procedure, Vol. C01

3. b
   Ref. IOSP Concurrent Maintenance Mode, Vol. C01.

4. CMM Mode

Exercise 7. PCE Diagnostics

What This Exercise is About

PCE Diagnostic and Failure Analysis

What You Should Be Able to Do

After completing this exercise, you should be able to select the diagnostics available for the PCE and IOSP, according to the procedures in the documentation. In case of a failure indication you should be able to perform failure analysis.

Time to complete this project : 1.5 Hours

Introduction

Perform an IOSP checkout by using the Diagnostic Diskette. Following the procedures, this checkout is done in IOSP disconnected mode.

Simple failures are forced to become familiar with its indication and analysis.

Selectable tests after IOSP initialization are executed and its failure indications analyzed.

Required Materials

You will need the following materials to complete this exercise:

- *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613
- PCE Maintenance Diskette, P/N.....

_ ***Step 1*** Obtain the Maintenance Diskette.

_ **Step 2** Refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613; and perform the following procedure: ***How to Run IOSP Diagnostics.***

Note : The system should already be in CMM.

1. Have the IOSP self-tests been executed? Y Y/N.

2. What screen is displayed on the IOSP Console?
IOSP Diskette Main Menu

_ **Step 3** Remove the Maintenance Diskette and set the diskette for ***Write Protect***, and re-insert it. This will cause a failure indication during the diagnostic run.

_ **Step 4** On the IOSP Console Select "1" to get to the Diagnostic Select Menu.

NOTE : For the following steps including this step, display the Help-information ***PF1 key*** before any selection. This option is offered at the bottom of the display.

_ **Step 5** Refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613; and perform the procedure: ***Run Test All*** using ***Option 11, Test All*** .

For this test there is no pre-requirements necessary and also no intervention required.

Run time Approximately 5 minutes.

_ **Step 6** Analyze the test result:

3. What is the resulting message?
Testing Completed w/Error

4. What reference code is displayed? 40002510

NOTE : These types of reference codes are related to a Repair Action Log and not listed in the MAPs.

_ **Step 7** Refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613; Review the procedure ***Test all Results*** and analyze the ***Repair Action Log*** and the ***Error Log Summary PF9 in both cases*** .

5. What does the Repair Action Log indicate?

_____

Don't forget to use the HELP function!

Remove the diskette, release the "write protect" and reinsert it.

Note: The next step of this Lab Exercise will demonstrate how to run extended diagnostics on test groups that have extended diagnostics available to run (indicated by an "*").

_ ***Step 8*** Refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613;. Review the procedure ***Run Optional Tests*** and select/run the Multiport Adapter Wrap test.

6. What do the following letters in the Last Selection field mean?

TG: _____

TP: _____

FN: _____

FP: _____

7. What is the P/N of the 78 Pin Connector Wrap Plug?

_____

8. How did you get the answer for the previous question?

_____

_ ***Step 9*** Go to MAP 0250 in *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613. Run test 51 as described in Step 1. At step 3, select any valid port for wrap test. Do **not** install the wrap plug.

Analyze the resulting error information also using *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613; MAP 0250 : IOSP Multiport Error Isolation.

_ ***Step 10*** Now return to step 3 of the MAP and run the 25 pin wrap test on one of the ports using the correct wrap plug.

_ ***Step 11*** Since you had the DASD out of the machine it is a good idea to run "Surface Scan" on both fixed disks. Use the "How To" section in chapter 3 to run Surface Scan. While Surface Scan is running you will

have a minute to scan the other Fixed Disk utilities available as described in the "How To" section.

Note: Surface Scan may fail with false error(s). This is a known problem currently under investigation (11/12/91). Retry for successful completion.

_ ***Step 12*** Under Fixed Utilities perform the procedure using the tape at your system to **"Backup PCC Variable Facility Data"**.

Warning: Make sure you **DO NOT "RUN RESTORE PCC VARIABLE FACILITY DATA"** as this will **DESTROY DATA** by writing over the present data (the restore function should only be done with a known good Backup PCC Configuration tape).

_ ***Step 13*** Use the "How to Leave IOSP Concurrent Maintenance Mode" and return the IOSP to an operational state.

Warning: During the reconnection phase a message may appear indicating the **IOSP IML Complete. To start PSP IML and IPL select PSP LOAD SCREEN** .

This **SHOULD NOT BE DONE** when leaving CMM as it will force a **POWER ON RESET** of the CPC and take the customer **DOWN!**.

_ ***Step 14*** With the IOSP reconnected all functions are restored.

The next steps **WILL** eventually take the system down and are **NOT** concurrent maintenance items.

_ ***Step 15*** Select the "PCE Operational Main Menu" (How to select it is in *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 chapter 3).

_ ***Step 16*** From this frame the PSP tests can be selected and run with the "Service Mode" switch set to enable however this will take the customers operating system **DOWN!**

The next step is **NOT** concurrent.

_ ***Step 17*** Power off the **ENTIRE** system (System Power Panel). Remove the PCE Maintenance Diskette. Put the "Service Mode" switch on the System Power Panel to the **ENABLE** position.

Power on the PCE using the PCE Service Power On button (the System Power Power On button will not work) and watch the IOSP Display. The IOSP will IML Complete and stop at the "PCE Operational Main Menu " with a message indicating how to IML and IPL the PSP at the bottom.

_ **Step 18** Run the SVCH Wrap Test using the Tag service channel wrap block labeled "LAB PROJECT USE ONLY WRAP WILL FAIL" and a good Bus service channel wrap block to create an error. For the selection, refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 MAP 0410 Service Channel Wrap Test.

Note: The "SERVICE MODE" switch will have to be put in the "ENABLE" position.

_ **Step 19** Analyze the result. You can break down the reference code extension to find the failing pins and use Vol C01 Chapter 8 to determine the signal name(s).

_ **Step 20** Now rerun the SVCH Wrap Test with the a good Tag wrap block as well to see successful results.

_ **Step 21** Remove the wrap plugs and re-install the service channel cables.

_ **Step 22** Run PSP IML Test.

- From the PCE Operational Main Menu select: 3 - PSP Tests
- From the PSP Tests menu select: 1 - PSP IML TEST

The "How To" section also has the procedure for running the PSP IML Test and describes what tests will be run. This checks out the PSP area and is also used by the : "Verify Repair and End Repair Action - MAP. Refer to Vol. C01, MAP 0170.

Run Time : Approximately 5 minutes

_ **Step 23** Now power off the entire system again and have your instructor install a TA!

Summary

This LAB Project provided how to run:

IOSP Diagnostics

SVCH Wrap Test

Test IML

As well as displaying resulting Reference Codes and its analysis.

This completes this Lab Project.

(This page skipped to align the following page.)

Answers to Questions

1. Yes
2. Main Menu
3. Testing Completed with Error(s)
4. 4000 2510
5. Maintenance Diskette is Write Protected

-- Question 'X1186' unknown --

-- Question 'X1187' unknown --

6. TG: Test Group
   TP: Test Parameter
   FN: Function Number
   FP: Function Parameter
7. 09F1803
8. Help Function

Exercise 8. System EC and AQE Display

What This Exercise is About

9121 System EC and AQE Display

What You Should Be Able to Do

After completing this exercise, you should be able to display the System EC Level and display AQEs by Type and Time. You will be given a 9121, the on-sight documentation, and 20 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with displaying the System EC level and displaying AQEs by Time and Type. You should already possess the console skills required to select the correct screens.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide, SY27-2609*
- *D01 9121 Service Information: Service Language Commands, SY27-2615*
- *D02 9121 Service Information: Frames, Part 1, SY27-2617*
- *D03 9121 Service Information: Frames, Part 2, SY27-2622*

System EC Level

_ **Step 1** If not already done, read the introduction for this Lab Exercise.

_ **Step 2** **Warning:** Make sure you read the entire step before performing any actions within that step to prevent missed information and mistakes!

_ **Step 3** From the Service Console INDEX0 frame, select the "MPINDX" frame. (do you know another way to select this frame?).

_ **Step 4** This frame has the System EC information you need to reference prior to installing ECs or MESs. It can also be found on the "SYSDEF" and "ECSTAT" frames (System Console) and some of the EC PATCH frames (Service Console).

Display AQEs by Type

_ **Step 1** From the Service Console INDEX0 frame select the "MPINDX" frame (you may already be at this frame).

_ **Step 2** Select "A1 Action Queue."

_ **Step 3** Select "A1 Action Queue Entry Summaries."

_ **Step 4** Leave the "ALL" in the TYPE field (you could choose to display them by a specific type) and before you press the ENTER key take a look at the different types of AQEs.

_ **Step 5** The frame displayed will have the AQEs listed by TYPE. Take a look at the format of the screen and notice the TIME stamping (First Occ - Last Occ.) and the number of times this same failure has occurred (No Occ.)

AQEs by TIME

_ **Step 1** Now get back to the "AQ" frame and make the selection "A2 AQEIDs by Time Stamp."

_ **Step 2** Leave the default times in the TIME field (you can narrow the time down to the general time of a Customer) and press the ENTER key.

_ **Step 3** Take a look at the format of this screen. Note that the same AQEID can be repeated several times if the same failure occurred several times.

You do not get the TYPE of AQE from this frame.

_ **Step 4** There are several other frames related to AQE information. Take a look at the "AQE" frame. It has several other frames to display AQE related data. Some of these will require an AQEID in the AQEID field at the lower right.

_ **Step 5** One last item. These frames can be selected directly by using the "F FRAME" command at the COMMAND line of any Service Console Frame instead of going through several indexes or menus.

Exercise 9. Alter/Display FRU table and Open FRU Replace

What This Exercise is About

Alter/Display FRU table and Open FRU Replacement

What You Should Be Able to Do

After completing this exercise, you should be able to display the FRU Table by Location and Alter the Date of Install. Also you will perform the Open FRU replacement procedure and Validate the repair. You will be given a 9121, the on-sight documentation, and 55 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you FRU table and how to alter the data if necessary. You will also use the Open FRU replacement to replace a part and validate the repair.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide, SY27-2609*
- *D01 9121 Service Information: Service Language Commands, SY27-2615*
- *D02 9121 Service Information: Frames, Part 1, SY27-2617*
- *D03 9121 Service Information: Frames, Part 2, SY27-2622*

~~10384~~

10404

FRU Table

_ ***Step 1*** If not already done, read the introduction to this Lab Exercise.

_ ***Step 2*** **Warning:** Make sure you read the entire step before performing any actions within that step to prevent missed information and mistakes!

_ ***Step 3*** If you need part number information for CPC parts the FRU table is a very good reference.

From the Service Console select the "MPINDX" frame and make the selection for "FRU Data"

_ ***Step 4*** Use the Location selection to obtain the Part Number and FEID of the part located at 01F-A1C2. Write down the information.

Location	01FA1C2
Part Number Type	S471062
FEID	2A00
Install Date - How	14/10/92

_ ***Step 5***

With the information recorded you can also get FRU Data by the FEID and Part Number selections as well.

Substitute part information may also be included for a given part number using this frame.

_ ***Step 6***

Now use the ALTER function to alter the Date installed to the current date.

Open FRU Replace

_ **Step 1** Use *B01 9121 Service Information: Service Guide*, SY27-2609 MAP 0310 Open FRU Replacement and perform Open FRU Replacement on the part you just altered and the date installed. Use the **"Part Number"** option for FRU to replace and select the location as noted above.

NOTE

Do **not** remove the part from the machine during the FRU Replacement procedure. The purpose of this exercise is to show you the procedure for Open FRU Replacement. Make sure you follow all steps including **END OF CALL** and use PMR #99999 and the AQE you generated to fill out the "CERF" frames.

Exercise 10. Manual Diagnostics

What This Exercise is About

Manual Diagnostics

What You Should Be Able to Do

After completing this exercise, you should be able to select and run manual diagnostics as required by Install, EC, MES and the Remote Support Center. You will be given a 9121, the on-sight documentation, and 55 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with the available manual diagnostics and how to select them. You will be directed to these diagnostics by Install, EC, and MES instructions as well as the Remote Support Center.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide, SY27-2609*
- *D01 9121 Service Information: Service Language Commands, SY27-2615*
- *D02 9121 Service Information: Frames, Part 1, SY27-2617*
- *D03 9121 Service Information: Frames, Part 2, SY27-2622*

Manual Diagnostics

_ **Step 1** If not already done, read the Introduction to this Lab Exercise.

_ **Step 2** **Warning:** Make sure you read the entire step before performing any actions within that step to prevent missed information and mistakes!

_ **Step 3**

From the Service Console select the "MPINDX" frame and make the selection for "For Installation" (SERVMODE must be ON).

_ **Step 4** Some of these tests will take quite some time to run. for now, lets just run the Processor Memory manual diagnostic.

_ **Step 5**

You will run the "Install" manual diagnostic later when you do the 9121 install Lab Exercise.

The PCX manual diagnostic runs much the same way as the Storage diagnostic did, only it takes about 30 minutes to complete.

All these diagnostics will generate an **AQE** if there is a **failure** and the normal method of resolving AQEs should be used to repair the failure.

_ **Step 6** Go back to the MPINDX frame and select the manual diagnostic "For Storage (PMAD)"

_ **Step 7** On this frame you can select specific diagnostics to run against storage and look at Files containing information on storage errors.

Select the PME (0)

Select the PMA (X)

Select and run the "Basic" test. For information on these tests refer to *D02 9121 Service Information: Frames, Part 1*, SY27-2617

_ ***Step 8*** Go back to the PMAD frame and select "File Management" under the heading EXECUTION CONTROL.

Browse the different logs that are available to you.

_ ***Step 9*** Use the "END" key to return to the MPINDX frame. You will run the channel diagnostics later in the course.

_ ***Step 10*** Turn SERVMODE to OFF

Exercise 11. Channel Component Locations

What This Exercise is About

9121 Channel Hardware Locations

What You Should Be Able to Do

After completing this exercise, you should be able to locate the major components of the Channel Subsystem. You will be given a 9121, the on-sight documentation, and 15 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with the many components that make up the Channel Subsystem. You will get a quick look at the TCM, Cards, Boards, and Cables that are associated with Channels.

Required Materials

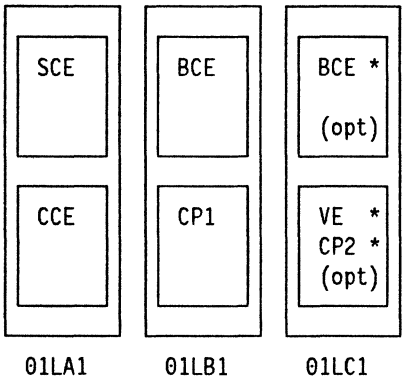
You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide, SY27-2609*
- *B04 9121 Service Information: Processor Service Guide Part 3, Input/Output, SY27-2612*

Channel Hardware

_ **Step 1** If not already done, read the introduction for this Lab Exercise.

_ **Step 2**



Locate the Channel Control Element TCM

_ **Step 3** Use *B04 9121 Service Information: Processor Service Guide Part 3, Input/Output*, SY27-2612 Chapter 2 and locate the cables and cards in the following steps.

_ **Step 4** Locate Adapter Cards 00, 01, 02, and 07 in gate 01F.

_ **Step 5** Locate Parallel Channel Cards for CHPIDs 00 - 0B in gate 01F.

_ **Step 6** Locate Fiber Channel Cards for CHPIDs 1C - 1F in gate 01F.

_ **Step 7** Locate the Cable connections from Adapter Card 01FA1B2 WXYZ at the other end. Three go to the CCE TCM board and one to the Service board (LSA and SDS data and controls)

_ **Step 8** Locate the Cable connections between Channel Card 01FA1C2 WXYZ and the I/O tailgate 01H Bus and Tag connector blocks.

_ **Step 9** Locate the same Cards and Cables in the 01P gate. (Adapter Cards 03, 04, 05, and 06. CHPIDs 0C to 1B).

Exercise 12. Activate LPAR and IPL Partition 1

What This Exercise is About

The purpose of this exercise is to become familiar with LPAR and the SLC's related to LPAR operations.

What You Should Be Able to Do

After completing this exercise, you should be able to activate LPAR with the correct IOCDS selected and perform configuration and operational functions.

Introduction

In this Exercise you will activate LPAR and IPL partition 1 using the LPAR IOCDS and the Orange book for the IPL procedures. You will look at the "LPDEF" and "LPCHNA" frames which are used to define and control partitions.

Required Materials

You will need the following materials to complete this exercise:

- The 9121 Orange Book
- *D01 9121 Service Information: Service Language Commands*, SY27-2615
- *D02 9121 Service Information: Frames, Part 1*, SY27-2617
- *D03 9121 Service Information: Frames, Part 2*, SY27-2622

Directions to the student

Activating LPAR

__ **Step 1** Release the configuration using the "CONFIG" frame.

__ **Step 2** Select and activate the correct IOCDS for LPAR mode using the Orange Book.

_ **Step 3** On the "CONFIG" frame make sure that the maximum amount of Central Storage and no Expanded storage is selected.

_ **Step 4** Select "LPAR" mode and initiate a POR.

The POR sequence is the same until the last part when LPAR activation begins. If no changes have been made to the Partitions definitions from the last time LPAR was activated the partitions will automatically activate. If any changes were made the POR will stop and the "LPDEF" frame will be displayed.

_ **Step 5** When the POR is complete select the "LPDEF" frame if not already at this frame.

_ **Step 6** Use the "A" and "C" options to display "One Partition" for each of the Partitions on your system.

Note the Partition ID, mode, amount of storage, and CPs.

_ **Step 7** Use the "C" options to display "Storage"

Pay close attention to the Defined, Assigned, and Configured amounts of storage. LPAR will take between 4 to 6 meg of storage reducing the total amount available for assigning.

_ **Step 8** Deactivate (if partitions are active) and activate the partitions on your system using this frame.

If no changes are made to the partition definitions the next time a POR in LPAR mode is done the partitions will automatically activate.

_ **Step 9** Take a look at the lower left of the display. The partition name (LXP1 for example, the X = your system number) should be displayed. Many of the System Console frames are now specific to the partition displayed in that area, such as the "OPRCTL" frame. If you wanted to work with the other partition you need to use the "SETLP" SLC to select it (SETLP L1P2 for example). You can use the SLC Service Guide for more information on this SLC if necessary. Try it out and switch between the partitions a couple of times.

_ **Step 10** Now IPL partition 1 on your system using the "OPRCTL" frame. Use the "SETLP" SLC to select the partition. (LXP1, the X = your system number).

_ **Step 11** In order to perform the following steps. Locate the "OPERATING GUIDE" manual and turn to "Reconfiguring Channel Paths for Logical

Partitions" in Chapter 6-23. Follow these instructions to reconfigure channel paths for logical partitions.

_ **Step 12** Take a look at the "LPCHNA" frame on the System console. This frame shows you what CHPIDs are configured to each partition (as defined in IOCDS) and which ones are reconfigurable (also defined in IOCDS).

_ **Step 13** Pick one of the reconfigurable CHPIDs and reconfigure from one partition to the other. If the operating systems are XA the "CF" command can be used at the master consoles to move the CHPID over. Otherwise you will need to use the CHPID OFF SLC to get the CHPID off of the current partition it is on and then switch to the other partition to put it on.

Since only one partition is IPLed use the MVS CF command for that partition. You will have to use the CHPID OFF/ON SLC for the other partition.

_ **Step 14** Verify by re-displaying the "LPCHNA" frame that you reconfigured the CHPID to the other partition.

_ **Step 15** Now put the CHPID back to its original partition.

_ **Step 16** To prevent operators and passers by from IPLing or performing other catastrophic functions to a partition a "LOCKLP" and "UNLOCKLP" SLC is provided. Use the SLC Service guide for information on these SLCs and try them out on your system!

The Customer can have up to seven partitions running at one time!

Exercise 13. IPL Flow, IOPD Frames and MVS Commands

What This Exercise is About

IPL Flow, IOPD Frames and MVS Commands

What You Should Be Able to Do

After completing this exercise, you should be able to use the IOPD frames and MVS commands to determine status of devices, paths to devices and CHPIDs for your configuration during and after IPL.

Introduction

This lab exercise will demonstrate the flow of an MVS IPL and the MVS commands used to display device and channel path status.

You will also use the IOPD frames to display path information during the MVS IPL and after MVS is running.

You can use the "Redbook" chapter 5 as a reference for the IPL flow and the MVS System Commands and messages books for detailed information.

Required Materials

You will need the following materials to complete this exercise:

- *IBM ES/3090 Complex Systems Recovery and Availability System Recovery Procedures,Chapter 5, GG24-3346*
- *MVS/ESA System Messages Vol 1, GC28-1812*
- *MVS/ESA System Messages Vol 2, GC28-1813*
- *MVS/ESA System Commands, GC28-1826*
- *MVS/ESA System Codes, GC28-1815*

IOPD Frames and MVS Commands

_ **Step 1** Verify the 9121 is in ESA390 mode with the non LPAR IOCDS active and POR is complete.

_ **Step 2** From the System console perform a system reset clear by entering at the command line "SYSRESET CLEAR"

_ **Step 3**

Select the I/O Problem Determination frame (IOPD)

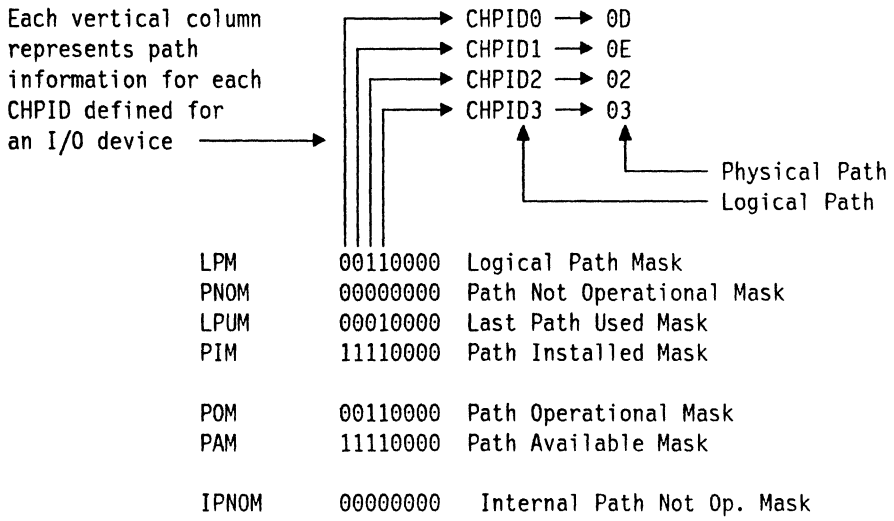
Select the Subchannel Status frame.

Use the device number of the IPL pack for your system (found in the orange book) and display its subchannel status.

_ **Step 4** Note the following fields:

Absolute Addr	07FF B300	The address of the subchannel in HSA (from POR).
Irpt Parm	0000 0000	The virtual address of the UCB (0s if not connected)
Subch No.	036	Assigned during POR
Device No.	0A6	This can be a random number (defined in IOCDS by the IODEVICE ADDRESS
Unit Addr	A6	The address of the control unit and device (physical address)
Enabled	0	A "1" indicates the subchannel is available for use (currently 0)
Multipath	0	A "1" indicates DPS arrays are initialized and DPR is active for DASD devices.

_ Step 5 Use this diagram for help in understanding the relationship of the path information.



_ Step 6 Now note these fields for your device currently displayed:

LPM	1111 0000	Logical Path Mask (the software will modify this for path selection). A "1" indicates the path is available.
PNOM	0000 0000	Path Not Operational Mask. A "1" indicates CC3 (select in) was received the last time this path was used. PNOM gets reset before every START SUBCHANNEL.
LPUM	0000 0000	Last Path Used Mask. The last path that was used.
PIM	1111 0000	Path Installed Mask. A "1" indicates the path is defined in IOCDS.
POM	1111 1111	Path Operational Mask. A "0" indicates CC3 (select in) was received the last time this path was used.
PAM	1111 0000	Path Available Mask. A "1" indicates the CHPID is ONLINE.

_ **Step 7** Find the 3880s for your systems DASD and disable paths (CHPIDS) 02 and 03. Use the storage director switch configuration diagram on the 3880s to determine what switches to disable. 30(D) 32(D)

_ **Step 8** From the System console enter "LOAD CP1 XXX C" (XXX = your IPL device).

_ **Step 9** Press the "REFRESH" key on the system console after the message appears indicating the IPL failed and determine what changed.

LPM	
PNOM	
LPUM	
PIM	
POM	
PAM	

(Part of the HARDWARE IPL OPERATION is to write "FF" into the LPM. MVS/XA uses the specific LPM (First LPUM which performs a succesful Device Level Selection to the IPL device) to load the BOOT-STRAP. If the IPL device is DASD, Command '02' will perform a seek to Cylinder 0, Head 0, then READ Record 1 on this track. You will see this in step 12.)

Note: Answers to questions are at the end of this Lab Exercise.

1. What three fields changed? LPM PNOM and POM

2. Why did PNOM and POM change? Tried to IPL from
(Hint, CHPID 0D and 0E are terminated at the 9121).

_ **Step 10** Look at the "Enabled" field. It has changed to a "1".

During the initial load, the subchannel for the IPL device will be enabled. A few seconds after the IPL has begun, all other subchannels will be enabled after the "Device Mapping" is complete.

Take a look at the "Enabled" field for your DASD work pack device which is the IPL device number + 1 (eg. IPL device = 2A0, the work pack is 2A1). It should be "0" since the IPL failed and device mapping did not happen.

_ Step 11 Re-enable the paths at the 3880s and perform another system reset clear.

Start another IPL by using the command "LOAD CP1 XXX C" again. **Do NOT reply to the message "Specify System Parameters" yet!**

_ Step 12 When the message appears on the Master Console "Specify System Parameters" (**do Not reply to it yet**) display the subchannel status again for your IPL device and note the changes:

LPM	
PNOM	
LPUM	
PIM	
POM	
PAM	

3. Do the POM and PNOM fields agree? _____

The PNOM field acts as an interrupt to MVS and is reset right away to zero. Earlier you saw this field with 1s because MVS was not up!

4. What path is available for use? (indicated by the LPM bit)

_____

5. Why isn't CHPID 0D and 0E available for use (LPM)?

_____

_ Step 13 At this point Device Mapping and Non DASD Pathing (channel activity) to all non DASD devices gen'ed online has completed.

If you look at the subchannel status for your console device (C20) and DASD work pack you will find they are now enabled.

Also the "Irpt Parm" now contains the virtual address of the "connected" UCB.

DASD pathing is next.

_ ***Step 14*** Re-display or refresh the subchannel status frame for your IPL device and note that only one path is available in the LPM. MVS will use the first good path only until DASD pathing is done.

Hit the enter key on the Master console to respond to the "Specify System Parameters" message.

Do NOT reply to the message "Specify Master Catalog" yet!

_ ***Step 15*** Refresh the subchannel status frame again and look at the change in the LPM.

_ ***Step 16*** Now reply to the message "Specify Master Catalog" by hitting the enter key on the Master console and refresh the subchannel status frame several times.

_ ***Step 17*** Reply to the Time Of Day prompt by entering "R 00,U."

After a few seconds the "Multipath" field will change to a 1 indicating that the DPS arrays have been initialized and DPR (Dynamic Path Reconnect) is active.

Refresh the subchannel status frame to see this.

Although 3480s have DPS arrays only 3380/3390 DASD devices are capable of DPR (dynamic path reconnect).

_ ***Step 18***

IPL THE SYSTEM COMPLETELY. ANSWER ALL REPLYS AND START MVSREC.

_ ***Step 19*** LAB PROJECT CONTINUES ON NEXT PAGE

_ Step 20

With MVS running you can now use "Vary" and "Config" commands as well as all the other MVS commands.

Use the "DEVSERV" command to check the path status of your work pack (DS P,XXX) and record it below.

CHPID 0D ___ CHPID 0E ___ CHPID 02 ___ CHPID 03 ___

Use the "D M=dev(XXX)" command and record its data.

Display the IOPD SUBCHANNEL and record its data also.

Note: REMEMBER TO USE THE "REFRESH" KEY TO REDISPLAY THE IOPD SUBCHANNEL

D M=dev(XXX) IOPD

UCB/CHP	0D	0E	02	03	UCW/CHP				
PATH ONLINE					LPM				
CHP PHYSICALLY ONLINE					PAM				
PATH OPERATIONAL					POM				

_ Step 21

At the MVS Master console vary a path off to your work pack on CHPID 03 (use the following for an example).

v path(XXX,03),offline (XXX = the device number of your work pack)

Note that the POM field now shows paths 0D and 0E are good again. This happened when you varied the path offline to the work pack.

"Vary Processing" resets the POM field back to its default state. When path activity occurs for this device it will get updated again to not operational.

Display and record the results.

D M=dev(XXX) IOPD

UCB/CHP					UCW/CHP				
PATH ONLINE					LPM				
CHP PHYSICALLY ONLINE					PAM				
PATH OPERATIONAL					POM				

_ Step 22

6. How many paths are available to your work pack? ___

_ Step 23

Use the "DS P,XXX" command to display path information for your work pack again.

CHPID 0D < CHPID 0E < CHPID 02 + CHPID 03 4 Logically off or physically

D M=dev(XXX) IOPD

UCB/CHP	01	0E	02	03	UCW/CHP	01	0E	02	03
PATH ONLINE	N	N	Y	N	LPM	0	0	1	0
CHP PHYSICALLY ONLINE	Y	Y	Y	Y	PAM	1	1	1	1
PATH OPERATIONAL	N	N	Y	Y	POM	0	0	1	1

7. Why did the POM field change?

Created path group with DS command

(Hang in there, we,re almost done!)

_ Step 24

Config CHPID 03 offline using the MVS command "CF CHP(03),offline" and refresh the subchannel status frame.

D M=dev(XXX) IOPD

UCB/CHP	01	0E	02	03	UCW/CHP	01	0E	02	03
PATH ONLINE	Y	N	Y	N	LPM	0	0	1	0
CHP PHYSICALLY ONLINE	Y	Y	Y	N	PAM	1	1	1	0
PATH OPERATIONAL	Y	N	Y	-	POM	0	0	1	1

8. In the IOPD SUBCHANNEL what field other than the LPM changed?

PAM

The Config command takes the CHPID offline to both MVS and the 9121 (you can verify this on the "Channel Summary Status" frame).

_ Step 25

Config CHPID 03 online using the MVS command "CF CHP(03),online" and refresh the subchannel status frame.

In this and the previous step all paths on CHPID 3 have been offline and online to all devices on this CHPID. The Config command handles all the vary path processing.

Display and record the results.

D M=dev(XXX) IOPD

UCB/CHP					UCW/CHP				
PATH ONLINE	N	N	Y	Y	LPM	0	0	1	1
CHP PHYSICALLY ONLINE	Y	Y	Y	Y	PAM	1	1	1	1
PATH OPERATIONAL	N	N	Y	Y	POM	0	0	1	1

In the next step you are going to "Steal" the CHPID.

_ Step 26

At the System console use the Service Language Command "CHPID 03 OFF" and refresh the Subchannel Status frame to display the current path information for your work pack.

D M=dev(XXX) IOPD

UCB/CHP					UCW/CHP				
PATH ONLINE	N	N	Y	Y	LPM	0	0	1	1
CHP PHYSICALLY ONLINE	Y	Y	Y	N	PAM	1	1	1	0
PATH OPERATIONAL	N	N	Y	Y	POM	0	0	1	1

9. What field changed? PAM

The LPM field has not changed because MVS is unaware that the CHPID is OFF yet!

You may also notice some indications on the MVS Master console that MVS is having some problems.

When ever possible always use the Config command to get CHPIDs offline.

_ Step 27

Use the proper commands to get CHPID 03 back online and verify good pathing for both your IPL and work pack devices.

Indicate the results of the "DS P" and "D M=DEV" commands below.

IPL Device:

DS P,XXX

CHPID 0D < CHPID 0E < CHPID 02 + CHPID 03 +

D M=dev(XXX) IOPD

UCB/CHP					UCW/CHP				
PATH ONLINE	N	N	Y	Y	LPM	0	0	1	1
CHP PHYSICALLY ONLINE	Y	Y	Y	N	PAM	1	1	1	0
PATH OPERATIONAL	N	N	Y	Y	POM	0	0	1	1

Work pack device:

DS P,XXX

CHPID 0D < CHPID 0E < CHPID 02 † CHPID 03 †

D M=dev(XXX) IOPD

UCB/CHP	0D	0E	02	03	UCW/CHP	0D	0E	02	03
PATH ONLINE	N	N	Y	Y	LPM	0	0	1	1
CHP PHYSICALLY ONLINE	Y	Y	Y	Y	PAM	1	1	1	1
PATH OPERATIONAL	N	N	Y	Y	POM	0	0	1	1

_ ***Step 28*** This concludes this Lab Exercise!

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Answers to Questions

1. LPM
   PNOM
   POM
2. CC3 (select-in received on all paths)
3. No
4. 02
5. POM is 0 for these paths
6. only 1!
7. The DEVSERV command caused channel activity
8. PAM
9. PAM only!

Exercise 14. Power Sequence

What This Exercise is About

Power On/Off Boundaries.

Also included in this Project, How to run P/T Diagnostics.

What You Should Be Able to Do

After completing this exercise, you should be able to power on/off the power boundaries manually. You should understand the dependency of some boundaries to others to control them manually in the correct sequence. You should also be able to select the P/T Diagnostics and P/T - Alter/Display functions and run them as directed by RSC.

Time to complete this project: 1.0 hour

Introduction

Power down the power boundaries manually and determine which of them need to power off prerequisite boundaries.

When the CPC is powered down, this state of the 9121 is used to run P/T - Diagnostics because this is a prerequisite. You will also be familiarized with the P/T - Alter/Display frames.

Power on the boundaries again according to the rules of the prerequisite boundaries.

Required Materials

The following materials are required to complete this exercise :

- *D02 9121 Service Information: Frames, Part 1*, SY27-2617

__ **Step 1** Power on the 9121 if not already done. Verify for completion by the System Power Complete light being on "Solid'.

_ **Step 2** Set SERVMODE to On.

_ **Step 3** Assign the Service Console to the IOSP - Console, then select the PWRCON frame.

_ **Step 4** Try to power off any of the following boundaries :

a. Boundary - Channel Logic 1

b. Boundary - Storage Logic

c. Boundary - CP1/SCE/CCE

1. What is the resulting message in all cases (view log)?

power off

_ **Step 5** Determine the prerequisite boundaries to be powered off for the following boundaries :

2.

	Prerequisite boundary
Channel Logic 1:	A6
Storage Logic:	A4
CP1/SCE/CCE:	A5 A4 A6 A3
PWR Compartment 1:	

_ **Step 6** Ensure all boundaries are powered off.

NOTE : This can be done with option ***B3*** , also if NOT all boundaries up.

3. Which blowers/fans are running in the 9121 at this time?

B04 Fans

4. Which boundary has AC Voltage Present?

_____

_ Step 7 Because CPC Power Off is a prerequisite to run P/T - Diagnostics, these are run next.

Select in the following sequence:

a. INDEX - frame on the Service Console

b. MANSVC - frame

5. What prerequisite is required to enable the PTINDX - frame selection?

_____

Activate Access - Level 1 and select the PTINDX - frame.

_ Step 8 Select the PTDIAG - Frame and run all Diagnostics.

NOTE : What diagnostics to apply depends on the P/T-Fault situation and is determined by RSC.

_ Step 9 Return to the PTINDX - Frame and select the remaining display-frames for familiarization. Observe the contents of these frames, do NOT execute any option!

- ADPTIR
- ADPTR
- PTCMD

NOTE : Any option given on these frames will only be used under direction of RSC.

_ Step 10 Return to the PWRCON - Frame.

6. Is it possible to power on the boundary Storage Logic as the only boundary? _____

7. Why? _____

_ Step 11 Power On the 1st boundary AC PWR Compartment 1.

8. What component in the P/T hardware causes AC Voltage to be applied to all boundaries? _____

9. Are all of the blowers/fans running in the 9121 with only the 1st boundary powered up? _____

_ ***Step 12*** Power On all boundaries.

_ ***Step 13*** Perform command ***B4*** :

Recycle the Channel Interface.

NOTE :A prerequisite is that all installed Channel Interfaces must be powered on. This option performs: Reset Channel Interface

_ ***Step 14*** Return the 9121 to normal operation.

a. Set SERVMODE to off.

b. POR if required.

This completes this Lab Project.

(This page skipped to align the following page.)

Answers to Questions

1. Power off prerequsite boundaries
2. Channel Interface 1
   Storage Array
   All Boundaries 3 to 6 (or 7)
   All Boundaries 2 to 6 (or 7)
3. B04A&B (Service Gate)
4. AC Power Compartment 1
5. Service Console must be Access level 1
6. No
7. Needs Prerequisite boundaries 1 & 2 powered up
8. Contactor K1
9. Yes

Exercise 15. Power Locations

What This Exercise is About

Location and identification of power components.

What You Should Be Able to Do

After completing this exercise, you should be able to identify and locate the power components in the 9121. This includes tracing the cabling in the power subsystem as documented in the on-site documentation. You should also verify the AC-Input to the 9121 according to the primary power specifications. The usage of any special tool in the 9121 power subsystem should be demonstrated.

Introduction

DANGER

Wall Power MUST be removed from the 9121 before beginning this project.

Attention! This is *very* important! ***Ask your instructor to turn off the wall breaker to your 9121 system.***

Follow the procedures as outlined in *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 to insure that **AC POWER** is not present. Power components on the level of Field Replaceable Units will be located and identified. This requires the use of all maintenance documents related to the power subsystem.

Power cables are located in the 9121. They can be identified with the help of the on-site documentation.

At the end of this project Wall Power is applied again to the 9121 and the AC-Input is verified to be within specification.

Required Materials

The following materials and tools are needed to complete this project :

- *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611
- Installation Manual
- Fluke Multimeter

_ **Step 1** Power down the 9121.

_ **Step 2** Disconnect Wall Power.

Read the section "Power-Off Maintenance" in *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Safety section, and perform the pro cedure to ensure voltage input to the 9121 has been removed for your safety.

_ **Step 3** Primary Power Compartment (PPC) and Base Power Supply (PS12)

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Chapter 3: Removal /Replacement Procedures Section: Base Power Supply and locate the following:

_____ CB1, CB2, CB3, CB4, CB5

_____ Contactors K01, K02, K03

_____ Contactor Driver Card

_____ Base Power Supply PS 12

_____ Power Cable Connectors

- 1/PS12 - J1 (AC)
- 1/PS12 - J2

_____ Test Points at PS12

_____ Green LED at PS12

_ **Step 4** The +5V from PS12 to the IPC card are fed via cabling:

_____ 1/PS12 - J2 to PPC 01C-J10 to IPC 01B-A3J3

_ **Step 5** Four Output Power Supply (PS01)

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Chapter 3: Removal/ Replacement Procedure Section: Four Output Power Supply and locate:

_____ Control cable at connector J3

_____ Sense Cable at connector P5

_____ Unused connector position J6

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Section ***Channel Cap Assembly*** and locate:

_____ Channel Cap Assembly, 01M/A01

Note: This component provides the cable connection between PS01 and the channel boards.

__ ***Step 6*** Service Multi Output Power Supply

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Removal/ Replacement Procedure Section: Service Multi: Output Power Supply and locate:

_____ Sense Cable at connector J5 going to 01E-A1C1.

_____ Test Points J1 through J8

_____ The green LED.

NOTE: The only PS of this type which has one.

_____ TB1 (at 01E)

NOTE: There is no Control Cable for this power supply.

__ ***Step 7*** Stacked Dual Output Power Supply (PS02).

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Chapter 3: Removal/ Replacement Procedure Section: Stacked Dual Output Power Supply and locate:

_____ Sense Cable at connector J5

_____ Sense Cable at connector J6 (Jumper-Plug if TCM - board 01L is not installed).

__ ***Step 8*** Stacked Power Supplies

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Chapter 3: Removal/ Replacement Procedure - Section: Stacked Power Supplies and locate at PS's 04, 06, 07, 09:

_____ Control cable at connector J3

_____ Sense cable at connector J5

_____ Test points J6, J7

_____ Captive screws, which provide the connections to the Bus Bars.

_ **Step 9** TCM Distribution BUS Capacitors

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Chapter 3: Removal/ Replacement Procedure Section: TCM Distribution BUS Capacitors and locate:

_____ Distribution Bus Capacitors 1L-A1, 01L-B1, 01L-C1

_ **Step 10** Blower/Fans

Refer to: *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611 Chapter 3: Removal/ Replacement Procedure and locate at Blower 1/B10:

_____ Blower Sensor Card

_____ AC Connector at the blower housing

Locate at Dual Fan 1/B04 A+B:

_____ Rotation Detector Card

_____ AC Connector to the Fan-Motors

_ **Step 11** Using: *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 Chapter 9: Cable Referen ces Section: PCE Cable Overview.

Identify power cables and connectors in the 9121 (Make your own selections.)

_ **Step 12** ***With Wall Power still disconnected*** , ensure that your machine is returned to an operational condition:

- Cables reconnected
- Covers mounted
- Gates closed
- Tools removed
- etc.

_ **Step 13** ***Before you apply Wall-Power to the 9121*** familiarize yourself with the content of: Volume: INSTALLATION Manual - Section: 50/60HZ

Power Connector Safety Check Procedure. Then perform the following steps:

a. Verify that CB1 (at PCC) is tripped.

b. When everything is safe, apply Wall Power to the 9121.

c. Measure the AC-Input Voltage at the Test Points as described in the "50/60HZ Power Receptacle Safety Check Procedure.

d. If within specifications, continue to next Lab Project.

   Do not power on!

This completes this lab project.

Exercise 16. TCM, Power Supply, and Blower

What This Exercise is About

In this lab project, you will remove and replace TCM 01LA1CE. You will also remove and replace PS01 and 1/B01.

What You Should Be Able to Do

After completing this exercise, you should be able to remove and replace a TCM, Power Supply, and Blower using the correct procedures in the machine documentation.

Introduction

The TCM, ***Thermal Conduction Module***, is one of the most up to date technologies of today. Because of the density of this FRU and its expensiveness, special handling procedures should be followed. Attention should also be given to the special packaging which is used to prevent damage. There are multiple types of power supplies that supply power to specific TCM's. The blower's function is to supply cooling for these components.

Required Materials

You will need the following materials to complete this exercise:

- Clip-on TCM cover
- ESD Kit
- Spring hook
- TCM pin gauge
- TCM actuation tool
- TCM camming gauge
- TCM handle
- TCM Pin Aligner
- Torque tool

  Maintenance Library
- On-site Documentation

TCM Removal and Replacement

Refer to the ***TCM Removal*** procedures in ML Vol. B02.

Warning: Read the warning on ***TCM Handling Precautions***

TCM Removal

Warning: Before beginning this procedure, do the following:

- Review ***Safety*** in ML Vol. B02.
- Press the Power-off pushbutton on the control panel.
- Turn off Circuit Breaker 1 (CB1) in the prime power compartment.

Care must be taken while performing the "TCM Removal" procedures.

Be sure to read all of the warnings before performing the step.

TCM Removal Procedure

_ **Step 1** Perform step 1. You will be removing TCM 01LA1CE (Bottom TCM).

Refer to ***TCM Board Locations***, ML Vol. B02.

_ **Step 2** Perform step 2.

Remove only the Plenum and Heat Sink for TCM Board 01LA1.

- Go to "Plenum Removal Procedure", Vol. B02. Complete the removal procedure.
- Go to "Heat Sink Removal Procedure," Vol. B02. Complete the removal procedure.
- Return to the TCM Removal Procedure.

_ **Step 3** Perform steps 3 through 11.

Note: Review the procedures for ***Handling Electrostatic Discharge Sensitive FRU's*** in the Introduction. Also read ***TCM Handling Precautions*** in the beginning of this section.

Now return to the ***TCM Replacement*** procedure and replace the TCM.

TCM Replacement Procedure

Refer to the ***TCM Replacement*** procedure in ML Vol. B02.

Once again, be sure to read all of the warnings before performing the step.

_ **Step 1** Perform steps 1-12.

If the TCM is fully cammed, go to step 17.

If the TCM is not fully cammed, follow the procedures for removing the TCM.

Continue with the following steps.

_ **Step 2** Perform steps 12 and 13.

_ **Step 3** Perform steps 14 and 15.

If no damage is found, continue with the procedure

_ **Step 4** Perform steps 16 through 19.

Part 2 of this Lab Project is to remove and replace PS01.

Four Output Power Supply Removal/Replacement

Refer to the Four Output Power Supply procedures under "Removals and Replacements" in Vol. B03.

Note: Read all warnings prior to beginning this procedure.

Four Output Power Supply Removal

If the power supply is to be laid aside, lie it down on a flat surface with the handle-side up.

_ **Step 1** Perform steps 1 through 6.

You have now removed the power supply. Once you are ready to replace the power supply, go to the replacement procedures in Vol. B03.

Four Output Power Supply Replacement

_ **Step 1** Perform step 7 (reverse the steps 2 through 4 of the removal procedure).

Do not do step 1.

Part 3 of this lab project is remove and replace 1/B01.

Blower

Refer to the ***Blower and Single Fan Removal/Replacement*** procedure under "Removals and Replacements" in Vol. B03.

Blower Removal Procedure

Step 1 is already completed.

_ *Step 1*

Perform steps 2 through 4.

Blower Replacement Procedure

_ *Step 1*

Perform steps 5 through 7.

_ *Step 2*

Perform step 8. Go to **Return Procedure,** Vol. B03. Perform steps 1 through 5.

Be sure all covers are replaced and all tools are removed from the machine. Be sure no one is endangered when power is applied.

Ensure that the system is powered up completely and left in operating condition.

Study Questions

1. CB1 is located in the _____ compartment.

2. T F The protective covers from all unused TCM positions must be removed.

3. Choose the correct sequence of steps for replacing a TCM.

   1. Latch the TCM in place.
   2. Insert TCM actuation tool into the TCM with the pin in 4 o'clock position and cam the TCM.
   3. Tighten the four TCM retaining screws.
   4. Place the TCM in position on the board.
   5. Remove the TCM handle.
   6. Check the pin alignment on the TCM.
   7. Use the TCM cam gauge to verify proper camming of the TCM.

   a. 3,4,5,2,7,1,6
   b. 3,4,6,2,5,1,7
   c. 6,4,1,2,7,5,3
   d. 3,4,6,2,7,1,5
   e. 6,4,3,2,7,1,5

4. From the following, select the correct statements concerning Blower Removal and Replacement in the CPC.

   1. There are two captive screws to be removed.
   2. To remove the blower, grip the blower housing and pull outward and away from the frame.
   3. Unplug the sensor cable from the blower sensor card to the PTC by pushing both levers together.
   4. All blower sensor cables are labeled with the plug location code.

   a. 1,2,4
   b. 2,4
   c. 1,3,4
   d. all of the above

5. The power supply is properly seated, when the _____ is flush with the frame.

Answers to Questions

1. prime power
   Ref. TCM Removal Procedure, Warning. Vol. B02.

2. F
   Ref. TCM Replacement Procedure, Step 2. Vol. B02

3. c
   Ref. TCM Remove/Replace Procedures, Vol. B02.

4. b
   Ref. Blower/Single Fan Removal, Vol. B03.

5. face plate
   Ref. Four Output Rem/Replacement, Vol. B03.

Exercise 17. 9121 Installation

What This Exercise is About

General 9121 installation

What You Should Be Able to Do

After completing this exercise, you should be able to perform the activities required to install a 9121, run diagnostics to check out the machine, and apply microcode updates and patches.

Introduction

This lab exercise will familiarize you with the procedure of installing the 9121 processing complex. You will use the documentation provided with the system to perform the install.

The installation leader should make sure all Pre installation Tasks have been completed after the 9121 arrival, and before beginning the physical installation.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide, SY27-2609*
- *D02 9121 Service Information: Frames, Part 1, SY27-2617*
- *E01 9121 Service Information: Installation, SY27-2616*

BEGIN INSTALLATION ACTIVITY

Perform this lab project just as if you were at a customer's account. Using the **INSTALLATION MANUAL** start with **INSTALLATION TASKS** and complete all activities through **Clean Up Area and Dispose of Shipping Material**.

_ ***Step 1*** Record your start time of installation. _____

_ ***Step 2*** Start with the **Installation Tasks** in your install manual. Perform Team A and Team B assignments as one lab group.

_ ***Step 3*** INSTALLATION TEAM A:_____

_ ***Step 4*** INSTALLATION TEAM B:_____

_ ***Step 5*** AFTER CHECKPOINT A _____

_ ***Step 6*** INITIAL POWER ON

_ ***Step 7*** REMOTE SERVICE CONFIGURATION_____

- Phone Numbers: On RSFCNF (1 of 2)
  - 1-800-525-0683 RAL/R370/R 2400 BPS FULL
  - 1-800-523-4822 RAL/R370/R 2400 BPS FULL

  Press the FWD key to invoke RSFCNF (2 of 2)
- Name: Atlanta Ed Center
- Address: 3100 Windy Hill Rd., Marietta, Ga., 30067
- Sys. Location: 9121 Lab
- Acct. Number: 4643411
- Main Number: 404-835-3478
- Console:
- RSF Modem: 1-404-955-xxxx (Use the number on the phone jack)
- Country: Domestic (the input field is 10 characters long)
- B/O Number: 0845
- B/O Phone: 1-404-835-3478
- Dispatch: N/A

__ **Step 8** MANUAL SERVICE UPDATE_____

__ **Step 9** INITIATE CUSTOMER PROBLEM REPORT_____

__ **Step 10** RUN PROCESSOR COMPLEX DIAGNOSTIC TESTS_____

__ **Step 11** RUN CHANNEL WRAP TESTS_____

__ **Step 12** RECORD YOUR STOP TIME OF INSTALLATION_____

__ **Step 13** INSTALLATION COMPLETE CERF UPDATE_____

__ **Step 14** FILL IN THE INSTALLATION RECORD FRAME_____

__ **Step 15** POST INSTALLATION TASKS

__ **Step 16** INSTALL CHANNEL CABLES_____

__ **Step 17** INSTALL I/O POWER SEQUENCER CABLES_____

__ **Step 18** GENERATE AN IOCDS ON A NEW PROCESSOR COMPLEX_____

__ **Step 19** RUN CHANNEL SUBSYSTEM EXERCISER_____

__ **Step 20** REINSTALL SAFETY AND EMC COVERS_____

__ **Step 21** FRAME COVER CHECKS AND ADJUSTMENTS_____

__ **Step 22** INSPECT EMC HARDWARE_____

__ **Step 23** Answer the questions on the next page about the 9121 installation.

1. What Gate is located inside the 01E Gate? (That's right, a Gate within a Gate!). _____

(This page skipped to align the following page.)

Answers to Questions

1. 01B

Optional Exercises

Exercise 18. Create a Minimum IOCDS

What This Exercise is About

Creating a Minimum IOCDS

What You Should Be Able to Do

After completing this exercise, you should be able to create a minimum IOCDS to define a tape drive to be used for reading in the full Customer IOCDS in card image from a 3480 tape drive. You will be given a 9121, the on-site documentation, and 60 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with creating a minimum IOCDS that will define a tape drive. You will use the Stand Alone IOCP program and edit an IOCDS Template.

IMPORTANT

The goal of this lab exercise is to define a tape drive, complete a POR with the IOCDS you just created, and then restart the IOCP program using the defined tape drive to read in and store the Customer's IOCDS. This is what you will do in the field at Install time!

There is a STARTER IOCDS installed at the plant prior to ship that can be modified; however, CEs who have performed this procedure have stated that it is much easier to build a mini IOCDS from scratch. This Lab Exercise will demonstrate that fact.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide, SY27-2609*
- *B04 9121 Service Information: Processor Service Guide Part 3, Input/Output, SY27-2612*
- *D02 9121 Service Information: Frames, Part 1, SY27-2617*

Start the Standalone IOCP Program

__ **Step 1** If not already done, read the introduction for this Lab Exercise.

__ **Step 2** There are different ways the IOCP Program can be started. The following gives two examples and you will use the first example in the next step.

a. Turn SERVMODE ON

b. Activate the D0 IOCDS (from the Service Console)

c. Perform a POR (from the Service Console)

d. Enter "IOCP CP1" at the COMMAND line (from the Service Console)

e. Assign and activate the Program Mode Console (from the Console Assignment frame)

This is the method used in the Install manual.

Here is the other method of starting the IOCP Program.

a. Make sure SERVMODE is OFF

b. Activate the A0 (Starter) IOCDS (from the System Console)

c. Perform a POR (from the System Console)

d. Change the Access level of the System Console to "1"

e. Enter "IOCP CP1" at the COMMAND line (from the System Console)

f. Assign and activate the Program Mode Console (from the Console Assignment frame)

__ **Step 3** Use the first method to start the IOCP Program since this is the way you will do it at install time.

_ **Step 4** At the IOCP MENU, select the "EDIT" option.

_ **Step 5** You should now have the template to modify and define the tape drive.

When you have modified this template it can be checked for correct syntax by entering "TEST" at the COMMAND line.

Use the IOCP Users Guide for a reference on editing the IOCDS data.

Contact an Instructor after the edit is complete and tested OK.

- Determine the CHPID that your 3480 is attached to. It will be an ESCON Conversion Channel (Conversion Channel type = FX)
- The address is 870 (you should define a range of 870 to 87F)
- The Protocol is 3 Meg Data Streaming.

_ **Step 6** **Warning:** The data that you just created is in Main Storage of the CPC; do **NOT** read anything into storage or all that work will be overlayed!

Use the "END" key to end the edit function.

Note: Make sure that the existing old A5 IOCDS is not write protected or you will get an error trying to write it during the next step.

_ **Step 7** From the main menu select "Write IOCDS to the Processor Controller"

Assign it as the "A5" IOCDS and write it.

_ **Step 8** Now perform a Power On Reset with the IOCDS you just created selected (IOCDS A5). Restart the IOCP Program using the same procedure as before. Have your Instructor put the Customer IOCDS tape into your tape drive.

_ **Step 9** From the main menu select "Build IOCDS from Card Images" Use the IOCDS Users Guide for information on the screen.

Make sure the tape is rewound and READY and use this screen to load in the Customer IOCDS into storage (file 02). Edit the IOCDS you just read from the tape.

The Customer will tell you what IOCDS (A2, A3, etc) to designate, and you would use the same procedure to write it as you did your "Mini" IOCDS however do **NOT** store this IOCDS.

_ **Step 10** To end the IOCP program enter "END" at the COMMAND line.

_ Step 11

Perform a POR with the correct IOCDS selected for normal LPAR operation.

Exercise 19. M/P Locations

What This Exercise is About

General 9121 M/P Locations

What You Should Be Able to Do

After completing this exercise, you should be able to locate FRUs in the 9121 M/P Processing complex. You will be given a 9121, the on site documentation, tools, and 45 minutes to complete this exercise.

Introduction

This lab exercise will familiarize you with the physical locations of the 9121 M/P processing complex.

Take a minute to look at the overall physical setup of the CPC (Central Processing Complex) and the attached PCE (Processor Controller Element).

The PCE is connected to the CPC by the Service Channel cables which control power sequencing and provide an interface for communication.

There are also power cables which come from the Filler Frame (frame 3) that provide the PCE with power from the Primary CPC Power compartment from its respective side.

Required Materials

You will need the following materials to complete this exercise:

- *B01 9121 Service Information: Service Guide*, SY27-2609
- *B02 9121 Service Information: Processor Service Guide Part 1, General*, SY27-2610
- *B03 9121 Service Information: Processor Service Guide Part 2, Power*, SY27-2611

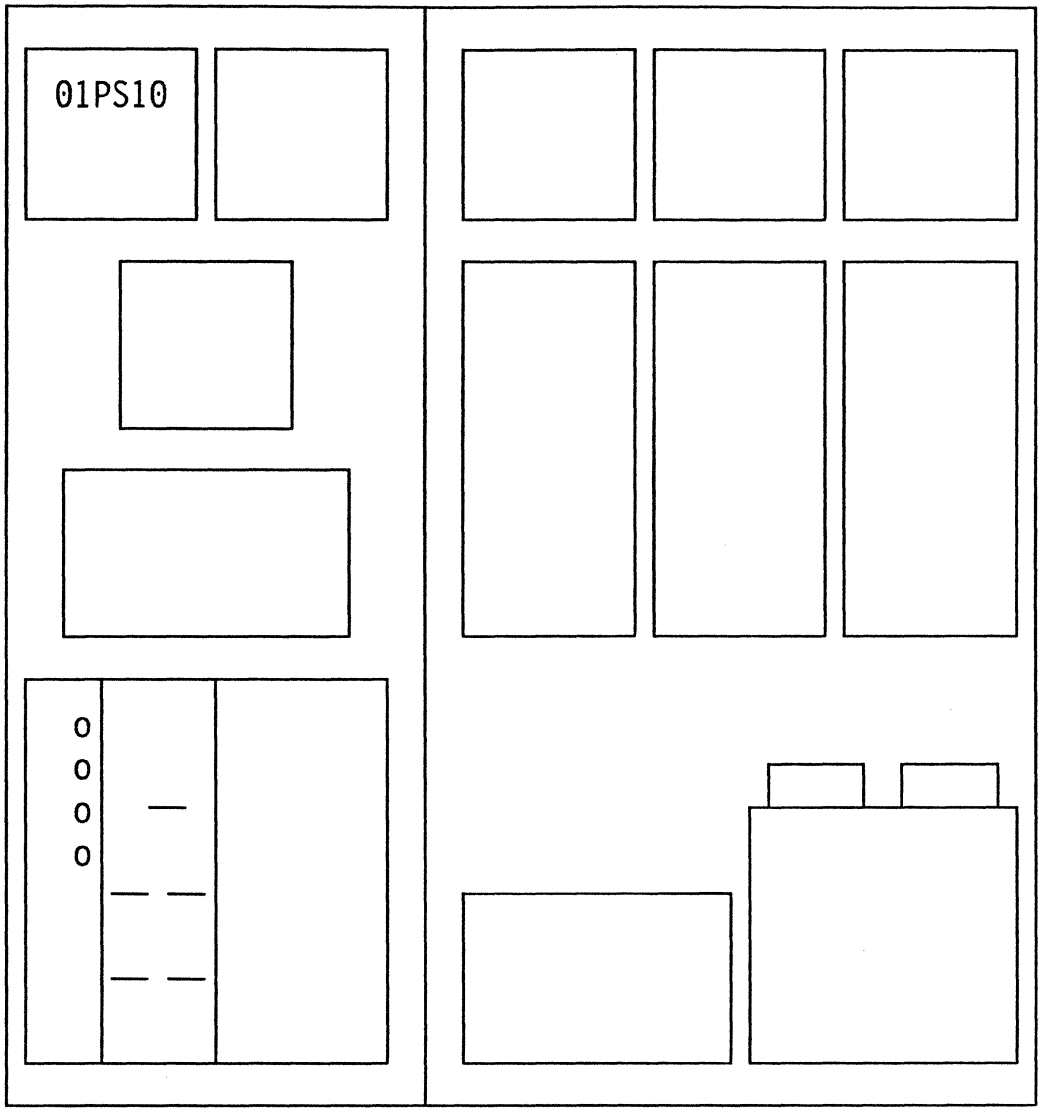
- *B04 9121 Service Information: Processor Service Guide Part 3, Input/Output*, SY27-2612
- *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613
- *C02 9121 Service Information: PCE Service Guide Part 2, Reference*, SY27-2614

_ ***Step 1*** If not already done, read the introduction for this Lab Exercise.

_ ***Step 2*** At the **System Power Panel** (refer to *B01 9121 Service Information: Service Guide*, SY27-2609 Control Panel) turn off system power by pushing the power off pushbutton and wait for the 2 **PCE Power Available** LED's to be the only LED's on (ignore Refcode display and Service Mode Enabled LEDs if they are still on).

_ ***Step 3*** Access the Mainline **CB1** in each side of the 9121 and turn them **OFF**.

_ ***Step 4*** Use the 9121 documentation to locate the items in the following figures and fill in their names and location IDs.



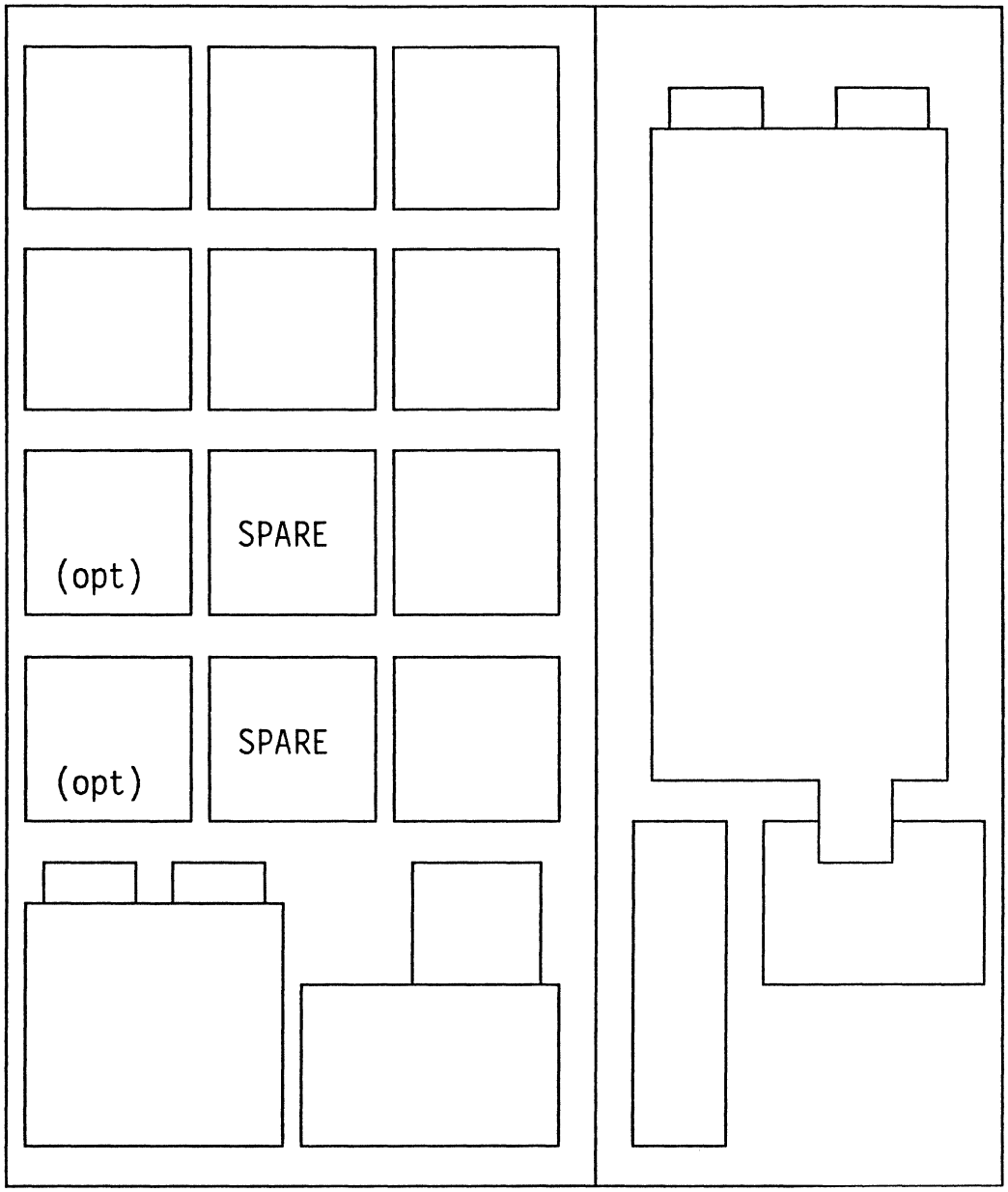
You should be able to identify all these items on this page:

__ 01PS10	__ 01B07	__ 01B11	__ 01LA1 Plenum *
__ 01PS11	__ 01B08	__ 01B12	__ 01LB1 Plenum *
__ 01B10	__ 01B09	__ 01P	__ 01LC1 Plenum *
__ 01K	__ 01C	__ 01N	

* Air Duct from Cold Plate to Blower

Figure 19-1. 9121 Front View

_ **Step 5** Now move to the rear of the machine and open the covers



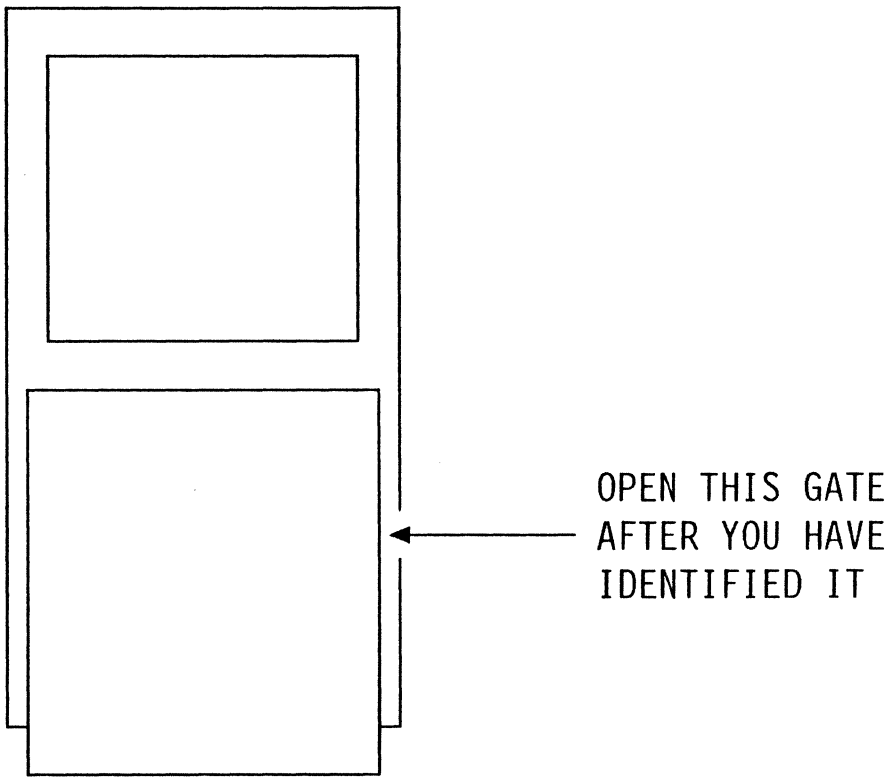
You should be able to identify all these items on this page:

__ 01B01	__ 01B04B	__ 01PS02	__ 01PS07	__ 01F
__ 01B02	__ 01B05	__ 01PS03	__ 01PS09	__ 01G
__ 01B03	__ 01B06	__ 01PS04	__ 01PS12	__ 01H
__ 01B04A	__ 01PS01	__ 01PS06	__ 01E	__ 01J

Figure 19-2. 9121 Rear View

CAUTION:
When performing the next task be careful not to let the cover drop.

__ ***Step 6*** Remove the cover on the 01E Gate (refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613) and locate the following items.

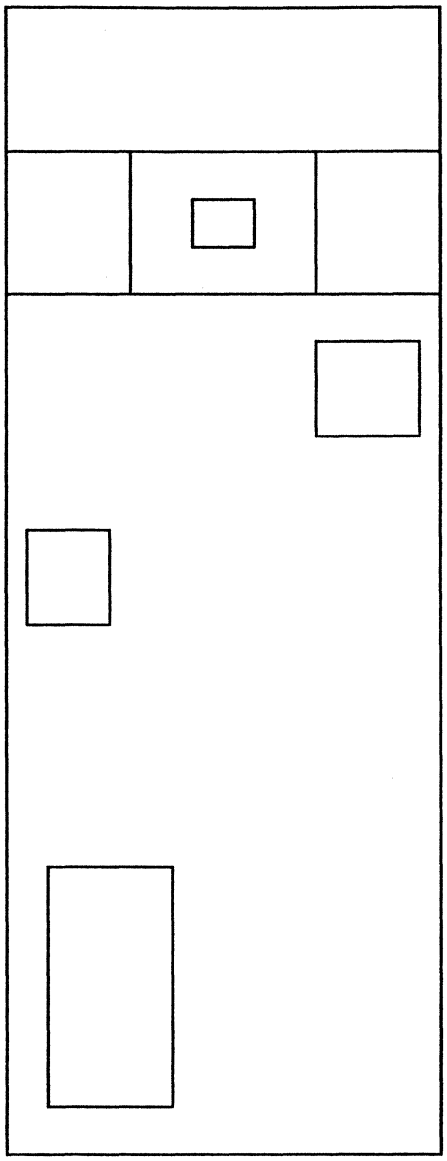


You should be able to identify all these items on this page:
__ 01EA01 __ 01EA02 __ 01BA01

Note: Contact an Instructor for help locating these items if needed.

Figure 19-3. 9121 Service Gate

_ **Step 7** Access the Filler Frame (refer to *B01 9121 Service Information: Service Guide*, SY27-2609) and locate the following items.



You should be able to identify all these items on this page:

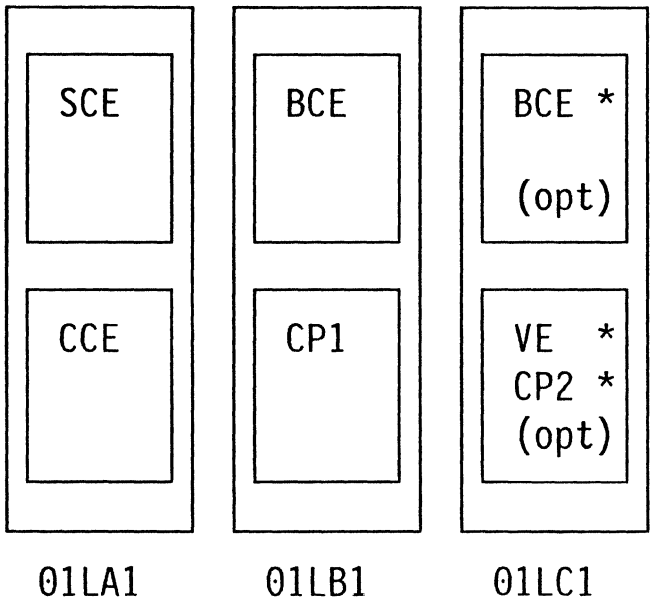
__ Power Dist Assembly
__ Bus & Tag Tailgate
__ UEPO Switch Assembly
__ UEPO Driver Assembly

Note: Notice the power cables from 01PS12 to 03F (Power Distribution). This is the power source for the PCE.

Note: Contact an Instructor for help locating these items if needed.

Figure 19-4. 9121 Filler Frame (frame 3)

_ **Step 8** Go back to the front of the 9121 and remove **one** of the TCM Plenums (refer to *B02 9121 Service Information: Processor Service Guide Part 1, General*, SY27-2610). Take a look at the TCM Board,TCM, and Cold Plate layout. Identify these items.



IDENTIFY THE TCMs IN YOUR MACHINE

You should be able to identify all these items on this page:

_ 01LA1CB	_ 01LB1CB	_ 01LC1CB
_ 01LA1CE	_ 01LB1CE	_ 01LC1CE

NOTE:
* The Vector TCM in location 01LC1CE is associated with CP1. 01LC1CB will be empty with the Vector TCM installed (CP2 not installed).
* CP2 will also require the BCE TCM, The Vector TCM (if part of the configuration) would be put in the Expansion Frame.

Figure 19-5. 9121 TCM Board

_ ***Step 9*** Now lets take a look at the **PCE** (Frame 8) This is a Duplex PCE which includes everything needed to maintain the M/P configuration.

_ ***Step 10*** Refer to *C01 9121 Service Information: Processor Controller Element Service Guide*, SY27-2613 and visually locate the following i tems in the PCE.

_ • Power Supply
_ • Diskette Drive
_ • Tape Drive
_ • PSP/IPC Assembly
_ • Switch Card Assembly
_ • Cooling Fan Assembly
_ • Logic Card Sockets
_ • Fixed-Disk Drives (4)
_ • IOSP Gate
_ • IPC Battery

_ ***Step 11*** Locate the IOSP Display. It is cabled directly to the IOSP. The keyboard is on a hinged panel that can be raised for storage or lowered for service. Note the different positions it can be stopped.

_ ***Step 12*** Locate the **Operator Panel**. Note the differences between this Operator panel and the one in the Simplex machine.

_ ***Step 13*** Locate the Modem. It is cabled up to the IOSP through the switch card.

_ ***Step 14*** Answer the questions on the next page about the 9121 locations.

1. There are two cables that leave the CPC at tailgate 03J, what are they connected to at the other end? (Refer to the introduction of this lab for a hint). _____

2. What Gate is located inside the 01E Gate? (That's right, a Gate within a Gate!). _____

_ Step 15

Replace the TCM Plenum and 01E Gate cover.

Answers to Questions

1. The PCE
2. 01B

Exercise 20. Channel Service Facilities

What This Exercise is About

This exercise introduces you to some of the Channel Service Facilities of the 9121 Complex including I/O Problem Determination and Channel Configuration Frames, along with using MVS I/O Commands in IOPD.

What You Should Be Able to Do

After completing this exercise, you should be able to enter the MVS commands displaying I/O status and match this status to the corresponding fields displayed on the IOPD frames.

Introduction

While the MVS operating system is running, you will
enter various display commands
for a device and compare the results to the IOPD frames for this device.

Supporting Documentation

- MVS/XA System Commands, GC28-1206
- MVS/XA System Messages, Vol 1 GC28-1376
- MVS/XA System Messages, Vol 2 GC28-1377

Directions to the student

- Perform the following if not already done.
  - A1 IOCDS active, POR Complete, IPL MVS/XA

Commands Displaying Device and Path Status

__ **Step 1** Enter the 'D U,,,ddd,1' command to display the 3380 device used to IPL your system. Enter the results in the blanks.

```
IEE450I hh.mm.ss UNIT STATUS nnn
UNIT TYPE STATUS VOLSER VOLSTAT

____ ____ ______ ______ _______
```

This information is directly from the Unit Control Block (UCB) representing the device to MVS. The display does not reflect path status such as path availability or operational state.

__ **Step 2** Use of the Display Matrix (D M) Command. Enter the D M=DEV(ddd) command for the IPL device on your system.

```
DEVICE ____      STATUS = ________________
CHP                       __ __ __ __
PATH ONLINE               __ __ __ __
CHP PHYSICALLY ONLINE     __ __ __ __
PATH OPERATIONAL          __ __ __ __
```

Note: Answers to questions are at the end of this Lab Exercise.

A. Where does the PATH ONLINE indication come from?

_____

B. Where does the CHP PHYSICALLY ONLINE indication come from?

_____

C. Where does the PATH OPERATIONAL indication come from?

_____

__ **Step 3** Select the IOPD frame from the system console and compare the LPM, PAM, and POM fields of the subchannel with the results from the D M=DEV(ddd) command.

__ **Step 4** To display the status of all devices in the system, enter ***D M=DEV***.

Note: To scroll the MVS Console forward enter "K D,F."

__ **Step 5** This step will use the DEVICE SERVICE (DS) command. The format of

this command is DS P,ddd,n where "ddd" is the starting device number and "n" is the total devices to display. The information displayed is similar to the "D U,,,ddd" command performed earlier but has additional data about the path and device. This command will support DASD and Tape.

A symbol definition display is built that describes the indicators that are alongside the devices and CHPID's. These represent the operational, availability, and DPS array conditions for the device. The information is gathered by the execution of a Sense Path ID CCW command along with either Seeks and Read Home Address commands for DASD, or a NOOP and Load Display command for 3480's (actual I/O work is performed).

If a DASD device is connected to a caching control unit, the DEVSERV command displays cache status. That is, is cache active or not active for the 3990 Mod 3. Also, status of the extended functions use of cache is displayed.

_ ***Step 6*** Enter the DS P command for your IPL device.

DTYPE _____
MODE _____
CNT _____
VOLSER _____
CHPID STATUS _____

_ ***Step 7*** Enter the DS P command for an offline 3380 device on your system. (Enter "D U,DASD,OFFLINE,,16" at the MVS console to find an offline DASD)

DTYPE _____
MODE _____
CNT _____
VOLSER _____
CHPID STATUS _____

DS P Command for DASD or Tape (info only).

The DEVSERV PATHS command is available in MVS/DFP Version 2 or 3 and supports DASD and Tape. Refer to the systems messages manual for a description of the IEE459I message associated with the DEVSERV PATHS command.

DEVSERV's path status is based on the results of true I/O operations attempted over EACH PATH to the device for 'non-boxed' devices. It therefore may reflect a more accurate picture of the device and path status than the 'D U,,,ddd,1' or 'D M=DEV(ddd)' commands.

DEVSERV I/O operations are tried as follows:

- To 'non-boxed' online or offline devices when the path is either online or offline and the CHPID is configured online.

The format of the DEVSERV PATHS command is as follows:

- DS P,ddd display data for device ddd
- DS P,ddd,nn display data for nn devices beginning with ddd
- DS P,ddd,nn,ONLINE
- DS P,ddd,nn,OFFLINE

Message IEE459I, which is issued in response to the DEVSERV command, contains one line per device showing the ACTUAL PATH STATES. An explanation of the symbol definitions is presented in the (dynamic) legend following the device entries.

The DEVSERV command performs I/O down every path even if the UCBLPM field indicates the path being offline. The information contains:

- The logical mode of the device
- The number of data sets allocated on the volume
- The volume serial label
- The channel path ID
- The status of the path
- Any 3990/3380 fence condition

MVS/SP DFP Version 3 has been enhanced considerably for DASD attached to a 3990 model 3. The following additional data is displayed in response to the DEVSER PATHS command (second data line)

- State of caching
- State of DASD fast write
- State of pinned data
- The channel unit address
- Dual copy volumes

A display of the DEVSERV command to a 3480 follows:

```
DS PATHS,870,2

IEE459I 22.16.30 DEVSERV PATHS  023
UNIT DTYPE M CNT VOLSER  CHPID=PATH STATUS
 870,3480 ,O,000,       ,20=R 22=R
 871,3480 ,F,000,       ,20=& 22=&
********************** SYMBOL DEFINITIONS ****************************
F = OFFLINE           R = PATH AVAILABLE AND RESERVED
O = ONLINE            & = RESERVED TO ANOTHER PATH
```

When the DEVSERV command is issued for 3480 tape drives, a status of 'R' (RESERVED) means the device is ASSIGNED to THIS system. A status of '&' (RESERVED TO OTHER SYSTEM'S PATH GROUP) means the device is ASSIGNED to ANOTHER system.

DS

A DEVSERV command to a 3880/3380 issues the following CCW's:

- X'34' - SNID read the dynamic path selection (DPS) array
- X'5B' - Suspend mutli-path reconnect
- X'03' - NO-OP
- X'07' - Seek to cylinder 0
- X'1A' - Read HA with the skip bit on(no data transfered)

This concludes the familiarization of the MVS commands used for device and path status displays. Next, the commands are used when exception conditions exist at the path or device level.

Using the Commands as a Problem Determination Aid

_ **Step 1** The following is an exercise to provide an understanding of the term "pathing" and its various status conditions as it applies to MVS and the subchannel within the Channel Subsystem.

_ **Step 2** Select IPLddd+1 device number (e.g. IPL dev = 2A0 + 1 = 2A1) and insure the device and paths for CHPID's 02 and 03 are varied online. Enter the "D M=DEV(ddd)" command for the device you selected and indicate the results of all fields.

DEVICE ——	STATUS =	——	——	——
CHP		——	——	——
PATH ONLINE		——	——	——
CHP PHYSICALLY ONLINE		——	——	——
PATH OPERATIONAL		——	——	——

_ **Step 3** Vary ONE PATH (use CHPID 03) for selected device offline. The command is,

V PATH(ddd,cc),offline

Where: ddd = device number and cc = CHPID.

_ **Step 4** Enter the "D M=DEV(ddd)" command for the device you selected and indicate the results of all fields.

DEVICE ——	STATUS =	——	——	——
CHP		——	——	——
PATH ONLINE		——	——	——
CHP PHYSICALLY ONLINE		——	——	——
PATH OPERATIONAL		——	——	——

D. The PATH ONLINE indication shows an "N" for the CHPID having its path varied offline. What MVS field in the UCB was changed?

_____

__ **Step 5** From the system console, display the IOPD Subchannel Status frame showing path information for the device. Notice the fields labeled LPM, PAM, POM, and PNOM. Continue to **REFRESH** this frame during the following steps and compare it to the MVS console display.

__ **Step 6** Enter the DEVSERV command for the selected device and indicate the results of the CHPID STATUS field and the meaning of the results.

CHPID 02 _____
CHPID 03 _____

__ **Step 7** Disable the channel interface for the device connected to the offline path on the 3880. Notice that the POM field on the IOPD frame has not changed (use the REFRESH key). Leave it disabled until a later step has you enable it.

__ **Step 8** Enter the "D M=DEV(ddd)" command again for the device you selected and indicate the results of all fields.

DEVICE ___ STATUS = _____
CHP __ __ __ __
PATH ONLINE __ __ __ __
CHP PHYSICALLY ONLINE __ __ __ __
PATH OPERATIONAL __ __ __ __

E. Why does the display indicate the CHPID is still operational?

_____

F. Display the POM field from the IOPD frame for the device. Is the bit representing this path on or off? _____

__ **Step 9** Ask your Instructor to start the MVSREC job to the selected device and enter the MVS Command again for your device. "D M=DEV(ddd)" Indicate the results.

DEVICE ___ STATUS = _____
CHP __ __ __ __
PATH ONLINE __ __ __ __
CHP PHYSICALLY ONLINE __ __ __ __
PATH OPERATIONAL __ __ __ __

_ **Step 10** Enter the DEVSERV command for the selected device and indicate the results of the CHPID STATUS field and the meaning of the results.

CHPID xx _____
CHPID yy _____

_ **Step 11** Enter the "D M=DEV(ddd)" command again for the device you selected and indicate the results of all fields.

DEVICE —— STATUS = _____
CHP — — — —
PATH ONLINE — — — —
CHP PHYSICALLY ONLINE — — — —
PATH OPERATIONAL — — — —

G. Why does the display show the path not operational only after the DEVSERV was issued and displayed as operational after the job was started?

_____

_____

_____

_____

_____

_____

_____

_____

_____

H. Display the POM field from the IOPD frame for the device. Is the bit representing this path on or off? _____

_ **Step 12** Enable the interface for the device on the 3880. Notice the POM bit for this path has not changed (REFRESH the screen). Enter the DEVSERV command again for the selected device and indicate the results of the CHPID STATUS field and the meaning of the results.

CHPID xx _____
CHPID yy _____

I. Notice the POM bit for the path now. What is its state and why?

_____

_ **Step 13** Enter the "D M=DEV(ddd)" command again for the device you selected and indicate the results of all fields.

DEVICE —— STATUS = _____
CHP — — — —
PATH ONLINE — — — —
CHP PHYSICALLY ONLINE — — — —
PATH OPERATIONAL — — — —

_ **Step 14** Vary the paths online (CHPID 03) to the selected device and the IPL device. (the path to the IPL device was removed when the channel interface switch was disabled). Use the command

V PATH(ddd,cc),ONLINE

Enter the DEVSERV command again for the selected device and indicate the results of the CHPID STATUS field and the meaning of the results.

CHPID xx _____
CHPID yy _____

_ **Step 15** Enter the "D M=DEV(ddd)" command again for the device you selected and indicate the results of all fields.

DEVICE —— STATUS = _____
CHP — — — —
PATH ONLINE — — — —
CHP PHYSICALLY ONLINE — — — —
PATH OPERATIONAL — — — —

_ **Step 16** Enter the "D M=DEV(ddd)" command for the IPL device you selected and indicate the results of all fields.

```
DEVICE ____     STATUS = ________________
CHP                      __ __ __ __
PATH ONLINE              __ __ __ __
CHP PHYSICALLY ONLINE    __ __ __ __
PATH OPERATIONAL         __ __ __ __
```

_ ***Step 17*** Paths for CHPID's 02 and 03 should be online and operational.

> **Important!**
>
> MAKE SURE ALL PATHS ARE ONLINE, AVAILABLE, and OPERATIONAL. Use the DS P command to insure they are online to both the IPL and selected devices.

_ ***Step 18*** From the MVS console, enter the command ***D R,R*** to find the outstanding message number and reply "M" for Menu. When new options are presented, reply "EXIT" to stop the MVSREC job.

"Stealing a CHPID from MVS"

_ Step 1

Important!

Before executing the next step make sure CHPID 03 is online and operational to your DASD or you will remove the last path to the SYSRES pack!

From the hardware system console, steal CHPID 02 by entering the service language command ***CHPID 02 OFF***

_ Step 2

Refresh or re-display the IOPD frame for the device. Notice the PAM bit representing CHPID xx is off indicating this CHPID is not available.

_ Step 3

Enter the "D M=DEV(ddd)" command again for the device you selected and indicate the results of all fields.

DEVICE ———	STATUS = ———————
CHP	— — — —
PATH ONLINE	— — — —
CHP PHYSICALLY ONLINE	— — — —
PATH OPERATIONAL	— — — —

_ Step 4

MVS still has this path logically online and will pass the LPM field to the channel subsystem thinking it is ok for use. The channel subsystem analyzes this field to select a CHPID to use. Since the bit is off, CHPID 02 will never be used. Also, by "stealing the CHPID", a general interface reset occurred by dropping the tag line Operational Out. This reset the DPS (path) array for every device on the DASD subsystem for this interface. This is called a "DPS OUT OF SYNC" condition, or in other words, MVS believes the path is ok due to the LPM field being correct but the DASD subsystem no longer has this interface as part of it's path group.

_ Step 5

From the system console, enter the service language command ***CHPID 02 ON*** to put the CHPID online. By doing so, you may notice "START PENDING" messages on the MVS console. An impact tothe operating system is now occurring. The DPS arrays are being rebuilt which takes processing time away from normal applications.

_ Step 6

The proper method of isolating a configured CHPID is to enter the MVS CONFIG command ***CF CHP(cc),OFFLINE***.

__ ***Step 7*** Use the DS P command to check that all paths are correctly operating.

Exercise Summary

This exercise introduced the MVS commands that display device and path status. Also, commands were used to show the condition of the paths when they are not operational and a detailed description of the DEVSERV command was provided. The Subchannel path fields were related to the indications available to the operator. "STEALING A CHPID" was also performed to show that system degradation can result, and this SLC is a last resort to remove a CHPID. The path information in the software and the hardware can get out of sync as demonstrated by improper use of the CHPID SLC.

Answers to Questions

A. The logical path status from the LPM field in the UCB.

B. The availability of the path from the PAM in the UCW.

C. The operational status of the path from the POM in the UCW.

D. Logical Path Mask (LPM)

E. No interface activity is performed with this command

F. On

G. MVS has the path offline (LPM reflects this), therefore, the channel subsystem was not given this path as an option to use for the MVSREC job. However, a DEVSERV command does not use the LPM field for determining path status and issues CCW commands to all CHPIDS installed for the device. (PIM field from the UCW).

H. Off

I. On. DEVSERV does not use the LPM from the UCB, which is off

Exercise 21. Setup Display and Interpret IOP TRACE

What This Exercise is About

The purpose of this exercise is to have the student become familiar with the IOP Trace facility. This exercise will cover the setting up of the trace controls and tracing using various options. It will also cover the formatting and displaying of the trace logs. The intent is to demonstrate the potential value of the tool for I/O problem determination.

What You Should Be Able to Do

After completing this exercise, you should be able to use the IOP trace facility to trace I/O activity within the IOP. You should then be able to display and interpret the trace, using it as a valuable tool to assist you in helping the customer do I/O problem determination.

Introduction

The procedures covered will be, using the IOP trace function to trace and display various I/O activity. This trace is not of the I/O interface but is a trace of the various actions within the I/O Processor.

Required Materials

You will need the following materials to complete this exercise:

-
-
- The 9121 Service Information Frames VOL D02.

Directions to the student

1. Power on Reset Complete.
2. A1 IOCDS Active
3. MVS/XA IPL'ed

Setting Up the IOP Trace Frame

_ **Step 1** Invoke the IOP Trace frame (IOPTRC) by following the set up

_ **Step 2** Set up the trace frame to:

- Trace device number 2A0
- Stop on Compare Events
  - FC/AC/SC to equal normal ending primary and secondary status
- Trace Action
  - Stop on Compare

_ **Step 3** Start the trace

_ **Step 4** From the MVS console, enter a DEVSERV command for 2A0.

_ **Step 5** After a few moments, the trace status will show "Compare Stop" and logging of the trace will complete.

A. The options selected to set up the trace frame are:

_____

B. In Step 3, Stop on Compare Events, the binary entry is:

_____

Displaying IOP Trace Information

_ **Step 1** From the IOPTRC frame, select the "F1" option.

This should put you on the IOPTDP frame.

_ **Step 2** Select the New trace you have just created.

It should be the last trace on the list.

_ **Step 3** Display the Formatted Trace.

_ **Step 4** After a few moments, the ***Top of file*** is displayed. The first trace entry at the top of the display is the last I/O operation performed by the I/O Processor (IOP).

NOTE:

The data you are viewing may be much more than you expected. This is because the trace buffers are in the HSA in core, and are not cleared when a trace is started. When the trace is written, the buffers are dumped to the Processor Controller File. Therefore a portion of the data may be residual data.

_ **Step 5** Scroll forward until the ***Bottom of file*** is displayed. This is the first I/O operation the I/O Processor performed after the trace was running.

_ **Step 6** By positioning the cursor at the ***Scrolling Increment*** line, a different scroll value can be entered. This is helpful when the ***Bottom of file*** needs to be displayed for a large trace size.

_ **Step 7** END the Trace Display.

This should put you back on the IOPTDP frame.

C. There are a maximum of _____ traces contained on the PCE file.

D. What must be entered on the IOPTDP frame to display the set up controls for a trace? _____

E. From the IOPTDP frame, a formatted trace is displayed by entering: _____

F. What is the subchannel number for device 'A0' on chpid number 2 ? _____

Formatting the Trace Display.

_ **Step 1** On the IOPTDP frame set up the 'B2' option with the subchannel no# for dev 'A0' that you determined in the previous procedure.

_ **Step 2** Now display the formatted trace again.

This should cut down the size of the trace data and make it easier to read.

ANALYZING IOP TRACE INFORMATION

A DESCRIPTION OF THE TRACE ENTRY TYPES FOLLOWS THIS EXERCISE.

The IOP Trace Display shown was a result of the controls set to Stop on Compare with FC/AC/SC equal to B'100 0000000 00111'. This is a stop on compare when the subchannel has the Start Function, Primary Status, Secondary Status, and Status Pending bits on. The MVS/XA device number is X'2A0'.

Although no CCW commands or data transfer is traced, information in the FASC field shows the state of the subchannel and/or device throughout an I/O operation.

_ **Step 3** END the trace Display.

_ **Step 4** On the IOPTDP frame, do an erase of the trace you have just created.

Note that you have to enter the 'X1' to proceed. This should help keep you from erasing the wrong trace record.

_ **Step 5** Return to the IOPTRC frame.

G. What CHPID,s were tested for device 2A0 ? _____ AND _____

H. To erase a trace, what options must be entered?

_____

I. From the IOPTDP frame, you return to the IOPTRC frame by entering: _____

IOP TRACE ENTRIES

The following tables have been taken from the Service Education Technical Awareness Information, Course #40628 (3090 Processor Complex IOP Trace Facility Enhancements (Appendix A)). It may not be 100% accurate for the liberty system, Documentation for the liberty system is not available at this time.

The following list describes the formatted trace entries found on the IOP Trace - Display (IOPTDP) frame. NOTE that the first two characters identify the type of entry and the third character is a sequence identifier. For example: CA0 = First CHE interrupt to IOP.

```
                    XA TRACE ENTRIES

                  CHE Interrupt to IOP
CA0-70TTTTTT SCH#FASC DsSs---- CIuaCh-  -<- Normal CHE irpt to IOP
CA1-71TTTTTT SCH#FASC DsSs---- CIuaCh-  -<- Normal CHE irpt to IOP
CA2-72TTTTTT SCH#FASC DsSs---- CIuaCh-  -<- Normal CHE irpt to IOP
CA3-73TTTTTT SCH#FASC DsSs---- CIuaCh-  -<- Normal CHE irpt to IOP
CA4-74TTTTTT SCH#FASC DsSs---- CIuaCh-  -<- Normal CHE irpt to IOP
CA5-75TTTTTT -------- -------- CIuaCh-  -<- CUE, invalid UA
CA6-76TTTTTT -------- -------- CIuaCh-  -<- CUE, invalid UA
CA7-77TTTTTT -------- -------- CIuaCh-  -<- Hung I/F, secondary error
CA8-78TTTTTT -------- -------- CIuaCh-  -<- Config error

                  Write to CHE from IOP
CW0-90TTTTTT SCH#FASC -------- IcUaCh-  -<- Successful channel tap
CW1-91TTTTTT SCH#FASC ------Ci IcUaCh-  -<- Headbutt
CW2-92TTTTTT SCH#FASC -------- IcUaCh-  -<- BiDi R/W, not same UA
CW3-93TTTTTT SCH#FASC ------Ci IcUaCh-  -<- Special situation
CW4-94TTTTTT SCH#FASC -------- IcUaChPi -<- Timeout
CW5-95TTTTTT SCH#FASC ------Ci IcUaCh-  -<- BiDi R/W, same UA, OK

                  SIGI and Idle IOP
IL0-A1TTTTTT SCH#FASC IQE#---- S601--Fx -<- Irpt, SIGI
IL1-D2TTTTTT SCH#FASC -------- S601--Fx -<- Irpt, non-SIGI (amended IRB)

                  Path Selection
PS0-E0TTTTTT SCH#FASC LpPa--Lu -------- -<- CU busy & shared busy
PS1-E1TTTTTT SCH#FASC LpPa--Lu -------- -<- Shared busy
PS2-E2TTTTTT SCH#FASC LpPa--Lu -------- -<- Dev active
PS3-E3TTTTTT SCH#FASC LpPa--Lu -------- -<- SIGW other IOP
PS4-E4TTTTTT SCH#FASC LpPa--Lu -------- -<- Other IOP has lock
PS5-E5TTTTTT SCH#FASC LpPa--Lu -------- -<- Chan path term. (hung I/F
PS6-E6TTTTTT SCH#FASC LpPa--Lu -------- -<- All paths busy
PS7-E8TTTTTT SCH#FASC LpPaPnLu -------- -<- CC3 (no path)
PS8-E9TTTTTT SCH#FASC LpPa--Lu -------- -<- SSCH OK

                  Halt/Clear Selected Path
HP0-F0TTTTTT SCH#FASC -------- -------- -<- Shared busy
HP1-F1TTTTTT SCH#FASC -------- -------- -<- SIGW other IOP
HP2-F2TTTTTT SCH#FASC -------- -------- -<- SIGW other IOP
HP3-F3TTTTTT SCH#FASC LpPa--Lu -------- -<- Chan path term.(hung I/F)
HP4-F4TTTTTT SCH#FASC LpPa--Lu -------- -<- CC3 (no path)
HP5-F5TTTTTT SCH#FASC LpPa--Lu -------- -<- HSCH/CSCH accept
HP6-F6TTTTTT SCH#FASC -------- -------- -<- CC3 (no path)

                  Store Subchannel
ST0-D1TTTTTT SCH#FASC -------- -------- -<- Store subchannel
```

Figure 21-1. NOTE:. The first three characters of each entry (for example, CW3 for special situation) is the mnemonic used to select the data type. These characters are not part of the trace data.

Table 21-1. Legend

CH	Channel path ID (CHPID)	**Pa**	Path available mask
Ci	CH to IOP Command	**Pi**	Previous CH to IOP command
Ds	Device status	**Pn**	IOP local path not operational mask
FASC	Function/Activity/Status Control flags	**SCH#**	Subchannel number
Fx	Entry flag/ISC	**Ss**	Subchannel status
Ic	I/O to CHE command	**S601**	Subchannel word 6 bytes 0 and 1
IQE#	Interrupt queue element count	**TTTTTT**	IOP timer value
Lp	Logical path mask	**Ua**	Unit address (UA)
Lu	Last path used mask		

Exercise Summary

This exercise provides direction in setting up the IOP Trace frame. After a trace was made, you displayed the results and by having an understanding of the Function / Activity / Status Control fields, an I/O operation can be followed through the I/O Processor.

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Answers to Questions

C. Six

A. A3, B4, D2, and E1.

B. 100 0000000 00111.

D. Ax and D1 option

E. Ax D2 option

F. nnnn

H. An x C1 option

G. 02 and 03

I. An x E1 option

Exercise 22. Setup Display and Interpret I/O Interface Trace.

What This Exercise is About

The purpose of this exercise is to have the student become familiar with the I/O Interface Trace facility. This exercise will cover the setting up of the trace controls and using the various tracing options. It will also cover the displaying of the trace records. The intent is to demonstrate the potential value of the tool for I/O problem determination.

What You Should Be Able to Do

After completing this exercise, you should be able to use the I/O trace facility to trace I/O activity on the I/O interface. You should then be able to display and interpret the trace, using it as a valuable tool to assist you in helping the customer do I/O problem determination.

Introduction

The procedures covered will be, using the I/O trace function to trace and display various I/O activity. This trace is of the I/O interface and NOT a trace of the various actions within the I/O Processor.

Required Materials

You will need the following materials to complete this exercise:

-
-
- The 9121 Service Information Frames VOL D02.

Directions to the student

1. Power on Reset Complete.
2. A1 IOCDS Active
3. MVS/XA IPL'ed

Setting Up the I/O Trace Frame

_ **Step 1** Invoke the I/O Trace frame (CHSVC).

_ **Step 2** Select CHPID 02.

_ **Step 3** Do an 'E3' option.
(restore trace defaults)

_ **Step 4** Set up the trace frame to:

- Trace device number 2A1 only.
- External sync option (no sync).
- Trace on tags and UA compare.
- External Sync Action (External J09).
- Trace Action
  - Stop on Compare

_ **Step 5** Do an Activate Single trace.

_ **Step 6** From the MVS console, enter a DEVSERV command for 2A0 for five devices.

_ **Step 7** Now on the CHSVC frame do a force log ('E4' option).

A. From the CHSVC frame, what option do you use to set up the unit address for a trace on Unit address? _____

B. What option selected the trace events ? _____

C. After step 6, what was the status of the channel clocks ?

_____

Displaying I/O Interface Trace Information

_ **Step 1** Go to the <CHERLG> frame.

_ **Step 2** Select error type Channel Control Checks.

_ **Step 3** Select the Log just created.

NOTE: There have been two logs created by the force log, the second log of the pair should be the log that contains the trace.

_ **Step 4** Select The Interface Trace display option.

_ **Step 5** After a few moments, the I/O Interface log is displayed, Page 1 of 2 Events 60 through 119.

NOTE:

The data you are viewing may be much more than you expected. This is because the trace buffers are in the HSA in core, and are not cleared when a trace is started. When the trace is written the buffers are dumped to the Processor Controller File. Therefore, a portion of the data may be residual data.

_ **Step 6** Event 119 will be the most current event. Page left to see events 0 to 59. Page down to view page 2 of the trace. For convenience of reading, you may swap lines.

D. What is on the B_OUT for the last SEL-OUT TAG ? _____

E. What is on the BUSIN at the last RISE of the OPL_IN tag ? _____

F. What is the first command sent to device 'A1' for the DevServ ?

_____

_ **Step 7** END the Trace Display.

This should put you back on the CHERLG frame.

Exercise Summary

This exercise provides direction in setting up the I/O Trace frame, CHSVC. After a trace was made, you displayed the results by using the CHERLG frame.

Although the method for obtaining the trace would not be the usual method, it is one way of obtaining an I/O Interface trace. Normally the trace would accompany a real IFCC or CCC .

Remember though that the trace must be set up to trace the devices and functions that you wish to view. If it is not, you may have a trace that is of little or no use to you.

Remember this trace has no time relationship between events. From one event to the next could be 1 ns, 1 hour, or 1 day. There is no way to tell for sure.

Answers to Questions

A. A2 (CALL FRAME UA Compare (CHUCW))

B. C2

C. Running

D. x A1

E. x A1

F. x 03

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