

VOLUME A01 MACHINE 4381- -0011647 MODEL M02 SYSTEM 0000JYP MODE SCHED SHIP 00/00/00

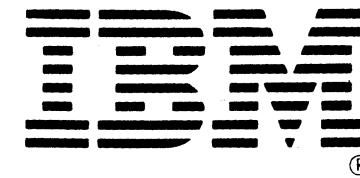
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DOC COUNTER

PAGE NUM	SH	TITLE	PART NUM	EC NUM	FEATURE B/M OR B/MS
AA005		FRT COV/END NOT	0000445716	A02220	.W. 0004473536
AA015		PREFACE	0000445717	A02215	.W. 0004473536
AA025		SAFETY NOTICES	0000445718	A02219	.W. 0004473536
AA035		SAFETY INFO	0000445719	A02215	.W. 0004473536
AB005		TAB-INDEX	0000445720	A02214	.W. 0004473536
AB015		INDEX	0000445721	A02217	.W. 0004473539
AB025		INDEX	0000445723	A02220	.W. 0004473539
AB035		INDEX	0000445724	A02220	.W. 0004473539
AB045		INDEX	0000445725	A02217	.W. 0004473539
AB055		INDEX	0000445726	A02220	.W. 0004473539
AB065		INDEX	0000445727	A02220	.W. 0004473539
AB075		INDEX	0000445728	A02220	.W. 0004473539
AB085		INDEX	0000445729	A02220	.W. 0004473539
AC005		GLOSSARY	0000445732	A02214	.W. 0004473536
AC015		GLOSSARY	0000445733	A02214	.W. 0004473536
AC025		GLOSSARY	0000445734	A02214	.W. 0004473536
AC035		GLOSSARY	0000445735	A02214	.W. 0004473536
AD005		TAB-INTRO	0000445736	A02214	.W. 0004473536
AD015		TOC/FREQ PRF TSK	0000445737	A02215	.W. 0004473536
AD025		ORGAN/EC LEVEL	0000445738	A02215	.W. 0004473536
AD035		READERS COMMENT	0000445739	A02215	.W. 0004473536
AD045		GENRAL DESCRI	0000445740	A02215	.W. 0004473536
AD055		INTRO REPAIR PRO	0000445741	A02215	.W. 0004473536
AE005		TAB-START	0000445743	A02214	.W. 0004473536
AE015		START REPAIR	0000445744	A02219	.W. 0004473539
AE025		PA OPTIONS	0000445745	A02220	.W. 0004473539
AE035		PA LOG REC	0000445746	A02219	.W. 0004473539
AE045		PROGRAM MSG	0000445747	A02220	.W. 0004473539
AE055		CHNL ERRORS	0000445748	A02220	.W. 0004473539
AE065		INT MSS ERRS	0000445749	A02219	.W. 0004473539
AE075		ST80 TEST	0000445750	A02217	.W. 0004473539
AF005		TAB-PU REPAIR	0000445751	A02214	.W. 0004473536
AF015		PU REPAIR	0000445752	A02214	.W. 0004473536
AF025		PU REPAIR	0000445753	A02217	.W. 0004473536
AF035		PU REPAIR	0000445754	A02217	.W. 0004473536
AF045		PU REPAIR	0000447361	A02215	.W. 0004473536
AG005		TAB-CHAN REPAI	0000445755	A02214	.W. 0004473536
AG015		CHANNEL REPAIR	0000445756	A02214	.W. 0004473536
AG025		CHANNEL REPAIR	0000445757	A02215	.W. 0004473536
AG035		CHANNEL REPAIR	0000445758	A02215	.W. 0004473536
AG045		CHANNEL REPAIR	0000445759	A02215	.W. 0004473536
AG055		CHANNEL REPAIR	0000445760	A02217	.W. 0004473536
AG065		CHANNEL REPAIR	0000445761	A02214	.W. 0004473536
AG075		CHANNEL REPAIR	0000445762	A02214	.W. 0004473536
AG085		CHANNEL REPAIR	0000445763	A02214	.W. 0004473536
AG095		CHANNEL REPAIR	0000445764	A02214	.W. 0004473536
AG105		CHANNEL REPAIR	0000445765	A02214	.W. 0004473536
AH005		TAB-MSS REPAIR	0000445766	A02214	.W. 0004473536
AH015		MSS REPAIR	0000445767	A02220	.W. 0004473536
AH025		MSS REPAIR	0000445768	A02220	.W. 0004473536
AH035		MSS REPAIR	0000445769	A02220	.W. 0004473536
AH045		MSS REPAIR	0000445770	A02220	.W. 0004473536
AH050		MSS REPAIR	0000447439	A02220	.W. 0004473536
AH055		MSS REPAIR	0000445771	A02220	.W. 0004473536
AH065		MSS REPAIR	0000445772	A02220	.W. 0004473536
AH075		MSS REPAIR	0000445773	A02220	.W. 0004473536
AH085		MSS REPAIR	0000445774	A02220	.W. 0004473536
AH095		MSS REPAIR	0000445775	A02220	.W. 0004473536
AH105		MSS REPAIR	0000445776	A02220	.W. 0004473536
AH115		MSS REPAIR	0000445777	A02220	.W. 0004473536
AH125		MSS REPAIR	0000445778	A02220	.W. 0004473536
AH135		MSS REPAIR	0000445779	A02220	.W. 0004473536
AH145		MSS REPAIR	0000447441	A02220	.W. 0004473536
AH155		MSS REPAIR	0000447442	A02220	.W. 0004473536
AI005		TAB-E-O REPAIR	0000445780	A02214	.W. 0004473536
AI015		END OF REPAIR	0000445781	A02215	.W. 0004473539

TOTAL PART NUMBERS THIS VOLUME

66



Maintenance Information

S/N MI	S/N MI	S/N MI	S/N MI	S/N MI	S/N MI	S/N MI	S/N MI
MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION
SAFETY INDEX TERMS/ ABBREVIATIONS INTRODUCTION START PU REPAIR CHNL REPAIR MSS REPAIR END OF REPAIR	PWR REPAIR (HWS AND MBC)	PWR REPAIR (PROC) PR 1001 THRU PR 13 XX	PWR REPAIR (PROC) PR 1401 THRU PR 18 XX	PWR REPAIR (PROC) PR 1901 THRU PR 5001	SERVICE AIDS	LOCATIONS TOOLS REMOVAL/ REPLACEMENT PREVENTIVE MAINTENANCE DIAGNOSTICS LOGS SYSTEM TEST INSTALLATION SAFETY INSP	CONSOLE FUNCTIONS MESSAGES
VOL A01	VOL A02	VOL A03	VOL A04	VOL A05	VOL A06	VOL A07	VOL A08

4381



Processor
Maintenance Information

Seq AA005	PN 0445716 Pg 1 of 2	EC A02214 15 SEP 83	EC A02220 06 JUN 84			
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IBM has prepared this maintenance manual for you in the use for installation, maintenance, or repair of the specific machine indicated. IBM makes no representation that it is suitable for any other purpose.

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A form for reader's comments is provided in Volume A01 of this publication. If the form has been removed, comments may be addressed to IBM Corporation, Processor Maintenance Information Development, Department X65, P.O. Box 6, Endicott, NY, U.S.A. 13760. IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Seq AA005	PN 0445716 Pg 2 of 2	EC A02214 15 SEP 83	EC A02220 06 JUN 84			
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Preface

Processor Library

The Processor Maintenance Library consists of the following manuals:

Order Number	Title
PN Controlled	Processor Maintenance Information (MI) manual
PN Controlled	Card/Module Plug Lists
PN Controlled	Cable Plug List
PN Controlled	Unpack/Pack Instructions
SY27-2546	3278 2A Display Console Maintenance Information
SY33-0069	3279 2C Display Console Maintenance Information
S124-0153	Parts Catalog
Z229-2302	4300 Functional Unit Code Guide
Z150-0103	CE Log Card
Z150-0224	4300 IAD Code Guide
ZZ29-2303	4300 Remote Support Facility Reference Guide

Note: Requests for copies of this material should be made to your IBM representative or to the IBM branch office serving your locality.

Purpose of Manual

The main purpose of the maintenance philosophy, incorporated in this manual, is to help you carry out maintenance activities and repair failures quickly. To bring about this objective, emphasis is placed on "how to fix" rather than "how it works." For each failure, the "how to fix" approach uses your resources, the failure isolation techniques, and the individual analysis procedures.

Audience and Level of Knowledge

Although the maintenance philosophy is designed for the service representative, it is recognized that there are significant differences in skill levels, experience, and natural ability. Additional maintenance procedures and sections are provided to allow you to continue with the maintenance procedure until you have exhausted your resources, or until existing policies dictate that you request assistance.

Manual Organization

The Maintenance Information (MI) manual has eight volumes. Volumes A01 through A07 are 11 x 17, and Volume A08 is 8.5 x 11 inches in size. They are organized in the following manner:

Volume Subject Material

A01	Preface Safety Index Glossary of Terms and Abbreviations Introduction START Repair Procedure Processing Unit Problem Isolation Procedure Channel Problem Isolation Procedure MSS Repair Procedure END Repair Procedure
A02	Power Repair (HWS and MBC) PR 001 through PR 901
A03	Power Repair (Processor) PR 1001 through PR 1393
A04	Power Repair (Processor) PR 1401 through PR 1893
A05	Power Repair (Processor) PR 1901 through PR 5001
A06	Service Aids
A07	Locations Tools Removals and Replacements Preventive Maintenance Diagnostics Logs System Test Processor Installation 4381 Processor Safety Inspection Guide
A08	Console Functions Messages

4381 Processor

The 4381 is an intermediate, general purpose processor. The processor is compatible with System/360, System/370, and 4341 Processors. No changes to customer programs, data, or operations are required to upgrade from a System/360, System 370, or 4341 Processor. The 4381 Processor provides the range of commercial and scientific data processing of previous systems with the addition of advanced functions through new circuit technology.

The processor includes:

- Instruction Processor
- Main Storage and Controls
- Channel Hardware
- Maintenance and Support Subsystem.

Safety

Safety Notices

Notices for 4381 Processor

Specific safety notices are published in each volume of the Maintenance Information (MI) manual. DANGER notices warn against conditions or procedures that can result in death or severe personal injury. CAUTION notices warn against personal injury that is neither lethal nor extremely hazardous. Warning notices warn against damage to machines, equipment, or programs.

DANGER Notices

The following DANGER notices from the Maintenance Information (MI) manual are especially important:

Page PR 1052

DANGER
300 Vdc.

Page PR 1062

DANGER
300 Vdc.

Page PR 1071

DANGER
300 Vdc.

Page PR 1072

DANGER
300 Vdc.

Page PR 1074

DANGER
300 Vdc.

Page PR 1075

DANGER
300 Vdc.

Page PR 1076

DANGER
300 Vdc.

Page PR 1077

DANGER
300 Vdc.

Page PR 1081

DANGER
300 Vdc.

Page PR 1083

DANGER
300 Vdc.

Page PR 1091

DANGER
300 Vdc.

Page PR 1093

DANGER
300 Vdc.

Page PR 1154

DANGER
Disconnect line cord before exchanging CB2.

Page PR 1161

DANGER
300 Vdc.

Page PR 1162

DANGER
300 Vdc.

Page PR 1163

DANGER
300 Vdc.

Page PR 1164

DANGER
300 Vdc.

Page PR 1165

DANGER
300 Vdc.

Page PR 1166

DANGER
300 Vdc.

Page PR 1931

DANGER
300 Vdc.

Page PR 2321

DANGER
300 Vdc.

Page PR 2323

DANGER
300 Vdc.

Page INST 002

DANGER
Do not touch any customer power receptacles at the installation site until instructed in the "Site and Processor Safety Checkout" procedure.

Page INST 005

DANGER
With the customer branch CB in the OFF position, do not touch the exterior shell of the customer receptacle with anything except the test probes until step 2 is complete.

Power must not be applied to the processor if the building ground cannot be located and verified.

Page INST 006

DANGER
This procedure must not be performed until you have completed the following procedures:

"Checking the 4381 Processor Power Plug"

"Checking the Customer Power Receptacle."

Do not touch the internal parts of the customer receptacle with anything except the test probes.

Page INSP 003

DANGER
Use only test probes to touch the exterior shell of the customer's receptacle until step 7.

Page INSP 003

DANGER
Do not touch connectors to be separated. Wrap connector with electrical tape or wear rubber gloves.

Page INSP 004

DANGER
A shock hazard may exist while plugging or disconnecting inline or Mate-N-Lok* connectors because of the connector pin slipping from its socket. Before working with any connectors, ensure power is off.

* Trademark of AMP, Inc.

Seq AA025	PN 0445718 Pg 1 of 1	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84		
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Safety Practices

Mandatory Safety Practices

Your Personal Safety Can Never Be Overemphasized

- You have been taught safety procedures since the earliest phase of your IBM training.
- Your safety is a part of every maintenance call. Be aware that:

Safety features are designed into every IBM machine.

IBM tools and test equipment, either furnished or recommended, are safety approved.

Chemicals and solvents are provided to you only after they meet IBM health and safety requirements.

Your IBM management insists that your customers provide a safe working environment that meets the National Fire Protection Association (NFPA) requirements (U.S.A.) or your country's local fire protection codes.

- You are the only one who can make a maintenance call safe.

The following safety practice are mandatory:

- Read and observe all the DANGER and CAUTION notices in this manual.
- Notify your management immediately of any unsafe working conditions.
- Ensure that someone can see or hear you while you are working on a maintenance call.
- Make sure that your management or another IBM employee knows where you are at all times.
- Ensure that another person is present in your immediate area when you are working with power on the machine. Instruct this person in emergency power-off procedures.
- Develop good safety habits by consistently following recommended safety practices.
- Report all accidents immediately to your manager.

Power-Off Maintenance

Ensure (by contacting your management) that the original equipment manufacturer (OEM) equipment attached to the machine does not affect your safety; do not assume that it does not affect you. After a 4381 has been powered down, voltages can still be present in the processor because of the attached OEM equipment that is still powered up.

For power-off maintenance:

- Power down the processor:
 - Press the Power Off switch on the operator control panel.
 - Open left side cover of frame.
 - Locate Primary Control Compartment (PCC) and place CB1 and CB2 in the OFF position.
 - Have the customer personnel turn off primary power at the customer branch circuit breaker. Switches or circuit breakers opened for this purpose should be tagged or locked open to avoid inadvertent closure while an engineering change is being installed.
 - Attach DO NOT OPERATE tags (Z229-0237) to the switches.
 - Using a voltmeter, verify that the power is off.
 - If voltage is detected at this time, notify the customer that you cannot proceed until the power source is removed.
- Ensure that someone can see or hear you while you are working on a maintenance call. Also ensure that your management or another IBM employee knows where you are at all times.

- Be prepared for any emergency. For example, someone in your immediate area should know:
 - The location of a telephone to be used for emergency calls and the emergency telephone number for your area.
 - The location of fire extinguishers and fire exits, and the type of chemical(s) used in the sprinkler system.
 - The location at which aid can be obtained.
 - The emergency procedures to be taken in case of an accident.

- Practice good housekeeping habits by placing your tool kit, test equipment, and machine covers in a safe location. Never place anything on top of the machine frame.
- Do not lean on or against machines or frames.
- Remove all jewelry that can cause personal injury or machine damage (for example, rings, watches, earrings, necklaces, and bracelets).
- Secure (tie back, tuck in) or remove loose items of clothing.
- Wear safety glasses wherever a risk of eye injury exists and in designated areas. You are responsible for the proper fit of your glasses.
- Use only the chemicals and solvents furnished by your branch office supply department. Before using any chemical, READ THE LABEL and observe the special safety rules that apply to the use and storing of that chemical.
- When lifting an object, choose a comfortable lifting position; lift with leg muscles, and avoid any twisting motion of the body.
- Ensure that no line-cord ground wire is open on powered test instruments. As a safety precaution, ground all test equipment to the frame ground, using a multimeter test lead, before plugging the line cord into a receptacle.

Power-On Maintenance

Ensure (by contacting your management) that the original equipment manufacturer (OEM) equipment attached to the machine does not affect your safety; do not assume that it does not affect you. After a 4381 has been powered down, voltages can still be present in the processor because of the attached OEM equipment that is still powered up.

Power-on maintenance requires that you:

- Remain alert and exercise all possible safety precautions.
- Follow only approved maintenance procedures from authorized publications such as this manual, Customer Engineering Memorandums (CEMs), and plant engineering changes.
- Always work within sight or hearing of someone who can take emergency action immediately.

Besides the standard safety practices, the following safety practices are to be observed:

1. Instruct personnel in your immediate area on the locations of the Unit Emergency switch on the machine and the location of the room emergency power off switch. Ensure that someone who can take emergency action should it become necessary remains in the immediate area.
2. Turn off the power at the appropriate source before removing covers and safety shields. Power sources include: Power Off switches, master circuit breakers, branch circuit breaker, and power cable connectors. Attach a DO NOT OPERATE tag (Z229-0237) to the switch when it is turned off.
 - a. Using a FLUKE* digital meter (or equivalent tool), verify that the power is off.
 - b. Remove appropriate machine covers and protective shields. Place all removed hardware parts away from your immediate work area. Save all star washers to be reinstalled later for proper grounding.

Note: Star washers are installed beneath the lug and next to the frame.
 - c. Ensure that no one is in danger when power is applied; only then, turn on the power.

* Trademark of John Fluke Mfg. Co.
Mount Lake Terrace, Washington

While doing maintenance with power on:

1. Wear safety glasses in designated areas and wherever a risk to eye injury exists.
2. Ground all test equipment with a ground wire (use a multimeter test lead) to machine ground.
3. Use only one hand to contact any part of the machine at any one time. Avoid contact with any other part of your body (such as your knees, elbows, and head).
4. Use only IBM-approved insulated tools issued by your branch office. Replace tools having broken or worn insulation.
5. Be aware of hazards in your immediate environment, such as holes in the floors, open machine gates, test equipment on casters near open gates or removed floor panels, and traffic in aisles.
6. Place manuals or test equipment on carts or tables. Do not place anything on top of machine frames.
7. Regularly check that the person designated to take emergency action remains in your immediate area.

Post Maintenance Procedure

At the completion of maintenance, perform the following procedure with power off:

1. Verify that power is off.
2. Replace all the safety shields and covers. Be sure to use the star washers that provide grounding to the frame (when applicable).

Note: Star washers are installed beneath the lug and next to the frame.
3. Restore all safety interlocks.
4. Remove DO NOT OPERATE tag(s) from the power source switch.

Housekeeping

To maintain a neat environment:

1. Secure machine gates and covers.
2. Ensure that all your tools are in your tool kit (leave no tools in the machine or on the floor).
3. Ensure that manual racks and test equipment do not block machine air circulation ports, traffic aisles, or access to wall power switches.
4. Ensure that any nickel-cadmium batteries or any capacitors that were replaced during maintenance are returned to the branch office parts room for proper disposal.

Seq AA035	PN 0445719 Pg 2 of 4	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Safety Guidelines

If you are aware of the guidelines for working with electrical and mechanical equipment and practice these guidelines, you can work safely with this equipment. **You need not fear electricity, but you must respect it.**

You should take every safety precaution possible and observe the following safety practices while maintaining IBM equipment:

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if this is a potential problem.
2. Remove 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 in machine circuitry.
3. Power supplies, pumps, blowers, motor-generators, and other units with voltages that exceed 30 Vac or 42.4 Vdc must not be serviced with power on when the unit is removed from its normal installed position within the machine, unless maintenance documentation clearly states otherwise. (This is done to ensure that proper grounding is maintained.)
4. Unplug the power supply 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 (Order No. 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.
5. When it is absolutely necessary to work on equipment having exposed live electrical circuitry, observe the following precautions:
 - a. Another person familiar with power-off controls must be in immediate vicinity. (Someone must be there to turn off power if it should become necessary.)
 - b. Do not wear any jewelry, chains, metallic frame eyeglasses, or metal cuff links. (In the event of contact, there will be more current flowing because of the greater contact area afforded by the metal.)
 - c. Use only insulated pliers, screwdrivers, and appropriate probe tips/extendors. (Remember, worn or cracked insulation is unsafe.)
 - d. 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 for electrical shock. This procedure helps eliminate a path that could complete a circuit through you!)
- e. When using test equipment, be certain that controls are set correctly and that insulated probes of proper capacity are used.
 - f. Avoid contacting ground potential (metal floor strips, machine frames, and so forth); use suitable rubber mats purchased locally if necessary.
6. Follow special safety instructions when working with extremely high voltages. These instructions are outlined in Customer Engineer Memorandums (CEMs) and the safety portion of maintenance documentation. Use extreme care when checking high voltage.
 7. Avoid use of tools and test equipment that have not been approved by IBM. [Electrical hand tools (wire wrap guns, drills, and so forth) should be inspected periodically.]
 8. Replace worn or broken tools and test equipment.
 9. After maintenance, restore all safety devices, such as guards, shields, signs, and ground leads. Replace any safety device that is worn or defective. (These safety devices are there to protect you from a hazard. Do not defeat their purpose by not replacing them at the completion of the service call.)
 10. Safety glasses must be worn when:
 - Using a hammer to drive pins, and so forth.
 - Power hand drilling.
 - Using spring hooks to attach springs.
 - Soldering, wire cutting, and removing steel bands.
 - Parts cleaning, using solvents, chemicals, and cleaners.
 - Working with electrolytic capacitors that have blowout plugs.
 - All other conditions which might be hazardous to your eyes.
 11. Never assume that a circuit is deenergized. (Check it first!)
 12. Always be alert to potential hazards in your working environment (for example, damp floors, nongrounded extension cords, power surges, missing safety grounds, and so forth).

13. Do not touch live electrical circuits with the surface of the plastic dental mirrors. The surface of the dental mirror is conductive and can result in machine damage and personal injury.
14. Four steps that should be taken in the event of an electrical accident:
 - a. USE CAUTION-DO NOT BE A VICTIM YOURSELF.
 - b. TURN POWER OFF.
 - c. HAVE SOMEONE ELSE GET MEDICAL HELP.
 - d. ADMINISTER RESCUE BREATHING IF VICTIM IS NOT BREATHING.
15. Do not use solvents, cleaners, or oils that have not been approved by IBM.
16. Lift by standing or pushing up with stronger leg muscles. This takes strain off back muscles. Do not lift any equipment or parts which you feel uncomfortable with.
17. It is your responsibility to be certain that no action on your part renders the product unsafe or exposes hazards to customer personnel.
18. Place removed machine covers in a safe out-of-way location while servicing the machine. These covers must be in place on the machine before the machine is returned to the customer.
19. Always place tool kit away from walk areas where no one can trip over it (for example, under desk or table).
20. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be buttoned or rolled up above the elbow. Long hair and scarves must be secured.
21. Ties must be tucked in shirt or have a tie clasp (preferably nonconductive) about three inches from the end when servicing a machine.
22. Before starting equipment, make sure that any personnel in the area are not in a hazardous position.
23. Maintain good housekeeping in the area of the machines while performing and after completing maintenance.
24. Avoid touching moving mechanical parts when lubricating, checking for play, and so forth.

Prevention is the key to electrical safety. You should always be conscious of electrical safety and practice **good habits** such as:

- Making certain that the customer's power receptacle meets IBM equipment requirements.
- Inspect line cords and plugs. Check for loose, damaged, or worn parts.
- Before removing a component that can retain a charge from the machine, review the procedure in the maintenance documentation. Wear safety glasses and CAREFULLY discharge the necessary components exactly as directed by the service procedure.
- Do not use an ordinary lamp as an extension trouble light.

Never **assume** anything about a machine or circuit. No machine is completely safe **all** of the time. The exact condition of a machine may be unknown. Here are some reasons why:

- The power cord could be incorrectly wired.
- Safety devices or features could be missing or defective.
- The maintenance and/or change history may be uncertain or unclear.
- A possible design deficiency could exist.
- The machine may have suffered transportation damage.
- The machine might have an unsafe alteration or attachment.
- An EC or sales change may have been improperly installed.
- The machine may have deteriorated because of age or environmental extremes.
- A component could be defective and create a hazard.
- Some component of the machine may have been incorrectly assembled.

Before you begin a service call or procedure, exercise good judgement and proceed with caution.

Seq AA035	PN 0445719 Pg 3 of 4	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Electrical Accidents

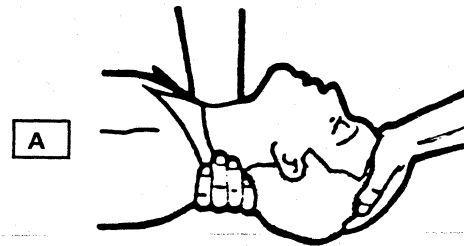
Administering First Aid

In 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 emergency power off or disconnect switch to remove the electrical current. If the switch in the room cannot be located, use a dry stick or another nonconducting object to pull or push the victim away from contact with the electrical equipment.
- **Act Quickly**—If the victim is unconscious, the person may need rescue breathing. If the heart has stopped beating, the victim may also need external cardiac compression. (External Cardiac Compression should only be performed by a qualified person. Persons interested in becoming certified in Cardiopulmonary Resuscitation (CPR) should contact the local American Red Cross or the American Heart Association.)
- **Call Fire Rescue**—Have someone summon medical aid (rescue squad, emergency, ambulance, hospital, and so forth).

If no CPR-trained person is available, determine if the victim needs rescue breathing.

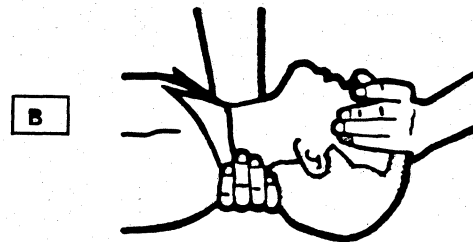
1. Make certain that the victim's airway is open and not obstructed. Check the mouth for objects that may be blocking the airway, such as gum, food, dentures, or even the tongue. Position the victim on his back, and place one hand beneath the victim's neck and the other hand on his forehead. Then lift the neck with one hand, and tilt the head backward with pressure on the forehead from the other hand **A**.



2. Now you must **look, listen, and feel** to determine if the victim is breathing freely. Place your cheek close to the victim's mouth and nose to listen and feel for exhaling of air.

At the same time, look at the chest and upper abdomen to see if they rise and fall. If the victim is not breathing properly, you should:

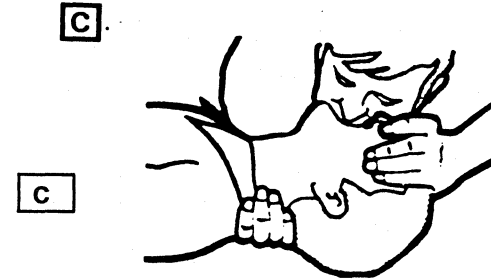
- a. With the head in a backward tilt **A**, continue to exert pressure on the victim's forehead with your hand while rotating this same hand so that you can pinch the victim's nostrils together with the thumb and index finger **B**.



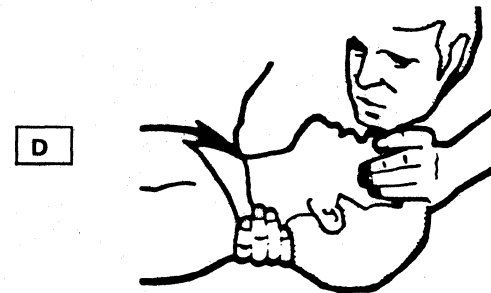
CAUTION

Use extreme care when administering rescue breathing to a victim that may have breathed in toxic fumes. **DO NOT INHALE AIR EXHAUSTED BY THE VICTIM.**

- b. Open your mouth wide and take a deep breath. Make a tight seal with your mouth around the victim's mouth and blow into the victim's mouth **C**.



- c. Remove your mouth and allow the victim to exhale. Watch for the victim's chest to fall **D**.



- d. Repeat this cycle once every five seconds until the victim breathes for himself or medical help arrives.

Reporting Accidents

It is your responsibility to report all electrical accidents, potential electrical hazards, and "near miss" accidents to your **field manager**. Remember, a near-miss accident might be the result of a design deficiency and prompt reporting assures that the situation will be resolved quickly.

It is important to report even a minor shock because the conditions which caused it need only be varied slightly to cause serious injury.

Index

A

abbreviations GLOSSARY 001
 ac distribution AID 825
 action string
 power-on, CE mode AID 931
 power-on, normal mode AID 915
 actuation tool TOOLS 011
 adapter
 cable probe TOOLS 002
 channel-to-channel feature AID 715
 continuity checker TOOLS 012
 CTCA AID 745
 drive 1/4 to 3/8 TOOLS 008
 adjustment, 3279 display console AID 025
 AFS (air flow sensor) location LOC 002
 air flow sensor (see AFS)
 air moving device (see AMD)
 alter/display (QD) screen (see Volume A08)
 AMD (air moving device)
 location LOC 002
 removal
 101 REM 095
 102 REM 096
 103 REM 105
 104 REM 106
 105 REM 115
 analog sense points AID 885
 assignment
 channel data rates AID 092
 device change S/370 AID 075
 IOCP device AID 110
 automatic patch installation AID 365

B

basic check indicator AID 570
 basic MSS diagnostic (see MSS)
 basic PU diagnostic (see processing unit)
 battery, continuity checker TOOLS 012
 bit definitions, limited channel logout bit AID 655
 block/patch (QB) screen (see Volume A08)
 board
 signal levels AID 765
 01A-A1
 card side LOC 007
 removal REM 003
 voltage pins AID 845
 01A-A1-01A-A4 pin layout LOC 015
 01A-A2
 card side LOC 008
 removal REM 003
 voltage pins AID 855

board (continued)
 01A-A3
 card side LOC 011
 removal REM 003
 voltage pins AID 865
 01A-A4
 card side LOC 012
 removal REM 003
 voltage pins AID 875
 01A-B2
 distribution AID 1025
 module pin layout LOC 023
 module side LOC 019
 removal REM 011
 resistor and I/O signal LOC 020
 terminals LOC 024
 01E channel gate connections AID 1195
 bus and tag lines AID 625
 button
 check reset AID 565
 copy SP storage data AID 565
 IML AID 565
 lamp test AID 565
 logic reset AID 565
 power on AID 565
 byte mode chnl 5 AID 050

C

C change password (ROCF) AID 410
 C-PAC (decoupling capacitor) REM 021
 cable
 actuation tool, I/O signal cable TOOLS 011
 and connectors AID 945
 connectors point to point AID 955
 FDS (flat distribution system) AID 995
 flat, removal REM 022
 I/O signal, removal REM 022
 probe adapter TOOLS 002
 reference number diagram AID 985
 reference 01AB2 AID 1015
 replacement
 channel AID 1065
 power AID 1035
 signal AID 1035
 unlock tool, I/O signal cable TOOLS 002
 cabling, CTCA AID 725
 cache (high speed buffer) INTRO 008
 card container TOOLS 002

cards, exchanging CTCA AID 740
 catalog numbers
 S/370 AID 665
 S/370XA AID 685
 CCW
 command (FRIEND) SYS TEST 090
 flag (FRIEND) SYS TEST 110
 CE mode switch AID 565
 CE safety inspection INSP 001
 channel
 cable replacement AID 1065
 configuration data rates (S/370) AID 092
 connector LOC 031
 control lines AID 1195
 data rates (S/370) AID 092
 diagnostic
 CMDE (channel microcode device exerciser) DIAG 140
 CWT (channel wrap test) DIAG 150
 description DIAG 135
 mark in test DIAG 135
 failure isolation AID 615
 interface/holly monitor AID 629
 introduction, general description INTRO 008
 log
 IFCC detail LOG 080
 IFCC summary LOG 075
 path identifier (CHIPD) AID 140
 repair procedure CHNL 001
 service aids AID 615
 01E gate connection I/O connector AID 1195
 0 I/O cable pin location AID 1075
 1 I/O cable pin location AID 1085
 2 I/O cable pin location AID 1095
 3 I/O cable pin location AID 1105
 4 I/O cable pin location AID 1115
 5 I/O cable pin location AID 1125
 6 I/O cable pin location AID 1135
 7 I/O cable pin location AID 1145
 8 I/O cable pin location AID 1155
 9 I/O cable pin location AID 1165
 A I/O cable pin location AID 1175
 B I/O cable pin location AID 1185
 channel to channel (see CTCA)
 characteristic, subchannel AID 140
 chart, EC level control INTRO 004
 check control (QK) screen (see Volume A08)
 check reset pushbutton AID 565
 checkout, service panel AID 575
 CHIPD (S/370XA)
 channel path identifier AID 140
 configuration report AID 200
 summary report AID 195
 clock waveforms AID 755

CMDE (channel microcode device exerciser)
 description INTRO 012
 diagnostic DIAG 140
code description
 MSS INTRO 011
 power INTRO 011
 reference INTRO 011
color convergence (QFA) screen (see Volume A08)
commands, FRIEND. SYS TEST 065
communications, remote console. AID 435
compare/trace (QA) screen (see Volume A08)
component location and part number update procedure. AID 297
configuration
 channel data rates AID 092
 customer system AID 045
 I/O (S/370). AID 065
 I/O (S/370XA). AID 105
 language AID 345
 procedure, customer (QFO) AID 045
 procedure, service (QFS) AID 055
 program, input/output. AID 105
 QF screen (see Volume A08)
 report, S/370XA AID 195
 ROCF procedure. AID 405
 RSF cards, diagrams, and wiring AID 445
 service
 aids AID 045
 system AID 055
connector
 and cables AID 945
 cable point to point. AID 955
 layout LOC 039
console
 color convergence, 3279 AID 025
 display connector LOC 029
 language code AID 045
 mode AID 045
 ports AID 050
 test pattern procedure, 3279 AID 035
 test pattern (QFP) screen (see Volume A08)
container, card. TOOLS 002
continuity checker, description. TOOLS 012
control lines
 channel AID 1195
 sense points AID 905
control storage size. AID 055
control unit (CTL UNIT) AID 140
control unit image report. AID 205
convergence
 procedure, 3279 AID 025
 QFA screen (see Volume A08)
copy, diskette AID 315

copy key. AID 050
copy SP storage data pushbutton. AID 565
copying a screen (see Volume A08)
CTCA (channel-to-channel adapter)
 cabling AID 725
 cards, exchanging. AID 740
 configuring. AID 060
 general description INTRO 015
 signals. AID 745
 switch settings. AID 725
 test. AID 725
CTL (control) unit type. AID 140
customer data and security control (PA). AID 295
CWT (channel wrap test). DIAG 150
cycle time, processor. INTRO 008

D

D system power down (ROCF). AID 410
damaged diskette recovery. AID 335
data bank initialization. AID 415
data rates, channel configuration. AID 092
data set
 selection procedure. AID 135
 subchannel AID 140
dc distribution. AID 835
decoupling capacitor (CPAC) REM 021
description
 actuation tool, torque leaf springs. TOOLS 011
 actuation tool, I/O cables TOOLS 011
 CTCA (channel-to-channel adapter) INTRO 015
 double bit error correction INTRO 012
 module pin aligner TOOLS 021
 processor configuration INTRO 009
 processor highlights INTRO 008
 PU (processing unit) INTRO 011
 repair procedures INTRO 013
DEV ADDR (device address). AID 140
DEV MODE (device mode). AID 140
DEV NUMBER (device number) AID 140
device
 address (DEV ADDR) AID 140
 assignment
 change, S/370 AID 075
 IOCP AID 110
 S/370 AID 070
 identification (S/370XA) AID 145
 I/O configuration report S/370XA AID 200
 mode (DEV MODE). AID 140
 number (DEV NUMBER) AID 140
 verification (S/370XA). AID 145

diagnostic
 channel
 CMDE (channel microcode device exerciser) DIAG 140
 CWT (channel wrap test) DIAG 150
 description DIAG 135
 mark in test DIAG 135
 wrap test DIAG 150
 diskette analysis. DIAG 100
 MSS
 basic DIAG 020
 extended. DIAG 020
 optional DIAG 070
 processing unit
 basic DIAG 110
 MSMD (machine speed microdiagnostic). DIAG 115
 system test/4381 SYS TEST 015
 system test/4381XA. SYS TEST 015
 summary DIAG 005
digital sense points. AID 895
directory
 UCW (S/370), display. AID 080
 S/370XA update AID 125
diskette
 analysis (QED) screen (see Volume A08)
 analysis test. DIAG 100
 copy AID 315
 copy patch installation. AID 365
 drive
 introduction. INTRO 012
 removal REM 118
 use of INTRO 008
 installation (QFM) screen (see Volume A08)
 recovery, damaged AID 335
 to diskette copy (QFG) screen (see Volume A08)
 update. AID 060
display
 mode notes AID 050
 service panel AID 570
 subchannel image by subchannel number AID 140
 UCW directory (S/370). AID 080
display console
 description. INTRO 008
 information (see Volume A08)
 messages (see Volume A08)
 3279 adjustment. AID 025
display/alter (QD) screen (see Volume A08)
distribution
 ac. AID 825
 board 01AB2 AID 1025
 dc. AID 835
documentation organization. INTRO 003
double bit correction description. INTRO 012
drive adapter 1/4 to 3/8. TOOLS 008
drive, diskette. INTRO 012

E

EC
 diskette update. AID 325
 level control chart. INTRO 004
ECBG (error correction bit generation) INTRO 012
EIA adapter
 RSF card/cable configuration. AID 476
 RSF card/cable configuration (UK) AID 485
ELA (error log analysis) DIAG 010
end repair END 001
error
 checking description INTRO 011
 correction bit generation (ECBG). INTRO 012
 log (see LOG)
 log analysis DIAG 010
 messages (IOCP) AID 155
event counter LOG 040
examples, channel rate assignments. AID 092
exchanging CTCA cards. AID 740
extended MSS (see MSS)
extension, continuity checker. TOOLS 012
external interrupts AID 1045
extract/insert (QV) screen (see Volume A08)

F

facility, remote support AID 375
failure isolation channel AID 615
FDS (flat distribution system) connectors. AID 995
feature, channel-to-channel adapter INTRO 015
field support center (FSC) mode. DIAG 165
first aid SAFETY 006
flat cable removal REM 022
flat distribution system (see FDS)
format, message (IOCP). AID 155
FRIEND
 advanced capabilities. SYS TEST 030
 CCW
 chains, predefined SYS TEST 040
 command modifiers SYS TEST 110
 commands SYS TEST 090
 flags. SYS TEST 110
 commands. SYS TEST 065
 examples. SYS TEST 025
 how to use SYS TEST 025
 messages SYS TEST 055
FSC (see field support center)

G

gate
 01A front view LOC 004
 01A right side LOC 004
 01A pin side LOC 003
 01A rear view LOC 003
 01C front and rear view. LOC 025
 01D LOC 029
 01E. LOC 031
 01F. LOC 029
 01G LOC 029
 01H LOC 029
general description INTRO 007
general selection (Q) screen (see Volume A08)
generation, IOCP. AID 120
glossary GLOSSARY 001
guidelines, safety. SAFETY 005

H

holly monitor. AID 629

I

I/O
 assignment table (S/370) AID 085
 cable tool TOOLS 002
 cable pin location
 channel 0 AID 1075
 channel 1 AID 1085
 channel 2 AID 1095
 channel 3 AID 1105
 channel 4 AID 1115
 channel 5 AID 1125
 channel 6 AID 1135
 channel 7 AID 1145
 channel 8 AID 1155
 channel 9 AID 1165
 channel A AID 1175
 channel B AID 1185
 cables actuation tool description. TOOLS 011
 configuration (S/370) AID 065
 configuration (S/370XA) AID 105
 power hold indicator AID 570
 power hold switch AID 565
 power on time out AID 045
 signal cable
 actuation tool TOOLS 002
 removal REM 022
 unlatch tool. TOOLS 002
 signals, support bus adapter (SBA) AID 1055
 status, MSS. LOG 035

identification, device (S/370XA) AID 145
IFA (interface adapter) card scope points AID 651
IFCC (interface control check), log (see channel)
image table report, S/370XA configuration AID 205
image, subchannel by device number AID 145
IML
 at power-on, QFO screen AID 045
 block transfer. AID 325
 pushbutton AID 565
indicator
 basic check AID 570
 I/O power hold AID 570
 MBC on AID 570
 power complete AID 570
 power in process AID 570
 24 volt AID 570
 5 volt AID 570
informational messages (IOCP) AID 155
initialization
 data bank AID 415
 remote console. AID 425
input device, IOCP assignment. AID 115
input file, I/O configuration AID 105
input/output configuration program (IOCP). AID 105
insert/extract (QV) screen (see Volume A08)
inspection, CE safety INSP 001
installation
 automatic patch AID 365
 description. INST 001
 diskette copy patch. AID 365
 manual patch. AID 355
 mode DIAG 160
 patch AID 355
 S/370XA. AID 095
interconnection 01AB2 signal AID 1005
interface
 adapter (IFA) pins AID 651
 channel, monitor. AID 629
 control check (IFCC) logs (see channel)
 isolation CTCA INTRO 016
interrupts, external AID 1045
introduction
 channel test. INTRO 012
 channel-to-channel feature INTRO 015
 diskette drive INTRO 012
 double bit correction INTRO 012
 ECBG (error correction and bit generation) INTRO 012
 error checking INTRO 011
 failures INTRO 010
 IOCDs (input/output configuration data set) INTRO 012
 I/O and system tests INTRO 012

introduction (continued)

MSS (maintenance support subsystem) INTRO 011
 PA (problem analysis) error codes INTRO 010
 power
 codes INTRO 011
 sequence INTRO 016
 processing unit (PU) INTRO 011
 processor INTRO 007
 RC (reference codes) INTRO 011
 reference codes (RC) INTRO 011
 repair procedures INTRO 013
 retry and reconfiguration INTRO 011
 service aid AID 015
 single bit correction INTRO 012
 system
 and I/O tests INTRO 012
 failures INTRO 010
 maintenance INTRO 010
IOCP
 device assignment AID 110
 generation AID 120
 message AID 155
 program, start AID 120
 screens AID 105
isolation mode DIAG 125
isolation, channel failure AID 615

L

label identification, subchannel AID 140
lamp
 continuity checker TOOLS 012
 test pushbutton AID 565
language code, console AID 045
level
 EC control INTRO 004
 signal
 01A-A1 board AID 765
 01A-A2 board AID 775
 01A-A3 board AID 785
 01A-A4 board AID 795
 01A-B2 board AID 805
lighted magnifier TOOLS 007
limited channel logout bit definitions AID 655
line plate (WT) RSF card/cable configuration AID 465
lines, bus and tag AID 625
load screen (QL) (see Volume A08)
log
 channel, interface control check (IFCC)
 detail LOG 080
 summary LOG 075
 introduction LOG 010
 MSS (maintenance and support subsystem) LOG 025

log (continued)

power
 detail LOG 090
 directory LOG 085
 processing unit
 directory LOG 050
 microword LOG 055
 reconfiguration data LOG 065
 summary LOG 060
 reference code history LOG 015
 RSF line statistics LOG 045
 SP (support processor)
 detail LOG 030
 event counters LOG 040
 summary LOG 025
logic reset pushbutton AID 565
loop procedure
 S/370XA AID 647
 TIO/SIO (S/370 mode) AID 645
LSI cards REM 004

M

machine layout LOC 002
magnifier, lighted TOOLS 007
main storage size AID 055
maintenance and support subsystem (see MSS)
maintenance
 overview INTRO 010
 preventive PM 001
manual patch installation AID 355
mark in test description DIAG 135
MBC on indicator AID 570
messages
 display console (see Volume A08)
 display (see Volume A08)
 FRIEND SYS TEST 055
 IOCP AID 155
 test case monitor DIAG 200
mode, console AID 045
module
 pin
 aligner TOOLS 007
 aligner description TOOLS 021
 alignment template TOOLS 007
 layout, board 01AB2 LOC 023
 transfer
 procedure AID 305
 QFM screen (see Volume A08)
 64 mm pluggable REM 017
monitor, channel interface/holly AID 629
MSMD, diagnostic (see processing unit)
MSMD, monitor DIAG 105

MSS (maintenance and support subsystem)

basic diagnostic DIAG 020
 code, basic test DIAG 030
 code, description DIAG 015
 codes INTRO 011
 extended diagnostic
 description DIAG 020
 reference code DIAG 040
 test IDs DIAG 045
 introduction INTRO 011
 I/O status LOG 035
 log, RSF statistics LOG 045
 log, SP
 detail LOG 030
 event counter LOG 040
 summary LOG 025
 optional diagnostic
 by test ID DIAG 080
 description DIAG 070
 reference codes DIAG 080
 repair
 action screen DIAG 055
 procedure MSS 001
 service aids AID 565

N

N system node ID (ROCF) AID 410
notices
 CAUTION SAFETY 001
 DANGER SAFETY 001
 warning SAFETY 001
 safety SAFETY 001
number of channels AID 060

O

OCP (operator control panel) layout LOC 041
operation rate control (QO) screen (see Volume A08)
operator control panel (OCP) layout LOC 041
optional MSS diagnostic (see MSS)
options
 C - channel interface diagnostic DIAG 135
 F - field support center mode DIAG 165
 I - isolation mode DIAG 125
 T - installation mode DIAG 160
 V - verification mode DIAG 130
organization
 documentation (MI) INTRO 003
 manual PREFACE 001
oscilloscope, Tektronix* 2465 TOOLS 008

* Trademark of Tektronix, Inc.

output device, IOCP assignment AID 115
 overview, CTCA AID 730

P

P console port (ROCF) AID 410
PA (problem analysis)
 error codes INTRO 010
 introduction INTRO 010
 maintenance use. INTRO 010
panel, processor service. AID 565
part number update procedure, component location. AID 297
password change procedure. AID 295
patch
 aids AID 355
 automatic installation. AID 365
 installation AID 355
 installation, copy patch AID 365
 manual installation AID 355
patch/block (QB) screen (see Volume A08)
path installed mask (PIM) AID 140
PCA (see power controller adapter)
PCC (primary control compartment) LOC 037
PCI (power control interface) panel LOC 029
PIM (path installed mask) AID 140
pin aligner template, module TOOLS 007
pin layout, board 01A-A1 to A4. LOC 015
pins
 board voltage
 01A-A1 AID 845
 01A-A2 AID 855
 01A-A3 AID 865
 01A-A4 AID 875
 channel
 0 AID 1075
 1 AID 1085
 2 AID 1095
 3 AID 1105
 4 AID 1115
 5 AID 1125
 6 AID 1135
 7 AID 1145
 8 AID 1155
 9 AID 1165
 A AID 1175
 B AID 1185
 IFA (interface adapter) card AID 651
PLDA LOG 036
PM PM 001

points, storage scope. AID 605
power
 bus torque wrench TOOLS 008
 cable replacement. AID 1035
 code DIAG 015
 complete indicator AID 570
 control interface (PCI) panel. LOC 029
 controller adapter (PCA), reference code DIAG 060
 diagnostic DIAG 060
 error log
 detail LOG 090
 directory LOG 085
 group codes. AID 055
 in process indicator. AID 570
 introduction
 codes INTRO 011
 description INTRO 011
 logic AID 055
 off switch AID 565
 on action string
 CE mode AID 931
 normal mode. AID 915
 on pushbutton AID 565
 reference code DIAG 060
 repair PR 001
 service aids AID 825
 QW screen (see Volume A08)
power supplies location. LOC 033
power supply (see PS101-PS109)
power controller adapter (PCA), diagnostic. DIAG 060
practices, safety SAFETY 003
preface PREFACE 001
preventive maintenance. PM 001
primary control compartment (PCC). LOC 037
printer/keyboard mode notes. AID 050
probe assembly. TOOLS 007
probe mask. TOOLS 007
problem analysis (PA)
 introduction INTRO 010
 use DIAG 010
procedure
 channel interface monitor. AID 629
 clock waveforms. AID 755
 component location update AID 297
 configuration, customer AID 045
 console test pattern AID 035
 convergence, 3279 AID 025
 damaged diskette recovery. AID 335
 data bank AID 415
 data set selection AID 135
 diskette copy AID 315
 EC diskette update AID 325
 holly monitor AID 629

procedure (continued)
 loop S/370XA AID 647
 module transfer AID 305
 part number update AID 297
 reconfiguration AID 505
 remote console communications. AID 435
 remote console initialization AID 425
 repair (see repair procedures)
 ROCF configuration. AID 405
 send service information AID 395
 TIO single cycle mode. AID 635
 TIO/SIO loop. AID 645
processing unit (PU)
 analysis DIAG 010
 basic diagnostic DIAG 110
 block diagram INTRO 007
 configuration INTRO 009
 description. INTRO 011
 diagnostic
 channel. DIAG 135
 FSC mode. DIAG 165
 installation mode DIAG 160
 isolation mode. DIAG 125
 verification mode DIAG 130
 highlights. INTRO 008
 library PREFACE 001
 log
 directory LOG 050
 microword directory LOG 055
 reconfiguration data LOG 065
 summary. LOG 060
 machine speed microdiagnostics (MSMDs) DIAG 115
 overview INTRO 007
 reconfiguration data LOG 065
 repair procedure PU 001
program
 I/O configuration AID 105
 support INTRO 008
protective coupler RSF card/cable configuration. AID 495
PS (power supply)
 101 REM 031
 102 REM 032
 103 REM 041
 104 REM 042
 105 REM 051
 106 REM 052
 107 REM 061
 108 REM 062
 109 REM 071
PU (see processing unit)
PUA (processing unit analysis) DIAG 010
pushbuttons/switches AID 565

Q

Q screens (see Volume A08)
QBTP screen, patch installation AID 355
QFB screen, ROCF procedure AID 405
QFC screen, remote console communication AID 435
QFD screen, data bank initialization AID 415
QFG screen, diskette copy procedure AID 315
QFM screen, module transfer procedure AID 305
QFO screen, configuration procedure AID 045
QFOI screen, data set selection AID 135
QFOIC screen, UCW verification AID 080
QFOID screen, IOCP device assignment AID 110
QFOIL screen, subchannel verification AID 140
QFOIN screen, device verification AID 145
QFOIS screen, IOCP generation AID 120
QFOISY screen, update XA directory AID 125
QFOIU screen, device assignment procedure AID 070
QFR screen, remote console initialization AID 425
QFS screen, configuration procedure AID 055
QP4 screen, send service information AID 395
QP6 screen, customer data/security AID 295
quick reference documentation index INTRO 002

R

R reset security count (ROCF) AID 410
readers comment form INTRO 005
RC (see reference code)
reconfiguration and retry introduction INTRO 011
reconfiguration
 description DIAG 010
 log data LOG 065
 procedure AID 505
 PU, QFSA screen (see Volume A08)
recovery, damaged diskette AID 335
reference, cables 01AB2 AID 1015
reference code (RC)
 description DIAG 015
 history log LOG 015
 for MSMDs DIAG 115
 for MSS extended diagnostic DIAG 045
 for MSS optional diagnostic DIAG 080
 for PCA diagnostic DIAG 060
 for PU basic diagnostic DIAG 110
reference diagram, cables AID 985
relays and CP layout LOC 040
remote console
 communications AID 435
 initialization AID 425
remote operator console facility (see ROCF)
remote support facility (see RSF)

remote TOD
 enabled AID 045
 installed AID 055
removal
 AMD (air moving device)
 101 REM 095
 102 REM 096
 103 REM 105
 104 REM 106
 105 REM 115
 board
 01A-A1 REM 003
 01A-A2 REM 003
 01A-A3 REM 003
 01A-A4 REM 003
 01A-B2 REM 012
 decoupling capacitor REM 021
 diskette drive REM 118
 I/O signal cable REM 022
 LSI card REM 004
 power supply
 PS101 REM 031
 PS102 REM 032
 PS103 REM 041
 PS104 REM 042
 PS105 REM 051
 PS106 REM 052
 PS107 REM 061
 PS108 REM 062
 PS109 REM 071
 service panel REM 117
 terminating resistors REM 018
 transformer
 TR100 REM 075
 TR101 REM 076
 TR102 REM 085
 TR103 REM 086
 TR104 REM 093
 64 mm pluggable module REM 017
repair action screen DIAG 055
repair procedures
 channel CHNL 001
 description INTRO 013
 end END 001
 MSS MSS 001
 power
 MBC PR 001
 PU PR 1001
 start START 001
 use of INTRO 013

replacement

AMD (air moving device)
 105 REM 115
 104 REM 106
 103 REM 105
 102 REM 096
 101 REM 095
 board
 01A-A1 REM 003
 01A-A2 REM 003
 01A-A3 REM 003
 01A-A4 REM 003
 01A-B2 REM 012
 decoupling capacitor REM 021
 diskette drive REM 118
 I/O signal cable REM 022
 LSI card REM 004
 power supply
 PS101 REM 031
 PS102 REM 036
 PS103 REM 041
 PS104 REM 046
 PS105 REM 051
 PS106 REM 056
 PS107 REM 061
 PS108 REM 066
 PS109 REM 071
 service panel REM 118
 terminating resistors REM 018
 transformer
 TR100 REM 075
 TR101 REM 076
 TR102 REM 085
 TR103 REM 086
 TR104 REM 093
 64 mm pluggable module REM 017
report
 CHPID configuration AID 200
 CHPID summary AID 195
 configuration (S/370XA) AID 195
 I/O configuration AID 200
 image table AID 200
 subchannel image AID 205
 unit control unit image AID 205
retry DIAG 010
retry and reconfiguration introduction INTRO 011
returning to normal CTCA operation AID 740

ROCF (remote operators console facility) INTRO 008
 auto modem AID 055
 configuration procedure AID 405
 description INTRO 008
 mode switch (M option) AID 405
RSF (remote support facility)
 cards, diagrams, and wiring configurations AID 445
 connector LOC 029
 description INTRO 008
 diagram
 feature code 9510 AID 445
 feature code 9511 AID 475
 feature code 9514 AID 495
 feature code AID 060
 line error statistic LOG 045
 option verification procedure (feature code 9514) AID 486
 service aids AID 375
run procedure, CTCA AID 735
running in S/370XA mode AID 130

S

S line speed-switch (ROCF) AID 410

S/370

 device, assignment AID 070

 I/O, configuration AID 065

 I/O table, assignment AID 085

 UCW assignment, screens AID 065

 UCW, directory display AID 080

S/370XA

 configuration report AID 195

 directory, update AID 125

 installation AID 095

 I/O configuration AID 105

 mode, running AID 130

 terms AID 185

safety

 CAUTION notices SAFETY 001

 DANGER notices SAFETY 001

 first aid SAFETY 006

 guidelines SAFETY 005

 inspection, CE INSP 001

 notices SAFETY 001

 practices SAFETY 003

 saving data (see Volume A08)

SBA (support bus adapter) I/O signals AID 1055

scope points, channel IFA AID 651

screens, IOCP AID 105

screens (Q) (see Volume A08)

send service information (problem analysis) AID 395

sense points

 analog AID 885

 control lines AID 905

 digital AID 895

serial number update AID 055

service aid

 cable diagrams AID 935

 channel AID 615

 clock AID 755

 configuration AID 045

 CTCA AID 715

 diskette AID 305

 display AID 025

 introduction AID 015

 MSS AID 565

 patch AID 355

 power AID 825

 RSF AID 375

 signal levels AID 765

 storage AID 605

service panel

 checkout AID 575

 display AID 570

 front and rear view LOC 027

 processor AID 565

 removal REM 117

setting, CTCA switch AID 725

signal cable replacement AID 1035

signal interconnection 01AB2 AID 1005

signal level

 01A-A1 board AID 765

 01A-A2 board AID 775

 01A-A3 board AID 785

 01A-A4 board AID 795

 01A-B2 board AID 805

single bit correction introduction INTRO 012

single cycle mode, TIO AID 635

SP (support processor) (see MSS)

start IOCP program AID 120

start repair START 001

status area codes, module transfer AID 305

status messages (IOCP) AID 155

storage aids AID 605

storage scope points AID 605

storage sizes INTRO 008

subchannel

 identification screen AID 140

 image by device number AID 145

 image report AID 205

 number, display AID 140

 verification AID 140

 370XA introduction INTRO 012

support bus adapter (SBA) I/O signals AID 1055

support facilities, remote AID 375

support processor (SP) (see MSS)

switch

 CE mode AID 565

 CTCA setting AID 725

 I/O power hold AID 565

 power off AID 565

 unit emergency AID 570

switches/pushbuttons AID 565

system

 and I/O tests introduction INTRO 012

 channels introduction INTRO 008

 configuration

 customer AID 045

 service AID 055

 failures description INTRO 010

 maintenance description INTRO 010

 repair procedures INTRO 013

 resets (see Volume A08)

 status (see Volume A08)

 subchannels description INTRO 012

 system test/4381 SYS TEST 015

 tests INTRO 012

 test, system test/4381 SYS TEST 015

system test/4381 and system test/4381XA

 general description SYS TEST 015

 run flowchart SYS TEST 020

 using MVS utilities to copy system

 test/4381XA AID 022

T

T protection-switch (ROCF) AID 405

tag lines, bus and AID 625

tape to diskette (QFT) screen (see Volume A08)

tasks, frequently performed INTRO 002

TCM (see test case monitor)

terminals, board 01AB2 LOC 024

terminating resistors REM 018

terms GLOSSARY 001

terms, S/370XA AID 185

test (see diagnostic)

test case monitor (TCM)

 description DIAG 105

 message DIAG 200

test pattern procedure, console AID 035

test, CTCA AID 725

time of day clock (QFY) screen (see Volume A08)

time-of-day clock (TODC) LOG 010

timer, subchannel AID 140

TIO single cycle mode (S/370 mode) AID 635

TIO/SIO Loop Procedure (S/370 mode) AID 645

TODC (time-of-day clock) LOG 010

tool

 actuation TOOLS 011

 continuity checker TOOLS 012

 drive adapter 1/4 to 3/8 TOOLS 008

 lighted magnifier TOOLS 007

 oscilloscope TOOLS 008

 torque wrench TOOLS 008

top card crossover connectors (TCC) LOC 016

torque wrench, power bus TOOLS 008

trace/compare (QA) screen (see Volume A08)

transformer (see TR100-TR103)

transformer location LOC 035

TR100 REM 075

TR101 REM 076

TR102 REM 085

TR103 REM 086

TR104 REM 093

types, messages (IOCP) AID 155

U

UCW
 assignment screens (S/370) AID 065
 verification (S/370) AID 080
unit emergency switch AID 570
update procedure send service information AID 395
update
 component location AID 297
 EC diskette AID 325
 part number AID 297
 S/370XA directory AID 125
using repair procedures description INTRO 013

V

verification
 device (S/370XA) AID 145
 mode DIAG 130
 UCW AID 080
voltage distribution
 ac AID 825
 dc AID 835
voltage pins, board
 01A-A1 AID 845
 01A-A2 AID 855
 01A-A3 AID 865
 01A-A4 AID 875

W

waveforms, clock AID 755
wiring configurations, RSF cards AID 445

Numerals

01A-A1 board signal level AID 765
01A-A2 board signal level AID 775
01A-A3 board signal level AID 785
01A-A4
 board signal level AID 795
 cable locations AID 605
 card locations AID 605
 pin locations AID 605
 storage scope points AID 611
01A-B2
 board signal level AID 805
 board distribution AID 1025
 cable reference AID 1015
 signal interconnection AID 1005
01E channel gate connections AID 1195
1/4 to 3/8 drive adapter TOOLS 008
24 volt indicator AID 570
3/8 to 1/4 drive adapter TOOLS 008
3279 display console adjustment AID 025
370/XA
 configuration AID 105
 subchannels, IOCDS INTRO 012
38LS/ (Japan) RSF card/cable configuration AID 455
38LS/ (USA/Canada) RSF card/cable
 configuration AID 446
5 volt indicator AID 570
50/60 Hz AID 055
64 mm pluggable module REM 017

Seq AB085	PN 0445729 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84	
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Glossary of Terms and Abbreviations

The following terms are defined as they are used in the Maintenance Information (MI) manual. If you do not find the term you are looking for, refer to the index or to the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, Order No. GC20-1699.

A

- A/D** Alter/Display
- A/FE** Americas/Far East (WT)
- ac** Alternating Current
- ACB** Address Check Boundary
- ACR** Automatic Carriage Return
- Adpt** Adapter
- Adr** Address
- AFS** Air Flow Sensor
- AIO** Adapter Input/Output
- AIS** Air Inlet Sensor
- ALD** Automated Logic Diagrams
- ALT** Alternate (key)
- ALU** Arithmetic and Logic Unit
- AM** Address Match
- AMD** Air Moving Device
- ANYREF** Any Reference
- AOS** Air Outlet Sensor
- ASCII** American Standard Code Information Interchange
- Asm** Assembly

- Async** Asynchronous
- Attn** Attention
- Aux** Auxiliary

B

- B/M** Bill of Material
- BAL** Branch and Link
- BAR** Buffer Address Register
- BAS** Branch and Save
- BC** Basic Control (Mode)
- Bd** Board
- Bfr** Buffer
- BG** Bias Good
- Bi-Di** Bidirectional bus. A bus on which data can be sent in either direction.
- Bkwd** Backward
- BMpx** Block Multiplexer
- block multiplexer channel** A multiplexer channel that interleaves blocks of data.
- Bndry** Boundary
- BOC** Bus-Out Check
- Br** Branch
- BSM** Basic Storage Module
- BUSIN** Data Input Bus
- BUSOUT** Data Output Bus
- byte multiplexer channel** A multiplexer channel that interleaves bytes of data.

C

- C** Capacitor
- C-IC** Corrected Instruction Counter
- C-PAC** Decoupling Capacitor
- C-STEP** Clock Step
- CAC** Common Adapter Code
- CACHE** Buffer that provides 16/32K bytes of high-speed storage.
- CAP** Code Analysis Processor
- CAW** Channel Address Word
- CB** Circuit Breaker
- CBC** Checking Block Code
- CC** Chain Command, Condition Code, Control Check, Cyclic Code
- CCA** Common Communications Adapter (RSF)
- CCAR** Channel Control Array Register
- CCC** Channel Control Check
- CCER** Cache Control Extension Register
- CCW** Channel Command Word
- Cd** Card
- CDB** Channel Data Buffer
- CDC** Channel Data Check
- CE** Customer Engineer (service representative), Channel End
- CHAN** Channel
- CH-DAT** Channel Data
- CH-SEQ** Channel Sequence
- CHG DPLY** Change Display (key)

- Chnl** Channel
- CL** Current Limit
- CLRB** Clear Block (instruction)
- CLRIO** Clear I/O (instruction)
- CMASK** Common Mask Setting
- Cmd** Command
- CMDE** Channel Microcode Device Exerciser
- CNCL** Cancel (key)
- Cnfg** Configuration
- Cnsl** Console
- COMM REQ** Communications Request (key)
- Cond** Condition
- Conn** Connector
- CONV** Convergence
- CP** Circuit Protector
- CPS** Characters per Second
- CRC** Cyclical Redundancy Check
- CRW** Channel Report Word
- CS** Control Storage
- CSAR** Control Storage Address Register
- CSARBU** Control Storage Address Register Backup
- CSDBAR** Channel Storage Data Buffer Address Register
- CSW** Channel Status Word
- CTCA** Channel-to-Channel Adapter. A hardware device that connects two channels for a channel-to-channel data transfer path.

Ctr Counter

Ctrl Control

CU Control Unit

CWT Cable Wrap Test (Channel)

Cyc Cycle

Cyl Cylinder

D

D-STOR Data Store

DAC Digital-to-Analog Converter

DASD Direct Access Storage Device

DASF Dual Address Space Facility

DAT Dynamic Address Translation

DATA-PHONE Both a service mark and a trademark of AT&T and the Bell System. As a service mark, it indicates the transmission of data over the telephone network. As a trademark, it identifies the telecommunication equipment furnished by the Bell System for transmission services.

data-streaming mode A mode of data transfer that permits a data transfer rate up to 3.0 megabytes per second on a single-byte bus. Used only for the Read and Write commands (not for the Sense or Control commands).

DBE Double-Bit Error

DBI Data Bus-In

DBO Data Bus-Out

dc Direct Current

DCA Device Cluster Adapter

DCC Disconnect Command Chaining

DCE Data Communication Equipment

DCK Data Check

DDA Diskette Drive Adapter

DE Device End

Decr Decrement

Dev Device

DI Disconnect-In

DIAG1 Diagnostic Diskette 1

Dir Directory

Disc Disconnect

diskette A thin, flexible magnetic disk that is permanently enclosed in a semi-rigid protective jacket. Synonymous with flexible disk.

DLAT Directory Lookaside Table

DOS Disk Operating System

DOS/VS Disk Operating System/Virtual Storage

DOS/VSE Disk Operating System/Virtual Storage Extended

DP Data Processing

DRIVE1 Diskette Drive 1

DRIVE2 Diskette Drive 2

Drvrr/Rec Driver/Receiver

DSR Data Set Ready

E

E/ME/A Europe/Middle East/Africa (WT)

EAU Erase All Unprotected

EBCDIC Extended binary-coded decimal interchange code. A set of 256 characters, each represented by eight bits.

EC Engineering Change, Extended Control (Mode)

ECC Error Checking and Correction

ECPS Extended Control Program Support

ECSW Extended Channel Status Word

EIA External Interface Adapter, Electronic Industries Association

ELA Error Log Analysis

EMC Electromagnetic Compatibility

EMI Electromagnetic Interference

Enb/Dis Enable/Disable

EOB End of Block

EOF End of File

EOP End of operation. A microcode controlled signal that indicates a microcode sequence has terminated; the end of instruction execution.

ERDS Environment Recording Data Set

EREP Environmental Recording, Editing, and Printing. Program that makes the data on the system recorder file available for analysis.

ERP Error Recovery Procedure

EST Eastern Standard Time

Exec Execution

Ext External

Ext Int External Interrupt

Extn Extension

F

F Fuse

FBM Field Bill of Material

FDS Flexible Distribution System

FE Field Engineering

FP Floating Point

frame The hardware support structure, the covers, and all electrical parts mounted therein that are packaged as one entity for shipping.

FRIEND Fast Running Interpreter Enabling Natural Diagnosis

FRU Field Replaceable Unit. A mechanical or electronic assembly or part that can be replaced in the field.

FSC Field Support Center

FUNC1 Functional Diskette 1

FUNC2 Functional Diskette 2

G

G/Y Green/Yellow

Gen Generator

Gnd Ground

GPR General Purpose Register

H

HDV Halt Device (Instruction)

Hdwr Hardware

hex Hexadecimal

HIO Halt Input/Output (Instruction)

HSB High-Speed Buffer

HW Halfword

HWS Hardwired sequence

Hz Hertz

Seq AC015	PN 0445733 Pg 2 of 2	EC A02214 15 Sep 83				
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I

I-Cntr Instruction Counter

I-Step Instruction Step

I/O Input/Output. Pertaining to a device or to a channel that may be involved in an input process, and, at a different time, an output process.

IB Interrupt Buffer

IC Instruction Counter

ICER IPU Control Extension Register

ICtr Instruction Counter

ID Identifier

IDA Indirect Data Addressing

IDAW Indirect Data Addressing Word

IFCC Interface Control Check

IL Incorrect Length

IML Initial Microcode Load

Ind Indicator

INST Instruction at Time of Failure

Intf Interface

Intlk Interlock

Intr Interrupt

IO-Ref I/O Reference

IOAdpt I/O Adapter

IOCmd I/O Command

IOIRR I/O Interrupt Request Register

IPC Interprocessor Control

IPL Initial Program Load

IPM Insert Program Mask

IPO Immediate Power Off (cable)

IR Intervention Required

IVSK Insert Virtual Storage Key

J

JCL Job Control Language

K

K Relay

Kb Kilobyte. Each kilobyte equals 1,024 bytes and refers to storage capacity.

L

L Inductor

LCA Local Channel Adapter

LED Light Emitting Diode

LMR Last Module ID Base Program Read

LOMC SP Check Register after Logging

LPUM Last Path Used Mask

LRU Least Recently Used

LS Local Storage

LS-Ext Local Storage External

LS-Des Local Storage Destination

LS-SRC Local Storage Source

LSI Large Scale Integration

LSXAD Local Storage Extended Addressing Register

M

M-Step Microword Step

Mb Megabyte (1,048,576 bytes)

MBC Maintenance Bias Controller

MBTR Trace Microbranch

MC SP Check Register

MCK Machine Check

MDM Multiple Decision Maker

MDT Modified Data Tags

MFI Machine Features Index

MI Maintenance Information

Microdiagnostic A microcode diagnostic routine.

Micwrd Microword

MIRR Microcode Interrupt Request Register

mm millimeter

MODE SEL Mode Select (key)

Mpx Multiplex, Multiplexer

MS Main Storage

ms millisecond

MSMD Machine Speed Microdiagnostic

MSS Maintenance Support Subsystem

MSSF Monitoring and System Support Facility. Supports the normal operation of and provides maintenance to the processor.

MST Monolithic System Technology

MSW Microcode Status Word

multiplexer channel A channel designed to operate with a number of I/O devices simultaneously. Several I/O devices can transfer records at the same time by interleaving items of data.

MWTR Microword Trace

N

N Neutral

NA Not Applicable

N/C Normally Closed

N/O Normally Open

NE Not Equal

NIB Next Instruction Buffer

NL New Line

NFPA National Fire Protection Association

NOP No Operation

Nor Normalized

ns nanosecond

NTF No Trouble Found

NZ Nonzero

O

OBR Outboard Recorder

OC Overcurrent

OCP Operator Control Panel. A panel attached to the keyboard of the system console.

OCR Optical Character Recognition

OLT Online Test

GLOSSARY 004

OLTEP Online Test Executive Program

OLTSEP Online Test Stand-alone Executive Program

ORB Operation Request Block

OS Operating System

OS/VS1 Operating System/Virtual System 1

OS/VS2 Operating System/Virtual System 2

operator console A display console used for communications between the operator and the system. This console is used primarily to specify information about application programs and I/O operations.

OSC Oscillator

OV Overvoltage

Overrun A loss of data condition because a receiving device is not able to accept data at the rate that it is transmitted.

P

P-Step Pulse Step

PN Part Number

PA Problem Analysis. A customer run routine used to identify system and procedure problems.

PAnn Problem Analysis Log Number

PC Parity Check; Power Controller

PCA Power Control Adapter

PCC Primary Control Compartment

PCI Power Control Interface; Program Controlled Interrupt

PCh Program Check

PDP Problem Determination Procedure

PER Program Event Recording

PFK Program Function Key

PF1-12 Program Function Keys 1-12

Ph Phase

PIRR Program Interrupt Request Register

PLDA Program Link Data Area

PLT Power Line Transient

PM Preventive Maintenance

PMA Product Maintenance Adapter

Pnl Panel

PP Primary Page

PR Power Repair

Prgm Program

Propagate The act of a channel control unit to receive and pass on a signal.

Prt Printer

Prt/Kybd Printer/Keyboard (mode)

PS Power Supply

PST CE Product Support Trained Customer Engineer; a service representative

PSW Program Status Word

PT Program Transfer

PTCE Product Trained Customer Engineer; a service representative

PU Processing Unit

PUA Processing Unit Analysis

PUAD Processing Unit Analysis Diskette

PUMA Processing Unit Maintenance Algorithm

PUSAR Processing Unit Storage Address Register

Pwr Power

Q

Q Queue

R

R Resistor

R-Adr Real Address

R-Data Real Data

R/W Read/Write

RA Repair Action

Repair Procedure A maintenance document that gives the service representative a step-by-step procedure for tracing a symptom to the cause of the failure.

RAS Reliability, Availability, and Serviceability

RC Reference Code

RC Extn Reference Code Extension

RCDB Reference Code Data Bank

RCNT Retry Count Register

RCS Reloadable Control Storage.

RCS Remote Communication Support

Rd In Read In

RDB Remote Data Bank

RDS Regional Designated Specialist

Ref Reference

REQ Request (key)

Res Restart

RMS Recovery Management Support; Root Mean Square

RMSR Recovery Management Support Recorder

ROCF Remote Operator Console Facility

ROS Read-Only Storage

RSC Real Storage Control; Remote Support Center

RSF Remote Support Facility. Provides a means of controlling the processor from a remote location for maintenance or operation.

RSP Recommended Spare Parts; a listing

S

S/370 System/370

Sel In Select In

Sel Out Select Out

Seq Sequence

SAL Set Address Limit

SAR Storage Address Register

SBA Support Bus Adapter

SCP System Control Program

SCR Silicon Controlled Rectifier

SDI Scanned Data In

SDLC Synchronous Data Link Control

SDO Scanned Data Out

SDR Storage Data Register

SE Systems Engineer; Storage Error Uncorrected

Sel Select (MODE SEL Key)

selector channel An I/O channel designed to operate with only one I/O device at a time. Once the I/O device is selected, a complete record is transferred one byte at a time.

V

Seq Sequence
SERDES Serializer/Deserializer
SEREP Systems Environmental Recording, Editing, and Printing
Serv Service
SF Start Field
SIC SPIL Last Instruction Address
SID Subsystem Identification Word
SIE Start Interpretive Execution
SILI Suppress Incorrect Length Indicator
SIO Start I/O (instruction)
SIOF Start I/O Fast Release (instruction)
SIR Shift Indirect Register
SNA Systems Network Architecture
SP Support Processor; Secondary Page
SPCK SP Check Register
SR Scan Ring; Shift Register; System Recovery
SRL Shift Register Latch; Scan Ring Latch
Srv In Service In
Srv Out Service Out
SSI Send Service Information
SSR Solid State Relay
Stat Status
Stat In Status In
Stg Storage

subchannel The channel facility required for sustaining a single I/O operation.
Supr Out Suppress Out
SvC Supervisor Call
Sw Switch
Sync Synchronous
Sys System. Consists of the processor complex and its associated I/O and communications devices.
system console A free standing console used by the operator to perform IPLs, to display data, to configure the system, and to perform other procedures.
SysLog System Log (printer-keyboard)
SysLst System List (printer)
SysRec System Record File
SysRes System Resident
Sys1/LogRec System 1/Log Recording
Sys1LogRec System Log Recorder

T

TB Terminal Block; Terminal Board; Test Block
TCCC Top Card Crossover Connector
TCh Test Channel
TCM Test Case Monitor
TD Time Delay; Timer Damage
Temp Temperature
Term Terminal; Terminator
Th Thermal

TIC Transfer in Channel
TIO Test Input/Output
TLB Table Lookaside Buffer
TLU Table Lookup
TNL Technical Newsletter
TOD Time of Day
Tp Teleprocessing
TPI Test Pending Interruption
TProt Test Protection
Tr Transformer
TrSt Trace Stop
TrWr Trace Wrap
Tx Transmit

U

U/D Up/Down
UC Unit Check; Undercurrent
UCS Universal Character Set
UCW Unit Control Word
UE Unit Exception
URSF Universal Remote Support Facility
us microsecond
US Unit Specify
U.S.A. United States of America
UV Undervoltage

W

V Volt
VA Volt-Ampere
V-Adr Virtual Address
V-Data Virtual Data
V/R Virtual/Real
Vac Volts Alternating Current
Vdc Volts Direct Current
VM Virtual Machine
VM/370 Virtual Machine 370
VMA Virtual Machine Assist
Vol ID Volume Identifier
VS Virtual Storage
VTL Vendor Transistor Logic

WCC Write Control Character
WEOF Write End-of-File
Wr Write
WS Work Storage
WT World Trade Corporation

Introduction

Contents

Preface..... PREFACE

Safety..... SAFETY 001
 Safety Notices..... SAFETY 001
 DANGER Notices..... SAFETY 001
 Safety Practices..... SAFETY 003
 Mandatory Safety Practices..... SAFETY 003
 Power-Off Maintenance..... SAFETY 003
 Power-On Maintenance..... SAFETY 004
 Post Maintenance Procedure..... SAFETY 004
 Housekeeping..... SAFETY 004
 Safety Guidelines..... SAFETY 005
 Electrical Accidents..... SAFETY 006

Index..... INDEX 001

Glossary of Terms and Abbreviations . GLOSSARY 001

Introduction..... INTRO 001
 Frequently Performed Tasks..... INTRO 002
 Documentation Organization..... INTRO 003
 EC Level Control..... INTRO 004
 Maintenance Package..... INTRO 004
 Machine..... INTRO 004
 Readers Comment Form..... INTRO 005
 General Description..... INTRO 007
 Processor Overview..... INTRO 007
 System Maintenance..... INTRO 010
 Processor Maintenance..... INTRO 011
 Introduction to Repair Procedures..... INTRO 013
 Channel To Channel Feature..... INTRO 015
 Overview..... INTRO 015
 Channel To Channel Maintenance..... INTRO 016

START Repair Procedure..... START 001

Processing Unit Problem Isolation Repair Procedure..... PU 001

Channel Problem Isolation Procedure..... CHAN 001

MSS Repair Procedure..... MSS 001

END Repair Procedure..... END 001

Seq AD015	PN 0445737 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Introduction

Frequently Performed Tasks

This page provides you with a quick page reference to find a given task or to seek general subject information:

To analyze a message:
Go to Volume A08, Console Functions and Messages.

To configure the system:
Go to Volume A06, page AID 005.

To find a certain subject matter:
Go to Volume A01, page INDEX 001.

To install a machine:
Go to Volume A07, page INST 001.

To perform a module transfer:
Go to Volume A06, page AID 005.

To perform a safety inspection:
Go to Volume A07, page INSP 001.

To perform a UCW assignment:
Go to Volume A06, page AID 005.

To perform system test:
Go to Volume A07, page SYS 001.

To remove or replace a mechanical part:
Go to Volume A07, page REM 001.

To review a term or acronym:
Go to Volume A01, page GLOSSARY 001.

To review information about a screen:
Go to Volume A08, Console Functions and Messages, for console function screens.
Go to Volume A07, page DIAG 001 for diagnostic screens.
Go to Volume A07, page LOG 001 for log screens.

To review information about Problem Analysis:
Go to Volume A08, Console Functions and Messages.

To review logs:
Go to Volume A07, page LOG 001.

To review preventive maintenance:
Go to Volume A07, page PM 001.

To review the maintenance philosophy:
Go to Volume A01, page INTRO 001.

To review the safety guidelines:
Go to Volume A01, page SAFETY 001.

To review tool requirements:
Go to Volume A07, page TOOL 001

To run diagnostics:
Go to Volume A07, page DIAG 001.

To troubleshoot or repair the machine:
Go to Volume A01, page START 001.

To understand how the machine operates:
Go to Volume A01, page INTRO 001.

To run FRIEND:
Go to Volume A07, page SYS 005.

To understand how a repair procedure works:
Go to Volume A01, page INTRO 001.

Seq AD015	PN 0445737 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Documentation Organization

The Maintenance Information (MI) manual has eight volumes. Each volume contains sections, some with their own table of contents. Divider tabs identify each section contained within the volume. Spine tabs identify the volume and what sections are contained within that volume.

Volume A01

Contains the following sections:

- MASTER INDEX** Alphabetical subject listing and the page number where it can be found.
- TERMS AND ABBREVIATIONS** Glossary of technical terms, acronyms, and abbreviations.
- INTRODUCTION** A quick reference guide to find specific procedures pertaining to the processor. Describes the functional operation and specifications of the processor, documentation description, maintenance philosophy, and how to use the manual.
- START** Repair Procedure starting point. Contains the entry point for troubleshooting and the exits to repair procedures contained within the manual.
- PU REPAIR** Repair Procedures pertaining to the processor.
- CHNL REPAIR** Repair Procedures pertaining to the channels.
- MSS REPAIR** Repair Procedures pertaining to the maintenance support subsystem (MSS).
- END REPAIR** Exit Repair Procedure on completion of other repair procedures.

Volume A02

Contains Repair Procedures for the hardwired sequence (HWS) and maintenance bias controller (MBC).

Volume A03

Contains Repair Procedures for the power section of the processor.

Volume A04

Contains Repair Procedures for the power section of the processor.

Volume A05

Contains Repair Procedures for the power section of the processor.

Volume A06

Contains Service Aid material used with the Repair Procedures or Installation Instructions. Also provides procedures to configure the state of the system or to enable remote site communication.

Volume A07

Contains the following sections:

- LOCATIONS** Locations of components within the frame.
- TOOLS** Tools required to maintain and service the processor.
- REMOVAL/REPLACEMENT** Removal and replacement procedures for servicing the processor.
- PREVENTIVE MAINTENANCE** Preventive Maintenance procedures for the processor.
- DIAGNOSTICS** Information for running any diagnostics available for the processor.
- LOGS** Information about the types of logs available with the processor, and how to display and print the logs.
- SYSTEM TEST** Description of all system tests available with the processor.
- INSTALLATION** Instructions for installing the processor.
- SAFETY INSPECTION** Procedures to ensure the electrical integrity of the processor.

Volume A08

Contains the console functions available with the processor. Also contains alphabetical listing of console messages, definitions, and recovery procedures (if applicable).

EC Level Control

This page provides a convenient place to record the EC level of the maintenance package and machine components.

Maintenance Package

Maintenance Information (MI)

Console Functions (Vol A08 of MI)

Maintenance Diagrams (MD)

Power Reference

Parts Catalog

Machine

Diskettes

Power

Logic

Mechanical

Seq AD025	PN 0445738 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Seq AD035	PN 0445739 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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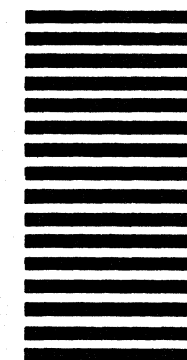


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General Description

Processor Overview

The IBM 4381 Processor contains processor storage, control storage, the system control functions, and other facilities to perform arithmetic and logical processing of data. The processor also contains the input/output channel circuits for transferring data to and from I/O devices.

Some of the characteristics of the processor are shown under "Highlights" and in "Processor Configuration."

Processor operation is controlled by microcode that is kept in control storage. The processor uses hardware registers to link user programs, processor microcode, and processor hardware. These registers assist the microcode in transferring data and control information to and from the various functional units of the processor.

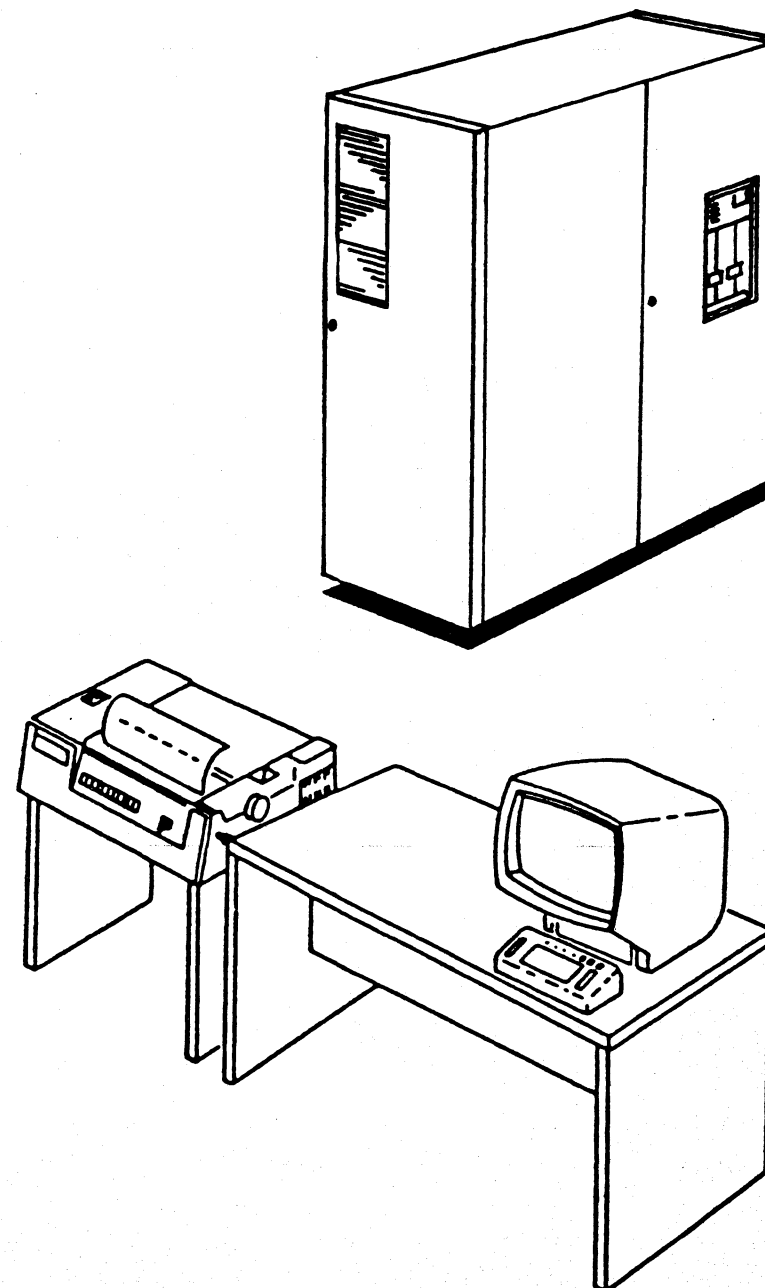
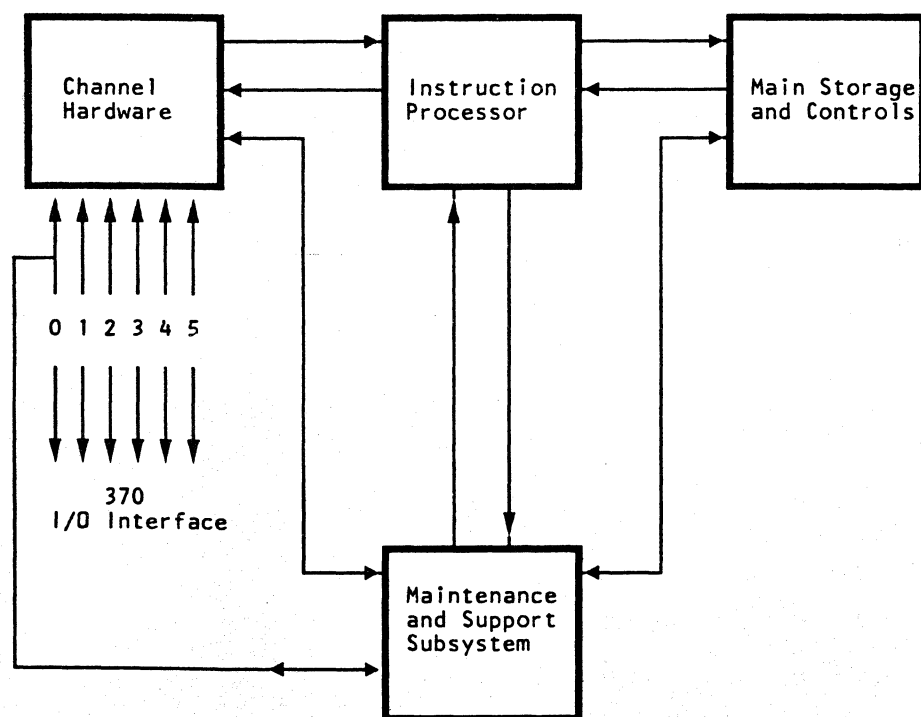
Each of these registers can be addressed, read from, and written to, by the microcode. Some registers are set and reset by the hardware and then tested by microcode. Others are set and reset only by microcode.

The processor is compatible with and can run under existing IBM program operating systems.

Each processor includes:

- Channel Hardware
- Instruction Processor
- Main Storage and Controls
- Maintenance and Support Subsystem.

Processor Block Diagram



Highlights

The processor provides virtual storage system control program (SCP) support and System/370 compatibility enabled by using large scale integrated (LSI) technology and large processor storage.

A 3278 Display Console Model 2A (or optional 3279 Color Display Console Model 2C) and two diskette drives are included to enable processor operation.

Model Group 1 Characteristics

- Cycle time: 68 to 136 nanoseconds.
- Four, eight, or sixteen megabytes of processor storage per processor.
- Sixteen-byte wide data path between the main storage and the cache.
- 112K control storage.
- 8K cache (high-speed buffer).
- An optional channel to channel adapter (CTCA) is available.

Channels (customer selection):

One byte multiplexer channel (channel 0) and five block multiplexer channels are standard.

or

Two byte multiplexer channels (0 and 5) and four block multiplexer channels.

For more channel information, see Volume A06, Service Aids, "Channel Configuration/Data Rates."

Model Group 2 Characteristics

- Cycle time: 68 to 136 nanoseconds.
- Four, eight, or sixteen megabytes of processor storage per processor.
- Sixteen-byte wide data path between the main storage and the cache.
- 112K control storage.
- 32K cache (high-speed buffer).

- An optional channel to channel adapter (CTCA) is available.

Channels (customer selection):

One byte multiplexer channel (channel 0) and five block multiplexer channels are standard.

or

Two byte multiplexer channels (0 and 5) and four block multiplexer channels.

For more channel information, see Volume A06, Service Aids, "Channel Configuration/Data Rates."

Other significant characteristics are:

- Easy installation, with minimum change of existing input/output configuration.
- Program support available includes DOS/VSE, OS/VS1, and VM/370.
- High reliability, availability, and serviceability (RAS) is provided. This includes: instruction and interrupt retry, dynamic reconfiguration of some processor hardware, single- and double-bit error checking and correction (ECC), error recording, remote maintenance, and problem analysis routine.
- The 3278-2A Display Console (or 3279-2C Color Display Console) interacts for both operation and maintenance. The operator control panel (OCP) is included on the operator console keyboard. The console turns power on and off for initial microcode load (IML) and for starting and stopping processor operations.

The console can operate in either printer/keyboard mode or display mode. In display mode, the display console is available to the operating system using 3272 control unit interface or equivalent support. The display output can be up to 20 lines of up to 80 characters each.

In printer/keyboard mode, the display console is available to the operating system using 1052, 3210, or 3215 Console Printer/Keyboard interface support. The display output can be up to 18 lines of up to 80 characters. The display console and an optional 3287 Printer (Model 1, 2, or 2C) are output devices. The display console and optional printer appear to the system as a printer/keyboard console. An optional alternate console (with one display/keyboard and one printer) can also be configured. For more information, see Volume A08, Console Functions and Messages, "Display Console Modes of Operation."

The console also provides for normal versus instruction step processing for address compare stopping, for changing some registers and storage areas, and for displaying hardware status.

For maintenance and service support, the console can display and store the status of the system and servicing information. The console also provides a tool for using the problem analysis routine and diagnostics.

A combination of up to three optional 3278-2A Display Consoles, 3279-2C Color Display Consoles, or 3287 Printers Model 1, 2, or 2C can be configured (up to four). The optional printer has a separate address and requires Multiple Console Support (MCS).

Note: The procedure for configuring 3287 Printers depends on the operating system being used. For OS/VS1, for example, the 3287 is supported by specifying either a 3286 or 3210 Printer.

- The support processor performs automatic analysis of failure symptoms. This **self-diagnosis** generates a **reference code** that is used in the repair procedures to find the failing FRU. The reference code is logged on the system diskette and displayed to alert the operator to notify the service representative.
- The diskette drives are used during the IML process and for error logging for later diagnosis. The diskettes contain all microcode needed for initializing basic features (and optional features when ordered) and diagnostics to be used by the service representative.

- The Remote Support Facility (RSF), under control of the on-site service representative (and with customer authorization), enables a remotely based specialist to assist in problem resolution. The specialist can observe and start functional operations of the system by telecommunication line transmission of data. The RSF enables remote operation of all system controls except power on, power off, and IML. Logout data stored on the functional diskettes can be sent to the remote support site for analysis later.
- The Remote Operator Console Facility (ROCF) is an extension of the RSF. The ROCF enables personnel at a host site to dial up and control the processor (remote processor). When ROCF is in use, the RSF cannot be used. ROCF includes password verification to protect against unauthorized use of the remote processor.

Modes of Operation: The processor performs in 370 or 370-XA mode. These modes are user-selected.

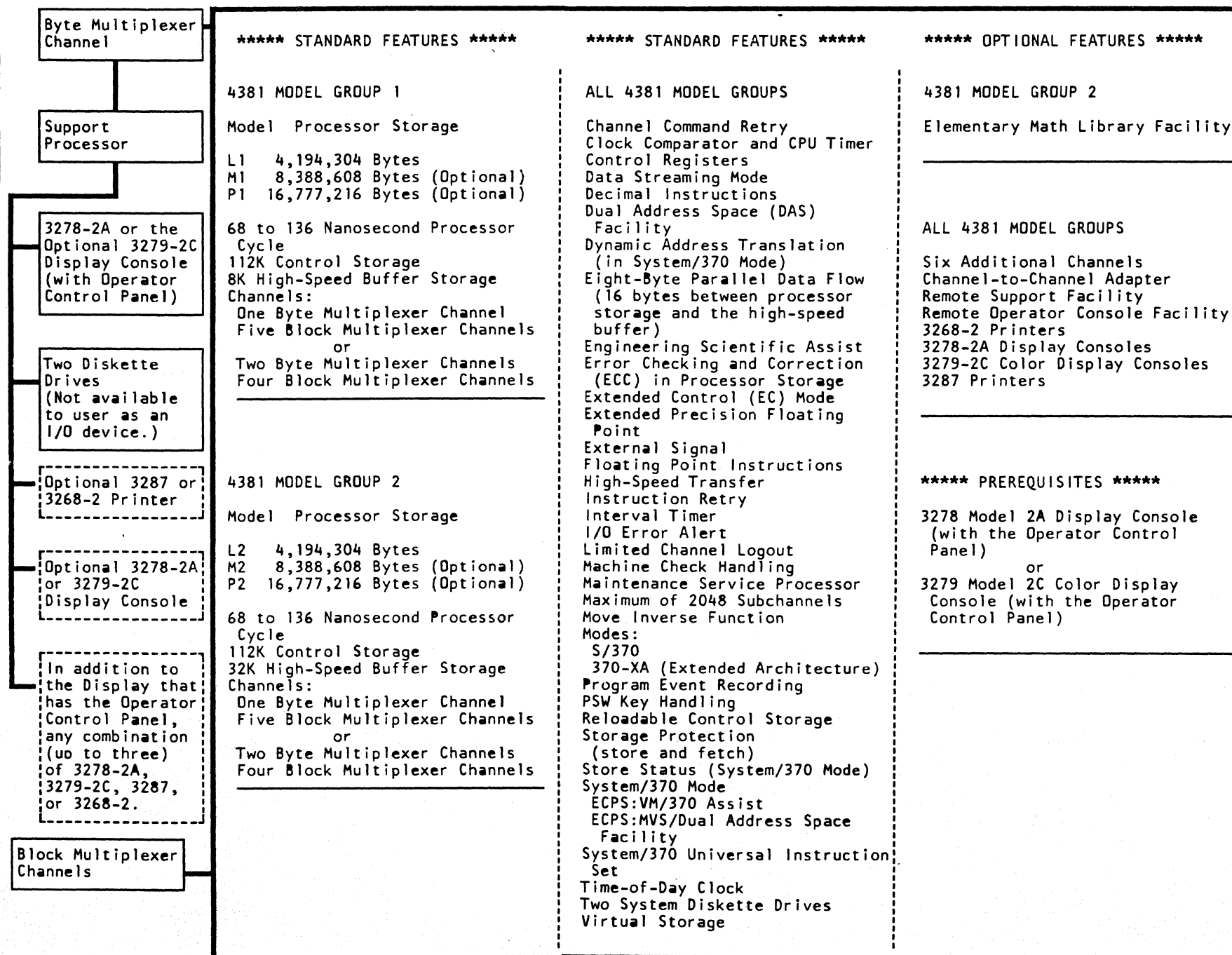
For details of processing and input output functions for a specific mode of operation, refer to *IBM System/370 Principles of Operation*, order number GA22-7000 and *IBM System/370 Extended Architecture Principals of Operation*, order number SA22-7085.

Programming Support: In System/370 mode, programming support is supplied by DOS/VSE, OS/VS1, MVSSP, VM/370, VMSP, and ACP/TPF. In 370-XA mode, program support for the processor is supplied by MVS/XA and VM/XA.

Brief descriptions of these program support packages (and references to the publications that describe them in detail) are available from your IBM representative.

Seq AD045	PN 0445740 Pg 2 of 6	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Processor Configuration



System Maintenance

System Failures

System failures are worked within an overall procedure as shown in the flowchart on this page.

The customer uses a problem analysis (PA) routine to determine the cause of the system failure. If the failure is in the processor, PA preselects possible failing parts, records failure information, and recommends corrective action (such as a call for service).

The service representative uses the repair procedure documentation (START Repair, Power Repair, PU Repair, Channel Repair, MSS Repair, and END Repair) to analyze and repair the processor.

The service representative's support structure can be invoked at any point during a processor repair action.

Problem Analysis (PA)

Problem analysis is performed by system operators assisted by a user-selected PA routine.

The PA routine assists the user in identifying system and procedure problems. If PA detects a failure, it collects operational and error information and saves it for later analysis. Also, if PA detects a processor failure, it guides the user through options that isolate probable failing FRUs.

The user reports the resulting PA Error Code (which may include FRU part numbers). The service representative uses this information with the Repair Procedures (shown in the flowchart at the right) to repair the machine problem.

Problem Analysis Error Code: The PAnn xxxx-xxx-etc. number is an error code that is displayed by the PA routine, and reported by the customer when requesting service.

The nn of PAnn is the PA log number. The service representative makes reference to this PA log for failure information.

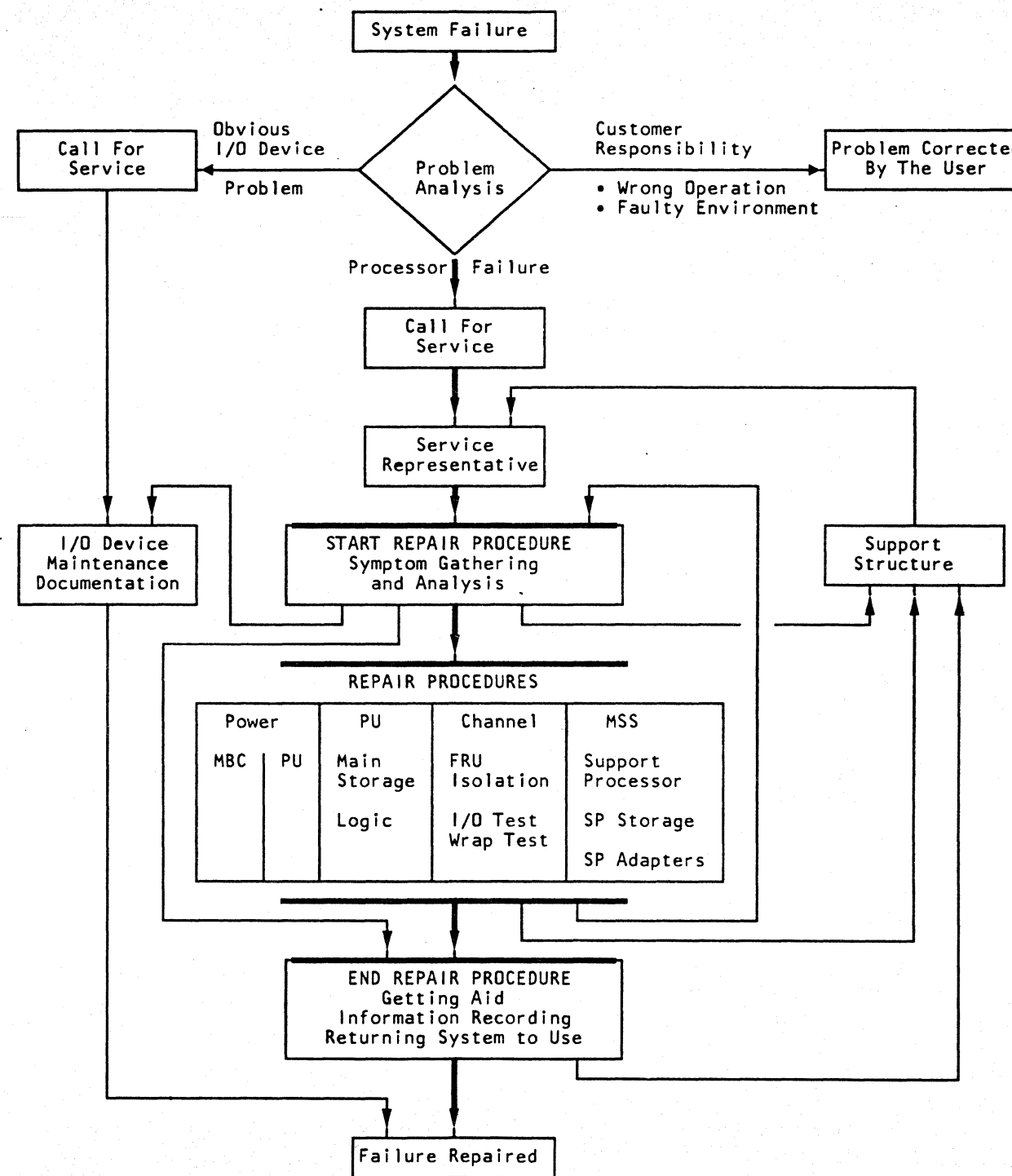
The xxxx-xxx-etc. are possible failing parts that display only if PA isolated the failure. (Two groups of four digits make one part number.)

START Repair Procedure: Start all processor repair actions at the START Repair procedure. Also, start again at the START Repair when new failure symptoms are found while using these Repair Procedures and no other instructions are given.

- START Repair guides you to an individual unit repair procedure to repair processor failures.
- If an I/O problem is indicated, you are sent to the I/O maintenance documentation.
- If the problem is repaired in the START Repair, you are guided to the END Repair procedure.

Unit Repair Procedures: The individual unit repair procedures (Power, PU, Channel, and MSS) aid in isolating the failure to a field replaceable unit (FRU) and aid in repairing the problem.

END Repair Procedure: All repair actions leave from the END Repair procedure. Instructions for completing the repair action and for obtaining aid are provided in this procedure.



Processor Maintenance

Power

The maintenance and support subsystem (MSS) and the processing unit (PU) are powered separately. Power for the maintenance and support subsystem is supplied by the maintenance bias controller (MBC) which must complete its tasks before power can be supplied to the processing unit by the power controller adapter.

MBC failures are indicated in LEDs on service panel. These Power Codes are analyzed under direction of the Power Repair procedures.

Power controller adapter diagnostic tests run automatically during support processor power-on sequences. Failures are indicated by reference codes.

Processing unit power is controlled and monitored by microcode by the power controller adapter. Failures result in power error logs and a reference code (see "Reference Codes" on this page).

Power Codes

A power code is an error message from the maintenance bias controller. The Power Code is a two-character (hex) number that is displayed on the service panel.

When a power code is available, the repair action is directed from the START Repair procedure to an individual unit repair procedure.

For more information, see Volume A07, Diagnostics, "MSS and Power Codes."

Maintenance and Support Subsystem (MSS)

Although MSS error logs are available, diagnostic tests are used as the primary method for sensing and isolating failures in the MSS.

- The Basic MSS diagnostic tests contained in the support processor read-only storage (SP ROS) and on the functional diskettes run automatically when the MSS is powered on. Failures sensed by these tests result in MSS Codes that are displayed on the service panel.
- Extended and optional MSS diagnostic tests give more complete testing and are run when requested by the repair procedures. Failures sensed by these tests result in reference codes.

For more information, see Volume A07, Diagnostics, "Maintenance and Support Subsystem (MSS) Diagnostics" and "Processing Unit Logs."

MSS Codes

An MSS code is an error message from the support processor error analysis routines. The MSS Code is a five-character (hex) number that is displayed on the service panel.

When an MSS code is available, the repair action is guided from the START Repair procedure to an individual unit repair procedure.

For more information, see Volume A07, Diagnostics, "MSS and Power Codes."

Processing Unit (PU)

Automatic error logging and error log analysis routines are used as the primary method for isolating failures in the processing unit. These routines run in the support processor and give a reference code that is used as input to the repair procedures. For more information, see Volume A07, Logs, "Processing Unit Logs."

Processing unit diagnostic tests are also available. The tests, consisting of processing unit basics and machine speed microdiagnostics, are run under direction of the repair procedures when error log analysis did not isolate the failing FRU and for processing unit verification.

For more information, see Volume A07, Diagnostics, "Processing Unit Diagnostics."

Reference Codes (RC)

A reference code is an error message from functional microcode, diagnostics, and error log analysis routines. The RC, an eight-character (hex) number, contains information that pertains to a processor failure, and displays on the display/console when a failure occurs.

When a reference code is available, the repair action is directed from the START Repair procedure to an individual unit repair procedure.

For more information, see Volume A07, Diagnostics, "Reference Codes."

Error Checking, Retry, and Reconfiguration

The processor detects errors on data and control lines. Data paths in the processor are monitored to detect any errors that occur. In addition, control lines in the PU are monitored for correct and valid operation.

Processor Retry: When an error is detected, the processor attempts to retry the failing operation by returning to the start of the instruction to refresh the data (instruction retry). Most operations are retried by this method. Because of time considerations, some operations are retried by returning to a checkpoint in the microcode to redo the operation (interrupt retry).

Channel operations cannot be retried by the processor. Channel failures are reported to the control program by machine check and logout of information is made for analysis purposes.

After retry, a routine determines the correct action to be taken. Some actions are: console messages, reference codes, or hardware reconfiguration of specific hardware.

Reconfiguration: Three hardware units can be disabled from operation, and five hardware units can be substituted with backup units while the processor is operating (dynamic reconfiguration). In most cases, the time taken for the retry and reconfiguration of these units does not interfere with system operation. However, I/O overruns can occur.

The units that can be reconfigured are:

- Multiply Function
Microcode multiply is substituted.
- Main Storage and Key Storage
4K blocks of storage are disabled.
- Channels
Each failing channel is disabled.
- Cache
Eight errors on different bytes can be reconfigured.
- Channel Data Buffer
Two CDBs can be substituted at one time.
- Swap Buffer
Duplicate hardware is used.
- Reloadable Control Storage
2K backup array is used.

For each FRU that can be reconfigured by using backup hardware, the backup hardware is substituted until no backup capacity remains. When no capacity remains, replacement of the failing hardware is indicated by a displayed reference code.

Performance degradation, resulting from reconfiguration of the multiply function, main and key storage, and the cache, is indicated by a console message.

All reconfiguration information is saved on the functional diskette. Diagnostic routines (run by the service representative) use this saved information both to set the configuration back to the original hardware and to test the replacement FRU. The backup hardware and the original hardware are in the same FRU. Therefore, when the FRU is exchanged, both the original and the backup hardware are exchanged.

Storage Correction (Single-Bit/Double-Bit): Processor storage data is checked and in most cases corrected by an error-correction and bit-generation unit (ECBG) and a maintenance routine. All data that is read from the basic storage module (BSM) is checked by an ECC and bit-generation unit. Data is checked on a doubleword basis (matching the internal data transfer width of the processor). If a single bit of the doubleword picks or drops, it is corrected by inverting its data line. This method corrects the failing bit with no time lost.

The processor also corrects two kinds of double-bit errors:

- **One solid single-bit failure and one intermittent single-bit failure** within a doubleword.
- **Two solid single-bit failures** within a doubleword.

This type of failure is corrected in the cache, and is reported to the system control program. System degradation is indicated and the current operation continues.

The processor does not correct **two intermittent single-bit failures** in the same doubleword.

When a double-bit error occurs, a routine saves the error data along with its storage address. The routine then searches for a solid single-bit failure at that storage address. When a solid single-bit failure is found, the bit in that location in the original data is corrected. The routine then passes the data through the ECBG unit to correct the remaining intermittent single-bit error. All uncorrected bit failures are reported to the system control program.

Diskette Drives

The diskette drives are small disk drive units into which flexible disks (diskettes) of prerecorded data are inserted. The drives are used during IML to copy the functional microcode from the functional diskettes (FUNC1 and FUNC2) into reloadable control storage. The drives are also used to record logout information and to supply microdiagnostics for system and processor testing.

Normally, FUNC1 is installed in diskette drive 1, and FUNC2 is installed in diskette drive 2 (all system modes and processor utilities are available).

If a diskette drive is inoperable, console messages inform the operator to install FUNC1 in the other drive. Now the processor can only operate in System/370 mode. Because FUNC2 is not available, none of the FUNC2 actions can be performed. (The FUNC2 diskette contains additional processor diagnostics, error log information (that supports PA), additional support processor utilities, and 370-XA microcode.)

System and I/O Tests

FRIEND, ST80, and OLTS are available for testing the processor and attached I/O devices as a system. For more information, see Volume A07, "System Test."

Channels

System/370 Unit Control Words (UCW): A UCW contains the control information needed to perform I/O operations to a specific I/O device. Each device needs its own descriptive UCW. However, some control units operate continuously with only one device at a time, and need only one UCW for all of the devices that are attached to it.

Each group of 64 UCWs that is assigned decreases the available processor storage by 4096 bytes. A maximum of 2048 UCWs are allowed.

For more information, see Volume A06, Service Aids, "I/O Configuration S/370."

System/370-XA Subchannels: Because of the many subchannels and paths that System/370-XA uses, a much larger descriptive data set is required. It is called the *Input/Output Configuration Data Set (IOCDs)*.

At processor installation time, an IOCDs is generated and stored on the functional diskette by a routine called *I/O Configuration Program (IOCP)*. For more information, see Volume A06, Service Aids, "I/O Configuration S/370XA."

Channel Tests: Two special channel tests are available to aid in isolating I/O device and channel interface problems:

- **Channel Microcoded Device Exerciser (CMDE).** This test sends a TIO and SIO (sense and NOP) to all available devices and displays detailed error information when a failure is sensed.
- **Channel Cable Wrap Test (CWT).** This test, using special channel cable wrap terminators, aids in isolating failures in the channel interface adapter drivers and receivers and in the cables and connectors on the interface.

For more information, see Volume A07, Diagnostics, "Special Channel Tests."

Seq AD045	PN 0445740 Pg 6 of 6	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Introduction to Repair Procedures

Repair Procedures

Repair Procedures supply aid in making decisions (based on sense data, microdiagnostic results, customer data, or visual indications) to isolate the failure to the smallest possible area. The normal isolation method is to exchange a specified card or module in a specific repair procedure until the failing part is located.

Organization: The repair procedures are contained in Volumes A01 through A05:

- Volume A01 contains the START, PU (processing unit), CHNL (channel), MSS (maintenance support subsystem), and END repair procedures.
- Volume A02 contains the PR (power repair) procedures for the hardwired sequence and the maintenance bias controller.
- Volumes A03, A04, and A05 contain the PR (power repair) procedures for processor power.

START Repair: Start all maintenance action with this repair procedure. The repair procedure guides you to:

- The needed repair procedure to repair the failure.
- The needed I/O repair procedure if an I/O problem has been determined.
- The END Repair procedure if the problem is repaired in the START Repair procedure or if aid is needed.

Power Repair (HWS and MBC): Aids you in isolating a problem to a FRU in the HWS or MBC and repairing the problem.

MSS Repair: Aids you in isolating a problem to a FRU in the MSS and repairing the problem.

Power Repair (Processor): Aids you in isolating a problem to a FRU in the processor power and repairing the problem.

Processing Unit Repair: Aids you in isolating a problem to a FRU in the processor and repairing the problem.

Channel Repair: Aids you in isolating an internal channel failure to a FRU in the processor and repairing the failure. The channel repair procedure also aids in identifying a possible failing unit or device that is external to the processor.

End Repair: After you complete a repair procedure, return to the END Repair procedure. This procedure aids you to:

- Collect any needed information
- Record this information
- Return the processor, in running order, to the customer.

Using the Repair Procedures

Each repair procedure is formatted the same way. Any needed setup information is ahead of the table. The table is used to isolate the problem and to send you to the correct FRU or repair procedure.

To use the repair procedure:

1. Read down the **Condition** column in the table until you find a condition that matches your machine symptom.
2. Do the instructions found in the **Instructions** column of that step.

Example:

0A,A0

Power code indicates tripped CP in PS102.

Possible causes:

- PS102
- Short in PS102 dc distribution
- 01A-A1V2.

Step	Condition	Instructions
1	Go to Instructions column.	<ol style="list-style-type: none"> 1. Set PCC CB1 and CB2 off. 2. Record and reset any tripped CP. 3. Set PCC CB1 and CB2 on.
2	Is any CP tripped?	<ol style="list-style-type: none"> 1. Set PCC CB1 and CB2 off. 2. Exchange PS102. 3. Set PCC CB1 and CB2 on. 4. Go to page PR 901.
3	Do you have a power code of 0A or A0?	Go to page PR 231.
4	No power code?	<ol style="list-style-type: none"> 1. Press Check Reset. 2. Press Power On.

Note: During a setup procedure, if your machine condition changes or you do not get the described result, start at page START 001 with the new symptom. You have a new failure.

START Repair Procedure

Read the **Condition** column until you find a question that you can answer "yes" or a description that matches the condition you have. Then do the instructions listed in the **Instructions** column.

Note: Go to "Nondetectable Problems" on page START 030 if you have one of the following problems:

- Wrong output on the console display
- The console does not display messages and the keyboard is locked
- Convenience outlet problems
- Switches that do not work correctly
- Wrong or missing digits on the service panel display
- The message: SERIAL NO. DO NOT MATCH
- The console keyboard not operational
- A Remote Support Facility failure.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	Press MODE SEL.	
2	Did the General Selection screen display?	1. Set the CE Mode switch to CE Mode. 2. Type in P, and press ENTER. 3. Go to step 5.	
3	Do you have the Basic Check indicator on and a two-digit power code?	Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	The service panel indicates a power code if <i>only</i> the two rightmost digits are on.
4	The General Selection screen failed to display.	Go to step 7.	
5	Did the Problem Analysis screen display?	Go to "PA Options" on page START 005.	
6	The Problem Analysis screen failed to display.	Go to "MSS Repair Procedure" on page MSS 001.	
7	Are <i>any</i> of the following indicators <i>off</i> ? 24 Volt 5 Volt MBC On	Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	
8	Do you have a five-digit MSS Code of 00000?	1. Ensure the CE Mode switch is in CE Mode. 2. Press Power On on the service panel. 3. Allow 30 seconds for the MSS to power up. 4. Go to step 9.	Zeros are displayed in all five of the display positions on the service panel.
9	Do you have a two-digit Power Code?	Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	The service panel indicates a power code if <i>only</i> the two rightmost digits are on.

Step	Condition	Instructions	Comments
10	Is the Partial Power screen displayed?	1. Key in UP, and press ENTER. 2. Allow time for the processor to power up. 3. Press MODE SEL. 4. Go to step 2.	
11	Is the Basic Check indicator <i>on</i> ?	Set the CE Mode switch to Normal. Basic Check indicator stays on. Go to "MSS Repair Procedure" on page MSS 001. Basic Check indicator goes off. Go to step 12.	
12	Do you have a reference code with a UU field of 11, 14, 17, or 1D?	Go to "Processing Unit Power Repair Procedure" on page PR 1001.	Reference codes have a format of UU RRRR IS.
13	Do you have a five-digit MSS Code? (See Comments .)	MSS Code is 00000. Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001. MSS Code is other than 00000. Go to "MSS Repair Procedure" on page MSS 001.	Digits are displayed or are changing in all five of the display positions on the service panel.
14	All other symptoms.	Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	

Seq AE015	PN 0445744 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02219 29 FEB 84		
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PA Options

You have been directed here because the customer ran PA, or PA can be run but the customer has not run it.

Step	Condition	Instructions	Comments
1	Are PA options 7, 8, and 9 displayed on the PA menu screen? yes	Go to step 4.	Selections 7 through 9 are displayed only in CE Mode.
2	Do you have a reference code with a UU field of Fx? yes	Go to "MSS Repair Procedure" on page MSS 001.	Reference codes have a format of UU RRRR IS.
3	Go to the Instructions column.	Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	The processor is not in CE Mode.
4	Did the customer report a PA log number?	Go to "PA Log Number" on page START 015.	The customer reported a code of PAxx followed by up to 24 digits.
5	Did the customer do Problem Analysis (PA)?	<ol style="list-style-type: none"> 1. Ask the customer for the time PA was run and any information recorded. 2. If the customer could not run PA Option 1, go to step 9. 3. If PA Option 1 was run: <ol style="list-style-type: none"> a. Key in P2 and press ENTER. b. Find the message string displayed when the customer ran PA. c. Go to step 12. 	<p>If the customer was directed to run PA Option 3 but did not, assume PA was not run and go to step 6.</p> <p>The PA Option 2 screen displays the numbers of the message screens displayed during PA (if any).</p>
6	The customer did not run PA and the original symptom is still present.	Key in QP1, and press ENTER. Go to step 8.	This step runs PA Option 1.
7	The customer did not run PA and the original symptom is not present.	Go to "Manual Symptom Gathering" on page START 040.	
8	Did PA Option 1 screen direct you to run Option 3?	Do not run Option 3. Go to "Processing Unit Failure Isolation Procedure" on page PU 001, Entry Point A.	MSG11, MSG24, MSG27
9	Did the customer record a two-digit power code?	Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	Only the two rightmost digits of the service panel display are on.
10	Did the customer record any of the following indicators off ? 24 Volt 5 Volt MBC On	Go to Volume A02, "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	
11	Did the customer record a five-digit MSS code?	Go to "MSS Repair Procedure" on page MSS 001.	Digits are displayed in all five display positions on the service panel.

Step	Condition	Instructions	Comments
12	Did PA display MSG1B ?	Go to "END Repair Procedure" on page END 001.	Reconfiguration has taken place; no repair is necessary.
13	Did PA display MSG19 ?	Go to "PA Log Number" on page START 015.	PA gives a PA log number of PAxx followed by up to 24 digits.
14	Did PA display MSG06 ?	Go to "Running PA Option 8" on page START 010.	PA said no trouble found.
15	Did PA display MSG1C or MSG28 ?	Go to "Running PA Option 8" on page START 010.	An intermittent problem is suspected.
16	Did PA display MSG15 ?	Go to "Channel and I/O Errors" on page START 035.	An IFCC occurred.
17	Did PA display one of the following? MSG02 MSG03 MSG05 MSG1D MSG21	Go to Volume A03, "Processing Unit Power Repair Procedure" on page PR 1001.	Thermal warning Voltage warning Power not complete I/O power sequence Power failure
18	Did PA display one of the following? MSG04 or MSG11 MSG08 MSG12 MSG1E MSG24 MSG27 MSG29 MSG30 MSG34 or MSG35	Go to "Running PA Option 8" on page START 010.	Machine check IML error System stopped Slow operation Hard wait Hardware failure Microcode failure Channel failure PU not operating
19	Did PA display MSG2A ?	Assume reference code ECxxxxxx occurred, and go to "MSS Repair Procedure" on page MSS 001.	PA detected an SP microcode failure.
20	Did PA display MSG31 or MSG14 ?	Go to "Channel Problem Isolation Procedure" on page CHNL 001.	You have a channel failure.
21	Go to the Instructions column.	Go to step 22 on page START 010.	

Step	Condition	Instructions	Comments
22	Did PA display any of the following? MSG0A, MSG0B, MSG0C, MSG0D, MSG0E, or MSG0F.	Go to "IPL Failure" on page START 020.	You have an IPL device or IPL PSW problem.
23	Did PA display MSG1F or MSG26 ?	Go to "MSS Repair Procedure" on page MSS 001.	You have a diskette drive problem.
24	Did PA display MSG25 ?	Go to "System Control Program or Program Product Message" on page START 025.	A hard wait was detected.
25	Did the customer get a system error or status message from the operating system?	Go to "System Control Program or Program Product Message" on page START 025.	
26	Do you have a reference code?	Go to "FRU Replacement" on page START 025.	This could be a PA error.
27	Go to the Instructions column.	Invoke your support structure.	You need assistance on this problem.

Running PA Option 8

Note: If you have a message indicating a problem with MSS, go to page MSS 001.

1. Ensure the FUNC1 diskette is in diskette drive 1.
2. Set the CE Mode switch to CE Mode.
3. Press MODE SEL. The General Selection screen displays.
4. Key in P, and press ENTER. The Problem Analysis Option screen displays.
5. Key in 8, and press ENTER. The Processing Unit Analysis FRU-Logs screen displays.

Step	Condition	Instructions	Comments
1	Did the customer report a PA log number (PAXx)?	Go to step 5.	
2	Is the time PA was run for this problem displayed in the LOG TIME STAMP field?	<ol style="list-style-type: none"> 1. Copy the PA log number (PAXx) for this problem. 2. Go to step 5. 	
3	Did you come to this page because PA displayed NO TROUBLE FOUND (MSG06)?	Go to "Nondetectable Problems" on page START 030.	
4	You have no PA log number and there is no PA log at the time PA was run.	Go to "Processing Unit Failure Isolation Procedure" on page PU 001, Entry Point A. Your condition is no reference code .	
5	Are FRUs recorded for your Log Record Number?	<ol style="list-style-type: none"> 1. Copy the following: <ol style="list-style-type: none"> a. PAXx b. The Prime Reference code c. The FRU list 2. Go to "PA Log Number" on page START 015. 	
6	There are no FRUs recorded for your Log Record Number.	Go to "Processing Unit Failure Isolation Procedure" on page PU 001, Entry Point A. Your condition is no reference code .	

PA Log Number

You have been directed here because you have a PA log number.

1. Ensure the CE Mode switch is set to CE Mode.
2. Key in QP7, and press ENTER. The first of three Component Locations and Part Numbers screens displays. The three screens are for:

01A gate cards (page 1 of 3)
 01A gate modules (page 2 of 3)
 Power and cooling FRUs (page 3 of 3)

(See the sample screen on this page.)

3. Key in PAXx (the error code that the customer called in), and press ENTER.
4. Use the ENTER key to go from one screen to the next. The FRUs called by the PA log number are intensified on the screen, and the sequence the FRUs are to be replaced in is shown by a number preceding the FRU part number.

Note: The FRUs called by your PAXx number may be on more than one screen.

If you do not find any intensified FRUs after pressing ENTER three times, call your support structure. (The possible failing FRUs are displayed on the QP8 screen, but Error Log Analysis cannot isolate the most probable FRUs.)

5. Check your FRU part numbers with the part numbers intensified on the QP7 screen, if any, and write the locations and replacement sequence on a piece of paper.

Note: Abbreviations are used for the locations of some of the FRUs. See the list on this page for an explanation of the abbreviations.

6. Record the reference code displayed in the lower right-hand corner of the screen if one is displayed.
7. Go to the Repair Procedure page displayed in the lower right-hand corner of the screen.

```

                    *COMPONENT LOCATIONS AND PART NUMBERS*
                LOC PART-NUM  LOC PART-NUM  LOC PART-NUM  LOC PART-NUM  LOC PART-NUM  PAGE n OF 3
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
    01*LLL  NNNNNNN  02*LLL  NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
                LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN  LLLL NNNNNNN
    COMMAND: QP7PAxx          PAxx RC=xxxxxxxx  PR1001
                                ==> MORE, PRESS ENTER
    
```

The meanings of the abbreviations used on the Component Locations and Part Numbers screens are:

AF01	Air Flow Sensor 101	OK02	Power Contactor K02
AF02	Air Flow Sensor 102	OK03	Power Contactor K03
AF03	Air Flow Sensor 103	OK04	Power Contactor K04
AF04	Air Flow Sensor 104	PS01	Power Supply 101
AF05	Air Flow Sensor 105	PS02	Power Supply 102
AI02	Air Inlet Sensor 101	PS03	Power Supply 103
AM01	Air Moving Device 101	PS04	Power Supply 104
AM02	Air Moving Device 102	PS05	Power Supply 105
AM03	Air Moving Device 103	PS06	Power Supply 106
AM04	Air Moving Device 104	PS07	Power Supply 107
AM05	Air Moving Device 105	PS08	Power Supply 108
A1BD	01AA1 Board	PS09	Power Supply 109
A2BD	01AA2 Board	04F1	Power Supply 104 Fuse 1
A3BD	01AA3 Board	04F2	Power Supply 104 Fuse 2
A4BD	01AA4 Board	04F3	Power Supply 104 Fuse 3
B2BD	01AB2 Board	04F4	Power Supply 104 Fuse 4
CB01	Circuit Breaker 01	04F5	Power Supply 104 Fuse 5
CB02	Circuit Breaker 02	04F6	Power Supply 104 Fuse 6
CP01	Circuit Protector 01	04F7	Power Supply 104 Fuse 7
DD01	Diskette Drive 01	04F8	Power Supply 104 Fuse 8
DD02	Diskette Drive 02	04F9	Power Supply 104 Fuse 9
INL1	Interlock Switch 1		
OK01	Power Contactor K01		

Seq AE035	PN 0445746 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	
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IPL Failure

START 020

You have been directed here because PA Option 1 detected one of the following IPL failures.

- IPL DEVICE DOES NOT RESPOND, NO DEVICE UCW (MSG0B)
- IPL DEVICE DOES NOT RESPOND, NO CHANNEL PATH AVAILABLE (MSG0C)
- IPL DEVICE DOES NOT RESPOND (MSG0A)
- IPL DEVICE I/O ERROR, IFCC OCCURRED (MSG0F)
- IPL DEVICE xxxx ERROR DETECTED (MSG0D)
- IPL EC-PSW FORMAT ERROR (MSG0E)

Step	Condition	Instructions	Comments
1	Did the PA Option 1 screen display IPL DEVICE xxxx DOES NOT RESPOND, NO DEVICE UCW (MSG0B)?	<p>This can be caused by one of the following:</p> <ul style="list-style-type: none"> • The operator has selected an invalid IPL device address on the Program Load screen. (The address is displayed in place of the xxxx.) • The Unit Control Word (UCW) for the selected IPL device address does not exist. <p>If the problem cannot be resolved, write down the IPL device address and go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.</p>	<p>Ensure the UCW is correctly specified for the IPL device.</p> <p>For additional information on UCWs, refer to Volume A06, "I/O Configuration (S/370)"</p>
2	Did the PA Option 1 screen display IPL DEVICE DOES NOT RESPOND, NO CHANNEL PATH AVAILABLE (MSG0C)?	<p>This message can be caused by one of the following conditions:</p> <ul style="list-style-type: none"> • The operator has selected an invalid IPL device number on the Program Load screen. • An I/O path for the selected IPL device address does not exist. <p>If the problem cannot be resolved, write down the IPL device address and go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.</p>	<p>Contact the system programmer to ensure the IPL address is correct.</p>

Step	Condition	Instructions	Comments
3	Did the PA Option 1 screen display IPL DEVICE xxxx ERROR DETECTED (MSG0D)?	<p>If channel status bits 4, 5, or 6 are on, go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A and test the channel used for IPL.</p> <p>If unit status bits 0, 2, 3, 6, or 7 are on, the problem can be in either the device or the channel. Go to the device maintenance procedures first. If the problem cannot be resolved, go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.</p> <p>For all other status, contact the system programmer or your program support.</p>	<p>Wrong setting of UCW can cause unit check.</p>
4	Did the PA Option 1 screen display IPL PSW IS NOT VALID (MSG0E)?	<p>Contact the system programmer or your program support.</p>	<p>Data received from the IPL device during IPL shows extended control mode is being used but the PSW is invalid.</p>
5	Did the PA Option 1 screen display IPL DEVICE DOES NOT RESPOND (MSG0A)?	<p>Go to "Channel Problem Isolation Procedure" on page CHNL 001.</p>	<p>Test the channel used by the customer for IPL.</p>
6	PA Option 1 displayed message MSG0F.	<ol style="list-style-type: none"> 1. Use the PA run time provided by the customer to select the PA run number from the PA history (QP2) screen for the problem you are working on. 2. Key in the run number (0-5) followed by 10F, and press ENTER. The PA message MSG0F received by the customer is redisplayed. 3. Go to step 7. 	<p>Redisplay the MSG0F screen the customer received during PA.</p>
7	Did the PA Option 1 screen display IPL DEVICE I/O ERROR, IFCC OCCURRED?	<p>Copy the IPL device address, and go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.</p>	<p>The screen for MSG0F said IFCC OCCURRED.</p>
8	Go to the Instructions column.	<p>Contact the system programmer to find the correct IPL device. If the problem cannot be resolved, go to the maintenance procedures for the IPL device.</p>	<p>The screen for MSG0F did not say IFCC OCCURRED.</p> <p>The data received from the IPL device during IPL was not program data.</p>

START 020

System Control Program or Program Product Message

If a message from the system control program or a program product is displayed in the program area of the screen (lines 1 through 20) or printed on the system printer, look up the message in the manual for your system.

If no message displayed and Problem Analysis reported a program hard wait (MSG25), a message code was stored by the operating system. Use the message manual for your system to find the hard wait message.

SCP Message Manuals

DOS/VSE GC33-5379
 VM370 GC20-1808
 OS/VS1 GC38-1001
 OS/VS2 GC38-1002

Step	Condition	Instructions	Comments
1	Does the message indicate an operational problem?	Report the problem to the customer. Go to "END Repair Procedure" on page END 001 when the problem is resolved.	
2	Does the message indicate an I/O device or channel problem?	Go to "Channel Problem Isolation Procedure" on page CHAN 001, Entry Point A.	
3	You have not resolved the problem using the information provided by the program message manuals.	The message can result from a program check, or a program problem. Invoke your support structure.	

FRU Replacement

You are here because you have FRUs to replace or a reference code.

Step	Condition	Instructions	Comments
1	Do you have a reference code with a UU field of 1x?	Go to Volume A03, "Processing Unit Power Repair Procedure" on page PR 1001.	Reference code format is: UU RRRR IS.
2	Do you have reference code with a UU field of EC?	Go to "Processing Unit Failure Isolation Procedure" on page PU 001.	Reference code format is: UU RRRR IS.
3	Do you have reference code with a UU field of Fx or ED?	Go to "MSS Repair Procedure" on page MSS 001.	Reference code format is: UU RRRR IS.
4	For any other problem.	Go to "Processing Unit Failure Isolation Procedure" on page PU 001, Entry Point A. Your symptom is FRU list.	

Nondetectable Problems

Step	Condition	Instructions	Comments
1	Do you have the wrong or missing output on the system console or is the console keyboard inhibited or not operational?	Go to step 15.	You have: Blank display Keyboard failure Messages that do not display Jitter Invalid or wrong characters.
2	Do you have the wrong or missing output on any of the other devices attached to the MSS?	Go to the <i>Maintenance Analysis Procedures</i> for the device.	Wrong output means the data is missing or not valid.
3	Does Power On/IML on the OCP or Power On on the service panel fail to power up the processor?	Go to "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	
4	Does Power On/IML fail to start an SP re-IML?	Go to "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	
5	Does the processor fail to sequence power off when the Power Off is pressed?	Go to "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	
6	Do you have a channel-to-channel problem?	Go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.	For information see "Introduction."
7	Do you suspect a remote support adapter problem when using RSF?	Go to "MSS Repair" on page MSS 001.	
8	Are the I/O meters running all the time or not at all?	Go to "Channel Problem Isolation Procedure" on page CHNL 061, Entry Point A.	
9	Do you have a convenience outlet problem?	Go to "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	
10	Do you have service panel or OCP indicators that are on when they should be off or that do not come on?	Go to "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	You have an OCP or service panel indicator failure.
11	Do you have the message SERIAL NO. DO NOT MATCH?	Go to "MSS Repair" on page MSS 001.	

Step	Condition	Instructions	Comments
12	Do you have the wrong output on the service panel five-digit display?	Go to "Basic Power (Hardwire Sequence) Repair Procedure" on page PR 001.	
13	Is the console keyboard not operational?	Go to the <i>Maintenance Analysis Procedures</i> for the system console.	
14	Go to the Instructions column.	Go to "Manual Symptom Gathering" on page START 040.	
15	Was your <i>original</i> symptom a basic check?	Go to "MSS Repair" on page MSS 001.	Use the MSS Code recorded by the customer.
16	Was your <i>original</i> symptom one of the following? <ul style="list-style-type: none"> • System console unchanged after IPL; keyboard works correctly. • System appeared to be running; no messages appeared at the system console. • An alternate console was assigned by the system. 	Go to "Channel Problem Isolation Procedure" on page CHNL 001, and test channel 0.	
17	You have the wrong or missing output or the keyboard fails on the system console.	Go to the <i>Maintenance Analysis Procedures</i> for the console. If you cannot find a problem with the console, assume you have a reference code with a UU field of F8 and go to "MSS Repair Procedure" on page MSS 001.	

Channel and I/O Errors

- 1. Key in QP5, and press ENTER. The PA Option 5 menu screen is displayed.
- 2. Examine the Option 5 screen to get the valid log number for Channel and I/O Device detail.
- 3. Key in Cx where x is a valid problem analysis log number and press ENTER. The Channel and I/O Device Detail screen is displayed.
- 4. Ensure that the date and time displayed are the same as the date and time that PA was run for this problem.

Step	Condition	Instructions	Comments
1	Are channels listed in CHAN NOT OPERATIONAL?	Record the channel addresses listed. Go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.	This line is displayed only if a channel was made not operational.
2	Are devices listed in CHANNEL INTERFACE CONTROL CHECKS?	The format is PCX,DEVPATH where PC is the two-digit channel address and X is the log number in the IFCC detailed log. Record the channel addresses listed and go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.	Additional information may be found in the Channel Interface Logout screens (QEI and QEIDxxx). Look on the QEPD screen for the reference code defining the failure.
3	Are devices listed in I/O DEVICE ERRORS?	Record the device numbers (DEVNUM) listed and get the physical device addresses from the customer. Go to the device maintenance procedure to correct the problem. If the problem cannot be resolved, go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.	
4	Go to the instructions column.	Rerun the failing job and PA Option 1 or run a device exerciser like 4300-FRIEND or System Test/4381 to isolate the device causing the problem. If several devices fail on the same channel or only one device is connected to the failing channel, go to "Channel Problem Isolation Procedure" on page CHNL 001. If only one device or device controller fails, go to the device maintenance procedure to find the problem.	Devices listed under I/O DEVICE WITH OPERATION NOT COMPLETE or CHNL BUSY, DEVICE OPERATION INCOMPLETE may indicate normal operation. For information about System Test/4381 and 4300-FRIEND, see Volume A07, "System Test."

```

*PROBLEM ANALYSIS*

PROBLEM ANALYSIS DETAIL SCREENS AVAILABLE:
OPTION  SCREEN CONTENT              VALID LOGS
                                  0  1  2  3  4  5
I      = IML ERROR DETAIL           X  X
M      = MICROCODE LOOP DETAIL      X
L      = LOW STORAGE DETAIL                X  X
T      = INSTRUCTION TRACE DETAIL            X
C      = CHANNEL AND I/O DEVICE DETAIL      X

SELECT ONE OPTION, ONE VALID LOG NUMBER, THEN PRESS ENTER
FOR EXAMPLE QP5T3

Q GEN SELECTION
Z RTN TO PGM SYS
COMMAND: QP5
  
```

```

PA-DETAIL LOG-nn             *PROBLEM ANALYSIS*           SAVED: yy/mm/dd hh:mm:ss

IML  IPL  MCK  PGM:WAIT  INT  LP:MICRO  PGM - CHN:ER  ACT
CHAN NOT OPERATONAL=    LIMITED LOG=xxxxxxxxx
CHANNEL INTERFACE CONTROL CHECKS:  IFCC DETAILED LOG==>QEIDXXY:
PCX,DEVPATH= ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '

I/O DEVICE ERRORS:
DEVPATH= _____
US/CS= _____
DEVNUM = _____
I/O DEVICE WITH OPERATION NOT COMPLETE:
DEVPATH= _____
DEVNUM = _____
CHNL BUSY, DEVICE OPERATION INCOMPLETE:
DEVPATH= _____
DEVNUM = _____

Q GEN SELECTION
Z RTN TO PGM SYS
COMMAND: QP5Cx                                 ==> MORE, PRESS ENTER
  
```


Manual Symptom Gathering

You have been directed here with the following conditions:

- The customer called for service but did not run PA.
- PA said no trouble found.
- The machine does not have the original symptom (not failing).

You will now be directed to look at a series of logout screens to find the cause of the failure.

```

POWER LOGOUT DIRECTORY          CURRENT TODC EQUIVALENT: yy/mm/dd hh:mm:ss

LINE TODC EQUIVALENT REFERENCE CODE
00 yy/mm/dd hh:mm:ss 11A0920E
01 yy/mm/dd hh:mm:ss 11D1600E
02 yy/mm/dd hh:mm:ss 1141300E
03 yy/mm/dd hh:mm:ss 11D1920E
04 yy/mm/dd hh:mm:ss 00000000
05 yy/mm/dd hh:mm:ss 00000000
06 yy/mm/dd hh:mm:ss 00000000
07 yy/mm/dd hh:mm:ss 00000000
08 yy/mm/dd hh:mm:ss 00000000
09 yy/mm/dd hh:mm:ss 00000000
10 yy/mm/dd hh:mm:ss 00000000
11 yy/mm/dd hh:mm:ss 00000000
12 yy/mm/dd hh:mm:ss 00000000
13 yy/mm/dd hh:mm:ss 00000000
14 yy/mm/dd hh:mm:ss 00000000
15 yy/mm/dd hh:mm:ss 00000000
COMMAND: QEWD

TIME OF LAST PURGE: yy/mm/dd hh:mm:ss
==>
    
```

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Type in QEWD, and press ENTER.
4. Use the QEWD screen to determine if a power error logout occurred at the time of the failure.

Step	Condition	Instructions	Comments
1	Did a logout occur at the time of failure?	Record the reference code listed in the logout, and go to Volume A03, "Processing Unit Power Repair Procedure" on page PR 1001.	
2	A logout did not occur at the time of failure.	Go to "SP Logout Summary (QESD)" on this page.	

SP Logout Summary (QESD)

```

***SP LOGOUT SUMMARY***          CURRENT TODC EQUIVALENT: yy/mm/dd hh:mm:ss
-----
LN EVNT CT TODC EQUIVALENT LVL MM MC --MSW--- C IC INST ADPT SIC- LMR- REF.CODE
00 0003 01 mm/dd hh:mm:ss 07 00 12 63402F2E 6340 EE05 0000 0000 3900 EC517464
01 0002 01 mm/dd hh:mm:ss 07 00 12 63402F2E 6340 EE05 0000 1856 96C8 EC517A64
02 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
03 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
04 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
05 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
06 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
07 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
08 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
09 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
10 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
11 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
12 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
13 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
14 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
15 0000 00 mm/dd hh:mm:ss 00 00 00 00000000 0000 0000 0000 0000 0000 00000000
COMMAND: QESD          ==>
    
```

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Type in QESD, and press ENTER.
4. Use the QESD screen to determine if an SP logout occurred at the time of failure.

Step	Condition	Instructions	Comments
1	Did a logout occur at the time of failure?	Record the reference code listed in the logout, and go to "MSS Repair Procedure" on page MSS 001.	
2	A logout did not occur at the time of failure.	Go to "Intermittent MSS Errors" on page START 045.	

Intermittent MSS Errors

Step	Condition	Instructions	Comments
1	Was your original symptom <i>all</i> of the following? Console keyboard not operational, Basic Check on, Power Complete on.	Assume a reference code of F8xxxxxx occurred, and go to "MSS Reference Code Index," on page MSS 031.	
2	Was your original symptom <i>all</i> of the following? Console keyboard not operational, Basic Check off, Power Complete on.	Assume a reference code of F2xxxxxx occurred, and go to "MSS Reference Code Index," on page MSS 031.	
3	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Press MODE SEL. 2. Key in QESE, and press ENTER. 3. Scan the DELTA columns for excessive errors. 4. Use the ALT and PAGE UP keys. 5. Scan the DELTA columns for excessive errors. 6. Go to step 4. 	<p>The SP Event Counters screens are displayed.</p> <p>See Volume A07, "Logs" for more information.</p>
4	Do you have an excessive number of LCA retries?	Assume reference code F2xxxxxx occurred, and go to "MSS Reference Code Index" on page MSS 031.	
5	Do you have an excessive number of SP parity errors?	Assume reference code F1xxxxxx occurred, and go to "MSS Reference Code Index" on page MSS 031.	
6	Do you have an excessive number of DCA retries?	Assume reference code F8xxxxxx occurred, and go to "MSS Reference Code Index" on page MSS 031.	
7	Do you have an excessive number of SP resets?	Assume reference code F0xxxxxx occurred, and go to "MSS Reference Code Index" on page MSS 031.	
8	Do you have an excessive number of DDA retries?	Assume reference code F5xxxxxx occurred and go to "MSS Reference Code Index" on page MSS 031.	
9	Do you have an excessive number of SBA retries?	Assume reference code FDxxxxxx occurred, and go to "MSS Reference Code Index" on page MSS 031.	
10	Do you have an excessive number of PCA retries?	Assume reference code F6xxxxxx occurred, and go to "MSS Reference Code Index" on page MSS 031.	
11	Go to the Instructions column.	Go to "Reference Code Logout (QERD)" on page START 050.	

```

*ERROR LOG DISPLAY*          *SP EVENT COUNTERS*
0 TOTAL POWER ON HOURS      CURRENT TODC EQUIV: yy/mm/dd hh:mm:ss
0 DELTA POWER ON HOURS     LAST RESET TODC EQUIV:
TOTAL DELTA                TOTAL DELTA
0 0 TIMES POWERED ON       0 0 TIMES POWERED OFF
0 0 POWER FAULTS           0 0 HOURS IN CE MODE
0 0 HOURS IN DIAGNOSTIC MODE
0 0 SP PARITY ERR HARD RECOV 0 0 SP PARITY ERR HARD UNREC
0 0 SP PARITY ERR SOFT RECOV 0 0 SP PARITY ERR SOFT UNREC

0 0 SP REIML               0 0 AUTO SP-REIML
0 0 SP RESETS              0 0 AUTO SP-RESET

0 0 SUCCESSFUL LCA RETRY   0 0 UNSUCCESSFUL LCA RETRY
0 0 LCA CYCLE STEAL ERROR

0 0 SUCCESSFUL DCA RETRY   0 0 UNSUCCESSFUL DCA RETRY
0 0 DCA CYCLE STEAL ERROR

COMMAND: QESE                ==>
    
```

```

*ERROR LOG DISPLAY*          *SP EVENT COUNTERS*
0 TOTAL POWER ON HOURS      CURRENT TODC EQUIV: yy/mm/dd hh:mm
0 DELTA POWER ON HOURS     LAST RESET TODC EQUIV: yy/mm/dd hh:mm
TOTAL DELTA                TOTAL DELTA
0 0 SUCCESSFUL CCA RETRY   0 0 UNSUCCESSFUL CCA RETRY

0 0 SUCCESSFUL DDA RETRY   0 0 UNSUCCESSFUL DDA RETRY
0 0 DDA CYCLE STEAL ERROR

0 0 SUCCESSFUL PCA RETRY   0 0 UNSUCCESSFUL PCA RETRY
0 0 SUCCESSFUL SBA RETRY   0 0 UNSUCCESSFUL SBA RETRY

0 0 PU-IML XA-MODE         0 0 PU-IML S370
0 0 PU-IPL                 0 0 PU-IML S370
0 0 SUCCESSFUL RETRY       0 0 UNSUCCESSFUL RETRY

COMMAND: QESE                ==>
    
```

Reference Code Logout (QERD)

```

**REFERENCE CODE LOGOUT FILE**      CURRENT TODC EQUIVALENT: yy/mm/dd hh:mm:ss
-----
RN CT ---TODC EQUIV-- REF CODE RC EXTN. RN CT ---TODC EQUIV-- REF CODE RC EXTN.
0 01 mm/dd hh:mm:ss EC517464 00000000 16 00 mm/dd hh:mm:ss 00000000 00000000
1 01 mm/dd hh:mm:ss EC517A64 00000000 17 00 mm/dd hh:mm:ss 00000000 00000000
2 00 mm/dd hh:mm:ss 00000000 00000000 18 00 mm/dd hh:mm:ss 00000000 00000000
3 00 mm/dd hh:mm:ss 00000000 00000000 19 00 mm/dd hh:mm:ss 00000000 00000000
4 00 mm/dd hh:mm:ss 00000000 00000000 20 00 mm/dd hh:mm:ss 00000000 00000000
5 00 mm/dd hh:mm:ss 00000000 00000000 21 00 mm/dd hh:mm:ss 00000000 00000000
6 00 mm/dd hh:mm:ss 00000000 00000000 22 00 mm/dd hh:mm:ss 00000000 00000000
7 00 mm/dd hh:mm:ss 00000000 00000000 23 00 mm/dd hh:mm:ss 00000000 00000000
8 00 mm/dd hh:mm:ss 00000000 00000000 24 00 mm/dd hh:mm:ss 00000000 00000000
9 00 mm/dd hh:mm:ss 00000000 00000000 25 00 mm/dd hh:mm:ss 00000000 00000000
10 00 mm/dd hh:mm:ss 00000000 00000000 26 00 mm/dd hh:mm:ss 00000000 00000000
11 00 mm/dd hh:mm:ss 00000000 00000000 27 00 mm/dd hh:mm:ss 00000000 00000000
12 00 mm/dd hh:mm:ss 00000000 00000000 28 00 mm/dd hh:mm:ss 00000000 00000000
13 00 mm/dd hh:mm:ss 00000000 00000000 29 00 mm/dd hh:mm:ss 00000000 00000000
14 00 mm/dd hh:mm:ss 00000000 00000000 30 00 mm/dd hh:mm:ss 00000000 00000000
15 00 mm/dd hh:mm:ss 00000000 00000000 TIME OF LAST PURGE: yy/mm/dd hh:mm:ss
COMMAND: QERD
    
```

1. Press MODE SEL.
2. Type in QERD, and press ENTER.
3. Use the QERD screen to determine if a reference code occurred at the time of failure.

Step	Condition	Instructions	Comments
1	Was there a reference code at the original time of the failure?	<ul style="list-style-type: none"> For a 1x reference code, go to Volume A03, "Processing Unit Power Repair Procedure" on page PR 1001. For a Fx or EC reference code, go to "MSS Repair Procedure" on page MSS 001. For all other reference codes, go to "Processing Unit Problem Isolation Procedure" on page PU 001, Entry Point A. 	
2	There was no reference code at the original time of failure.	Go to "Channel Interface Logout Summary" on this page.	

Channel Interface Logout Summary

```

*ERROR DISPLAYS*                *INTERFACE CONTROL CHECK LOGOUTS*
XXY=CHNLXX,L Y

DXXY DISPLAY                    CHNL  IFCC  LAST
                                LOGGED  IFCC
                                03
                                00  00
                                01  02
P  PURGE IFCC LOGOUTS          02  00
                                03  01
                                04  00
                                05  00

Q  GENERAL SELECT

Z  RTN TO SYSTEM

LAST PURGE: yy/mm/dd hh:mm
COMMAND: QE1
    
```

1. Press MODE SEL.
2. Type in QE1, and press ENTER.
3. For each channel with an IFCC logged, key in QEIDxx, where xx is the channel ID. Press ENTER. Use the QEIDxx screen to determine if an IFCC occurred at the time of failure.
4. If the operator ran PA at the time of failure, PA Option 5 may have I/O and channel failure information. (For information on running PA Option 5, see "Channel and I/O Errors" on page START 035 then return here.) If PA was not run, ask the operator to print EREP/SYS1.LOGREC, and look for channel or device errors that can cause your problem.

Step	Condition	Instructions	Comments
1	Was an IFCC logged at the time of failure?	Go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.	
2	Is there a channel with errors logged on more than one device?	Go to "Channel Problem Isolation Procedure" on page CHNL 001, Entry Point A.	
3	Are there device errors that could have caused your failure?	Go to the device maintenance procedure to correct your problem.	
4	Go to the Instructions column.	Go to "Running System Test/4381" on page START 055.	

Running System Test/4381

1. Ensure that the FUNC1 diskette is installed in diskette drive 1 and the FUNC2 diskette is installed in diskette drive 2.
2. Press Power On/IML to IML the support processor.
3. When the Program Load screen displays, key in QLM and press ENTER. This IMLs the processing unit.
4. Ensure that all I/O devices that were active when the failure occurred are ready and enabled.
5. Run System Test/4381 or System Test/4381XA. For run information, refer to Volume A07, "System Test."

Step	Condition	Instructions	Comments
1	Did System Test/4381 detect an I/O device failure?	Use the I/O device maintenance package to resolve the problem.	
2	Does System Test/4381 indicate a failure other than an I/O failure?	If you have a new symptom, go back to START 001. If you have the same symptom, invoke your support structure.	
3	System Test/4381 did not detect an error.	Set I/O Trace: 1. Press STOP. 2. Key in QAPY, and press ENTER. 3. Have the customer rerun the failing job. Go to the step 4.	The failure is intermittent. An I/O trace may aid in determining which device failed to interrupt if the failure occurs with I/O trace set.
4	Did the job fail again?	Go to "Display the I/O Trace" on this page.	
5	The job did not fail this time.	When you go to END 001, make sure you enter the following information in your call reports. • Record that I/O trace is set. • For the next call on the same problem, direct the next repair person to "Display the I/O Trace" on page START 055. Go to "END Repair Procedure" on page END 001.	The failure is intermittent.

Display the I/O Trace

```

*COMPARE/TRACE*                *PSW & I/O TRACE DISPLAY*                PAGE 00
PSW LOAD  ADR=0000 0000  OLD=0000 0000 0000 0000
                                NEW=0000 0000 0000 0000
PSW I/O    DEV=10C        OLD=FE00 010C 0007 7622
                                NEW=0000 0000 0000 3466
PSW MCHK   INT=0000 0101  OLD=070C 0000 0004 4444
                                NEW=0008 0000 000E 3922
OPS SIO    CC=0  DEV=2B4  CCW=0202 334C 0000 0050
                                CAW=0006 304C
OPS HIO    CC=1  DEV=119  CSW=..... 0100 ....
                                CNT=0000 0002

OPS CLRIO  CC=3  DEV=111
OPS TCH    CC=2  DEV=3AD
CSW

COMMAND: QAT00                ==>
    
```

The QAT screen displays the traces made with the selections on the QAP screen. You can use the PAGE UP key with this screen to go from page to page.

1. Type in QAT, and press ENTER. The Display PSW and I/O Trace screen displays.
2. Copy this screen for your support structure.
3. Press the PAGE UP key. The next I/O Trace screen displays. Copy this screen.
4. Key in QATP, and press ENTER to clear the trace screens.
5. Invoke your support structure.

Note: To reset I/O Trace, key in QAPN and press ENTER.

Processing Unit Problem Isolation Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
START	A	PU 001	Processing Unit Failure Isolation
PA OPT 7	A	PU 001	Processing Unit Failure Isolation

*** ENTRY POINT A ***

The purpose of this Repair Procedure is to guide in processing unit problem isolation.

Processing Unit Failure Isolation

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the FUNC1 diskette is installed in diskette drive 1.	
2. Ensure that the CE Mode switch is set to CE Mode.	
3. Press the MODE SEL key.	The General Selection screen is displayed.
4. Key in G, and press the ENTER key.	The Diagnostic Mode PU Diagnostic Selection screen is displayed.
5. Key in I, and press the ENTER key.	This selects the Isolate Failure option.
6. Follow the directions displayed on the screen.	Diagnostic tests run.
7. Wait for the results from the diagnostics being run.	

Step	Condition	Instructions
1	Is a repair procedure indicated on the screen?	Record the reference code, extension, and FRU list on a paper pad. Go to the indicated Repair Procedure.
2	If not:	It is recommended that you invoke your support structure. Go to "END Repair Procedure" on page END 001.

Processing Unit FRU Exchange Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
PU DIAGS	A	PU 041	FRU Exchange
PA OPT 7	A	PU 041	FRU Exchange
PU DIAGS	B	PU 043	Intermittent Failure Analysis
PA OPT 7	B	PU 043	Intermittent Failure Analysis
PU DIAGS	D	PU 044	FRU Removal
PU 051	F	PU 042	Processing Unit Fix Verification
CHNL 021	F	PU 042	Processing Unit Fix Verification

The purpose of this Repair Procedure is to guide in processing unit FRU exchange.

*** ENTRY POINT A ***

FRU Exchange

Always exchange FRU(s) in the order they are listed in your FRU list.

Circle the FRU(s) in the FRU list that you are going to exchange.

Note: Unless you have been instructed to exchange more than one FRU by another repair procedure or your support structure, exchange only one FRU at a time.

Step	Condition	Instructions
1	Is the FRU (or the last one exchanged) located on the A1 or A2 board?	Go to "Complete System Power Down FRU Exchange" on page PU 042.
2	If not:	Go to "Partial Power Down FRU Exchange" on this page.

Partial Power Down FRU Exchange

Warning: Damage will result if cards or modules are removed or installed with power ON. For more information on FRU removal and exchange, refer to Volume A07, Removals and Replacements.

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the I/O Power Hold switch is set to I/O Power Hold.	
2. Press the MODE SEL key.	The General Selection screen is displayed.
3. Key in QWW, and press the ENTER key.	The Power Up/Down screen is displayed.
4. Key in DP, and press the ENTER key.	PROCESSOR STATUS: POWER IS OFF is displayed.
5. Remove the last FRU exchanged (if any) and reinstall the original FRU before exchanging the next FRU.	
6. Inspect the card or module being installed for bent, broken, or dirty pins. Exchange or repair the card or module if any damage is found.	
7. Exchange the circled FRU(s) in the FRU list.	
8. Key in UC, and press the ENTER key.	PROCESSOR STATUS: POWER IS ON is displayed. I/O STATUS: POWER IS ON is displayed.
9. Go to "Processing Unit Fix Verification" on page PU 042, Entry Point F.	

Complete System Power Down FRU Exchange

Warning: Damage will result if cards or modules are removed or installed with power ON. For more information on FRU removal and exchange, refer to Volume A07, Removals and Replacements.

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the CE Mode switch is set to CE Mode.	
2. Ensure that the I/O Power Hold switch is set to I/O Power Hold.	
3. Press the Power Off key.	The Power In Process indicator turns OFF.
4. Remove the last FRU exchanged (if any) and reinstall the original FRU before exchanging the next FRU.	
5. Inspect the card or module being installed for bent, broken, or dirty pins. Exchange or repair the card or module if any damage is found.	
6. Exchange the circled FRU(s) in the FRU list.	
7. Press the Power On pushbutton on the service panel.	The Local Time/Date screen is displayed.
8. Key in the correct time and date, and press the ENTER key.	The Power Up/Down screen is displayed.
9. Key in UC, and press the ENTER key.	PROCESSOR STATUS: POWER IS ON is displayed. I/O STATUS : POWER IS ON is displayed.
10. Go to "Processing Unit Fix Verification," Entry Point F on this page.	

*** ENTRY POINT F ***

Processing Unit Fix Verification

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the FUNC1 diskette is installed in diskette drive 1.	
2. Ensure that the CE Mode switch is set to CE Mode.	
3. Press the MODE SEL key.	The General Selection screen is displayed.
4. Key in G, and press the ENTER key.	The Diagnostic Mode PU Diagnostic Selection screen is displayed.
5. Key in V, and press the ENTER key.	This selects the Fix Verify option.
6. Follow the directions displayed on the screen.	

Seq AF025	PN 0445753 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84		
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*** ENTRY POINT B ***

Intermittent Failure Analysis

The problem cannot be recreated by the diagnostics.

The FRU(s) that are intensified have a probability of 90% or more of fixing the failure.

Before exchanging FRUs, check the Account Management Log and any other source of problem history for this processor. Look for previous incidents with similar symptoms.

Step	Condition	Instructions
3	Are there previous incidents with similar symptoms and/or FRUs listed?	<ol style="list-style-type: none"> 1. It is recommended that you inform your support structure of this repeated intermittent failure. 2. If you are instructed to continue exchanging FRUs, go to "FRU Exchange" on page PU 041, Entry Point A.
4	If not:	<ol style="list-style-type: none"> 1. This is the first reported occurrence of this intermittent failure on this processor. 2. Depending on parts availability, you should exchange all of the intensified FRU(s) in the FRU list at the same time. Note: If no FRUs are intensified, it is recommended that you invoke your support structure for assistance in isolating this failure. If this is not possible, exchange only the first FRU. 3. Go to "FRU Exchange" on page PU 041, Entry Point A.

Seq AF035	PN 0445754 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84		
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*** ENTRY POINT D ***

FRU Removal

The purpose of this procedure is to restore the processing unit to its original condition before invoking your support structure.

Warning: Damage will result if cards or modules are removed or installed with power ON. For more information on FRU removal and exchange, refer to Volume A07, Removals and Replacements.

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Record all of the information displayed on the screen.	
2. Ensure that the I/O Power Hold switch is set to I/O Power Hold.	
3. Press the Power Off key.	The Power In Process indicator turns OFF.
4. Inspect the card or module being reinstalled for bent, broken, or dirty pins. Exchange or repair the card or module if any damage is found.	
5. Remove the last FRU exchanged and reinstall the original FRU.	
6. Press the Power On pushbutton on the service panel.	The Local Time/Date screen is displayed.
7. Key in the correct time and date, and press the ENTER key.	The Power Up/Down screen is displayed.
8. Key in UC, and press the ENTER key.	PROCESSOR STATUS: POWER IS ON is displayed. I/O STATUS: POWER IS ON is displayed.
9. Invoke your support structure for assistance with this failure.	
10. Go to "END Repair Procedure" on page END 001.	

Scan Ring Problem Isolation Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
PU DIAGS	A	PU 051	FRU Exchange and Power-On Sequencing
PA OPT 7	A	PU 051	FRU Exchange and Power-On Sequencing
PU DIAGS	B	PU 052	Intermittent Failure Analysis
PA OPT 7	B	PU 052	Intermittent Failure Analysis

The purpose of this Repair Procedure is to isolate processing unit scan ring problems by using the Power-On sequencing.

*** ENTRY POINT A ***

FRU Exchange and Power-On Sequencing

Always exchange FRU(s) in the order they are listed in your FRU list.

Circle the FRU(s) in the FRU list that you are going to exchange. Unless otherwise specified, exchange only one FRU at a time.

Warning: Damage will result if cards or modules are removed or installed with power ON. For more information on FRU removal and exchange, refer to Volume A07, Removals and Replacements.

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the CE Mode switch is set to CE Mode.	
2. Ensure that the I/O Power Hold switch is set to I/O Power Hold.	
3. Press the Power Off key.	Power In Process indicator turns OFF.
4. Remove the last FRU exchanged (if any) and reinstall the original FRU before exchanging the next FRU.	
5. Inspect the card or module being installed for bent, broken, or dirty pins. Exchange or repair the card or module if any damage is found.	
6. Exchange the circled FRU(s) in the FRU list.	
7. Press the Power On pushbutton on the service panel.	The Local Time/Date screen is displayed.
8. Key in the correct time and date, and press the ENTER key.	The Power Up/Down screen is displayed.
9. Key in UC, and press the ENTER key.	PROCESSOR STATUS: POWER IS ON is displayed. I/O STATUS: POWER IS ON is displayed.
	The expected failure is a reference code (uurrrris) with an IS field equal to 2E.

Step	Condition	Instructions
1	Is a Reference Code displayed on the screen?	Go to step 3.
2	If not:	You have had a correct power-up sequence after problem FRU exchange. Go to "Processing Unit Fix Verification" on page PU 042, Entry Point F.
3	Have all of the FRUs been exchanged?	You have reached a point where you have one of the following conditions. 1. You have a board or cable problem. 2. A possible bad card or module from supplies is causing the same or similar failure. If possible, try exchanging the same FRUs. It is recommended that you invoke your support structure. Go to "END Repair Procedure" on page END 001.
4	If not:	The FRU you exchanged did not fix the problem. You will have to continue with the FRU exchange procedures using the next FRU in the FRU list. Go to "FRU Exchange and Power-On Sequencing," Entry Point A on this page.

Seq AF045	PN 0447361 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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• ENTRY POINT B •

Intermittent Failure Analysis

The problem cannot be recreated by the diagnostics.

The FRU(s) that are intensified have a probability of 90% or more of fixing the failure.

Before exchanging FRUs, check the Account Management Log and any other source of problem history for this processor. Look for previous incidents with similar symptoms.

Step	Condition	Instructions
5	Are there previous incidents with similar symptoms and/or FRUs listed?	<ol style="list-style-type: none"> 1. It is recommended that you inform your support structure of this repeated intermittent failure. 2. If you are instructed to continue exchanging FRUs, go to FRU Exchange and Power-On Sequencing on page PU 051, Entry Point A.
6	If not:	<ol style="list-style-type: none"> 1. This is the first reported occurrence of this intermittent failure on this processor. 2. Depending on parts availability, you should exchange all of the intensified FRU(s) in the FRU list at the same time. 3. When no FRUs are intensified, exchange only the first FRU. 4. Go to "FRU Exchange and Power-On Sequencing" on page PU 051, Entry Point A.

Seq AF045	PN 0447361 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Channel Problem Isolation Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
START	A	CHNL 001	Test Processing Unit Hardware

The purpose of this Repair Procedure is to analyze Channel errors.

*** ENTRY POINT A ***

Test Processing Unit Hardware

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the FUNC1 diskette is installed in diskette drive 1.	
2. Ensure that the CE Mode switch is set to CE Mode.	
3. Press the MODE SEL key.	The General Selection screen is displayed.
4. Key in G, and press the ENTER key.	The Diagnostic Mode PU Diagnostic Selection screen is displayed.
5. Key in I, and press the ENTER key.	This selects the Isolate Failure option.
6. Follow the directions displayed on the screen.	Diagnostic tests run.
7. Wait for the results from the diagnostics being run.	

Cable Wrap Test Setup

Step	Condition	Instructions	Comments
3	Is a Channel Switching Unit attached to the channel being tested?	Install the Cable Wrap Terminators, BUS (part 8483772) and TAG (part 8483773), in the channel side BUS/TAG OUT I/O connector positions of the switching unit. Go to "Running the Cable Wrap Test" on page CHNL 002.	For more information, use the attached switching unit's maintenance documentation.
4	If not:	Find the standard channel terminators on the suspected channel and exchange them with the Cable Wrap Terminators, BUS (part 8483772) and TAG (part 8483773). Go to "Running the Cable Wrap Test" on page CHNL 002.	

Step	Condition	Instructions
1	Is a reference code displayed on the screen?	Record the reference code and FRUs for use later. Then go to the indicated repair procedure.
2	If not:	Go to "Cable Wrap Test Setup" on this page.

Running the Cable Wrap Test

Note: While running the Cable Wrap Test, false errors may be sensed if operator action causes interrupts on the channel.

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

- | Required Actions | Expected Results |
|---|---|
| 1. Ensure that the FUNC1 diskette is installed in diskette drive 1. | |
| 2. Ensure that the DIAG1 diskette is installed in diskette drive 2. | |
| 3. Ensure that the CE Mode switch is set to CE Mode. | |
| 4. Press the MODE SEL key. | The General Selection screen is displayed. |
| 5. Key in G, and press the ENTER key. | The Diagnostic Mode PU Diagnostic Selection screen is displayed. |
| 6. Key in C, and press the ENTER key. | Channel tests are loaded; then the Special Channel Tests Selection screen is displayed. |
| 7. Key in 02, and press the ENTER key. | Instructions are displayed on the screen. |
| 8. Follow the displayed instructions. | |

Step	Condition	Instructions
5	Did the Channel Cable Wrap Test sense a failure?	Go to "Cable Wrap Test Failure Isolation" on page CHNL 031, Entry Point B.
6	If not:	Go to "Running the Channel Microcoded Device Exerciser" on this page.

Running the Channel Microcoded Device Exerciser

Use the following procedure to run the Channel Microcoded Device Exerciser (CMDE) on the suspected channel.

For additional information, see Volume A07, Diagnostics, "Channel Microcoded Device Exerciser (CMDE)."

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

- | Required Actions | Expected Results |
|---|---|
| 1. Return all standard channel terminators to their original locations on the channels. | |
| 2. Ensure that the DIAG1 diskette is installed in diskette drive 2. | |
| 3. Ensure that the CE Mode switch is set to CE Mode. | |
| 4. Press the MODE SEL key. | The General Selection screen is displayed. |
| 5. Key in G, and press the ENTER key. | The Diagnostic Mode PU Diagnostic Selection screen is displayed. |
| 6. Key in C, and press the ENTER key. | Channel tests are loaded; then the Special Channel Tests Selection screen is displayed. |
| 7. Key in 01, and press the ENTER key. | Instructions are displayed on the screen. |
| 8. Follow the displayed instructions. | |

Step	Condition	Instructions
7	Did the CMDE sense a failure?	Using the device maintenance package and CMDE, attempt to solve the problem. If you require assistance, go to "END Repair Procedure" on page END 001.
8	If not:	This is either an intermittent failure, or a failure inside the I/O device. Using the device maintenance package and/or information from the IFCC logs (Selection QEI from the General Selection screen), attempt to correct the problem. Go to "END Repair Procedure" on page END 001.

Channel Hot Tag Failure Isolation Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
PU DIAGS	A	CHNL 021	Channel Error Analysis

The purpose of this Repair Procedure is to analyze channel errors that are associated with diagnostic reference codes.

* ENTRY POINT A *

Channel Error Analysis

Step	Condition	Instructions
1	Do you have a diagnostic reference code (60xxxx9x)?	Go to the chart below to determine the failing channel.
2	If not:	Do the following: 1. Press the MODE SEL key. 2. Type in QP8, then press ENTER. 3. Record the PUA Reference Code and extension field in the log under the PAXx number you are working with. 4. Go to the chart below to determine the failing channel.

Using the chart below, find the channel that is failing. Write the channel number on the paper pad.

Reference Code	Extension Field	Channel
60xxxx9x	xxxxxx10	0
60xxxx9x	xxxxxx20	1
60xxxx9x	xxxxxx30	2
60xxxx9x	xxxxxx40	3
60xxxx9x	xxxxxx50	4
60xxxx9x	xxxxxx60	5
60xxxx9x	xxxxxx70	6
60xxxx9x	xxxxxx80	7
60xxxx9x	xxxxxx90	8
60xxxx9x	xxxxxxA0	9
60xxxx9x	xxxxxxB0	A
60xxxx9x	xxxxxxC0	B

Note: The error may be in a cable, control unit or LCA.

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Remove the BUS and TAG I/O cables from the failing channel at the channel tailgate. (Refer to the decal by the 01E gate for the proper location.)	
2. Move the standard terminators from the last control unit on the failing channel to the channel tailgate.	
3. Ensure that the FUNC2 diskette is installed in diskette drive 2.	
4. Ensure that CE Mode switch is set to CE Mode.	
5. Press the MODE SEL key.	The General Selection screen is displayed.
6. Key in G, and press the ENTER key.	The Diagnostic Mode PU Diagnostic Selection screen is displayed.
7. Key in F, and press the ENTER key.	The Field Support Center screen is displayed.
8. Press the ENTER key twice.	The system requests START TEST ID.
9. Key in Z4, and press the ENTER key.	Run time is about 2 minutes. Normal end is indicated by an END of MSMDs message.

A reference code (uurrrris) with a UU field equal to 6X is the expected failure indication.

Ignore any repair procedure direction on the screen and continue at step 3 below.

Step	Condition	Instructions
3	Is a reference code displayed on the screen?	The error is inside the processor. It is possible that you have a bad channel terminator. Use the current diagnostic FRU list, and add the channel terminators to the FRU list. Go to "FRU Exchange" on page PU 041, Entry Point A.
4	If not:	Go to "Running the Cable Wrap Test" on page CHNL 022.

Running the Cable Wrap Test

The error was not found with the cables disconnected.

The problem may be with a control unit or cable associated with the failing channel, or it may be **intermittent**.

A special test, Cable Wrap Test, will now be run to check the cables.

Note: While running the Cable Wrap Test, false errors may be sensed if operator action causes interrupts on the channel.

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Remove the standard terminators at the channel tailgate of the failing channel. Reinstall the BUS and TAG I/O cables of the failing channel in their original location.	
2. Install the special wrap terminators, BUS (part 8483772) and TAG (part 8483773), in place of the standard terminators in the last control unit on the failing channel.	
3. Ensure that the DIAG1 diskette is installed in diskette drive 2.	
4. Ensure that the CE Mode switch is set to CE Mode.	
5. Press the MODE SEL key.	The General Selection screen is displayed.
6. Key in G, and press the ENTER key.	The Diagnostic Mode PU Diagnostic Selection screen is displayed.
7. Key in C, and press the ENTER key.	Channel tests are loaded; then the Special Channel Tests Selection screen is displayed.
8. Key in 02, and press the ENTER key.	Instructions for CWT are displayed.
9. Follow the displayed instructions.	

Step	Condition	Instructions
5	Does the Cable Wrap Test indicate a failure?	Go to "Cable Wrap Test Failure Isolation" on page CHNL 031, Entry Point B.
6	If not:	Go to "Intermittent Cable Errors" on this page.

Intermittent Cable Errors

The failure was not sensed by the Cable Wrap Test.

This indicates that no TAG or BUS lines have been found to be bad.

The problem may be inside one of the control units on the channel, or it may be **intermittent**.

Using the Cable Wrap Test as an exerciser, see if the failure is caused by loose cables or connectors along the interface.

Step	Condition	Instructions
7	Can you locate the problem?	Repair the cables or connectors; then ensure that the cable(s) and terminator(s) are returned to their original positions. Go to "END Repair Procedure" on page END 001.
8	If not:	Reinstall the standard terminators on the last control unit. It is recommended that you invoke your support structure. Go to "END Repair Procedure" on page END 001.

Channel Cable Wrap Failure Isolation Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
CHNL 001	B	CHNL 031	Cable Wrap Test Failure Isolation

The purpose of this Repair Procedure is to analyze Channel errors that are associated with failures detected while running the Cable Wrap Test.

*** ENTRY POINT B ***

Cable Wrap Test Failure Isolation

The Cable Wrap Test has sensed a error in the cable path. (This is often caused by a bad connection.)

Disconnect the failing channel interface cable(s) at the channel tailgate, and install the special TAG and BUS Wrap terminator(s).

Follow the directions on the screen to display the Cable Wrap Test screen, and **rerun the Cable Wrap Test.**

Step	Condition	Instructions
1	Does the Cable Wrap Test indicate a failure?	Follow instructions on the screen to exit the Cable Wrap Test. Go to "Tailgate Failure Isolation" on page CHNL 033.
2	If not:	To isolate the failing cable, connector, or control unit, remove the special TAG and BUS Wrap terminators from the failing channel at the tailgate and reinstall the interface cables. Go to "Moving the Wrap Terminators" on this page.

Moving the Wrap Terminators

Locate the next control unit on the channel in the direction outward from the processor.

If this is the last control unit on the channel, remove the standard terminators. Otherwise, disconnect the outbound TAG and BUS cables.

Install the special TAG and BUS terminators in their place.

Follow the directions on the screen to display the Cable Wrap Test screen and **rerun the Cable Wrap Test.**

Step	Condition	Instructions
3	Does the Cable Wrap Test indicate a failure?	The channel interface cables between the terminated control unit and last control unit that ran error free, or the terminated control unit, is causing the failure. Go to "Cable Checkout" on page CHNL 032.
4	Are the special TAG and BUS Wrap terminators installed in the last control unit on the failing channel?	There is no longer a failure on this channel. Remove the special TAG and BUS Wrap terminators and install the standard terminators. Exchange the standard terminators if the problem continues. Go to "END Repair Procedure" on page END 001.
5	If not:	Remove the special terminators and reinstall the cables. Go to "Moving the Wrap Terminators" on page CHNL 031.

Cable Checkout

Remove the interface cables from the failing control unit, and connect the special TAG and BUS terminators directly to the inbound cables.

Note: This will test the cables.

Follow the directions on the screen to display the Cable Wrap Test screen, and rerun the Cable Wrap Test.

Step	Condition	Instructions
6	Does the Cable Wrap Test indicate a failure?	The channel interface cables that have the cable wrap terminators connected directly to them are causing the failure. Repair the failing cables. Go to "Verify Cable Repair" on this page.
7	If not:	<p>The last control unit to be terminated is the probable cause of the channel failure.</p> <ol style="list-style-type: none"> 1. Reinstall the channel interface cable(s) and terminators in their original location. 2. Ensure that the standard terminators are in the last control unit of the failing channel. 3. The repair action for the failing control unit should be performed following the maintenance package of that control unit. 4. Go to "END Repair Procedure" on page END 001.

Verify Cable Repair

Return the cables to their original positions.

Place the special terminators at the last control unit.

Follow the directions on the screen to display the Cable Wrap Test screen, and rerun the Cable Wrap Test.

Step	Condition	Instructions
8	Does the Cable Wrap Test indicate a failure?	A failure occurred during the verifying test. Go to "Cable Wrap Test Failure Isolation" on page CHNL 031, Entry Point A.
9	If not:	The repair has been verified. Exchange the special terminators with the standard terminators. Go to "END Repair Procedure" on page END 001.

Tailgate Failure Isolation

The error is inside the processing unit.

The following chart has the Interface Adapter cards listed by channel assignment.

Chan Number	IFA Card
0	A3K2
1	A3E2
2	A3F2
3	A3G2
4	A3H2
5	A3J2
6	A3P2
7	A3Q2
8	A3R2
9	A3S2
A	A3T2
B	A3U2

Using the above chart, do one of the following:

1. If you have a new Channel Interface Adapter card with you, use the following procedure to exchange the card for the failing channel.
2. Otherwise, use the following procedure to swap the Channel Interface Adapter card for the failing channel with a card for another channel.

Note: Do not use the CHAN 0 Interface Adapter card for swapping, unless CHAN 0 is the failing channel.

Go to "Exchange of the Failing Interface Adapter Card" on this page.

Exchange of the Failing Interface Adapter Card

Warning: Damage will result if cards or modules are removed or installed with power ON. For more information on FRU removal and exchange, refer to Volume A07, Removals and Replacements.

Note: If the following Required Actions do not produce the Expected Results, go to START Repair on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the I/O Power Hold switch is set to I/O Power Hold.	
2. Press the MODE SEL key.	The General Selection screen is displayed.
3. Key in QWW, and press the ENTER key.	Power Up/Down screen is displayed.
4. Key in DP, and press the ENTER key.	PROCESSOR STATUS: POWER IS OFF is displayed.
5. Ensure that there are no bent, broken, or dirty pins on the card being exchanged.	
6. Exchange or swap the failing channel Interface Adapter card.	
7. Key in UC, and press the ENTER key.	PROCESSOR STATUS: POWER IS ON is displayed. I/O STATUS: POWER IS ON is displayed.
8. Go to "Verify Fix of Interface Adapter" on page CHNL 034.	

Verify Fix of Interface Adapter

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

- | Required Actions | Expected Results |
|---|---|
| 1. Ensure that the DIAG1 diskette is installed in diskette drive 2. | |
| 2. Ensure that the CE Mode switch is set to CE Mode. | |
| 3. Press the MODE SEL key. | The General Selection screen is displayed. |
| 4. Key in G, and press the ENTER key. | The Diagnostic Mode PU Diagnostic Selection screen is displayed. |
| 5. Key in C, and press the ENTER key. | Channel tests are loaded; then the Special Channel Tests Selection screen is displayed. |
| 6. Key in 02, and press the ENTER key. | Instructions for CWT are displayed. |
| 7. Follow the directions to rerun the Cable Wrap Test. | |

Step	Condition	Instructions
10	Does the Cable Wrap Test indicate a failure?	You may have a bad 01A-A3 board, possible bad terminator, or a bad cable. Use the "Channel Failure Isolation" procedure in Volume A06, Service Aids to isolate the failure. If you require assistance with this problem, invoke your support structure. Go to "END Repair Procedure" on page END 001.
11	If not:	You have had a good diagnostic run after a problem FRU exchange or swap. Go to step 12.
12	Did you exchange the failing Interface Adapter Card with a new FRU?	You have repaired the failure. Return all standard channel terminators and cables to their original locations. Follow the instructions on the screen to exit from the Cable Wrap Test. Go to END Repair on page END 001.
13	If not:	Obtain a new FRU for the failing Interface Adapter Card. Return the swapped cards to their original locations, and exchange the failing card by going to "Exchange of the Failing Interface Adapter Card" on page CHNL 033.

End Channel Problem Isolation Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
PU DIAGS	A	CHNL 051	End Channel Isolation

The purpose of this Repair Procedure is to restore the processor to its original condition before seeking assistance.

* ENTRY POINT A *

End Channel Isolation

The purpose of this procedure is to restore the Processing Unit to its original condition before invoking your support structure.

Warning: Damage will result if cards or modules are removed or installed with power ON.

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Record all of the information displayed on the screen.	
2. Ensure that the I/O Power Hold switch is set to I/O Power Hold.	
3. Press the Power Off key.	Power In Process indicator turns OFF.
4. Inspect the card or module being reinstalled for bent, broken, or dirty pins. Exchange or repair the card or module if any damage is found.	
5. Remove the last FRU exchanged and reinstall the original FRU.	
6. Press the Power On pushbutton on the service panel.	The Local Time/Date screen is displayed.
7. Key in the correct time and date, and press the ENTER key.	The Power Up/Down screen is displayed.
8. Key in UC, and press the ENTER key.	PROCESSOR STATUS: POWER IS ON is displayed. I/O STATUS: POWER IS ON is displayed.
9. Go to "Cable and Pin Checkout" on this page.	

Cable and Pin Checkout

The FRUs you have exchanged have not corrected the failure.

Use the pin location diagram in the Channel Service Aids in the AID section of Volume A06 to check for loose connectors or cables and bent or dirty pins on the channel with the failure. Run the failing procedure again to verify any repair action made.

Step	Condition	Instructions
1	Has the failure been corrected?	Go to "END Repair Procedure" on page END 001.
2	If not:	You are at a point where you need aid. Invoke your support structure for assistance with this failure. Go to "END Repair Procedure" on page END 001.

Metering Test Repair Procedure

ENTRY POINTS

From Repair Procedure	Entry Point	Page Number	Procedure Title
START	A	CHNL 061	Metering Test Repair Procedure

* ENTRY POINT A *

The purpose of this Repair Procedure is to find and repair any problem with the metering circuit in the processor or the interface cables attached to the processor tailgate.

An oscilloscope may be required to complete this procedure. You may want to delay maintenance as a convenience to the customer.

This procedure can be used to solve the following meter problems:

1. Meter is running all the time.
2. The meter is not running.

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Press the MODE SEL key.	The General Selection screen is displayed.
2. Key in QNORM, and press the ENTER key.	At this point all meters should be stopped.
3. Press the STOP key.	INSTR STOP is displayed.
4. Ensure that the CE Mode switch is set to CE Mode.	
5. Key in QOM, and press the ENTER key.	The system responds with the message SELECTION COMPLETE.
6. Key in QVC, and press the ENTER key.	The Insert/Extract screen is displayed. The state of all Channel BUS and TAG lines should be displayed.

Step	Condition	Instructions
1	Is SRVIN/DATIN field for any of the channels equal to 11, 01, or 10? Refer to Example of QVC screen.	Do the following: 1. Remove the channel tag cable at the tailgate, and install a standard tag terminator. 2. Key in QVC and press the enter key. 3. Go to step 3.
2	If not:	Go to step 5 on page CHNL 062.
3	Is SRVIN/DATIN field for the failing channel equal to 00? Refer to Example of QVC Screen.	Reinstall the cables and terminators to their original positions. Go to CHNL 001, Entry Point A.
4	If not:	It is possible that you may have a processing unit problem that is causing the metering problem. Go to CHNL 001, Entry Point A.

EXAMPLE OF QVC SCREEN

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*INSERT/EXTRACT* CHANNEL INTERFACE (QVC1-3)                                FIELDS 01-07
S STATUS RING      0 1 2 3 4 5      CHANNEL      6 7 8 9 A B
K SYSTEM CHECKS   1 1 1 1 1 1      OPOUT       1 1 1 1 1 1
I PU HARDWARE     0 0 0 0 0 0      SELOUT      0 0 0 0 0 0
B CS HARDWARE     0 0 0 0 0 0      ADROUT      0 0 0 0 0 0
M MS HARDWARE     0 0 0 0 0 0      CMDOUT      0 0 0 0 0 0
H CHNL HARDWARE   00 00 00 00 00 00  SRVOUT/DATOUT 00 00 00 00 00 00
C CHNL HARDWARE   0 0 0 0 0 0      SUPROUT     0 0 0 0 0 0
X EXTERNAL REGS   00 00 00 00 00 00  NPLBOUT     00 00 00 00 00 00
R SCAN RING
L LOG DSPL MODE   0 0 0 0 0 0      OPIN        0 0 0 0 0 0
N CLK IGNORE MDE  0 0 0 0 0 0      SELIN       0 0 0 0 0 0
T ADDRESS XLATE   0 0 0 0 0 0      ADRIN       0 0 0 0 0 0
G SET CSAR        0 0 0 0 0 0      STATIN      0 0 0 0 0 0
W MAINT COMMAND   00 00 00 00 00 00  SRVIN/DATIN 00 00 00 00 00 00
D DSPL BUFR SW    0 0 0 0 0 0      REQIN       0 0 0 0 0 0
A ARRAY SELECT    0 0 0 0 0 0      MARKIN      0 0 0 0 0 0
Q GENERAL SELECT  0 0 0 0 0 0      DISCIN      0 0 0 0 0 0
Z PROG SYSTEM     00 00 00 00 00 00  NPLBIN      00 00 00 00 00 00
COMMAND: QVC1
    
```


Step	Condition	Instructions
5	Scope 01AA3-A4D02 (scope point N on Figure 1). Is the signal equal to +5V?	Go to step 18.
6	Scope 01AA3-A4B02 (scope point C on Figure 1). Is the signal equal to -1.2V?	Go to step 25.
7	Scope 01AA2-X2U09 (Figure 1). Is the signal equal to +4V?	Go to step 14.
8	Scope the +NPL MTR OUT pins (scope point O on Figure 1). Are all the Adapter card output pins at a level equal to ground?	Go to "Activate MTR OUT Lines" on page CHNL 065.
9	If not:	Using the "FRU Exchange" procedure on page CHNL 070, swap the Channel Adapter card that has 4 volts at +NPL MTR OUT with one that has ground. Go to step 10.
10	Scoping the same pin location, is the signal equal to ground?	Using the "FRU Exchange" procedure on page CHNL 070, exchange the card you just moved with a new one from supplies. Go to step 16.
11	If not:	Disconnect the Interface Cables for the channel with the problem. Go to step 12.
12	Scoping the same pin location, is the signal equal to ground?	The problem is in one of the control units or cables attached to the interface. You will have to use the maintenance package for the failing control unit.
13	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended actions:</p> <ol style="list-style-type: none"> Reinstall all disconnected bus and tag cables. Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>
14	Scope 01AA3-K2D12 (Figure 1). Is the signal equal to ground?	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad cable or bad board. <p>Recommended actions:</p> <ol style="list-style-type: none"> Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>
15	If not:	Using the "FRU Exchange" procedure on page CHNL 070, swap the Channel Adapter card that has 4 volts at +NPL MTR OUT with one that has ground. Go to step 10.

Step	Condition	Instructions
16	Scope (scope point O on Figure 1). Do all the Adapter card output pins equal ground?	You have exchanged the failing card. Go to "END Repair Procedure" on page END 001.
17	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended action:</p> <ol style="list-style-type: none"> Invoke your support structure. <p>Go to "END Repair" on page END 001.</p>

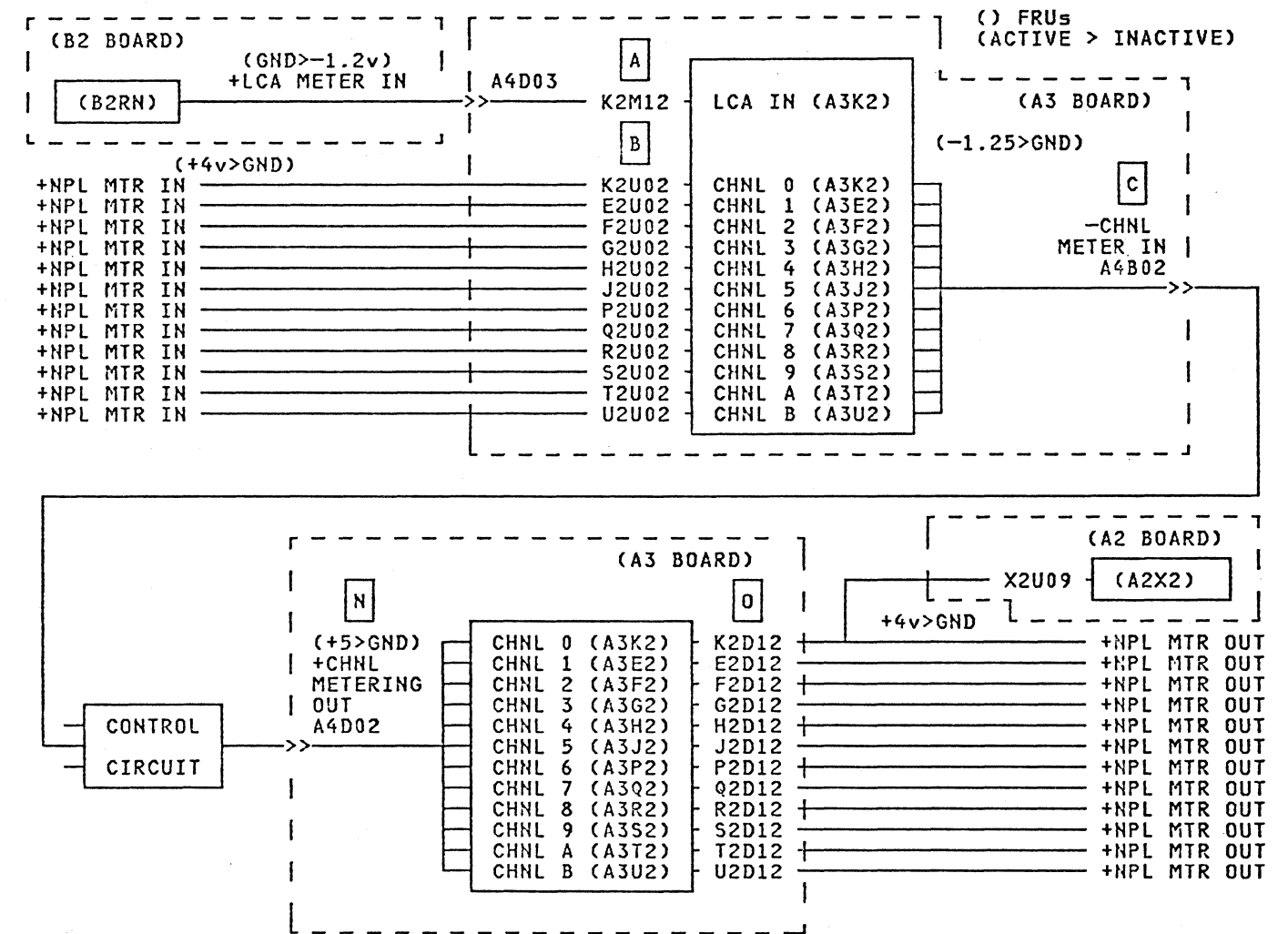


Figure 1. I/O Metering Circuit (Part 1 of 7)

Step	Condition	Instructions
18	Scope 01AA2-T2S04 (scope point J on Figure 2). Is the signal equal to +4V?	Using the "FRU Exchange" procedure on page CHNL 070, exchange the A2T2 card. Go to step 23.
19	Scope 01AA2-U2G05 (scope point I on Figure 2). Is the signal equal to ground?	Using the "FRU Exchange" procedure on page CHNL 070, exchange the A2U2 card. Go to step 23.
20	If not:	Using the "FRU Exchange" procedure on page CHNL 070, exchange the B2MJ module. Go to step 21.
21	Scope 01AA2-U2G05 (scope point I on Figure 2). Is the signal equal to ground?	You have removed the failing card. Go to "END Repair Procedure" on page END 001.
22	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad module from supply, bad cable, or bad board. <p>Recommended action:</p> <ol style="list-style-type: none"> Invoke your support structure. <p>Go to "END Repair" on page END 001.</p>
23	Scope 01AA2-T2S03 (Figure 2). Is the signal equal to ground?	You have removed the failing card. Go to "END Repair Procedure" on page END 001.
24	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended action:</p> <ol style="list-style-type: none"> Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>
25	Scope 01AA3-K2M12 (scope point A on Figure 2). Is the signal equal to ground?	Go to "LCA METER IN Test" on page CHNL 068.
26	Scope (scope point B on Figure 2). Are any of the +NPL Meter In lines at +4V?	Remove the Channel TAG Cable that has 4 volts on the Channel Meter In line. Go to step 31.
27	If not:	<p>All the channel interface Meter In lines are at ground. The problem is in one of the Adapter cards. Do the following:</p> <ol style="list-style-type: none"> Using the "FRU Exchange" procedure on page CHNL 070, remove one Channel Adapter card at a time. Go to step 28.
28	Scope 01AA3-A4B02 (scope point C on Figure 2). Is the signal equal to ground?	Using the "FRU Exchange" procedure on page CHNL 070, swap the Channel Adapter card that has 4 volts at +NPL MTR OUT with one that has ground. Go to step 33.

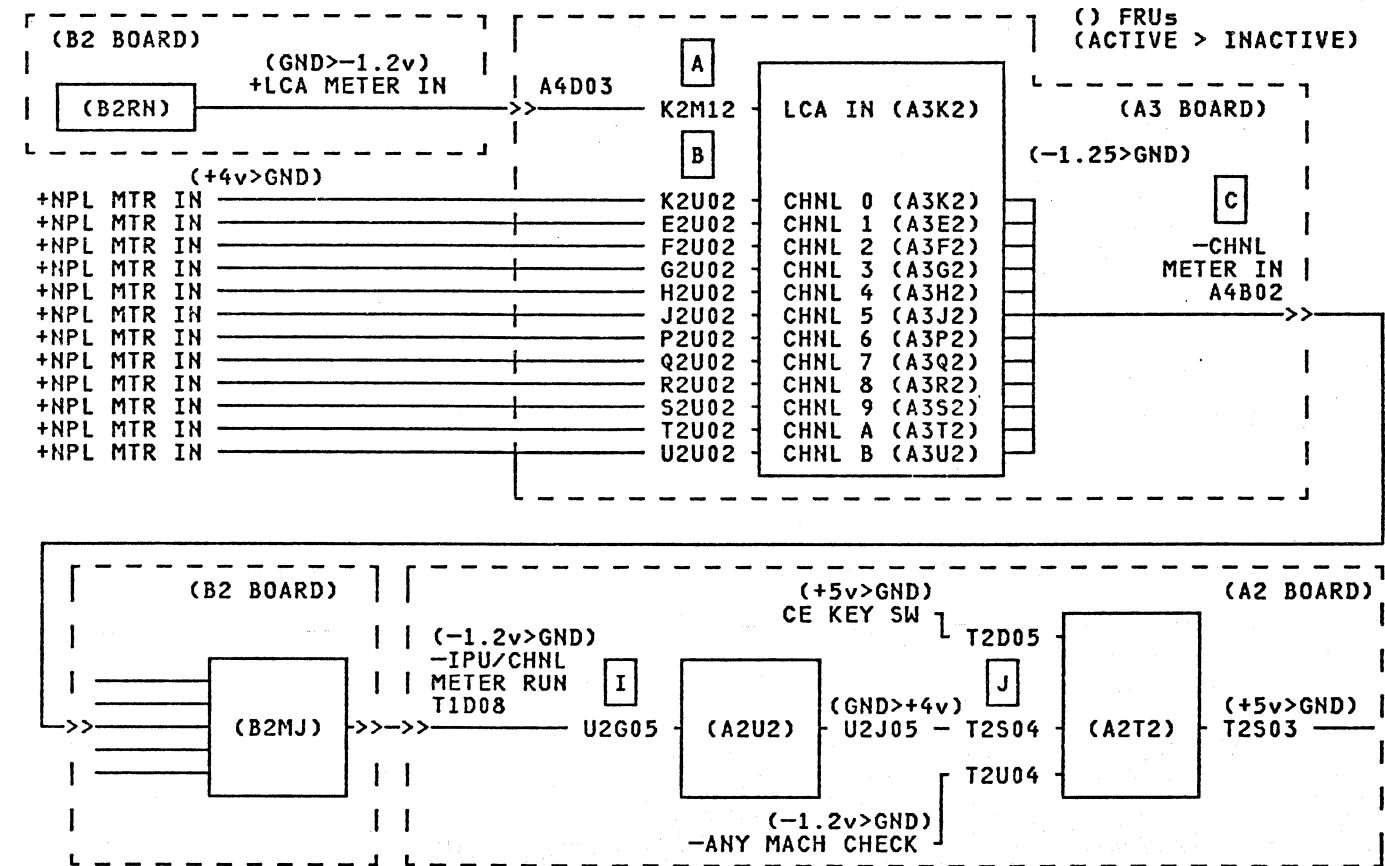


Figure 2. I/O Metering Circuit (Part 2 of 7)

Step	Condition	Instructions
29	Have all the Channels been tested?	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad cable or bad board. <p>Recommended actions:</p> <ol style="list-style-type: none"> Reinstall all adapter cards using the "FRU Exchange" procedure on page CHNL 070. Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>
30	If not:	Using the "FRU Exchange" procedure, on page CHNL 070, remove the next Channel Adapter card. Go to step 28.
31	Scope 01AA3-A4B02 (scope point C on Figure 3). Is the signal equal to ground?	The problem is in one of the control unit or cables attached to the interface. You will have to use the maintenance strategy for servicing the Standard 370 Interface.
32	If not:	The problem is in the processor. Using the "FRU Exchange" procedure on page CHNL 070, remove one Channel Adapter card at a time. Go to step 28.
33	Scope 01AA3-A4B02 (scope point C on Figure 3). Is the signal equal to ground?	You have removed the failing card. Using the "FRU Exchange" procedure on page CHNL 070, exchange the failing card with a new part. Then go to "END Repair Procedure" on page END 001.
34	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended actions:</p> <ol style="list-style-type: none"> Reinstall all adapter cards using the "FRU Exchange" procedure on page CHNL 070. Reinstall all disconnected bus and tag cables. Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>

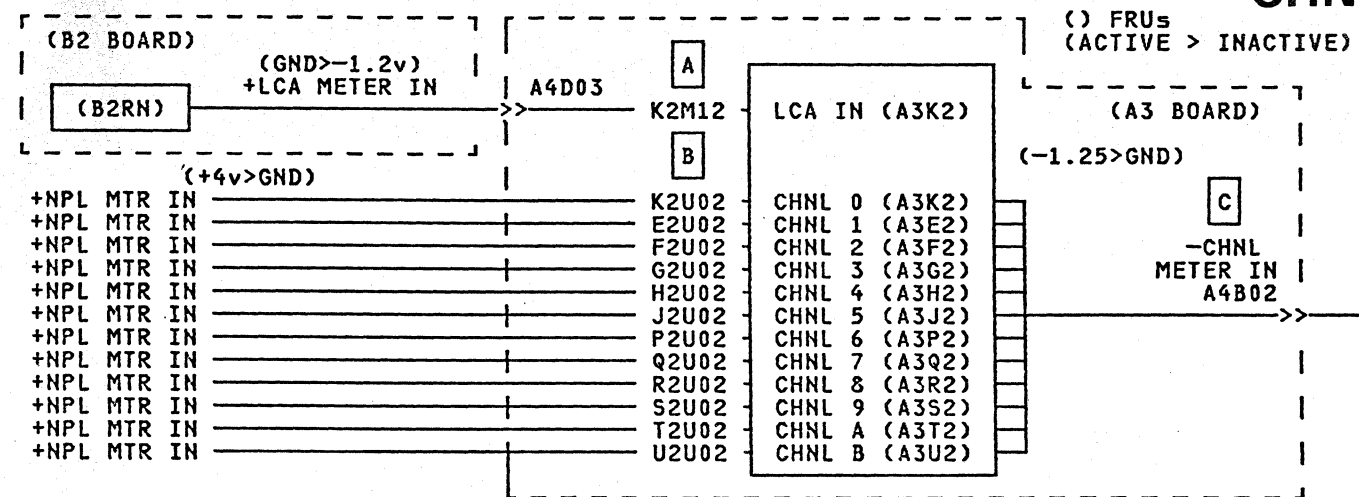


Figure 3. I/O Metering Circuit (Part 3 of 7)

Activate MTR OUT Lines

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the FUNC1 diskette is installed in diskette drive 1.	
2. Press the MODE SEL key.	The General Selection screen is displayed.
3. Key in QLM, and press the ENTER key.	Processor IML begins. Wait until IML COMPLETE is displayed.
4. Key in QDM0, and press the ENTER key.	The Alter/Display screen is displayed.
5. At location 0000, key in 47F0 0000 and press the ENTER key.	Memory location 0000 changes to 47F0 0000.
6. Press the START key.	System status of OPERATING is displayed.

Step	Condition	Instructions
40	Scope 01AA2-T1D08 (scope point H on Figure 4). Is the signal equal to -1.2V?	Possible causes: 1. Bad cable, or bad board. Recommended action: 1. Invoke your support structure. Go to "END Repair" on page END 001.
41	If not:	Using the "FRU Exchange" procedure on page CHNL 070, exchange the B2MJ module. Go to step 49.
42	Scope 01AA3-K2D12 (Figure 4). Is the signal equal to +4V?	Possible causes: 1. Bad cable or bad board. Recommended action: 1. Invoke your support structure. Go to "END Repair" on page END 001.
43	If not:	Go to step 36.

Step	Condition	Instructions
35	Scope 01AA2-X2U09 (scope point P on Figure 4). Is the signal equal to ground?	Go to step 42.
36	Scope (scope point O on Figure 4). Are all the adapter card Meter Out outputs at 4V?	Starting with Channel 0, swap the standard terminator with the TAG Wrap terminator (part 8483773). Go to step 51.
37	Is only one of the adapter card Meter Out outputs at ground?	Go to "Card Swap to Isolate Failure" on page CHNL 069.
38	Scope 01AA3-A4D02 (scope point N on Figure 4). Is the signal equal to +5V?	Possible causes: 1. Bad cable or bad board. Recommended action: 1. Invoke your support structure. Go to "END Repair" on page END 001.
39	Scope 01AA2-U2G05 (scope point I on Figure 4). Is the signal equal to -1.2V?	Go to step 44.

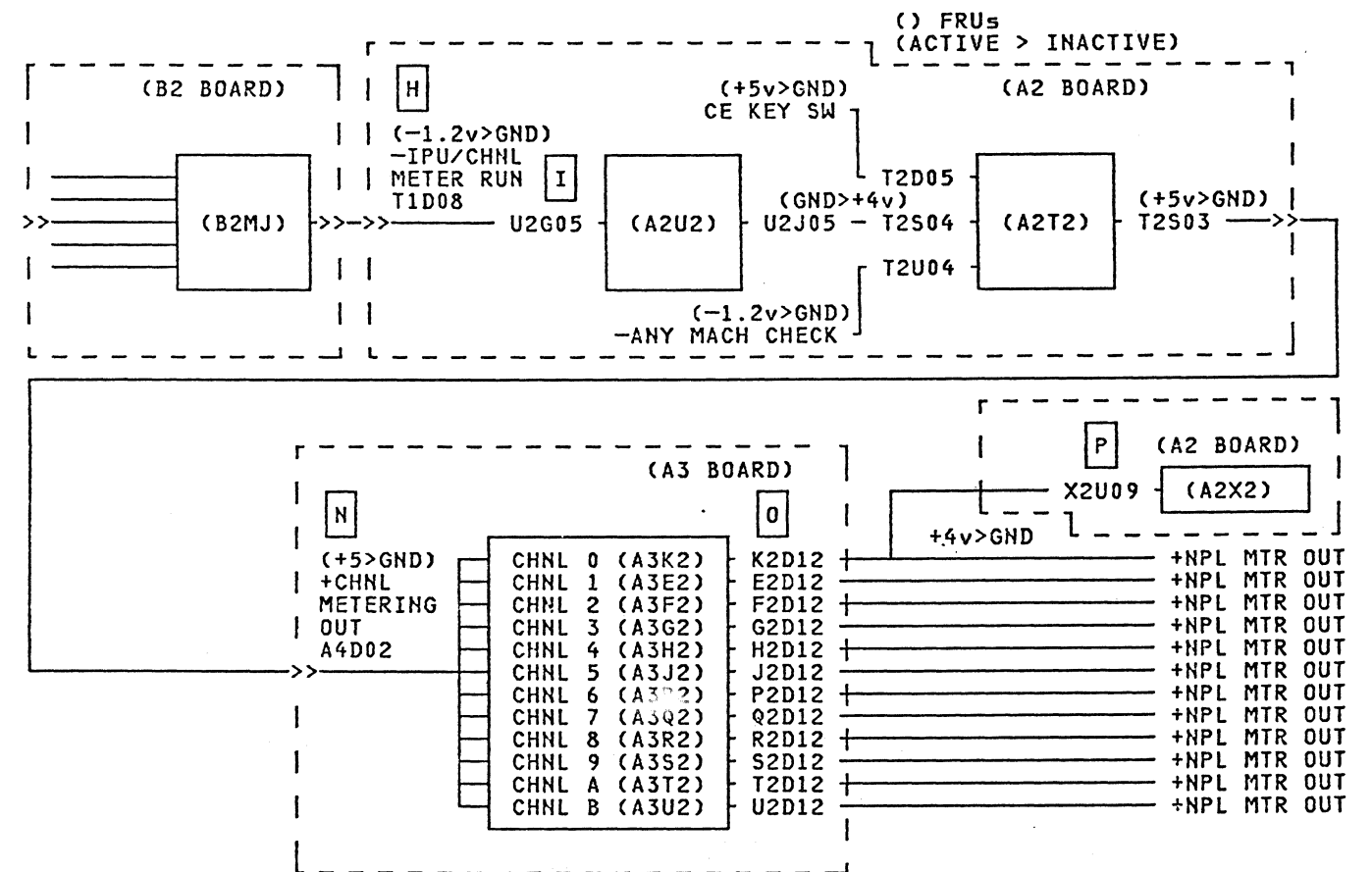


Figure 4. I/O Metering Circuit (Part 4 of 7)

Step	Condition	Instructions
44	Scope 01AA2-T2U04 (Figure 5). Is the signal equal to ground?	The inactive level of -ANY MACH CHECK is missing (Figure 6). You are at a point where you need aid. Go to "END Repair Procedure" on page END 001.
45	Scope 01AA2-T2D05 (Figure 5). Is the signal equal to ground?	Using the "FRU Exchange" procedure on page CHNL 070, exchange the A2T2 card. Go to step 47.
46	If not:	With the CE KEY SW signal at +5 volts, the +METERING OUT line is disabled. Go to Logic Pages YA 281 and YA 274 in Volume C01 for Service Panel CE Key Sw circuit.
47	Scope 01AA2-T2S03 (scope point K on Figure 5). Is the signal equal to +5V?	You have exchanged the failing card. Go to "END Repair Procedure" on page END 001.
48	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended action:</p> <ol style="list-style-type: none"> Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>
49	Scope 01AA2-U2G05 (scope point I on Figure 5). Is the signal equal to -1.2V?	You have exchanged the failing card. Go to "END Repair Procedure" on page END 001.
50	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad module from supply, bad cable, or bad board. <p>Recommended action:</p> <ol style="list-style-type: none"> Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>
51	Scope 01AA3-A4B02 (scope point C on Figure 5). Is the signal equal to -1.2V?	Go to step 54.
52	Scope (scope point B on Figure 5), for the channel being checked. Is the signal equal to +4V?	The adapter card for the channel just checked is failing. Install a new card using the "FRU Exchange" procedure on page CHNL 070. Go to step 56.
53	If not:	The problem is in one of the control units or cables attached to the interface. You will have to use the maintenance philosophy for servicing the Standard 370 Interface. Go to "END Repair Procedure" on page END 001.
54	Have all channels on the interface been checked?	Go to "DATA and SERVICE IN Test" on page CHNL 067.

Step	Condition	Instructions
55	If not:	Reinstall the standard terminator to the checked channel. Exchange the standard terminator with the TAG Wrap terminator on the next channel to be checked. Go to step 51.
56	Scope 01AA3-A4B02 (scope point C on Figure 5). Is the signal equal to -1.2V?	You have exchanged the failing card. Go to "END Repair Procedure" on page END 001.
57	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended actions:</p> <ol style="list-style-type: none"> Reinstall all the Channel Tag cables that were disconnected. Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>

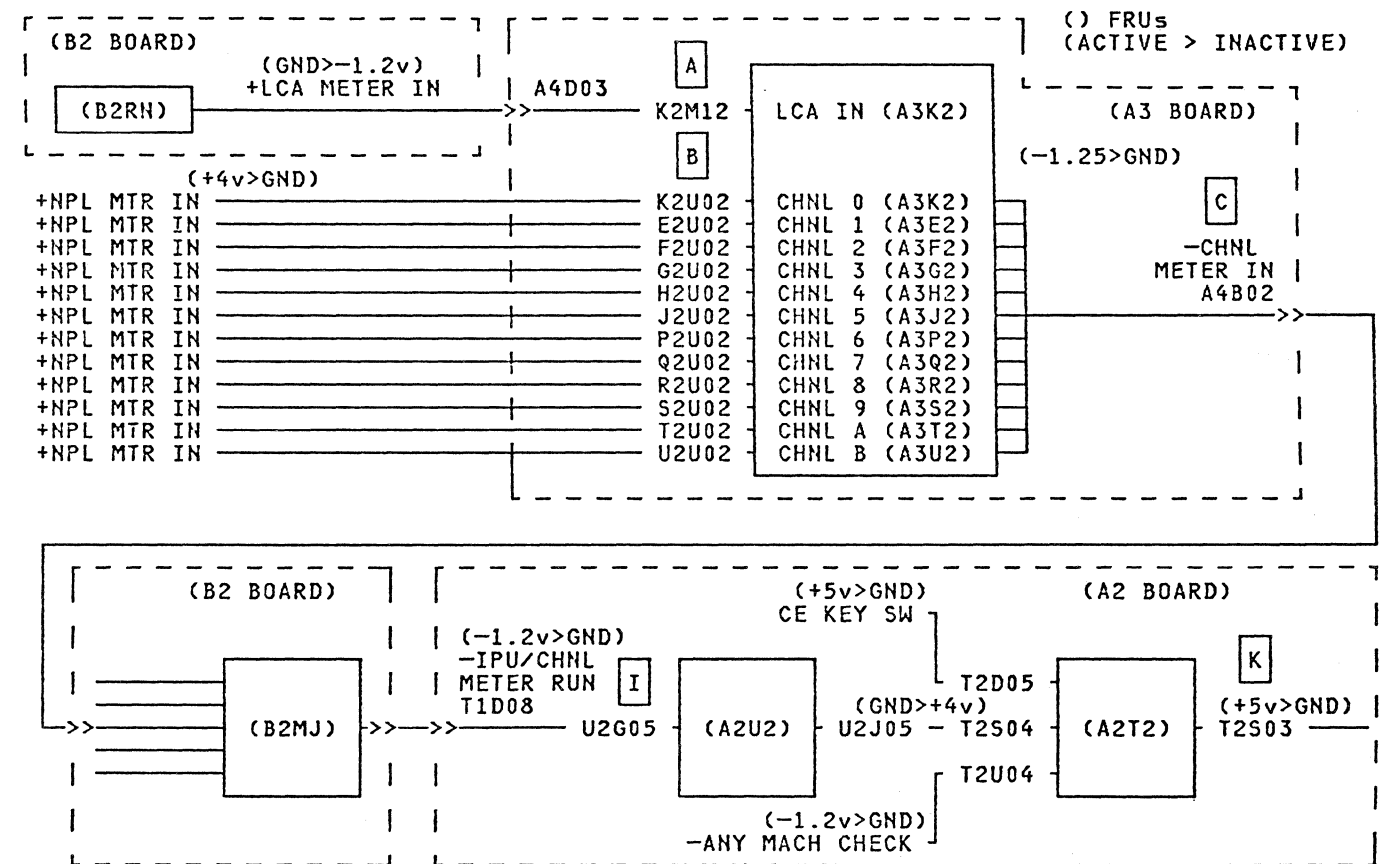


Figure 5. I/O Metering Circuit (Part 5 of 7)

DATA and SERVICE IN Test

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the FUNC1 diskette is installed in diskette drive 1.	
2. Ensure that the DIAG1 diskette is installed in diskette drive 2.	
3. Ensure that the CE Mode switch is set to CE Mode.	
4. Press the MODE SEL key.	The General Selection screen is displayed.
5. Key in G, and press the ENTER key.	The Diagnostic Mode PU Diagnostic Selection screen is displayed.
6. Key in C, and press the ENTER key.	Channel tests are loaded; then the Special Channel Tests Selection screen is displayed.
7. Install the Wrap Terminators at the tailgate for the failing channel.	
8. Key in 02, and press the ENTER key.	Instructions are displayed on the screen.
9. Follow the displayed instructions to loop with Errors Disabled (Option D) on the failing channel.	

Step	Condition	Instructions
58	Scope 01AA3-A4B02 (scope point C on Figure 6). Is the signal equal to ground?	Using the "FRU Exchange" procedure on page CHNL 070, exchange the channel card for the failing channel. Go to step 61.
59	Have all of the channels been tested?	Key in R, and press the ENTER key. Go to "LCA METER IN Test" on page CHNL 068.
60	If not:	Do the following: 1. Move the Wrap Terminator to the next channel. Go to step 58.
61	Scope 01AA3-A4B02(scope point C on Figure 6). Is the signal equal to -1.2V?	You have exchanged the failing card. Go to "END Repair Procedure" on page END 001.

Step	Condition	Instructions
62	If not:	Possible causes: 1. Bad card from supply, bad cable, or bad board. Recommended actions: 1. Key in R, and press the ENTER key. 2. Reinstall all disconnected bus and tag cables. 3. Invoke your support structure. Go to "END Repair Procedure" on page END 001.

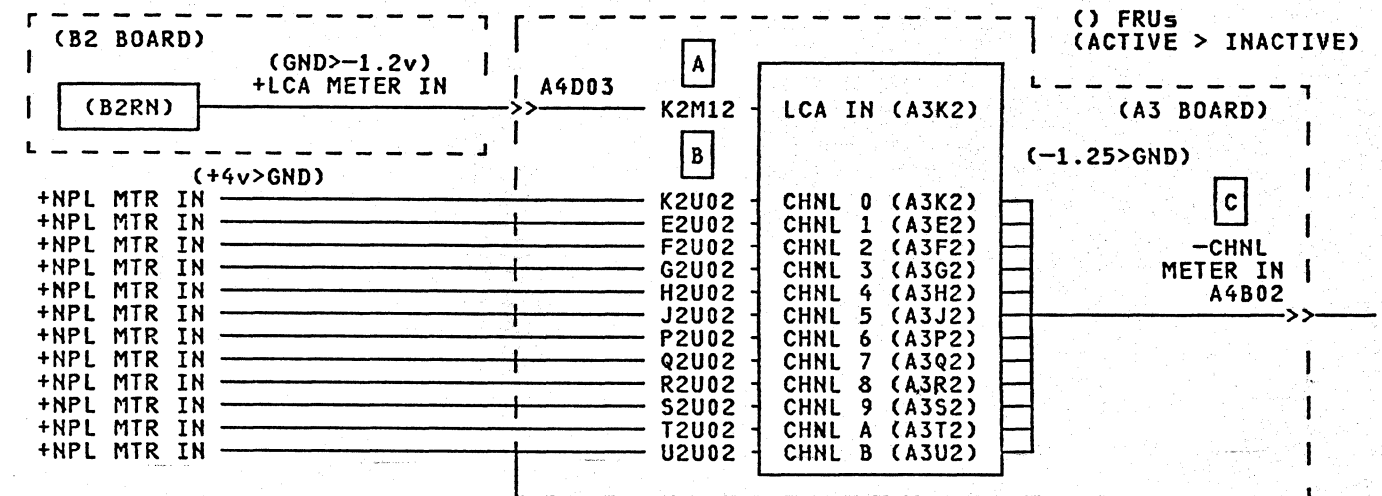


Figure 6. I/O Metering Circuit (Part 6 of 7)

LCA METER IN Test

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

- | Required Actions | Expected Results |
|---|--|
| 1. Press the STOP key. | |
| 2. Press the MODE SEL key. | The General Selection screen is displayed. |
| 3. Key in QOM, and press the ENTER key. | |
| 4. Key in QVH014=20, and press the ENTER key. | |
| 5. Go to step 63. | |

Step	Condition	Instructions
63	Scope 01AA3-A4B02. Is the signal equal to -1.25V?	Go to "End LCA METER IN Test" on this page.
64	Scope 01AA3-K2M12. Is the signal equal to ground?	Using the "FRU Exchange" procedure on page CHNL 070, exchange the A3K2 card. Go to step 67.
65	Scope 01AA3-A4D03. Is the signal equal to ground?	Possible causes: 1. Bad cable or bad board. Recommended action: 1. Invoke your support structure. Go to "END Repair Procedure" on page END 001.
66	If not:	Using the "FRU Exchange" procedure on page CHNL 070, exchange the B2RN module. Go to step 67.
67	Scope 01AA3-A4B02. Is the signal equal to -1.2V?	Go to "END Repair Procedure" on page END 001.
68	If not:	Possible causes: 1. Bad card from supply, bad cable, or bad board. Recommended action: 1. Invoke your support structure. Go to "END Repair Procedure" on page END 001.

End LCA METER IN Test

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

- | Required Actions | Expected Results |
|---|--|
| 1. Press the STOP key. | |
| 2. Press the MODE SEL key. | The General Selection screen is displayed. |
| 3. Key in QOM, and press the ENTER key. | |
| 4. Key in QVH014=00, and press the ENTER key. | |
| 5. Go to step 69. | |

Step	Condition	Instructions
69	Scope 01AA3-A4B02. Is the signal equal to ground?	No trouble was found, or the problem may be intermittent. Go to "END Repair Procedure" on page END 001.
70	Scope 01AA3-K2M12. Is the signal equal to -1.2V?	Using the "FRU Exchange" procedure on page CHNL 070, exchange the A3K2 card. Go to step 73.
71	Scope 01AA3-A4D03. Is the signal equal to -1.2V?	Possible causes: 1. Bad cable or bad board. Recommended action: 1. Invoke your support structure. Go to "END Repair Procedure" on page END 001.
72	If not:	Using the "FRU Exchange" procedure on page CHNL 070, exchange the B2RN module. Go to step 73.
73	Scope 01AA3-A4B02. Is the signal equal to ground?	Go to "END Repair Procedure" on page END 001.
74	If not:	Possible causes: 1. Bad module from supply, bad cable, or bad board. Recommended action: 1. Invoke your support structure. Go to "END Repair Procedure" on page END 001.

Card Swap to Isolate Failure

Note: If the following **Required Actions** do not produce the **Expected Results**, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Using the "FRU Exchange" procedure on page CHNL 070, swap the Channel Adapter card that has 4 volts at the Meter Out output with one that has ground output.	
2. Ensure that the FUNC1 diskette is installed in diskette drive 1.	
3. Press the MODE SEL key.	The General Selection screen is displayed.
4. Key in QLM, and press the ENTER key.	Processor IML begins. Wait until IML COMPLETE is displayed.
5. Key in QDMO, and press the ENTER key.	The Alter/Display screen is displayed.
6. At location 0000, key in 47F0 0000 and press the ENTER key.	Memory location 0000 changes to 47F0 0000.
7. Press the START key.	System status of OPERATING is displayed.

Step	Condition	Instructions
79	Scope (scope point O on Figure 7) of the new Adapter card. Is the signal equal to +4.0V?	You have exchanged the failing card. Go to "END Repair Procedure" on page END 001.
80	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended actions:</p> <ol style="list-style-type: none"> Reinstall all disconnected bus and tag cables. Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>

Step	Condition	Instructions
75	Scoping the same pin location, is the signal equal to +4V?	The card you just moved was failing. Using the "FRU Exchange" procedure on page CHNL 070, install a new card from supplies. Go to step 79.
76	If not:	Disconnect the Interface Cables for the channel with the problem. Go to step 77.
77	Scoping the same pin location, is the signal equal to +4V?	The problem is in one of the control units or cables attached to the interface. You will have to use the maintenance strategy for the failing control unit. Go to "END Repair Procedure" on page END 001.
78	If not:	<p>Possible causes:</p> <ol style="list-style-type: none"> Bad card from supply, bad cable, or bad board. <p>Recommended actions:</p> <ol style="list-style-type: none"> Reinstall all disconnected bus and tag cables. Invoke your support structure. <p>Go to "END Repair Procedure" on page END 001.</p>

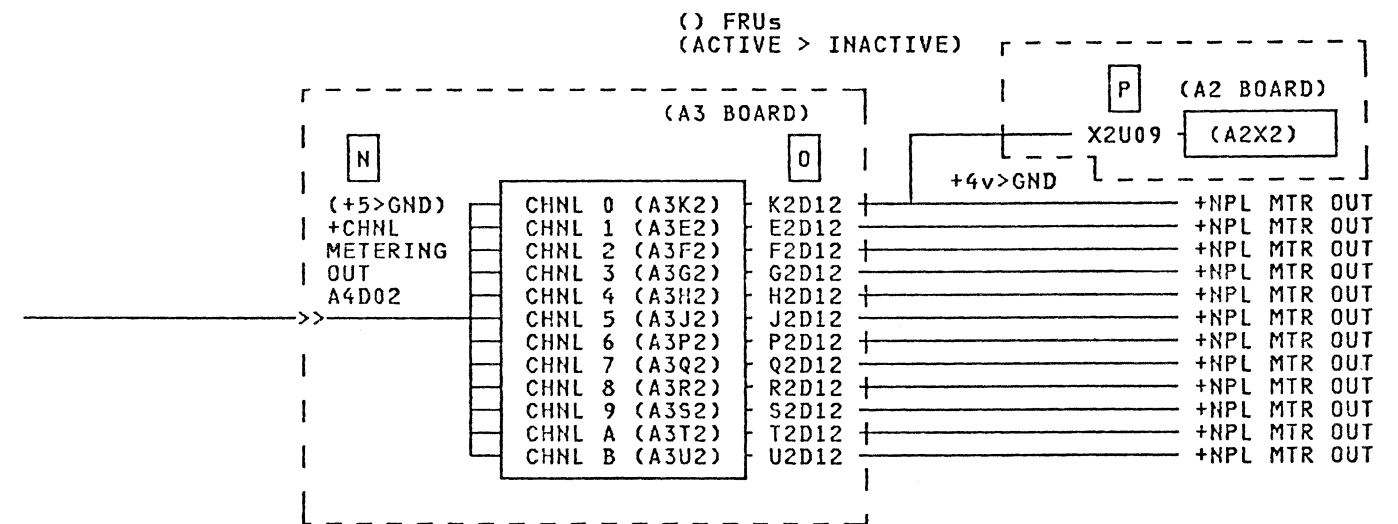


Figure 7. I/O Metering Circuit (Part 7 of 7)

FRU Exchange

Warning: Damage will result if cards or modules are removed or installed with power ON. For more information on FRU removal and exchange, refer to Volume A07, Removals and Replacements.

Note: If the following Required Actions do not produce the Expected Results, go to "START Repair Procedure" on page START 001 with the new symptom.

Required Actions	Expected Results
1. Ensure that the CE Mode switch is set to CE Mode.	
2. Ensure that the I/O Power Hold switch is set to I/O Power Hold.	
3. Press the Power Off key.	Power In Process indicator turns OFF.
4. Remove the required FRU(s).	
5. Inspect the card or module being installed for bent, broken, or dirty pins. Exchange or repair the card or module if any damage is found.	
6. Install the required FRU(s).	
7. Press the Power On pushbutton on the service panel.	The Local Time/Date screen is displayed.
8. Key in the correct time and date,, and press the ENTER key.	The Power Up/Down screen is displayed.
9. Key in UC, and press the ENTER key.	PROCESSOR STATUS: POWER IS ON is displayed. I/O STATUS: POWER IS ON is displayed.
10. Ensure that the CE Mode switch is set as required.	
11. Ensure that the required diskettes are installed.	
12. Ensure that the machine is in the required state and that the required program loops are running before returning to the procedure from which you came.	

*** End of FRU Exchange Procedure ***

Seq AG105	PN 0445765 Pg 2 of 2	EC A02214 15 Sep 83				
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MSS Repair Procedure

Start all MSS Repair actions here. You have one of the following:

- Reference code
- MSS code stop
- SP message
- MSS FRUs to be installed
- RSF failure.

Read the **Condition** column until you find a description that matches the condition you have. Then follow the instructions in the **Instructions** column.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	1. Write down your <i>original</i> symptom. 2. Go to step 2.	
2	Did you come here from an MSS diagnostic screen after exchanging all FRUs without fixing the problem?	Go to "Adapter Isolation" on page MSS 015.	You have an MSS diagnostic reference code of FxxxxxF8.
3	Do you have a reference code with a UU field of EC?	Go to "UU = EC" on page MSS 040.	Reference codes have a format of UU RRRR IS.
4	Do you have a reference code with a UU field of ED?	Go to "UU = ED" on page MSS 041.	Reference codes have a format of UU RRRR IS.
5	Do you have a reference code with a UU field of FD?	Go to "UU = FD" on page MSS 039.	Reference codes have a format of UU RRRR IS.
6	Go to the Instructions column.	1. Set the Power Off switch on the service panel to Power Off. 2. Wait for power off to complete. The service panel display is 00000. 3. Install DIAG1 in diskette drive 1 and remove FUNC2 from diskette drive 2. 4. Set the Power Off switch to Normal and press Power On. MSS Basic and Extended diagnostics run. 5. Go to step 7.	
7	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	Go to step 10.	
8	Do you have a diagnostic error stop with a reference code displayed?	If you have a reference code of F5xxxxx displayed, go to "Console Diskette Errors" on page MSS 051. For any other reference code, follow the instructions on the system console.	The MSS diagnostic screens guide you in the repair.

Step	Condition	Instructions	Comments
9	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.
10	Go to the Instructions column.	Test diskette drive 1 as follows: 1. Key in A0 and press ENTER. 2. Key in 1 to select drive 1. 3. Press ENTER. The diskette drive diagnostics are run on diskette drive 1. 4. Go to step 11.	
11	Did diagnostic option A0 run on diskette drive 1 without errors?	Go to step 14.	
12	Do you have a diagnostic error stop with a reference code displayed?	If you have a reference code of F5xxxxx displayed, go to "Console Diskette Errors" on page MSS 051. For any other reference code, follow the instructions on the system console.	
13	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	
14	Go to the Instructions column.	Test diskette drive 2 as follows: 1. Key in A0 and press ENTER. 2. Insert DIAG1 in diskette drive 2. 3. Key in 2 to select diskette drive 2. 4. Press ENTER. The diskette drive diagnostics are run on diskette drive 2. 5. Go to step 15.	
15	Did diagnostic option A0 run on diskette drive 2 without errors?	Go to step 18.	
16	Do you have a diagnostic error stop with a reference code displayed?	If you have a reference code of F5xxxxx displayed, go to "Console Diskette Errors" on page MSS 051. For any other reference code, follow the instructions on the system console.	
17	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	

Seq AH015	PN 0445767 Pg 1 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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Step	Condition	Instructions	Comments
18	Go to the Instructions column.	Test the device cluster adapter (DCA) as follows: 1. Insert DIAG1 in diskette drive 1. 2. Key in G and press ENTER. The Optional MSS Diagnostic Selection screen is displayed. 3. Key in CE and press ENTER. The DCA diagnostics are run. 4. Go to step 19.	Note: Diagnostic reference code F8Cx03F8 is a normal stop if there is no terminal on port x or if the terminal on port x is not powered on and ready. To continue testing the rest of the DCA, key in G and press ENTER.
19	Did diagnostic option CE run without errors?	Go to step 22.	
20	Do you have a diagnostic error stop with a reference code displayed?	Follow the directions on the system console.	The MSS diagnostic screens guide you in the repair.
21	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.
22	Go to the Instructions column.	Test the remote support facility (RSF) adapter as follows: 1. Key in D0 and press ENTER. The RSF diagnostics are run. 2. Go to step 23.	
23	Did diagnostic option D0 run without errors?	Go to step 26.	
24	Do you have a diagnostic error stop with a reference code displayed?	Follow the directions on the system console.	
25	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.
26	Do you have a machine without the EIA interface feature?	You do not have a diagnostic failure. Use your original symptom to find the problem. Go to step 31.	
27	Go to the Instructions column.	Test the EIA interface as follows: 1. Install the wrap plug on the end of your EIA interface cable. 2. Select diagnostic option E0 and press ENTER. The EIA diagnostics are run. 3. Go to step 28.	

Step	Condition	Instructions	Comments
28	Did diagnostic option E0 run without errors?	You do not have a diagnostic failure. Use your original symptom to find the problem. Go to step 31.	
29	Do you have a diagnostic error stop with a reference code displayed?	Follow the directions on the system console.	
30	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.
31	Was your original symptom either a five-digit MSS Code displayed on the service panel or a basic check?	Go to "Functional Code Stop" on page MSS 014.	Digits are displayed or are changing in all five of the display positions on the service panel.
32	Did you have an RSF problem? (Example: fails to transmit, does not initialize.)	Go to "UU = FE" on page MSS 034.	
33	Did you have the message SERIAL NO. DOES NOT MATCH or a reference code of F61801FA?	Go to "Serial Number Match" on page MSS 037.	
34	Did you have a console message indicating an MSS problem? (Example: DISKETTE DRIVE 1 NOT READY.)	Go to "MSS Reference Code Index" on page MSS 031.	
35	Did you have a reference code (Fxxxxxx) indicating an MSS problem?	Go to "MSS Reference Code Index" on page MSS 031.	
36	Did the PA option screen fail to display on page START 001?	Go to the <i>Problem Determination Guide</i> for your system console.	
37	Go to the Instructions column.	You do not have a diagnostic failure or a symptom related to the MSS. Go back to page START 001.	

MSS Code Stop

You had a five-digit MSS Code displayed on the service panel while MSS diagnostics were running.

Notes:

1. All the digits of the display are not stable if the MSS microcode is in a loop.
2. If 'x' is specified as part of an MSS Code, that position could be any hex digit (0-9, A-F) or could be constantly changing.

Read the **Condition** column until you find a question you can answer "yes" or a description that matches the condition you have. Then follow the instructions in the **Instruction** column.

Step	Condition	Instructions	Comments
1	Do you have an MSS Code of 0Exxx or 0Fxxx?	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange 01A-A2 H2. 3. Ensure DIAG1 is installed in diskette drive 1. 4. Set the Power Off switch to Normal, and press Power On. The MSS Basic and Extended diagnostics run. 5. Go to step 9. 	<p>These MSS Codes indicate a controller problem.</p> <p>Note: MSS Code 0E06x can be caused by a DIAG1 diskette problem or a diskette hardware error.</p>
2	Do you have an MSS Code of 80011, 80012, 80013, 80014, 80015, 80016, 81513, or 81523?	Go to "Adapter Isolation" on page MSS 015.	These MSS Codes indicate a bit on the controller bus is always on or off. Since the bus is common to the controller and all adapters, this could be either a controller or an adapter problem.
3	Do you have an MSS Code of 83502 or 83503?	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange 01A-A2 H2. 3. Ensure DIAG1 is installed in diskette drive 1. 4. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics run. 5. Go to step 9. 	This MSS Code indicates a problem in the first 32K bytes of SP storage.
4	Do you have an MSS Code of 815xx, 818xx, 81Fxx, or 835xx?	Go to "Console Diskette Errors" on page MSS 051.	These MSS Codes indicate a problem with the Diskette Drive Adapter (DDA).

Step	Condition	Instructions	Comments
5	Do you have an MSS Code of 88xxx or 89xxx?	<p>Check for the following:</p> <ol style="list-style-type: none"> 1. The system console is powered on. 2. The system console Normal/Test switch is set to Normal. 3. Go to step 16. 	These MSS codes indicate a problem with the Device Cluster Adapter (DCA).
6	Do you have an MSS Code that does not change but has a combination of hex characters that are mainly the character F? (For example: BFFFF, F0FF0, FFFEF.)	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange 01A-A2 H2. 3. Ensure DIAG1 is installed in diskette drive 1. 4. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics run. 5. Go to step 8. 	MSS Code FFFFF or combinations that are mainly F indicate that the support processor is held reset.
7	You have some other MSS Code.	<ol style="list-style-type: none"> 1. Check the service panel for valid displays as follows: <ol style="list-style-type: none"> a. Set the Power Off switch on the service panel to Power Off. The display should return to 00000. b. Set the Power Off switch to Normal and press Power On. c. Wait 2 seconds, and set the Power Off switch to Power Off again. d. The display should be FFFFF for about 1.5 seconds and then return to 00000 a few seconds after power off. 2. If the display is not correct, go to Volume A02, "Hex Display" on page PR 381. 3. If the display is correct: <ol style="list-style-type: none"> a. Exchange 01A-A2 H2 and G4. b. Ensure DIAG1 is installed in diskette drive 1. c. Set the Power Off switch to Normal and press Power On. d. Go to step 9. 	<p>Your controller is in a microcode loop, an uncontrolled runaway, or cannot communicate with the DCA.</p> <p>Ensure the Security Keylock (if you have one) in your system console is on and the Brightness Control is not set too low.</p>
8	Is an MSS Code mainly of the character F still displayed?	<p>Reinstall any FRUs you exchanged.</p> <p>Go to Volume A02, "MBC Reset" on page PR 431.</p>	The FRU you replaced did not fix the problem.

Seq AH025	PN 0445768 Pg 1 of 2	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84	
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Step	Condition	Instructions	Comments
9	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	Run the following MSS optional diagnostics: 1. A0 on diskette drive 1. 2. A0 on diskette drive 2. 3. CE to test the DCA. 4. D0 to test the RSF. If an error occurs during the tests, go to step 14. If you complete the tests, go to step 13.	For information on running MSS optional diagnostics, see Volume A07, Diagnostics, "Optional MSS Diagnostics."
10	Do you have a diagnostic error stop with a reference code displayed?	Follow the instructions on the display console. If you have already exchanged all FRUs displayed, go to "Adapter Isolation" on page MSS 015.	The MSS diagnostic screens now guide you in the repair.
11	Do you still have the same MSS code after replacing FRU(s) in a previous step?	Reinstall any FRUs you exchanged. Go to "Adapter Isolation" on page MSS 015.	
12	A different MSS Code is displayed when the MSS Basic diagnostics run.	Copy down your new MSS Code. Go to step 1 on page MSS 011.	Start this Repair Procedure again using your new MSS Code as the symptom.
13	Did the optional MSS diagnostics run without error?	If more than one FRU was exchanged, reinstall the FRUs one at a time and rerun the MSS diagnostics to isolate the failing FRU. If the failure is intermittent and you cannot isolate the failing FRU, leave all FRUs exchanged. Go to "END Repair Procedure" on page END 001.	Power down before exchanging FRUs.
14	Do you have a diagnostic error stop with a reference code displayed?	If a reference code of F5xxxxxx is displayed, go to "Console Diskette Errors" on page MSS 051. For all other reference codes, follow the instructions on the display console. If you have already exchanged all FRUs displayed, go to "Adapter Isolation" on page MSS 015.	The MSS diagnostic screens now guide you in the repair.
15	You have an MSS code stop	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.

Step	Condition	Instructions	Comments
16	Was the system console powered on and the Normal/Test switch in Normal?	Check for the following: <ul style="list-style-type: none">The coaxial cable for the system console is connected at Port 0 (location 01F - Port 0) and at the system console.The signal cable from Port 0 (01F - Port 0) to board location 01A-A2 YN is properly installed. Go to step 18.	MSS code 89102 indicates no response from the system console. For the Location of 01F - Port 0, see Volume 07, "Locations."
17	The system console was not powered on or the Normal/Test switch was set to Test.	<ol style="list-style-type: none">Ensure the Normal/Test switch on the system console is set to Normal.Power on the system console.Wait for the three console LEDs to light.Set the Power Off switch on the service panel to Power Off.Set the Power Off switch to Normal and press Power On. MSS Basic and Extended diagnostics run.Go to step 9.	MSS code 89102 indicates no response from the system console.
18	Is the coaxial cable to the system console installed correctly?	<ol style="list-style-type: none">Set the Power Off switch on the service panel to Power Off.Exchange 01A-A2 Q2 and R2.Ensure DIAG1 is installed in diskette drive 1.Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics run.Go to step 20.	This MSS code indicates no Power On response from the system console.
19	The coaxial cable or signal cable to the system console was not installed correctly.	<ol style="list-style-type: none">Set the Power Off switch on the service panel to Power Off.Correct the problem with the coaxial cable or signal cable.Set the Power Off switch to Normal, and press Power On.Go to step 9.	
20	Do you still have an MSS Code of 88xxx or 89xxx?	Reinstall any FRUs you exchanged. Go to the <i>Maintenance Analysis Procedure</i> for the system console to check the coaxial cable.	The failure is in the coaxial cable or the system console. Check coaxial cable continuity at the device end.
21	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	Go to "END Repair Procedure" on page MSS 001.	

Step	Condition	Instructions	Comments
22	Do you have a diagnostic error stop with a reference code?	<p>If a reference code of F5xxxxxx is displayed, go to "Console Diskette Errors" on page MSS 051.</p> <p>For all other reference codes, follow the instructions on the display console.</p> <p>If you have already exchanged all FRUs displayed, go to "Adapter Isolation" on page MSS 015.</p>	The MSS diagnostic screens now guide you in the repair.
23	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 001.	Wait 30 seconds for the MSS Code to display.

Seq AH035	PN 0445769 Pg 1 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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Functional Code Stop

Because customer microcode detected a failure and MSS diagnostics ran without error, you may have an intermittent problem. The following procedure will have you exchange the FRU(s) that are the most probable cause of the original failure.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> Set the Power Off switch to Power Off. Locate your original MSS Code in the Condition column of the following steps and follow the instructions in the Instructions column. Go to step 2. 	
2	Was your MSS Code 81601, 81606, or 8160A?	<ol style="list-style-type: none"> Exchange 01A-A2 H2 and J2. Go to step 13. 	
3	Was your MSS Code 81602, 81608, 81701, or 82806?	<ol style="list-style-type: none"> Exchange 01A-A2 Q2, R2, and H2. Go to step 13. 	
4	Was your MSS Code any of the following? 81603 81702 8170A 82802 82803 82804 82805 82807 82808 8280C	Go to "Console Diskette Errors" on page MSS 051.	You may have a problem with your FUNC1 diskette.
5	Was your MSS Code 81607?	<ol style="list-style-type: none"> Exchange 01A-A2 V2, W2, and X2. Go to step 13. 	
6	Was your MSS Code 820C0?	<ol style="list-style-type: none"> Exchange 01A-A2 H2, J2, K2, L2, R2, P2, and V2. Go to step 13. 	
7	Was your MSS Code 820A6?	<ol style="list-style-type: none"> Exchange 01A-A2 J2. Go to step 13. 	
8	Was your MSS Code 8280D?	<ol style="list-style-type: none"> Exchange 01A-A2 F2. Go to step 13. 	
9	Was your MSS Code 820xx or 828xx?	<ol style="list-style-type: none"> Exchange 01A-A2 H2. Go to step 13. 	
10	Was your MSS Code 81703?	Go to "MSS Code Stop 81703" on page MSS 016.	

Step	Condition	Instructions	Comments
11	Was your MSS Code 06xxx?	<p>This is the code displayed by the MSS when no error has been detected. It indicates that the DCA was not able to communicate with the system console. This can be caused by one of the following:</p> <ul style="list-style-type: none"> A system console error A defective coaxial cable to the system console A DCA problem. <ol style="list-style-type: none"> Exchange 01A-A2 R2 and Q2 Go to step 13. 	If this problem returns, check the system console and the coaxial cable to the system console.
12	Was your MSS Code 0E06x?	Go to "Console Diskette Errors" on page MSS 051.	
13	Go to the Instructions column.	<ol style="list-style-type: none"> Set the Power Off switch to Normal. Ensure DIAG1 is installed in diskette drive 1. Press Power On. MSS Basic and Extended diagnostics run. Go to step 14. 	
14	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<p>Run the following MSS optional diagnostics:</p> <ol style="list-style-type: none"> A0 on diskette drive 1. A0 on diskette drive 2. CE on the DCA. D0 on the RSF. <p>If an error is detected during the optional diagnostics, go to step 15.</p> <p>If the tests run without errors, go to "END Repair Procedure" on page END 001.</p>	<p>For information on running the MSS optional diagnostics, see Volume A07, Diagnostics, "Optional MSS Diagnostics."</p> <p>Note: Diagnostic reference code F8Cx03F8 is a normal stop if the console on port x is not ready. Continue testing the DCA by keying in G and pressing ENTER.</p>
15	Do you have a diagnostic error stop with a reference code displayed?	<p>If a reference code of F5xxxxx is displayed, go to "Console Diskette Errors" on page MSS 051.</p> <p>For all other reference codes, follow the instructions on the display console.</p>	
16	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.

Seq AH035	PN 0445769 Pg 2 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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Adapter Isolation

This procedure uses the MSS diagnostics to identify the failing adapter for a solid failure on the bus that attaches to all MSS adapters.

The procedure starts with a minimum number of MSS adapters and has you run MSS diagnostics looking for known diagnostic error stops. After each known stop is reached, you are asked to reinstall the FRUs for another adapter and run the diagnostics again.

Notes:

- Each of the following steps **MUST** produce the five-digit (hex) MSS code or MSS diagnostic reference code indicated or the last FRU(s) to be reinstalled is defective or not properly seated.
- The MSS Diagnostic reference codes for the following steps are displayed on the system console. **Ignore** the repair instructions displayed.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Remove all the cards from board 01A-A2 except G4, H2, Q2, and R2. Ensure DIAG1 is installed in diskette drive 1. Set the Power Off switch to Normal, and press Power On. Go to step 2. 	Ensure Q4 is removed and each card is labeled with its location.
2	Do you have an MSS Code of 81513?	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Reinstall 01A-A2 K2. Set the Power Off switch to Normal, and press Power On. Go to step 4. 	Test DDA1
3	You do not have an MSS code of 81513.	<p>Your failing FRU is either 01A-A2 G4, H2, Q2, or R2.</p> <p>Write down number 3 and the failing FRU list. Go to "Failing FRU Procedure" on MSS 017.</p>	
4	Do you have a reference code of F11101F8 displayed on the system console? Ignore the instructions on the screen.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Reinstall 01A-A2 J2. Clear the display by placing the Normal/Test switch on the system console in Test and returning it to Normal. Set the Power Off switch to Normal, and press Power On. Go to step 6. 	Test the remainder of SP storage.

Step	Condition	Instructions	Comments
5	You do not have a reference code of F11101F8 displayed.	<p>Your failing FRU is 01A-A2 K2.</p> <p>Write down number 5 and the failing FRU list. Go to "Failing FRU Procedure" on MSS 017.</p>	
6	Do you have a reference code of FD2121F8 displayed on the system console? Ignore the instructions on the screen.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Reinstall 01A-A2 L2, T2, and U2. Clear the display by placing the Normal/Test switch on the system console in Test and returning it to Normal. Set the Power Off switch to Normal, and press Power On. Go to step 8. 	Test DDA2 and SBA.
7	You do not have a reference code of FD2121F8 displayed.	<p>Your failing FRU is 01A-A2 J2.</p> <p>Write down number 7 and the failing FRU list. Go to "Failing FRU Procedure" on MSS 017.</p>	
8	Do you have a reference code of F23106F8 displayed on the system console? Ignore the instructions on the screen.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Reinstall 01A-A2 V2, W2, X2, and top card connectors. Clear the display by placing the Normal/Test switch on the system console in Test and returning it to Normal. Set the Power Off switch to Normal, and press Power On. Go to step 10. 	Test LCA.
9	You do not have a reference code of F23106F8 displayed.	<p>Your failing FRU is either 01A-A2 L2, T2, or U2.</p> <p>Write down number 9 and the failing FRU list. Go to "Failing FRU Procedure" on MSS 017.</p>	
10	Do you have a reference code of F68121F8 displayed on the system console? Ignore the instructions on the screen.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Reinstall 01A-A2 C2, C4, D2, E2, F2, F4, and top card connectors. Clear the display by placing the Normal/Test switch on the system console in Test and returning it to Normal. Set the Power Off switch to Normal, and press Power On. Go to step 12. 	Test PCA.

Seq AH045	PN 0445770 Pg 1 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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Step	Condition	Instructions	Comments
11	You do not have a reference code of F68121F8 displayed.	Your failing FRU is either 01A-A2 V2, W2, or X2. Write down number 11 and the failing FRU list. Go to "Failing FRU Procedure" on MSS 017.	
12	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Reinstall 01A-A2 P2, and Q4. 3. Clear the display by placing the Normal/Test switch on the system console in Test and returning it to Normal. 4. Set the Power Off switch to Normal, and press Power On. 5. Go to step 14. 	Test CCA.
13	You do not have the message MSS EXTENDED DIAGNOSTICS COMPLETED.	Your failing FRU is either 01A-A2 C2, C4, D2, E2, F2, F4, or the top card connectors. Write down number 13 and the failing FRU list. Go to "Failing FRU Procedure" on MSS 017.	
14	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<p>Run the following MSS optional diagnostics:</p> <ol style="list-style-type: none"> 1. A0 on diskette drive 1. 2. A0 on diskette drive 2. 3. CE on the DCA. 4. D0 on the RSF. <p>If all optional diagnostics run without errors, go to "END Repair Procedure" on page END 001.</p> <p>If an error occurs during one of the tests, go to step 16.</p>	<p>For information about running MSS optional diagnostics, see Volume A07, Diagnostics, "Optional MSS Diagnostics."</p> <p>Note: Diagnostic reference code F8Cx03F8 is a normal stop if the console on port x is not ready. Continue testing the DCA by keying in G and pressing ENTER.</p>
15	You do not have the message MSS EXTENDED DIAGNOSTICS COMPLETED.	Your failing FRU is either 01A-A2 P2, or Q4. Write down number 15 and the failing FRU list. Go to "Failing FRU Procedure" on MSS 017.	
16	Do you have a diagnostic error stop with a reference code displayed?	<p>If a reference code of F5xxxxxx is displayed, go to "Console Diskette Errors" on page MSS 051.</p> <p>For all other reference codes, follow the instructions on the display console.</p>	
17	You have an MSS code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.

MSS Code Stop 81703

MSS Code 81703 indicates that multiple errors occurred during automatic SP re-IML.

No errors occurred when you looped MSS Basic and Extended diagnostics.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch at the service panel to Power Off. 2. Set the Power Off switch to Normal, and press Power On. 3. After MSS Extended diagnostics complete, select MSS Diagnostic option AF. 4. Run option AF for two minutes. 5. Press Power On/IML to terminate the loop. 6. Go to step 2. 	This option loops the diskette drive adapter diagnostics.
2	Did an MSS Code stop occur?	Go to page MSS 011, step 1.	Start this repair procedure with your <i>new</i> symptom.
3	Do you have the message DIAGNOSTIC OPTION AF DETECTED AN ERROR?	Follow the directions on the display console.	
4	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Select MSS Diagnostic option C0. 2. Run option C0 for two minutes. 3. Press Power On/IML to terminate the loop. 	This option loops the system console adapter diagnostics.
5	Do you have the message DIAGNOSTIC OPTION C0 DETECTED AN ERROR?	Follow the directions on the console.	
6	Did diagnostic option C0 run without errors?	<ol style="list-style-type: none"> 1. Set the Power Off switch at the service panel to Power Off. 2. Insert FUNC1 diskette in diskette drive 1. 3. Set the CE Mode switch to CE Mode. 4. Set the Power Off switch to Normal, and press Power On. 5. Go to "Manual Symptom Gathering" on page START 040. 	Find the cause of the automatic re-IML using the SP logs.
7	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.

Failing FRU Procedure

You were directed here from the Adapter Isolation procedure.

This procedure is used to identify the FRU(s) that is causing the error detected by the MSS Basic or Extended diagnostics.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> Set the service panel Power Off switch to Power Off. Exchange the failing FRU identified in the Adapter Isolation procedure. <p>Note: If more than one FRU is to be exchanged, reinstall the FRUs one at a time to isolate the failing FRU.</p> <ol style="list-style-type: none"> Set the Power Off switch to Normal, and press Power On. The MSS Basic and Extended diagnostics run. Go to step 2. 	If you cannot isolate the failing FRU because your problem is intermittent, leave all FRUs exchanged.
2	Go to the Instructions column.	<p>Find the step number that you recorded in "Adapter Isolation" in the list below, and verify that you now have the expected error code or diagnostic message.</p> <p>step 3 MSS Code is 81513 step 5 reference code is F11101F8 step 7 reference code is FD2121F8 step 9 reference code is F23106F8 step 11 reference code is F68126F8 step 13 message is MSS EXTENDED DIAGNOSTICS COMPLETED step 15 message is MSS EXTENDED DIAGNOSTICS COMPLETED</p> <p>Go to step 3.</p>	<p>failing FRU list</p> <p>01A-A2 G4, H2, Q2, R2 01A-A2 K2 01A-A2 J2 01A-A2 L2, T2, U2 01A-A2 V2, W2, X2 C2, C4, D2, E2, F2, F4</p> <p>01A-A2 P2, Q4</p>
3	Did you have the expected error code or message in step 2?	<ol style="list-style-type: none"> Set the Power Off switch to Power Off. Install all remaining board 01A-A2 FRUs. Set the Power Off switch to Normal, and press Power On. Go to step 5. 	
4	You do not have the expected error code or message.	<p>Check that all cards and cables in board 01A-A2 are in the correct positions.</p> <p>Go back to "Adapter Isolation" on page MSS 015.</p> <p>If you cannot resolve this problem, call for assistance.</p>	

Step	Condition	Instructions	Comments
5	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<p>Run the MSS optional diagnostics as follows:</p> <ol style="list-style-type: none"> A0 on diskette drive 1. A0 on diskette drive 2. CE on the DCA. DO on the RSF. <p>If all optional diagnostics run without errors, go to "END Repair Procedure" on page END 001.</p> <p>If you get an error during the optional diagnostics, go to step 6.</p>	<p>Note: Diagnostic reference code F8Cx03F8 is a normal stop if there is no terminal on port x, or the terminal on port x is not powered on and ready. To continue testing the DCA, key in G and press ENTER.</p>
6	Do you have a diagnostic error message and a reference code displayed?	<p>If a reference code of F5xxxxx is displayed, go to "Console Diskette Errors" on page MSS 051.</p> <p>For any other reference code, follow the instructions on the display console.</p>	
7	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011.	Wait 30 seconds for the MSS Code to display.

MSS Reference Code Index

MSS diagnostics do not fail. Your original symptom was one of the following:

- MSS reference code with a UU field of Fx, EC, or ED
- MSS error message
- Instructions to go to *Fx Exit* on this page.

Read the **Condition** column until you find a question you can answer "yes" or a description that matches the condition you have. Then do the instructions in the **Instructions** column.

Step	Condition	Instructions	Comments
1	Were you instructed to go to <i>Fx Exit</i> on this page?	Go to step 16.	You exchanged FRUs to correct a failure detected by MSS diagnostics.
2	Go to the Instructions column.	1. Set the CE Mode switch to Normal. 2. Go to step 3.	
3	Do you have a reference code with a UU field of EC ?	Go to "UU = EC" on page MSS 040.	Reference code format is UU RRRR IS.
4	Do you have a reference code with a UU field of ED ?	Go to "UU = ED" on page MSS 041.	Reference code format is UU RRRR IS.
5	Do you have a reference code with a UU field of F0 or F1 ?	Go to "UU = F0 or F1" on page MSS 032.	Reference code format is UU RRRR IS.
6	Do you have a reference code with a UU field of F2 ?	Go to "UU = F2" on page MSS 033.	Reference code format is UU RRRR IS.
7	Do you have a reference code with a UU field of F4 or F5 ?	Go to "Console Diskette Errors" on page MSS 051.	Reference code format is UU RRRR IS.
8	Do you have a message SERIAL NO. DOES NOT MATCH or a reference code of F61801FA?	Go to "SERIAL NUMBER MATCH" on page MSS 037.	
9	Do you have a reference code with a UU field of F6 ?	Go to "UU = F6" on page MSS 036.	Reference code format is UU RRRR IS.
10	Do you have a reference code with a UU field of F8 or F9 ?	Go to "UU = F8 or F9" on page MSS 038.	Reference code format is UU RRRR IS.
11	Do you have a reference code with a UU field of FD ?	Go to "UU = FD" on page MSS 039.	Reference code format is UU RRRR IS.
12	Do you have a reference code with a UU field of FE ?	Go to "UU = FE" on page MSS 034.	Reference code format is UU RRRR IS.

Step	Condition	Instructions	Comments
13	Do you have one of the following messages? DISKETTE DRIVE x NOT READY CONSOLE DISK FAILURE CONSOLE DISK I/O ERROR CRC ERROR ON DRIVE x DISKETTE xxx CHECK DISKETTE xxx NOT READY ERR - DISK ERROR FUNCTION NOT AVAILABLE	Go to "Console Diskette Errors" on page MSS 051.	
14	Do you have one of the following messages? DISPLAY CONSOLE FAILURE PRT-INTV REQD	Go to "UU = F8 or F9" on page MSS 038.	
15	Do you have the message SUPPORT BUS FAILURE?	Go to "UU=F0 or F1" on page MSS 032.	
16	You were instructed to go to <i>Fx Exit</i> on this page.	If you exchanged more than one FRU, reinstall the FRUs one at a time and rerun the diagnostics to isolate the failing FRU If you cannot isolate to a single FRU because of an intermittent problem, leave all FRUs exchanged. Go to "END Repair Procedure" on page END 001.	

UU = F0 or F1

Your original failure was one of the following:

- A reference code with a UU field of F0
- A reference code with a UU field of F1
- The message SUPPORT BUS FAILURE.

These indicate a failure in the Support Processor (SP) or SP storage. Suspect the following FRUs:

- 01A-A2 H2 SP
- 01A-A2 J2 SP storage

Step	Condition	Instruction	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Ensure DIAG1 is in diskette drive 1. 3. When you are asked to exchange FRUs, check all top card connectors (TCCs) for damaged pins. 4. Go to step 2. 	
2	Did you have a reference code with a UU field of F0 or the message SUPPORT BUS FAILURE?	<ol style="list-style-type: none"> 1. Exchange 01A-A2 H2. 2. Set the Power Off switch on the service panel to Normal, and press Power On. MSS Basic and Extended diagnostics are run. 3. Go to step 4. 	This indicates a logic failure in the controller.
3	Did you have a reference code with a UU field of F1?	<ol style="list-style-type: none"> 1. Exchange 01A-A2 H2 and J2. 2. Set the Power Off switch on the service panel to Normal, and press Power On. MSS Basic and Extended diagnostics are run. 3. Go to step 4. 	This indicates a parity error in MSS storage.
4	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<ol style="list-style-type: none"> 1. Select diagnostic option FF. 2. Let the tests loop for two minutes. 3. Press Power On/IML to terminate the loop. 4. Go to step 7. 	
5	Do you have an error stop and a reference code displayed?	Follow the directions on the screen.	
6	You have an MSS Code displayed.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	

Step	Condition	Instruction	Comments
7	Did the tests run without errors?	<p>If you were asked to exchange more than one FRU, reinstall the FRUs one at a time and rerun the diagnostics to isolate the failing FRU.</p> <p>If the failure is intermittent or you cannot isolate to the failing FRU, leave all FRUs exchanged.</p> <p>Go to "END Repair Procedure" on page MSS 001.</p>	Power down before reinstalling FRUs.
8	Do you have an error stop and a reference code displayed?	Follow the directions on the screen.	
9	You have an MSS Code displayed.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	

UU = F2

MSS 033

Your original failure was a reference code of F2xxxxxx.

This indicates a failure in the Local Channel Adapter (LCA). Suspect the following FRUs:

- 01A-A2 V2 LCA
- 01A-A2 W2 LCA
- 01A-A2 X2 LCA

Step	Condition	Instruction	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Ensure DIAG1 is in diskette drive 1. 3. When you are asked to exchange FRUs, check all top card connectors (TCCs) for damaged pins. 4. Exchange 01A-A2 V2, W2, and X2. 5. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics are run. 6. Go to step 2. 	You have a failure in the Local Channel Adapter (LCA).
2	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<ol style="list-style-type: none"> 1. Select diagnostic option FF. 2. Let the tests loop for two minutes. 3. Press Power On/IML to terminate the loop. 4. Go to step 5. 	These diagnostics test only the logic between the SP and the LCA. The processing unit diagnostics test the logic between the LCA and channel.
3	Do you have an error stop and reference code displayed?	Follow the directions on the screen.	
4	You have an MSS Code displayed.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	
5	Did the tests run without errors?	Go to "END Repair Procedure" on page END 001.	
6	Do you have an error stop and reference code displayed?	Follow the directions on the screen.	
7	You have an MSS Code displayed.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	

MSS 033

UU = FE

Your original symptom was a Remote Support Facility (RSF) failure or a reference code of FExxxxx. MSS diagnostics ran without detecting an error.

Suspect the following FRUs:

- 01A-A2 P2 CCA
- 01A-A2 Q4 38LS modem or EIA interface
- 01G-CCA1 Integrated Protective Coupler.

Notes:

1. For diagrams of possible RSF configurations, see Volume A06, Service Aids, "RSF Cards and Wiring Configurations."
2. Location 01A-A2 Q4 has either the 38LS modem or the EIA interface card. The 38LS has two rows of switches. For switch settings and jumper locations, see Volume A07, Installation, "Installing Remote Support Facility (RSF)."
3. The 38LS modem can be isolated from the integrated protective coupler by setting switch K to the ON position and selecting the D0 option. This tests only the 38LS; it does not test the integrated protective coupler or connecting cable.

Step	Condition	Instruction	Comments
1	Do you have RSF Feature Code 9514 installed?	Go to step 14.	See Notes to determine which RSF feature you have.
2	You do not have RSF feature code 9514 installed.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange 01A-A2 P2, and Q4. 3. Ensure the DIAG1 diskette is in diskette drive 1. 4. Set the Power Off switch to Normal, and press Power On. The MSS Basic and Extended diagnostics run. 5. Go to step 3 	Verify that the switch settings or jumpers are correct on the new FRUs. (See Notes .)
3	Do you have an error stop with a reference code displayed?	Follow the instructions on the screen.	
4	Do you have the message EXTENDED DIAGNOSTICS COMPLETED?	Go to step 6.	
5	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your new symptom.	Wait 30 seconds for the MSS Code to display.
6	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Select diagnostic option D0 and press ENTER. 2. Let the tests loop for two minutes. 3. Press Power On/IML to stop the loop. 4. Go to step 7. 	

Step	Condition	Instruction	Comments
7	Do you have an error stop with a reference code displayed?	Follow the instructions on the screen.	
8	Did the diagnostics run without error?	Go to step 10.	
9	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your new symptom.	Wait 30 seconds for the MSS Code to display.
10	Do you have an RSF with an EIA interface?	<ol style="list-style-type: none"> 1. Install the wrap plug on the end of the EIA interface cable. 2. Select diagnostic option EF, and press ENTER. 3. Let the tests loop for two minutes. 4. Press Power On/IML to stop the loop. 5. Go to step 12. 	
11	You do not have an EIA interface.	Go to "END Repair Procedure" on page END 001. Note: If the RSF still fails, suspect the telecommunication line.	
12	Do you have an error stop with a reference code displayed?	<p>If the reference code is FE E0xx F8, refer to "RSF Cable Analysis" on page MSS 035 and repair the RSF cable.</p> <p>If you have a different reference code, follow the instructions on the screen.</p> <p>Reinstall the FRUs you exchanged in step 2, and go to "END Repair Procedure" on page END 001 after you complete the repair.</p>	
13	The diagnostics ran without error.	Go to "END Repair Procedure" on page END 001. Note: If the RSF still fails, suspect the telecommunication line.	
14	Go to the Instructions column.	Go to Volume A06, Service Aids, "RSF Option Verification Procedure for Feature Code 9514" and follow the procedure for checking the telephone configuration you have (Common Carrier or IBM supplied). When you have completed the checks, go to step 15.	
15	Did you find a problem with your telephone?	Follow the instructions in the Service Aids to correct the problem and go to "END Repair Procedure" on page END 001.	

Seq AH065	PN 0445772 Pg 2 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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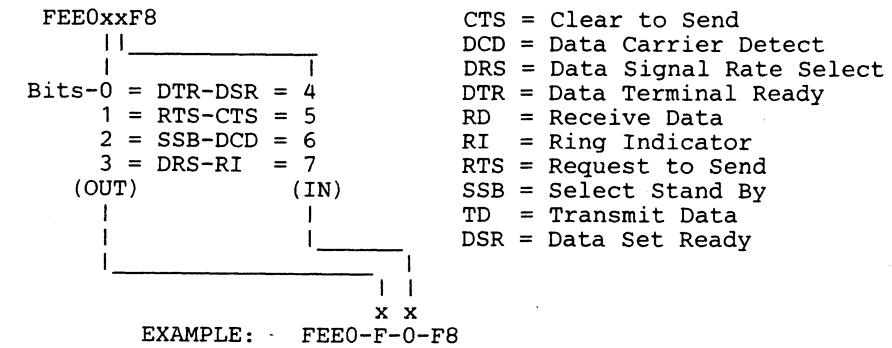
Step	Condition	Instruction	Comments
16	You did not find a problem with your telephone.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange 01A-A2 P2, Q4, and the integrated protective coupler (if installed). 3. Ensure the DIAG1 diskette is in diskette drive 1. 4. Set the Power Off switch to Normal and press Power On. The MSS Basic and Extended diagnostics run. 5. Go to step 17. 	Verify that the switch settings or jumpers are correct on the new FRUs. (See Notes.)
17	Do you have an error stop with a reference code displayed?	Follow the instructions on the display.	
18	Do you have the message EXTENDED DIAGNOSTICS COMPLETED?	Go to "END Repair Procedure" on page END 001. Note: If the RSF still fails, suspect the telecommunication line.	

RSF Cable Analysis

The MSS diagnostic option Ex wraps the EIA interface cable through a wrap plug. The following reference codes indicate a failure in the EIA wrap test:

FEE0EEF8 = TD - RD connection disturbed

FEE0FFF8 = CCA FRU defective



Reference code FEE0 F0 F8 indicates that all four EIA interface OUT lines (F) had a signal on them and none of the IN lines returned the signal (0). This occurs if the wrap plug is not plugged on the end of the cable.

Reference code FEE0-8-C-F8 indicates that a signal was present on the DTR OUT line (8) and both the DSR and CTS IN lines returned a signal. This indicates a short between DSR and CTS.

UU = F6

Your original symptom was a reference code of F6xxxxx. This indicates a failure in the Power Controller Adapter (PCA) voltage sense, the isolator, the PCA interface, or the sense cables. Suspect the following FRUs.

- 01A-A2 C2 isolator
- 01A-A2 C4 isolator
- 01A-A2 D2 voltage sense
- 01A-A2 E2 voltage sense
- 01A-A2 F2 PCA interface.

Notes:

1. The FRUs in location C2 and C4 have the same part number and the FRUs in D2 and E2 have the same part number.
2. Some voltage sense failures cause an F6 reference code when there is no problem with the PCA. This procedure will have you exchange the PCA FRUs to verify that the PCA is not causing the problem.

Step	Condition	Instruction	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Set the CE Mode switch to CE Mode. 3. Ensure the FUNC1 diskette is in diskette drive 1 and the FUNC2 diskette is in diskette drive 2. 4. Set the Power Off switch to Normal, and press Power On. 5. When prompted, key in the date and time, and then press ENTER. The Partial Power Up/Down screen is displayed. 6. Key in QWP and press ENTER. The PCA diagnostics run. 7. Go to step 2. 	
2	Did the PCA diagnostics run without an error?	<p>Exchange the FRUs at 01A-A2 D2, E2, and F2. Go to "END Repair Procedure" on page END 001.</p> <p>If these FRUs have already been exchanged for this intermittent problem, exchange C2 and C4. Go to "END Repair Procedure" on page END 001.</p>	

Step	Condition	Instruction	Comments
3	Did the PCA diagnostics fail and a reference code of F6xxxxx display?	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange 01A-A2 D2, E2, and F2. 3. Set the Power Off switch to Normal, and press Power On. 4. When prompted, key in the date and time, and then press ENTER. The Partial Power Up/Down screen is displayed. 5. Key in QWP and press ENTER. The PCA diagnostics run. 6. Go to step 5. 	
4	The PCA diagnostics failed and you have another reference code displayed.	<p>Reinstall all the FRUs you exchanged.</p> <p>Go back to page MSS 001.</p>	
5	Did the PCA diagnostics run without an error?	<p>Reinstall the old FRUs one at a time, and rerun the diagnostic until the failing FRU is isolated.</p> <p>Go to "END Repair Procedure" on page END 001.</p>	Power down before reinstalling FRUs.
6	The PCA diagnostics failed again.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Reinstall the FRUs you exchanged in step 3. 3. Exchange 01A-A2 C2 and C4. 4. Set the Power Off switch to Normal, and press Power On. 5. When prompted, key in the date and time, and then press ENTER. The Partial Power Up/Down screen is displayed. 6. Key in QWP and press ENTER. The PCA diagnostics run. 7. Go to step 7. 	
7	Did the PCA diagnostics run without an error?	<p>Reinstall the old FRUs one at a time, and rerun the diagnostic until the failing FRU is isolated.</p> <p>Go to "END Repair Procedure" on page END 001.</p>	Power down before reinstalling FRUs.
8	The PCA diagnostics failed again.	<ol style="list-style-type: none"> 1. Set the Power Off switch at the service panel to Power Off. 2. Reinstall the FRUs exchanged in step 6. 3. Call for assistance on this problem. 	

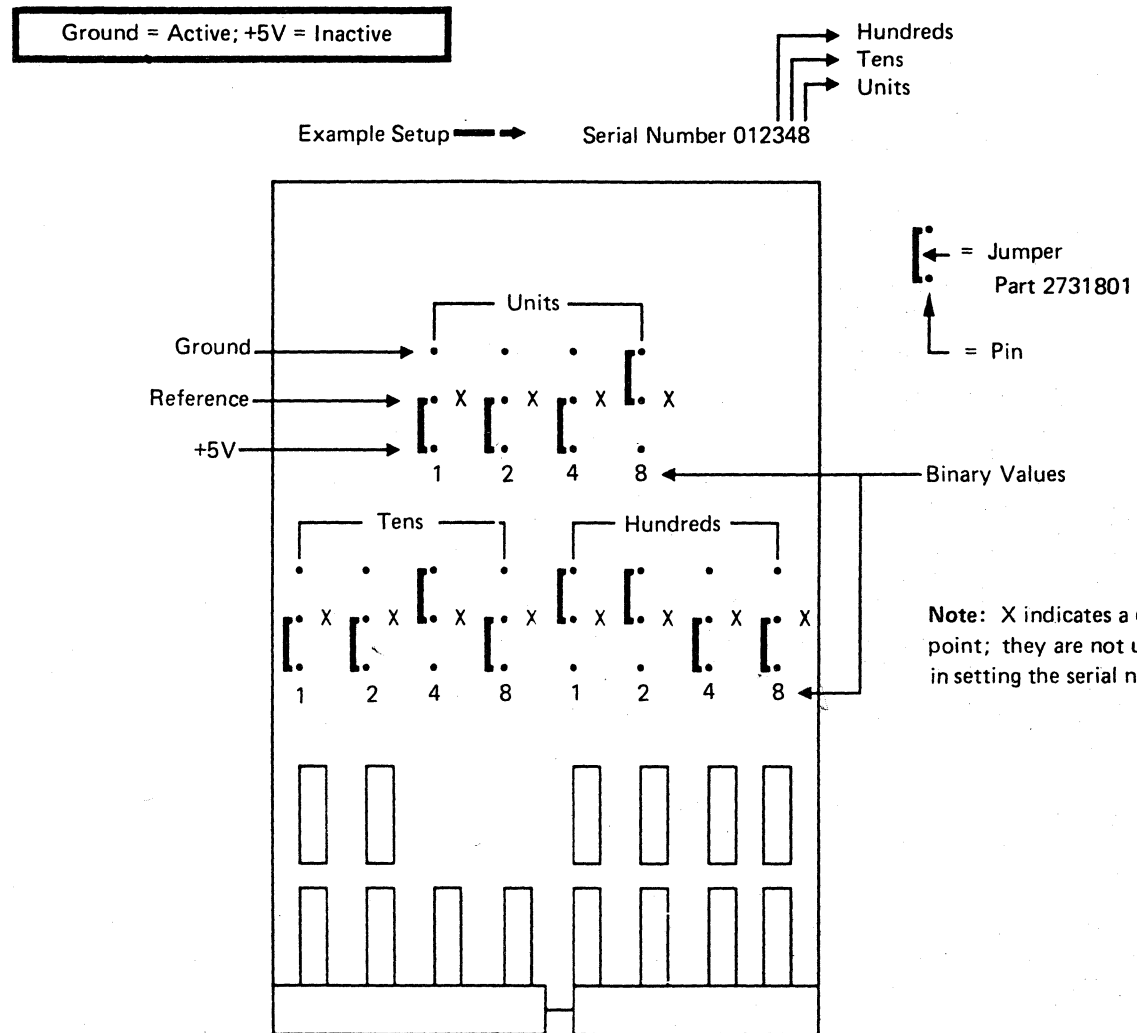
SERIAL NUMBER MATCH

You have a reference code of F61801FA or the message SERIAL NUMBER MATCH. This indicates one of the following:

- The wrong machine serial number stored on the FUNC1 diskette
- The wrong machine serial number wired on the 01A-A2 F4 card
- A defective serial number card at 01A-A2 F4.

Step	Condition	Instruction	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Set the CE Mode switch to CE Mode. 3. Ensure the FUNC1 diskette is in diskette drive 1 and the FUNC2 diskette is in diskette drive 2. 4. Set the Power Off switch to Normal, and press Power On. 5. When prompted, key in the date and time, and then press ENTER. The Partial Power Up/Down screen is displayed. 6. Key in QWP and press ENTER. The PCA diagnostics run. 7. Go to step 2. 	
2	Did the PCA tests run without errors?	You have an intermittent problem. Exchange 01A-A2 F4 and go to "END Repair Procedure" on page END 001.	Ensure the new FRU has the correct jumpers.
3	Did the PCA tests fail with a reference code of F6 1801 FA?	The serial numbers stored on the FUNC1 diskette and jumpered on 01A-A2 F4 are displayed. Check the serial numbers displayed and go to step 5.	
4	Did the PCA tests fail with an MSS Code or a reference code other than F6 1801 FA?	You have a new failure. Go back to MSS 001 with your new symptom.	
5	Is the serial number displayed for the machine different from the actual serial number on the machine?	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Check the jumpers on 01A-A2 F4 using the example on this page as a guide. <p>If the jumpers are not correct, correct the jumpers. Rerun the PCA test, and go to "END Repair Procedure" on page END 001.</p> <p>If the jumpers are correct, exchange 01A-A2 F4. (Ensure the new FRU has the correct jumpers.) Go to "END Repair Procedure" on page END 001.</p>	

Step	Condition	Instruction	Comments
6	The serial number displayed for the FUNC1 diskette is wrong.	Ensure the correct FUNC1 diskette is installed. Use the backup FUNC1 diskette if possible and order a replacement diskette. Go to "END Repair Procedure" on page END 001.	



UU = F8 or F9

Your original symptom was a reference code of F8xxxxx or F9xxxxx or a failure of one of the devices attached to the Device Cluster Adapter (DCA). This indicates one of the following:

- Device Cluster Adapter (DCA) failure
- Coaxial cable problem
- Console device failure.

Suspect the following FRUs:

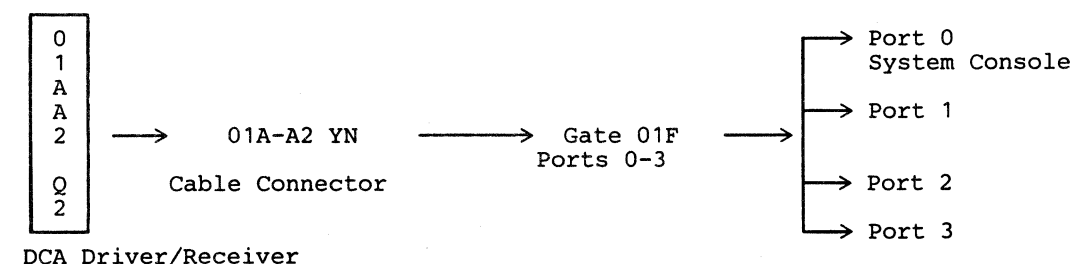
01A-A2 Q2 DCA receiver/driver
01A-A2 R2 DCA

Step	Condition	Instruction	Comments
1	Do you have a reference code of F8 4001 C0?	<p>You have a command failure on a console printer. Go to the maintenance procedures for the attached printer and run the device tests.</p> <p>If you cannot find a problem with the device:</p> <ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Verify that all console devices are ready. 3. Ensure DIAG1 is in diskette drive 1. 4. Set the Power Off switch to Normal, and press Power On. 5. After the MSS Basic and Extended diagnostics run, select diagnostic option CF and let the tests loop for two minutes. 6. Press Power On/IML to stop the loop. <p>If errors occur, go to step 4.</p> <p>If the test runs without errors, go to step 3.</p>	Reference code F8 Cx03 F8 is a normal stop if the device on port x is not connected or not ready.
2	Do you have a reference code of F9 0x0B 20?	<p>You have a problem with the device attached to port x (where x=0-3).</p> <p>Go to the device maintenance procedures to test the device and the coaxial cable between the device and gate 01F.</p> <p>If you cannot resolve the problem using the device maintenance procedures, continue with step 3.</p>	For information on the coaxial cables, see "DCA Port to Device Attachment" on this page.

Step	Condition	Instruction	Comments
3	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange 01A-A2 Q2, and R2. 3. Verify that all console devices are attached and ready. 4. Ensure the DIAG1 diskette is in diskette drive 1. 5. Set the Power Off switch to Normal, and press Power On. 6. After the MSS Basic and Extended diagnostics run, select diagnostic option CF and let the tests loop for two minutes. 7. Press Power On/IML to stop the loop. 8. Go to step 4. 	Reference code F8 Cx03 F8 is a normal stop if the device on port x is not connected or not ready.
4	Do you have a diagnostic error stop with a reference code displayed?	Follow the instructions on the console display.	
5	Did diagnostic option CF run without errors?	<p>Go to "END Repair Procedure" on page END 001.</p> <p>If errors occur during customer operation, the failure is in one of the devices attached to the DCA. Go to the device maintenance procedures.</p>	
6	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your new symptom.	Wait 30 seconds for the MSS Code to display.

DCA Port to Device Attachment

The coaxial cables for the system console and console devices are connected at gate 01F (the system console is attached at gate 01F, port 0). The signal cable from the MSS board goes from 01A-A2 YN to gate 01F.



UU = FD

Your original symptom was a reference code of FDxxxxx. This indicates a failure in one of the following:

Support Bus Adapter (SBA)
Converter.

Suspect the following FRUs:

01A-A2 T2 SBA
01A-A2 U2 Converter

Step	Condition	Instruction	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Install DIAG1 in diskette drive 1 and remove FUNC2 from diskette drive 2. 3. Exchange the FRUs at 01A-A2 T2 and U2. 4. Set the Power Off switch to Normal, and press Power On. The MSS Basic and Extended diagnostics run. 5. Go to step 2. 	The MSS Basic and Extended diagnostics test the path from the SP to the SBA and some lines to the converter. The path through the converter to the processing unit is tested during processing unit IML.
2	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<ol style="list-style-type: none"> 1. Key in FF and press ENTER. MSS diagnostics loop. 2. After two minutes, press Power On/IML to stop the loop. 3. Go to step 5. 	
3	Do you have a diagnostic error stop with a reference code displayed?	Follow the directions on the system console.	MSS diagnostic screens guide you in the repair.
4	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	Wait 30 seconds for the MSS Code to display.
5	Did diagnostic option FF run without errors.	<p>Go to "END Repair Procedure" on page END 001.</p> <p>If this problem occurs again, go to "Processing Unit Failure Isolation Procedure" on page PU 001.</p>	
6	Do you have a diagnostic error stop with a reference code displayed?	Follow the directions on the console.	
7	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	Wait 30 seconds for the MSS Code to display.

UU = EC

MSS 040

Your original symptom was a reference code of ECxxxxxx. This indicates a MSS microcode failure that may be caused by a failure in the MSS hardware. Channel and processing unit diagnostics have not detected an error.

Step	Condition	Instruction	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Ensure DIAG1 is in diskette drive 1. 3. Set the Power Off switch to Normal, and press Power On. The MSS Basic and Extended diagnostics are run. 4. Go to step 2. 	
2	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<ol style="list-style-type: none"> 1. Select diagnostic option FF and press ENTER. 2. Let the diagnostics loop for two minutes. 3. Press Power On/IML to stop the loop. 4. Go to step 5. 	
3	Do you have an error stop with a reference code displayed?	Follow the directions on the screen.	
4	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	Wait 30 seconds for the MSS Code to display.
5	Did diagnostic option FF loop without detecting an error?	<p>Run the following MSS optional diagnostics:</p> <ol style="list-style-type: none"> 1. A0 on diskette drive 1. 2. A0 on diskette drive 2. 3. CE to test DCA. 4. D0 to test RSF. <p>If all optional diagnostics run without errors, call for assistance on this problem.</p> <p>If errors occur, go to step 6.</p>	For more information on the MSS optional diagnostics, see Volume A07, Diagnostics, "MSS Optional Diagnostics."
6	Do you have an error stop with a reference code displayed?	Follow the directions on the screen.	
7	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	Wait 30 seconds for the MSS Code to display.

MSS 040

UU = ED

Your original symptom was a reference code of EDxxxxx. Processing Unit diagnostics did not find a failure. This indicates one of the following:

- Channel 0 logic failure
- IFCC on channel 0
- Local Channel Adapter (LCA) failure.

Suspect the following FRUs:

- 01A-A2 V2 LCA
- 01A-A2 W2 LCA
- 01A-A2 X2 LCA

Step	Condition	Instruction	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Ensure DIAG1 is in diskette drive 1. 3. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics are run. 4. Go to step 2. 	
2	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<ol style="list-style-type: none"> 1. Select diagnostic option FF and press ENTER. 2. Let the diagnostics loop for two minutes. 3. Press Power On/IML to stop the loop. 4. Go to step 5. 	
3	Do you have an error stop with a reference code displayed?	Follow the directions on the screen.	
4	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	Wait 30 seconds for the MSS Code to display.
5	Did diagnostic option FF loop without detecting an error?	<p>You have either an intermittent failure or a failure caused by a device on channel 0.</p> <p>Exchange 01A-A2 V2, W2, and X2 and go to "END Repair Procedure" on page END 001. (See Comments.)</p>	If the problem returns when the customer tries to use the system, go to "Channel Problem Isolation Procedure" on page CHNL 001 and test channel 0.
6	Do you have an error stop with a reference code displayed?	Follow the directions on the screen.	
7	You have an MSS Code stop.	Go to "MSS Code Stop" on page MSS 011 with your <i>new</i> symptom.	Wait 30 seconds for the MSS Code to display.

Console Diskette Errors

You have a console message, an MSS Code, or a reference code that indicates a failure in one of the diskette drives, one of the Diskette Drive Adapters (DDAs), or a damaged diskette. Suspect the following FRUs:

- 01A-A2 K2 (DDA1) or 01A-A2 L2 (DDA2)
- Control cards on the diskette drives
- Diskette drive assembly 1 or 2
- 01A-A2 H2 (SP)
- Cable from 01A-A2 ZD to diskette drive 1
- Cable from 01A-A2 ZF to diskette drive 2
- Diskette.

Notes:

1. The failing drive is indicated by the third digit of the functional reference code. Example: F5 210A 2C indicates an error in diskette drive 2.
2. For *diagnostic* reference codes (IS field = F8), the failing drive is indicated by the high-order bit of the fifth digit. Example: F5 1B12 F8 indicates a CRC error on diskette drive 1 and F5 1B92 F8 indicates a CRC error on diskette drive 2.

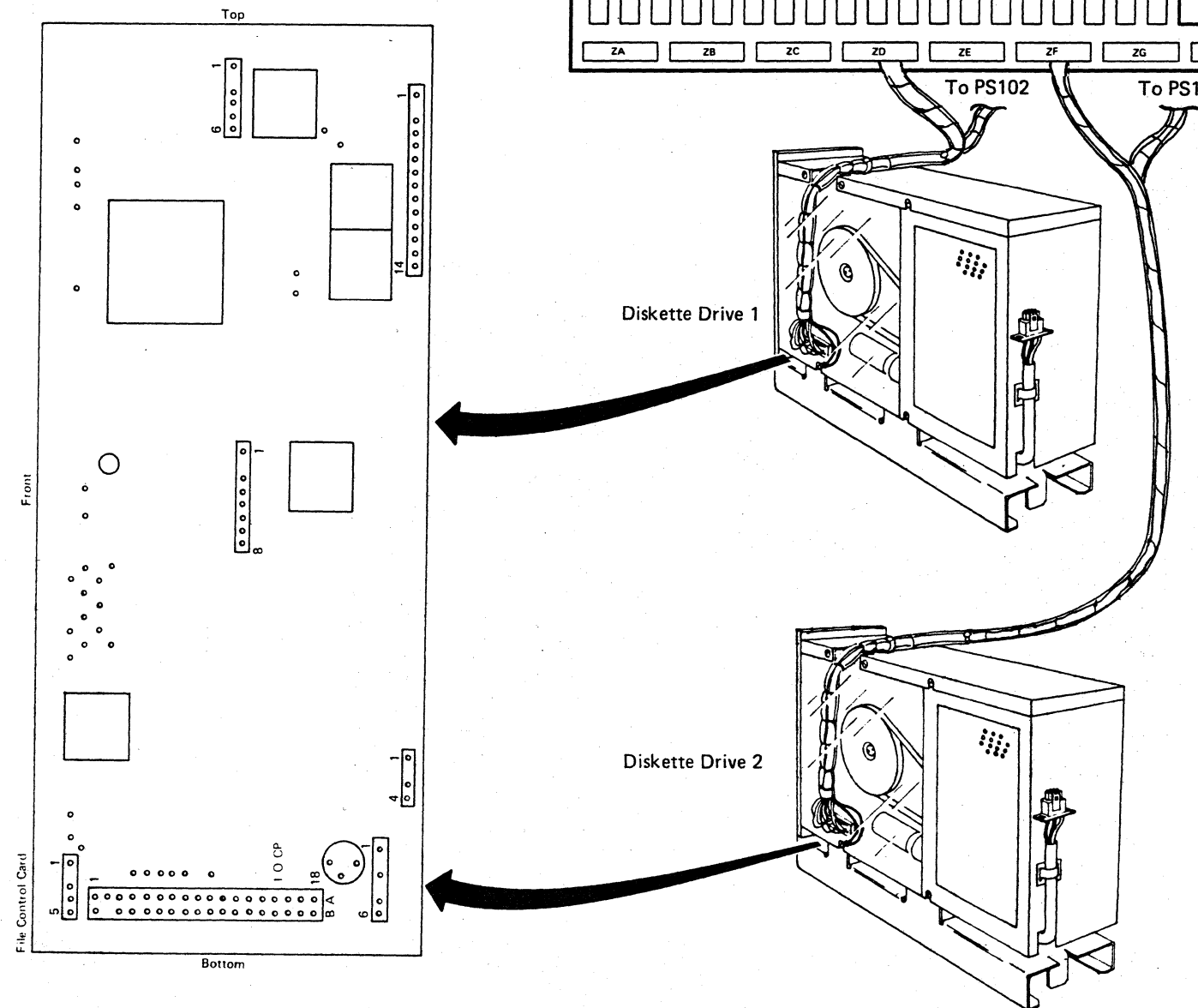
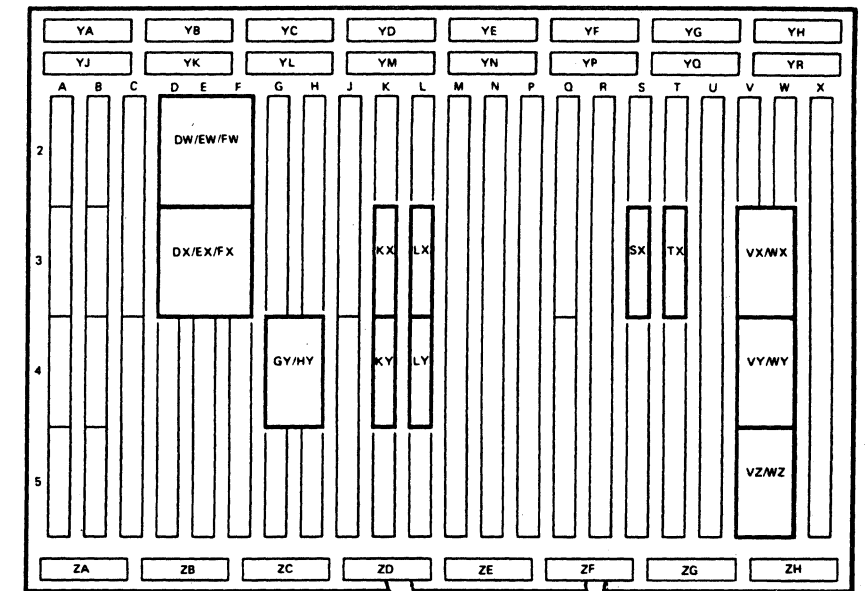
Step	Condition	Instructions	Comments
1	Go to the Instructions column.	Check for the following on both diskette drives: <ul style="list-style-type: none"> • The drive motor is running • The belt is not broken or off the pulleys. Go to step 2.	To check the belts and motors, open the cover over the service panel and slide the drives out.
2	Is either drive motor stopped?	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Go to "AC Power Plug Check" on page MSS 058. 	
3	Are either of the drive belts broken or off the pulleys?	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Exchange the drive belt. 3. Set the Power Off switch to Normal, and press Power On. 4. Go to "END Repair Procedure" on page END 001. 	Ensure the belt works correctly after pressing Power On.
4	Did you have a failure while running diagnostics to one of the diskette drives?	Go to "Adapter Exchange" on page MSS 054.	
5	Go to the Instructions column.	Go to "Diskette Analysis" on page MSS 052.	Diskette drive diagnostics did not fail.

A

Two identical 51TD diskette files are used. This allows FRUs to be swapped for diagnostic purposes.

The adapters are located at :
 01AA2K2 diskette drive 1
 01AA2L2 diskette drive 2

The cable locations are:
 01AA2ZD diskette drive 1
 01AA2ZF diskette drive 2



Diskette Analysis

You have run diagnostics on both diskette drives without errors. Use the following procedure to test your functional diskettes for valid data.

Note: If a reference code or MSS Code is displayed during the diskette analysis test, go to "Adapter Exchange" on page MSS 054.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Install the FUNC1 diskette in diskette drive 1 and the FUNC2 diskette in diskette drive 2. Ensure the CE Mode switch is set to CE Mode. Set the Power Off switch to Normal and press Power On. Key in the date and time when prompted. When the Partial Power Up/Down screen displays, press MODE SEL. The General Selection screen displays. Key in QED and press ENTER. The Diskette Analysis screen displays. Key in 1 to select diskette drive 1, and press ENTER. Go to step 2. 	<p>This tests FUNC1 for valid data.</p> <p>Note: If you cannot IML your FUNC1 diskette, use your backup FUNC1 diskette to IML and test your original diskette. If a reference code or MSS Code displays during IML, go to "Adapter Exchange" on page MSS 054.</p> <p>For more information on the Diskette Analysis test, see Volume A07, Diagnostics, "Diskette Analysis."</p>
2	Did the Diskette Analysis test detect any diskette errors on FUNC1?	<p>Check your system log to see if a backup diskette was exchanged for a similar diskette drive problem. If a backup diskette was not used before, install the backup FUNC1 diskette.</p> <p>If a backup diskette was already exchanged for a similar problem, exchange the diskette adapter (01A-A2 K2) and diskette drive 1. Then install the FUNC1 backup diskette.</p> <p>If your system log indicates that the diskette drive and adapter card have already been exchanged for this problem, exchange the cable to diskette drive 1.</p> <p>(See A on page MSS 051.) Then install the FUNC1 backup diskette.</p> <p>Go to step 6.</p>	

Step	Condition	Instructions	Comments
3	No data errors were detected on FUNC1.	<p>Test FUNC2 as follows:</p> <ol style="list-style-type: none"> Press MODE SEL. The General Selection screen displays. Key in QED and press ENTER. Key in 00 for the starting cylinder number, 01 for the starting record number, 2 for the drive number, and press ENTER. Go to step 4. 	<p>If a reference code or MSS Code displays, go to "Adapter Exchange" on page MSS 054.</p>
4	Did the Diskette Analysis test detect any diskette errors on FUNC2?	<p>Check your system log to see if a backup diskette was exchanged for a similar diskette drive problem. If a backup diskette was not used before, install the backup FUNC2 diskette.</p> <p>If a backup diskette was already exchanged for a similar problem, exchange the diskette adapter (01A-A2 L2) and diskette drive 2. Then install the FUNC2 backup diskette.</p> <p>If your system log indicates that the diskette drive and adapter card have already been exchanged for this problem, exchange the cable to diskette drive 2.</p> <p>(See A on page MSS 051.) Then install the FUNC2 backup diskette.</p> <p>Go to step 6.</p>	
5	No data errors were found on FUNC2.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Use the message or reference code recorded at the time of the original failure to determine which drive failed. (See Notes on page MSS 051.) Exchange the DDA FRU for the failing diskette drive (01A-A2 K2 or L2). Go to "END Repair Procedure" on page END 001. 	<p>You had an intermittent failure.</p> <p>If the problem occurs again, exchange the failing diskette drive.</p>

Step	Condition	Instructions	Comments
6	Go to the Instructions column.	Test the backup diskette you installed as follows: 1. Press MODE SEL. The General Selection screen displays. 2. Key in QED and press ENTER. 3. Key in 00 for the starting cylinder number and 01 for the starting record number. 4. Key in the drive number that you installed the backup diskette in. 5. Go to step 7.	If a reference code or MSS Code displays, go to "Adapter Exchange" on page MSS 054.
7	Did the Diskette Analysis test run without errors?	Go to "Diskette Drive 1 Verification" on page MSS 059.	
8	The Diskette Analysis test failed on the backup diskette.	Go to "FRU Swap" on page MSS 054.	You may have an intermittent failure.

Seq AH125	PN 0445778 Pg 1 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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Adapter Exchange

You have a failure in one of the diskette drives during the MSS diagnostics.

This procedure will have you exchange the diskette adapter FRU for the failing drive (01A-A2 K2 for DDA1 or 01A-A2 L2 for DDA2) and test both drives.

Notes:

1. The failing drive is indicated by the third digit of the functional reference code. Example: F5 210A 2C indicates an error in diskette drive 2.
2. For *diagnostic* reference codes (IS field = F8), the failing drive is indicated by the high-order bit of the fifth digit. Example: F5 1B12 F8 indicates a CRC error on diskette drive 1 and F5 1B92 F8 indicates a CRC error on diskette drive 2.
3. If you got an MSS Code when you ran the MSS diagnostics, diskette drive 1 is the failing drive.
4. To run the diagnostics with DDA2 FRU removed, place a jumper between the U10 and S10 pins at board location 01A-A2 L2.
5. For intermittent problems, you can operate the machine with the diskette drive cables swapped at the diskette drive ends.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Ensure DIAG1 is in diskette drive 1. 2. Set the Power Off switch on the service panel to Power Off. 3. Exchange the DDA FRU for the failing drive. (01A-A2 K2 for DDA1 or 01A-A2 L2 for DDA2.) 4. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics run. 5. Go to step 2. 	
2	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<p>Test diskette drive 1 as follows:</p> <ol style="list-style-type: none"> 1. Key in A0 and press ENTER. The optional diskette drive tests are selected. 2. Key in 1 to select drive 1 and press ENTER. Diskette drive 1 is tested. 3. Go to step 4. 	
3	You had a failure on MSS Basic and Extended diagnostics.	Go to step 8.	

Step	Condition	Instructions	Comments
4	Did diagnostic option A0 run on diskette drive 1 without errors?	<p>Test diskette drive 2 as follows:</p> <ol style="list-style-type: none"> 1. Key in A0 and press ENTER. The optional diskette drive tests are selected. 2. Insert DIAG1 in diskette drive 2. 3. Key in 2 to select diskette drive 2 and press ENTER. Diskette drive 2 is tested. 4. Go to step 6. 	
5	Diagnostic option A0 failed on diskette drive 1.	Go to step 8.	
6	Did diagnostic option A0 run on diskette drive 2 without errors?	Go to "END Repair Procedure" on page END 001.	The operation of both diskette drives has been verified.
7	Diagnostic option A0 failed on diskette drive 2.	Go to step 8.	
8	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Reinstall any FRUs you already exchanged. 3. Exchange 01A-A2 H2. 4. Insert DIAG1 in diskette drive 1. 5. Set the Power Off switch to Normal, and press Power On. The MSS Basic and Extended diagnostics run. 6. Go to step 9. 	
9	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<p>Test diskette drive 1 as follows:</p> <ol style="list-style-type: none"> 1. Key in A0 and press ENTER. The optional diskette drive tests are selected. 2. Key in 1 to select diskette drive 1 and press ENTER. Diskette drive 1 is tested. 3. Go to step 11. 	
10	You had a failure on MSS Basic and Extended diagnostics.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Reinstall 01A-A2 H2. 3. Set the Power Off switch to Normal, and press Power On. 4. Go to "Diskette Drive Voltage Check" on page MSS 056. 	

Step	Condition	Instructions	Comments
11	Did diagnostic option A0 run on diskette drive 1 without errors?	Test diskette drive 2 as follows: <ol style="list-style-type: none"> 1. Key in A0 and press ENTER. The optional diskette drive tests are selected. 2. Insert DIAG1 in diskette drive 2. 3. Key in 2 to select diskette drive 2 and press ENTER. Diskette drive 2 is tested. 4. Go to step 13. 	
12	Diagnostic option A0 failed on diskette drive 1.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Reinstall 01A-A2 H2. 3. Set the Power Off switch to Normal, and press Power On. 4. Go to "Diskette Drive Voltage Check" on page MSS 056. 	
13	Did diagnostic option A0 run on diskette drive 2 without errors?	Go to "END Repair Procedure" on page END 001.	The operation of both diskette drives has been verified.
14	Diagnostic option A0 failed on diskette drive 2.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Reinstall 01A-A2 H2. 3. Set the Power Off switch to Normal, and press Power On. 4. Go to "Diskette Drive Voltage Check" on page MSS 056. 	

Diskette Drive Voltage Check

The voltages supplied to the diskette drive must be checked at the control card test points shown on this page.

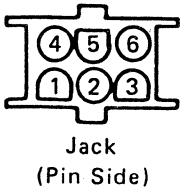
Voltages are supplied to the diskette drives from board 01A-A2 by the signal cables (01A-A2 ZD for diskette drive 1 and 01A-A2 ZF for diskette drive 2). The signal cables for the two diskette drives have the same part number.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> Open the front cover of the service panel. Slide the failing drive forward. Set the Power Off switch to Normal and press Power On. Check the control card for the DC voltages listed in "DC Voltages for the Diskette Control Card" <p>Warning: You are working in an area of limited space. Do not short the control card pins to ground.</p> <p>Go to step 2.</p>	
2	Are all voltages correct (+ or - 9%)?	Go to "Diskette Drive Exchange" on page MSS 057.	
3	A voltage is missing or out of tolerance.	Use the connector locations in the table and check for the failing voltage at PS102. Go to step 4.	For the locations on PS102 see Volume A07, Locations, "Power Supplies."
4	Are the voltages correct at PS102?	Exchange or repair the signal cable to the failing drive. Go to "END Repair Procedure" on page END 001.	
5	The voltages are not correct at PS102.	Exchange or repair PS102. Go to "END Repair Procedure" on page END 001.	The diagrams for PS102 are shown in Volume C01.

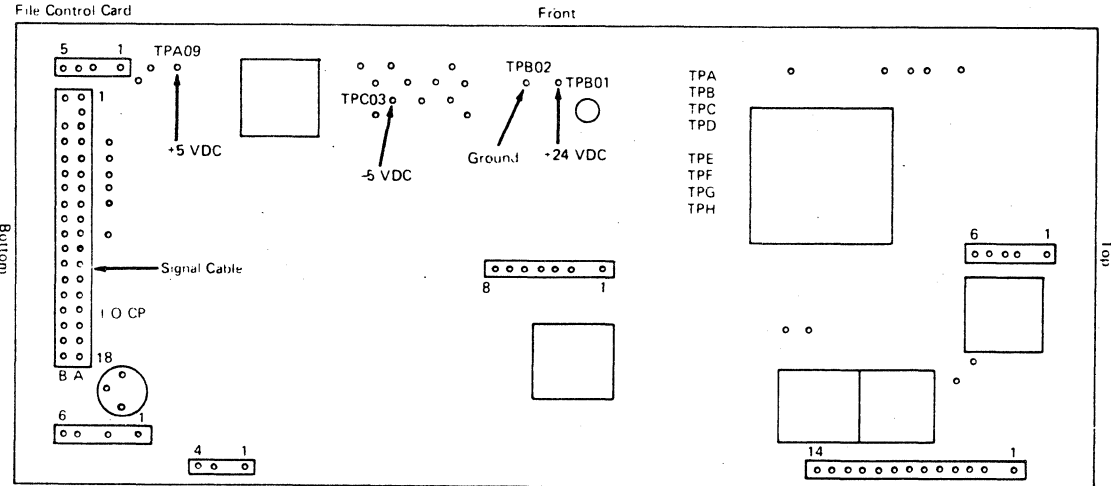
DC Voltages for the Diskette Control Card

PS102 Output	Connector	Drive 1 or Drive 2	Cable	Control Card	Voltage	
V				I/O CP	Test Point	
+ 5 Vdc	J10/P10-2	J11/P11-2	---->>	I/O B01	TPA09	+ 5 Vdc
+24 Vdc	J10/P10-5	J11/P11-5	---->>	I/O B03	TPB01	+24 Vdc
- 5 Vdc	J10/P10-6	J11/P11-6	---->>	I/O A01	TPC03	- 5 Vdc
Gnd	J10/P10-4	J11/P11-4	---->>	I/O A18	TPB02	Ground

Pin Locations for J10 and J11



Control Card Test Points



Seq AH135	PN 0445779 Pg 2 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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Diskette Drive Exchange

You have exchanged the DDA on the failing drive and checked the voltages on the control card without finding the problem. This procedure will have you exchange the failing diskette drive and the cable to the drive.

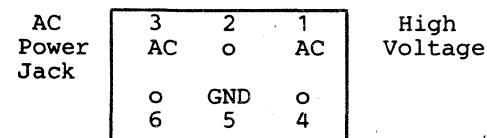
Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Exchange the failing diskette drive. Insert DIAG1 in diskette drive 1. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics are run. Go to step 2. 	
2	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<p>Test diskette drive 1 as follows:</p> <ol style="list-style-type: none"> Key in A0 and press ENTER. The optional diskette drive tests are selected. Key in 1 to select diskette drive 1 and press ENTER. Diskette drive 1 is tested. Go to step 4. 	
3	MSS Basic and Extended diagnostics failed.	Go to step 8.	
4	Did diagnostic option A0 run without errors on diskette drive 1?	<p>Test diskette drive 2 as follows:</p> <ol style="list-style-type: none"> Key in A0 and press ENTER. The optional diskette drive tests are selected. Install DIAG1 in diskette drive 2. Key in 2 to select diskette drive 2 and press ENTER. Diskette drive 2 is tested. Go to step 6. 	
5	Diagnostic option A0 failed on diskette drive 1.	Go to step 8.	
6	Did diagnostic option A0 run without errors on diskette drive 2?	Go to "END Repair Procedure" on page END 001.	The operation of both diskette drives has been verified.
7	Diagnostic option A0 failed on diskette drive 2.	Go to step 8.	

Step	Condition	Instructions	Comments
8	Go to the Instructions column.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Exchange the cable to the failing drive. Insert DIAG1 in diskette drive 1. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics are run. Go to step 9. 	
9	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	<p>Test diskette drive 1 as follows:</p> <ol style="list-style-type: none"> Key in A0 and press ENTER. The optional diskette drive tests are selected. Key in 1 to select diskette drive 1 and press ENTER. Diskette drive 1 is tested. Go to step 11. 	
10	MSS Basic and Extended diagnostics failed.	Go to step 15.	
11	Did diagnostic option A0 run without errors on diskette drive 1?	<p>Test diskette drive 2 as follows:</p> <ol style="list-style-type: none"> Key in A0 and press ENTER. The optional diskette drive tests are selected. Install DIAG1 in diskette drive 2. Key in 2 to select diskette drive 2 and press ENTER. Diskette drive 2 is tested. Go to step 13. 	
12	Diagnostic option A0 failed on diskette drive 1.	Go to step 15.	
13	Did diagnostic option A0 run without errors on diskette drive 2?	Go to "END Repair Procedure" on page END 001.	The operation of both diskette drives has been verified.
14	Diagnostic option A0 failed on diskette drive 2.	Go to step 15.	
15	Go to the Instructions column.	<ol style="list-style-type: none"> Reinstall any FRUs you exchanged. Call for assistance on this problem. 	You have exchanged the DDA, SP, diskette drive, and drive cable without finding the problem.

AC Power Plug Check

You determined that the drive motor of the failing drive is not turning. Use the diagram of the power plug and the following procedure to check the ac voltage at the drive motor.

DANGER
Hazardous voltages are present on the connector.



For power logics, see Volume C01.

Step	Condition	Instructions	Comments
5	You got an MSS Code or a reference code during the MSS Basic or Extended diagnostics.	Check that all cables and connectors to the diskette drive are correctly installed. If you have a reference code displayed, follow the instructions on the screen. If you have an MSS Code, go to "MSS Repair Procedure" on page MSS 001 with your new symptom.	You have a new problem on the system which may be caused by the new diskette drive.

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> Set the Power Off switch on the service panel to Power Off. Unplug the ac power cable on the rear of the failing diskette drive. Check the plug and jack connector for loose or broken pins. Set the Power Off switch to Normal, and press Power On. <p>DANGER <i>Hazardous voltages are present on the connector</i></p> <ol style="list-style-type: none"> Check for 200 to 240 Vac between connector pins 1 and 3. Set the service panel Power Off switch to Power Off. Reconnect the ac power cable. Go to step 2. 	<p>The voltage you measure should be the same as the system phase-to-phase ac input voltage.</p> <p>For pin locations on the plug, see the diagram on this page.</p>
2	Is the voltage missing or low at the power connector?	Use the wiring diagram in Volume C01 to correct the problem. When complete, go to "END Repair Procedure" on page END 001.	
3	The ac voltage is correct at the power connector.	<ol style="list-style-type: none"> Exchange the failing diskette drive. Insert DIAG1 into diskette drive 1. Set the Power Off switch to Normal, and press Power On. MSS Basic and Extended diagnostics run. Go to step 4. 	
4	Do you have the message MSS EXTENDED DIAGNOSTICS COMPLETED?	Go to "Diskette Drive 1 Verification" on page MSS 059.	

Diskette Drive 1 Verification

You have isolated and exchanged the failing FRU. Now verify the operation of diskette drives 1 and 2 before going to the "END Repair Procedure."

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the Power Off switch on the service panel to Power Off. 2. Ensure DIAG1 is in diskette drive 1. 3. Set Power Off to Normal, and press Power On. MSS Basic and Extended diagnostics run. 4. When the message MSS EXTENDED DIAGNOSTICS COMPLETED is displayed, key in A0, and press ENTER. The diskette drive optional diagnostics are selected. 5. Key in 1, and press ENTER. Diskette drive 1 is tested. 6. Go to step 2. 	If the MSS Basic and Extended diagnostics detect an error, go to "START Repair Procedure" on page START 001 with your new symptom.
2	Did diagnostic option A0 run without errors?	<p>You have verified the operation of diskette drive 1.</p> <p>Go to "Diskette Drive 2 Verification."</p>	
3	Do you have an error stop and a reference code with a UU field of F5 displayed?	<p>Check that the cards and cables in the area where you were working are properly seated.</p> <p>You may have an intermittent problem. If you cannot resolve the problem, call for assistance.</p>	Reference code format is: UU RRRR IS.
4	Do you have an error stop and a reference code with a UU field that is not F5?	Follow the instructions on the system console.	You have a new problem on the system.

Diskette Drive 2 Verification

The failing diskette drive has been repaired and the operation of diskette drive 1 verified. Verify the operation of diskette drive 2 and go to "END Repair Procedure"

Step	Condition	Instructions	Comments
1	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Select diagnostic option A0, and press ENTER. The optional DDA/diskette tests are selected. 2. Insert DIAG1 in diskette drive 2. 3. Key in 2, and press ENTER. Diskette drive 2 is tested. 4. Go to step 2. 	
2	Did diagnostic option A0 run without errors?	Go to "END Repair Procedure" on page END 001.	You have fixed the problem and verified the operation of both diskette drives.
3	Do you have an error stop and a reference code with a UU field of F5 displayed?	<p>Check that the cards and cables in the area where you were working are properly seated.</p> <p>You may have an intermittent problem. If you cannot resolve the problem, call for assistance.</p>	Reference code format is: UU RRRR IS.
4	Do you have an error stop and a reference code with a UU field that is not F5?	Follow the instructions on the system console.	You have a new problem on the system.

END Repair Procedure

Read down the **Condition** column until you find a question you can answer "yes" or a statement that matches the conditions you have. Then do the instructions in the **Instructions** column.

Step	Condition	Instructions	Comments
1	Is the machine still failing?	Invoke your support structure. Return here when the problem is resolved.	The problem has not been resolved, and the machine is still failing.
2	The machine is not failing.	<ol style="list-style-type: none"> 1. Ensure the FUNC1 diskette is in diskette drive 1 and the FUNC2 diskette is in diskette drive 2. 2. Set the CE Mode switch to Normal. 3. Press Power On/IML on the operator control panel. 4. If the Local Time Clock screen displays, enter the date and time on the fields on the screen and press ENTER. 5. Go to step 3. 	The Local Time Clock screen displays only if the MSS was powered down.
3	Did you change the system configuration or UCWs?	Transfer the UCW and configuration data to the other system diskette. Go to step 4.	For additional information, refer to Volume A08, Console Functions, "(QFM) Module Transfer."

Step	Condition	Instructions	Comments
4	Did you exchange any FRUs while working on the problem?	<ol style="list-style-type: none"> 1. Set the CE Mode switch to CE Mode. 2. Press MODE SEL. The General Selection screen displays. 3. Key in P8, and press ENTER. The Problem Analysis FRU Logs screen displays. 4. Key in the following information: <ol style="list-style-type: none"> a. The two-digit PA log number you were working with. b. The four-digit FRU location you exchanged. c. The letter Y. <p>Example: If you were working with PA log number 04 and exchanged the FRU at A2B2, key in 04A2B2Y.</p> 5. Press ENTER. Y is placed next to the FRU you exchanged. 6. Repeat the two previous steps for any other FRUs you exchanged. 7. Go to step 5 on page END 002. 	If you have no PA log number or the FRU location you exchanged is not on the Problem Analysis FRU Logs screen, go to step 5. Record the use of all FRUs exchanged even if you later removed them because they did not fix the problem.

Step	Condition	Instructions	Comments
5	Did you leave a substitute part number in the machine?	<ol style="list-style-type: none"> 1. Ensure the CE Mode switch is set to CE Mode. 2. Press MODE SEL. The General Selection screen is displayed. 3. Key in P7, and press ENTER. The first of three Component Locations and Part Numbers screens is displayed. 4. Key in the FRU location you exchanged followed by an equal sign (example: A1N2=), and press ENTER. The old part number is displayed on the selection line (example: A1N2=9999999). 5. Key in the new part number in place of the old part number, and press ENTER. The new part number is stored on the diskette. 6. Repeat the two previous steps for any other FRUs with a substitute part number you left in the machine. 7. Go to step 6. 	<p>All of the machine FRUs are not listed on the PA7 screens. If the FRU you replaced is not on one of the screens, go to step 6.</p> <p>For power components, use the chart on page START 015 to determine the code used for the FRU location.</p>
6	Did you update any part numbers on the PA Option 7 screen?	<ol style="list-style-type: none"> 1. Press MODE SEL. The General Selection screen is displayed. 2. Key in QFM and press ENTER. The module transfer screen is displayed. 3. Key in X next to PROBLEM ANALYSIS. 4. Insert the backup FUNC1 diskette in diskette drive 2 and press ENTER. The new part number is transferred to the backup diskette. 5. Return the FUNC2 diskette to diskette drive 2. 6. Go to step 7. 	Update the backup system diskette with the new part number(s).

Step	Condition	Instructions	Comments
7	Go to the Instructions column.	<ol style="list-style-type: none"> 1. Set the CE Mode switch to CE Mode. 2. Key in QPE, and press ENTER. SERVICE ACTION COMPLETED is displayed on line 20 of the console display. 3. Set the CE Mode switch to Normal. 4. Ensure all other switches (including control unit Local/Remote switches and I/O Power Hold) are set to Normal. 5. Key in QL, and press ENTER. When the Program Load screen displays, ensure the correct mode is set. 6. Key in QLM, and press ENTER to IML the processing unit. 7. Complete your call report. 	If necessary, use the QLI screen to change the mode for IML. Refer to Volume A08, Console Functions, "(QLI) Alter IML Parameters."