I B M

PUBLICATION DRAWING

PART NUMBER	4177106
DATE	CHANGE NUMBER
26 MARCH 82	838739
22 SEP 82	838798
25 FEB 83	826324
27 MAY 83	826380
15 FEB 84	826487
04 DEC 84	839954
04 NOV 85	842350
01 AUG 86	842375

BASE FORM NUMBER SY31-8999

TITLE. IBM SYSTEM/36 GENERAL MAINTENANCE
INFORMATION MANUAL

NOTE. ALL ITEMS FOLLOWING THE LAST ROW OF ASTERISKS ARE TO BE SHIPPED.

CHANGE NUMBER	FORM / TNL	DESCRIPTION / COMMENTS
**********	**********	**********
838739	SY31-8999-B	CHECKPOINT 9 DRAFT
**********	**********	**********
838798	SY31-8999-C	CHECKPOINT 11 DRAFT
**********	**********	**********
826324	SY31-8999-D	PRELIMINARY VERSION - FIRST EDITION
**********	**********	**********
826380	SY31-8999-0	RELEASE 1, FIRST CUSTOMER SHIP
**********	**********	**********
826487	SY31-8999-1	RELEASE 2, FIRST CUSTOMER SHIP
**********	**********	**********
839954	SY31-8999-2	RELEASE 3, FIRST CUSTOMER SHIP
**********	**********	**********
842350	SY31-8999-3	RELEASE 4, FIRST CUSTOMER SHIP
**********	**********	**********
842375	SY31-8999-4	RELEASE 5, FIRST CUSTOMER SHIP

IBM System/36

IBM System/36 General Maintenance Information Manual

Order Number
SY31-8999-4

Section 01

IBM System/36

General Maintenance Information Manual

Order Number
SY31-8999-4

Fifth Edition (October 1986)

This major revision makes obsolete SY31-8999-3. Changes were made to reflect technical changes made to the product.

IBM has prepared this maintenance manual for use by hardware service representatives in the maintenance or repair of the specific machines indicated. IBM makes no representations that it is suitable for any other purpose.

Information contained in this manual is subject to change from time to time. Any such change will be reported in subsequent revisions or Technical Newsletters.

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates.

Publications are not stocked at the address given below. Requests for IBM publications should be made to your IBM representative or to your IBM-approved remarketer.

This publication could contain technical inaccuracies or typographical errors. A form for readers' comments is provided at the back of this publication. If the form has been removed, comments may be addressed to IBM Corporation, Information Development, Department 245, Rochester, Minnesota, U.S.A. 55901. IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Preface

This MIM (maintenance information manual) contains general procedures and information needed to service System/36. These procedures are specifically for the system, or are common to most I/O attachments, controllers, adapters, and devices attached to the system.

This manual uses a specific range of words so that the text can be understood by customer engineers in countries where English is not the normal language.

It is assumed that the hardware service representative using this manual has been trained on System/36, as described in the *System/36-5360 New Product Planning Technical Newsletter*.

About This Manual

The service procedures in this manual are numbered. When necessary:

- The MAPs (maintenance analysis procedures) send you to a specific procedure in this manual.
- Other System/36 MIMs send you to a specific procedure in this manual.
- Steps in a procedure in this manual send you to another procedure in this manual or in other System/36 MIMs.
- The index sends you to procedures in this manual (or in other manuals) where key words can be found.

There is also a sequence number in the upper right- or left-hand corner of pages after the table of contents and before Appendix A. This page number is used to quickly reference information during telephone assistance.

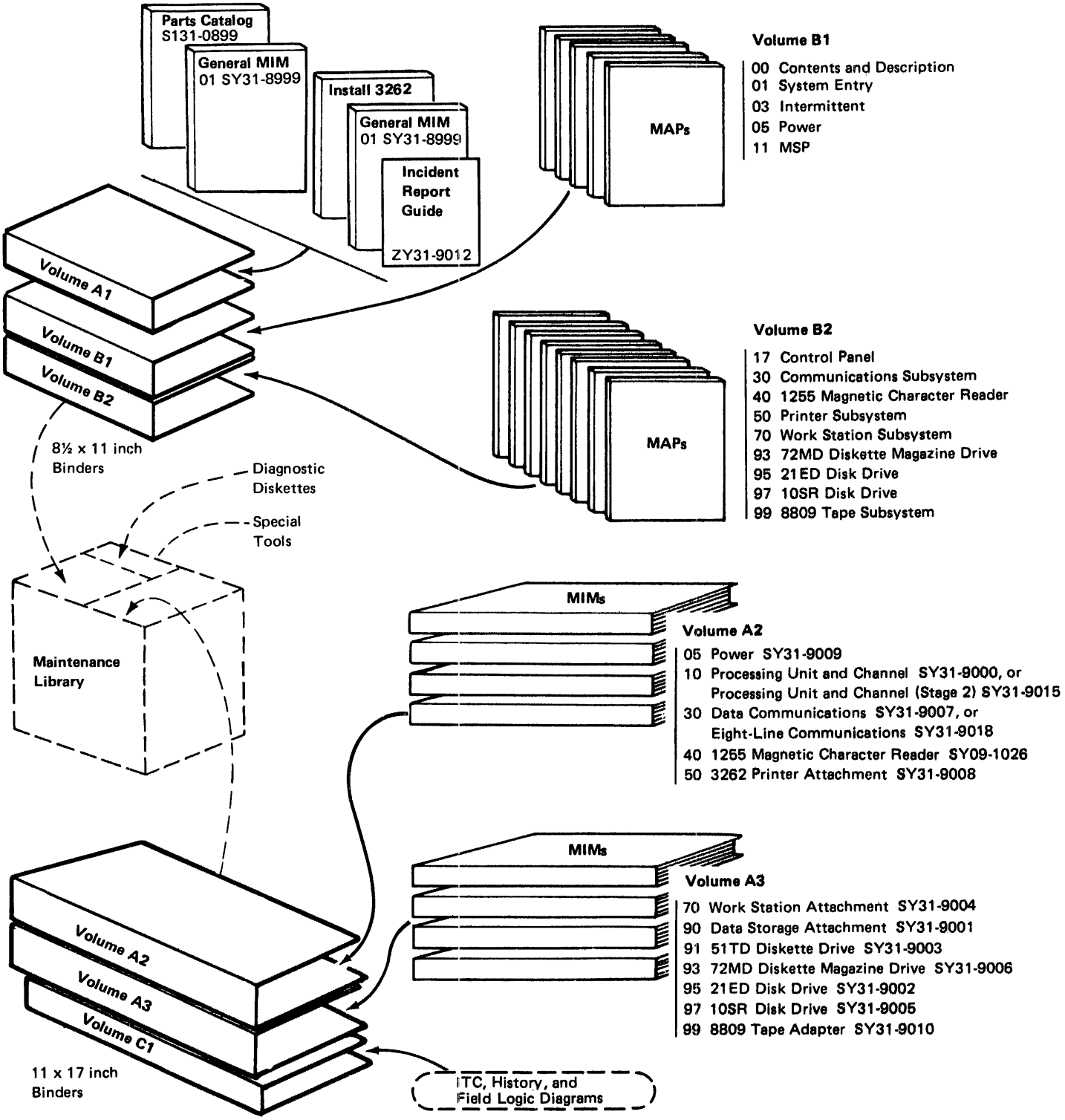
This manual also includes:

- A general contents page showing the major sections of this manual, the reference number of each section contents page, and the general procedure titles in each section.
- A contents page for each section showing all procedures in the section.
- A tab page (xiii), showing the locations of the major sections in this manual.
- A glossary of terms and abbreviations used in the System/36 hardware maintenance information manuals.

Note: Some of the display examples in this manual may not be exactly the same as the displays on your system.

RELATED PUBLICATIONS

System/36 Hardware Publications



Other System/36 Publications

Customer/Operator Publications

- *Setting Up Your Computer*, SA21-9430
  Contains procedures to:
  - Install System/36
  - Attach work stations
  - Attach communications lines
  - Attach other I/O devices
  - Test System/36

- *Managing Your System*, SC21-9452
  Contains commands and procedures for a person who is operating System/36 from the system console, an alternative console, or a subconsole display station.

- *Using Your Display Station*, SC21-9455
  Contains command and sort procedures for a person who is operating a data display station or a command display station.

- *System Messages*, SC21-7938
  Contains the system, licensed program, and utility program displayed messages, their causes, and their recovery procedures

- *System Problem Determination*, SC21-7919
  Contains error analysis information to isolate and determine the cause of system and communications problems

Service Publications

- *Program Service Information*, LY21-0590
  Contains the system overview and information on:
  - Function control flow
  - SSP interface
  - Problem diagnosis
  - Program support actions

- *System Data Areas*, LY21-0592
  Contains information to support SSP problem diagnosis, including:
  - Data area descriptions
  - Feature support information for programming languages and utilities

- *Program Problem Diagnosis and Diagnostic Aids*, SY21-0593
  Contains diagnostic aids for diagnosing SSP problems

- *Functions Reference Manual*, SA21-9436
  Contains information needed to understand the system from a hardware point of view, including:
  - System instructions
  - Status bytes
  - Controls and indicators
  - Device characteristics

- *Control Storage Service Information*, LY31-0650
  Contains information to:
  - Analyze microcode problems
  - Make microcode temporary fixes

Safety

Danger and Caution Notices

In the System/36 maintenance manuals, the word *DANGER* informs you of conditions that could cause personal injury or death. (The word *HAZARDOUS* or *WARNING* may appear on machine labels and field-supply items.) The word *CAUTION* informs you of an action that could cause damage to a program, to a device or system, or to data.

There are blank lines below each notice. You can write these notices in your own words on the blank lines.

Danger Notices

A danger notice appears on page x of this *Safety* section, under *Electrical Accidents—First Aid*.

Caution Notices

Caution notices appear in the following procedures:

01-077 Service Keys
01-140 Loading the System
01-210 Using the Alter/Display Utility
01-240 Displaying or Altering Storage
01-246 Displaying or Altering Real Main Storage
01-248 Displaying or Altering Translated Storage
01-410 Running the CSIPL Load Tests
01-420 Running the CSP Tests
01-450 Running the MSP Tests
01-470 Free-lance Display Real Main Storage (Not Stage 2 and Stage 3 Systems)
01-473 Free-lance Alter Real Main Storage (Not Stage 2 and Stage 3 Systems)
01-490 Free-lance Display Translated Storage (General Information)
01-493 Free-lance Alter Translated Storage (General Information)
01-840 Updating UDT Entries and Microcode on Disk
01-845 Verifying UDT Entries on Disk
01-850 Patching Data on Diskette
01-852 Patching Data on Disk

Rules for Safety

If you know the safety rules for working with electrical and mechanical equipment and you observe the rules, you can work safely with IBM equipment.

Do not fear electricity, but respect it.

While you are maintaining IBM equipment, observe every safety precaution possible and the following safety rules.

Work Environment

- Do not work alone in hazardous conditions or near equipment that has dangerous voltage. Always inform your manager if the conditions or voltages are a possible problem.
- Always look for possible hazards in your work environment. Examples of hazards are: moist floors, nongrounded extension cables, power surges, and missing grounds.
- Do not perform any action that makes the product unsafe or that causes hazards for customer personnel.
- Before you start the equipment, ensure that other personnel are not in a hazardous position.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that the sleeves of your clothing are fastened or are rolled above the elbow.
- Insert your necktie into your clothing or fasten it with a clip (preferably nonconductive) at approximately 8 centimeters (3 inches) from its end.
- Lift the equipment or parts by standing or pushing up with your stronger leg muscles; this action removes the strain from the muscles in your back. Do not lift any equipment or parts that are too heavy for you.
- Put removed machine covers in a safe place while you are servicing the machine. Reinstall the covers before returning the machine to the customer.
- Always keep your tool kit away from walk areas so that other persons cannot trip over it. For example, keep the kit under a desk or table.
- Observe good housekeeping practices in the area of the machines while you are performing maintenance and after completing it.
- After maintenance, reinstall all safety devices, such as guards, shields, labels, and grounding devices. Exchange safety devices that are worn or defective. Remember, the safety devices protect you from a hazard. You destroy their purpose if you do not reinstall them when you have completed the service call.

Electrical Safety

- If possible, always disconnect the power-supply cables before you work on a machine. When you switch off power at the wall box, lock the switch in the off position or attach a DO NOT OPERATE tag (Z229-0237) to the switch.

  Note: A non-IBM attachment to an IBM machine may be powered from another source and may be controlled by a different switch or circuit breaker.

- Switch off all power before:
  - Removing or assembling the main units of the equipment
  - Working near power supplies
  - Inspecting power supplies
  - Installing changes in machine circuits

- If you really need to work on equipment that has exposed live electrical circuits, observe the following precautions:
  - Ensure that another person who understands the power off controls, is near you. Another person must be there to switch off the power, if necessary.
  - Do not wear jewelry, chains, metal-frame eyeglasses, or other personal metal objects. Remember, if the metal touches the machine, the flow of current increases because the metal is a conductor.
  - Use only insulated probe tips or extenders. Remember, worn or cracked insulation is unsafe.
  - Use only one hand while you are working on live equipment. Keep the other hand in your pocket or behind your back. Remember, there must be a complete circuit for an electrical shock to occur. This precaution prevents your body from completing the circuit.
  - When you use a tester, set its controls correctly and use insulated probes that have the correct electrical specification.
  - Do not touch objects that are grounded, such as metal floor strips, machine frames, or other conductors. Use suitable rubber mats obtained locally, if necessary.

- When you are working with machines having voltages more than 30 Vac or 42 Vdc, observe the special safety instructions given in customer engineering memorandums (CEMs).

- Never assume that power has been removed from a circuit. First, ensure that power has been removed.

- Do not touch live circuits with the surface of a plastic dental mirror. Remember, the surface of the dental mirror is conductive and can cause damage or personal injury.

- If an electrical accident occurs:
  - Use caution. Do not be a victim yourself.
  - Switch off the power.
  - Instruct another person to get medical aid.
  - If the victim is not breathing, perform mouth-to-mouth rescue breathing. See *Electrical Accidents—First Aid*.

Mechanical Safety

Do not touch moving mechanical parts when you are lubricating a part, checking for play, or doing other similar work.

Safety Glasses

Wear safety glasses when:

- Using a hammer to drive pins or other similar parts
- Using a power drill
- Using a spring hook to attach or remove a spring
- Soldering parts
- Cutting wire or removing steel bands
- Using solvents, chemicals, or cleaners to clean parts
- Working in any other conditions that could injure your eyes

Tools, Testers, and Field-Use Materials

- Do not use tools or testers that have not been approved by IBM. Ensure that electrical hand tools, such as Wire-Wrap[1] tools and power drills, are inspected regularly.
- Exchange worn or broken tools or testers.
- Do not use solvents, cleaners, or lubricants that have not been approved by IBM.

Summary

Prevention is the main aid to electrical safety. Always think about electrical safety and use good practice; for example:

- Ensure that the customer's power receptacle matches the IBM equipment specifications.
- Inspect power cables and plugs; check for loose, damaged, or worn parts.
- Review the procedures in the maintenance documents before you remove a part that can hold an electrical charge from the machine. Carefully discharge the necessary parts exactly as instructed by the procedure.

Never assume that a machine or a circuit is safe. No machine is always completely safe. You may not know the exact condition of a machine because, for example:

- The power receptacles could be wrongly wired.
- Safety devices or features could be missing or defective.
- The maintenance or machine level change history could be wrong or not complete.
- The design could have a problem.
- The machine could have damage, caused when it was shipped.
- The machine could have an unsafe change or attachment.
- An engineering change or a sales change could be wrongly installed.
- The machine could be deteriorated because it is old, or because it operates in an extreme environment.
- A part could be defective, therefore causing a hazard.
- A part could be wrongly assembled.

These are some of the ways that the condition of the machine could affect safety. Before you start a service call or procedure, have good judgment and use caution.

[1]Trademark of the Gardner-Denver Co.

Electrical Accidents–First Aid

When performing rescue procedures for an electrical accident, do as follows:

- *Use Caution:* If the victim is touching the electrical-current source, remove the power. To do this, you may need to operate the room emergency power-off switch or the disconnecting switch. If you cannot find the switch, use a dry wooden rod or other nonconductive object to pull or push the victim away so he or she is not touching the electrical-current source.

- *Work Quickly:* If the victim is unconscious, he or she may need mouth-to-mouth rescue breathing and possibly external cardiac compression if the heart is not beating.

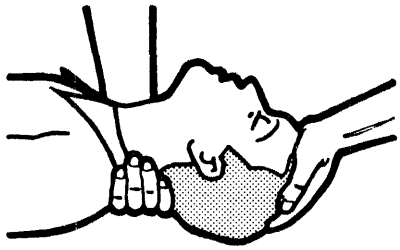
- *Get Medical Aid:* Instruct another person to dial the rescue service (such as the ambulance or the hospital).

Determine if the victim needs mouth-to-mouth rescue breathing. If he or she does, perform the following steps:

DANGER

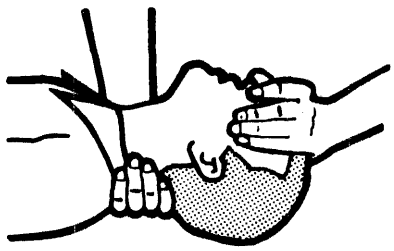
Use extreme care when you perform rescue breathing for a victim who may have breathed in toxic fumes. Do not breathe in air that the victim has breathed out.

1. Prepare for rescue breathing:
   a. Ensure that the victim's airway is open and that it is not obstructed; check the mouth for objects that may be obstructing the airway, such as chewing gum, food, dentures, or the tongue.
   b. Place the victim on his or her back, put one hand behind the victim's neck, and put the other hand on his or her forehead.
   c. Lift the neck with one hand, and tilt the head backward by pressing on the forehead with the other hand.



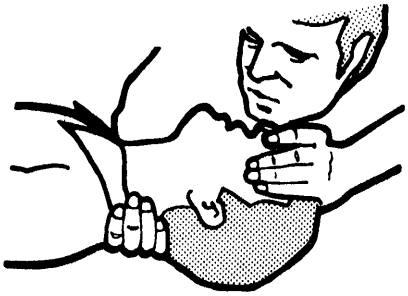
2. Look, listen, and feel to determine if the victim is breathing freely.
   a. Put your cheek near the victim's mouth and nose.
   b. Listen and feel for the breathing out of air. At the same time, look at the victim's chest and upper abdomen to see if they move up and down.

3. If the victim is not breathing correctly:
   a. Keep the victim's head tilted backward. Continue to press on the forehead with your hand; at the same time, position the same hand so that you can pinch together the victim's nostrils with your thumb and finger.



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

c. Remove your mouth to let the victim breathe out, and check that the victim's chest moves down.



d. Repeat steps b and c once every 5 seconds either until the victim breathes for himself or herself, or until medical aid comes.

Reporting Accidents

Report, to your field manager, all electrical accidents, possible electrical hazards, and accidents that nearly occurred. Remember, an accident that nearly occurs might be caused by a design problem; your immediate reporting ensures that the problem will be solved quickly.

Also report all small electrical shocks. Remember, a condition that causes a small shock need only differ slightly to cause serious injury.

General Contents

This page is intentionally left blank.

Maintenance Overview and System Controls

01-000 Contents

MAINTENANCE OVERVIEW

SYSTEM CONTROLS

About This Section

This section contains general information about system maintenance and system controls.

- *Maintenance Overview*: This part of the section gives you:
  - An overview of the System/36 service call
  - An overview of the service tools available for concurrent and dedicated maintenance
  - Information about tools and test equipment, including:
    a. Tools shipped with the system
    b. Tools shipped with special features
    c. Tools you may need, but are not shipped
    d. Logic probes
  - Tables for locating maintenance information
  - Instructions for identifying System/36 models
  - Instructions for working with ESD-sensitive cards

- *System Controls:* This part of the section shows the arrangement of the system control panel and describes the following:
  - Operator lights
  - Operator keys
  - Power and storage security
  - Service displays
  - Service lights
  - Service keys
  - Mode menu
  - Interrupt levels

01-010
The System/36 Service Call

When you take a System/36 service call, you should understand some general procedures. This manual contains procedures and information about:

- Starting the system
- Displaying and changing system information
- Displaying error information
- Testing control storage, main storage, and the control storage and main storage processors
- Testing communications and remote work stations
- Testing I/O devices
- Updating diagnostic and system programs

You use the system console or local work station and the system control panel to operate and service the system.

- The system console or local work station displays messages that indicate the system status or that request operator actions.
- The control panel contains operator keys and lights that are used to operate the system, and service keys and lights that are used to service the system. The control panel also contains displays that are used to analyze system problems (01-300).

Each procedure in this manual assumes that power is on and, when necessary, the procedure indicates which diagnostic control program is needed.

Start the service call, using the general service call procedure.

General Service Call Procedure

If available, obtain the system reference code as follows:

- Off-site:
  - From the call dispatcher
  - From the customer
- On-site, using:
  - System messages
  - ERAP history tables
  - SYSTEST results

Is a system reference code available?

Y **N**

- **N**
  - Verify customer problem determination procedures.
  - Go to system entry MAP 0101, entry point A.

- **Y**
  - Use the system reference code information on microfiche, or MAPs 0113 through 0118 to:
    a. Replace indicated FRUs
    b. Run MDIs for indicated device
    c. Go to indicated hard-copy MAP
    d. Go to indicated MIM procedure

Have you diagnosed and repaired the problem?

Y **N**

- **N**
  - Go to system entry MAP 0101, entry point A.

End of service call.

Note: If you have used this procedure and have not repaired the problem, use the general free-lance procedure to determine the failure symptoms (step 1), and determine what you can do to diagnose and repair the problem (step 2).

General Free-Lance Procedure

Step 1
Determine the Failure Symptoms

Get the failure symptoms from the customer/operator; determine one or more of the following:

- Is the customer using the system now?
- Are any of the following red lights on?
  - Processor Check
  - Program Check
  - Console Check

  Note: Power checks, temperature checks, and some processor checks are analyzed by the system entry MAP 0101.
- Did the customer use the system problem determination procedures?
- Has the system or device failed the same way before?
- Is the failure intermittent?
- Can the system be used for concurrent maintenance?
- What device failed?
- What job failed?
- Have any new program changes (PTFs, MPTFs, or new releases) been added?
- Have any new features been added?
- Have any new jobs been added?

Continue with step 2.

Step 2
Determine What You Can Do to Diagnose and Repair the Problem

Use the information in this step to determine what you can do to diagnose and repair the problem.

- Use the customer problem determination procedures to see if you should continue.
- For problems associated with loading the system, run the CSIPL load tests.
- For a device identified as the problem:
  - Run the device MDIs
  - Run the device exercisers
  - Run the system test on the device
  - Inspect the error log for the latest device errors
- Run ERAP for all devices and look for:
  - Time and date associated with the existing problem
  - Frequency of retries
- Run the system test for all devices to see if the problem still occurs.
- Have the customer start the failing job to see if the problem still occurs.
- Check for problems associated with media, including:
  - Diskettes
  - Disk
  - Communications lines
  - Tape
- For programming problems, call the IBM PSR (programming service representative).

Have you diagnosed and repaired the problem?

Y **N**

- Use the intermittent MAPs, or return to system entry MAP 0101, entry point A.

End of service call.

This page is intentionally left blank.

01-020
Concurrent Service Tools

You can perform maintenance on System/36 in concurrent mode, with customer jobs running. You use the system console or local work station to start concurrent maintenance.

You and the customer can share the system so you can diagnose and repair external devices (not part of the base system) while customer jobs are running. The tables in this procedure identify the tasks associated with concurrent maintenance.

General Concurrent Tasks

Service Task	Service Tool	Diskette	Procedure
Give the prompt to display or print the selected system data for the tape volumes.	TAPESTAT		01-000
Select options from menus to perform specific tasks.	HELP		01-165
Perform online problem determination.	PROBLEM		01-170
Select options from menus to run service aid procedures.	SERVICE		01-170
List the UDT entries on the diskette.	CONCR	DIAG21[1]	01-290
Update the UDT entries on the diskette.	CONCR	DIAG21[1]	01-835
List the system records from disk or diagnostic diskettes.	CONCR	DIAG21[1]	01-285
Initialize a system (SSP) diskette.	INIT		01-815
Initialize a diagnostic diskette.	DIAGINIT		01-815
Copy files from an SSP diskette to one or more other SSP diskettes with the same format.	COPYI1		01-820
Copy files from any diagnostic diskette to one or more other diagnostic diskettes with the same format.	DIAGCOPY		01-820
Add entries to the system service log.	SERVLOG		01-170
Specify a display station to be used to enter any procedure or command to service the system.	START		01-170
Return a display station to its normal use.	STOP		01-170
Select options from menus to measure system actions.	SMF		
Start the system measurement program.	SMFSTART		01-170
Stop the system measurement program.	SMFSTOP		01-170
Print a formatted report of the data collected by the system measurement program.	SMFPRINT		01-170
Change the status of a display station, printer, system printer, or the diskette drive to online or offline.	VARY		01-165
Print selected entries from the system history file.	HISTORY		01-170
Display selected entries from the system history file.	HISTCRT		01-170
Sign on the system.	Sign-on menu		01-160
Sign off the system.	OFF		01-160
Power off the system.	POWER OFF		01-115

[1]For Stage 3 systems, use the DIAG41 diskette.

01-020 (continued)
Concurrent Service Tools

Service Tools for Hardware Problem Determination

Service Task	Service Tool	Diskette	Procedure
Collect program check information.	Procedure		01-340
Create APAR diskette when a program check occurs.	APAR		01-125
Select options from menus to diagnose device failures concurrently with customer jobs.	CONCR	DIAG21[1]	01-155
Select options from menus to display or print the error log reports.	ERAP		01-360
Select options from menus to test diskettes and the diskette drive.	TESTDSKT		01-740
Select options from menus to perform the local work station verification tests.	TESTREQ		01-535
Perform online problem determination for diskette, tape, local area network, communications, and local work stations.	PROBLEM		01-170

[1]For Stage 3 systems, use the DIAG41 diskette.

Service Tools for Communications Problem Determination

Service Task	Service Tool	Diskette	Procedure
Display communications configuration data.	D COMM		01-605
Perform online problem determination.	PROBLEM		01-170
Select options from menus to perform the communications online tests.	COMMTEST		01-610
Select options from menus to perform the BSC online tests.	BSCTEST	DIAG23[1]	01-620
Select options from menus to perform the SDLC online tests.	SDLCTEST	DIAG23[1]	01-625
Select options from menus to perform the remote work station tests.	STATEST		01-630
Temporarily change some communications parameters.	ALTERCOM		30-445
Permanently change some communications parameters.	SETCOMM		30-440
Select options from menus to perform the remote work station verification tests.	TESTREQ		01-635
Verify that an SSP-ICF subsystem is correctly installed.	ICVERIFY		01-170
Run the SSP-ICF debug program.	ICFDEBUG		01-170

[1]For Stage 3 systems, use the DIAG43 diskette.

Service Tools for Software Problem Determination

Service Task	Service Tool	Diskette	Procedure
Copy diagnostic information to disk or diskette.	APAR	APAR	01-860
Print or display the selected system data areas from disk or from a diskette made by the APAR procedure.	DUMP		01-865
Print or display the selected information from the dump file.	DFA		01-870
Set the address compare dump values for programs running in main storage.	SETDUMP		01-880
Keep a record of selected events on the system.	TRACE		01-875
Install or remove PTFs (program temporary fixes) or MPTFs (microcode program temporary fixes) to disk.	PTF		01-855
Patch selected diskette sectors.	PATCH		01-850
Patch selected disk sectors.	PATCH		01-852
Trace the processing of a procedure.	// DEBUG		
Cause OCL statements to be logged in the system history file.	// LOG		

01-025
Dedicated Service Tools

You can perform maintenance on System/36 in dedicated mode without customer jobs running. You control the system from the control panel or the system console (or any local work station when the SSP is running). This lets you diagnose and repair any system problem.

Service Tools for CSIPL Failures

Service Task	Service Tool	DIAGxx or Disk	Procedure
Interpret I/O wrap errors.	System entry MAP 0116		01-380
Display CSIPL error data in control storage.	Alter/display		01-393
Interpret CSIPL error data in control storage.			01-397
Enter options to the control panel display to run the CSIPL load tests.	CSIPL load tests	DIAG21[1] or disk	01-190 01-410
Enter options to the control panel display to test the control storage processor.	CSIPL load tests	DIAG21[1]1 or disk	01-420
Enter options to the control panel display to test the main storage processor.	CSIPL load tests	DIAG21[1] or disk	01-450

[1]For Stage 3 systems, use the DIAG41 Diskette.

Service Tools for Device Failures

Service Task	Service Tool	DIAGxx or Disk	Procedure
Test one or more devices, using the system test under SSP.	SYSTEST	Customer PD diskette	01-720
Select options from menus to run the MDIs to a specific device.	DCP menu/MDI	DIAG21[1] or disk	01-710
Select options from menus to loop or step TUs to a specific device.	DCP menu/TU select	DIAG21[1] or disk	01-717
Free-lance disk drive problems associated with disk media errors, using PUMP.	DCP menu/utilities	DIAG22[2] only	01-730
Free-lance disk drive problems not associated with disk media errors.	DCP menu/exercisers	DIAG21[1] only	01-735
Free-lance diskette drive problems not associated with diskette media errors.	DCP menu/exercisers	Disk only	01-745
Free-lance 3262 Printer problems.	DCP menu/exercisers	DIAG21[1] or disk	01-755
Free-lance 8809 tape drive problems.	DCP menu/exercisers	DIAG21[1] or disk	01-765
Free-lance 1255 magnetic character reader problems.	DCP menu/exercisers	DIAG21[1] or disk	01-775

[1]For Stage 3 systems, use the DIAG41 diskette.
[2]For Stage 3 systems, use the DIAG42 diskette.

Service Tools for Local Work Station Failures

Service Task	Service Tool	DIAGxx or Disk	Procedure
Use the control panel to run the local work station MDIs.	Work station MDIs	DIAG21[1] or disk	01-510
Use the control panel to run the local work station TUs.	Work station TUs	DIAG21[1] or disk	01-520

[1]For Stage 3 systems, use the DIAG41 diskette.

Service Tools for Diagnostic Program Maintenance

Service Task	Service Tool	DIAGxx or Disk	Procedure
Patch #LIBRARY on disk.	PATCH	SSP running	01-852
Select options from menus to patch diagnostic programs, using the program patch utility.	DCP menu/utilities	DIAG21[1] or disk	01-830
List or change the UDT entries on the DIAG21 diskette, using the system configure utility.	DCP menu/utilities	DIAG21[1] only	01-835
Verify the UDT entries on disk	Alter/display utility	SSP running	01-845
Move the microcode and diagnostic programs from the diagnostic diskettes to disk, using the system customize utility.	DCP menu/utilities	DIAG21[1] or disk	01-840

[1]For Stage 3 systems, use the DIAG41 diskette.

01-030
Tools and Test Equipment

Tools Shipped with Base System

The following tools are shipped with System/36 and stored on site in the maintenance library container.

Quantity	Item	IBM Part
6	6-inch red jumpers	829117
1	Printer jumper	5785274

Tools Not Shipped

The following tools might be needed, but are not shipped with System/36.

Quantity	Item	IBM Part
1	Integrated logic probe with accessories, or Integrated logic probe without accessories	453222 8550201
1	General logic probe II	453212
1	General logic probe II test lead extender	453605
1	Digital meter	9900628
1	475 oscilloscope	453215
1	EIA interface tester	453637
1	PT2 tester	1749268
1	PT2 line monitor	1749296
1	Cable extender	5998763
1	Keytop puller	9900373
1	Read pattern tape	4297736

Tools Shipped with Features

The following tools are shipped with specific System/36 features and stored on site in the maintenance library container.

Feature	Item	IBM Part
21ED disk drive	30-inch jumper	2545579
51TD diskette drive	Timing pins	5562019
	Spring	4240631
	Clip	4240632
72MD diskette magazine drive	Adjusting pins	2462574
	Adjusting tool	2462612
8809 tape drive 6157 tape drive	Skew tape Wrap connector	432641 4178459
1255 magnetic character reader	Wrap connector	2446184
Communications	Wrap card (board) (30-210)	4233787 (Note 2)
	Cable tower wrap plug (Note 1)	8636690
V.35 communications	Cable wrap plug (Note 2)	2771168
EIA	Cable and wrap plug (31-210)	8636752
Autocall	Cable and wrap plug (32-210)	8636758 (Note 3)
1200 bps IM nonswitched (Note 2)	Cable and wrap plug (33-230)	8636754
DDSA	Cable and wrap plug (34-210)	8636753

Notes:

1. The cable tower wrap plugs are attached to the cable tower (see 30-210 for communications or 98-210 for 6157 tape).
2. MLCA feature (4500) only.
3. Part 2597423 is used if ELCA feature (4550) is installed.

System/36 Wrap Plug Wiring Information

Use the following table to locate the wiring information for specific communications wrap cards and plugs.

Wrap Card/Plug	MIM	MAP	Chart
2-ended wrap card (board) (see note)	30-210	3020	B
Cable tower wrap connector	30-210	3020	A
EIA	31-210	3020	A
Autocall	32-210	3014	A
1200 IM (see note)	33-230	3058	2
DDSA	34-210	3026	3
V.35		3080	A
X.21		3074	C
6157 wrap connector	98-210		
Note: MLCA feature (4500) only.			

01-030 (continued)
Tools and Test Equipment

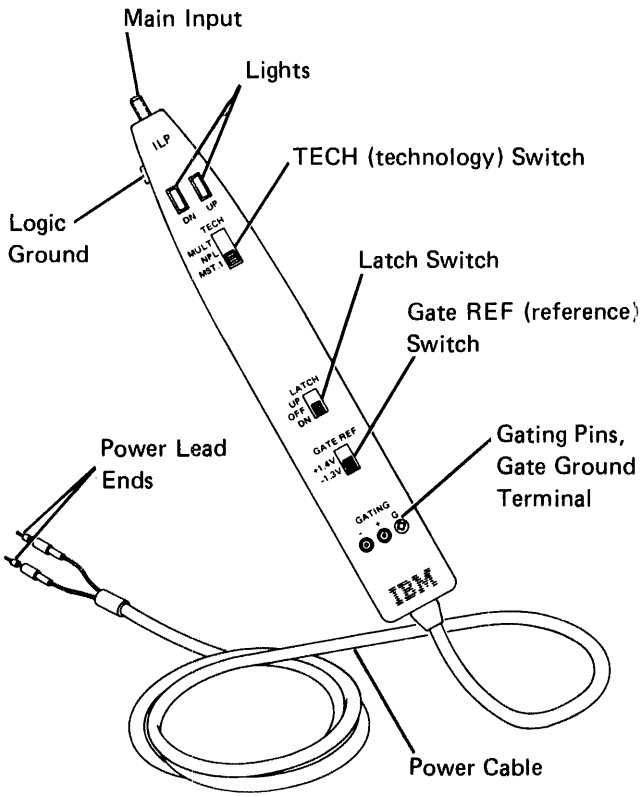
Logic Probes

There are two logic probes in general use in the field. They are:

- Integrated logic probe (IBM part 453222)
- General logic probe II (IBM part 453212)

Integrated Logic Probe

For more information about the use of the integrated logic probe, see the *IBM Integrated Logic Probe Operator's Guide*, S226-3951.



Part Numbers:
453222 (with accessories)
8550201 (without accessories)

P/N 2588263
Gate Jumper
300 mm
(12 inch)
(one)

P/N 8550208
Gate Resistor
Jumper
300 mm
(12 inch)
(one)

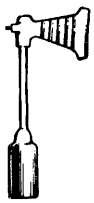
P/N 8565942
Ground Lead
300 mm
(12 inch)
(one)

P/N 5500900
Ground Lead
125 mm
(5 inch)
(one)

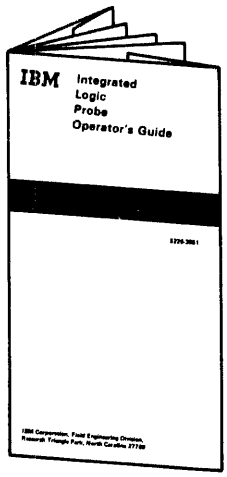
P/N 8550205
Probe
Straight Tip
(one)

P/N 453167
Tip SLT
Oscilloscope
Probe
(three)

P/N 461159
Alligator Clip
(three)



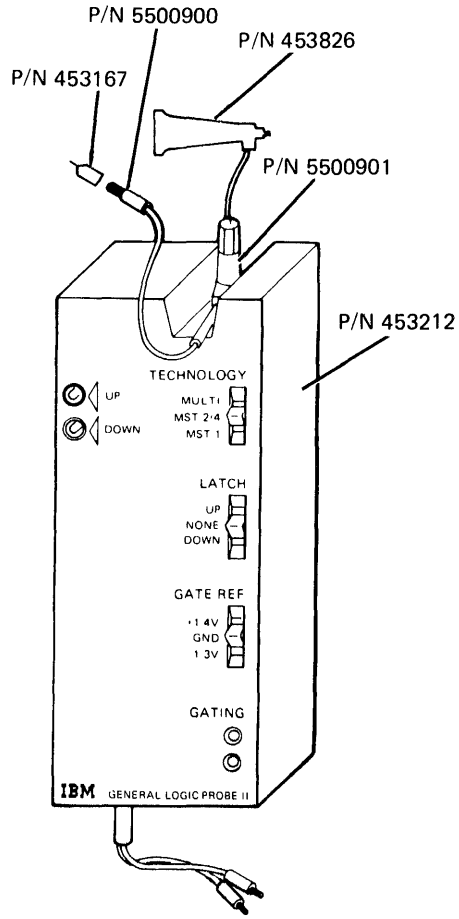
P/N 453826
Tip Assembly
Oscilloscope
Probe
(one)



Integrated Logic Probe Operator's Guide
S226-3951
(one)

General Logic Probe II

For more information about the use and maintenance of the general logic probe, see the *IBM General Logic Probe II Manual*, SY27-0127.



General Probing Information

Normal Probe Settings

When probing, the GLP or ILP is to be set in the Normal position unless directed to set in another position.

Switch	GLP	ILP
Technology switch	Multi	Multi
Latch switch	None	Off
Gate ref	+1.4 V	+1.4 or -1.3 V

What the Probe Lights Mean

When using the MAPs, use the logic probe to determine if a signal level is up, down, or pulsing.

When the Lights Are		
Up Light	**Down Light**	**The Point Being Probed Is**
○	○	Not at an up level or a down level, or there is no power to the probe.
●	○	At an up level.
○	●	At a down level.
●	●	Pulsing at a frequency of more than 30 pulses per second.
⊗	⊗	Pulsing at a frequency of less than 30 pulses per second.
⊗	●	A series of narrow positive pulses with a frequency of less than 30 pulses per second.
●	⊗	A series of narrow negative pulses with a frequency of less than 30 pulses per second.

Legend:
● On
○ Off
⊗ Blinking

Logic Probe Power

Source	Board Pin
Power (red lead)	Any D03 pin (card sockets C through T)
Ground (black lead)	Any D08 pin

01-040
Locating Maintenance Information

Use the following tables to identify and locate maintenance information.

Volume A1

Section	Type of Information
	Incident report guide
01	General MIM
	Non-CSU 3262 installation
	Safety inspection guide
	Parts catalog

Volume A2

Section	Type of Information
05	Power MIM
10	Processing unit and channel MIM
30	Data communications MIM or
	Eight-line communications MIM
39	Local area network attachment MIM
40	1255 magnetic character reader attachment MIM
50	3262 Printer attachment MIM

Volume A3

Section	Type of Information
70	Work station attachment MIM
90	Data storage attachment MIM
91	51TD diskette drive MIM
93	72MD diskette magazine drive MIM
95	21ED disk drive MIM
97	10SR disk drive MIM
98	6157 tape adapter MIM
99	8809 tape adapter MIM

Volume B1

Section	Type of Information
00	Contents and description
01	System entry MAPs, including: System reference code MAPS CSP MAPs Channel MAPs
03	Intermittent MAPs
05	Power MAPs
11	MSP MAPs

Volume B2

Section	Type of Information
17	Control panel MAPs
30	Communications subsystem MAPs
40	1255 magnetic character reader MAPs
50	3262 Printer subsystem MAPs
70	Work station subsystem MAPs
90	Data storage subsystem MAPs
91	51TD diskette drive MAPs
93	72MD diskette magazine drive MAPs
95	21ED disk drive MAPs
97	10SR disk drive MAPs
99	8809 tape subsystem MAPs

Volume C1

Type of Information
Machine history
Individual table of contents (ITC)
Field logic diagrams (see AA000 for contents)

01-045
Identifying System/36 Models

System/36 model numbers determine base main storage size, type of diskette drive, base disk drive type, and total disk storage size.

The system configure utility displays (or prints) the system serial number and model number (01-290).

Model	ID	ID	Definition
XYZ	X	A	128 K-byte base main storage
		B	256 K-byte base main storage
		C	512 K-byte base main storage
		D	1024 K-byte base main storage
	Y	1	51TD diskette drive
		2	72MD diskette drive
	Z	1	30-megabyte disk storage (one 21ED)
		2	60-megabyte disk storage (two 21EDs)
		3	200-megabyte disk storage (one 10SR Model 1)
		4	400-megabyte disk storage (two 10SRs Model 1)
		5	600-megabyte disk storage (three 10SRs Model 1)
		6	800-megabyte disk storage (four 10SRs Model 1)
		A	758-megabyte disk storage (two 10SRs Model 1, one 10SR Model 2)
		B	1116-megabyte disk storage (two 10SRs Model 1, two 10SRs Model 2)
		J	358-megabyte disk storage (one 10SRs Model 2)
		K	716-megabyte disk storage (two 10SRs Model 2)
		L	1074-megabyte disk storage (three 10SRs Model 2)
		M	1432-megabyte disk storage (four 10SRs Model 2)

Notes:

- If the system is a Stage 2 system, Stage 2 is printed on the control panel label.
- If the system is a Stage 3 system, Stage 3 is printed on the control panel label.
- If the system is a Stage 2.1 system, 2.1 is printed on the control panel label. Use Stage 2 maintenance procedures for a Stage 2.1 system.

01-050
Working with ESD-Sensitive Cards

Many System/36 logic cards are sensitive to electrostatic discharge (ESD). To diagnose specific ESD problems, go to MAP 0309.

Use the ESD handling kit (IBM part 6428316) when handling or installing ESD-sensitive cards. Read the instructions located inside the top cover of the carrying case.

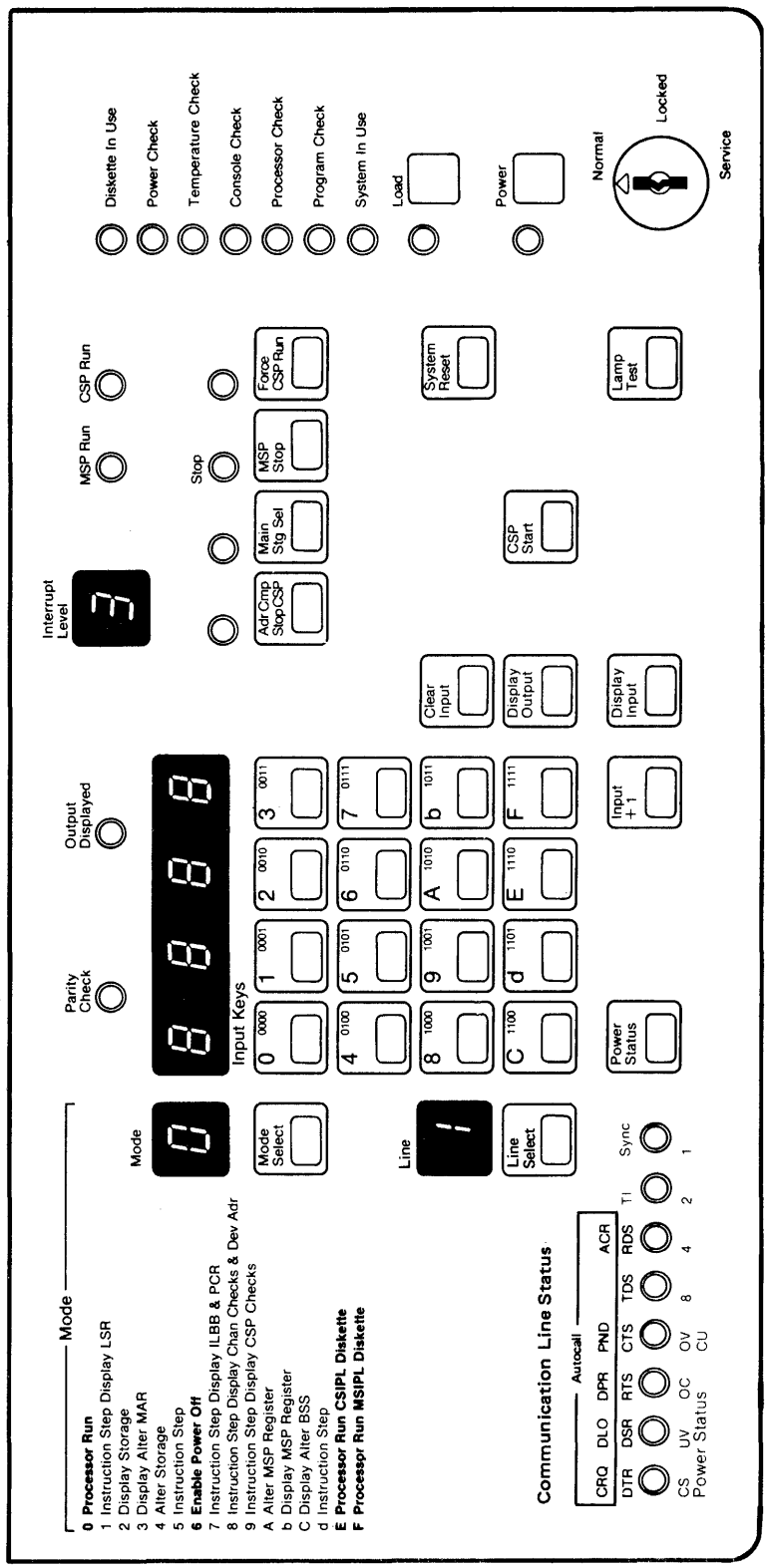
01-055
System Controls

The interface between you (or the operator) and the system includes the system console, other local or remote work stations, and the system control panel.

- The system console displays messages that show the system status or that request operator actions.
- Other local or remote work stations display messages that show the status of a job or that request operator actions.
- The control panel contains operator keys and lights that are used to operate the system, and service keys and lights that are used to service the system. The control panel also contains displays that are used to analyze system problems.

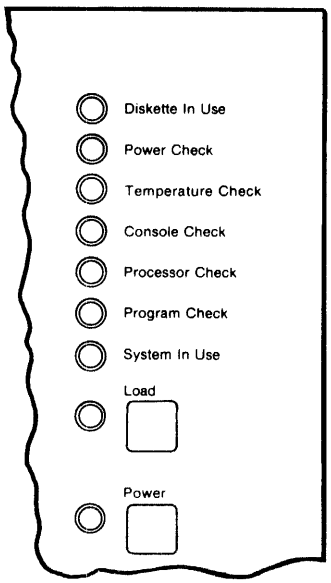
The figure on this page shows the physical arrangement of the System/36 control panel.

See 10-215 for control panel FRU locations.



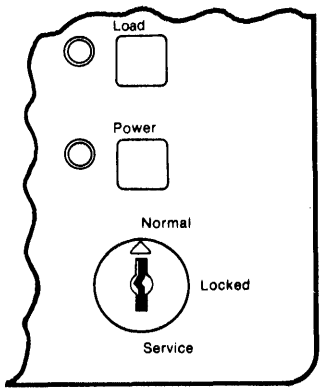
01-060
Operator Lights

Light Name	Meaning (If Active)	What You Should Do
Diskette in Use	The diskette storage device is allocated.	Information only
Power Check	A power check has occurred; the system power is off.	Display the power status (01-350)
Power Check (blinking)	The system is getting ready to power off. This occurs only if 21ED disk drives are installed.	Information only
Temperature Check	The temperature in the logic gate or the power area is too high; the system power is off.	Determine the cause (05-820)
Console Check	A message cannot be displayed on the system console.	Determine the cause (01-345)
Processor Check	A hardware error has occurred; the system cannot recover.	Check for a valid system reference code and determine the cause (01-310)
Program Check	A program error has occurred; the system cannot recover.	Save the system data areas (01-125) and determine the cause (01-340)
System in Use	Programs or commands are active in main storage, or a diagnostic test is looping. When active, the load key function is inhibited.	Information only
Load	The Load key was pressed. The Load light remains active until 4096 bytes of data are loaded to control storage.	Information only
Power	The system power is on.	Information only



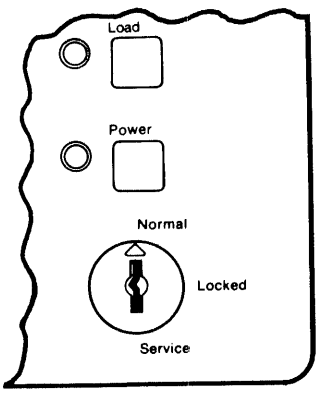
01-065
Operator Keys

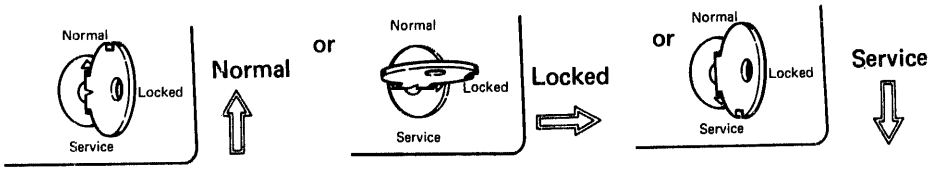
Key Name	Operator Action	System Action	Key Function Inhibited When
Load	Press to load	• Sets the control panel display to output mode • Performs a system reset • Activates the Load light • Starts the CSIPL sequence	The System in Use light is on unless the Processor Check light also is on; or when mode E or mode F is selected and the Security switch is not in the Service position.
Power	Press to power on	• Activates the power supplies • Activates the Power light • Performs a power-on reset • Selects mode 0 • Selects communications line 1	The Security switch is in the Locked position.
Power	Select mode 6; press the Power key to power off	• Activates the Power Check light (if 21ED disk drives are installed, the Power Check light blinks for 15 seconds) • Deactivates the power supplies • Deactivates the Power light	Mode 6 is not selected.



01-068
Power and Storage Security

Security Switch Position	Power On Inhibited	Functions Inhibited
Normal	No	• Load key (modes E and F) • Force CSP Run key • MSP Stop key • CSP Start key for: – Mode 2: Display storage – Mode 3: Display/alter MAR – Mode 4: Alter storage – Mode A: Alter MSP register – Mode b: Display MSP register
Locked	Yes	• Load key (modes E and F) • Force CSP Run key • MSP Stop key • CSP Start key for: – Mode 2: Display storage – Mode 3: Display/alter MAR – Mode 4: Alter storage – Mode A: Alter MSP register – Mode b: Display MSP register
Service	No	All functions are enabled
Note: The Security key can be removed in any position.		





01-070
Service Displays

Display Unit	Meaning	Additional Information
Mode	This display indicates which mode is active.	Mode Menu (01-080) Service Keys (01-077)
Line	This display indicates which communications line status is being displayed in the Communications Line Status lights.	Display Communications Status (01-355) Service Keys (01-077)
Interrupt Level	This display indicates the active interrupt level.	Interrupt Levels (01-085)
Input/Output Display	This is a 4-character hexadecimal display of input or output address and data information. **Note:** The characters B and D appear as lowercase characters b and d. *Input Display (Output Displayed Light Off)* The input display shows data entered with the Input keys, the Clear Input key (displays 0000), or the Input + 1 key (displays the input data increased by 1). The input display is selected by one of the following actions: • Press the Display Input key. • Press the Clear Input key. • Press one of the 16 Input keys. • Press and hold the Input + 1 key. • Select mode 1, mode 4, or mode A. **Note:** Releasing the Input + 1 key causes the output to be displayed and activates the Output Displayed light. *Output Display (Output Displayed Light On)* The output display shows output address and data information. **Exception:** When you select mode 4 (alter storage) or mode A (alter MSP register), the input data is also the displayed output data until you press the CSP Start key; then zeros appear in the output display. The output display is selected by one of the following actions: • Press and release the Display Output key. • Press and release the CSP Start key. • Select a different mode (except modes 1, 4, and A). • Press and release the Load key. • Press and release the Input + 1 key. The output display also is selected by a hardware request from CSP (CSP is not running).	Service Keys (01-077)

01-073
Service Lights

Light (Status)	Meaning	Additional Information
Parity Check (on)	A parity error has occurred on data to the control panel display.	
Output Displayed (on)	Data from the CSP bus is displayed in the control panel display.	Service Keys (01-077) Service Displays (01-070)
Output Displayed (off)	Data from the control panel input register is displayed in the control panel display.	
Adr Cmp Stop CSP (on)	The control storage processor stops on a CSP access to main storage (01-215) when the address in the MSP address compare register (ACR) is equal to the storage address and the Main Stg Sel light is on, or stops at a control storage address (01-216) when the address in the control panel input register is equal to the storage address and the Main Stg Sel light is off.	Service Keys (01-077)
Adr Cmp Stop CSP (off)	Address compare stop is not active.	
Main Stg Sel (on)	Main storage is selected.	Service Keys (01-077) Service Displays (01-070)
Main Stg Sel (off)	Control storage is selected.	
MSP Run (on)	The main storage processor is running.	Service Keys (01-077) Service Displays (01-070)
MSP Run (off)	The main storage processor is stopped.	
MSP Stop (on) (not Stage 2 systems)	The 'MSP stop' latch is active; the main storage processor stops at the end of the present instruction.	Service Keys (01-077) Service Displays (01-070)
MSP Stop (off) (not Stage 2 systems)	The 'MSP stop' latch is not active.	
MSP Stop (blinks) (Stage 2 systems)	If the 'MSP stop' latch is not active, it is activated and the main storage processor stops at the end of the present instruction. If the 'MSP stop' latch is active, it is deactivated.	Service Keys (01-077) Service Displays (01-070)
CSP Run (on)	The control storage processor is performing instructions, cycle steal operations, or control panel operations.	Service Keys (01-077) Service Displays (01-070)
CSP Run (off)	The control storage processor is stopped.	
Force CSP Run (on)	The control storage processor is forced to run with machine check interrupts inhibited.	Service Keys (01-077) Service Displays (01-070) Forcing Storage to Known Data (01-235)
Force CSP Run (off)	The control storage processor runs normally; machine check interrupts are permitted.	

01-077
Service Keys

Input Keys (0 through F)

The 16 Input keys are used to enter address and data information to the system. The information is stored in a 4-character input register and is displayed in the control panel display. When a key is pressed, the control panel display is set to the input mode and the information in the input register is moved to the left; the last character entered is the rightmost character displayed.

The Input keys also are used with the Mode Select key to select a mode and with the Line Select key to select a communications line.

Display Input Key

The Display Input key is used to deactivate the Output Displayed light, causing the contents of the control panel input register to be displayed in the control panel display. The control panel display is automatically set to input mode when you select mode 1, 4, or A.

Display Output Key

The Display Output key is used to activate the Output Displayed light, causing the CSP bus information to be displayed in the control panel display.

Clear Input Key

The Clear Input key is used to deactivate the Output Displayed light and reset the control panel register to 0000.

Input + 1 Key

The Input + 1 key is used to increment (add 1 to) the control panel input register. When you press and hold this key, the control panel display is set to the input mode, displaying the incremented value. When you release this key, the control panel display is set to the output mode.

CSP Start Key

The function of the CSP Start key is determined by one of the following conditions:

- If the control storage processor (CSP) is stopped, and one of the three processor run modes (0, E, or F) is selected, pressing the CSP Start key causes normal CSP processing to continue.

- If CSP is stopped, and any mode except one of the three processor run modes is selected, pressing the CSP Start key causes CSP to start, perform the next instruction or control panel operation, and stop.

CAUTION
If CSP is running and CSIPL is not complete, pressing the CSP Start key can cause a processor check.

- If CSP is running and CSIPL is complete, pressing the CSP Start key has no effect.

- If the Security switch is set to the Locked or Normal position, the CSP Start key function is inhibited for some modes (01-068).

01-077 (continued) Service Keys

Lamp Test Key

The function of the Lamp Test key is determined by one of the following conditions:

- If power is on, pressing and holding the Lamp Test key causes all lights and displays to become active; the character 8 should be displayed. When you release this key, the lights and displays return to their original status.
- If power is off, pressing and holding the Lamp Test key causes only the Power Check light, the Temperature Check light, and the eight Communications Line/Power Status lights to become active. When you release this key, the eight Communications Line/Power Status lights are deactivated, and the two check lights are returned to their original status.

System Reset Key

The function of the System Reset key is determined as follows:

- If the CSP Run light is off (and, for Stage 2 systems only, the Force CSP Run light is off), pressing the System Reset key causes the system to perform a reset operation. However, a system reset does not change the condition of the following control panel keys or displays.
  - Adr Cmp Stop key
  - Force CSP Run key (not Stage 2 systems)
  - Display Input key or Display Output key (input or output display mode selected)
  - Main Stg Sel key (main storage or control storage selected)
  - Mode Select display
  - Communications Line display
- If the CSP Run light is on, and the selected mode is 0, E, or F, the System Reset key function is inhibited.
- If the Force CSP Run light is on (Stage 2 systems only, see 01-045), the System Reset key function is inhibited.

Address Compare Stop CSP Key

The Adr Cmp Stop CSP key is used to activate or deactivate the Adr Cmp Stop CSP light, starting or stopping an address compare stop operation.

MSP Stop Key

With the Security switch in the Service position, the MSP Stop key is used to activate or deactivate the 'MSP stop' latch.

- When the latch is activated, the MSP stops at the end of the present instruction.
- When the latch is deactivated, the MSP is enabled to continue processing.

To determine the MSP Stop light operation for each system model, see *Service Lights* (01-073).

Force CSP Run Key

With the Security switch in the Service position, the Force CSP Run key is used to activate or deactivate a CSP check run operation (01-317).

- When you press the Force CSP Run key to start a check run operation (CSP Run light on), you start the control storage processor (if the CSP is not running), and inhibit machine check interrupts.
- When you press the Force CSP Run key to stop a check run operation (Force CSP Run light off), the control storage processor continues to run unless a processor check halt instruction occurred during the force run operation, then the CSP stops. The processor check must be reset (01-313) to start the CSP again.

Main Storage Select Key

The Main Stg Sel key is used to select main storage (activating the Main Stg Sel light) or to select control storage (deactivating the Main Stg Sel light).

Mode Select Key

The Mode Select key is used to clear the Mode display. This lets you select, using the Input keys, one of the 16 modes from the mode menu (01-080). The selected mode remains active until a new mode is selected. (On Stage 2 and Stage 3 systems, pressing the Mode Select key also stops the CSP.) A power-on reset selects mode 0 (processor run).

When the Mode display is blank, only the 16 Input keys, the Power Status key, the Lamp Test key, and the Power key (if the old mode was 6) are recognized; all other key functions are inhibited.

Line Select Key

The Line Select key is used to clear the Line display. This lets you select, using the Input keys, one of the communications lines (01-355). The selected line remains active until a new line is selected. A power-on reset selects line 1.

When the Line display is blank, only the 16 Input keys, the Power Status key, the Lamp Test key, and the Power key (if the mode is 6) are recognized; all other key functions are inhibited.

If an Input key that is not valid is pressed, the line number will appear in the Communications Line display. However, no status will be displayed.

Note: If your system is not a Stage 2 or Stage 3 system, and you have the ELCA feature (4550) installed, Input key 0 must be pressed to select line 8.

Power Status Key

The Power Status key is used to display the power status.

- When you press and hold the Power Status key, the Power Status lights display the last power check condition
- When you release the Power Status key, the Power Status lights return to their normal condition, displaying the status of the selected communications line

Additional Information

01-080
Mode Menu Descriptions

Overview: Processor Run Modes

The processor run modes are the normal modes to continuously perform microinstructions. These three run modes permit different combinations of loading control storage (CSIPL) and main storage (MSIPL) from the disk and diskette storage devices.

When mode 1 through d is selected (any mode for Stage 2 systems), the control storage processor stops at the end of the present microinstruction, and the selected mode becomes active. Selecting one of the processor run modes causes the control storage processor to continuously perform microinstructions when the CSP Start key is pressed. However, modes E and F can be selected only when the Security switch is in the Service position.

Mode 0: Processor Run

Mode 0 permits loading of both control storage and main storage from disk. This mode is used for customer operations.

Mode 1: Instruction Step/Display LSR

When you select mode 1, the control storage processor stops at the end of the present microinstruction; the control panel display switches to input mode (Output Displayed light off). You can enter the address of a local storage register (LSR) in the control panel display and press the Display Output key to display the contents of the selected LSR.

Each time you press the CSP Start key, the control storage processor performs the next microinstruction and stops, displaying the contents of the selected LSR.

To display a specific LSR, go to 01-225.

Mode 2: Display Storage

Selecting mode 2 lets you display the contents of control storage addressed by the MAR (Main Stg Sel light off) or the contents of main storage addressed by the MAR (Main Stg Sel light on). One word of control storage is displayed as a 4-character value in the control panel display; one byte of main storage is displayed as the 2 rightmost characters. Ignore the 2 leftmost characters of a main storage display because they may not be valid.

To free-lance display storage, using mode 2, go to one of the following procedures:

- To display control storage, go to 01-433.
- To display real main storage, go to 01-470 (not Stage 2 systems).
- To display translated storage, go to 01-490.

Mode 3: Display/Alter MAR

When you select mode 3, the control storage processor stops at the end of the present microinstruction. The contents of the microinstruction address register (MAR) for the present interrupt level are displayed as a 4-character value in the control panel display.

To alter the MAR, go to 01-220.

Mode 4: Alter Storage

Selecting mode 4 lets you change the contents of control storage addressed by the MAR (Main Stg Sel light off) or the contents of main storage addressed by the MAR (Main Stg Sel light on). One word of control storage can be changed; one byte of main storage can be changed.

To free-lance alter storage, using mode 4, go to one of the following procedures:

- To alter control storage, go to 01-437.
- To alter real main storage, go to 01-473 (not Stage 2 systems).
- To alter translated storage, go to 01-493.

Mode 5: Instruction Step

When you select mode 5, the control storage processor stops at the end of the present microinstruction. However, the data that appears in the control panel display has no meaning. Each time you press the CSP Start key, the control storage processor performs the next microinstruction and stops.

Mode 6: Enable Power Off

When you select mode 6, the control storage processor stops at the end of the present microinstruction; the Power key is enabled. Pressing the Power key causes the system to perform a normal power-off sequence.

On systems preceding Stage 2 or Stage 3 systems (01-045), if you press the Mode key (the Mode display is blank) and mode 6 was the last mode selected, pressing the Power key causes the control storage processor to stop at the end of the present microinstruction; the system performs a normal power-off sequence.

When system power is on and mode 6 is not selected, the Power key function is inhibited.

If you press the CSP Start key when mode 6 is selected, the operation is the same as mode 5 and mode d.

To power on the system, go to 01-110; to power off the system, go to 01-115.

Mode 7: Instruction Step/Display ILBB and PCR

When you select mode 7, the control storage processor stops at the end of the present microinstruction. The contents of the interrupt level backup byte register (ILBB) are displayed as the 2 leftmost characters in the control panel display. On systems preceding Stage 2 systems, the contents of the processor condition register (PCR) are displayed as the 2 rightmost characters. On Stage 2 systems, the 2 rightmost characters are blank.

Each time you press the CSP Start key, the control storage processor performs the next microinstruction and stops, displaying the contents of the interrupt level backup byte and (on systems preceding Stage 2 systems) the processor condition register.

To display the ILBB and PCR checks, go to 01-325.

Mode 8: Instruction Step/Display Channel Checks and Device Address

When you select mode 8, the control storage processor stops at the end of the present microinstruction. The channel error byte (CEB) is displayed as the 2 leftmost characters in the control panel display; the last device address or cycle steal address that was loaded in the channel register is displayed as the 2 rightmost characters.

To display channel checks, go to 01-335.

Mode 9: Instruction Step/Display CSP Checks

When you select mode 9, the control storage processor stops at the end of the present microinstruction. The processor error byte (PEB) is displayed as the 2 leftmost characters in the control panel display; the control storage error correction code (ECC) error byte is displayed as the 2 rightmost characters.

To display CSP checks, go to 01-330.

01-080 (continued) Mode Menu Descriptions

Mode A: Alter MSP Register

Selecting mode A permits altering the contents of some main storage processor registers. With the Security switch in the Service position, each time the CSP Start key is pressed (if the MAR contains a valid MSP register address and that register is not a read-only register), the contents of the addressed MSP register are changed to the value of the 2 rightmost characters of the control panel display. However, if the addressed register is an address translation register (ATR), the contents of the register are changed to the 4-character value of the control panel display.

To alter the value of any MSP register, go to 01-230.

Mode b: Display MSP Register

Selecting mode b permits displaying the contents of some main storage processor registers. With the Security switch in the Service position, each time the CSP Start key is pressed (if the MAR contains a valid MSP register address), the contents of the addressed MSP register are displayed as the 2 rightmost characters in the control panel display. Ignore the 2 leftmost characters because they may not be valid. However, if the addressed register is the buffer compare register extended (BCRE) or an address translation register, the contents of the register are displayed as a 4-character value in the control panel display.

To display the value of any MSP register, go to 01-230.

Mode C: Display/Alter BSS

Mode C is not used. However, mode C will perform the same function as mode d.

Mode d: Instruction Step

When you select mode d, the control storage processor stops at the end of the present microinstruction. However, the data that appears in the control panel display has no meaning. Each time you press the CSP Start key, the control storage processor performs the next microinstruction and stops.

Mode E: Processor Run CSIPL Diskette

This mode permits loading of control storage and main storage from diskette.

Mode F: Processor Run MSIPL Diskette

This mode permits loading of control storage from disk and main storage from diskette.

Additional Information

Service Displays	01-070
Service Lights	01-073
Service Keys	01-077

01-085
Interrupt Levels

The Interrupt Level display is a 1-character display. This display indicates which CSP interrupt level is active. The following table shows the meaning of the character displayed for each interrupt level.

Character Displayed	Interrupt Level
Blank	Main program level
0	Machine check interrupt level
1	Interrupt level 1
2	Interrupt level 2
3	Interrupt level 3
4	Interrupt level 4
5	Interrupt level 5
6	Cycle steal (Stage 2 and Stage 3 systems, see 01-045)

To display the interrupt level backup byte (ILBB), go to 01-325.

For a description of the ILBB, see 10-506.

This page is intentionally left blank.

Starting the System

01-100 Contents

About This Section

This section describes the procedures that power on the system, power off the system, reset the system, and load the system. When there is more than one method of performing a procedure, all methods are described.

- *Powering On/Off the System*: These procedures let you:
  - Power on the system
  - Power off the system
- *Resetting the System*: These procedures let you:
  - Reset the system
  - Dump the system data areas when necessary
- *Loading the System*: These procedures let you operate the system by:
  - Loading dedicated DCP, concurrent DCP, or SSP
  - Using the Main Help menu
  - Using the Run Service Aid Procedures menu
  - Using the Diagnose Device Failures menu
- *System Service Tasks*: These procedures let you select tasks associated with:
  - Control programs
  - Diagnostic utilities
  - CSIPL load options

Procedures in other sections of this manual assume that power is on, and specify which diagnostic control program is needed.

01-110
Powering On the System

To Power On the System

1. Ensure that:
   a. The system power plug is installed in the grounded power outlet.
   b. Circuit breaker CB1 is on.
   c. The Unit Emergency switch is in the Power Enable position.
   d. The Security switch is in the Normal or Service position (01-068).

2. Press the Power key.

When you press the Power key, the system:

- Activates the power supplies
- Activates the system Power light and, if the 3262 Printer is installed, activates the 3262 Power light
- Performs a power-on reset
- Selects mode 0 (processor run)
- Selects communications line 1

To Force Power On

If it is necessary to force the power on to diagnose power problems, go to MAP 0500.

Associated Procedures

Additional Information

Other System Publications

Operating Your Computer

01-115
Powering Off the System

To Power Off Using the Control Panel

1. Select mode 6 (enable power off). The control storage processor stops at the end of the present microinstruction; the Power key is enabled.

2. Press the Power key.

When you press the Power key, the system:

- Activates the Power Check light (if 21ED disk drives are installed, the Power Check light blinks for 15 seconds).

- Deactivates the power supplies.

- Deactivates the system Power light and, if the 3262 Printer is installed, deactivates the 3262 Power light.

To Power Off Under SSP Using the System Console

Key in POWER OFF.

If jobs are running or system tasks are active that cannot be interrupted, the system displays a message at the system console.

If the power off command is run, the system:

- Activates the Power Check light (if 21ED disk drives are installed, the Power Check light blinks for 15 seconds).

- Deactivates the power supplies.

- Deactivates the system Power light and, if the 3262 Printer is installed, deactivates the 3262 Power light.

Associated Procedures

Powering On the System	01-110
Displaying Power Status	01-350

Additional Information

Working with ESD-Sensitive Cards	01-050
System Controls	01-055

Other System Publications

Operating Your Computer

01-120
Resetting the System

Before you perform a system reset, inspect the control panel display for a valid system reference code (01-370). If a processor check has occurred, the system reference code also is stored in the machine check microinstruction address backup (MAB) register (01-225).

To Reset the System

1. Select mode 1 to ensure that the CSP is stopped.
2. Press the System Reset key.

When you press the System Reset key, the system performs a reset operation.

A system reset does not change the condition of the following control panel keys or displays:

- Adr Cmp Stop key
- Force CSP Run key
- Display Input key or Display Output key (input or output display mode selected)
- Main Stg Sel key (main storage or control storage selected)
- Mode display
- Communications Line display

Associated Procedures

Using the System Termination Utility	01-125
Displaying Processor Checks	01-310

Additional Information

System Controls	01-055

01-125
Using the System Termination Utility

```
                    *** SYSTEM TERMINATION UTILITY ***
A system dump has been requested.  This utility will copy problem
diagnosis data to diskette or tape.  At IPL the system will prompt
you for additional information to be copied.


System reference code..................... 0041

Copy the data to diskette or tape?......D,T,C,D
  (D-copy to diskette, T-copy to tape, C-cancel)


 |-------------------------------------------------------------------|
 |  Number of diskettes needed    |   Diskette format (Bytes/Sector) |
 |-------------------------------------------------------------------|
 |              04                |   Type 2D FORMAT2 (1024)         |
 |              04                |   Type 2D FORMAT  (256)          |
 |              13                |   Type 1  FORMAT2 (512)          |
 |              15                |   Type 1  FORMAT  (128)          |
 |-------------------------------------------------------------------|
```

When a program check occurs, the system termination utility can be loaded. This utility lets you dump the system data areas to save information associated with the program check.

Also, if other conditions occur that make it necessary to load the system again, you may have to reset the system to clear the check condition. Before you load the system again, you can save the system data areas using the system termination utility.

The APAR procedure (01-860) should be run at the next IPL to collect additional information on the dump diskettes.

Note: The System Termination Utility display shown is for a system with tape.

Associated Procedures

Dumping the System Data Areas	01-260
Displaying Processor Checks	01-310
Collecting Information about Program Checks	01-340
Analyzing Console Checks	01-345

Additional Information

System Controls	01-055

To Start the System Termination Utility

1. Inspect the control panel display for a valid system reference code (01-370).
2. Select mode 1 to ensure that the CSP is stopped.
3. Press the System Reset key.
4. Select mode 0 (processor run).
5. Press the CSP Start key.
6. When the System Termination Utility display appears, you can copy the problem diagnosis data to diskette or tape.
7. When a message appears indicating that you can load the system, go to one of the following procedures:

   Loading the System (01-140)
   Loading Dedicated DCP (01-150)
   Loading and Starting SSP (01-160)

   If you are loading SSP again, you can use ERAP (01-360) to display the error history logs.

01-140
Loading the System

CSIPL diagnostics and wrap tests automatically test most of the system logic (control storage processor, main storage processor, and data channel) and attachment logic each time the Load key is pressed. This testing verifies that important parts of the system are working OK.

If an error occurs during system loading, a message is displayed on the system console; or, if the console is not working or is not available, a system reference code is displayed in the control panel display (01-370).

To Load the System

1. Select mode 0, E, or F. (To select mode E or F, the Security switch must be in the Service position.)

2. Use the Input keys to enter a Load option.

3. Ensure that the System In Use light is off, unless the Processor Check light is on. The Load key function is inhibited if the System In Use light is on (01-065).

CAUTION

If the Processor Check light is on, inspect the control panel display for a valid system reference code (01-370) before you press the Load key.

4. Press the Load key. When you press the Load key, the system:
   a. Sets the control panel display to output mode, and forces the display to FFFF
   b. Resets part of the system (the main storage processor is not reset)
   c. Activates the Load light (the Load light is deactivated when 4096 bytes of data are loaded to control storage)
   d. Starts the CSIPL sequence

Associated Procedures

Additional Information

Load Options

Type of Load	Run Mode	Load Option
Load the system from disk, run all wrap tests for normal customer operation, and display the system sign-on prompt.	0	0000
Load the system from disk, bypass all wrap tests, MSP tests, and main storage tests, initialize main storage, and display the system sign-on prompt. Customer jobs will run if no hardware errors occur. However, the disk must contain correct configuration data.	0	FF00
Load the system from the DIAG21 diskette (DIAG41 for Stage 3 systems), run all wrap tests, and display the dedicated DCP Main menu.	E	0000
Load the system from the DIAG21 diskette (DIAG41 diskette for Stage 3 systems), bypass the configuration sensitive CSP tests, bypass the MSP load tests, bypass all wrap tests, initialize 128K bytes of main storage, and display the dedicated DCP Main menu. This option is normally used to load the system from a diskette that does not contain device configuration data (only the system UDT entry), or from a diskette that does not contain the correct configuration data.	E	FF00
Load the system from disk, bypass all wrap tests, and display the dedicated DCP Main menu.	F	F800
Load the system from disk, run all wrap tests, and display the dedicated DCP Main menu.	F	F801

Special-Purpose Load Options

Type of Load	Run Mode	Load Option
Load the system from the DIAG21 diskette (DIAG41 for Stage 3 systems), run only the CSP and MSP tests. Bypass all other wrap tests and controller initialization. This option is used by the system entry MAPs (see MAP 0190, entry point A) to diagnose channel problems.	E	FFF0
Load the system from disk, run only the CSP and MSP tests. Bypass all other wrap tests and controller initialization. This option is used by the system entry MAPs (see MAP 0190, entry point A) to diagnose channel problems.	F	F8F0
Load the system from disk and run all wrap tests. Then, load the SSP control storage code from disk and the main storage code from diskettes. This option loads SSP from SSP diskettes.	F	0000
Load the system from disk and bypass all wrap tests. Then, load the SSP control storage code from disk and the main storage code from diskettes. This option loads SSP from SSP diskettes.	F	FF00

01-140 (continued) Loading the System

CSIPL Sequences

The following sequences show the process of loading the system for modes 0, E, and F.

Mode 0: Processor Run

When you select mode 0 (processor run) and press the Load key, the system:

- Loads control storage from the control storage library on disk
- Deactivates the Load light
- Runs the basic CSP tests
- Loads and runs the remaining CSP tests
- Loads and runs the MSP tests and main storage tests if option 0000 is selected, or bypasses the MSP tests and main storage tests if option FF00 is selected
- Initializes the system
- Loads DCP
- Loads and runs the I/O wrap tests if option 0000 is selected, or bypasses the I/O wrap tests if option FF00 is selected
- Loads SSP (the sign-on display appears on the system console)

Mode E: Processor Run–CSIPL Diskette

When you select mode E (processor run–CSIPL diskette) and press the Load key, the system:

- Loads control storage from the control storage library on the DIAG21 diskette (DIAG41 for Stage 3 systems)
- Deactivates the Load light
- Runs the diskette loader and loads all CSP tests
- Runs all CSP tests if option 0000 is selected, or bypasses configuration sensitive CSP tests if option FF00 is selected
- Loads and runs the MSP tests and main storage tests if option 0000 is selected, or bypasses the MSP tests and main storage tests if option FF00 is selected
- Initializes the system
- Loads dedicated DCP
- Loads and runs the I/O wrap tests if option 0000 is selected, or bypasses the I/O wrap tests if option FF00 is selected (see note)
- Displays the dedicated DCP Main menu on the system console

Note: The FFF0 load option (not described above) loads the system from the DIAG21 diskette (DIAG41 for Stage 3 systems), runs the CSP and MSP tests, but bypasses all other wrap tests and controller initialization. This option is used by the system entry MAP (MAP 0190, entry point A) to diagnose channel problems.

Mode F: Processor Run–MSIPL Diskette

When you select mode F (processor run–MSIPL diskette) and press the Load key, the system:

- Loads control storage from the control storage library on disk
- Deactivates the Load light
- Runs the basic CSP tests
- Loads and runs the remaining CSP tests
- Loads and runs the MSP tests and main storage tests if option 0000 or F801 is selected, or bypasses the MSP tests and main storage tests if option FF00 or F800 is selected
- Initializes the system
- Loads dedicated DCP
- Loads and runs the I/O wrap tests if option 0000 or F801 is selected, or bypasses the I/O wrap tests if option FF00 or F800 is selected (see note)
- At this time, the selected load option determines the load function as follows:
  - If option F801 or F800 is selected, the system displays the dedicated DCP Main menu on the system console.
  - If option 0000 or FF00 is selected, the system loads SSP control storage code from disk and main storage code from diskette, and displays the sign-on menu on the system console.

Note: The F8F0 load option (not described above) loads the system from disk, runs the CSP and MSP tests, but bypasses all other wrap tests and controller initialization. This option is used by the system entry MAP (MAP 0190, entry point A) to diagnose channel problems.

01-150
Loading Dedicated DCP

Dedicated DCP is loaded from disk (mode F) or from the DIAG21 diskette (mode E). In either mode, you can run or bypass the I/O wrap tests by entering a Load option in the control panel display.

Note: For Stage 3 systems, use the DIAG41 diskette.

To Load Dedicated DCP from Disk

1. Ensure that the Security switch is in the Service position.
2. Select mode F.
3. Use the Input keys to enter F801 (run all wrap tests) or F800 (bypass all wrap tests).
4. Press the Load key.
5. Select an option from the dedicated DCP Main menu.

   When you are working with devices other than the diskette drive, or with diagnostic utilities, use the DCP supervisor option (option 3) to load diagnostics from diskette. Device diagnostics and diagnostic utilities are on diskette only.

To Load Dedicated DCP from Diskette

1. Ensure that the Security switch is in the Service position.
2. Select mode E.
3. Insert the DIAG21 diskette ((DIAG41 for Stage 3 systems, or the diagnostic magazine (01-810).

   Note: For Stage 3 systems, use the DIAG41 diskette.
4. Use the Input keys to enter 0000 (run all wrap tests) or FF00 (bypass all wrap tests).
5. Press the Load key.
6. Select an option from the dedicated DCP Main menu.

Dedicated DCP Load Options

Type of Load	Run Mode	Load Option
Load the system from the DIAG21 diskette (DIAG41 for Stage 3 systems), run all wrap tests, and display the dedicated DCP Main menu.	E	0000
Load the system from the DIAG21 diskette (DIAG41 for Stage 3 systems), bypass the configuration sensitive CSP tests, bypass the MSP load tests, bypass all wrap tests, initialize 128K bytes of main storage, and display the dedicated DCP Main menu. This option is normally used to load the system from a diskette that does not contain device configuration data (only the system UDT entry), or from a diskette that does not contain the correct configuration data.	E	FF00
Load the system from disk, bypass all wrap tests, and display the dedicated DCP Main menu.	F	F800
Load the system from disk, run all wrap tests, and display the dedicated DCP Main menu.	F	F801
Note: See also *Special-Purpose Load Options* in 01-140.		

Example Display: Dedicated DCP Main Menu

```
                        MAIN MENU

Select one of the following:                Standard Function Keys

   1. MDI MAPs                          Cmd1 - Eject diskette
   2. Exercisers                        Cmd3 - Back up to a preceding screen
   3. Supervisor Options                Cmd5 - Interrupt executing program
   4. TU Select                         Cmd7 - Return to Main Menu
   5. MDI Special                       Print- Print screen
   6. Utilities                         Roll - Roll screen Up or Down
                                        Help - Display Help text
Option: _
```

Summary of Dedicated DCP Options

- *MDI MAPs*: This option lets you run all or selected MAPs for each configured device.
- *Exercisers*: This option lets you run selected exerciser tests for each configured device.
- *Supervisor Options*: This option lets you:
  - Select the printer or system console to display the output.
  - Load the diagnostic tests from disk or diskette without loading dedicated DCP from disk again. For example, all diskette tests are located on disk. If you have loaded DCP from disk, and you want to test the diskette drive, use this option to ensure that supervisor option 3 (diagnostics from disk) is selected.
  - Use the diagnostic magazine or I/O slot 1 only (51TD default is I/O slot 1).
- *TU Select*: This option lets you free-lance I/O device problems by running selected TUs.
- *MDI Special*: This option is used by some device MDI MAPs.
- *Utilities*: This option lets you select a specific utility to perform system maintenance. These utilities include:
  - Disk utilities (PUMP)
  - System records list
  - System configure
  - System customize
  - Program patch
  - Network analysis
  - Work station cable check

Additional Information

Associated Procedures

01-155
Loading Concurrent DCP

Concurrent DCP lets you run selected device exercisers and diagnostic utilities as a job under SSP. These jobs can run concurrently with customer jobs.

The following procedures assume that SSP is loaded (01-160), customer jobs are running, and you have signed on the system. (See the customer sign-on procedures.)

Using the Concurrent Command

1. Key in CONCR.
2. Select an option from the Concurrent DCP Primary menu.
3. Follow the displayed instructions.

Using the Main Help Menu

1. If the Main Help menu is not displayed, key in HELP (01-165).
2. Select the option to perform problem determination and service.
3. Select the option to run the service aids.
4. Select the option to diagnose device failures.
5. Select the option to load concurrent DCP.
6. Select an option from the Concurrent DCP Primary menu.
7. Follow the displayed instructions.

Using the Run Service Aids Menu

1. Key in SERVICE (01-170).
2. Select the option to diagnose device failures.
3. Select the option to load concurrent DCP.
4. Select an option from the Concurrent DCP Primary menu.
5. Follow the displayed instructions.

Concurrent DCP Primary Menu

The following options appear on the Concurrent DCP Primary menu:

```
                    CONCURRENT DCP PRIMARY MENU                    W1

Select one of the following:

   1. Printer selection
   2. I/O exerciser
   3. System records list
   4. System configure

Option: _









Cmd7-End
```

Summary of Concurrent DCP Options

- *Printer selection*: This option lets you:
  - Send the output to the system printer
  - Spool the output for printing later
  - Free the system printer, or make the spooled output available for printing
- *I/O exerciser*: This option lets you run selected exerciser tests for each configured device except the disk drives and the 1255. (The disk drive and the 1255 exercisers run under dedicated DCP only.)
- *System records list*: This utility lets you list the following system records:
  - Control storage directory (on disk)
  - Patch table (on disk)
  - Diskette engineering change (EC) level records
  - Diskette directory
  - Microcode level table (on disk or diskette)
  - Prerequisite list (on disk or diskette)
- *System configure*: This option lets you work with UDT entries on the DIAG21 diskette. However, the system customize utility under dedicated DCP must be used to move the configuration data to disk.

Note: For Stage 3 systems, use the DIAG41 diskette.

Associated Procedures

Loading the System	01-140
Loading Dedicated DCP	01-150
Loading and Starting SSP	01-160
Using the Main Help Menu	01-165
Using the Run Service Aid Procedures Menu	01-170
Using the Diagnose Device Failures Menu	01-175

Additional Information

Tasks Associated with Control Programs	01-180
Tasks Associated with Diagnostic Utilities	01-185

Other System Publications

Operating Your Computer
System Data Areas
Program Problem Diagnosis and Diagnostic Aids
Program Service Information

01-160
Loading and Starting SSP

```
                         IPL Sign On                Optional - *      W1



            User ID . . . . . . . . . . . . . . .

            Password  . . . . . . . . . . . . . .

            User menu . . . . . . . . . . . . . .                  *

            Library . . . . . . . . . . . . . . .                  *

            Date  . . . . . . . . . . . . . MMDDYY 030184

            Time  . . . . . . . . . . . . . hhmmss 073000

            Overrides . . . . . . . . . . . . . N,Y N

  Help-Assistance for sign on

                                      (c) Copyright 1984 IBM Corporation
```

Normally, the customer is running under SSP, and you start concurrent maintenance by keying in CONCR, HELP, SERVICE (01-155), or the name of some other procedure, system utility, control command, or OCL (operation control language) statement. However, when you must load SSP, you are usually operating a dedicated system with no customer jobs running.

To Load and Start SSP

1. Ensure that mode 0 is selected.

Do you want to run the I/O wrap tests?

Y N

– To bypass the I/O wrap tests, use the Input keys to enter the FF00 CSIPL load option to the control panel display.

2. Press the Load key.

3. When the sign-on display appears (see example above), key in the necessary information. (See the customer sign-on procedures.)

4. When the Main Help menu appears, select an option, or key in the name of a procedure, system utility, control command, or OCL statement.

The procedure *Concurrent Service Tools* (01-020) describes the tasks that can be performed using procedures, system utilities, control commands, and OCL statements. (OCL statements start with // .)

Notes:
1. To configure the system UDT entries, see *Updating UDT Entries on Diskette* (01-835).
2. To update the system microcode, see *Updating UDT Entries and Microcode on Disk* (01-840).
3. To install the SSP (SSP reload from diskettes), see the manual *Operating Your Computer*.

System Support Program

SSP is loaded for normal customer operation. This program controls all system operations and lets jobs run concurrently.

After you load SSP and sign on the system, the system displays the Main Help menu.

```
                                MAIN                                    W1
                        Main System/36 help menu

Select one of the following:

   1. Display a user menu
   2. Perform general system activities
   3. Use and control printers, diskettes, or tape
   4. Use and maintain libraries, files, or folders
   5. Use programming languages and utilities
   6. Communicate with another system or user
   7. Define the system and its users
   8. Problem determination and service
   9. Use office products
  10. Sign off the system


Cmd3-Previous menu   Cmd7-End     Cmd12-How to use help      Home-Sign on menu

Ready for option number or command
-

                                                        (c) 1984 IBM Corp.
```

The Main Help menu is described in 01-165.

Associated Procedures

Additional Information

Other System Publications

Operating Your Computer
System Data Areas
Program Problem Diagnosis and Diagnostic Aids
Program Service Information

01-165
Using the Main Help Menu

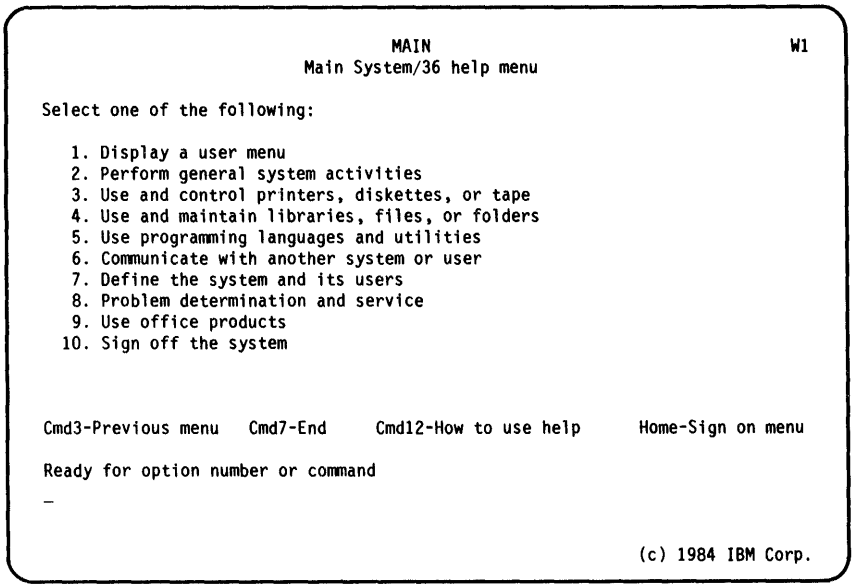
There are two ways to get help under SSP: press the Help key, or key in HELP at the system console or other work stations.

When you key in HELP, the system displays a sequence of menus that let you locate and use procedures and system utilities. Or, if you know the procedure you want to use, but do not remember the necessary parameters, you can get the system to prompt you. For example, to get the prompt display to change the online/offline status of a device, key in HELP VARY and press the Enter key, or key in VARY and press the Help key.

Also, you can press the Help key at any time and, if the Help key is active, the system displays additional information about the help menus, or about the task you are performing.

You can select any option from the Main Help menu. However, a customer-controlled security code may be necessary to use some of the options.

To get the Main Help menu, sign on the system, or press the Home key on the work station keyboard.



Summary of Main Help Options

- *Display a user menu*: This option permits a user to display a menu and select options from it.
- *Perform general system activities*: This option permits a user to display or change information associated with system jobs, display station sessions, or I/O devices.
- *Use and control printers, diskettes, or tape*: This option permits a user to perform tasks associated with devices, such as printing a data file or library member.
- *Use and maintain libraries or data files*: This option permits a user to perform tasks that use libraries, such as adding or changing a library member, or copying a library.
- *Use programming languages and utilities*: This option permits a user to perform tasks that a programmer normally performs, adding or changing programs, procedures, display formats, and message members.
- *Communicate with another system or user*: This option permits a user to perform the tasks necessary to communicate with another system or display station.
- *Define the system and its users*: This option permits a user to perform the tasks necessary to use the system.
- *Problem determination and service*: This option permits a user to analyze system problems or run programs that aid IBM service personnel (01-170).
- *Sign off the system*: This option permits a user to sign off the system.

Associated Procedures

This page is intentionally left blank.

01-170
Using the Run Service Aid Procedures Menu

Example Display: Problem Determination and Service

The Run Service Aid Procedures menu can be selected from the Problem Determination and Service menu (option 8 on the Main Help menu, 01-165).

```
                                PROBSERV                                W1

                      Problem determination and service

Select one of the following:

   1. User problem determination
   2. Run service aid procedures









Cmd3-Previous menu   Cmd7-End     Cmd5-Main help menu       Home-Sign on menu

Ready for option number or command
-
                                                          (c) 1984 IBM Corp.
```

Summary of Problem Determination and Service Options

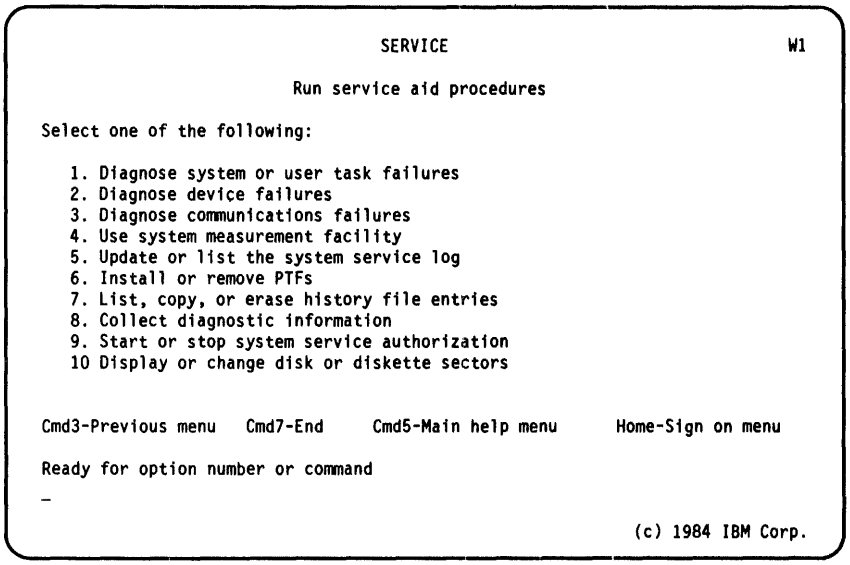
The problem determination and service options are described as follows:

- *User problem determination*: This option lets you run the normal customer online problem determination procedures. This option can also be selected by entering PROBLEM on the SSP command line.
- *Run service aid procedures*: This option lets you diagnose problems with programs on the system or with devices used by the system. You will use this option the most. This option can also be selected by entering SERVICE on the SSP command line.

01-170 (continued) Using the Run Service Aid Procedures Menu

Example Display: Run Service Aid Procedures

To get the Run Service Aid Procedures menu, select option 2 from the PROBSERV (problem determination and service) menu, or key in SERVICE.



Summary of Service Aids Options

The service aids options (and associated utilities) are described as follows:

- *Diagnose system or user task failures*: This option lets you diagnose problems with programs or tasks.
  - DUMP (01-865)
  - DFA (01-870)
  - APAR (01-860)
  - SETDUMP (01-880)
  - TRACE (01-875)
  - SERVLOG (01-020)

- *Diagnose device failures*: This option lets you diagnose problems with devices (01-175), such as printers and display stations.
  - ERAP (01-360)
  - CONCR (01-155)
  - SYSTEST (01-720)
  - TESTREQ (01-535 and 01-635)
  - TESTDSKT (01-740)

- *Diagnose communications failures*: This option lets you diagnose problems with communications devices and Interactive Communications Feature (ICF) subsystems.
  - COMMTEST (01-610)
  - STATEST (01-630)
  - DUMP (01-865)
  - TRACE (01-875)
  - DFA (01-870)
  - ICVERIFY (01-020)

- *Use system measurement facility*: This option lets you record and print how the system is being used. For example, you can measure how much a selected disk drive is being used.
  - SMFSTART (01-020)
  - SMFSTOP (01-020)
  - SMFPRINT (01-020)

- *Update or list the system service log*: This option lets you change or add entries to the service log, and to display or print the entries in the service log.
  - SERVLOG (01-020)
  - DUMP (01-870)

- *Install or remove PTFs*: This option lets you install or remove program temporary fixes (PTFs) or microcode program temporary fixes (MPTFs) on the system.
  - PTF (01-855)

- *List, copy, or erase history file entries*: This option lets you print or display information in the system history logs about jobs run on the system and operator responses.
  - HISTORY (01-020)
  - HISTCRT (01-020)

- *Collect diagnostic information*: This option lets you collect the system data areas needed to prepare an authorized program analysis report.
  - APAR (01-860)

- *Start or stop system service authorization*: This option lets you select any display station to be used to run the commands and procedures needed to service the system. This option also lets you return the display station to normal service.
  - START (01-020)
  - STOP (01-020)

- *Display or change disk or diskette sectors*: This option lets you change the information contained on a disk or on diskette.
  - PATCH (01-850 and 01-852)

Additional Information

Displaying and Changing System Information	01-200
Testing Local Work Stations	01-500
Testing Communications and Remote Work Stations	01-600
Testing the System and I/O Devices	01-700
Updating and Patching Programs	01-800

Other System Publications

Operating Your Computer
System Problem Determination
System Data Areas
Program Problem Diagnosis and Diagnostic Aids
Program Service Information

01-175 Using the Diagnose Device Failures Menu

The Diagnose Device Failures menu lets you select options to perform the tasks necessary to determine why devices used by the system are not working correctly. These tasks are performed concurrently with customer jobs.

Example Display: Diagnose Device Failures

To get the Diagnose Device Failures menu, select option 2 from the Run Service Aid Procedures menu (01-170).

```
                                DIAGDEV                                 W1

                          Diagnose device failures

Select one of the following:

   1. List device error log
   2. Perform diagnostics while programs are running
   3. Run system verification tests
   4. Run display station or printer verification tests
   5. Run diskette tests
   6. Display and correct sectors after a disk error




Cmd3-Previous menu   Cmd7-End     Cmd5-Main help menu       Home-Sign on menu

Ready for option number or command
_
                                                          (c) 1984 IBM Corp.
```

Summary of Diagnose Device Failures Options

The options to diagnose device failures are described as follows:

- *List device error log*: This option invokes the ERAP procedure (01-360) and lets you display or print device history tables while customer jobs are running.

- *Perform diagnostics while programs are running*: This option invokes the CONCR procedure (01-155) and lets you:
  - Run I/O exerciser tests to the:
    a. 3262 Printer (01-755)
    b. 51TD or 72MD diskette drive (01-745)
    c. 8809 tape drives (01-765)
  - List the system records (01-285)
  - Update the system configuration (01-835)

- *Run system verification tests*: This option invokes the SYSTEST procedure (01-720) and lets you perform diagnostic tests on the system. However, no customer programs can be running while system testing is being performed.

- *Run display station or printer verification tests*: This option invokes the TESTREQ procedure (01-535) and lets you test:
  - Display stations (01-540)
  - Work station printers (01-542)

- *Run diskette tests*: This option invokes the TESTDSKT procedure (01-740) and lets you:
  - Test the diskette drive
  - Scan a diskette for errors
  - Display diskette error logs
  - Recover data on a diskette
  - Copy data from one diskette to another
  - Display or change diskette sectors

- *Display and correct sectors after a disk error*: This option invokes the BUILD procedure and lets you display and correct data on disk after an error occurs.

Additional Information

Other System Publications

Operating Your Computer
System Problem Determination
System Data Areas
Program Problem Diagnosis and Diagnostic Aids
Program Service Information

01-180 Tasks Associated with Control Programs

Concurrent and Dedicated Maintenance

You perform maintenance on System/36 in concurrent mode, with customer jobs running, or in dedicated mode, without customer jobs running.

- *Concurrent mode:* You use the system console or local work station to start concurrent maintenance. You and the customer share the system. This lets you diagnose and repair external devices (not part of the base system) while customer jobs are running.
- *Dedicated mode:* You use the Load key on the control panel to start dedicated maintenance. You control the system from the system console and the control panel. This lets you diagnose and repair any system problem.

To Select the Correct Control Program

1. Using the table on the next page, select a procedure in this manual, or:
   a. Determine the diagnostic test to be used.
   b. Determine if the job is to be performed in concurrent or dedicated mode.
   c. Determine the correct control program to use.
   d. Determine which diagnostic diskette to use if needed.
2. Load dedicated DCP (01-150) or concurrent DCP (01-155), or ensure that SSP is running (steps 1b and 1c).
3. Select a DCP option, or key in a command under SSP (step 1a).
4. If necessary, insert the correct diagnostic diskette (step 1d).
5. Select a diagnostic option.
6. Follow the displayed instructions.

Control Programs

All system utilities, service procedures, and diagnostics are controlled by one of three control programs:

- System support program (SSP)
- Concurrent diagnostic control program (concurrent DCP)
- Dedicated diagnostic control program (dedicated DCP)

System Support Program

SSP is loaded for normal customer operation. This program controls all system operations and lets jobs run concurrently.

Concurrent Diagnostic Control Program

Concurrent DCP is loaded from disk. This diagnostic control program runs the diagnostic utilities and device exercisers as a job under SSP. The menus for these diagnostic tests have the same format as the menus for diagnostic tests that run under dedicated DCP.

Dedicated Diagnostic Control Program

Dedicated DCP is loaded from either disk or diskette. This diagnostic control program runs selected MDI MAPs, TUs, diagnostic utilities, and device exercisers as stand-alone diagnostic tests.

Associated Procedures

Loading the System	01-140
Loading Dedicated DCP	01-150
Loading Concurrent DCP	01-155
Loading and Starting SSP	01-160

Additional Information

Displaying and Interpreting System Error Information	01-300
Testing Local Work Stations	01-500
Testing Communications and Remote Work Stations	01-600
Testing the System and I/O Devices	01-700
Updating and Patching Programs	01-800

Control Program Determination Table

Diagnostic Test	Control Program	Run Mode	Diagnostic Diskette	Associated Procedure
ERAP	SSP	Concurrent		01-360
CSU verification	Dedicated DCP	Dedicated	CSU	See note.
Work station verification (local)	SSP	Concurrent		01-540
Work station verification (remote)	SSP	Concurrent		01-640
System test (SYSTEST)	SSP	Dedicated		01-720
Communications online tests (COMMTEST)	SSP	Concurrent		01-610
SDLC online tests (SDLCTEST)	SSP	Concurrent	DIAG23[3]	01-625
BSC online tests (BSCTEST)	SSP	Concurrent	DIAG23[3]	01-620
Remote work station test (STATEST)	SSP	Concurrent		01-630
Pack utility maintenance program (PUMP)	Dedicated DCP	Dedicated	DIAG22[2]	01-730
Disk drive exerciser	Dedicated DCP	Dedicated	DIAG21[1]	01-735
Diskette utility (TESTDSKT)	SSP	Concurrent	Drive test diskette	01-740
Diskette drive exerciser	Concurrent or dedicated DCP	Concurrent or dedicated		01-745
3262 Printer exerciser	Concurrent or dedicated DCP	Concurrent or dedicated	DIAG21[1]	01-755
8809 tape drive exerciser	Concurrent or dedicated DCP	Concurrent or dedicated	DIAG21[1]	01-765
6157 tape OLPD	SSP	Concurrent		01-170
1255 magnetic character reader exerciser	Dedicated DCP	Dedicated	DIAG21[1]	01-775
MDI maintenance analysis procedures (MAPs)	Dedicated DCP	Dedicated	DIAG21[1]	01-710
MDI test units (TUs)	Dedicated DCP	Dedicated	DIAG21[1]	01-717
Diagnostic utilities	Concurrent or dedicated DCP	Concurrent or dedicated		01-185

Note: See the manual *Setting Up Your Computer*.

[1]For Stage 3 systems, use the DIAG41 diskette.
[2]For Stage 3 systems, use the DIAG42 diskette.
[3]For Stage 3 systems, use the DIAG43 diskette.

01-185
Tasks Associated with Diagnostic Utilities

This procedure lets you select a diagnostic utility associated with the task to be performed. By selecting the correct utility, you can:

- Analyze diskette drive (read/write functions)
- Analyze diskettes for data exchange compatibility
- Configure the system
- Customize the system
- Display or print data from disk or diskette
- Recover data from disk
- Initialize or analyze the system disks
- Initialize or copy diagnostic diskettes
- Install diagnostic program patches
- List the system records
- Scan diskettes for errors

To Select a Diagnostic Utility

1. Using the *Diagnostic Task Table*:
   a. Determine the task to be performed.
   b. Determine the correct utility to use.
   c. Determine if the job is to be performed under dedicated DCP or concurrent DCP.

2. Load dedicated DCP (01-150) or concurrent DCP (01-155). (See step 1c.)

   When loading dedicated DCP from disk (mode F), use the supervisor option (option 3) to load diagnostics from diskette. Diagnostic utilities are on diskette only.

3. Select the diagnostic utilities option.

4. Select a utility associated with the task to be performed (step 1b).

5. If necessary, insert the correct diagnostic diskette.

6. Select an option (step 1a).

7. Follow the displayed instructions.

Diagnostic Task Table

Task Associated with Utilities	Utility	Concurrent DCP	Dedicated DCP	Associated Procedure
Analyze:				
• Disk	PUMP	No	Yes	01-730
• Diskette for: – Recovering sector data – Errors	TESTDSKT	SSP only		01-740
• Diskette drive for: – Read function – Write function	TESTDSKT	SSP only		01-740
Copy diagnostic diskettes	DIAGCOPY	SSP only		01-820
Display or *print*:				
• System records: – Control storage directory (on disk) – Patch tables (on disk or diskette) – Diskette engineering change (EC) level records – Diskette directory – Microcode level table (on disk or diskette) – Prerequisite list (on disk or diskette)	System records list	Yes	Yes	01-285
• Unit definition table (UDT)	System configure	Yes	Yes	01-290
Initialize:				
• Diagnostic diskettes	DIAGINIT	SSP only		01-815
• Disk	PUMP	No	Yes	01-730
Install controlled PTFs and MPTFs, and free-lance PTFs to disk	PTF	SSP only		01-855
Install controlled patches to disk or diagnostic diskettes, or free-lance patches to disk	Program patch	No	Yes	01-830
Recover data from disk	PUMP	No	Yes	01-730
Update (add or delete):				
• System microcode and UDT entries on disk from diskettes (see Notes 2 and 3)	System customize	No	Yes	01-840
• System UDT entries (see Note 1)	System configure	Yes	Yes	01-835

Notes:

1. Before updating, adding, or deleting a UDT entry, print the UDT entries (01-290) to have a record of the original system configuration.
2. Before starting the customize utility, print the UDT entries (01-290) to have a record of the present system configuration, and list the patch table, using the system records list utility (01-285) or the PTF procedure (01-855) to have a record of the controlled and free-lance patches.
3. The system customize utility runs automatically. However, some specific tests are performed to ensure system compatibility. You can end the utility if you determine that some important field-installed or controlled patches are going to be destroyed.

This page is intentionally left blank.

01-190
Tasks Associated with CSIPL Load Options

CSIPL diagnostics and I/O wrap tests automatically test most of the system and attachment logic each time the Load key is pressed. This testing verifies that important parts of the system are working OK.

If an error occurs during the CSP or MSP load tests, the system activates the Processor Check light and displays a system reference code on the control panel (01-310).

If other errors occur during system loading, the system displays a message on the system console; or, if the console is not working or is not available, the system displays a system reference code on the control panel (01-370).

For system maintenance or problem diagnosis, you have some options when loading the system. You can loop on single tests or loop on all tests with an option to bypass error stops. These options are described in the CSIPL load option table.

To Use the CSIPL Load Option Table

1. Select the CSIPL task that best describes the task you want to perform.

2. Go to the procedure associated with this task.

01-190 (continued)
Tasks Associated with CSIPL Load Options

CSIPL Load Option Table

Task Associated with CSIPL	Run Mode	Load Option	Associated Procedure
Load the system from disk, run all wrap tests, and load SSP for normal customer operation.	0	0000	01-160
Load the system from disk, bypass all wrap tests, MSP tests, and main storage tests, initialize main storage, and load SSP. Customer jobs will run if no hardware errors occur. However, the disk must contain correct configuration data.	0	FF00	01-160
Load the system from diskette, run all wrap tests, and display the dedicated DCP Main menu.	E	0000	01-150
Load the system from diskette, bypass configuration sensitive CSP tests, bypass MSP load tests, bypass all wrap tests, initialize 128K bytes of main storage, and display the dedicated DCP Main menu. This option is normally used to load from a diskette that does not contain device configuration data (only system UDT entry), or from a diskette that contains configuration data that is not correct.	E	FF00	01-150
Load the system from the DIAG21 diskette (DIAG41 for Stage 3 systems), run only the CSP and MSP tests. Bypass all other wrap tests and controller initialization. This option is used by the system entry MAPs (see MAP 0190, entry point A) to diagnose channel problems.	E	FFF0	01-140
A special-purpose load option that lets you load the system from disk, bypass all wrap tests, and display the dedicated DCP Main menu.	F	F800	01-150
Load the system from disk, run all wrap tests, and display the dedicated DCP Main menu.	F	F801	01-150
A special-purpose load option that lets you load the system from disk, run only the CSP and MSP tests. Bypass all other wrap tests and controller initialization. This option is used by the system entry MAPs (see MAP 0190, entry point A) to diagnose channel problems.	F	F8F0	01-140
A special-purpose load option that lets you load the system from disk and run all wrap tests. Then, load the SSP control storage code from disk and the main storage code from diskettes. This option loads SSP from SSP diskettes.	F	0000	01-140
A special-purpose load option that lets you load the system from disk and bypass all wrap tests. Then, load the SSP control storage code from disk and the main storage code from diskettes. This option loads SSP from SSP diskettes.	F	FF00	01-140

Task Associated with CSIPL	Run Mode	Load Option	Associated Procedure
Bypass all wrap tests, run the work station MAPs, and store the results in work registers.	E or F	F0C2	01-510
Bypass all wrap tests, run the work station TUs, and store the results in work registers.	E or F	F1C2	01-520
Stop after CSIPL load 1 is run. This lets you enter another CSIPL option to the control panel display.	E or F	FA01	01-420
Loop on CSIPL load 1 and stop on errors.	E or F	Fb01	01-420
Loop on CSIPL load 1 and bypass errors.	E or F	FC01	01-420
Stop after CSIPL load 2 is run. This lets you enter another CSIPL option to the control panel display.	E or F	FA02	01-420
Loop on CSIPL loads 1 and 2 and stop on errors.	E or F	Fb02	01-420
Loop on CSIPL loads 1 and 2 and bypass errors.	E or F	FC02	01-420
Stop after CSIPL load 3 is run. This lets you enter CSIPL load 3 (MSP) or DCP options to the control panel display.	E or F	FA03	01-450
Loop on CSIPL load 3 (MSP) until an error occurs (some 2K page errors are ignored). Use this option to diagnose intermittent errors. The System In Use light is activated to indicate that the test is looping. When an error occurs, the test stops and displays a dxxx system reference code in the control panel display.	E or F	Fb03	01-450
Loop on CSIPL load 3 (MSP) until an error occurs. Bad 2K-byte pages are not permitted. The System In Use light is activated to indicate that the test is looping. When an error occurs, the test stops and displays a dxxx system reference code in the control panel display.	E or F	FC03	01-450
Loop on CSP routine xx. (Routines 00 through 08 cannot be looped.)	E or F	FExx	01-420
Loop on CSP routine xx that failed during the wrap tests. (Routines 00 through 08 cannot be looped.) The failing routine number is in work register 7 low (WR7L) of the main program level. (See 01-225.)	E or F	Fdxx	01-420
Diagnose main storage problems, using specified MAPs (not Stage 2 systems).	E or F	E9xx F9xx	01-455
Run the MSP diagnostic TUs in step mode, using the CSP Start key. This test stops after each TU is run. The TU results (WR7) are displayed in the control panel display. Pressing the CSP Start key displays dAxx, where xx is the next TU that will run. Pressing the CSP Start key again runs the next TU and displays the results.	E or F	EE00	01-450
Loop on MSP TUs, using specified MAPs. The System In Use light is activated to indicate that the test is looping.	E or F	EExx	01-450
Run Pass 1 of the 6157 tape subsystem diagnostic from the CSU diagnostics.	F	5001	See note
Run Pass 2 of the 6157 tape subsystem diagnostic from the CSU diagnostics.	F	5002	See note

Note: See the manual *Setting Up Your Computer*.

This page is intentionally left blank.

Displaying and Changing System Information

01-200 Contents

01-200 (continued) Contents

About This Section

This section describes the procedures that display or change system information. When there is more than one method of performing a procedure, all methods are described.

- *Using the Alter/Display Utility:* This is a general procedure for using the alter/display utility. Other procedures that use this utility are described in other parts of this section.

- *Stopping on a Storage Address:* These procedures let you:
  - Stop the main storage processor (MSP) on a selected main storage address
  - Stop the control storage processor (CSP) on a selected main storage or control storage address
  - Stop the system and display the Alter/Display Option menu on a write operation to a selected disk address

- *Displaying or Altering Registers:* These procedures let you:
  - Display or change the existing microinstruction address
  - Display the CSP local storage registers (LSRs)
  - Display or change selected MSP registers

- *Displaying or Altering Storage:* These procedures let you:
  - Display or alter control storage or main storage (real or translated)
  - Display or alter virtual storage
  - Display or patch disk storage
  - Display I/O controller storage

- *Dumping Storage:* These procedures let you dump selected system data areas, or print:
  - Real main storage
  - Translated storage
  - Virtual storage
  - Control storage
  - Disk storage

- *Stepping/Tracing Storage:* These procedures let you:
  - Trace or step main storage instructions
  - Display/step control storage
  - Step I/O controller I/O actions
  - Stop on I/O controller detected errors

- *Displaying System Status, System Records, and UDT Entries:* These procedures let you:
  - Display the status of system jobs
  - Display the task region of any task
  - Display specific control records on the diagnostic diskettes and on disk.
  - Display or print the UDT entries, using the system configure utility.

01-210
Using the Alter/Display Utility

The alter/display utility is a dedicated utility that interrupts normal system operation to let you perform specific storage operations.

CAUTION

All communications tasks should be completed or stopped before you start the alter/display utility.

You can determine if a communications line is active by inspecting the Communications Status lights for each line (01-355). The DSR (data set ready) light should always be off.

Note: If the system printer is allocated to any program, the alter/display utility print options will not print. The spool writer must be stopped before you can allocate the system printer to the alter/display utility. All alter/display screens can be printed on the system printer, using the Print key.

To Start the Alter/Display Utility

1. Ensure that the Security switch is in the Service position.

2. Press the MSP Stop key (control panel).

   Note: When you press the MSP Stop key to invoke the alter/display utility, the utility stops the main storage processor (MSP), but the Alter/Display Option menu does not appear on the system console when the terminal unit block (TUB) chain is locked, or if there is a work station error being processed. If the Alter/Display Option menu does not appear on the system console, press the MSP Stop key again to start the main storage processor.

   If you press the MSP Stop key the third time, and the Alter/Display Option menu still does not appear, it is probably because some program has the TUB chain locked. Either continue pressing the MSP Stop key or wait until a later time to start the alter/display utility.

3. Return to the procedure that asked you to start the alter/display utility, or select an option from the Alter/Display Option menu to continue.

Associated Procedures

Displaying or Altering Storage	01-240
Displaying or Altering Control Storage	01-242
Displaying or Altering Virtual Storage	01-244
Displaying or Altering Real Main Storage	01-246
Displaying or Altering Translated Storage	01-248

Additional Information

System Controls	01-055

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

01-210 (continued)
Using the Alter/Display Utility

To End the Alter/Display Operation

Select option 0 (exit alter/display) from the Alter/Display Option menu to end the alter/display operation.

Example Display: Alter/Display Option Menu

```
                        ALTER/DISPLAY OPTION MENU

0 - EXIT ALTER/DISPLAY                  7 - SPECIFY MSP ADDRESS STOP VALUES
1 - ALTER/DISPLAY STORAGE               8 - DISPLAY I/O CONTROLLER STORAGE
2 - ALTER/DISPLAY DISK STORAGE          9 - I/O CONTROLLER STEP OR STOP
3 - DUMP STORAGE TO PRINTER            10 - ALTER/DISPLAY MSP REGISTERS
4 - DUMP DISK STORAGE TO PRINTER       11 - SYSTEM DUMPS
5 - MAIN STORAGE INSTRUCTION TRACE     12 - SYSTEM STATUS DISPLAY
6 - MAIN STORAGE INSTRUCTION STEP


ENTER OPTION NUMBER AND PRESS FIELD EXIT -----> _
```

Summary of Alter/Display Options

- *Option 0:* This option ends the alter/display utility.

  When you end the alter/display utility, the utility resets the 'MSP stop' latch, starting the main storage processor. If you press the MSP Stop key while the alter/display utility is active, MSP is suspended until you end the utility.

  Note: Except for stepping main storage instructions, you can only end the alter/display utility from the Alter/Display Option menu. (See the note under option 1.)

- *Option 1:* This option lets you alter/display real main storage (01-246), translated storage (01-248), virtual storage (01-244), and control storage (01-242). Also, some system registers (WR4 through WR7, IAR, ARR, XR1, XR2, DIR, PMR, and PSR) and task block (TB), request block (RB), and storage block (SB) addresses can be altered or displayed (01-240). The TB and RB addresses let you inspect any task in translated main storage (01-248).

  Note: To exit the storage option display (option 1) when instruction stepping is active, press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, or the Cmd1 key.

- *Option 2:* This option lets you display or patch disk storage at a selected storage address (01-255), or select an address to stop the MSP when a write operation is attempted to a selected disk sector (01-217).

- *Option 3:* This option lets you dump real main storage, translated main storage, virtual storage, and control storage to the system printer (01-263).

- *Option 4:* This option lets you dump disk storage to the system printer (01-266).

- *Option 5:* This option lets you print instruction data for each main storage instruction, including all data areas used by an instruction, between the address limits you specify (01-270). You can also trace instructions for a specific data condition (for example, trace with verify).

- *Option 6:* This option lets you display real main storage, translated main storage, or control storage for each main storage instruction as they occur between the address limits you specify (01-272). You can also step instructions for a specific data condition (for example, instruction step with verify).

- *Option 7:* This option lets you specify the hardware and software address stop values to stop the main storage processor (MSP) at a specified main storage address (01-214). A main storage address and address qualifier are the hardware stop values. The address qualifier describes the main storage address as real or logical.

- *Option 8:* This option lets you display I/O controller storage at a selected storage address (01-250).

- *Option 9:* This option lets you specify parameters that will stop MSP when an I/O request is sent to, or an error occurs on, the I/O controller device and unit you specify (01-276).

- *Option 10:* This option lets you display all of the MSP registers except status byte 1 (01-230). This option also lets you change all of the MSP registers except status bytes 0, 2, 4, and 5, and Q-byte (real).

- *Option 11:* This option lets you perform a task dump for system tasks (01-260), or invoke the system termination utility (01-125).

- *Option 12:* This option lets you display the status of the system at the time you select this option (01-280).

01-214 Stopping MSP on a Main Storage Address

You can specify the hardware and software address stop values to stop the main storage processor (MSP) at a specified main storage address. A main storage address and address qualifier are the hardware stop values. The address qualifier describes the main storage address as real or logical.

When programs are running concurrently, a specific main storage address can be used by many tasks. A software address stop qualifier can stop the main storage processor when the stop address is selected by a specific task.

To Specify the MSP Stop Values

1. Start the alter/display utility (01-210).

2. Select option 7 (specify MSP address stop values).

There are two prompts associated with this option: specify hardware address stop values, and specify software address stop values (optional). Set the hardware and software address compare stop values, and exit the alter/display utility. The alter/display main storage display appears when all address compare conditions are met.

Notes:

1. On a Stage 3 system, always use the verify stop option when you specify a real main storage address of 000000 through 0007FF.
2. The prompt to specify software address stop values is optional. You can enter the R option to reset the software address compare stop, or you can enter the E option to exit this display without resetting the software stop. When the alter/display utility returns to the Alter/Display Option menu (01-210), select option 0 (exit alter/display).
3. The TB address is optional for the real verify address, but is needed if the verify address is logical. If the TB address is specified, the TB must be on the TB chain.
4. The TB address is needed if you select the task only (T) option. The T option lets you stop a specific task.

Associated Procedures

Using the Alter/Display Utility	01-210
Stopping CSP When CSP Accesses a Main Storage Address	01-215
Stopping CSP on a Control Storage Address	01-216

Example Display: Specify Hardware Address Stop Values

```
SPECIFY HARDWARE ADDRESS STOP VALUES

ADDRESS STOP OPTION (A, V, R, E) ..... A
  A - SET HARDWARE VALUES AND ENABLE ADDRESS COMPARE HARDWARE
  V - BYPASS SETTING HARDWARE VALUES
  R - DISABLE HARDWARE ADDRESS COMPARE
  E - EXIT
MAIN STORAGE ADDRESS .....
MAIN STORAGE ADDRESS LOGICAL (L) OR REAL (R) ..... R
ENTER YES (Y) OR NO (N) FOR EACH OF THE FOLLOWING
MS PROCESSOR REFERENCES INSTRUCTION AT SPECIFIED ADDRESS ... Y
MS PROCESSOR REFERENCES DATA AT SPECIFIED ADDRESS ..... Y
CONTROL PROCESSOR REFERENCES DATA AT SPECIFIED ADDRESS ..... Y
```

Example Display: Specify Software Address Stop Values

If the A or V address stop option was selected on the prompt to specify hardware address compare values, the following display appears.

```
SPECIFY SOFTWARE ADDRESS STOP VALUES

STOP OPTION (V, T, R, E) ..... R
  V - VERIFY STOP, T - TASK ONLY STOP, R - RESET, E - EXIT
VERIFY ADDRESS .....
VERIFY DATA .....
VERIFY DATA OPTION (S, D, N, F) .....
  S - SAME, D - DIFFERENT, N - ONES, F - ZEROS
VERIFY ADDRESS LOGICAL (L) OR REAL (R) .....
TB ADDRESS ..... 000F00
NOTE: TB ADDRESS IS REQUIRED IF VERIFY ADDRESS IS LOGICAL.
      FOR STOP ON TASK ONLY OPTION, SPECIFY THE TB ADDRESS ONLY.
```

01-215 Stopping CSP when CSP Accesses a Main Storage Address

You can stop the control storage processor (CSP) when CSP accesses a real or logical main storage address by changing the following MSP registers: the configuration control register (CCR) and the address compare registers (ACR low, ACR high, and ACR extend).

To Stop CSP on a Real Storage Address

1. Ensure that the Security switch is in the Service position.
2. Change the MSP register values to stop on a 20-bit real address.

MSP Register	Address	Real Address Value
CCR (bits 0-3)	0038	Hex 6x (x = value not changed)
ACR(L)	0039	Low-order byte
ACR(H)	003A	Second byte
ACR(E)	003b	High-order byte (4 bits)

3. Ensure that the Main Stg Sel light is on.
4. Press the Adr Cmp Stop CSP key.
5. Select mode 0, E, or F.
6. Press the CSP Start key.

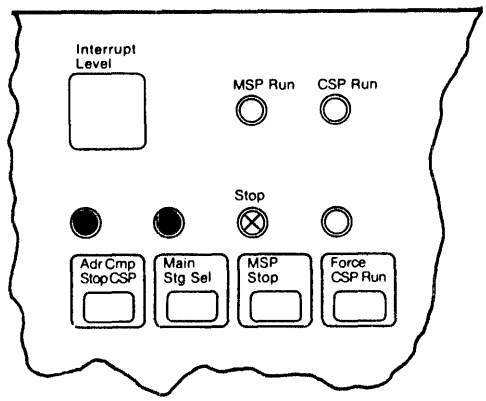
To Stop CSP on a Logical Storage Address

1. Ensure that the Security switch is in the Service position.
2. Change the MSP register values to stop on a 16-bit logical address.

MSP Register	Address	Logical Address Value
CCR (bits 0-3)	0038	Hex Ex (x = value not changed)
ACR(L)	0039	Low-order byte
ACR(H)	003A	High-order byte
ACR(E)	003b	Do not change

3. Ensure that the Main Stg Sel light is on.
4. Press the Adr Cmp Stop CSP key.
5. Select mode 0, E, or F.
6. Press the CSP Start key.

The following light conditions indicate when the system is stopped at the selected real or logical main storage address.



Associated Procedures

Stopping MSP on a Main Storage Address	01-214
Stopping CSP when CSP Accesses a Main Storage Address	01-215

Additional Information

System Controls	01-055

Legend

○ = Light is off
● = Light is on
⊗ = Light is on, off, or blinking

01-216
Stopping CSP on a Control Storage Address

There are two procedures to stop the control storage processor (CSP) on a control storage address. The first procedure is for early systems (not Stage 2) and the second procedure is for Stage 2 systems. See 01-045 to identify the model of the system.

To Stop CSP on a Control Storage Address (Not Stage 2 Systems)

1. Ensure that:
   a. The Security switch is in the Service position.
   b. The selected mode is 0, E, or F.
   c. The Main Stg Sel light is off.

2. Use the Input keys to enter the control storage stop address as follows:
   a. For storage without error checking and correction (ECC), enter an even- or odd-numbered address.
   b. For storage with ECC, enter only an even-numbered address.

   Exception: You can stop the CSP on an odd-numbered address if the address is:
   - The address being branched to
   - The entry point of an interrupt level routine

3. Press the Adr Cmp Stop CSP key.

4. Press the CSP Start key.

To Stop CSP on a Control Storage Address (Stage 2 and Stage 3 Systems)

1. Ensure that:
   a. The Security switch is in the Service position.
   b. The selected mode is 0, E, or F.
   c. The Main Stg Sel light is off.

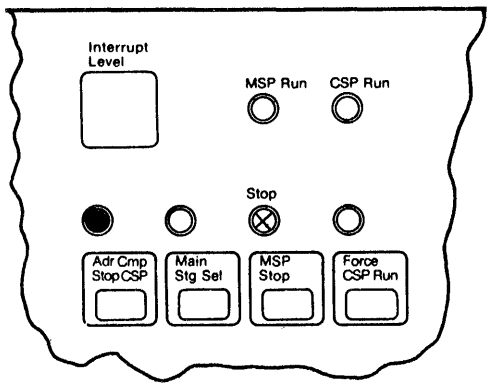
2. Use the Input keys to enter the control storage stop address.

3. Press the Adr Cmp Stop CSP key. The control storage stop address is loaded when the Adr Cmp Stop light is activated. If the light is already on, press the Adr Cmp Stop key twice.

4. Press the CSP Start key.

Light Conditions

The following light conditions indicate when the system is stopped at the selected control storage address.



Legend

○	= Light is off
●	= Light is on
⊗	= Light is on, off, or blinking

Associated Procedures

Stopping MSP on a Main Storage Address	01-214
Stopping CSP when CSP Accesses a Main Storage Address	01-215

01-217 Stopping on a Write to a Selected Disk Address

You can stop the system on a write operation to a specified disk sector, using the alter/display disk storage option of the alter/display utility.

To Get the Alter/Display Disk Storage Prompt

1. Start the alter/display utility (01-210).
2. Select option 2 (alter/display disk storage).

Example Display: Alter/Display Disk Storage

```
2 - ALTER/DISPLAY DISK STORAGE

REPLY FORMATS: F SSSSSS
               S SSSSSS
               R
               E

ENTER OPTION PARAMETERS ---> S 00003B   (A)
```

To Set the Disk Address Stop Function

1. Enter the option parameters (A) using the reply format S SSSSSS, where SSSSSS = the disk sector address. The alter/display utility returns to the Alter/Display Option menu (01-210).
2. Select option 0 (exit alter/display).

To Reset the Disk Address Stop Function

1. Enter the option parameters (A) using the reply format R. The alter/display utility returns to the Alter/Display Option menu (01-210).
2. Select option 0 (exit alter/display).

Associated Procedure

Displaying or Patching Disk Storage 01-255

01-220
Displaying or Altering the MAR

This procedure lets you change the value of the microinstruction address register (MAR) for the present interrupt level.

1. Select mode 3 (display/alter MAR). The control storage processor stops, and the contents of the MAR for the present interrupt level appear in the control panel display.

Do you want to change the MAR?

Y **N**

– Return to the procedure that instructed you to display the MAR, or select mode 0 (processor run) and press the CSP Start key to continue.

2. Ensure that the Security switch is in the Service position.

3. Record the contents of the MAR for possible use by other procedures.

MAR =

4. Use the Input keys to enter the new address.

5. Press the CSP Start key. The new value of the MAR appears in the control panel display.

6. Return to the procedure that instructed you to change the MAR, or select mode 0 (processor run) and press the CSP Start key to continue.

Additional Information

System Controls 01-055

01-225
Displaying CSP Local Storage Registers

This procedure lets you display the CSP local storage registers (LSRs).

1. Select mode 1 (instruction step display LSRs). The control storage processor stops at the end of the present microinstruction.

2. To select a specific LSR, use the Input keys to enter the LSR address (see *CSP LSR Tables*) in the control panel display.

3. Press the Display Output key to display the contents of the selected LSR.

Do you want to display the next sequential LSR?

Y **N**

Do you want to display another specific LSR?

Y **N**

Do you want to display the same LSR after the system performs the next microinstruction?

Y **N**

– Return to the procedure that instructed you to display LSRs, or select mode 0 (processor run), and press the CSP Start key to continue.

– Press the CSP Start key.

– Go to step 2.

– Press and release the Input + 1 key.

CSP LSR Tables

Main Program Level or Machine Check Interrupt Level

Register	Register Name	LSR Address
WR0	Work register 0	0000
WR1	Work register 1	0001
WR2	Work register 2	0002
WR3	Work register 3	0003
WR4	Work register 4	0004
WR5	Work register 5	0005
WR6	Work register 6	0006
WR7	Work register 7	0007

Microinstruction Address Register (MAR), Microinstruction Address Backup Register (MAB), and Base Displacement Registers

Register	Register Name	LSR Address
MAR	Main program level	0008
MAB	Main program level	0009
MAR	Machine check interrupt	000A
MAB	Machine check interrupt (A default code of hex 1111 indicates that this register was used and reset by an error recovery routine.)	000b
MAR	Interrupt level 1	000C
MAB	Interrupt level 1	000d
MAR	Interrupt level 2	000E
MAB	Interrupt level 2	000F
MAR	Interrupt level 3	0028
MAB	Interrupt level 3	0029
WR42	Base displacement address	002A
WR43	Base displacement data	002b
MAR	Interrupt level 4	002C
MAB	Interrupt level 4	002d
MAR	Interrupt level 5	002E
MAB	Interrupt level 5	002F

Additional Information

System Controls 01-055

Interrupt Level 1 and Cycle Steal

Register	Register Name	LSR Address
WR0	Work register 0	0010
WR1	Work register 1	0011
WR2	Work register 2	0012
WR3	Work register 3	0013
WR4/CS4	Work register 4 or cycle steal register 4	0014
WR5/CS5	Work register 5 or cycle steal register 5	0015
WR6/CS6	Work register 6 or cycle steal register 6	0016
WR7/CS7	Work register 7 or cycle steal register 7	0017

Interrupt Level 2

Register	Register Name	LSR Address
WR0	Work register 0	0018
WR1	Work register 1	0019
WR2	Work register 2	001A
WR3	Work register 3	001b
WR4	Work register 4	001C
WR5	Work register 5	001d
WR6	Work register 6	001E
WR7	Work register 7	001F

Interrupt Level 3 and Cycle Steal

Register	Register Name	LSR Address
WR0/CSC	Work register 0 or cycle steal register C	0020
WR1/CSd	Work register 1 or cycle steal register d	0021
WR2/CSE	Work register 2 or cycle steal register E	0022
WR3/CSF	Work register 3 or cycle steal register F	0023
WR4/CS8	Work register 4 or cycle steal register 8	0024
WR5/CS9	Work register 5 or cycle steal register 9	0025
WR6/CSA	Work register 6 or cycle steal register A	0026
WR7/CSb	Work register 7 or cycle steal register b	0027

Interrupt Level 4 and Cycle Steal

Register	Register Name	LSR Address
WR0	Work register 0	0030
WR1	Work register 1	0031
WR2	Work register 2	0032
WR3	Work register 3	0033
WR4/CS0	Work register 4 or cycle steal register 0	0034
WR5/CS1	Work register 5 or cycle steal register 1	0035
WR6/CS2	Work register 6 or cycle steal register 2	0036
WR7/CS3	Work register 7 or cycle steal register 3	0037

Interrupt Level 5

Register	Register Name	LSR Address
WR0	Work register 0	0038
WR1	Work register 1	0039
WR2	Work register 2	003A
WR3	Work register 3	003b
WR4	Work register 4	003C
WR5	Work register 5	003d
WR6	Work register 6	003E
WR7	Work register 7	003F

01-230
Displaying or Altering MSP Registers

You can display all of the MSP registers except status byte 1. You can change all of the MSP registers except the buffer compare register extended (BCRE), status bytes 0, 2, 4, and 5, and Q-byte (real). When changing status byte 1, if you specify a value other than 40, status byte 1 is loaded with the new value. However, bit 0, the MSP step mode bit, cannot be set on.

Using the Alter/Display Utility

This procedure assumes that SSP is running.

To Display or Alter the MSP Registers:

1. Ensure that the Security switch is in the Service position.
2. Start the alter/display utility (01-210).
3. Select the option to alter/display MSP registers. The present values of the MSP registers are displayed.
4. To alter the MSP registers, key in the new register values and press the Enter key. The values for WR4 through WR7, IAR, ARR, XR1, XR2, DIR, PMR, and PSR are also updated in the main storage save area.

Using the Control Panel

When you use the control panel to display or change MSP registers, the main program level MAR is used unless a machine check interrupt is active. A machine check can occur if an address that is not a valid MSP register is used. If the MSP register address is not valid, or if you start to change or display more than one MSP register, and a machine check occurs, the machine check interrupt level MAR is used for the next display or change operation. Press the System Reset key to display the main program level MAR.

To Display the MSP Registers:

1. Ensure that the Security switch is in the Service position.
2. Select mode 3 (display/alter MAR).
3. Record the value of the MAR.

MAR =

4. Use the Input keys to enter the MSP register address. (See *MSP Register Tables*.)
5. Press the CSP Start key to load the MAR with the MSP register address.
6. Select mode b (display MSP register).
7. Press the CSP Start key. If you are displaying a register other than the BCRE or the address translation registers, the data appears in the low-order byte of the control panel display. Ignore the high-order byte because the data may not be valid. However, if you are displaying the BCRE or the ATRs, the data appears in both bytes of the display.

Do you want to display the next sequential MSP register?

Y **N**

Do you want to display a different MSP register?

Y **N**

– Return to the procedure that instructed you to display MSP registers, or restore the MAR to its original value (see step 3), select mode 0 (processor run), and press the CSP Start key to continue.

– Select mode 3 (display/alter MAR).
– Go to step 4.

– Go to step 7.

Associated Procedures

Using the Alter/Display Utility	01-210
Displaying or Altering Storage	01-240

Additional Information

System Controls	01-055

To Alter the MSP Registers:

1. Ensure that the Security switch is in the Service position.
2. Select mode 3 (display/alter MAR).
3. Record the value of the MAR.

MAR =

4. Use the Input keys to enter an MSP register address. (See *MSP Register Tables*.)
5. Press the CSP Start key to load the MAR with the MSP register address.
6. Select mode A (alter MSP register).
7. Use the Input keys to enter the data to be stored. If you are changing a register other than the address translation registers (ATRs), enter 1 byte of data in the low-order byte of the control panel display. If you are changing the ATRs, enter 2 bytes of data in the control panel display.
8. Press the CSP Start key.

Do you want to alter the next sequential MSP register?

Y **N**

Do you want to alter a different MSP register?

Y **N**

– Return to the procedure that instructed you to display MSP registers, or restore the MAR to its original value (see step 3), select mode 0 (processor run), and press the CSP Start key to continue.

– Select mode 3 (display/alter MAR).
– Go to step 4.

– Go to step 7.

MSP Register Tables

Storage Control Registers

Register	Register Name	Register Address
BCRE	Buffer compare register extended (sense only)	0035
SIR	Storage interface register	0036
DACR	Diagnostic ACR high	0037
CCR	Configuration control register	0038
ACR(L)	Address compare register (low)	0039
ACR(H)	Address compare register (high)	003A
ACR(E)	Address compare register (extend)	003b
BMR	Backup mode register	003C
	Not used	003d
CMR	Control mode register	003E
PMR	Program mode register	003F

Status Registers

Register Name	Register Address
Program status register (PSR)	0040
Status byte 0 (sense only)	0041
Status byte 1 (load only)	0041
Status byte 2 (sense only)	0042
Q-byte (real) (sense only)	0043
Status byte 4 (sense only)	0044
Status byte 5 (sense only)	0045
Status byte 6	0046

01-230 (continued)
Displaying or Altering MSP Registers

Address Translation Registers

Register Name	Address Range
Task ATR group 1	0080-009F
PACT registers: PDIR PXR1 PXR2 PIAR PREG PATR PXXX PCSP	00A0-00A7 00A0 00A1 00A2 00A3 00A4 00A5 00A6 00A7
I/O ATRs group 1	00A8-00bF
Task ATR group 0	00C0-00dF
I/O ATRs group 0	00E0-00FF

Local Storage Registers

Register	Register Name	Register Address
	Operand 1 low	0060
	Operand 1 high	0061
	Operand 2 low	0062
	Operand 2 high	0063
IAR(L)	Instruction address register (low)	0064
IAR(H)	Instruction address register (high)	0065
Q-reg	Q-register	0066
OP reg	Operation register	0067
XR1(L)	Index register 1 (low)	0068
XR1(H)	Index register 1 (high)	0069
XR2(L)	Index register 2 (low)	006A
XR2(H)	Index register 2 (high)	006b
ARR(L)	Address recall register (low)	006C
ARR(H)	Address recall register (high)	006d
	Used internally by the MSP. The data in this register has no meaning.	006E
LCRR or R-byte	Length count recall register	006F
WR4(L)	Work register 4 (low)	0070
WR4(H)	Work register 4 (high)	0071
WR5(L)	Work register 5 (low)	0072
WR5(H)	Work register 5 (high)	0073
WR6(L)	Work register 6 (low)	0074
WR6(H)	Work register 6 (high)	0075
WR7(L)	Work register 7 (low)	0076
WR7(H)	Work register 7 (high)	0077
PSATR(L)	Fast task switch register (low)	0078
PSATR(H)	Fast task switch register (high)	0079
PSREG(L)	Fast task switch register (low)	007A
PSREG(H)	Fast task switch register (high)	007b
PRATR(L)	Fast task switch register (low)	007C
PRATR(H)	Fast task switch register (high)	007d
PRPCT(L)	Fast task switch register (low)	007E
PRPCT(H)	Fast task switch register (high)	007F

01-235
Forcing Storage to Known Data

You can force up to 64K bytes of main storage with 1 byte of input data, or all of control storage with 1 word (2 bytes) of input data, using the Force CSP Run key.

To Force Control Storage to Known Data

1. Ensure that the Security switch is in the Service position.
2. Ensure that the Main Stg Sel light is off.
3. Select mode 4 (alter storage).
4. Press the System Reset key.
5. Use the Input keys to enter the word (2 bytes) to be stored.
6. Press the Force CSP Run key. The force storage operation continues until you press the Force CSP Run key again.

Associated Procedures

Additional Information

To Force Main Storage to Known Data

1. Ensure that the Security switch is in the Service position.
2. Select mode 3 (display/alter MAR).
3. Press the System Reset key.
4. Use the Input keys to enter 00A7 (PCSP register address).
5. Select mode A (alter MSP register).
6. Use the Input keys to enter 0000 (PCSP register data).

When forcing main storage to known data, the storage interface register (SIR) must be initialized. This register is initialized when the system is loaded. If the system has not been loaded, you must initialize this register.

Has the system been loaded?

Y

N

- Select mode 3 (display/alter MAR).
- Use the Input keys to enter 0036 (SIR address).
- Select mode A (alter MSP register).
- Use the Input keys to alter the SIR to:
  - 0036 if largest card is 128K bytes
  - 0056 if largest card is 256K bytes
  - 0076 if largest card is 512K bytes
  - 0096 if largest card is 1024K bytes

7. Ensure that the Main Stg Sel light is on.
8. Select mode 4 (alter storage).
9. Use the Input keys to enter the data (1 byte) to be stored.
10. Press the Force CSP Run key. The force storage operation continues until you press the Force CSP Run key again.

01-240
Displaying or Altering Storage

This procedure assumes that SSP has been loaded.

Real main storage, translated storage, virtual storage, and control storage can be altered or displayed, using the alter/display utility. Also, some system registers (WR4 through WR7, IAR, ARR, XR1, XR2, DIR, PMR, and PSR) and task block (TB), request block (RB), and storage block (SB) addresses can be altered or displayed. The TB and RB addresses let you inspect any task in translated main storage (01-248).

Notes:
1. A TB address must be on the TB chain and in real main storage.
2. All addresses must be valid. Addresses that are not valid are changed to valid addresses for the main storage processor. However, this address may not be the same address that you specified.

CAUTION

Data can be lost if the procedures are not used correctly. All registers and storage locations that are altered must be restored to their original values, or the system must be loaded again.

_____

_____

_____

_____

_____

If you are going to run the system after displaying or altering data in storage, record the original values of registers you are going to alter.

To Display Storage Data

1. Start the alter/display utility (01-210).
2. Select option 1 (alter/display storage).
3. Enter the storage address Ⓐ followed by a C, V, M, or X Ⓑ for the type of storage:

   C = Control storage

   V = Virtual storage

   M = Main storage

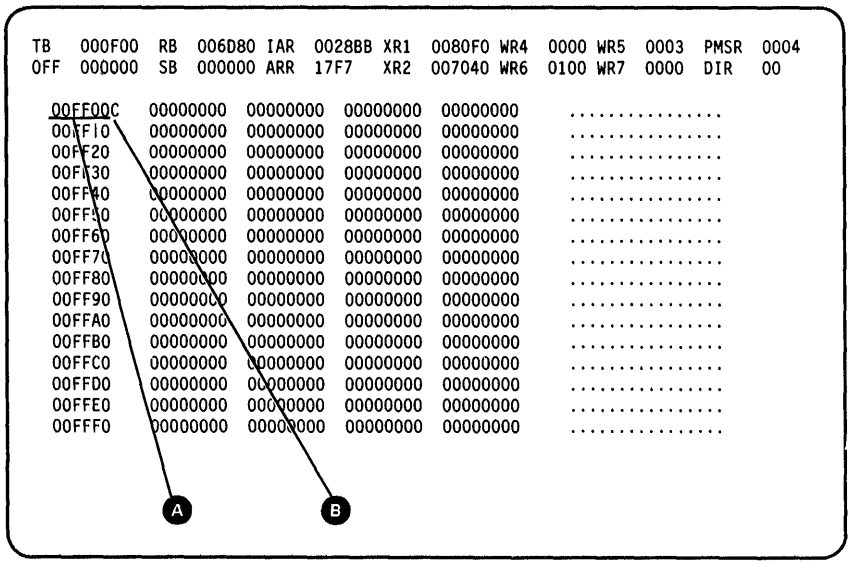
   X = Translated storage

4. Press the Roll↑ key and the Roll↓ key to scroll the displayed storage.

To Display Data at a New Storage Address

1. Enter the new storage address (A).
2. Press the Roll↑ key and the Roll↓ key to scroll the displayed storage.

Example Display: Alter/Display Storage



To Alter Storage Data

Alter the storage data, system register data, TB, RB, or SB address, and press the Enter key.

To End the Alter/Display Storage Option from This Display

Enter an E after the storage address (B), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, or the Cmd1 key.

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

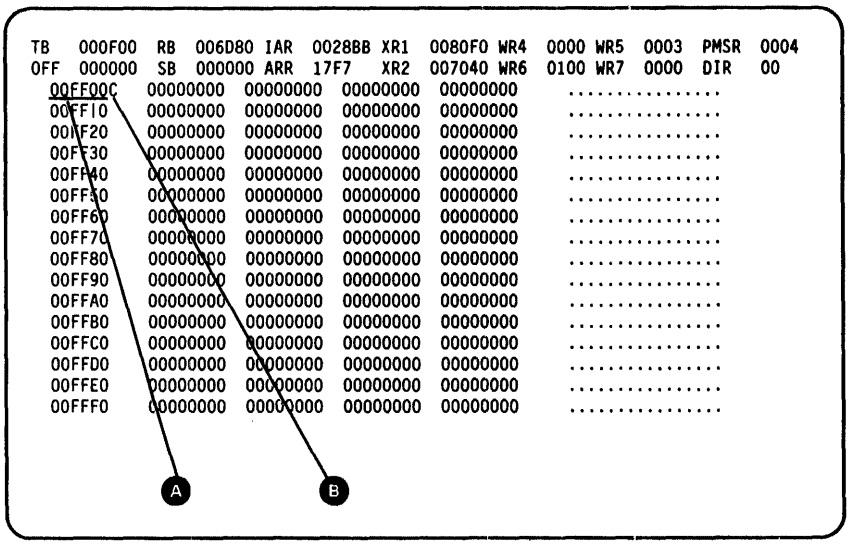
Associated Procedures

01-242
Displaying or Altering Control Storage

This procedure assumes that SSP has been loaded.

You can display or alter control storage, using the alter/display utility.

Example Display: Display Control Storage



To Display Control Storage

1. Start the alter/display utility (01-210).
2. Select option 1 (alter/display storage).
3. Enter the storage address (A) followed by a C (B).
4. Press the Roll↑ key and the Roll↓ key to scroll the displayed storage.

To End the Display/Alter Storage Option from This Display

Enter an E after the storage address (B), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, or the Cmd1 key.

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

Associated Procedures

01-244
Displaying or Altering Virtual Storage

This procedure assumes that SSP has been loaded.

You can display or alter virtual storage, using the alter/display utility.

Example Display: Display Virtual Storage

```
TB   000F00  RB   006D80 IAR  0028BB XR1  0080F0 WR4  0000 WR5  0003  PMSR  0004
0FF  000000  SB   000000 ARR  17F7   XR2  007040 WR6  0100 WR7  0000  DIR   00
  00FF00V    00000000  00000000  00000000  00000000    ................
  00FF10     00000000  00000000  00000000  00000000    ................
  00FF20     00000000  00000000  00000000  00000000    ................
  00FF30     00000000  00000000  00000000  00000000    ................
  00FF40     00000000  00000000  00000000  00000000    ................
  00FF50     00000000  00000000  00000000  00000000    ................
  00FF60     00000000  00000000  00000000  00000000    ................
  00FF70     00000000  00000000  00000000  00000000    ................
  00FF80     00000000  00000000  00000000  00000000    ................
  00FF90     00000000  00000000  00000000  00000000    ................
  00FFA0     00000000  00000000  00000000  00000000    ................
  00FFB0     00000000  00000000  00000000  00000000    ................
  00FFC0     00000000  00000000  00000000  00000000    ................
  00FFD0     00000000  00000000  00000000  00000000    ................
  00FFE0     00000000  00000000  00000000  00000000    ................
  00FFF0     00000000  00000000  00000000  00000000    ................

             (A)               (B)
```

To Display Virtual Storage

1. Start the alter/display utility (01-210).
2. Select option 1 (alter/display storage).
3. Enter the storage address (A) followed by a V (B).
4. Enter the SB address associated with virtual storage.
5. Press the Roll↑ key and the Roll↓ key to scroll the displayed storage.

To End the Display/Alter Storage Option from This Display

Enter an E after the storage address (B), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, or the Cmd1 key.

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

Associated Procedures

01-246 Displaying or Altering Real Main Storage

This procedure assumes that SSP has been loaded.

You can display or alter real main storage, using the alter/display utility.

CAUTION

Data can be lost if the procedures are not used correctly. All registers and storage locations that are altered must be restored to their original values, or the system must be loaded again.

_____

_____

_____

_____

_____

If you are going to run the system after displaying or altering data in main storage, record the original values of registers you are going to alter.

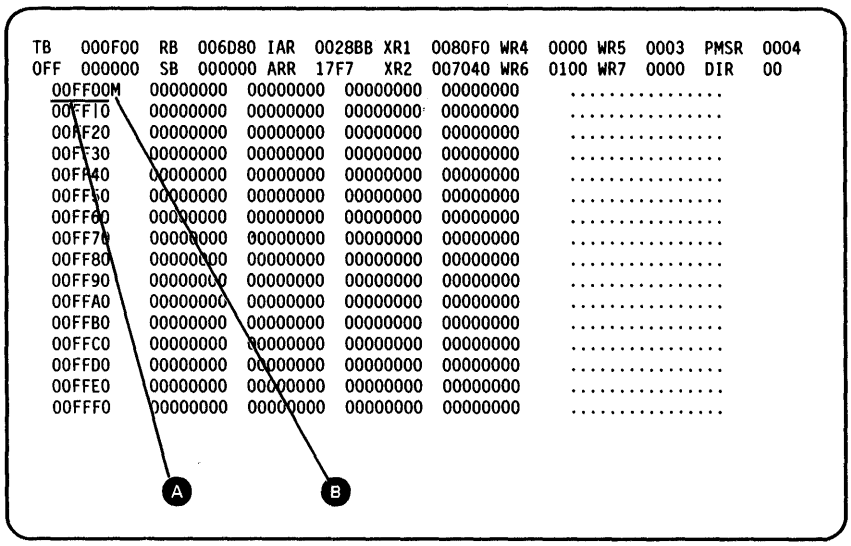
To Display Main Storage

1. Start the alter/display utility (01-210).
2. Select option 1 (alter/display storage).
3. Enter the storage address (A) followed by an M (B).
4. Press the Roll↑ key and the Roll↓ key to scroll the displayed storage.

To End the Display/Alter Storage Option from This Display

Enter an E after the storage address (B), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, or the Cmd1 key.

Example Display: Display Real Main Storage



Associated Procedures

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

01-248 Displaying or Altering Translated Storage

This procedure assumes that SSP has been loaded.

You can display or alter translated storage, using the alter/display utility.

CAUTION

Data can be lost if the procedures are not used correctly. All registers and storage locations that are altered must be restored to their original values, or the system must be loaded again.

_____

_____

_____

_____

_____

If you are going to run the system after displaying or altering data in main storage, record the original values of registers you are going to alter.

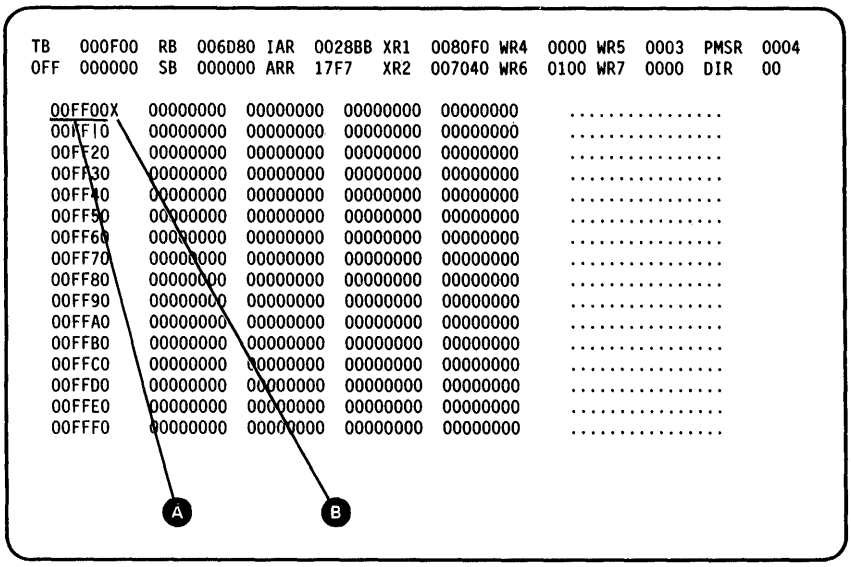
To Display Translated Storage

1. Start the alter/display utility (01-210).
2. Select option 1 (alter/display storage).
3. Enter the storage address (A) followed by an X (B).
4. Enter the TB and RB addresses associated with the translated storage.
5. Press the Roll↑ key and the Roll↓ key to scroll the displayed storage.

To End the Display/Alter Storage Option from This Display

Enter an E after the storage address (B), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, or the Cmd1 key.

Example Display: Display Translated Storage



Associated Procedures

Using the Alter/Display Utility	01-210
Displaying or Altering Storage	01-240
Displaying or Altering Control Storage	01-242
Displaying or Altering Virtual Storage	01-244
Displaying or Altering Real Main Storage	01-246
Testing CSP, MSP, Control Storage, and Main Storage	01-400

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

01-250
Displaying I/O Controller Storage

You can display I/O controller storage at a selected storage address, using the alter/display utility.

To Get the I/O Controller Storage Prompt

1. Start the alter/display utility (01-210).
2. Select option 8 (display I/O controller storage).

Example Display: Display I/O Controller Storage

```
8 - DISPLAY I/O CONTROLLER STORAGE

REPLY FORMATS: D @@@@ DD
               E


ENTER OPTION PARAMETERS -> D 0100 10   (A)
```

To Select a Device and Display Data

Enter the option parameters (A) where:

- D = Display I/O controller storage
- @@@@ = Address of I/O controller storage data
- DD = Device address:
  - 40–Communications controller (ELCA)
  - 50–1255 magnetic character reader
  - 80–Communications controller (MLCA)
  - 90–Work station controller 2
  - A0–Data storage controller
  - C0–Work station controller 1
  - E0–3262 Printer
- E = Exit this option

Notes:

1. Storage data can be addressed on a byte boundary.
2. The 3262 Printer is not ready while displaying the 3262 Printer storage.
3. The 3262 Printer Ready light can be on or off when the output is to the printer. This is normal. However, the Ready light will be on during actual printing.

To Display Data at a New Storage Address

1. Key in the new storage address (A).
2. Press the Enter key.
3. Press the Roll↑ key and the Roll↓ key to scroll the displayed storage.

Example Display: Display I/O Controller Storage

```
DEVICE ADDRESS= 10              DISPLAY I/O CONTROLLER STORAGE
 (A) (B)
01000  00000000  00000000  00000000  00000000  ................
0110   00000000  00000000  00000000  00000000  ................
0120   00000000  00000000  00000000  00000000  ................
0130   00000000  00000000  00000000  00000000  ................
0140   00000000  00000000  00000000  00000000  ................
0150   00000000  00000000  00000000  00000000  ................
0160   00000000  00000000  00000000  00000000  ................
0170   00000000  00000000  00000000  00000000  ................
0180   00000000  00000000  00000000  00000000  ................
0190   00000000  00000000  00000000  00000000  ................
01A0   00000000  00000000  00000000  00000000  ................
01B0   00000000  00000000  00000000  00000000  ................
01C0   00000000  00000000  00000000  00000000  ................
01D0   00000000  00000000  00000000  00000000  ................
01E0   00000000  00000000  00000000  00000000  ................
01F0   00000000  00000000  00000000  00000000  ................
```

To End I/O Controller Storage Option from This Display

Enter an E after the storage address (B), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, or the Enter key.

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

Additional Information

Using the Alter/Display Utility 01-210

01-255
Displaying or Patching Disk Storage

You can display or patch disk storage at a selected storage address, using the alter/display utility.

To Get the Disk Storage Prompt

1. Start the alter/display utility (01-210).
2. Select option 2 (alter/display disk storage).

Example Display: Alter/Display Disk Storage

```
2 - ALTER/DISPLAY DISK STORAGE

REPLY FORMATS: F SSSSSS
               S SSSSSS
               R
               E



ENTER OPTION PARAMETERS -> F 00003B   (A)
```

To Display Data at a Disk Address

Enter the option parameters (A) where:

F	= Display disk storage
SSSSSS	= Disk sector address

Example Display: Display Disk Storage

```
SS@= AAAAAA(A)

0000    00000000  00000000  00000000  00000000    ................
0010    00000000  00000000  00000000  00000000    ................
0020    00000000  00000000  00000000  00000000    ................
0030    00000000  00000000  00000000  00000000    ................
0040    00000000  00000000  00000000  00000000    ................
0050    00000000  00000000  00000000  00000000    ................
0060    00000000  00000000  00000000  00000000    ................
0070    00000000  00000000  00000000  00000000    ................
0080    00000000  00000000  00000000  00000000    ................
0090    00000000  00000000  00000000  00000000    ................
00A0    00000000  00000000  00000000  00000000    ................
00B0    00000000  00000000  00000000  00000000    ................
00C0    00000000  00000000  00000000  00000000    ................
00D0    00000000  00000000  00000000  00000000    ................
00E0    00000000  00000000  00000000  00000000    ................
00F0    00000000  00000000  00000000  00000000    ................
```

To Display Disk Data at a New Address

1. Enter the new disk sector address using the format AAAAAA.
2. Press the Roll↑ key or Cmd1 key to display the next disk sector.
3. Press the Roll↓ key or Cmd2 key to display the preceding disk sector.

To Patch Disk Storage

Display disk data at the address to be patched.

Do you want to verify the data?

Y

- Key in a P after the disk address (A) (SS@=AAAAAAP).
- Change the displayed data.
- Press the Enter key.

N

- Change the displayed data.
- Press the Enter key.
- Verify that the data is correct.
- Key in a P after the disk address (A) (SS@=AAAAAAP).
- Press the Enter key.

To End the Alter/Display Disk Storage Option from This Display

Enter an E after the disk address (A), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, the Cmd1 key, or the Cmd2 key.

Notes:

1. All data must be a hexadecimal value.
2. If a disk address is not valid, you will be prompted again.

Associated Procedure

Stopping on a Write to a Selected Disk Address . 01-217

Additional Information

Using the Alter/Display Utility 01-210

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

This page is intentionally left blank.

01-260
Dumping the System Data Areas

You can dump the system data areas to the disk dump file, using the alter/display utility.

To Get the System Dumps Prompt

1. Start the alter/display utility (01-210).
2. Select option 11 (system dumps).

Example Display: System Dumps

```
11 - SYSTEM DUMPS

REPLY FORMATS: S ## - TASK DUMP FOR SYSTEM TASKS
               D    - SYSTEM DUMP
               E


ENTER OPTION PARAMETERS -> S 09   (A)
```

To Perform a System Dump

Enter the option parameters (A), where:

- S = Task dump
- ## = System task ID of task to be dumped
- D = System dump
- E = Exit option and display option menu

Notes:

1. Instead of using option D, it is recommended that you exit the alter/display utility. Then use the system termination utility (01-125) to obtain a system dump.
2. The system does not have to be loaded after an option S dump. The alter/display utility ends and the main storage processor starts automatically. A system console message informs you of the dump.

Additional Information

Using the Alter/Display Utility 01-210

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

01-263
Dumping Storage to the Printer

You can dump real main storage, translated main storage, virtual storage, and control storage to the system printer. You select the size of the dump.

To Get the Dump Storage to Printer Prompt

1. Start the alter/display utility (01-210).
2. Select option 3 (dump storage to printer).

Example Display: Dump Storage to Printer

```
3 - DUMP STORAGE TO PRINTER

REPLY FORMATS: X LLLLLL HHHHHH  T @@@@@@ @@@@@@
               V LLLLLL HHHHHH  S @@@@@@
               M LLLLLL HHHHHH
               C LLLLLL HHHHHH
               E


ENTER OPTION PARAMETERS -> X LLLLLL HHHHHH   T @@@@@@ @@@@@@   (A)
```

To Dump Storage to the Printer

Enter the option parameters (A) (dump translated storage example shown), where:

X	= Dump translated storage
V	= Dump virtual storage
M	= Dump real main storage
C	= Dump control storage
T	= Print the storage for a specified task (TB address followed by RB address)
S	= Print the storage for a specified storage block (SB).
E	= Exit option and display option menu
LLLLLL	= Low limit address value
HHHHHH	= High limit address value
@@@@@@	= Control block address value

Notes:

1. The system printer must be ready. If the spool writer is allocated to the system printer, the alter/display utility print options will not print. The spool writer must be stopped before you can allocate the system printer to the alter/display utility.
2. Any printer errors cause the option menu to be displayed.
3. All storage addresses are tested for valid addresses. If storage data is not accessible, the dump will end.
4. If only the low dump address (LLLLLL) is specified, only one line of storage is printed.
5. Storage addresses are aligned on a 32-byte boundary.
6. When the storage dump ends, the system prompts you for another dump.

01-266
Dumping Disk Storage to the Printer

You can dump disk storage to the system printer. You select the size of the dump.

To Get the Dump Disk Storage to Printer Prompt

1. Start the alter/display utility (01-210).
2. Select option 4 (dump disk storage to printer).

Example Display: Dump Disk Storage to Printer

```
4 - DUMP DISK STORAGE TO PRINTER

REPLY FORMATS: F SSSSSS NN
               E


ENTER OPTION PARAMETERS -> F SSSSSS NN   (A)
```

To Dump Disk Storage to the Printer

Enter the option parameters (A), where:

F	= Dump disk storage
SSSSSS	= Sequential sector address
NN	= Hexadecimal number of disk sectors to dump (must be a 2-character value)
E	= Exit option and display option menu

Additional Information

Using the Alter/Display Utility 01-210

Notes:

1. If the spool writer is allocated to the system printer, the alter/display utility print options will not print. The spool writer must be stopped before you can allocate the system printer to the alter/display utility.
2. If a printer or disk error occurs while dumping disk storage, this option is ended and the alter/display option menu is displayed. Stopping the printer is an error to the alter/display utility.
3. A disk address that is not valid or a printer error causes the option menu to be displayed.
4. The disk address for each sector dumped also is printed.
5. When the disk storage dump ends, the system prompts you for another dump.

01-270
Tracing Main Storage Instructions

You can print instruction data for each main storage instruction, including all data areas used by an instruction, between the address limits you specify. You can also trace instructions for a specific data condition (for example, trace with verify).

To Get the Main Storage Instruction Trace Prompt

1. Start the alter/display utility (01-210).

2. Select option 5 (main storage instruction trace).

Notes.:

1. If the spool writer is allocated to the sytstem printer, the alter/display utility print options will not print. The spool writer must be stopped before you can allocate the system printer to the alter/display utility.
2. No input response to the prompt causes an instruction trace from hex 000000 to the end of main storage.
3. Operand trace means that the operand and the IAR are compared with the specified limits.
4. The verify address is logical or real, and is determined by the status of the program mode register (PMR) for each instruction. A logical verify address is tested for translation. If it cannot be translated, the verify address is assumed to be real.
5. The main storage instruction active when instruction step is started is not traced.
6. The verify data should not go across a 2K-page boundary.
7. If the TB cannot by found, you are prompted again.

Example Display: Main Storage Instruction Trace

```
5 - MAIN STORAGE INSTRUCTION TRACE

REPLY FORMATS: L LLLLLL HHHHHH  V @@@@@@  ######      (A)
               L LLLLLL HHHHHH  Y @@@@@@
               O LLLLLL HHHHHH
               E



ENTER OPTION PARAMETERS -> L LLLLLL HHHHHH  Y @@@@@@ ####      (A)
```

To Trace Main Storage Instructions

Enter the option parameters (A), where:

- L = Trace IAR between address limits
- O = Trace operand addresses and IAR between address limits
- V = Trace with verify (optional)
- T = Trace by task (optional)
- E = Exit option and display option menu
- LLL = Lower address limit
- HHH = Upper address limit
- @@@ = Verify address or TB address
- ### = Verify data

2. Select the O option to end the alter/display utility.

To End Instruction Trace

1. Press the MSP Stop key.
2. Select option 5 (main storage instruction trace).
3. Key in an E to end the option to trace main storage instructions.

Additional Information

Using the Alter/Display Utility 01-210

Other System Publications

System Data Areas *Program Problem Diagnosis and Diagnostic Aids*

01-272
Stepping Main Storage Instructions

You can display real main storage, translated main storage, or control storage for each main storage instruction as they occur between the address limits you specify. You can also step instructions for a specific data condition (instruction step with verify).

To Get the Main Storage Instruction Step Prompt

1. Start the alter/display utility (01-210).

2. Select option 6 (main storage instruction step).

Notes:
1. No input response to the prompt causes an instruction step from hex 000000 to the end of main storage.
2. The verify address is logical or real, and is determined by the status of the program mode register (PMR) for each instruction. A logical verify address is tested for translation. If it cannot be translated, the verify address is assumed to be real.
3. The verify data should not go across a 2K-page boundary.
4. If the TB cannot be found, you are prompted again.

Example Display: Main Storage Instruction Step

```
6 - MAIN STORAGE INSTRUCTION STEP

REPLY FORMATS: L LLLLLL HHHHHH  V @@@@@@  ####
               L LLLLLL HHHHHH  Y @@@@@@
               E




ENTER OPTION PARAMETERS -> L LLLLLL HHHHHH  Y @@@@@@ ####      (A)
```

To Trace Main Storage Instructions

1. Enter the option parameters (A), where:
   - L = Instruction step IAR between address limits
   - V = Instruction step with verify (optiona)
   - T = Instruction step by task (optiona)
   - E = Exit option and display option menu
   - LLL = Lower address limit
   - HHH = Upper address limit
   - @@@ = Verify address or TB address
   - ### = Verify data

   If no parameters are specified, instruction stepping occurs from hex 000000 to the end of main storage.

2. Select option 0 to exit the alter/display utility.

To End Instruction Step

1. Press the MSP Stop key.
2. Select option 6 (main storage instruction step).
3. Key in an E to end the option to step main storage instructions.

This page is intentionally left blank.

Additional Information

Using the Alter/Display Utility	01-210

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

01-274
Stepping Control Storage

You can step control storage, using the control panel. The content (one word) of the selected CSP register is displayed in the control panel display. The value of the MAR is updated to the next instruction. Pressing the CSP start key runs the next instruction.

To Step Control Storage

1. Ensure that the Security switch is in the Service position.
2. Ensure that the Main Stg Sel light is off.
3. Select mode 1 (instruction step display LSR).
4. Use the Input keys to enter the 16-bit address of the CSP LSR displayed (01-225).
5. Press the Display Output key to display the contents of the selected LSR.
6. Press the CSP Start key. The content (one word) of the selected LSR is displayed in the control panel; the value of the MAR is updated to the next instruction.
7. Perform one of the following steps:
   a. Repeat step 6 to display the selected LSR for each instruction.
   b. Repeat steps 4 and 5 to display the contents of other LSRs.
   c. Select mode 0 (processor run) to end stepping control storage.

Associated Procedure

Stepping Control Storage Locations 01-440

Additional Information

System Controls 01-055/

01-276
Stepping I/O Controller I/O Actions

When you can specify parameters that will stop MSP when an I/O request is sent to, or an error occurs on,the I/O controller device and unit you specify.

To Get the I/O Controller Step or Stop on Error Prompt

1. Start the alter/display utility (01-210).

2. Select option 9 (I/O controller step or stop on error).

Example Display: I/O Controller Step or Stop on Error

```
9 - I/O CONTROLLER STEP OR STOP ON ERROR

REPLY FORMATS: S DD UU   STEP
               P DD UU   STOP ON ERROR
               E         END STEP OR STOP ON ERROR




ENTER OPTION PARAMETERS -> S DD UU   (A)
```

To Step or Stop I/O Controller I/O Actions

1. Enter the option parameters (A), where:
   - S = Step mode
   - P = Stop on error
   - E = Exit option and display option menu
   - DD = Device address:
     - 40–Communications controller (ELCA)
     - 50–1255 magnetic character reader
     - 80–Communications controller (MLCA)
     - 90–Work station controller 2
     - A0–Data storage controller
     - C0–Work station controller 1
     - E0–3262 Printer
   - UU = Unit address
2. Select the 0 option to end the alter/display utility.

To End I/O Controller Step or Stop

1. Press the MSP Stop key.
2. Select option 9 (I/O controller step or stop).
3. Key in an E to end step or stop on error.

Additional Information

Using the Alter/Display Utility	01-210
Displaying I/O Controller Storage	01-250
System Controls	01-055

This page is intentionally left blank.

01-280
Displaying System Status

You can display the status of the system at the time you invoke the alter/display utility.

The information displayed is obtained from the task block (TB), the request block (RB), and the job control block (JCB).

To Display the System Status

1. Start the alter/display utility (01-210).
2. Select option 12 (display system status).

Example Display: System Status Display

```
                        SYSTEM STATUS DISPLAY

                                TB 000F00

RB  00E790  CMPL 000000  ARR  13E3  IAR 008C8B  WR4 0000  DIR 00  ERMIC  00
JCB 000000  TWSQ 000000  PMSR 0004  XR1 00F600  WR5 0003  IL1 34  PRTY   FC
PB  008960  OPQR F46902  TKID 0009  XR2 00BE75  WR6 0100  IL2 A1  PROC
TUB         RGSIZE       JOBID      ATR 00213F  WR7 0000  IL3 8C  PROG
STATUS:     EVTW

                                TB 00E5E0

RB  00E6A0  CMPL 000000  ARR  158C  IAR 8010A6  WR4 0000  DIR 80  ERMIC  00
JCB 007B70  TWSQ 000000  PMSR 0A01  XR1 000000  WR5 0009  IL1 34  PRTY   F0
PB  00F7C0  OPQR F42D02  TKID 0083  XR2 000000  WR6 0000  IL2 A1  PROC   .......
TUB 000000  RGSIZE   0K  JOBID  W1  ATR 00E67F  WR7 8000  IL3 1B  PROG   #GCAC
STATUS:     EVTW
```

Notes:

1. Tasks are displayed in the same order as the existing task control block priority queue.
2. Press the Enter key to cause the next display to appear.
3. Press the Print key to print the existing display.
4. Press any attention identification (AID) key other than the Enter key to end this option.

Additional Information

Using the Alter/Display Utility 01-210

Other System Publications

System Data Areas *Program Problem Diagnosis and Diagnostic Aids*

01-280 (continued)
Displaying System Status

Description of Displayed Labels

The displayed system status contains the following labels:

Label	Meaning	Control Block Label
TB	Task block address	TB_TBQ
RB	Request block address	TB_RBQ
JCB	Job control block address	TB_JCB
PB	Program block address	RB_PB
TUB	Terminal unit block address	JCBRTUB
CMPL	Complete ACE queue header	TB_CMPLQ
TWSQ	Task work space queue header	TB_TWSQ
OPQR	Operation code	RB_OP
	Q-byte	RB_Q
	R-byte	RB_R
RGSIZE	Job region size decimal K-bytes	JCBDJBRG
ARR	Address recall register	RB_ARR
PMSR	Program mode register	RB_PMR
	Program status register	RB_PSR
TKID	Task identification	TB_TSKID
JOBID	Job identification	JCBDJBID
IAR	Instruction address register	RB_PIAR,RB_IAR
XR1	Index register 1	RB_PXR1,RB_XR1
XR2	Index register 2	RB_PXR2,RB_XR2
ATR	Rightmost byte of ATR stack pointer	TB_PATR,RB_ATR
WR4-WR7	Work registers 4 through 7	RB_WRX
DIR	Direct instruction register	RB_PDIR
IL1-IL3	Inline parameters 1 through 3	RB_INLX
ERMIC	Message identification code	TB_MIC
PRTY	Priority	TB_PRTY
PROC	Procedure name	JCBDPROC
PROG	Program name	JCBDPROG
STATUS	Status indicators	

TB Status Byte Table

The status of a task is determined from the status bytes and wait masks in the task block (TB) and the job control block (JCB). The following table shows which bytes are tested and the label that is displayed.

Status Byte	Active Bit	Label (Displayed)	Meaning
TB__STAT1	0000 0000	REDI	Task is ready, but is not the dispatched task
		or	
		ACTV	Task is ready, and is the dispatched task
	1000 0000		Task is waiting
	0100 0000	SVCQ	Waiting for SVC request
	0000 1000	SVCT	SVC retry
	0000 0100	SVCF	SVC failed
TB__STAT2	0000 0000		Waiting for storage
	1000 0000	EVTW	Waiting for event to end
	0010 000	PSTW	Waiting for general post
	0001 000	RNQW	Waiting for resource enqueue
	0000 1000	SVCW	Waiting for internal delayed SVC
	0000 0100	TMRW	Waiting for timer elapse
TB__WMASK	1000 0000	SQSW	Waiting for system queue space
	0100 0000	TWAW	Waiting for task work area
	0010 0000	TASW	Test and set wait
	0001 0000	WQSW	Waiting for work station queue space
	0000 0100	FDRW	Waiting for disk resources
	0000 0010	SNQW	Waiting for disk record enqueue
	0000 0001	WSRW	Work station release wait
TB__WMSK2	1000 0000	PTRW	Waiting for printer
	0100 0000	CMLW	Waiting for communications line
	0010 0000	DKTW	Waiting for diskette
	0001 0000	DSKW	Waiting for disk
	0000 1000	DEVW	Waiting for other devices
	0000 0010	QLWT	Waiting for quick lock
TB__STAT3	1000 0000	TERM	Task is ending
TB__STAT4	0100 0000	SUBT	Task is a subtask
	0001 0000	ABTM	Task is in abnormal termination
JCBSUSPS	1000 0000	SUNK	Task is suspended by UNLOCK
	0100 0000	SOPR	Task is suspended by system operator
	0010 0000	SINQ	Task is suspended by inquiry
	0001 0000	SSPL	Task is suspended by spool suspend/restore
	0000 0010	SADL	Task is suspended by address compare
	0000 0001	SWIO	Task is suspended by work station I/O error

This page is intentionally left blank.

01-282
Displaying the Task Region of a Selected Task

The TB and RB addresses let you inspect any task in translated main storage.

To Get the Alter/Display Storage Prompt

1. Start the alter/display utility (01-210).
2. Select option 1 (alter/display storage).

Example Display: Alter/Display Storage

```
TB   000F00  RB  006D80 IAR  0028BB XR1  0080F0 WR4  0000 WR5  0003  PMSR  0004
0FF  000000  SB  000000 ARR  17F7   XR2  007040 WR6  0100 WR7  0000  DIR   00

  00FF00X   00000000  00000000  00000000  00000000     ................
  00FF|0    00000000  00000000  00000000  00000000     ................
  00FF20    00000000  00000000  00000000  00000000     ................
  00FF30    00000000  00000000  00000000  00000000     ................
  00FF40    00000000  00000000  00000000  00000000     ................
  00FF50    00000000  00000000  00000000  00000000     ................
  00FF60    00000000  00000000  00000000  00000000     ................
  00FF70    00000000  00000000  00000000  00000000     ................
  00FF80    00000000  00000000  00000000  00000000     ................
  00FF90    00000000  00000000  00000000  00000000     ................
  00FFA0    00000000  00000000  00000000  00000000     ................
  00FFB0    00000000  00000000  00000000  00000000     ................
  00FFC0    00000000  00000000  00000000  00000000     ................
  00FFD0    00000000  00000000  00000000  00000000     ................
  00FFE0    00000000  00000000  00000000  00000000     ................
  00FFF0    00000000  00000000  00000000  00000000     ................
```

To Display a Task Region

1. Ensure that the storage option (following the first storage address) is an X (for translated storage).
2. Enter the task block (TB) and request block (RB) addresses.

Notes:

1. The TB address must be on the TB chain and in real main storage.
2. The RB address must be for an RB on the RB chain of the specified TB.
3. Each RB describes a task region. The task region may be in real storage or may have been swapped to disk. The alter/display utility will display storage and the associated SB address.
4. All addresses must be valid. Addresses that are not valid are changed to valid addresses for the main storage processor. However, this address may not be the same address that you specified.

Associated Procedures

Using the Alter/Display Utility 01-210
Displaying or Altering Storage 01-240

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

01-285
Displaying System Records

The system records list utility lets you display or print all accessible control records on disk and diskettes. These records include:

- Control storage directory (disk only)
- Diskette directory (of each diskette)
- EC level record (diskette only)
- Patch tables (disk and diskette)
- Prerequisite list (disk and diskette)
- Microcode level table (disk and diskette)

To Display System Records

Do you want to run concurrently with customer jobs?

Y **N**

- Load dedicated DCP (01-150).
- Select the Utilities option.
- Go to step 2 and continue.

1. Key in CONCR.
2. Select the system records list utility.
3. Follow the displayed instructions to list specific control records.

Records on Disk

- *Control Storage Directory:* The control storage directory contains 8-byte records that identify and locate all system microcode modules. This variable-length directory starts at disk address hex 000041. Each directory entry includes the:
  - Module ID
  - Disk address (SSSS)
  - Number of text sectors
  - Link edit address high byte
  - RLD displacement last sector
  - Total number of sectors

Records on Diskette

- *Diskette Directory:* A diskette directory is a variable-length record that contains fixed-length entries (64 bytes each) about the modules on the diskette. Each entry includes the:
  - Module name
  - Module ID
  - Module class
  - Module number
  - Module status (r = replaced; p = patched)
  - Diskette address: CCHHSS (real address)
  - Module description
- *EC Level Record:* The 12-byte EC level record contains the following status information about the factory level of the diskette:
  - Diskette ID
  - Part number
  - EC sequence number
  - EC number
  - Number of the last patch included in the EC

Additional Information

Loading Concurrent DCP	01-155
Tasks Associated with Diagnostic Utilities	01-185

Records on Both Disk and Diskette

- *Patch Tables:* The patch table on disk (module ID = F020) is generated from the patch tables of all diagnostic diskettes. This table contains variable-length records (9 bytes minimum; 27 bytes maximum) that show which of the patches have been installed on the disk. This table also includes a history of all field-installed free-lance patches, and all patches installed by the PTF utility (SSP) and by the program patch utility (DCP). Each entry in this table includes the:
  - Patch type (free-lance, PTF, free-lance PTF, or controlled)
  - Patch number (A patch number of FFFF indicates a free-lance patch.)
  - Patched module IDs
  - Special module ID if necessary as follows:
    - F0FD This patch is a diskette absolute sector patch
    - F0FE This patch is a disk sequential sector patch (this special module ID is contained in the disk patch table only)
    - F0FF The module patched on a diskette is identified by a module name instead of a module ID
  - Number of the diagnostic diskette that contains the original patch data (Patches installed by the PTF utility have a diskette ID of A0. Free-lance patches have a diskette ID of 00, unless the patch was installed using the SSP PTF procedure. Then the ID is A0.)
  - Date patch was installed

  Each diagnostic diskette contains a patch table. This table contains variable-length records (9 bytes minimum; 27 bytes maximum) that show which of the patches have been installed on the diskette. Each entry in this table includes the:
  - Patch type (PTF or controlled)
  - Patch number
  - Patched module IDs
  - Number of the diagnostic diskette that contains the original patch data
  - Date patch was installed

- *Prerequisite List:* The prerequisite list (on the DIAG24[1] diskette only) is an 8-byte record that shows the microcode level relative to the level of the software and the hardware. Each entry in this table includes the:
  - Hardware EC number
  - SSP release level
  - SSP modification level
  - SSP PTF number

- *Microcode Level Table:* The microcode level table (on the DIAG24[1] diskette only) contains the 4-digit release level number of the microcode and the last patch that was included in the release. The microcode level table also includes the:
  - Diskette IDs
  - Diskette release part numbers
  - Diskette release EC sequence numbers
  - Exception diskette part numbers
  - Exception diskette EC sequence numbers

  An exception entry is made when a diskette other than those specified is used to customize the system.

  A compatibility table is added to the microcode level table that includes the part numbers of diskettes that can be used for diagnostics.

[1]For Stage 3 systems, use the DIAG44 diskette.

01-290
Displaying UDT Entries

The diagnostic diskettes contain diagnostic tests for all devices that can be attached to System/36. These devices have different descriptions and storage sizes. Therefore, you must describe the system hardware configuration for the diagnostic control programs (01-835).

When you describe the system configuration, a unit definition table (UDT) is generated. This table contains an entry for each device. Each entry contains the device ID, the device address, and configuration data (such as storage size for disk storage devices, print image for the system printer, and type of keyboard and display for the system console).

```
                    SYSTEM CONFIGURE PRIMARY MENU

Select one of the following:

   1. Display UDT entries
   2. Print UDT entries
   3. Delete all entries from the temporary UDT buffer
   4. Configure a device in the temporary UDT
   5. Write the temporary UDT to a DIAG21 diskette
      (RPQs can be selected during this option.)

Option: _




Cmd3-Back up Cmd7-End
```

To Load the System Configure Utility

Insert the DIAG21 diskette or the diagnostic magazine.

Do you want to run the configure utility concurrently with customer jobs?

Y **N**

- Load dedicated DCP (01-150).
- Select the Utilities option.
- Select the system configure utility.

- Key in CONCR (01-155).
- Select the system configure utility.

Associated Procedures

Updating UDT Entries on Diskette	01-835
Updating UDT Entries and Microcode on Disk	01-840
Verifying UDT Entries on Disk	01-845

Additional Information

Tasks Associated with Diagnostic Utilities	01-185

To Display or Print the UDT Entries

Options 1 and 2 of the System Configure Primary menu let you display or print the UDT entries from the:

- Disk
- Diskette
- Temporary UDT buffer

Do you want to display the UDT entries?

Y

- Select option 2 to print all UDT entries.
- Select the option to print the UDT entries from disk, diskette, or the temporary UDT buffer.

N

- Select option 1 to display the UDT entries.
- Select the option to display the UDT entries from disk, diskette, or the temporary UDT buffer.

The following display is an example of how UDT entries are displayed.

```
                          SYSTEM CONFIGURE

                            Display UDT

S/36                      SN/000000

MSP                       384K bytes (model Bxx w/1005)

Disk size                 400 megabytes (model xx4)

Diskette                  72MD (model x2x)

Work station              Expansion A (4900)
                          US-EBCDIC (2956)
                          Multinational (2990)


Cmd3-Back up   Cmd7-End   Roll-Page
```

This page is intentionally left blank.

Displaying and Interpreting System Error Information

01-300 Contents

About This Section

This section describes the procedures that display system error information. When there is more than one method of performing a procedure, all methods are described.

- *Displaying Information about Processor Checks:* These procedures let you display and interpret:
  - MSP status bytes 4 and 5
  - The processor condition register (PCR) byte (not Stage 2 systems)
  - The interrupt level backup byte (ILBB)
  - Control storage processor (CSP) errors
  - Channel errors and associated device addresses

  These procedures also let you:
  - Use the control panel to force the control storage processor to run continuously without stopping when errors occur
  - Install a jumper to permit the control storage processor and the main storage processor to run without stopping when errors occur

- *Displaying Information about Program and Console Checks:* These procedures let you:
  - Collect information about program checks
  - Analyze console checks

- *Displaying Communications and Power Status:* These procedures let you display and interpret:
  - Communications line status
  - Power status

- *Displaying and Interpreting Error Reports:* These procedures let you:
  - Display all ERAP error reports
  - Interpret the system summary report
  - Interpret all system reference codes associated with system units and I/O devices
  - Interpret all I/O wrap errors
  - Display and interpret CSIPL error data
  - Display and interpret error data after CSIPL

01-310
Displaying Processor Checks

If a processor check occurs, inspect the control panel display for a valid system reference code (01-370). Use the following procedures to determine what caused the processor check:

01-320 Displaying MSP Status Bytes
01-325 Displaying the ILBB and PCR Checks
01-330 Displaying CSP Checks
01-335 Displaying Channel Checks

Additional information may have been recorded in the error save area of control storage (01-390). To display this data:

- Before IPL: Reset the processor check (01-313), display (01-393) and interpret (01-398) the error save table.
- After IPL: Reset the processor check (01-313), load and start SSP (01-160), and use the procedure *Running ERAP* (01-360) to display error data logged during CSIPL.

01-313
Resetting Processor Checks

Before you reset a processor check, inspect the control panel display for a valid system reference code (01-370). The system reference code also is stored in the machine check microinstruction address backup (MAB) register (01-225).

To Reset the Processor Check

1. Select mode 1 to ensure that the CSP is stopped.
2. Press the System Reset key. The system resets the Processor Check light.
3. Determine the cause of the processor check (01-310), or load the system (01-140).

01-317
Inhibiting Processor Checks

A CSP check run operation prevents processor checks from stopping the system. A check run operation lets you diagnose problems that cause a processor check. There are two methods of forcing a check run operation; you can use the Force CSP Run key, or you can install a jumper on the A1 board.

To Force a Check Run Operation, Using the Force CSP Run Key

With the Security switch in the Service position, use the Force CSP Run key to activate or deactivate the CSP check run operation.

- When you press the Force CSP Run key to start a check run operation (CSP Run light on), you start the control storage processor (if the CSP is not running), and inhibit machine check interrupts.
- When you press the Force CSP Run key to stop a check run operation (Force CSP Run light off), the control storage processor continues to run unless a processor check halt instruction occurred during the force run operation, and the CSP stops. The processor check must be reset (01-313) to start the CSP again.

To Force a Check Run Operation, Using a Jumper

Install a jumper as follows:
- Not Stage 2 and Stage 3 systems: A-A1B4B02 to any D08 pin.
- Stage 2 systems: A-A1M2B10 to any D08 pin. (See 01-045 to identify Stage 2 systems.)
- Stage 3 systems: A-A1M2X33 to A-A1M2X27 pin. (See 01-045 to identify Stage 3 systems.)

Note: Errors that occur during a check run operation are logged in the CSP processor error byte (01-330).

If the CSP is not running, press the CSP Start key.

01-320
Displaying MSP Status Bytes

This procedure lets you determine if a main storage processor error caused a processor check. If an MSP error occurred, you can inspect MSP status bytes 4 and 5 to determine what caused the error.

To Display MSP Status Bytes

1. Ensure that the Security switch is in the Service position.
2. Select mode 3 (display/alter MAR).
3. Use the Input keys to enter 0044 and press the CSP Start key to load the MAR with the address of status byte 4.
4. Select mode b (display MSP register).
5. Press the CSP Start key to display status byte 4.
6. Interpret status byte 4 (10-558).
7. Press the CSP Start key to display status byte 5.
8. Interpret status byte 5 (10-560).

Associated Procedures

Displaying MSP Status Bytes	01-320
Displaying the ILBB and PCR Checks	01-325
Displaying CSP Checks	01-330
Displaying Channel Checks	01-335

Additional Information

Resetting the System	01-120
System Controls	01-055

Associated Procedures

Displaying CSP Checks	01-330
Displaying Channel Checks	01-335

Additional Information

Displaying or Altering MSP Registers	01-230
System Controls	01-055

01-325
Displaying the ILBB and PCR Checks

This procedure lets you display information generated at the time an error occurs:

- The interrupt level backup byte (ILBB) indicates on which hardware interrupt level the CSP was running when the error occurred
- The processor condition register (PCR) contains information about the status of the last operation (of the type that affects the PCR) performed in the CSP. (The PCR is not displayed on Stage 2 systems. However, it is recorded in the error history table at the time the error occurs.)

To Display the ILBB and PCR Checks

1. Select mode 7 (display ILBB and PCR).

   The control storage processor stops at the end of the existing instruction. The interrupt level backup byte (ILBB) appears in the two leftmost positions of the control panel display; the processor condition register (PCR) byte appears in the two rightmost positions.

2. Use procedures 10-506 and 10-504 to interpret the information in the control panel display.

01-330
Displaying CSP Checks

This procedure lets you display the processor error byte and the error correction code (ECC) error byte. CSP checks normally cause a processor check (01-310), unless processor checks are inhibited (01-317).

- The processor error byte (PEB) contains information about errors that occur in the CSP.
- The error correction code (ECC) error byte contains information about the type of ECC error.

To Display CSP Checks

1. Select mode 9 (display CSP checks).

   The control storage processor stops at the end of the existing instruction. The processor error byte appears in the two leftmost positions of the control panel display; the control storage error correction code (ECC) error byte appears in the two rightmost positions.

2. Use procedure 10-508 and 10-514 to interpret the information in the control panel display.

01-335
Displaying Channel Checks

This procedure lets you display the channel check register and the channel register.

- The channel check register contains the channel error byte (CEB), and indicates the type of error that occurred (10-510).
- The channel register contains information about the type of operation that was last performed by the channel (10-512).

To Display Channel Checks

1. Select mode 8 (display channel checks).

   The control storage processor stops at the end of the present instruction. The channel error appears in the two leftmost positions of the control panel display; the channel register byte associated with the error appears in the two rightmost positions.

2. Use procedures 10-510 and 10-512 to interpret the information in the control panel display.

Associated Procedures

Displaying MSP Status Bytes	01-320
Displaying the ILBB and PCR Checks	01-325

Additional Information

System Controls	01-055

01-340
Analyzing Program Checks

If a program check occurs while you are operating the system, this procedure lets you collect information for the PSR (programming support representative).

To Collect Program Check Information

1. Record the contents of the control panel display.
2. Record the condition (on or off) of any other check light.
3. Perform a system dump, using procedure 01-125.

01-345
Analyzing Console Checks

If a console check occurs while you are operating the system, this procedure lets you determine the cause of the console check.

Notes:
1. If the Processor Check light is on, go to the procedures that display processor check information (start with 01-310).
2. If the Program Check light is on, go to the procedure that collects information about program checks (01-340).

To Analyze Console Checks

Is the Console Check light on now?

Y **N**

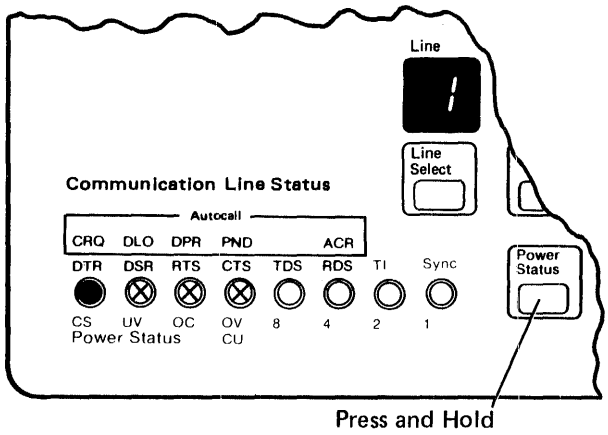
– Run the local work station MDI MAPs (01-510).

– Use the customer problem determination procedures, or run the local work station MDI MAPs (01-510).

Additional Information

01-350
Displaying Power Status

Power status can be displayed at any time. The control power supply is OK if the CS light is on. For cable unseated (CU) problems, go to MAP 0503 or FLD YA140.



To Display Power Status

1. Press and hold the Power Status key.
2. Interpret the Power Status lights.

Power Check Conditions

Light Status 8	4	2	1	Power Assembly	Power Check Condition Can Be
○	○	○	○	No power check	None
○	○	○	●	All base assemblies	UV or CU (base cable)
○	○	●	○	Base +5 volt assembly	UV or OC
○	○	●	●	+12 volts	UV or OC
○	●	○	○	+24 volts	UV or OC
○	●	○	●	-5 volts	UV or OC
○	●	●	○	+8.5 volts/-12 volts	UV, OC, or OV
○	●	●	●	Base +1.7 V assembly	UV, OC, or OV
●	○	○	○	A2 power assemblies	UV or CU (A2 cable)
●	○	○	●	Any 10SR +36 V, -36 V, or -12 V	UV, OC, or OV
●	○	●	○	A2 board levels	OC
●	○	●	●	A2 board +1.7 V assembly	UV, OC, or OV
●	●	○	○	A3 power assembly, 1.7 V regulator/preload assembly	UV or CU
●	●	○	●	A3 board levels	UV, OC, or OV
●	●	●	○	Expansion supply	UV, OC, or OV
●	●	●	●	Expansion supply	UV, OC, or OV

Legend

○ = Light off
● = Light on
⊗ = Light on indicates condition
CS = Control power supply OK (if light is on)
CU = Cable unseated
OC = Overcurrent condition
OV = Overvoltage condition
UV = Undervoltage condition

Additional Information

System Controls 01-055

01-355
Displaying Communications Status

Communications status for any line can be displayed at any time.

To Display Communications Status

Does the system have only one communications line (SLCA)?

Y N

Is the line selected the line you want to check?

Y N

– Press the Line Select key.
– Use the Input keys to select a communications line. The line selected appears in the Line display.

– Interpret the Communication Line Status lights.

Note: If your system is not a Stage 2 system and you have the ELCA feature (4550) installed, select Line 0 to display Line 8 status. See 01-045 to identify Stage 2 systems.

Legend

○ = Light off
● = Light on

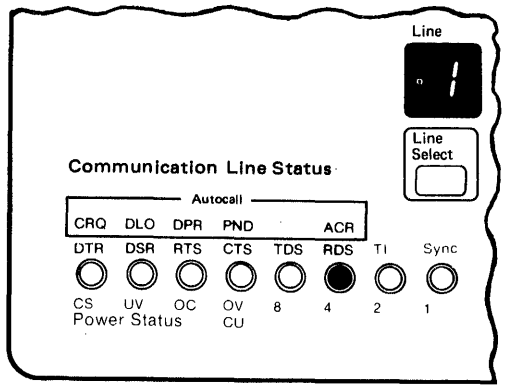
Communicatios Line Status

CTS = Clear to send
DSR = Data set ready
DTR = Data terminal ready
RDS = Receive data space
RTS = Request to send
TDS = Transmit data space
TI = Test indicate (not used with ELCA feature 4550)
Sync = Sync

Autocall Status

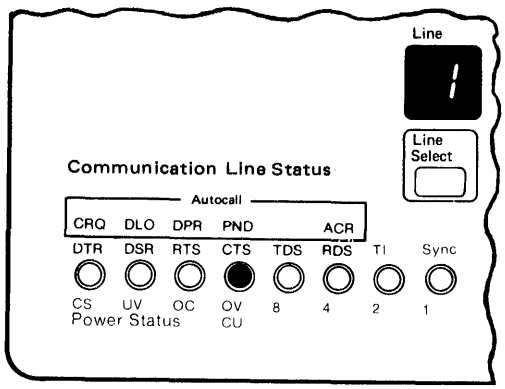
ACR = Abandon call and retry
CRQ = Call request
DLO = Data line occupied
DPR = Digit present
PND = Present next digit

Communications Status (Normal)



Example: RDS (receive data space) is active on line 1.

Communications Status (Autocall)



Example: PND (present next digit) is active on line 1.

Additional Information

Testing Communications and Remote Work Stations	01-600
System Controls	01-055

01-360 Running ERAP

The error recording analysis procedure (ERAP) gets, formats, and displays or prints error statistical information from the following error log tables:

- *Error History Tables:* These tables contain the device error entries. Each table includes a series of fixed-length entries for one device. Each entry contains information about one error. The entries are added to the table so that the latest error is first in the table. If the table is full, the oldest entry is removed from the table.
- *Error Counter Tables:* These tables include a series of counters assigned to save specific types of device errors.
- *I/O Counter Tables:* These tables save device statistics (number of actions by operation). For example, the actions recorded for disk drive A include the number of verifies, writes, reads or scan reads, and nonzero seek operations. These counters are updated every 6 minutes during normal system operation. (Except for the system test, no errors are recorded during concurrent and dedicated maintenance.)

Resetting ERAP Data

Some of the I/O counters and error counters can be reset. When the reset option is available for a device, the reset options appear on the ERAP Output and Reset menu.

If the disk that contains the I/O counter tables and error counter tables is initialized, the tables are reset.

The error history tables cannot be reset.

Getting ERAP Reports

ERAP reports include system summaries (01-363) and detailed device reports, including error and statistical information (01-367).

There are four methods of getting ERAP reports:

- The ERAP procedure under SSP lets you get system summary reports and detailed device reports from the system error log.
- The test request procedure (TESTREQ) under SSP lets you get ERAP reports associated with work stations and communications devices.
- The Test Request function key of any local or remote work station lets you get ERAP reports associated with work stations and communications devices.
- A system test option lets you get reports about errors that occurred during system testing.

Associated Procedures

Example Display: ERAP Main Menu (SSP)

The ERAP Main menu under SSP shows the options available for all devices attached to the system.

```
                              ERAP MAIN MENU                              W1

Select one of the following:

 1. System summary                  8. Local WSA or Remote WSC
 2. Elapse time counters            9. Display stations
 3. All devices                    10. Printers
 4. Main store processor           11. Communications
 5. Control processor              12. 8809 tape
 6. Disk                           13. 1255 magnetic character reader
 7. Diskette                       14. IPL wrap errors

Option: __




Cmd3-Backup   Cmd7-End
```

To Get ERAP Reports under SSP

This procedure assumes that SSP is running, and you have signed on a work station.

1. Key in ERAP.

2. Select the type of ERAP report.

3. Select the option to display or print the ERAP report.

   When you display ERAP reports, not all of the information available in the reports is shown. Additional information is available when you print the reports.

4. Go to 01-367 to interpret the ERAP reports.

01-360 (continued) Running ERAP

Example Display: ERAP Main Menu (Test Request)

The ERAP Main menu, using the test request option, displays only the options available for work stations and communications.

```
                              ERAP MAIN MENU                              W1

Select one of the following:

                                    8. Local WSA or Remote WSC
                                    9. Display stations
 3. All devices                    10. Printers
                                   11. Communications



Option: __




Cmd3-Backup   Cmd7-End
```

To Get ERAP Reports, Using the Test Request Procedure under SSP

This procedure assumes that SSP is running, and you have signed on a work station. (See also 01-546 and 01-646.)

1. Key in TESTREQ.
2. Select the ERAP option.
3. Select the type of ERAP report.
4. Go to 01-367 to interpret the ERAP report.

To Get ERAP Reports, Using the Work Station Test Request Key

This procedure assumes that SSP is running, and you have a sign-on display, but have not signed on a work station. (See also 01-546 and 01-646.)

1. Press the Cmd key and the Test Request function key (←—).
2. Select the ERAP option.
3. Select the type of ERAP report.
4. Go to 01-367 to interpret the ERAP report.

To Get ERAP Reports When Running the System Test

1. To display ERAP reports while running the system test, interrupt the test (01-720) and select the option that starts ERAP.

2. To interpret the error reports for the system test, see the specific device MIM (01-367).

3. Press Cmd7 key from the ERAP Main menu to continue system testing.

To Spool and Display ERAP Reports

The local work station attachment and disk error history tables contain additional information that is not displayed. When a printer is busy, or is not available, you can send the ERAP report to the system spool writer. The spooled output can be displayed at a local work station using the following procedures.

To spool the Erap output:

1. From the ERAP Main menu, select the option for disk or local work station.

2. Select a disk drive or the local work station attachment.

3. Select the option to print the report.

4. Enter the ID of the printer to receive the output and the additional output option(s) to spool the output.

   Note: The printer ID must be valid, but the printer does not need to be operational.

5. Enter the desired time range.

   Note: If the selected printer is not operational, a message is sent to the system console indicating that the printer and the system are not communicating. If this occurs, use option 1 to respond to the message.

6. End ERAP and return to the Main (help) menu.

To display the spooled output:

1. From the Main (help) menu, select the option to perform general system activities.

2. From the SYSSESN menu, select the option to control printing (spool file).

3. On the Spool File Status display (upper half of the display), located and record the spool ID (SP-ID) number for the procedure (PROC) ERAP.

4. From the SPOOLJOB menu (lower half of the display), select the option to control the spool writer and stop spooling to the selected printer, or select the option to hold entries and enter the spool ID. Return to the SPOOLJOB menu.

5. From the SPOOLJOB menu, select the option to copy or display entries.

6. On the COPYPRT procedure prompt, enter the spool ID (first item) and CRT (last item).

   Note: You can also copy the ERAP data to a named file, and you can cancel or release the spool entry in the same operation.

7. On the display that shows the error history table, position the cursor to the DISP START POS field and enter 70. You are now displaying the last 62 positions of the spooled output. Use the roll keys to view entries in the table.

8. Use the Cmd7 key to return through the prompts and menus. Restart the spool writer, or release or cancel entries as you return.

01-363
Interpreting System Summaries

The system summary shows the present error count in the selected time range for the main storage processor, the control storage processor, and for each device attached to the system. You can display or print the system summary. The system summary report for displaying or printing has the same format.

Example Display: System Summary Display

```
                              SYSTEM SUMMARY                                W1

        PRESS ENTER TO VIEW NEXT DISPLAY.    CMD7-RESTART  CMD3-BACKUP
        FROM: 00/00/00  00:00:00             TO: 00/00/00  00:00:00

       DEVICE                  COUNT            DEVICE                  COUNT
MAIN STORE PROCESSOR             0      CONTROL STORE                     2
DISK DRIVE  A                   14      DISK DRIVE  B                     4
DISKETTE                        13      LINE PRINTER                     15
W/S ATTACHMENT                   0      W/S CONTROLLER  C01               0
LOCAL DISPLAY STATION  W1        4      LOCAL DISPLAY STATION  W2         6
LOCAL DISPLAY STATION  W3        5      LOCAL DISPLAY STATION  W4         2
LOCAL DISPLAY STATION  W5        9      LOCAL DISPLAY STATION  W6         2
REMOTE DISPLAY STATION  A1       8      REMOTE DISPLAY STATION  A2        3
REMOTE DISPLAY STATION  A3       7      REMOTE DISPLAY STATION  A4       12
REMOTE DISPLAY STATION  A5       1      LOCAL STATION PRINTER  P1         1
REMOTE STATION PRINTER  PX       0      BSC LINE  1                      14
BSC LINE  2                      0      BSC LINE  4                       0
SDLC LINE  1                     0      SDLC LINE  2                      0
SDLC LINE  4                     0      COMMUNICATIONS CONTROLLER         0
AUTOCALL LINE  3                 0      X-21 LINE  4                      0
8809 TAPE 1                      1      8809 TAPE 2                       1
1255 MCR                         5      IPL WRAP ERRORS                   1
************************** END OF TABLE ***************************************
```

Associated Procedures

01-364
Interpreting Elapse Time Counters

The elapse time counters record the number of 6-minute I/O updates to the error history tables, error counters, and I/O counters. You can display or print the elapse time counter table. The elapse time counter table for displaying or printing has the same format.

Example Display: Elapse Time Counter Table

```
                        ELAPSE TIME COUNTER TABLE                        W1

          DATE CREATED..... 83/05/15
        NONRESETTABLE ELAPSE TIME COUNT .................        5672

          DATE LAST RESET.... 00/00/00
        RESETTABLE ELAPSE TIME COUNT ....................        3328
**************************** END OF TABLE ***************************************
```

Associated Procedures

01-367
Interpreting ERAP Reports

To interpret device reports, select a procedure or reference from the ERAP report table.

ERAP Report Table

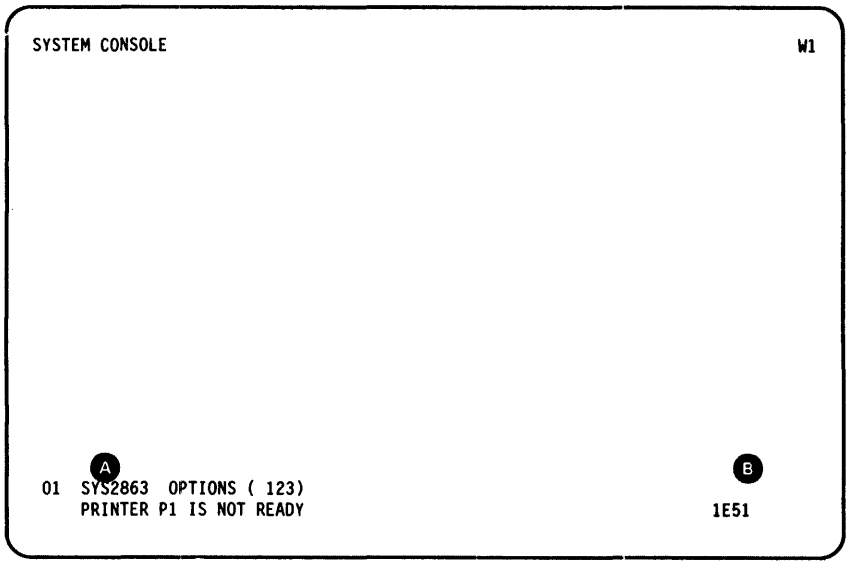
ERAP Main Menu Option	Type of ERAP Report	Reference
System summary	This option lets you display or print the error count in the selected time range for the main storage processor, the control storage processor, and for each device attached to the system.	01-363
Elapse time counters	This option lets you display or print the elapse time counters. These counters record the number of 6-minute I/O updates that have occurred.	01-364
All devices	This option lets you display or print all reports for devices that appear on the ERAP Main menu.	Device MIM
Main storage processor	This option lets you display or print the error history table for the main storage processor.	10-550
Control storage processor	This option lets you display or print the error history table for the control storage processor.	10-500
Disk	This option lets you display or print the error history table, the error counter table, and the I/O counter table for the disk storage devices attached to the system. See one of the following procedures to interpret the disk drive reports: 21ED disk drive 10SR disk drive	 95-500 97-500
Diskette	This option lets you display or print the error history table, the error counter table, and the I/O counter table for the diskette drive attached to the system. See one of the following procedures to interpret the diskette drive reports: 51TD diskette drive 72MD diskette magazine drive **Note:** If an error occurs before the volume ID (VOLID) is read, the VOLID in the diskette error history table is the last volume ID read, or IPLIPL if this is the first diskette read after loading the system, or $INIT if the error occurred during diskette initialization.	 91-500 93-500
Tape	This option lets you display or print the error history table, the error counter table, and the I/O counter table for the 8809 tape drives attached to the system. See one of the following procedures to interpret the tape drive reports: 8809 tape drive 6157 tape drive	 99-500 98-500
1255 MCR	This option lets you display or print the error history table, the error counter table, and the I/O counter table for the 1255 magnetic character reader attached to the system.	40-500

ERAP Main Menu Option	Type of ERAP Report	Reference
Local WSA or Remote WSC	This option lets you display or print the error history table and the error counter table for the local work station attachment, or the error history table for remote work station controllers attached to the system. See one of the following procedures or maintenance manuals to interpret the local or remote work station reports:	
	Local work station attachment	70-500
	Remote work station controller	Remote device MIM
Display stations	This option lets you display or print the error history table and the error counter table for local work stations, or the error history table for remote work stations attached to the system. See one of the following procedures or maintenance manuals to interpret the display station reports:	
	Local work stations (ERAP procedure)	70-520
	Local work stations (Test Request key or TESTREQ procedure)	Local display MIM
	Remote work stations	Remote display MIM
Printers	This option lets you display or print the error history table, the error counter table, and the I/O counter table for the 3262 Printer and local work station printers, or the error history table for remote work station printers attached to the system. See one of the following procedures or maintenance manuals to interpret the printer reports:	
	3262 Printer	50-500
	Local work station printers	Local printer MIM
	Remote work station printers	Remote printer MIM
Communications	This option lets you display or print the error history table for the communications controller, and the error history table, the error counter table, and the I/O counter table for other data communications features attached to the system. See one of the following procedures to interpret the communications report:	
	BSC lines	30-510
	SDLC lines	30-520
	Communications controller	30-530
	Autocall lines	30-540
	X.21 lines	30-550
	X.25 lines	30-560
	Async	30-570
IPL wrap errors	This option lets you display or print the error history table for IPL wrap errors.	01-380
Local area network	This option lets you display or print the error history table, the error counter table, and the I/O counter table for the local area network.	39-510

Associated Procedures

01-370
Interpreting System Reference Codes

Example Display: System Message



System reference codes (SRCs) are 4-character codes that describe conditions about the system and attached I/O devices. While some SRCs appear in the control panel display, most appear as part of a displayed message on the system console. If the error can be logged in the error history log, the system reference code is also logged.

The system reference code microfiche and MAPs 0113 through 0118 describe all valid SRCs associated with system units, I/O devices, and power. These tables show the FRUs and system message associated with each error. These tables also include references to additional information or procedures in the system maintenance library.

Identifying System Reference Codes

During normal operation, system reference codes (B) appear in a system message (A) on the system console.

During the control storage initial program load (CSIPL) operation, or during some dedicated diagnostic procedures, or when some permanent errors activate the Processor Check light, the system console cannot be used to display the system reference codes. These codes are displayed in the control panel display.

The tables on the facing page identify the SCR groups by MAP.

Associated Procedures

Additional Information

Other System Publications

Operating Your Computer
System Messages

System Reference Codes in MAP 0113

SRC Group	Type of Reference Code
00xx	Programming
01xx	Local display station
02xx	Local printer
10xx	CSP/channel (not Stage 2 systems)
1111	Default SRC (does not indicate an error condition)
12xx	MSP
13xx	Data storage controller
15xx	1255 magnetic character reader
16xx	CSP/channel (Stage 2 systems)
17xx	6157 tape subsystem
18xx	Communications
19xx	21ED disk storage device
4Exx	Local area netowrk
4Fxx	Local area netowrk

System Reference Codes in MAP 0114

SRC Group	Type of Reference Code
1Axx	10SR disk storage device

System Reference Codes in MAP 0115

SRC Group	Type of Reference Code
1bxx	8809 tape drive codes
1Cxx	Local work station attachment
1dxx	Diskette storage device
1Exx	3262 Printer
2xxx	IPL processor check
30xx	Hardware errors detected by software
5xxx	CSU verification
71xx	Remote displays
72xx	Remote printers
81xx	Work station displays
82xx	Work station printers

System Reference Codes in MAP 0116

SRC Group	Type of Reference Code
Axxx	DCP diagnostic error
bxxx	Local work station controller wrap error
Cxxx	I/O wrap error during CSIPL (See 01-380 for a description of the codes.)
dxxx	MSP error during CSIPL
Exxx	CSP or panel error during CSIPL
Fxxx	Other CSIPL load error

System Reference Codes in MAP 0118

SRC Group	Type of Reference Code
99xx	Power

Associated Procedures

Other System Publications

System Data Areas
Program Problem Diagnosis and Diagnostic Aids

This page is intentionally left blank.

01-380
Interpreting I/O Wrap Errors

SRC Wrap Code Table

The following table shows the valid system reference codes (Cxxx) for wrap errors that occur during CSIPL.

SRC	Type of Wrap Code
C0xx	DCP
C1xx	6157 tape subsystem
C18x	6157 DSA 3
C2xx	MSP
C3xx	Data storage controller
C5xx	1255 magnetic character reader
C6xx	Local work station
C8xx	Communications
C9xx	21ED disk drive
CAxx	10SR disk drive
Cb8x	Tape DSA 2
Cbxx	8809 tape adapter/drive
CCxx	Local work station
Cd8x	Disk/diskette DSA 1
Cdxx	Diskette drive
CExx	3262 Printer
CFxx	Unexpected error or CSU I/O wrap error
C4xx	Local area network adapter

SRCs When Loading SSP

Wrap errors that occur when loading SSP are displayed as a 4-character system reference code on the system console (if available) or on the control panel display. The system reference code has the following format.

Cxyy

where:
- C = I/O wrap error
- x = Failing device
- yy = Error number

See *Example Display 1: SRCs When Loading SSP.*

See MAP 0116 for a description of these reference codes.

Wrap Errors When Loading DCP

Wrap errors that occur when loading DCP are displayed on the system console as a 4-character system reference code and a 12-character wrap code. If the system console is not available, the 4-character system reference code is displayed on the control panel.

The system reference code and wrap code have the following format.

Cxyy aabbccddeeff

where:
- C = I/O wrap error
- x = Failing device
- yy = Error number (MAP 0116)
- aa = Device ID (01-845)
- bb = Device address 1 (or FF)
- cc = Device address 2
- dd = Device address 3 (or FF)
- ee = Unit address
- ff = Failing TU (01-FF)

See *Example Display 2: SRCs and Wrap Codes When Loading DCP* and *Example Display 3: SRCs and Wrap Codes Displayed by ERAP.*

See MAP 0116 for a description of these reference codes.

Example Displays

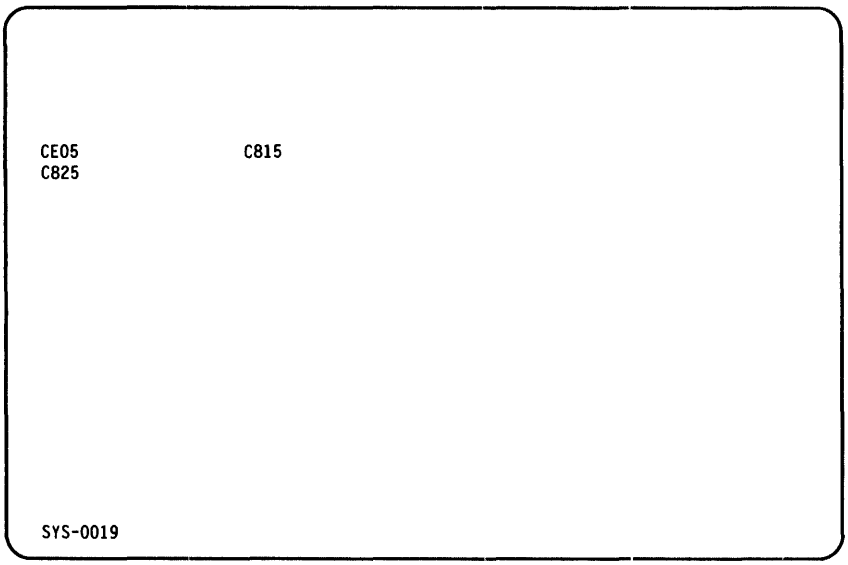
The displays shown here are examples of how wrap errors are displayed when loading SSP (example display 1), loading DCP (example display 2), and displaying the IPL wrap error history table (example display 3).

If the system console is not available, the 4-character system reference code is displayed in the control panel display. If you have only the 4-character SRC, you can display the error save table at control storage location 7A00 (01-393).

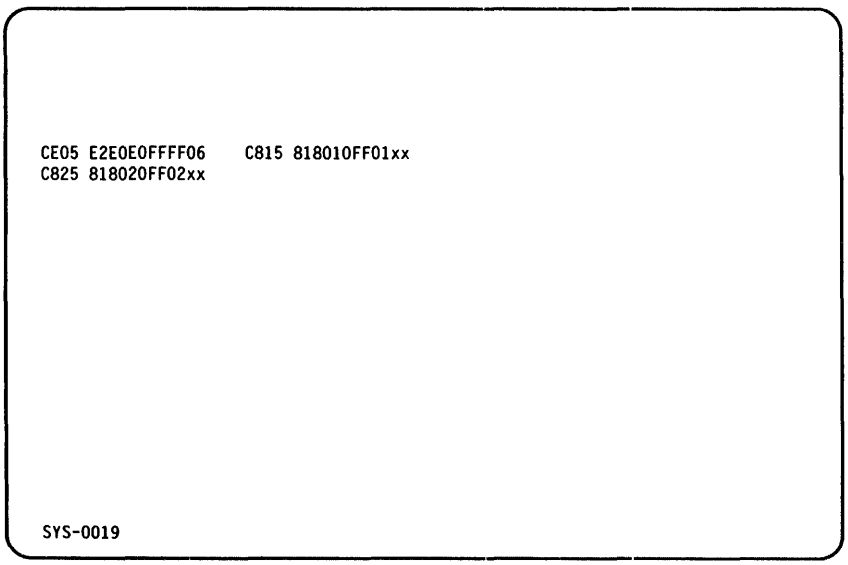
Associated Procedures

01-380
Interpreting I/O Wrap Errors

Example Display 1: SRCs When Loading SSP



Example Display 2: SRCs and Wrap Codes When Loading DCP



Example Display 3: SRCs and Wrap Codes Displayed By ERAP

```
              ERROR HISTORY TABLE FOR IPL TIME WRAP ERRORS                  W1

        PRESS ENTER TO VIEW NEXT DISPLAY.   CMD7-RESTART  CMD3-BACKUP
        FROM: 00/00/00  00:00:00            TO: 00/00/00  00:00:00
                                               TEST
  DATE     TIME      SRC      DEVICE ADDRESS    ID
YY/MM/DD HH:MM:SS    ..................HEX...................
84/02/26 08:35:27    CE05     E2 E0 E0 FF FF    06
84/02/26 13:35:16    CC44     C2 C0 C0 FF 00    44
84/02/28 22:33:08    CE01     E2 E0 E0 FF FF    62
```

01-390
CSIPL Error Data

The error save table in control storage (locations 7A00 through 7BFF) contains information about the last system IPL. Information saved in this table is recorded in the error history log. However, except for some types of main storage errors, errors that occur during CSIPL diagnostic testing cause processor checks (01-310). If SSP cannot be loaded, the error data is saved in the error save table, but is not recorded in the error history log.

During CSIPL, the first routine to receive control processes information for the error save table when loading from disk, or indicates that no information will be saved when loading from diskette. The error information is collected in one of two ways:

- The CSP diagnostic machine check routine collects information about processor checks or channel checks that occur during CSIPL.
- The programming machine check routine collects information about errors that occur under SSP.

A machine check IPL flag is always saved (word 1, address 7A01) when loading from disk.

Control Storage Contents

Address	Contents
0000	CSP load 1 diagnostics
0700	General loader
0800	CSP load 2 diagnostics
1D00	Unit definition table (UDT)
1F00	Disk loader error handler (disk IPL)
2000	Not used
7A00	Error save table
7C00	Relocated UDT
7E00	Relocated disk loader error handler (disk IPL)
7F00	Relocated general loader

Associated Procedures

Interpreting System Reference Codes	01-370
Interpreting I/O Wrap Errors	01-380
Displaying CSIPL Error Data	01-393
Interpreting CSIPL Error Data	01-397

01-393
Displaying CSIPL Error Data

Displaying Control Storage, Using the Alter/Display Utility

If SSP was loaded, you can display the contents of control storage locations 7A00 through 7BFF, using the alter/display utility.

To Display CSIPL Error Data

1. Start the alter/display utility (01-210).
2. Select option 1 (alter/display storage).
3. Enter the address of the error save table in control storage as:

   007A00C

4. Interpret the error data (01-397).

Displaying Control Storage, Using the Control Panel

If the system console cannot be used to display the wrap code, the wrap code appears in the control panel. You can display the contents of the error save table in control storage (words 7A00 through 7BFF), using the control panel.

To Display CSIPL Error Data

1. Ensure that the Security switch is in the Service position.
2. Ensure that the Main Stg Sel light is off.
3. Select mode 3 (display/alter MAR).
4. Record the value of the MAR. This step is necessary only if you want to continue system operation after displaying control storage.

MAR =

5. Use the Input keys to enter 7A00 (the 16-bit address of the error save table).
6. Press the CSP Start key to load the MAR with the error save table address.
7. Select mode 2 (display storage).
8. Press the CSP Start key to display each word of the error save table.
9. Interpret the error data (01-397).

If you want to continue normal system operation after displaying the error data, restore the MAR to the value recorded in step 4, select the run mode (0, E, or F) you were using, and press the CSP Start key.

Associated Procedures

01-397
Interpreting CSIPL Error Data

Error Save Table Formats

The error save table in control storage has three parts:

- CSP save area
- MSP save area
- I/O wrap save area (if the wrap tests are run)

The error save table of control storage is initialized during CSIPL to hex 5555.

Basic Error Save Table Format

The error save table has the following basic format:

```
10nn  xxxx..xxxx  (CSP)
2nnn  xxxx..xxxx  (MSP)
FFnn  xxxx..xxxx  (first wrap error)
      xxxx..xxxx  (second wrap error)
      xxxx..xxxx  (third wrap error)
```

where:

- 10 = CSP
- 2n = MSP
- FF = I/O wraps
- nn = Number of error words (CSP)
  Number of I/O errors
- nnn = Number of bad 2K pages (MSP)
- xxxx = Error information

CSP Save Area Format

The CSP area of the error save table can have one of the following formats:

```
1000           = No errors (CSIPL from diskette)

1001 0000      = No errors (CSIPL from disk)

104E xxxx..xxxx = Errors (78 error words)
```

MSP Save Area Format

The MSP area of the error save table can have one of the following formats:

```
2000 = No bad 2K pages

2nnn xxxx..xxxx
```

where:

```
nnn        = Number of bad 2K pages
xxxx..xxxx = Addresses of bad 2K pages
```

I/O Wrap Save Area Format

The I/O wrap area of the error save table can have one of the following formats:

```
FF00 = No I/O wrap errors

FFnn ssss aabb ccdd eeff..ssss aabb ccdd eeff
```

where:

```
nn             = Number of error words
ssss           = System reference code
aabb ccdd eeff = 3-word (12-character) wrap
                 error code
  aa = Device ID (01-845)
  bb = Device address 1 (or FF)
  cc = Device address 2
  dd = Device address 3 (or FF)
  ee = Unit address
  ff = Failing TU (01-FF)
```

No Errors during CSIPL

If no errors occur during CSIPL, the first six words of the error save table have the following formats.

Mode	Load Option	IPL From	Wraps	Control Program	Error Save Table Address 7A00 7A01 7A02 7A03 7A04 7A05
0	0000	Disk	Run	SSP	1001 xxxx 2000 FF00 5555 5555
0	FF00	Disk	Bypass	SSP	1001 xxxx 2000 5555 5555 5555
F	F801	Disk	Run	DCP	1001 xxxx 2000 FF00 5555 5555
F	F800	Disk	Bypass	DCP	1001 xxxx 2000 5555 5555 5555
E	0000	Diskette	Run	DCP	1000 2000 FF00 5555 5555 5555
E	FF00	Diskette	Bypass	DCP	1000 2000 5555 5555 5555 5555

The remaining words of the error save table are hex 5555.

Example Display 1: No Errors during CSIPL

Using the alter/display utility, this example display shows no errors occurred during CSIPL. IPL was from disk and the mode was 0 with a load option of 0000 (run wraps) or mode F with a load option of F801 (run wraps).

```
TB   000F00  RB  006D80 IAR  0028BB XR1  0080F0 WR4  0000 WR5  0003  PMSR  0004
0FF  000000  SB  000000 ARR  17F7   XR2  007040 WR6  0100 WR7  0000  DIR   00
  007A00C   10010000  2000FF00  55555555  55555555    ................
  007A08    55555555  55555555  55555555  55555555    ................
  007A10    55555555  55555555  55555555  55555555    ................
  007A18    55555555  55555555  55555555  55555555    ................
  007A20    55555555  55555555  55555555  55555555    ................
  007A28    55555555  55555555  55555555  55555555    ................
  007A30    55555555  55555555  55555555  55555555    ................
  007A38    55555555  55555555  55555555  55555555    ................
  007A40    55555555  55555555  55555555  55555555    ................
  007A48    55555555  55555555  55555555  55555555    ................
  007A50    55555555  55555555  55555555  55555555    ................
  007A58    55555555  55555555  55555555  55555555    ................
  007A60    55555555  55555555  55555555  55555555    ................
  007A68    55555555  55555555  55555555  55555555    ................
  007A70    55555555  55555555  55555555  55555555    ................
  007A78    55555555  55555555  55555555  55555555    ................
```

01-397 (continued)
Interpreting CSIPL Error Data

Errors during CSIPL

If errors occur during CSIPL, CSP (if IPL was from disk), MSP, and I/O wrap errors are stored in the error save table (control storage locations 7A00 through 7BFF). (See *Example Display 2: Errors during CSIPL.*)

CSP Save Area Format

The CSP area of the error save table has the following format.

Address (Hex)	Word (Decimal)	Description	Additional Information
7A00	0	104E (CSP ID and length of error data)	
7A01	1	System check IPL flag (internal program use only)	
7A02	2	System reference code (E100 if the error occurs during CSIPL load 1, routines 00 through 08)	01-420
7A03	3	Processor condition register (PCR; not Stage 2 systems) and interrupt level backup byte (ILBB)	01-325
7A04	4	Processor error byte (PEB) and channel error byte (CEB)	01-330 (PEB); 01-335 (CEB)
7A05	5	Channel register and control storage ECC error byte	01-330 (chan); 01-335 (ECC);
7A06 7A45	6-69	Control storage LSRs	01-225
7A46	70	MSP buffer compare register (BCR)	01-230
7A47	71	MSP storage interface register (SIR) and diagnostic address compare register high (DACR)	
7A48	72	MSP configuration control register (CCR) and address compare register low (ACRL)	
7A49	73	MSP address compare register high (ACRH) and address compare register extended (ACRE)	
7A4A	74	MSP backup mode register (BMR) and control mode register (CMR)	
7A4B	75	MSP program mode register (PMR) and program status register (PSR)	
7A4C	76	MSP status byte 0 and status byte 1	
7A4D	77	MSP status byte 2 and Q-byte (real)	
7A4E	78	MSP status byte 4 and status byte 5	01-230/01-320

Example Display 2: Errors during CSIPL

Using the alter/display utility, this example display shows that CSP errors, no MSP errors, and two I/O wrap errors occurred during CSIPL. IPL was from disk (01-390).

```
TB   000F00  RB  006D80 IAR  0028BB XR1  0080F0 WR4  0000 WR5  0003  PMSR  0004
0FF  000000  SB  000000 ARR  17F7   XR2  007040 WR6  0100 WR7  0000  DIR   00
  007A00C   104E0000  00919207  02802C00  002A101B    ................
  007A08    00004203  29E14200  42FF802A  72003505    ................
  007A10    473E1111  0100DA00  21062112  C3F10010    ............C1..
  007A18    7F447FD4  0F80C3F1  C3F10BB1  00000200    ...M..C1........
  007A20    000092F1  C3F1C3F1  C3F1C3F1  C3F1C3F1    ..K1C1C1C1C1C1C1
  007A28    C3F1C3F1  28152808  C3F10BB2  212B0292    C1C1............
  007A30    0F1B0000  010B0108  1E071F78  17904200    ................
  007A38    0040927D  50007104  71007500  00000000    ................
  007A40    000068F0  00000000  002A0000  00413600    ................
  007A48    098C0000  0400020A  016E8800  00002000    ................
  007A50    FF08C802  81FF80FF  0006CA11  A3FFA001    ..H.A.......T...
  007A58    01015555  55555555  55555555  55555555    ................
  007A60    55555555  55555555  55555555  55555555    ................
  007A68    55555555  55555555  55555555  55555555    ................
  007A70    55555555  55555555  55555555  55555555    ................
  007A78    55555555  55555555  55555555  55555555    ................
```

In the example above, the CSP save area contains 78 (hex 4E) error words. Therefore, the MSP save area starts at word 7AFF. Because there are no MSP errors (hex 2000), the wrap errors start at word 7A50. Hex FF08 indicates there are 8 words of wrap data. There are 4 words for each wrap error, so there are two wrap errors; one communications error (C8xx at word 7A51) and one 10SR disk error (CAxx at word 7A55).

01-398
Interpreting Error Data after CSIPL

Errors after CSIPL

If errors occur after CSIPL, the system reference code and some system registers are stored in the error save table (control storage locations 7A00 through 7BFF). (See *Example Display: Errors after CSIPL.*)

Save Area Format after CSIPL

The error save table after CSIPL has the following format.

Address (Hex)	Word (Decimal)	Description	Additional Information
7A00	0	System reference code	01-420
7A01	1	Processor condition register (PCR; not Stage 2 systems) and interrupt level backup byte (ILBB)	01-325
7A02	2	Processor error byte (PEB) and channel error byte (CEB)	01-330 (PEB); 01-335 (CEB)
7A03	3	Channel register and control storage ECC error byte	01-330 (chan); 01-335 (ECC);
7A04 7A43	4-67	Control storage LSRs	01-225
7A44	68	MSP buffer compare register (BCR)	01-230
7A45	69	MSP storage interface register (SIR) and diagnostic address compare register high (DACR)	
7A46	70	MSP configuration control register (CCR) and address compare register low (ACRL)	
7A47	71	MSP address compare register high (ACRH) and address compare register extended (ACRE)	
7A48	72	MSP backup mode register (BMR) and control mode register (CMR)	
7A49	73	MSP program mode register (PMR) and program status register (PSR)	
7A4A	74	MSP status byte 0 and status byte 1	
7A4B	75	MSP status byte 2 and Q-byte (real)	
7A4C	76	MSP status byte 4 and status byte 5	01-230/01-320

Example Display: Errors after CSIPL

```
TB   000F00  RB  006D80 IAR  0028BB XR1  0080F0 WR4  0000 WR5  0003  PMSR  0004
OFF  000000  SB  000000 ARR  17F7   XR2  007040 WR6  0100 WR7  0000  DIR   00
  007A00C   00159207  00002100  0000000D  09238710    ................
  007A08    00000000  00108480  49BB4C82  473E000D    ................
  007A10    0100DA00  21062112  C3F10010  7F447FD4    ........C1.....M
  007A18    4F00C3F1  C3F1C3F1  00000000  0046A2F1    ..C1C1C1......S1
  007A20    C3F1C3F1  C3F1C3F1  C3F1C3F1  C3F1C3F1    C1C1C1C1C1C1C1C1
  007A28    28182808  C3F1C3F1  212B0092  42D5000D    ....C1C1.....N..
  007A30    010C0108  1E071E14  03404200  80409CF1    ..............1
  007A38    5000C3F1  C3F14F00  00000000  84808710    ..C1C1..........
  007A40    00008480  042A0000  00023600  0B8C0000    ................
  007A48    04000000  04230A91  010300FF  FFFFFFFF    ................
  007A50    FFFFFFFF  FFFFFFFF  FFFFFFFF  FFFFFFFF    ................
  007A58    FFFFFFFF  79B117A4  13DBC091  84800030    ................
  007A60    13FB1B02  00000009  00A08000  851F8737    ................
  007A68    DFDFA3A3  00000001  00020003  00040005    ..TT............
  007A70    00060007  00080009  000A000B  000C000D    ................
  007A78    000E000F  00100011  00120013  00140015    ................
```

In the example above, the SRC (0015) is displayed at word 7A00. There are 76 words of error data following the SRC. The error data ends at 7A4D.

This page is intentionally left blank.

Testing CSP, MSP, Control Storage, and Main Storage

01-400 Contents

About This Section

This section describes the procedures that start the CSIPL load tests, test the control storage processor, and test the main storage processor. When there is more than one method of performing a procedure, all methods are described.

- *Running the CSIPL Load Tests:* These procedures let you perform specific CSIPL diagnostic tests.
- *Testing CSP and Control Storage:* These procedures let you perform specific CSP diagnostic tests.
- *Free-Lancing Control Storage:* These procedures let you display/alter control storage and free-lance control storage problems.
- *Testing MSP and Main Storage:* These procedures let you perform specific MSP diagnostic tests.
- *Free-Lancing Main Storage:* These procedures let you display/alter real storage (not Stage 2 systems) and translated storage, and free-lance main storage problems.

01-410
Running the CSIPL Load Tests

For system maintenance or problem diagnosis, you have some options when loading the system. You can loop on single tests or loop on all tests with an option to bypass error stops. These options are described in the CSP load options table (01-420) and the MSP load options table (01-450).

If an error occurs during CSIPL testing, a processor check occurs and a system reference code (01-370) is displayed on the control panel.

System reference codes associated with this procedure are described as follows:

SRC	Meaning
FFFF	This code is generated by hardware when the Load key is pressed. This display is reset when the 'MSP stop' latch has been set.
F090	This code indicates that an error occurred while the diskette bootstrap loader was running.
F000	This code indicates that the diskette inserted is not a CSIPL diskette.

To Locate a CSIPL Failure

1. Ensure that the Security switch is in the Service position.

2. Select mode E or F. If mode E is selected, insert the DIAG21 diskette (DIAG41 for Stage 3 systems) or the diagnostic magazine.

3. Use the Input keys to enter the FA01 load option.

4. Press the Load key.

Did the CSIPL tests stop with FA01 displayed in the control panel?

Y **N**

A failure occurred during load 1 testing.
- Determine if a valid SRC is displayed (01-370).
- Go to 01-420 to perform CSP load 1 testing.

5. Use the Input keys to enter the FA02 load option.

6. Press the Load key.

Did the CSIPL tests stop with FA02 displayed in the control panel?

Y **N**

A failure occurred during load 2 testing.
- Determine if a valid SRC is displayed (01-370).
- Go to 01-420 to perform CSP load 1/2 testing.

7. Use the Input keys to enter the FA03 load option.

   Note: FA03 tests MSP storage. The time it takes to run the test is determined by the amount of storage. 1024K takes approximately two minutes.

8. Press the Load key.

Did the CSIPL tests stop with FA03 displayed in the control panel?

Y **N**

A failure occurred during load 3 testing.
- Determine if a valid SRC is displayed (01-370).
- Go to 01-450 to perform MSP testing.

9. The CSIPL tests ran OK.

CAUTION

Any attempt to start SSP or dedicated DCP after performing CSIPL diagnostic testing, without loading the system again, can cause unexpected results to occur.

_____

_____

_____

_____

Load SSP (01-160), or dedicated DCP (01-150).

Associated Procedures

Loading the System	01-140
Loading Dedicated DCP	01-150
Loading and Starting SSP	01-160
Tasks Associated with CSIPL Load Options	01-190
Running the CSP Tests	01-420
Running the MSP Tests	01-450

Additional Information

Interpreting System Reference Codes	01-370
System Controls	01-055

01-420
Running the CSP Tests

After running the CSP tests, you must load SSP (01-160) or dedicated DCP (01-150).

There are two parts to the control storage processor (CSP) tests: CSIPL load 1 and CSIPL load 2. When you select CSIPL load 2 option, the CSIPL load 1 test is also loaded in control storage. You can loop on single routines in the load 1 and load 2 tests, or loop on all routines in each test. These options can be selected when loading from disk or diskette and while testing the CSP, but not while testing the MSP.

This procedure contains:

- A description of how to run the CSP tests
- A description of system reference codes asociated with CSP testing

Associated Procedures

Additional Information

To Run the CSP Load Tests

1. Ensure that the Security switch is in the Service position.
2. Select mode E or F. If mode E is selected, insert the DIAG21 diskette (Diag41 for Stage 3 systems), or the diagnostic magazine.
3. Use the Input keys to enter one of the load 1 or load 2 test options. See the option tables on the following page.

   Note: When running the load 1 and load 2 tests together, a load 2 option must be selected first to ensure that both tests are loaded to control storage.
4. Press the Load key.

To end a CSP loop or select another option:

1. Perform a system reset (01-020.
2. Use the Input keys to enter a CSP load option.
3. Press the Load key.

To Loop on a CSP Routine (Single Test)

Routines 00 through 08 cannot be looped. See Section 10-400 for d description of the <csp routines.

1. Perform a system rest (01-120).
2. Use the Input keys to enter a CSP routine option. See the option tables on the following page.
3. Press the Load key.

To end the loop, perform a system reset (01-120).

CSP Load 1 Test Options

Option	Description
FA01	Run CSIPL load 1 test.
Fb01	Loop on CSIPL load 1 test, stop on errors.
FC01	Loop on CSIPL load 1 test, bypass errors

CSP Load 2 Test Options

Option	Description
FA02	Run CSIPL load 1 and load 2 tests.
Fb02	Loop on CSIPL load 1 and load 2 tests, stop on errors.
FC02	Loop on CSIPL load 1 and load 2 tests, bypass errors

CSP Routine Options

Option	Description
FExx	Loop on CSP routine xx, bypass errors.
Fbxx	Loop on CSP routine xx, stop on errors. Use this option to loop on a failing routine. See the information that follows for errors during CSP testing.

Errors During CSP Testing

If an error occurs during CSP testing, the Processor Check light is activated and a system reference code (01-370) is displayed on the control panel. System reference codes associated with CSIPL loading are described in 01-410. System reference codes associated with CSP testing are described in the following table.

SRC	Meaning
E100, E300, or E900	This code indicates that an error occurred while CSP routines 00 through 08 were running.
E19x, E39x, or E99x	This code indicates that a disk loader error occurred while loading the CSP load 2 tests.
E1xx, E3xx, or E9xx	This code indicates that an error occurred while the CSP load 1 tests were running (xx = number of routine that failed).
E29x, E49x, or EA9x	This code indicates that a disk or diskette loader error occurred while loading the CSP load 3 test.
E2FF	This code indicates that the diskette is not configured.
E2xx, E4xx, or EAxx	This code indicates that an eror occurred while the CSP load 2 tests were running (xx = number of routine that failed).
Note: See Section 10-400 for a description of the CSP routines.	

This page is intentionally left blank.

01-425
Testing Control Storage

To diagnose control storage problems, use procedure 10-305 in the processing unit and channel MIM.

01-430
Forcing Control Storage to Known Data

You can force data to control storage with one word (2 bytes) of input data, using the Force CSP Run key.

To Force Control Storage to Known Data

1. Ensure that the Security switch is in the Service position.
2. Ensure that the Main Stg Sel light is off.
3. Select mode 4 (alter storage).
4. Press the System Reset key.
5. Use the Input keys to enter the word (2 bytes) to be stored.
6. Press the Force CSP Run key. The force storage operation continues until you press the Force CSP Run key again.

Associated Procedures

Free-Lance Display Control Storage	01-433
Free-Lance Alter Control Storage	01-437

Additional Information

Displaying or Altering Storage	01-240
System Controls	01-055

01-433
Free-Lance Display Control Storage

You can display control storage data, using the control panel.

To Display Control Storage

1. Ensure that the Security switch is in the Service position.
2. Ensure that the Main Stg Sel light is off.
3. Select mode 3 (display/alter MAR).
4. Record the value of the MAR. This step is necessary only if you want to continue system operation after displaying control storage.

MAR =

5. Use the Input keys to enter the 16-bit address of the control storage location to be displayed.
6. Press the CSP Start key to load the MAR with the address of the control storage location to be displayed.
7. Select mode 2 (display storage).
8. Press the CSP Start key. The content (one word) of the selected storage location is displayed in the control panel; the value of the MAR is increased by 1.

Do you want to display the next sequential control storage location?

Y **N**

Do you want to display a different control storage location?

Y **N**

- Return to the procedure that instructed you to display control storage, or restore the MAR to its original value (see step 4), select mode 0 (processor run), and press the CSP Start key to continue.

- Select mode 3 (display/alter MAR).
- Go to step 5.

- Go to step 8.

Associated Procedures

Using the Alter/Display Utility	01-210
Displaying or Altering Storage	01-240
Displaying or Altering Control Storage	01-242
Free-Lance Alter Control Storage	01-437

Additional Information

System Controls	01-055

01-437
Free-Lance Alter Control Storage

You can alter control storage data, using the control panel.

To Alter Control Storage

1. Ensure that the Security switch is in the Service position.
2. Ensure that the Main Stg Sel light is off.
3. Select mode 3 (display/alter MAR).
4. Record the value of the MAR.

MAR = _____ _____

5. Use the Input keys to enter the 16-bit address of the control storage location to be altered.
6. Press the CSP Start key to load the MAR with the address of the control storage location to be altered.
7. Select mode 4 (alter storage).
8. Use the Input keys to enter the word (2 bytes) of data to be stored.
9. Press the CSP Start key. The content of the selected storage location is altered to the data displayed in the control panel; the value of the MAR is increased by 1.

   Note: To force the data to all control storage locations, use procedure 01-235.

Do you want to alter the next sequential control storage location?

Y **N**

Do you want to alter another control storage location?

Y **N**

– Return to the procedure that instructed you to alter control storage, or restore the MAR to its original value (see step 4), select mode 0 (processor run), and press the CSP Start key to continue.

– Select mode 3 (display/alter MAR).
– Go to step 5.

– Go to step 8.

Associated Procedures

Using the Alter/Display Utility	01-210
Displaying or Altering Storage	01-240
Displaying or Altering Control Storage	01-242
Free-Lance Display Control Storage	01-433

Additional Information

System Controls	01-055

This page is intentionally left blank.

01-440
Stepping Control Storage Locations

You can step control storage locations, using the control panel. The content (one word) of the selected CSP register is displayed in the control panel display. The value of the MAR is updated to the next instruction. Pressing the CSP Start key runs the next instruction.

To Step Control Storage Locations

1. Ensure that the Security switch is in the Service position.
2. Ensure that the Main Stg Sel light is off.
3. Select mode 1 (instruction step display LSR).
4. Use the Input keys to enter the 16-bit address of the CSP LSR displayed (01-225).
5. Press the Display Output key to display the contents of the selected LSR.
6. Press the CSP Start key. The content (one word) of the selected LSR is displayed in the control panel; the value of the MAR is updated to the next instruction.
7. Perform one of the following steps:
   a. Repeat step 6 to display the selected LSR for each instruction.
   b. Repeat steps 4 and 5 to display the contents of other LSRs.
   c. Select mode 0 (processor run) to end stepping control storage locations.

01-445
Stopping CSP on a Control Storage Address

You can stop the control storage processor (CSP) on a control storage address.

Use procedure 01-216 to stop CSP on a control storage address.

Associated Procedures

Stopping MSP on a Main Storage Address	01-214
Stopping CSP When CSP Accesses a Main Storage Address	01-215
Stopping CSP on a Control Storage Address	01-216
Stepping Control Storage	01-274
Stopping on a Main Storage Address	01-485

Additional Information

System Controls	01-055

01-450
Running the MSP Tests

You have some options when testing the main storage processor (MSP). You can loop on single tests or loop on all tests. You can also step or, using MAP procedures, loop MSP diagnostic TUs. These options can be selected when loading from diskette and while testing the MSP, but not while testing the CSP.

This procedure contains:

- Descriptions of load options for MSP testing
- Steps to perform MSP testing, using the MSP load options
- Descriptions of system reference codes associated with MSP testing

Associated Procedures

Additional Information

Load Options for MSP Testing

The following table describes the load options for MSP testing.

Type of MSP Test	Load Option
Stop after CSIPL load 3 is run. This lets you enter MSP options or DCP options to the control panel display.	FA03
Loop on CSIPL load 3 until an error occurs. Some 2K page errors are ignored. Use this option to diagnose intermittent errors. The System In Use light is activated to indicate that the test is looping. When an error occurs, the test stops and displays a dxxx system reference code in the control panel display.	Fb03
Loop on CSIPL load 3 until an error occurs. Bad 2K-byte pages are not permitted. The System In Use light is activated to indicate that the test is looping. When an error occurs, the test stops and displays a dxxx system reference code in the control panel display.	FC03
Diagnose main storage problems, using specified MAPs. Not for Stage 2 systems. (See procedure 01-455.)	E9xx F9xx
Run the MSP diagnostic TUs in step mode, using the CSP Start key. This test stops after each TU is run. The TU results (WR7) are displayed in the control panel display. Pressing the CSP Start key displays dAxx, where xx is the next TU that will run. Pressing the CSP Start key again runs the next TU and displays the results.	EE00
Loop on MSP TUs, using specified MAPs. The System In Use light is activated to indicate that the test is looping.	EExx
Note: See Section 10-420 for a description of the MSP TUs.	

To Run the MSP Load Tests

1. Ensure that the Security switch is in the Service position.
2. Select mode E or F. If mode E is selected, insert the DIAG21 diskette (DIAG41 for Stage 3 systems), or the diagnostic magazine.
3. Use the Input keys to enter an MSP load option.
4. Press the Load key.

To Select a Different MSP Load Option

1. Perform a system reset (01-120).
2. Use the Input keys to enter an MSP load option.
3. Press the CSP Start key.

   Note: If unexpected results occur, use the Load key instead of the CSP Start key.

To Loop an MSP Load Test or Routine

1. Perform a system reset (01-120).
2. Use the Input keys to enter an MSP loop option.
3. Press the CSP Start key.

   Note: If unexpected results occur, use the Load key instead of the CSP Start key.

To End an MSP Loop

1. Perform a system reset (01-120).
2. Use the Input keys to enter an MSP load option.
3. Press the CSP Start key.

   Note: If unexpected results occur, use the Load key instead of the CSP Start key.

To Step an MSP TU

Use the procedure *To Select a Different MSP Load Option*, using the EE00 MSP loop option. The first stop displays dA01 in the control panel. Pressing the CSP Start key displays the TU result bytes for that TU. Pressing the CSP Start key again steps the next TU.

To End the MSP Load Tests

CAUTION
Any attempt to start SSP or dedicated DCP after performing MSP diagnostic testing, without loading the system again, can cause unexpected results to occur.

Load SSP (01-160), or dedicated DCP (01-150).

01-450 (continued) Running the MSP Tests

Errors During MSP Testing

If an error occurs during MSP testing, the Processor Check light is activated and a system reference code (01-370) is displayed on the control panel. System reference codes associated with CSIPL loading are described in 01-410. System reference codes associated with MSP testing are described in the following table.

SRC	Meaning
d0xx	Indicates the last two-digits (11xx) of hard-copy MAP for main storage with 128K-byte, 256K-byte, and 256K-byte cards, if main storage is tested by MAP 11xx.
d1xx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with 512K-byte cards, if main storage is tested by MAP 11xx.
d2xx	One or more FRUs might be failing (including 512K-byte main storage cards).
d3xx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with 256K-byte cards, if main storage is tested by MAP 11xx.
d4xx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with 256K-byte cards, if main storage is tested by MAP 11xx.
d5xx	One or more FRUs might be failing (including 256K-byte main storage cards).
d6xx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with 128K-byte and 256K-byte cards, if main storage is tested by MAP 11xx.
d7xx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with 128K-byte and 512K-byte cards.
d8xx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with 256K-byte and 512K-byte cards, if main storage is tested by MAP 11xx.
d9xx	One or more FRUs might be failing (including a 128K-byte main storage card).
dAxx	Used with step mode (EE00) to indicate the TU routine (xx) that will run next. This code also is loaded in CSP work register WRd before each TU is run.
dbxx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with a 128K-byte card, if main storage is tested by MAP 11xx.
dCxx	Indicates the last two digits (11xx) of a hard-copy MAP for main storage with 128K-byte cards, if main storage is tested by MAP 11xx.
ddxx	One or more FRUs might be failing (including 128K-byte main storage cards).
dExx	This code indicates that TU xx (01 through FF) could not be located.
dF91	A disk adapter error occurred while loading DCP from disk.
dF92	A disk storage attachment (DSA) error occurred while loading DCP from disk.
dF93	An interrupt time-out was detected while loading DCP from disk.
dFFA	Cannot initialize MSP.
dFFb	An MSP configuration error has occurred.
dFFC	An unexpected error occurred while loading DCP.
dFFd	The TU is too large for available space in control storage.
dFFE	A diagnostic program error has occurred.
dFFF	This code is generated when an error that cannot be identified occurs. CSP work register WRd contains the ID (dAxx) of the last TU that ran. **Note:** See Section 10-420 for a description of the MSP TUs.

01-455
Testing Main Storage

Options E9xx and F9xx are MAP procedures to diagnose main storage problems (not for Stage 2 systems). These options are used in the following MSP MAPs:

Option	MSP MAPs	Associated Procedures
E9xx	1177 1178 1179 1190	10-305 10-310
F9xx	1180 1181 1192	

01-460
Forcing Main Storage to Known Data

You can force up to 64K bytes of main storage with 1 byte of input data, using the Force CSP Run key.

Associated Procedures

Tasks Associated with CSIPL Load Options	01-190
Running the CSIPL Load Tests	01-410
Running the CSP Tests	01-420
Running the MSP Tests	01-450

Additional Information

Interpreting System Reference Codes	01-370
System Controls	01-055

To Force Main Storage to Known Data

1. Ensure that the Security switch is in the Service position.
2. Select mode 3 (display/alter MAR).
3. Press the System Reset key.
4. Use the Input keys to enter 00A7 (PCSP register address).
5. Press the CSP Start key.
6. Select mode A (alter MSP register).
7. Use the Input keys to enter 0000 (PCSP register data).

When forcing main storage with known data, the storage interface register (SIR) must be initialized. This register is initialized when the system is loaded. If the system has not been loaded, you must initialize this register.

Has the system been loaded?

Y **N**

- Select mode 3 (display/alter MAR).
- Use the Input keys to enter 0036 (SIR address).
- Select mode A (alter MSP register).
- Use the Input keys to alter the SIR to:
  - 0036 if the largest card is 128K bytes
  - 0056 if the largest card is 256K bytes
  - 0076 if the largest card is 512K bytes
  - 0096 if the largest card is 1024K bytes
  - 00A6 if the largest card is 2048K bytes

8. Ensure that the Main Stg Sel light is on.
9. Select mode 4 (alter storage).
10. Use the Input keys to enter the data (1 byte) to be stored.
11. Press the Force CSP Run key. The force storage operation continues until you press the Force CSP Run key again.

01-470
Free-Lance Display Real Main Storage (Not Stage 2 and Stage 3 Systems)

This procedure is only a general guide to display the contents of main storage using real addresses.

CAUTION

Data can be lost if this procedure is not used correctly. All registers and storage locations that are altered by this procedure must be restored to their original values when you have completed all steps, or the system must be loaded again.

_____

_____

_____

_____

_____

_____

_____

To Display Real Main Storage

1. Ensure that the Security switch is in the Service position.

Is the system loaded?

Y **N**

– If the system is not loaded, a system restart (01-477) cannot be performed.
– Use procedure 01-230 to alter the registers shown in Table A (01-477).

2. Use procedure 01-230 to record and alter the registers shown in Table B (01-477).

   Note: You cannot use real addresses on interrupt levels 1, 3, and 4. If the system did not stop on the main program level (Interrupt Level display is blank), or on interrupt level 0, 2, or 5, run the system until it can be stopped. Or, perform a system reset (01-120) to get the main program level. However, if you perform a system reset, you cannot perform a system restart (01-477).

3. Ensure that the Main Stg Sel light is on.

4. Use procedure 01-220 to alter the microinstruction address register (MAR) to the 16-bit low-order real address of the main storage location to be displayed. Record the original address in Table C (01-477).

5. Select mode 2 (display storage) and press the CSP Start key. The low-order byte of the control panel display contains the data of the storage location selected in step 4. Ignore the high-order byte because the data may not be valid.

Do you want to end the procedure?

Y **N**

Do you want to display the next sequential storage location?

Y **N**

– Go to step 4 to display a different storage location.

– Press the CSP Start key.
Note: If the last displayed address was FFFF, the next address is 0000 and is not the next sequential storage location.

Do you want to perform a system restart?

Y **N**

– Go to 01-140 and load the system.

6. Go to 01-477 to perform a system restart.

Associated Procedures

Additional Information

01-473
Free-Lance Alter Real Main Storage (Not Stage 2 and Stage 3 Systems)

This procedure is only a general guide to alter the contents of main storage using real addresses.

CAUTION

Data can be lost if this procedure is not used correctly. All registers and storage locations that are altered by this procedure must be restored to their original values when you have completed all steps, or the system must be loaded again.

To Alter Real Main Storage

1. Ensure that the Security switch is in the Service position.

Is the system loaded?

Y **N**

If the system is not loaded, a system restart (01-477) cannot be performed.
- Use procedure 01-230 to alter the registers shown in Table A (01-477).

2. Use procedure 01-230 to record and alter the registers shown in Table B (01-477).

   Note: You cannot use real addresses on interrupt levels 1, 3, and 4. If the system did not stop on the main program level (Interrupt Level display is blank), or on interrupt level 0, 2, or 5, run the system until it can be stopped. Or, perform a system reset (01-120) to get the main program level. However, if you perform a system restart, you cannot perform a system restart (01-477).

3. Ensure that the Main Stg Sel light is on.

4. Use procedure 01-220 to alter the microinstruction address register (MAR) to the 16-bit low-order real address of the main storage location to be altered. Record the original address in Table C.

5. Select mode 4 (alter storage).

6. Use the Input keys to enter the data to be stored (enter as 00xx).

7. Press the CSP Start key. (To force storage, press the Force CSP Run key. The force operation continues until the Force CSP Run key is pressed again. However, if you force storage, you cannot perform a system restart.)

Do you want to end the procedure?

Y **N**

Do you want to alter the next sequential storage location?

Y **N**

- Go to step 4 to alter a different storage location.

- Press the CSP Start key.

Note: If the last displayed address was FFFF, the next address is 0000, and is not the next sequential storage location.

Do you want to perform a system restart?

Y **N**

- Go to 01-140 and load the system.

8. Go to 01-477 to perform a system restart.

Associated Procedures

Additional Information

01-477
Real Main Storage and Register Tables (Not Stage 2 and Stage 3 Systems)

Use the following tables to record the original data of registers altered by procedures 01-470 and 01-473.

Table A

Alter These Registers (01-230)	Address (Hex)	To One of These New Values (Hex)
Storage interface register (SIR)	0036	Alter to 0036 if largest card is 128K bytes. Alter to 0056 if largest card is 256K bytes. Alter to 0076 if largest card is 512K bytes.
Configuration control register (CCR)	0038	Alter value to the size of the largest main storage card times the number of main storage cards installed. For example, with three cards installed and with the largest card being 512K bytes, the value should be altered to 04 (1536K). Value altered to _____ 0B for 128K main storage 09 for 256K main storage 08 for 384K main storage 07 for 512K main storage 06 for 768K main storage 05 for 1024K main storage 04 for 1536K main storage 03 for 2048K main storage

Table B

Display These Registers (01-230)	Address (Hex)	Record the Original Value	Alter These Registers (01-230) to One of These New Values (Hex)
Control mode register (CMR)	003E		00 only
PCSP PACT register	00A7	See note.	Value altered to _____ (See note.)
Note: Display and record all bits of the PCSP register. Alter the 4 low-order bits of this register, using the 4 high-order bits of the 20-bit real address. Alter the remaining bits to zeros.			

Table C

Address	Data

Address	Data

Address	Data

Address	Data

To Perform a System Restart

To perform a system restart, alter all registers and storage locations that were changed by procedures 01-470 and 01-473 to their original values, using the data recorded in Tables B and C.

Associated Procedures

Free-Lance Display Real Main Storage	01-470
Free-Lance Alter Real Main Storage	01-473

Additional Information

System Controls	01-055

01-480
Stepping/Tracing Main Storage Instructions

Stepping Main Storage Instructions

You can display real main storage, translated storage, or control storage for each main storage instruction as they occur between the address limits you specify. You can also step instructions for a specific data condition (for example, instruction step with verify).

Use procedure 01-272 to step main storage instructions.

Tracing Main Storage Instructions

You can print instruction data for each main storage instruction, including all data areas used by an instruction, between the address limits you specify. You can also trace instructions for a specific data condition (for example, trace with verify).

Use procedure 01-270 to trace main storage instructions.

Associated Procedures

Additional Information

01-485
Stopping on a Main Storage Address

Stopping CSP When CSP Gets Access to a Main Storage Address

You can stop the control storage processor (CSP) when CSP gets access to a real or logical main storage address by changing the following MSP registers: the configuration control register (CCR) and the address compare registers (ACR low, ACR high, and ACR extend).

Use procedure 01-215 to stop CSP when CSP gets access to a main storage address.

Stopping MSP on a Main Storage Address

You can specify the hardware and software address stop values to stop the main storage processor (MSP) at a specified main storage address. A main storage address and address qualifier are the hardware stop values. The address qualifier describes the main storage address as real or logical.

When programs are running concurrently, a specific main storage address may be used by many tasks. A software address stop qualifier can stop the main storage processor when the stop address is selected by a specific task.

Use procedure 01-214 to stop MSP on a main storage address.

This page is intentionally left blank.

01-490
Free-Lance Display Translated Storage (General Information)

There are two procedures to free-lance display translated storage as follows:

- 01-491 for early systems (not Stage 2)
- 01-492 for Stage 2 systems

These procedures are only a general guide to display the contents of main storage using translated addresses.

CAUTION

Data can be lost if these procedures are not used correctly. All registers and storage locations that are altered by these procedures must be restored to their original values when you have completed all steps, or the system must be loaded again.

01-491
Free-Lance Display Translated Storage (Not Stage 2 and Stage 3 Systems)

To Display Translated Storage

1. Ensure that the Security switch is in the Service position.

Is the system loaded?

Y **N**

If the system is not loaded, a system restart (step 8) cannot be performed.
- Use procedure 01-230 to alter the registers shown in Table A (01-497).

2. Select mode A (alter MSP register).

Did the system stop on the main program level (no display) or on interrupt level 0, 2, or 5?

Y **N**

I/O ATRs group 1 are automatically selected for interrupt level 1.
I/O ATRs group 0 are automatically selected for interrupt levels 3 and 4.

Do you want to use the selected ATR group?

Y **N**

- Run the system until it can be stopped on the main program level or on interrupt level 0, 2, or 5; or, perform a system reset (01-120) to get the main program level. However, if you perform a system reset, you cannot perform a system restart (01-497).
- Use procedure 01-230 to record the contents of the control mode register (CMR) in Table B (01-497), then alter the CMR with the value that selects the ATR group you want.

3. Determine which 2K block of main storage you want to address. (The 2K block is specified by the 8 high-order bits of the 19-bit real main storage address.)

4. Use procedure 01-230 to record the contents of the ATR you want to use in Table C (01-497), then alter the ATR with the value of the 2K block you have selected.

5. Ensure that the Main Stg Sel light is on.

6. Use procedure 01-220 to alter the microinstruction address register (MAR) to the 16-bit logical address of the main storage location to be displayed. Record the original address in Table C (01-497).

   Note: The 5 high-order bits of the logical address must be the same as the 5 low-order bits of the address of the ATR register you selected in step 4. The 11 low-order bits of the logical address select 1 byte of main storage in the 2K block you have selected. These 11 bits are the 11 low-order bits of the real main storage address.

7. Select mode 2 (display storage) and press the CSP Start key. The low-order byte of the control panel display contains the data of the storage location selected in step 6. Ignore the high-order byte because the data may not be valid.

Do you want to end the procedure?

Y **N**

Do you want to display the next sequential storage location?

Y **N**

- Go to step 3 to display a different storage location.

- Press the CSP Start key.

  Note: If any of the high-order address bits change, a different ATR will be used.

Do you want to perform a system restart?

Y **N**

- Go to 01-140 and load the system.

8. Go to 01-497 and perform a system restart.

Associated Procedures

01-492
Free-Lance Display Translated Storage (Stage 2 and Stage 3 Systems)

To Display Translated Storage

1. Ensure that the Security switch is in the Service position.

Is the system loaded?

Y **N**

If the system is not loaded, a system restart (step 8) cannot be performed.
- Use procedure 01-230 to alter the registers shown in Table A (01-498).

2. Select mode A (alter MSP register).

3. Determine which 2K block of main storage you want to address. (For Stage 2 systems, the 2K block is specified by the 9 high-order bits of the 20-bit real main storage address. For Stage 3 systems, the 2K block is specified by the 12 byte high-order bits of the 23-bit real main storage address.)

4. Use procedure 01-230 to record the contents of the ATR at address hex E0 (Table C, 01-498), then alter the ATR (hex E0) with the value of the 2K block you have selected.

5. Ensure that the Main Stg Sel light is on.

6. Use procedure 01-220 to alter the microinstruction address register (MAR) to the 16-bit logical address of the main storage location to be displayed. Record the original address in Table C (01-498).

   Note: The 5 high-order bits of the logical address must be zeros. The 11 low-order bits of the logical address select 1 byte of main storage in the 2K block you have selected. These 11 bits are the 11 low-order bits of the real main storage address.

7. Select mode 2 (display storage) and press the CSP Start key. The low-order byte of the control panel display contains the data of the storage location selected in step 6. Ignore the high-order byte because the data may not be valid.

Do you want to end the procedure?

Y **N**

Do you want to display the next sequential storage location?

Y **N**

- Go to step 3 to display a different storage location.

- Press the CSP Start key.

Note: If any of the 5 high-order address bits change, go to step 3.

Do you want to perform a system restart?

Y **N**

- Go to 01-140 and load the system.

8. Go to 01-498 and perform a system restart.

Associated Procedures

This page is intentionally left blank.

01-493
Free-Lance Alter Translated Storage (General Information)

There are two procedures to free-lance alter translated storage as follows:

- 01-494 for early systems (not Stage 2)
- 01-495 for Stage 2 systems

These procedures are only a general guide to alter the contents of main storage using translated addresses.

CAUTION
Data can be lost if these procedures are not used correctly. All registers and storage locations that are altered by these procedures must be restored to their original values when you have completed all steps, or the system must be loaded again.

01-494
Free-Lance Alter Translated Storage (Not Stage 2 and Stage 3 Systems)

To Alter Translated Storage

1. Ensure that the Security switch is in the Service position.

Is the system loaded?

Y **N**

If the system is not loaded, a system restart (step 7) cannot be performed.
- Use procedure 01-230 to alter the registers shown in Table A (01-497).

2. Select mode A (alter MSP register).

Did the system stop on the main program level (no display) or on interrupt level 0, 2, or 5?

Y **N**

I/O ATRs 40 through 63 are automatically selected for interrupt level 1.
I/O ATRs 0 through 31 are automatically selected for interrupt levels 3 and 4.

Do you want to use the selected ATR group?

Y **N**

- Run the system until it can be stopped on the main program level or on interrupt level 0, 2, or 5; or, perform a system reset (01-120) to get the main program level. However, if you perform a system reset, you cannot perform a system restart (01-497).
- Use procedure 01-230 to record the contents of the control mode register (CMR) in Table B (01-497), then alter the CMR with the value that selects the ATR group you want.

3. Determine which 2K block of main storage you want to address. (The 2K block is specified by the 8 high-order bits of the 19-bit real main storage address.)

4. Use procedure 01-230 to record the contents of the ATR you want to use in Table C (01-497), then alter the ATR with the value of the 2K block you have selected.

5. Ensure that the Main Stg Sel light is on.

6. Use procedure 01-220 to alter the microinstruction address register (MAR) to the 16-bit logical address of the main storage location to be displayed or altered. Record the original address in Table C (01-497).

   Note: The 5 high-order bits of the logical address must be the same as the 5 low-order bits of the address of the ATR register you selected in step 4. The 11 low-order bits of the logical address select 1 byte of main storage in the 2K block you have selected. These 11 bits are the 11 low-order bits of the real main storage address.

Do you want to end the procedure?

Y **N**

Do you want to alter the next sequential storage location?

Y **N**

- Go to step 3 to alter a different storage location.

- Press the CSP Start key.

  Note: If any of the high-order address bits change, a different ATR will be used.

Do you want to perform a system restart?

Y **N**

- Go to 01-140 and load the system.

7. Go to 01-497 and perform a system restart.

Additional Information

Using the Alter/Display Utility	01-210
Displaying or Altering Storage	01-240
Free-Lance Display Translated Storage	01-490

Additional Information

System Controls	01-055

01-495
Free-Lance Alter Translated Storage (Stage 2 and Stage 3 Systems)

To Alter Translated Storage

1. Ensure that the Security switch is in the Service position.

Is the system loaded?

Y **N**

If the system is not loaded, a system restart (step 7) cannot be performed.
- Use procedure 01-230 to alter the registers shown in Table A (01-498).

2. Select mode A (alter MSP register).

3. Determine which 2K block of main storage you want to address. (For Stage 2 systems, the 2K block is specified by the 9 high-order bits of the 20-bit real main storage address. For Stage 3 systems, the 2K block is specified by the 12 high-order bits of the 20 bit real main storage address.)

4. Use procedure 01-230 to record the contents of the ATR at address hex E0 (Table C, 01-498), then alter the ATR (hex E0) with the value of the 2K block you have selected.

5. Ensure that the Main Stg Sel light is on.

6. Use procedure 01-220 to alter the microinstruction address register (MAR) to the 16-bit logical address of the main storage location to be displayed or altered. Record the original address in Table C (01-498).

   Note: The 5 high-order bits of the logical address must be zeros. The 11 low-order bits of the logical address select 1 byte of main storage in the 2K block you have selected. These 11 bits are the 11 low-order bits of the real main storage address.

7. Select mode 4 (alter storage.

8. Use the Input keys to enter the word (2 bytes of data to be stored.

9. Press the CSP Start key. The contents of the selected storage location is altered to the data displayed in the control panel; the value of the MAR is increased by 1.

Do you want to end the procedure?

Y **N**

Do you want to alter the next sequential storage location?

Y **N**

- Go to step 3 to alter a different storage location.

- Press the CSP Start key.

  Note: If any of the 5 high-order address bits change, go to step 3.

Do you want to perform a system restart?

Y **N**

- Go to 01-140 and load the system.

10. Go to 01-498 and perform a system restart.

Additional Information

Using the Alter/Display Utility	01-210
Displaying or Altering Storage	01-240
Free-Lance Display Translated Storage	01-490

Additional Information

System Controls	01-055

01-497
Translated Storage and Register Tables (Not Stage 2 and Stage 3 Systems)

Use the following tables to record the original data of registers altered by procedures 01-491 and 01-494.

Table A

Alter These Registers (01-230)	Address (Hex)	To One of These New Values (Hex)
Storage interface register (SIR)	0036	Alter to 0036 if largest card is 128K bytes. Alter to 0056 if largest card is 256K bytes. Alter to 0076 if largest card is 512K bytes.
Configuration control register (CCR)	0038	Alter value to the size of the largest main storage card times the number of main storage cards installed. For example, with three cards installed and the largest card being 512K bytes, the value should be altered to 04 (1536K). Value altered to _____ 0B for 128K main storage 09 for 256K main storage 08 for 384K main storage 07 for 512K main storage 06 for 768K main storage 05 for 1024K main storage 04 for 1536K main storage 03 for 2048K main storage

Table B

Display These Registers (01-230)	Address (Hex)	Record the Original Value	Alter These Registers (01-230) to One of These New Values (Hex)
Control mode register (CMR)	003E		Value altered to _____ 01 Task ATR group 0 03 I/O ATRs group 0 05 Task ATR group 1 07 I/O ATRs group 1
Address translation register (ATR) Record the address and original data in the next 2 columns.			Value altered to _____ (See note.)
Note: The 5 high-order bits of the logical address must be the same as the 5 low-order bits of the address of the ATR register you selected in step 4 of the procedure to alter translated storage. The 11 low-order bits of the logical address select 1 byte of main storage in the 2K block you have selected. These 11 bits are the 11 low-order bits of the real main storage address.			

Table C

Address	Data

Address	Data

Address	Data

Address	Data

To Perform a System Restart

To perform a system restart, alter all registers and storage locations that were altered by procedures 01-491 and 01-494 to their original values, using the data recorded in Tables B and C.

01-498
Translated Storage and Register Tables (Stage 2 Systems)

Use the following tables to record the original data of registers altered by procedures 01-492 and 01-495.

Table A

Alter These Registers (01-230)	Address (Hex)	To One of These New Values (Hex)
Storage interface register (SIR)	0036	Alter to 0036 if largest card is 128K bytes. Alter to 0056 if largest card is 256K bytes. Alter to 0076 if largest card is 512K bytes. Alter to 0000 if largest card is 1024K bytes.
Configuration control register (CCR)	0038	Alter value to the size of the largest main storage card times the number of main storage cards installed. For example, with three cards installed and the largest card being 512K bytes, the value should be altered to 04 (1536K). Value altered to _____ 0B for 128K main storage 09 for 256K main storage 08 for 384K main storage 07 for 512K main storage 06 for 768K main storage 05 for 1024K main storage 04 for 1536K main storage 03 for 2048K main storage 02 for 3584K main storage

Table B

Display These Registers (01-230)	Address (Hex)	Record the Original Value	Alter These Registers (01-230) to One of These New Values (Hex)
Address translation register (ATR) Record the original value in column 3 and the altered value in column 4.			Value altered to _____ (See note.)
Note: The 5 high-order bits of the logical address must be zeros. The 11 low-order bits of the logical address select 1 byte of main storage in the 2K block you have selected. These 11 bits are the 11 low-order bits of the real main storage address.			

Table C

Address	Data

Address	Data

Address	Data

Address	Data

To Perform a System Restart

To perform a system restart, alter all registers and storage locations that were altered by procedures 01-492 and 01-495 to their original values, using the data recorded in Tables B and C.

01-498
Translated Storage and Register Tables (Stage 3 Systems)

Use the following tables to record the original data of registers altered by procedures 01-492 and 01-495.

Table A

Alter This Registers (01-230)	Address (Hex)	To One of These New Values (Hex)
Memory configuration register (MCR)	0051	Alter Value to indicate storage card locations *Bits* *Meaning* 0-1 Card size in 01A-A1U2 2-3 Card size in 01A-A1T2 4-5 Card size in 01A-A1S2 6-7 Card size in 01A-A1R2
		Card Size 00 No card in this location 01 1024K card in this location 10 2048K card in this location 11 Not used

Table B

Display These Registers (01-230)	Address (Hex)	Record the Original Value	Alter These Registers (01-230) to One of These New Values (Hex)
Address translation register (ATR) Record the original value in column 3 and the altered value in column 4.			Value altered to _____ (See note.)
Note: The 5 high-order bits of the logical address must be zeros. The 11 low-order bits of the logical address select 1 byte of main storage in the 2K block you have selected. These 11 bits are the 11 low-order bits of the real main storage address.			

Table C

Address	Data

Address	Data

Address	Data

Address	Data

To Perform a System Restart

To perform a system restart, alter all registers and storage locations that were altered by procedures 01-492 and 01-495 to their original values, using the data recorded in Tables B and C.

Testing Local Work Stations

01-500 Contents

RUNNING LOCAL WORK STATION MAPs AND TUs

FREE-LANCING LOCAL WORK STATIONS

About This Section

This section describes the procedures that test local work stations. When there is more than one method of performing a procedure, all methods are described.

- *Running Local Work Station MAPs and TUs for the Base Attachment:* These procedures let you test local work stations from the control panel.
- *Running MDI MAPs for the Second Attachment:* This procedure lets you test the second work station attachment.
- *Running Network Analysis:* This procedure lets you test the status of the local work station network.
- *Running Work Station Cable Check:* This procedure lets you isolate work station cable failures.
- *Free-Lancing Local Work Stations:* These procedures let you perform operations from the work station you are testing.
  - Test request options let you run selected work station verification tests, and obtain configuration and error information about local work stations.
  - Free-key mode lets you test work station keyboard, display, and attachment operations.

01-510
Running Work Station MDI MAPs

Work station attachment 1 MDI MAPs are run from the control panel. You can run the MAPs automatically or in step mode. The MAPs display a no-trouble-found message on the system console if no errors occur. If an error occurs while the MAPs are running, a b2xx (xx = MAP ID) appears in the control panel display. (If a stop, not b2xx, occurs, go to MAP 0116 to interpret the displayed code.) MDI stores the results in the main program level work registers (WR3, WR6, and WR7) as follows:

Address	Meaning
0003	WR3(H) contains the ID of the TU that completed or failed.
	WR3(L) has no meaning.
0006	WR6 contains TU result bytes 1 and 2.
0007	WR7 contains TU result bytes 3 and 4.

Notes:

1. Use procedure 01-225 to display the work registers containing the MDI results.
2. Use procedure 70-420 to interpret the work station result bytes.

The MDI MAPs for work station attachment 2 are run from the DCP Main menu.

To Run Work Station Attachment 1 MDI MAPs

1. Ensure that the Security switch is in the Service position.
2. Insert the DIAG21 diskette (DIAG41 for Stage 3 systems) or the diagnostic magazine (01-810).
3. Select mode E to load DCP from diskette.
4. Use the Input keys to enter F0C2.
5. Press the Load key.

When DCP is loaded, does b421 appear in the control panel display?

Y **N**

– Use MAPs 0113 through 0116 to interpret the displayed code.

6. Continue with one of the following procedures.

To Run the MDI MAPs Automatically

Press the CSP Start key. The MAPs display a no-trouble-found message on the system console if no errors occur. If an error occurs, you can display work registers WR3, WR6, and WR7 to determine the error (see Notes 1 and 2).

To Step the MDI MAPs

1. Press the MSP Stop key.
2. Press the CSP Start key to run each MDI TU (70-400).

After each TU is run, a b2xx (xx = MDI ID) appears in the control panel display. You can display work registers WR3, WR6, and WR7 to determine if an error occurred (see Notes 1 and 2). After all steps have been run, the MAPs display a no-trouble-found message on the system console if no errors occur.

Associated Procedure

Running Work Station TUs 01-520

To Run Work Station Attachment 2 MDI MAPs

Note: A work station must be attached to port 6 address 0 to run the MDI MAPs for work station attachment 2.

1. Ensure that the Security switch is in the Service position.

2. Insert the DIAG21 diskette (DIAG41 for Stage 3 systems) or the diagnostic magazine (01-810).

3. Load dedicated DCP from diskette (01-150).

4. Select the MDI MAPs option from the DCP Main menu.

5. Select the option for the second work station attachment.

   If an error occurs while the MDI MAPs are running, an SRC is displayed on the system console.

   If no errors occur, a completion message is displayed on the system console.

01-520
Running Work Station TUs

The local work station attachment TUs are run from the control panel. You can step or loop a work station attachment TU. If a TU fails, a b1xx (xx = the last 2 characters of the selected TU) appears in the control panel display. (If a stop, not b1xx, occurs, go to MAP 0116 to interpret the displayed code.) MDI stores the results in the main program level work registers (WR3, WR6, and WR7) as follows:

Address (Hex)	Meaning
0003	WR3(H) contains the work station ID (C2).
	WR3(L) contains the ID of the TU.
0006	WR6 contains TU result bytes 1 and 2.
0007	WR7 contains TU result bytes 3 and 4.

Notes:
1. Use procedure 01-225 to display the work registers containing the MDI results.
2. Use procedure 70-420 to interpret the work station result bytes.

To Run a TU

1. Ensure that the Security switch is in the Service position.
2. Insert the DIAG21 diskette (DIAG41 for Stage 3 systems) or the diagnostic magazine (01-810).
3. To load DCP from diskette, select mode E; to load DCP from disk, select mode F.
4. Use the Input keys to enter F1C2.
5. Press the Load key.

When DCP is loaded, does b421 appear in the control panel display?

Y **N**

– Use MAPs 0113 through 0116 to interpret the displayed code.

6. Continue with one of the following procedures.

To Loop a TU

1. Use the Input keys to enter the last 4 characters of a work station attachment TU (see 70-420).
2. Press the CSP Start key. The selected TU loops until CSP is stopped. An error will not stop the selected TU.
3. To stop CSP, press the MSP Stop key. The result bytes are in work registers WR6 and WR7 (see Notes 1 and 2).
4. To loop another TU, repeat this procedure.

To Step a TU

1. Use the Input keys to enter the last 4 characters of a work station attachment TU (see 70-420).
2. Press the MSP Stop key.
3. Press the CSP Start key to step the selected TU.

The TU steps once and stops. To step another TU, press the Input + 1 key (the next sequential TU) and press the CSP Start key, or repeat step 1 and press the CSP Start key.

Associated Procedure

Running Work Station MDI MAPs 01-510

01-525
Running Work Station Cable Check

The work station cable check procedure is used to locate open circuits, short circuits, and phase reversals in work station cables. The procedure directs you to measure resistances at selected points on the work station cable to locate the failure.

To Run the Work Station Cable Check Procedure

1. Ensure that the Security switch is in the Service position.
2. Insert the DIAG21 diskette (DIAG41 for Stage 3 systems) or the diagnostic magazine (01-810).
3. Load dedicated DCP from diskette (01-150).
4. Select the Utilities option from the DCP Main menu.
5. Select the Work Station Cable Check option from the Utilities menu.
6. Follow the prompts.

The correct responses are as follows:

- Work station display: An X in the single-frame condition row.
- Work station printer: An X in the single-frame condition row for the first sense and an X in the multiframe condition row for following senses.
- No work station at the address: An X in the no-response row.

Running Network Analysis

01-530
Running Network Analysis

Note: The system console must be working before this procedure can be used. Also, you need to know the addresses of the work stations that are attached to the system. The customer should give you this information.

This procedure isolates local work station problems. Network analysis displays a matrix on the system console. The matrix shows:

- The cable and station addresses of all possible work stations across the top of the matrix.
- The conditions sensed for each address down the side of the matrix.

An X is placed at the position of the work station address and the condition that was sensed.

The following FRUs are partially tested:

- Adapter card:
  - A-A1J2 for base attachment
  - A-A3T2 for second work station attachment
- Controller card:
  - A-A1H2 for base attachment
  - A-A3S2 for second work station attachment
- Attachment cable:
  - A-A1V4 for base attachment
  - A-A3V4 for second work station attachment
- A-A1 board (A-A3 board for second attachment)
- Twinaxial/IBM cabling system cables
- Work stations

To Run Network Analysis from the System Console

1. Ensure that the Security switch is in the service position.
2. Insert the DIAG21 diskette or the diagnostic magazine (01-810).
3. Load dedicated DCP from diskette (01-150).
4. When the DCP Main menu appears on the system console, select the Utilities option.
5. Select the option to run network analysis and follow the prompts.

   The sytem displays a status matrix on the console after approximately 30 seconds.
6. Use the table at the end of this procedure and the matrix that is displayed on the system console to isolate the failure.

To Run Network Analysis from the Control Panel (WS Controller 1 Only)

1. Ensure that the Security switch is in the Service position.
2. Insert the DIAG21 diskette or the diagnostic magazine (01-810).
3. Select mode E.
4. Use the Input keys to enter F1C2.
5. Press the Load key.

   The control panel display should stop with b421 displayed. If b421 is not displayed, use MAPs 0113 through 0116 to interpret the displayed code.
6. Use the Input keys to enter C245.
7. Press the CSP Start key.

   The network analysis matrix is displayed on the system console after approximately 30 seconds.
8. Use the network analysis matrix displayed on the system console and the table at the end of this procedure to isolate a failing work station.

Condition Sensed	Failing FRU or Action
RCV buffer overrun	A1J2 (A3T2), A1H2 (A2S2)
Single-frame or multiframe	If an X appears in a position that is not valid (no work station connected to the address) or if a failure cannot be isolated: 1. Ensure that the work station cables are connected to the correct ports at the system. 2. Ensure that the address switches on the work stations are set correctly. 3. Ensure that the terminator switches on the work stations are set correctly. 4. Check the work station cables (see 70-310, 70-330, and 70-350). 5. Check the A1V4 (A3V4) attachment cable (see 70-710).
	For work station displays: An X should appear in the Single-Frame row each time the display is polled. An X in the Multiframe row is not valid; see the device maintenance manual to isolate the failure.
	For work station printers: An X should appear in the Single-Frame row the first time the printer is polled. An X should appear in the Multiframe row for each additional time the printer is polled. If an X does not appear in the Multiframe row, see the device maintenance manual to isolate the failure. The work station printer failed to perform the modeset command.
No response	Each address position that is connected to a work station should be blank (no X). If an X appears at a position that is connected to a work station: 1. Verify that the work station is powered on and ready (not in test or setup mode). 2. Verify that the address and terminator switches are set correctly. 3. Check the twinaxial cable (see 70-310, 70-330, and 70-350). 4. Check the A1V4 (A3V4) attachment cable (see 70-710). 5. If the above steps are OK, exchange A1H2 (A3S3) or A1J2 (A3T2). If a work station printer failed to respond, also see the action under single-frame or multiframe condition.
Serial parity check	A1H2 (A3S2) or A1J2 (A3T2).
Driver activity check	A1H2 (A3S2), A1J2 (A3T2), or a short circuit in one of the work station cables.

01-535
Using the Test Request Menus

Example Display: Prime Option Menu

```
PRIME OPTION MENU                SELECT OPTION _                DISPLAY W2

 C END                               3 CONFIGURATION DATA
 1 DISPLAY VERIFICATION              4 ERAP
 2 WORK STATION PRINTER VERIFICATION

USE THE FOLLOWING LINES TO VERIFY CORRECT OPERATION OF KEYBOARD DATA KEYS
```

The test request menu for local work stations lets you:

- Run the display verification tests (01-540)
- Run the work station printer verification tests (01-542)
- Display local and remote work station configuration data (01-544)
- Display (or print) local work station ERAP reports (01-546)
- Test the keyboard in free-key mode (01-550)

You can display the test request Prime Option menu from any local work station, including the system console if it is in display station mode (not console mode).

To Display the Test Request Prime Option Menu

Do you have a sign-on display?

Y **N**

Have you signed on the work station you want to test?

Y **N**

The work station is active or offline.

– Key in TESTREQ to display the Prime Option menu.

– Use the Cmd key and the Test Request function key (⟵) to display the Prime Option menu.

Associated Procedures

Associated Procedures for Remote Work Stations

01-540
Running Display Verification Tests

Example Display: Display Verification Menu

```
DISPLAY VERIFICATION MENU                                    DISPLAY W2

   _ SELECT OPTION

   C RETURN TO PRIME OPTION MENU
   1 DISPLAY ATTRIBUTES
   2 DISPLAYABLE CHARACTERS
   3 SPECIFIED INPUT FIELDS
   4 FUNCTION KEYS
   5 COLOR DISPLAY ATTRIBUTES
   6 GRAPHICS VERIFICATION
```

The display verification test is an option of the test request Prime Option menu at the work station (including the system console, if the system console is in display station mode, not console mode). This test lets you perform the following operations concurrently with customer jobs:

- Display all characters and attributes that can be displayed
- Display and enter data in more than one type of field
- Verify the operation of the roll keys and the command keys
- Verify the operation of all data keys
- Display the color attributes for color displays
- Verify the operation of a graphics display

To Run the Display Verification Test

1. Display the test request Prime Option menu (01-535).
2. Select option 1 (display verification).

See the maintenance manual for the work station display for more information about the tests.

Associated Procedures

Associated Procedures for Remote Work Stations

01-542
Running Printer Verification Tests

Example Display: Work Station Printer Verification

```
WORK STATION PRINTER VERIFICATION                          DISPLAY W2

  _  SELECT PRINTER OR ENTER C TO RETURN TO PRIME MENU

  WORK STATION PRINTERS ON THE SYSTEM
P3 P2
```

The work station printer verification test is an option of the test request Prime Option menu at the work station (including the system console, if the system console is in display station mode, not console mode). This test lets you print data patterns on work station printers, using most of the printer commands.

To Run the Work Station Printer Verification Test

1. Display the test request Prime Option menu (01-535).

2. Select option 2 (work station printer verification).

See the maintenance manual for the work station printer for more information about the test.

Associated Procedures

Using the Test Request Menus	01-535
Running Display Verification Tests	01-540
Using Free-Key Mode	01-550

Associated Procedures for Remote Work Stations

Using the Test Request Menus	01-635
Running Display Verification Tests	01-640
Running Printer Verification Tests	01-642
Using Free-Key Mode	01-650

01-544
Displaying Configuration Data

Example Display: Configuration Data (Local Stations)

```
     CONFIGURATION DATA - LOCAL STATIONS                                DISPL
      _ENTER C TO RETURN TO PRIME MENU
DEVICE ADDR   UNIT ADDR   LOGICAL ID   DESCRIPTION
     C0          30          P1        PRINTER
     C0          20          P2        PRINTER   IDEOGRAPHIC
     C0          00          W1        DISPLAY   1920
     C0          10          W2        DISPLAY   IDEOGRAPHIC
     C0          33          W3        DISPLAY   GRAPHICS



*** PRESS ENTER TO SCROLL ***    SYSTEM CONFIGURATION SEE CNFIGSSP ***
```

Displaying work station configuration data is an option of the test request Prime Option menu at the work station (including the system console, if the system console is in display station mode, not console mode).

If remote work stations are attached through a communications line, remote configuration data is displayed when you scroll this display.

To Display Work Station Configuration Data

1. Display the test request Prime Option menu (01-535).
2. Select option 3 (configuration data).

Associated Procedures

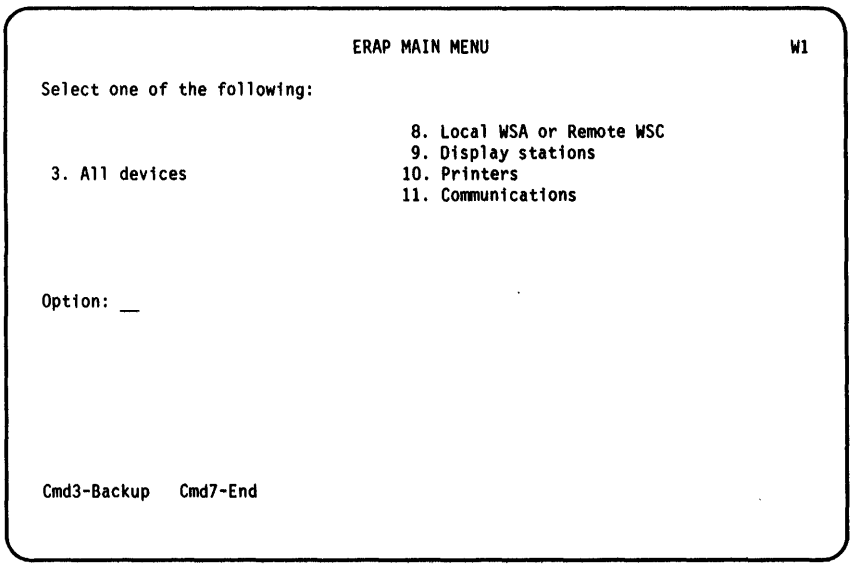
Displaying UDT Entries	01-290
Using the Test Request Menus	01-535
Displaying ERAP Reports	01-546

Associated Procedures for Remote Work Stations

Using the Test Request Menus	01-635
Displaying Configuration Data	01-644
Displaying ERAP Reports	01-646

01-546
Displaying ERAP Reports

Example Display: ERAP Main Menu



Displaying work station ERAP reports is an option of the test request Prime Option menu at the work station (including the system console, if the system console is in display station mode, not console mode).

To Display Work Station ERAP Reports

1. Display the test request Prime Option menu (01-535).

2. Select option 4 (ERAP).

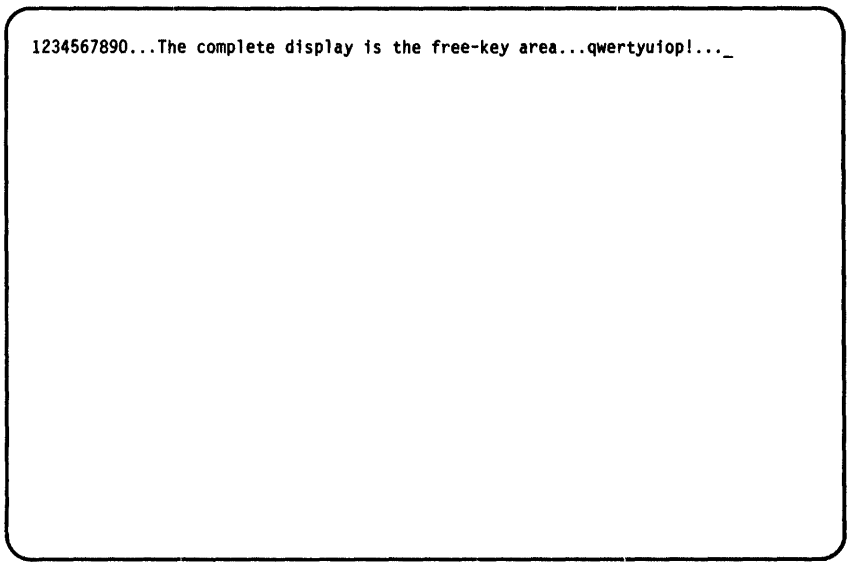
Associated Procedures

Associated Procedures for Remote Work Stations

01-550
Using Free-Key Mode

Free-key mode lets you test all normal work station operations. Keys that need system action cause a keyboard error. You can reset the keyboard error and continue.

Example Display: Free-Key Mode (Vary Command)



Using the Vary Command

1. To start free-key mode, key in the following command at the system console to change the selected work station status to offline.

   VARY OFF,xx (xx = work station ID)

2. To test the keyboard and display, press any key or combination of keys. The data appears on the work station display.

3. To end free-key mode, key in the following command at the system console to change the selected work station status to online.

   VARY ON,xx (xx = work station ID)

Example Display: Free-Key Mode (Test Request)

```
PRIME OPTION MENU                SELECT OPTION                    DISPLAY W2

 C END                              3 CONFIGURATION DATA
 1 DISPLAY VERIFICATION             4 ERAP
 2 WORK STATION PRINTER VERIFICATION

USE THE FOLLOWING LINES TO VERIFY CORRECT OPERATION OF KEYBOARD DATA KEYS

1234567890-=...This is the free-key area...qwertyuiop!....._
```

Using the Test Request Command

1. Sign on the work station.
2. Key in TESTREQ and press the Enter key to display the Prime Option menu.
3. Press the Field Exit key to move the cursor to the free-key area.
4. To test the keyboard and display, press any key or combination of keys. The data appears on the work station display.
5. Select option C (terminate) to end the test request function.

Using the Test Request Function Key

1. Ensure that you have a sign-on display. However, do not sign on.
2. Press the Cmd key and the Test Request function key (←—) to display the Prime Option menu.
3. Press the Field Exit key to move the cursor to the free-key area.
4. To test the keyboard and display, press any key or combination of keys. The data appears on the work station display.
5. Select option C (end) to end the test request function.

Associated Procedure

Using the Test Request Menus	01-535

Associated Procedures for Remote Work Stations

Using the Test Request Menus	01-635
Using Free-Key Mode	01-650

This page is intentionally left blank.

Testing Communications and Remote Work Stations

01-600 Contents

About This Section

This section describes the procedures that test the data communications attachment and devices. When there is more than one method of performing a procedure, all methods are described.

- *Displaying Communications Status:* This procedure lets you display the configuration status of all communications lines.

- *Running the Data Communications Tests:* These procedures contain information about running the following communications tests:
  - Communications concurrent diagnostic tests (COMMTEST) for testing single-line and multiline communications attachments
  - Local and remote modem diagnostic tests under COMMTEST for communications lines using LPDA modems
  - Remote loopback tests under COMMTEST
  - Communications controller diagnostic test under COMMTEST
  - Data traces under COMMTEST
  - Static driver installation tests under COMMTEST (Japan only)
  - BSC online test (BSCTEST) for testing communications lines using the BSC format
  - SDLC online test (SDLCTEST) for testing communications lines using the SDLC format
  - Station test (STATEST) for testing remote work stations and SDLC secondary devices

- *Free-Lancing Remote Work Stations:* These procedures let you perform operations from the work station you are testing.
  - Test request options let you run selected work station verification tests, and obtain configuration and error information about remote work stations.
  - Free-key mode lets you test work station keyboard, display, and attachment operations.

Note: See 01-710 for running communications MDIs and TUs.

01-605
Displaying Communications Status

Some communications configuration data can be changed by the SETCOMM procedure (30-440) or by the ALTERCOM procedure (30-445) under SSP. These changes can affect the way communications jobs run. You can verify the configuration status of each communications line using the STATUS COMCNFIG or STATUS COMM procedures.

The SETCOMM and ALTERCOM procedures are described as follows:

- SETCOMM: The SETCOMM procedure under SSP changes some communications parameters in the system configuration record. An initial program load (IPL) must be performed before the changes take effect.

  You can use the STATUS COMCNFIG (D H) command to display the present settings.

- ALTERCOM: The ALTERCOM procedure under SSP changes some items associated with batch BSC, SDLC, or a communications line. ALTERCOM only changes information for the display station at which it is run. If ALTERCOM is run while an SSP-ICF (interactive communications feature) subsystem or batch BSC job is running, it will have no effect on the job that is running. Changes made using ALTERCOM remain in effect until the ALTERCOM procedure is run again, or until the SETCOMM procedure is run.

  You can use the STATUS COMM (D C) command to display the present settings.

Use the Help menus or see the manual *System Reference* for additional information on these procedures.

To Display or Update System Communications

1. Key in D H.
2. Inspect the communications status for the line shown.
3. Press the Roll↑ key to display the status for the next line.

To Display or Update Display Station Communications

1. Key in D C.
2. Inspect the communications status for the line shown.
3. Press the Cmd9 key for additional status for the line shown.
4. Press the Roll↑ key to display the status for the next line.

Example Displays

The two example displays show typical configuration data for line 1. Example display 1 was obtained using the SSP procedure D H; example display 2 was obtained using the SSP procedure D C.

Example Display 1: System Communications

```
                    SYSTEM COMMUNICATIONS CONFIGURATION LINE 1        W1

Hardware configuration . . . EIA/CCITT          Clock . . . . . . MODEM
Line type  . . . . . . . . . SWITCHED           NRZI  . . . . . . Y
Multipoint control . . . . . N                  Answer tone . . . N
Continuous carrier . . . . . N                  SDLC time-out . . 3.0
SDLC retry count . . . . . . 1                  Modem . . . . . . NON-IBM
Self test required . . . . . N                  X.25 data line  . N


Cmd7-End      Cmd8-Help     Cmd15-Update     Cmd16-Restart      Roll-Page
------------------------------------------------------------------------------
                                  CNTLCMPR
                         Update System Communications

  1. Display specific line
  2. Communications configuration parameters


Ready for option number or command


                                                         (c) 1984 IBM Corp.
```

Example Display 2: Display Station Communications

```
                  DISPLAY STATION COMMUNICATIONS CONFIGURATION LINE 1   W1

Hardware configuration . . . .  EIA/CCITT
Line type  . . . . . . . . . .  SWITCHED
Multipoint control . . . . . .  N
Modem rate . . . . . . . . . .  FULL
X.25 data line . . . . . . . .  N
Switched network backup  . . .  N


Cmd9-Next segment
Cmd7-End      Cmd8-Help     Cmd15-Update     Cmd16-Restart      Roll-Page
------------------------------------------------------------------------------
                                  CNTLCOMM
                      Update display station communications

  1. Display specific line
  2. Communications lines, batch BSC or SDLC parameters


Ready for option number or command


                                                         (c) 1984 IBM Corp.
```

01-610 Running the Communications Concurrent Diagnostic Tests

The communications concurrent diagnostic tests (COMMTEST) have options for testing single-line communications attachments (SLCA) and multiline communications attachments (MLCA).

To Run COMMTEST

1. Key in COMMTEST.
2. Select an option (see Example Display 1) and follow the displayed instructions.

Note: Use the control panel to display the Communications Status lights for the line being tested.

Summary of Communications Concurrent Diagnostic Test Options

The following is a description of the COMMTEST options. If a test runs OK, a no-failure-found message is displayed. Errors associated with these tests are displayed as messages and system reference codes (MAPs 0113 and 0116).

Basic Communications Diagnostic Test

This option tests internal hardware and cable by performing internal diagnostic tests.

Testing of the external cables, modems, DCE (data communications equipment), and telephone line is performed when the line configuration permits as follows:

- For configurations without LPDA or IBM 387x modems, the farthest point of testing can be determined from the message displayed by the COMMTEST utility. For example, if a message is displayed that instructs you to install the external cable wrap connector, the farthest point tested in the communications link is the external cable.
- For configurations with IBM 387x modems, tests of the external cable and local modems are performed.
- For configurations with LPDA modems, tests of the external cable and local modems are performed. Remote modem tests are also performed if the network is nonswitched point-to-point and the local modem is a control modem.

When the basic diagnostic communications test (line wrap) is run, microcode trace information is moved to disk storage. This test can be run on a line that is not used to collect trace information of other lines that are having problems. Use the print COMMTEST data trace option (01-616) to print the trace information.

Additional Communications Diagnostic Tests

This option permits selection of more specific diagnostic tests (see Example Display 2) as follows:

- LPDA local and remote modem diagnostic tests (01-612)
- Remote loopback tests (01-613)
- Communications controller diagnostic tests (01-614)
- Print data traces (01-616)
- Static driver on/off installation tests (01-618)

Example Display 1: Communications Test Selection

```
                                COMMTEST                                W1

                        Communications Test Selection

Select one of the following:

   1. Basic communications diagnostic test
   2. Additional communications diagnostic tests

Option: _




Cmd7-End
```

Example Display 2: Communications Test Selection

```
                                COMMTEST                                W1

              Additional Communications Diagnostic Tests

Select one of the following:

   1. LPDA local and remote modem diagnostic tests
   2. Remote loopback tests
   3. Communications controller diagnostic test
   4. Print data traces
   5. Static driver on installation test
   6. Static driver off installation test

Option: _


Cmd7-End
```

Note: Only options that are valid are displayed.

01-612
Running the LPDA Local and Remote Modem Diagnostic Tests

The local and remote modem diagnostic tests are for IBM LPDA modems. These tests cause the local and remote modems to perform internal diagnostic tests and return the results to the COMMTEST utility. These tests also display the data quality of the communications line (generated by the local or remote modem).

Remote and local/remote tests can be run only if the local modem is a control modem, not a secondary modem.

To Run the Local and Remote Modem Diagnostic Tests

1. Start the COMMTEST utility (01-610).
2. Select option 2 (additional communications diagnostic tests).
3. Select option 1 (LPDA local and remote modem diagnostic tests).
4. Select one of the local or remote options.
5. Follow the displayed instructions.

Example Display: Running the LPDA Local and Remote Modem Diagnostic Tests

```
                                COMMTEST                                W1

LPDA Local and Remote Modem Diagnostic Tests

Select one of the following:

   1. Local modem self test
   2. Local modem status test of the communications line
   3. Remote modem self test
   4. Local and remote modem status test of the communications line

Option: _




Cmd7-End
```

Summary of LPDA Local and Remote Modem Diagnostic Tests

- *Local modem self test:* This test causes local modems to run internal diagnostic tests and return the results to the COMMTEST utility.
- *Local modem status test of the communications line:* This test displays the data quality value stored by the local modem. The data quality value is from 0 through F; the lower the value, the better the communications line. A data quality of 8 or higher indicates bad data transmission.

  The local modem sets the stored data to zero after this test runs. The local modem must be receiving data or a carrier signal to generate a new data quality value.
- *Remote modem self test:* This test causes remote modems to perform internal diagnostic tests and return the results to the COMMTEST utility.
  - The remote modem self test can be run only from stations that have a control modem.
  - On multipoint networks, a station address of a remote modem will be needed.
- *Local and remote modem status test of the communications line:* This test displays a data quality value generated by the local modem and a data quality value generated by the remote modem. The data quality values are from 0 through F; the lower the value, the better the quality of the communications line. A data quality of 8 or higher indicates bad data transmission.

01-613
Running the Remote Loopback Tests

The remote loopback tests transmit data to an external device where it is wrapped back to this system. The data received is checked to see that it is the same as the data sent. The external device must wrap the data back and supply clocking when necessary.

This test can also put the internal communications hardware in loopback wrap mode.

To Run the Remote Loopback Test

1. Start the COMMTEST utility (01-610).
2. Select option 2 (additional communications diagnostic tests).
3. Select option 2 (remote loopback tests).
4. Select one of the test options.
5. Follow the displayed instructions.

Example Display: Remote Loopback Tests

```
                                COMMTEST                                W1

                          Remote Loopback Tests

Select one of the following:

   1. Transmit test pattern to a remote station that is in
        wrap mode and check receive data
   2. Activate wrap mode at this station to echo received data

Option: _




Cmd7-End
```

Summary of Remote Loopback Test Options

Transmit Test Pattern to a Remote Station That Is in Wrap Mode and Check Receive Data

This option transmits data and checks the receive data to see if it is the same. An external device is needed to wrap the data back to the system and can be a wrap plug, local modem, remote modem, telephone network, or remote system. The external device need not supply clocking if any of the following is correct:

- An internal modem or DDSA (digital data service adapter) is installed on the selected line.
- The network or modem between this system and the wrapping device supplies clocking.
- The internal clock feature is used on the selected communications line.

This option can cause errors at other stations of a multipoint network.

This test can be run, for example, to:

- Wrap connectors for the following features:
  - 1200-bps nonswitched integrated modem with SLCA feature (2500) and MLCA feature (4500) only
  - EIA/CCITT (with internal clocking)
  - DDSA (does not include multipoint network)
- The telephone company wrap devices at different points in the network
- Local or remote modems set to wrap mode
- Remote systems that can be put in loopback mode

Activate Wrap Mode at This Station to Echo Received Data

This option puts the internal communications hardware in wrap mode. All data received will be returned to the system transmitting a test pattern.

This option can cause errors at other stations of a multipoint network.

01-614
Running the Communications Controller Diagnostic Test

This test runs internal diagnostic tests of the MLCA controller. This test indicates error results by displaying a system reference code (SRC). This test does not run if any communications line is in use.

See also procedure 30-410.

To Run the Controller Wrap Test

1. Start the COMMTEST utility (01-610).
2. Select option 2 (additional communications diagnostic tests).
3. Select option 3 (communications controller diagnostic test).
4. Follow the displayed instructions.

01-616
Printing Data Traces

The options to print the data traces permits printing the data transfers traced by the communications controller. These options are described as follows:

- Print Automatic Data Trace: This option formats and prints the communications data trace information that was stored when the basic communications diagnostic test (line wrap) or the communications controller diagnostic test (controller wrap) was automatically run because a permanent error occurred.

- Print COMMTEST Data Trace: The basic diagnostic communications test (line wrap) and communications controller diagnostic test (controller wrap) options of the COMMTEST utility can be run to record microcode trace information on disk storage. These tests can be run on a line that is not used, to collect trace information of other lines that are having problems. Use the print COMMTEST data trace option to print this trace information.

To Print the Trace Tables

1. Start the COMMTEST utility (01-610).

2. Select option 2 (additional communications diagnostic tests).

3. Select option 4 (print data traces).

4. Select option 1 (print automatic data trace) or option 2 (print COMMTEST data trace).

5. Interpret the trace output (30-410).

01-618
Running the Static Driver Installation Tests

The static driver tests are needed for Japanese NTT installations tests. These tests force the communications interface drivers on (active state) or off (not active state).

To Perform the Static Driver Installation Tests

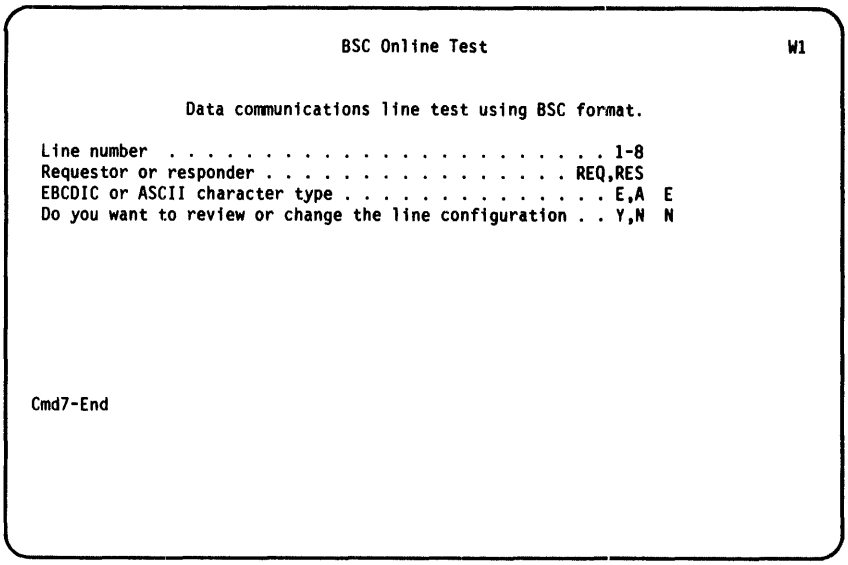
1. Start the COMMTEST utility (01-610).

2. Select option 2 (additional communications diagnostic tests).

3. Select option 5 (static driver on installation test) or option 6 (static driver off installation test).

   Messages indicate the status of the drivers for a specific line.

01-620
Running the BSC Online Test



The BSC online test communicates between BSC systems and between BSC devices and a system. Using this test, you can:

- Verify correct operation of the communications link between two systems, or between a system and the attached BSC devices
- Analyze difficult communications problems
- Supply remote site support

The BSC online test has two routines: a requestor routine and a responder routine. The requestor routine transmits a test code to the responder routine, requesting a specific test pattern.

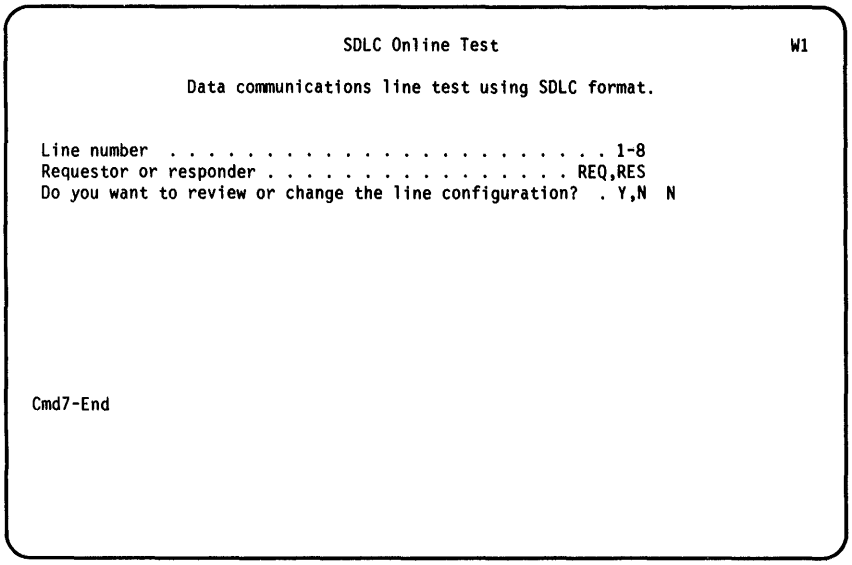
To Run BSCTEST

1. Key in BSCTEST.
2. Insert the DIAG23 diskette (DIAG43 for Stage 3 systems) or the diagnostic magazine and ensure that the diskette prompt is correct.
3. Press the Enter key and follow the displayed instructions.

Notes:

1. Use the control panel to display the Communications Status lights for the line being tested.
2. The Print key does not always work. This is a function of the BSCTEST, and is not a system error.
3. The command keys may not function as they should if a time-out occurs between the time you press the Cmd key and the 3 or 7 key. This is not a system error. Repeat the operation.

01-625
Running the SDLC Online Test



The SDLC online test communicates between SDLC systems and between SDLC devices and a system. Using this test, you can:

- Verify correct operation of the communications link between two systems, or between a system and the attached SDLC devices
- Analyze difficult communications problems
- Supply remote site support

The SDLC online test has two routines: a requestor routine and a responder routine. Data that is transmitted by the requestor routine is transmitted back by the responder routine.

The SDLC online test can also be run from the system (using the requestor routine) to a remote work station controller. The remote work station controller must be powered on and varied offline.

To Run SDLCTEST

1. Key in SDLCTEST.
2. Insert the DIAG23 diskette (DIAG43 for Stage 3 systems) or the diagnostic magazine and ensure that the diskette prompt is correct.
3. Press the Enter key and follow the displayed instructions.

Notes:
1. Use the control panel to display the Communications Status lights for the line being tested.
2. The Print key does not always work. This is a function of the SDLCTEST, and is not a system error.
3. The command keys may not function as they should if a time-out occurs between the time you press the Cmd key and the 3 or 7 key. This is not a system error. Repeat the operation.

01-630
Running the Station Test

```
                        PRIMARY STATION TEST                          W1


 Communications Line Number (1-8) ..................................... 1

 Number of Test Transmissions (1-999) ................................. 1

 Number of Seconds Between Transmissions (0-20) ....................... 0

 Log Successful Transmissions to History File? (No-N Yes-Y) ........... N









Enter-Continue   Cmd7-End
```

The station test for remote work stations permits online testing between the system and work station devices concurrently with other communications jobs. Using this test, you can:

- Verify correct operation of the communications link between the system and the remote work stations
- Analyze difficult communications problems associated with remote work stations

The station test lets you verify correct operation of:

- A remote work station
- An ICF-configured station
- A station that is not configured

To Run STATEST

1. Key in STATEST.
2. Enter the station test prompt information and follow the displayed instructions.

Notes:

1. When STATEST is started to test a switched line, the primary station (host) waits for a call from the secondary station (remote) to start the station test.
2. Use the control panel to display the Communications Status lights for the line being tested.

01-635
Using the Test Request Menus

Example Display: Prime Option Menu

```
PRIME OPTION MENU                SELECT OPTION _                DISPLAY W2

 C END                              3 CONFIGURATION DATA
 1 DISPLAY VERIFICATION             4 ERAP
 2 WORK STATION PRINTER VERIFICATION

USE THE FOLLOWING LINES TO VERIFY CORRECT OPERATION OF KEYBOARD DATA KEYS
```

The test request menus for remote work stations let you:

- Run the display verification tests (01-640)
- Run the work station printer verification tests (01-642)
- Display remote and local work station configuration data (01-644)
- Display (or print) remote work station ERAP reports (01-646)
- Test the keyboard in free-key mode (01-650)

You can display the test request Prime Option menu from any remote work station.

To Display the Test Request Prime Option Menu

Do you have a sign-on display?

Y

Have you signed on the work station you want to test?

Y

– Key in TESTREQ to display the Prime Option menu.

N

The work station is active or offline.

N

– Use the Cmd key and the Test Request function key (←—) to display the Prime Option menu.

Associated Procedures

Associated Procedures for Local Work Stations

01-640
Running Display Verification Tests

Example Display: Display Verification Menu

```
DISPLAY VERIFICATION MENU                                    DISPLAY W2

   _ SELECT OPTION

   C RETURN TO PRIME OPTION MENU
   1 DISPLAY ATTRIBUTES
   2 DISPLAYABLE CHARACTERS
   3 SPECIFIED INPUT FIELDS
   4 FUNCTION KEYS
   5 COLOR DISPLAY ATTRIBUTES
   6 GRAPHICS VERIFICATION
```

The display verification test is an option of the test request Prime Option menu at the remote work station. This test lets you perform the following operations concurrently with customer jobs:

- Display all characters and attributes that can be displayed
- Display and enter data in more than one type of field
- Verify the operation of the roll keys and the command keys
- Verify the operation of all data keys
- Display the color attributes for color displays
- Verify the operation of a graphics display

To Run the Display Verification Test

1. Display the test request Prime Option menu (01-635).
2. Select option 1 (display verification).

See the maintenance manual for the work station display for more information about the tests.

Associated Procedures

Using the Test Request Menus	01-635
Running Printer Verification Tests	01-642
Using Free-Key Mode	01-650

Associated Procedures for Local Work Stations

Using the Test Request Menus	01-535
Running Display Verification Tests	01-540
Running Printer Verification Tests	01-542
Using Free-Key Mode	01-550

01-642
Running Printer Verification Tests

Example Display: Work Station Printer Verification

```
WORK STATION PRINTER VERIFICATION                          DISPLAY W2

  _  SELECT PRINTER OR ENTER C TO RETURN TO PRIME MENU

  WORK STATION PRINTERS ON THE SYSTEM
P3 P2
P3 P2
```

The work station printer verification test is an option of the test request Prime Option menu at the remote work station. This test lets you print data patterns on work station printers, using most of the printer commands.

To Run the Work Station Printer Verification Test

1. Display the test request Prime Option menu (01-635).

2. Select option 2 (work station printer verification).

See the maintenance manual for the work station printer for more information about the test.

Associated Procedures

Using the Test Request Menus	01-635
Running Display Verification Tests	01-640
Using Free-Key Mode	01-650

Associated Procedures for Local Work Stations

Using the Test Request Menus	01-535
Running Display Verification Tests	01-540
Running Printer Verification Tests	01-542
Using Free-Key Mode	01-550

01-644
Displaying Configuration Data

Example Display: Configuration Data (Remote Stations)

```
CONFIGURATION DATA REMOTE STATIONS                              DISPLAY W2
     ENTER C TO RETURN TO PRIME MENU:
LINE   STATION ADDR   LSID   LOGICAL ID   DESCRIPTION
  1         01         00        R1        DISPLAY    960
  1         01         02        R2        DISPLAY   1920
  1         02         02        R3        PRINTER



*** PRESS ENTER TO SCROLL ***    SYSTEM CONFIGURATION SEE CNFIGSSP ***
```

Displaying work station configuration data is an option of the test request Prime Option menu at the work station. You can display configuration data for all remote work stations that are online.

You can also display configuration data for local work stations by scrolling this display.

To Display Work Station Configuration Data

1. Display the test request Prime Option menu (01-635).
2. Select option 3 (configuration data).

Associated Procedures

Displaying UDT Entries	01-290
Using the Test Request Menus	01-635
Displaying ERAP Reports	01-646

Associated Procedures for Local Work Stations

Using the Test Request Menus	01-535
Displaying Configuration Data	01-544
Displaying ERAP Reports	01-546

01-646
Displaying ERAP Reports

Example Display: ERAP Main Menu

```
                              ERAP MAIN MENU                              W1

Select one of the following:

                                      8. Local WSA or Remote WSC
                                      9. Display stations
 3. All devices                      10. Printers
                                     11. Communications



Option: __




Cmd3-Backup   Cmd7-End
```

Displaying work station ERAP reports is an option of the test request Prime Option menu at the work station.

To Display Work Station ERAP Reports

1. Display the test request Prime Option menu (01-635).

2. Select option 4 (ERAP).

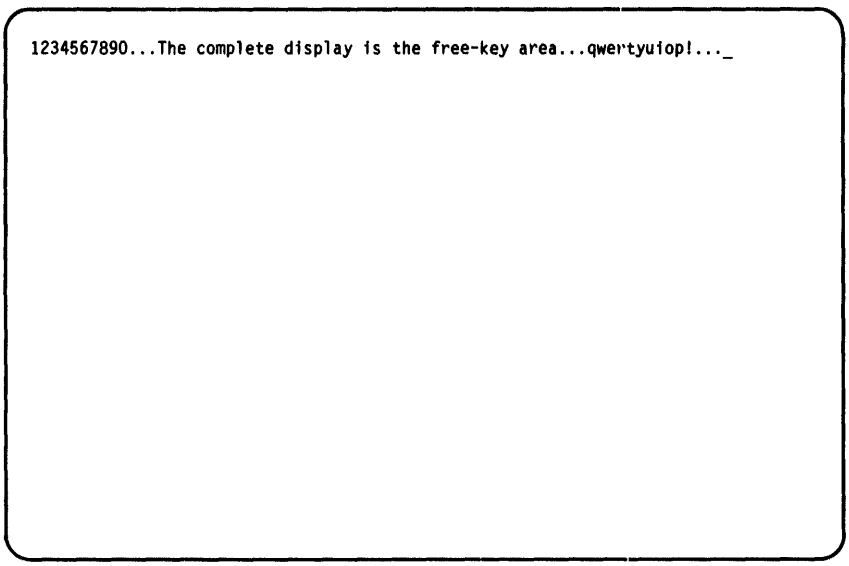
Associated Procedures

Associated Procedures for Local Work Stations

01-650
Using Free-Key Mode

Free-key mode lets you test all normal work station operations. Keys that need system action cause a keyboard error. You can reset the keyboard error and continue.

Example Display: Free-Key Mode (Vary Command)



Using the Vary Command

1. To start free-key mode, key in the following command at the system console to change the selected work station status to offline.

   VARY OFF,xx (xx = work station ID)

2. To test the keyboard and display, press any key or combination of keys. The data appears on the work station display.

3. To end free-key mode, key in the following command at the system console to change the selected work station status to online.

   VARY ON,xx (xx = work station ID)

Example Display: Free-Key Mode (Test Request)

```
PRIME OPTION MENU                SELECT OPTION                    DISPLAY W2

 C END                              3 CONFIGURATION DATA
 1 DISPLAY VERIFICATION             4 ERAP
 2 WORK STATION PRINTER VERIFICATION

USE THE FOLLOWING LINES TO VERIFY CORRECT OPERATION OF KEYBOARD DATA KEYS

1234567890-=...This is the free-key area...qwertyuiop[.....
```

Using the Test Request Command

1. Sign on the work station.
2. Key in TESTREQ and press the Enter key to display the Prime Option menu.
3. Press the Field Exit key to move the cursor to the free-key area.
4. To test the keyboard and display, press any key or combination of keys. The data appears on the work station display.
5. Select option C (terminate) to end the test request function.

Using the Test Request Function Key

1. Ensure that you have a sign-on display. However, do not sign on.
2. Press the Cmd key and the Test Request function key (←—) to display the Prime Option menu.
3. Press the Field Exit key to move the cursor to the free-key area.
4. To test the keyboard and display, press any key or combination of keys. The data appears on the work station display.
5. Select option C (terminate) to end the test request function.

Additional Information

Using the Test Request Menus	01-635

Associated Procedure for Local Work Stations

Using the Test Request Menus	01-535
Using Free-Key Mode	01-550

This page is intentionally left blank.

Testing the System and I/O Devices

01-700 Contents

About This Section

This section describes the procedures that test I/O devices. When there is more than one method of performing a procedure, all methods are described.

- *Running the MDI MAPs and Test Units:* These procedures (under dedicated DCP) let you diagnose and repair most failures associated with the base system and I/O devices.
- *Running the System Test:* These procedures let you test all parts of the system and all devices attached to the system under SSP with no customer jobs running.
- *Running the Disk Drive Diagnostic Tests:* These procedures let you perform specific tests to the 21ED or 10SR disk storage devices.
- *Running the Diskette Drive Diagnostic Tests:* These procedures let you perform specific tests to the 51TD or 72MD diskette drives.
- *Running the 3262 Printer Diagnostic Tests:* These procedures let you perform specific tests to the 3262 Printer.
- *Running the 8809 Tape Drive Diagnostic Tests:* These procedures let you select specific routines for the 8809 tape drive.
- *Running the 1255 Magnetic Character Reader Diagnostic Tests:* These procedures let you perform specific tests to the 1255 magnetic character reader.

01-705
Using the Dedicated DCP Supervisor Option

Option Descriptions

The Supervisor Options menu under dedicated DCP lets you select the console or printer (to display or print the output), the disk or diskette (to load the diagnostic tests), and I/O slot 1 or the diagnostic magazine (when using the 72MD diskette magazine drive). However, options 3 and 4 are valid only when loading DCP from disk (mode F).

Options 1 and 2

Options 1 and 2 let you select the system printer or the system console for the normal printed output. The default (*) is to the system printer.

Options 3 and 4

When dedicated DCP is loaded from disk (mode F), options 3 and 4 let you select the diagnostic tests from disk or diskette. When DCP is loaded from disk (mode F), the default (*) is from disk. These options are used when running device diagnostic tests, diagnostic utilities, or diskette drive diagnostic tests. For example, diskette diagnostic tests must be loaded from disk; diagnostic utilities and other device diagnostic tests must be loaded from diskette.

Note: When testing the disk drives, dedicated DCP must always be loaded from diskette using mode E. (See 01-730 and 01-735.)

Options 5 and 6

Options 5 and 6 let you select I/O slot 1 or the diagnostic magazine as the location of the diagnostic diskette containing the diagnostic tests The default (*) is from I/O slot 1 if a 51TD diskette drive is installed, or from the diagnostic magazine if a 72MD is installed.

Additional Information

Loading Dedicated DCP 01-150

Example Displays

Example display 1 shows the defaults (*) when dedicated DCP is loaded from disk, and a 72MD diskette magazine drive is installed.

Example display 2 shows the defaults (*) when dedicated DCP is loaded from diskette, and a 51TD diskette drive is installed. When DCP is loaded from diskette, option 3 cannot be selected.

Example Display 1: Supervisor Options

```
                Supervisor Options

Select one of the following:                Standard Function Keys

*  1. Printed output to printer          Cmd1 - Eject diskette
   2. Printed output to console          Cmd3 - Back up to a preceding screen
*  3. Diagnostics from disk              Cmd5 - Interrupt executing program
   4. Diagnostics from diskette          Cmd7 - Return to Main Menu
*  5. Use magazine                       Print- Print screen
   6. Use slot 1 only (Orient)           Roll - Roll screen Up or Down
                                         Help - Display Help text
Option: _          (* = selected)
```

Example Display 2: Supervisor Options

```
                Supervisor Options

Select one of the following:                Standard Function Keys

*  1. Printed output to printer          Cmd1 - Eject diskette
   2. Printed output to console          Cmd3 - Back up to a preceding screen
   3. Diagnostics from disk              Cmd5 - Interrupt executing program
*  4. Diagnostics from diskette          Cmd7 - Return to Main Menu
   5. Use magazine                       Print- Print screen
*  6. Use slot 1 only (Orient)           Roll - Roll screen Up or Down
                                         Help - Display Help text
Option: _          (* = selected)
```

01-710
Running the MDI MAPs

The MAPs option under dedicated DCP lets you run all or selected MAPs for each configured I/O device. This option lets you diagnose and repair most failures associated with I/O devices including remote work stations and communications lines. The MDI MAPs automatically control the running of diagnostic test units (TUs) and interpret the results. These results permit the MDI MAPs to diagnose the failing device and display repair information.

All MDI MAPs, except the local work station MAPs, are run from the system console. The local work station MAPs cannot use the system console because the system console also is being tested. Therefore, the local work station MAPs are run from the control panel (01-510).

Starting the MDI MAPs

1. Ensure that the Security switch is in the Service position.
2. Load dedicated DCP (01-150).

   When you are testing a disk drive, use mode E to load DCP from diskette; when you are testing the diskette drive, use mode F to load DCP from disk. When you are testing other devices, you can use mode E or mode F. However, when you use mode F, use the supervisor option to select diagnostics from diskette.
3. When the dedicated DCP Main menu appears, select the MDI MAPs option.
4. Continue with one of the additional procedures.

Associated Procedures

Testing CSP, MSP, Control Storage, and Main Storage	01-400
Testing Local Work Stations	01-500
Testing Communications and Remote Work Stations	01-600
Using the MDI Special Option	01-713
Using the TU Select Option	01-717

Additional Information

System Entry MAP	MAP 0100
System Controls	01-055

To Run All MAPs for a Specific Device

1. Select a device.
2. Follow the displayed instructions.

To Run One MAP for a Specific Device

1. Press the MSP Stop key (control panel).
2. Select a device.
3. When the MDI menu for a selected device appears, press the MSP Stop key and select one MDI test. If you are also selecting the MDI starting step number, select one MDI test and enter the step number before you press the MSP Stop key.
4. Follow the displayed instructions.

To Step One MAP for a Specific Device

1. Press the MSP Stop key (control panel).
2. Select a device.
3. When the MDI menu for a selected device appears, select one MDI test. You can also select the MDI starting step number.
4. Press the Enter key to run each MDI step.

To end step mode, press the MSP Stop key (control panel) and the Enter key (system console).

Example Displays

Example display 1 shows the MDI MAPs menu when DCP is loaded from disk. Only the diskette tests are displayed unless the supervisor option is set to select diagnostics from diskette; then the menu would be similar to display 2.

Example display 2 shows the MDI MAPs menu when DCP is loaded from diskette.

Example Display 1: DCP Loaded from Disk

```
 1. 72MD diskette




MDI MAPS
_  <--Enter
```

Example Display 2: DCP Loaded from Diskette

```
 1. MLCA line 1
 2. MLCA line 2
 3. MLCA line 3
 4. MLCA line 4
 5. 10SR disk A
 6. 72MD diskette
 7. 3262 Printer
 8. 8809 tape
 9. 1255 MCR




MDI MAPS
_  <--Enter
```

This page is intentionally left blank.

01-713
Using the MDI Special Option

The MDI Special option under dedicated DCP is used by some device MDI MAPs. The correct procedure is contained in the MDI MAP that instructed you to select the MDI Special option.

Associated Procedures

Running the MDI MAPs	01-710
Using the TU Select Option	01-717

Additional Information

System Entry MAP	MAP 0100
Testing Local Work Stations	01-500

01-717
Using the TU Select Option

The TU Select option under dedicated DCP lets you free-lance I/O device and communications problems by running selected TUs with the following additional options active:

- Run the test, stop, and display the results
- Loop on the test, and display the results
- Loop on the test until an error occurs

All TUs, except the local work station TUs, are run from the system console. The local work station TUs cannot use the system console because the system console is also being tested. Therefore, the local work station diagnostics are run from the control panel (01-520).

To Run TU Select

1. Ensure that the Security switch is in the Service position.
2. Load dedicated DCP (01-150).

   When you are testing a disk drive, use mode E to load DCP from diskette; when you are testing the diskette drive, use mode F to load DCP from disk. When you are testing other devices, you can use mode E or mode F. However, when you use mode F, use the supervisor option to select diagnostics from diskette.
3. When the dedicated DCP Main menu appears, select the TU Select option.
4. Select the device to be tested.
5. Key in the last 2 characters of a test ID (see example display 1).

   A description of the TU is displayed. Read the description and press the Enter key.
6. Select a run option (see example display 2).
7. Follow the instructions on the TU select displays.

To Select Another TU

If a TU has ended, press the Cmd3 key twice to return to the TU Select prompt.

If a TU is looping, press the Sys Req key to return to the TU Select Run Options menu. Press the Cmd3 key to return to the TU Select prompt.

To Stop a TU Loop

If a TU is looping, press the Sys Req key to return to the TU Select Run Options menu. Select another run option or press the Cmd3 key to return to the TU Select prompt.

To End TU Select

Use the Cmd7 key to end TU select and return to the DCP Main menu.

Example Displays

Example display 1 shows the Disk/Diskette DSA TU Select prompt. When a TU is selected, a description of the TU is displayed.

Example display 2 shows the TU select run options.

Associated Procedures

Running the MDI MAPs	01-710
Using the MDI Special Option	01-713

Additional Information

System Entry MAP	MAP 0100
Testing Local Work Stations	01-500

Example Display 1: Disk/Diskette DSA TU Select Prompt

```
  Buffer Reset Command Test       T6501
  Buffer Segment Counter Test     T6502
  Channel Segment Address Test    T6503
  Segment Address Counter Test    T6504
  Buffer Scan Delimiter Test      T6505
  Buffer Mode Command Reg Test    T6506
  Load Device Address Test        T6507
  Buffer Assignment Test          T6508
  Buffer Latches Test             T6509
  Enable Interrupt Test           T6510
_   <--Enter                    (Roll)
Enter last 2 digits of a test ID
```

Example Display 2: TU Select Run Options

```
                    Execution Options

 Select one of the following:
    1. Execute test, display and stop
    2. Loop on test displaying results
    3. Loop on test until error



 Option: _
```

01-720
Running the System Test

This procedure assumes that SSP is started, but no customer jobs are running. If you attempt to invoke SYSTEST and the system is in use, the system displays a message indicating that SYSTEST cannot be loaded.

Example Display: System In Use

```
Input-Output                                                    W1









 SYSTEST
 SYSTEST,CONFIGURE Y,REGION 64

SYS-2685  Options ( 1 3 )
SYSTEST --Cannot be loaded - System in use
```

System Test Description

The system test program is a multiple-device exerciser that lets you run all I/O devices in a mode similar to running customer programs. This method of testing the system can detect failures that might not occur when testing single devices. However, all commands or functions for the selected devices are not tested.

Operation statistics and error log information are displayed by the system test program. When ERAP is used to display the error history table, the information logged during system testing is included.

To Recover from Printer Forms Problems

If you are testing the system console and the 3262 Printer, and the printer has a forms problem, the system displays the Message Waiting indicator on the system console.

1. Press the Sys Req key and the Enter key (system console). The message appears on the last line of the display.
2. Correct the printer forms problem.
3. If necessary, respond to the console message.
4. Press the Sys Req key and the Enter key.
5. Select option 0.

System testing continues.

Example Display: Device Selection Menu

```
                              SYSTEST
                         Device Selection Menu

Select one of the following to activate or deactivate:

   1. Exit device selection
 * 2. Disk exerciser
 * 3. Diskette exerciser
 * 4. Display station exerciser
 * 5. Main Store Processor exerciser
 * 6. Printer exerciser
   7. Tape exerciser
   8. Device to device  exerciser
   9. 1255 exerciser
  10. Communications (All lines must be varied off.)

Option _

* Indicates active exerciser


Cmd1-Deactivate all              Cmd19-Cancel
```

To Run SYSTEST

To run SYSTEST for communications, vary off all lines before starting the test.

1. Key in SYSTEST.
2. Press the Enter key.

   If the system test is not available on disk, insert the problem determination diskette (72MD, slot 1) and press the Enter key.
3. Select the devices to be tested. Each asterisk (*) indicates an active exerciser.

   Note: The 6157 and 8809 tape drives cannot be selected at the same time.
4. Select system test options to activate specific exercisers (see 01-723 for stopping on errors).
5. After you have activated the system test exercisers you want, select the option to exit the Device Selection menu.
6. Select a SYSTEST timer option and enter the length of time you want system test to run.

To Interrupt SYSTEST

To interrupt system testing, press the Attn key and select option 4 on the Inquiry menu. A SYSTEST print/display menu appears on the system console.

To End SYSTEST

You can end system testing only from the SYSTEST print/display menu. Therefore, if the system test program is running, it must be interrupted.

From the SYSTEST print/display menu, select the option to terminate (end) SYSTEST.

Associated Procedures

01-723
Stopping on Errors During System Test

When you are selecting devices to be tested, you can also select the halt (stop on error) option for temporary errors. The default is Y (yes) for permanent and miscompare errors.

Example Display: Diskette Exerciser Prompt

```
                              SYSTEST
                          Diskette Exerciser

Activate diskette exerciser . . . . . . . . . . . . . . . . . . Y,N Y

 Slot 1 . . . . . . . . . . . . . . . . . . . . . . . . . . . . Y,N Y
 Slot 2 . . . . . . . . . . . . . . . . . . . . . . . . . . . . Y,N N
 Slot 3 . . . . . . . . . . . . . . . . . . . . . . . . . . . . Y,N N
 Magazine 1 . . . . . . . . . . . . . . . . . . . . . . . . . . Y,N N
 Magazine 2 . . . . . . . . . . . . . . . . . . . . . . . . . . Y,N N

 Range of records . . . . . . . . . . . . . . . . . . . . . . 01-26 01 to 05
 Range of cylinder seeks . . . . . . . . . . . . . . . . . . 01-75 01 to 05

                                                 Check  Record  Halt  Dump
 Permanent error options . . . . . . . . . . . . Y,N   Y       N      Y
 Temporary error options . . . . . . . . . . . . Y,N   Y       N      N
 Miscompare error options . . . . . . . . . . . Y,N   Y       N      Y     N


Cmd 3-Return
```

Error Descriptions

Errors detected during system test are described as follows:

- *Permanent error:* An error has occurred, but the error recovery action was not successful.
- *Temporary error:* An error has occurred, and the error recovery action was successful.
- *Miscompare error:* The data read back did not compare with the actual data written; the hardware did not detect the error.

To Stop on Errors

While you are activating device exercisers, select the type of errors you do not want totals for. The default for checking temporary, permanent, or miscompare errors is Y (yes). At the same time, you can change the halt (stop on error) option. When an error occurs, system testing stops and the error is displayed if a halt option is selected.

Stop on Error Displays

When an error occurs, system testing stops and the error is displayed. For temporary errors, except temporary communications errors, this information is displayed after error recovery is performed.

This is an information display. Use ERAP (option 4 on the SYSTEST print/display menu) to display the status information associated with errors that occur during system testing.

Example Display: Error Detection and Halt Display

```
01/20/83                          SYSTEST                          06.36.39
USERID _____________________System I/O Test Program_____________________MACHINE#

                    Error Detection and Halt Display          M#06
                    ------------------------------------------------

Date/Time.....  01/20/83 06.43.11
Error Type.....' PERMANENT
Device In Error...' DISKETTE


Error Text..... ERROR DETECTED IN DISKETTE IOB
```

Associated Procedures

This page is intentionally left blank.

01-725
Displaying System Test Results

There are three types of test results displayed by the system test program: summary (automatic) totals, detailed totals and error summaries, and ERAP reports.

- *Summary totals:* These totals are automatically displayed on the system console while the system test program is running. These totals are displayed for each device type and are updated every 15 seconds.

- *Detailed totals and error summaries:* The detailed totals are obtained by interrupting the system test program (01-720) and selecting the option that prints or displays this information. The detailed totals format includes the summary totals for each device type and totals for each specific device tested.

- *ERAP reports:* ERAP reports are obtained by interrupting the system test program and selecting the option that starts ERAP. These reports can be displayed or printed. The error history table for each device includes the error information logged during system testing.

To Get Summary Totals

Summary totals are generated by the system test program while the test is running. These totals are automatically updated and displayed on the system console every 15 seconds. Use procedure 01-726 to interpret the summary totals.

To Get Detailed Totals

You can select options to print or display detailed totals.

1. Press the Attn key.
2. Select option 4 from the Inquiry menu.
3. Select the option that prints or displays the detailed totals and error summary.
4. Use procedure 01-726 to interpret the detailed totals.

To Get the Logged Error Totals

1. Press the Attn key.
2. Select option 4 from the Inquiry menu.
3. Select the option that calls ERAP.
4. Select the ERAP reports you want (01-360).
5. Use procedure 01-367 to interpret ERAP reports for specific devices.
6. Use the Cmd7 key to return to SYSTEST.

Associated Procedures

01-726
Interpreting System Test Results

This procedure aids you in interpreting summary and detailed totals displayed by SYSTEST.

Example Display: Summary Totals

```
01/20/83                          SYSTEST                          06.36.39
USERID _____________________System I/O Test Program_____________MACHINE#

START 01/20/83  06.35.18          Summary Totals                    Page 01

    + I/O DEVICE NAME... + OPERATIONS..... + PERM... + TEMP... + MISCMPR +
    +-------------------+----------------+---------+---------+---------+
    + Disk Drive       1 +          5,808 +       0 +       0 +       0 +
    + Diskette           +            551 +       1 +       2 +       0 +
    + Display Station  2 +          3,104 +       0 +       0 +       0 +
    + MS Processor   IRW +            147 +       0 +       0 +       0 +
    + Printers         1 +            399 +       0 +       0 +       0 +
    + Tape Drive       1 +            256 +       0 +       0 +       0 +
    + Device to Device 3 +             95 +       0 +       0 +       0 +
    + MCR Drive          +            422 +       0 +       0 +       0 +
    + Communications   4 +             15 +       0 +       0 +       0 +
    +-------------------+----------------+---------+---------+---------+


Press ATTN key and take option 4 on inquiry menu to interrupt program
```

Example Hard Copy: Detailed Totals

```
USERID                          01/20/83 06.56.05              MACHINE#
START 01/20/83  06.35.18         DETAILED TOTALS                PAGE 01

+ I/O DEVICE NAME... + OPERATIONS..... + PERM... + TEMP... + MISCMPR +
+--------------------+----------------+---------+---------+---------+
+ DISK DRIVE       1 +          8,798 +       0 +       0 +       0 +
+  SPINDLE 1          +          8,798 +       0 +       0 +       0 +

+ DISKETTE           +            690 +       1 +       2 +       0 +
+  TYPE 2D/1024BYTE  +            682 +       1 +       2 +       0 +

+ DISPLAY STATION  2 +          3,767 +       0 +       0 +       0 +
+  PORT 1, ACTIVE# 2 +          3,767 +       0 +       0 +       0 +

+ MS PROCESSOR   IRW +            181 +       0 +       0 +       0 +
+  MSP INSTRUCTIONS  +             61 +       0 +       0 +       0 +
+  MSP MEMORY 64/512 +             60 +       0 +       0 +       0 +
+  MSP WRITE    0354 +             60 +       0 +       0 +       0 +

+ PRINTERS         1 +            512 +       0 +       0 +       0 +
+  IBM 3262           +            512 +       0 +       0 +       0 +

+ TAPE DRIVE 8809  1 +            256 +       0 +       0 +       0 +
+  DRIVE 1            +            256 +       0 +       0 +       0 +

+ DEVICE TO DEVICE 3 +             95 +       0 +       0 +       0 +
+  DISK SPINDLE 1     +             34 +       0 +       0 +       0 +
+  TAPE UNIT 1        +             31 +       0 +       0 +       0 +
+  DISKETTE           +             30 +       0 +       0 +       0 +

+ MCR DRIVE           +            410 +       0 +       0 +       0 +

+ COMMUNICATIONS   4 +             15 +       0 +       0 +       0 +

+--------------------+----------------+---------+---------+---------+
```

01-726 (continued) Interpreting System Test Results

Description of Total Fields

Summary totals are one-line summaries for each device type tested. Detailed totals are additional entries for each device type. The summary and detailed total fields are described as follows:

- *I/O device name:* The name of the device type being tested, the number of devices tested, and, for detailed totals, an entry for each device.

- *Operations:* The summary total of operations for each device type being tested and, for detailed totals, a separate entry for each device of that type with the following exceptions:
  - For disk drives, the number of operations is equal to the total number of sectors operated on for all disk drives. Separate entries are included for each drive (spindle) tested.
  - For diskettes, the number of operations is equal to the total number of diskette operations, including diskette drive autoloader operations. More than one diskette sector can be operated on during one diskette operation. Separate entries are included for each diskette format tested. The total for the separate diskette entries is not the total number of operations, but the total number of sectors operated on. Therefore, the sum of the diskette media totals can be more than the total number of diskette operations.
  - For work stations, the number of operations is equal to the total number of commands for all work stations tested. One command includes a write operation and a read operation. Separate entries are included for each work station port tested.
  - For the main storage processor, the number of operations is equal to the total number of times the instruction exerciser, the memory exerciser, and the write exerciser were run. Three characters are used in the device name field of the summary line to show the exerciser used. I is for the instruction exerciser, R is for the memory exerciser, and W is for the write exerciser. IRW indicates that all three were used. Separate entries are included for each exerciser used.
  - For printers, the number of operations is equal to the total number of lines printed for all printers tested. Separate entries are included for each printer or work station port tested.
  - For tape drives, the number of operations is equal to the number of supervisor calls (SVCs) issued. Separate entries are included for each drive tested.
  - For the 1255 magnetic character reader, the number of operations is equal to the total number of documents read. (See also *Information About 1255 Documents.*)
  - For device-to-device operations, the number of operations is equal to the number of supervisor calls (SVCs) issued to both the source and intermediate devices. Separate entries are included for each device tested.
  - For communications operations, the number of operations is equal to the number of supervisor calls (SVCs) issued. The number in the I/O device name field is the communications line being tested.

- *PERM:* This field shows the total number of permanent errors that occurred for each device type. Separate totals are included for each entry.

- *TEMP:* This field shows the number of temporary errors that occurred for each device type. Separate totals are included for each entry.

  Note: For 1255 operations, the counter for temporary errors counts the number of rejected documents. (See also *Information About 1255 Documents.*)

- *MISCMPR:* This field shows the number of times that the data read did not compare with the data written for each device type. Separate totals are included for each entry.

Information About 1255 Documents

The following information pertains to documents used for testing the 1255 MCR.

- 1255 testing supports the following documents:
  - 209386
  - 209388
  - 209389
  - 209393 (end-of-file)

- 12 pocket sorting occurs as follows (no problems):
  - 209386 to pocket 0
  - 209388 to pocket 2
  - 209389 to pocket 4

- 6 pocket sorting has two configurations:
  - Odd (0, 1, 2, 3, 4, and R)
  - Even (0, 2, 4, 6, 8, and R)

- Sorting occurs only on a specific field for each of the supported documents.

- The 1255 reads all check data to the buffer and uses this data for comparison.

- All small documents (4-field documents) are rejected.

- A 5-field document is rejected if there is an error in any field.

Associated Procedures

01-730
Using the Pack Utility Maintenance Program

The pack utility maintenance program (PUMP) under dedicated DCP lets you initialize all cylinders, analyze all cylinders, or recover one sector on a selected disk drive.

To Run PUMP

1. Ensure that the Security switch is in the Service position.
2. Load dedicated DCP from diskette, using mode E (01-150).
3. Select the Utilities option.
4. Select the Disk Utilities option.
5. Select a PUMP option and follow the displayed instructions.

Example Display: PUMP Primary Menu

```
                          PUMP PRIMARY MENU

 Select one of the following:

   1. Pack analysis
   2. Pack initialization
   3. Sector recover

 Option: _









 Cmd3-Back up   Cmd7-End
```

Summary of PUMP Options

- *Pack analysis*: This option analyzes all cylinders on a selected disk
  - Reads and verifies all data fields (see note 1)
  - Displays a summary of any detected errors (see note 2)
  - Aids you in determining if the disk is OK, or if it must be initialized after a hardware problem has been corrected

- *Pack initialization*: This option initializes all cylinders on a selected disk
  - The IOSR disk drive writes zeros to all data areas and verifies that all data areas can be read without errors.
  - The 21ED disk drive writes zeros and then hex FF to all data areas and verifies that all data areas can be read without errors.
  - Both drives write all IDs to the original status.
  - Both drives assign alternative sectors when defective sectors are found.

- *Sector recover*: This option attempts to:
  - Recover sector data with either ECC errors or no-record-found errors (an alternative sector can be assigned for any logical sector)
  - Set the defective sector bit in the flag of a sector

Notes:

1. The pack analysis option has two options: fast analysis and analysis. Use fast analysis first to determine if the number of disk errors is critical to normal operation. The analysis option, which reads all IDs before verifying the data fields, can aid you in:
   a. Finding errors that are not yet critical
   b. Analyzing existing errors
   c. Finding field assigned alternative sectors
2. Use the pack analysis error information for the sector recover option to correct:
   a. ECC errors
   b. No-sync-found errors
   c. No-record-found errors

   If necessary, you can use the sector recover option to assign alternative sectors to recover from these errors.

01-735
Running the Disk Drive Exerciser Tests

21ED Disk Drive

The Exerciser option under dedicated DCP lets you assemble exerciser tests to free-lance problems associated with the 21ED disk drive. Select up to nine commands to assemble a valid test.

To Assemble 21ED Exerciser Tests

1. Load dedicated DCP from diskette, using mode E (01-150).

2. Select the Exerciser option.

3. Select 21ED commands to assemble an exerciser test.

To get a description of the 21ED disk drive exerciser commands, press the Help key. To get a description of a specific command, enter the option number of a command and press the Help key.

Example Display: 21ED Disk Commands

```
                          I/O EXERCISER

                       21ED Disk Commands

Select one of the following:

   1. Execute selected commands    13. Read ID
   2. Look at selected commands    14. Write ID and clear data
   3. Cancel last command          15. Write format
   4. Cancel all commands          16. Read data diagnostic
   5. Seek                         17. Scan read data
   6. Recalibrate                  18. Disk status bytes
   7. Reset                        19. Sense adapter registers
   8. Device reset (POR)           20. Start motor
   9. Read data                    21. Stop motor
  10. Write data                   22. Halt
  11. Write repeat (record)        23. Loop VFO
  12. Read verify

OPTION: __  Number of commands assembled: _


Cmd3-Back up   Cmd7-End
```

10SR Disk Drive

The Exerciser option under dedicated DCP lets you assemble exerciser tests to free-lance problems associated with the 10SR disk drive. Select up to nine commands to assemble a valid test.

To Run the 10SR Exerciser Tests

1. Load dedicated DCP from diskette, using mode E (01-150).

2. Select the Exerciser option.

3. Select 10SR commands to assemble an exerciser test.

To get a description of the 10SR disk drive exerciser commands, press the Help key. To get a description of a specific command, enter the option number of a command and press the Help key.

Example Display: 10SR Disk Commands

```
                          I/O EXERCISER

                        10SR Disk Commands

Select one of the following:

   1. Execute selected commands    13. Read ID
   2. Look at selected commands    14. Write ID
   3. Cancel last command          15. Write format
   4. Cancel all commands          16. Read data diagnostic
   5. Seek                         17. Scan read ID
   6. Recalibrate                  18. Scan read data
   7. Reset                        19. Sense disk register
   8. Read data                    20. Sense attachment hardware regs
   9. Write data                   21. Sense attachment CB regs
  10. Write repeat (byte)
  11. Write repeat (record)
  12. Read verify

OPTION: __  Number of commands assembled: _


Cmd3-Back up   Cmd7-End
```

01-740
Using the Diskette Utilities

The diskette utility under SSP lets you perform tests to determine if diskette data errors are associated with a diskette or the diskette drive. The diskette utility also lets you recover data or patch data on a diskette.

To Run the Diskette Utility

1. Key in TESTDSKT and press the Help key.

2. Select an option and follow the displayed instructions.

Example Display: Diskette Utility

```
                                TESTDSKT                                W1

                            Run Diskette Tests

Select one of the following:

   1. Test diskette drive
   2. Scan diskette for errors
   3. Display diskette error log
   4. Recover data on a diskette
   5. Copy data from one diskette to another
   6. Display or change diskette sectors




Cmd3-Previous menu     Cmd7-End     Cmd5-Main help menu     Home-Sign-on menu

Ready for option number or command
_
                                                    C  1983 IBM Corp.
```

Summary of Diskette Utility Options

- *Test diskette drive:* This option performs write and read tests on specified tracks of the drive test diskette (IBM part 4234002) without the normal use of the 'switch filter' line and the 'inner tracks' line. This diskette is stored inside the rear cover.

- *Scan diskette for errors:* This option:
  - Reads data from a selected diskette
  - Records (but does not log) all errors by type and location
  - Displays and prints the results with probable causes

- *Display diskette error log*: This option displays the diskette format and the information in the diskette media log.

- *Recover data on a diskette:* This option:
  - Attempts to read data from a selected sector
  - Displays a message indicating if the read operation was acceptable or not (if the read operation fails and the diskette address was not cylinder 0, head 0, sectors 7 through 26, the write prompt is not displayed)
  - Displays a prompt to write the data back to diskette
  - Attempts to write the data back to diskette
  - Displays a message indicating if the write operation was acceptable or not

  The device error recovery procedures (ERP) and the error logging function (ELF) are inhibited during the recovery operation.

- *Copy data from one diskette to another*: This option invokes the COPYI1 procedure (01-820). This procedure lets you copy SSP diskettes.

- *Display or change diskette sectors*: This option invokes the PATCH procedure (01-850). This procedure lets you display and change the information on a diskette.

01-745
Running the Diskette Drive Exerciser Tests

72MD Diskette Magazine Drive

The I/O Exerciser option under concurrent or dedicated DCP lets you perform tests to diagnose and repair problems associated with the 72MD diskette magazine drive.

To Run the 72MD Exerciser Tests

1. Load dedicated DCP (01-150) or concurrent DCP (01-155). Dedicated DCP must be loaded from disk (mode F).

2. Select the I/O Exerciser option.

3. Select the 72MD and follow the displayed instructions.

To get a description of the 72MD diskette drive exerciser commands, press the Help key. To get a description of a specific command, enter the option number of a command and press the Help key.

Example Display: 72MD Test Selection

```
                              I/O EXERCISER

                              Test Selection

 Device:  72MD Diskette

 Select one of the following:

    1. C401  -  FRIENDs test
    2. C402  -  Stepper motor test
    3. C403  -  Read/write head wear scope loop  1

OPTION: _




Cmd3-Back up   Cmd7-End
```

72MD FRIENDs Test

The I/O Exerciser option under concurrent or dedicated DCP lets you assemble tests to free-lance problems associated with the 72MD diskette magazine drive. Up to nine commands can be selected to assemble a valid test.

Example Display: 72MD Diskette FRIENDs Test

```
                              I/O EXERCISER

                          Diskette FRIENDs Test

Select one of the following:

   1. Execute selected commands     9. Read ID
   2. Look at selected commands    10. Write data
   3. Cancel last command          11. Write CAM
   4. Cancel all commands          12. Write format
   5. Recalibrate                  13. Eject diskette
   6. Seek                         14. Orient autoloader
   7. Read data                    15. Abort autoloader
   8. Read data/CAM                16. Select diskette

OPTION: __




Cmd3-Back up   Cmd7-End
```

01-745 (continued) Running the Diskette Drive Exerciser Tests

51TD Diskette Drive

The I/O Exerciser option under concurrent or dedicated DCP lets you perform tests to diagnose and repair problems associated with the 51TD diskette drive.

To Run the 51TD Exerciser Tests

1. Load dedicated DCP (01-150) or concurrent DCP (01-155). Dedicated DCP must be loaded from disk (mode F).

2. Select the I/O Exerciser option.

3. Select the 51TD and follow the displayed instructions.

To get a description of the 51TD diskette drive exerciser commands, press the Help key. To get a description of a specific command, enter the option number of a command and press the Help key.

Example Display: 51TD Test Selection

```
                              I/O EXERCISER

                              Test Selection

 Device:  51TD Diskette

 Select one of the following:

    1. C401  -  FRIENDs test
    2. C403  -  Read/write head wear scope loop  1

OPTION: _









Cmd3-Back up   Cmd7-End
```

[1]Dedicated DCP only.

51TD FRIENDs Test

The I/O Exerciser option under concurrent or dedicated DCP lets you assemble tests to free-lance problems associated with the 51TD diskette drive. Up to nine commands can be selected to assemble a valid test.

Example Display: 51TD Diskette FRIENDs Test

```
                          I/O EXERCISER

                      Diskette FRIENDs Test

Select one of the following:

   1. Execute selected commands
   2. Look at selected commands
   3. Cancel last command
   4. Cancel all commands
   5. Recalibrate
   6. Seek
   7. Read data
   8. Read data/CAM
   9. Read ID
  10. Write data
  11. Write CAM
  12. Write format

OPTION: __

Cmd3-Back up   Cmd7-End
```

01-755
Running the 3262 Printer Exerciser Tests

The I/O Exerciser option under concurrent or dedicated DCP lets you select exerciser tests (50-430) to free-lance problems associated with the 3262 Printer.

To Run the 3262 Exerciser Tests

1. Load dedicated DCP (01-150) or concurrent DCP (01-155).
2. Select the I/O Exerciser option.
3. Select the 3262 Printer, or enter a 3262 test ID.
4. Follow the displayed instructions.

To get a description of the 3262 Printer exerciser tests, press the Help key. To get a description of a specific test, enter the option number of the test and press the Help key.

Example Display: 3262 Test Selection

```
                              I/O EXERCISER

                              Test Selection

 Device:  3262 Printer

 Select one of the following:

     1. PEXE2P   - 3262 Function Tests
     2. PEXE2T   - 3262 Timing Tests

OPTION: _




Cmd3-Back up   Cmd7-End
```

Example Display: Printer Function Tests

```
                          PRINTER EXERCISER

                        Print Function Tests

Select one of the following:

   1. Character print test
   2. Ripple print test
   3. Hammer matrix test
   4. Carriage space/skip test
   5. H print test
   6. T print test









Cmd3-Back up   Cmd7-End
```

Example Display: 3262 Timing Tests

```
                          PRINTER EXERCISER

                        3262 Timing Tests

Select one of the following:

   1. IMPSS timing test
   2. Emitter delay timing test
   3. Carriage feedback LED timing test









Cmd3-Back up   Cmd7-End
```

01-765
Running the 8809 Tape Drive Exerciser Routines

The Exerciser option under concurrent or dedicated DCP lets you select exerciser routines to diagnose problems associated with tape drives. You will test one tape drive at a time.

Example Display: Routine Selection

```
                          I/O EXERCISER

                        Routine Selection

Device:  8809 tape 1

Select one of the following:

   1. PEXB11 - Diagnostic linked series
   2. PEXB12 - Special requirement diagnostics

Option: _









Cmd3-Back up       Cmd7-End
```

To Run the 8809 Exerciser Routines

1. Load dedicated DCP from diskette (01-150) or concurrent DCP (01-155). If the customer is using the system now, you will want to load concurrent DCP.
2. Select the Exerciser option (dedicated DCP) or the I/O exerciser option (concurrent DCP).
3. Select the 8809 tape 1 (or 2) option. Some systems may have only one tape drive. If you are not sure which tape drive is causing the problem, start with the 8809 tape 1 option.
4. Select option 1 (diagnostic linked series) to run the DLS routines, or select option 2 (special requirement diagnostics) to run the special routines, including the cable wrap routine.

Note: See the 8809 MIM (DIAGNOSTICS) for a description of the 8809 tape drive routines.

To Stop the 8809 Exerciser Routines

You can stop the exerciser routines in one of two ways:

- Press the Cmd5 key on the system console. This procedure stops all testing after the routine that is running ends.

- Press the Reset pushbutton on the 8809 tape drive you are testing. This procedure ends the routine immediately. However, an error message is displayed on the system console; ignore this message.

Example Display: DLS Routine Selection

The diagnostic linked series (DLS) routines can be run in concurrent or dedicated mode. You can select a specific DLS routine or you can run all routines sequentially (option 1). See the 8809 MIM (DIAGNOSTICS) for a description of these routines.

```
                          TAPE EXERCISER

              Routine Selection  -  Diagnostic Linked Series

Select one of the following:

   1. 01-Run DLS (all routines)        10. 4A-Backward creep
   2. 40-Control line                  11. 4C-High speed
   3. 42-Check byte                    12. 4D-Reposition
   4. 43-Loop write-to-read            13. 4E-Write tape mark
   5. 44-Poll                          14. 4F-Write high speed
   6. 46-Low speed                     15. 52-Erase gap
   7. 47-Write/read PEID               16. 53-Write high speed/read low speed
   8. 48-Write/read low speed          17. 54-Read high speed
   9. 49-Dual gap                      18. 55-Magnetized head
                                       19. 56-Data security erase
OPTION: 1



Cmd3-Back up       Cmd7-End
```

01-765 (continued) Running the 8809 Tape Drive Exerciser Routines

Example Display: Special Requirement Diagnostics

The special requirement diagnostic routines below can be selected and run in dedicated mode. See the 8809 MIM (DIAGNOSTICS) for a description of these routines.

```
                          TAPE EXERCISER

          Routine Selection - Special Requirement Diagnostics

Select one of the following:

   1. 60-Write reliability              7. 62-Control line exerciser
   2. 61-Read reliability               8. 64-Command reinstruct timing
   3. 69-Cable wrap                        (short gap)
   4. 6B-Check byte display             9. 65-Command reinstruct timing
   5. 6C-System reference code             (long gap)
      generator                        10. 66-Read continuous (high
   6. 6D-Loop write-to-read                speed)
      exerciser                        11. 67-IBG measurement


OPTION: _



Cmd3-Back up       Cmd7-End
```

Example Display: Special Requirement Diagnostics

The special requirement diagnostic routines below can be selected and run in concurrent mode. See the 8809 MIM (DIAGNOSTICS) for a description of these routines.

```
                              TAPE EXERCISER

            Routine Selection - Special Requirement Diagnostics

Select one of the following:

   1. 60-Write reliability
   2. 61-Read reliability
   3. 69-Cable wrap
   4. 6B-Check byte display
   5. 6C-System reference code generator


OPTION: _




Cmd3-Back up       Cmd7-End
```

01-775
Running the 1255 Magnetic Character Reader Exerciser Tests

The Exerciser option under dedicated DCP lets you select exerciser tests to free-lance problems associated with magnetic character readers.

Example Display: 1255 Test Selection

```
                          I/O EXERCISER

                          Test Selection
Device:  1255 MCR

Select one of the following:

    1. PEX401   - 1255 MCR sort test        090783
    2. PEX402   - 1255 MCR timing test      090783

OPTION: _









Cmd3-Back up   Cmd7-End
```

To Run the 1255 Exerciser Tests

1. Load dedicated DCP (01-150).
2. Select the Exerciser option.
3. Select the 1255 and follow the displayed instructions.

To get a description of the 1255 magnetic character reader exerciser tests, press the Help key (Test Selection menu).

Option Descriptions

- 1255 MCR sort test:
  - Sort documents to different stackers
  - Compare a test deck to an expected data table
  - Print results
- 1255 MCR timing test:
  - Measure gap between documents read
  - Measure length of documents read
  - Print results

Updating and Patching Programs

01-800 Contents

About This Section

This section describes the procedures that update and patch system and diagnostic programs. When there is more than one method of performing a procedure, all methods are described.

- *Working with Diagnostic Programs:* These procedures let you:
  - Initialize system and diagnostic diskettes
  - Copy system and diagnostic diskettes
  - Patch diagnostic programs on disk or diskette

- *Updating and Verifying UDT Entries:* These procedures let you:
  - Update and verify configuration data
  - Update microcode and diagnostic programs on disk

- *Installing Patches and PTFs:* These procedures let you:
  - Patch data on disk or diskettes
  - Install program temporary fixes (PTFs)
  - Install microprogram temporary fixes (MPTFs)

- *Working with System Data Areas:* These procedures let you:
  - Collect and display data for authorized program analysis reports (APARs)
  - Analyze a dump file from APAR diskettes
  - Generate diskette files containing information for diagnosing program problems
  - Set the address compare dump values

This page is intentionally left blank.

01-810
Diagnostic Diskette Descriptions

The diagnostic diskettes contain functional microcode and diagnostic tests for concurrent and dedicated maintenance, customer setup, and problem determination procedures. For systems with a 51TD diskette drive installed, each diskette must be inserted separately in the diskette drive.

For systems with a 72MD diskette magazine drive installed, the diagnostic diskettes are inserted in a diskette magazine or an I/O slot as follows:

DIAG21: magazine 1, slot 1
DIAG22: magazine 1, slot 2
DIAG23: magazine 1, slot 3
DIAG24: magazine 1, slot 4
Type 1 scratch diskette: magazine 1, slot 9
Type 2D scratch diskette: magazine 1, slot 10
DIAG3x (RPQ): I/O slot 2
Checkout diskette (CSU): I/O slot 1
Drive test diskette: I/O slot 1
Problem determination diskette: I/O slot 1

Note: For Stage 3 systems, use:
DIAG41 instead of DIAG21
DIAG42 instead of DIAG22
DIAG43 instead of DIAG23
DIAG44 instead of DIAG24

Summary of Diagnostic Diskettes

The following is a summary of the diagnostic diskettes.

- The DIAG21 or DIAG41 diskette contains:
  - CSP diagnostics
  - MSP diagnostics
  - CSIPL I/O wrap tests
  - System configuration data
  - Dedicated DCP supervisor
  - Device exercisers (except diskette)
  - 8809 tape routines
  - Work station processor code
  - Work station diagnostic tests
  - Disk and printer I/O code
  - 3262 controller code
  - Communications controller code
  - System configure utility
  - System records list utility

- The DIAG22 or DIAG42 diskette contains:
  - 21ED and 10SR disk diagnostic tests
  - 51TD and 72MD diskette diagnostic tests
  - 8809 tape adapter diagnostic tests
  - Diskette exercisers
  - Disk utilities (PUMP)

- The DIAG23 or DIAG43 diskette contains:
  - BSC online test (BSCTEST)
  - SDLC online test (SDLCTEST)
  - Communications diagnostic tests
  - 3262 Printer diagnostic tests
  - 1255 magnetic character reader diagnostic tests
  - Program patch utility

- The DIAG24 or DIAG44 diskette contains:
  - System customize utility
  - Reload utility
  - Control storage microcode
  - Controller microcode

- The DIAG3x (x = 1-F) diskette contains RPQ modules.

- The checkout diskette contains the customer setup (CSU) verification tests.

- The drive test diskette is used with the diskette utility.

- The problem determination diskette contains the system online problem determination procedures and the system test (SYSTEST) utility.

01-815
Initializing Diskettes

This procedure assumes that SSP is running.

You can initialize system diskettes or diagnostic diskettes, using one of two system procedures: INIT and DIAGINIT. These procedures can be run from any work station or from the job queue (JOBQ).

The system initialize procedure (INIT) lets you rename a system diskette, or initialize a system diskette to a diskette 1 or diskette 2D format.

The diagnostic initialize procedure (DIAGINIT) lets you initialize 77 cylinders (tracks) of a diskette 2D to the diagnostic format as follows:

- Cylinder 0, head 0: 26 sectors (128 bytes)
- Cylinder 0, head 1: 26 sectors (256 bytes)
- Cylinders 1 through 76, both heads: 15 sectors (512 bytes)

If a defective cylinder is found, the system displays a message; the diskette is not initialized and cannot be used.

The INIT and DIAGINIT procedures check for correct format, active files, and access protection before the initialization is attempted. Messages are displayed if any of these conditions occur. You have the following options:

- If the diskette you are initializing has active files, you can delete the active files and initialize the diskette, or you can insert a different diskette.
- If the diskette you are initializing (using DIAGINIT) is not a diskette 2D, you can insert a different diskette.
- If the diskette you are initializing is access protected, you can format the diskette, or you can insert a different diskette.

To Initialize Diagnostic Diskettes

1. Insert the diskette to be initialized. For 72MD drives, use I/O slot 1.
2. Key in `DIAGINIT`.
3. Follow the displayed instructions.

To Initialize Multiple Diagnostic Diskettes

1. Insert the diskettes to be initialized, using I/O slots or magazines, but not a combination of both.
2. Key in `DIAGINIT START,END`.

   Examples:

`DIAGINIT S1,S3:`	Initialize the diagnostic diskettes in I/O slots 1 through 3.
`DIAGINIT M1.01,M1.04:`	Initialize diagnostic diskettes 1 through 4 in magazine 1.
`DIAGINIT M1,M2:`	Initialize all the diagnostic diskettes in magazines 1 and 2.

3. Follow the displayed instructions.

To Initialize System Diskettes

1. Insert the diskette to be initialized. For 72MD drives, use I/O slot 1.
2. Key in `INIT` and press the Help key.
3. Follow the displayed instructions.

01-820
Copying Diskettes

This procedure assumes that SSP is running.

You can copy system diskettes or diagnostic diskettes, using one of two system procedures: COPYI1 and DIAGCOPY. These procedures can be run from any work station or from the job queue (JOBQ).

The system diskette copy procedure (COPYI1) lets you copy a system diskette (but not diagnostic diskettes) to one or more other system diskettes of the same format.

The diagnostic diskette copy procedure (DIAGCOPY) lets you copy any diskette to one or more other diskettes of the same format. To copy diagnostic diskettes, the copy-to diskette must have the diagnostic format, or must have been initialized by the DIAGINIT procedure.

The COPYI1 and DIAGCOPY procedures check for correct format, active files, and access protection before the copy is attempted. Messages are displayed if any of these conditions occur.

When using the DIAGCOPY procedure, all sectors of the input diskette are copied to the output diskette with the following exceptions:

- Cylinder 0, head 0, sector 3 (system scratch sector) is not copied.
- Cylinder 0, head 0, sector 5 (error sector) is not copied.
- Deleted records in the diskette directory are compressed, and all HDR1 records are written to consecutive sectors on the output diskette. All sectors on cylinder 0 that are not used are written as deleted records.
- Deleted records in the data sectors of the diskette can cause unexpected results.

To Copy a Diagnostic Diskette

1. Insert the diskette to be read (the input diskette). For 72MD drives, use I/O slot 1. I/O slot 2 should contain the output diskette.
2. Key in `DIAGCOPY`.
3. Follow the displayed instructions.

When the input diskette has been read, or when the output diskette has been written, the system prompts you for an output diskette. You have the following options:

- Option 0 causes the output diskette to be written.
- Option 2 or 3 ends the job.

This prompt continues to appear after the output diskette is written until you enter option 2 or 3 to end the job.

To Copy a System Diskette

1. Insert the diskette to be read (the input diskette). For 72MD drives, use I/O slot 1. I/O slot 2 should contain the output diskette.
2. Key in `COPYI1` and press the Help key.
3. Follow the displayed instructions.

01-830
Patching Diagnostic Programs

The program patch utility under dedicated DCP lets you:

- Install controlled patches to the disk or DIAGxx diskette
- Install free-lance patches to the disk

The program patch utility records information about the patch in the patch table. If the patch table is full, this utility displays information about the patch record being deleted, and instructs you to print the display. When the new patch is installed, the oldest patch record is deleted.

When you update diagnostic programs on disk (01-840), the customize utility checks the patch table for existing controlled and free-lance patches.

See *Displaying System Records* (01-285) for more information about the patch tables on disk and diskette.

Installing Controlled Patches

Patch options 1 and 2 let you install controlled patches to the disk or diskette. When you install a controlled patch, the program patch utility makes an entry in the patch table with a patch number and a diskette ID of the diskette to which the patch is installed. If the patch is to disk, the diskette ID is the ID of the diskette that contained the data to be patched.

Installing Free-lance Patches

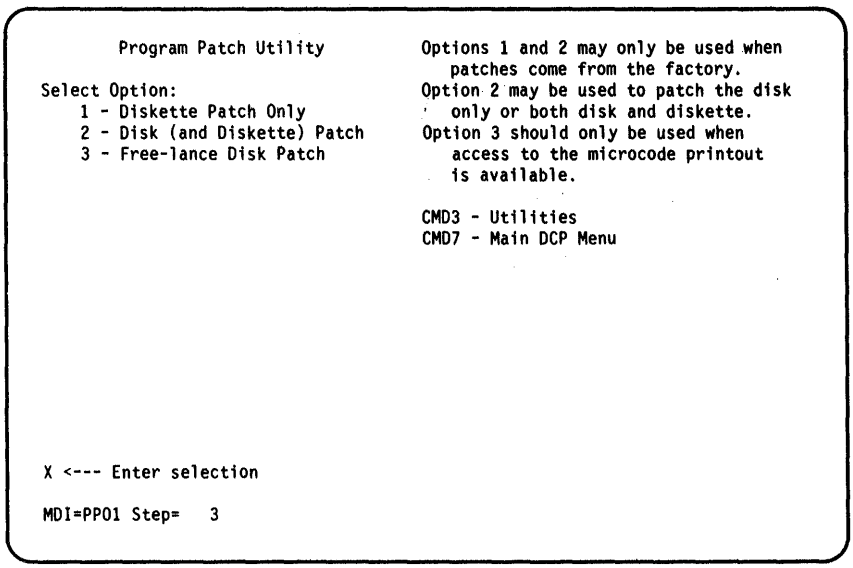
The free-lance patch option (option 3) lets you field-install free-lance patches to existing modules on the disk. When the operation is complete, the program patch utility makes an entry in the patch table with a patch ID of hex FFFF and a diskette ID of 00.

To Run the Program Patch Utility

1. Ensure that the Security switch is in the Service position.
2. Load dedicated DCP (01-150).
3. Select the Utilities option.
4. Select the Program Patch option.
5. Select an option to patch disk or diskette.
6. Follow the displayed instructions.

Associated Procedures

Example Display: Program Patch Utility



```
        Program Patch Utility          Options 1 and 2 may only be used when
                                          patches come from the factory.
Select Option:                         Option 2 may be used to patch the disk
    1 - Diskette Patch Only               only or both disk and diskette.
    2 - Disk (and Diskette) Patch      Option 3 should only be used when
    3 - Free-lance Disk Patch             access to the microcode printout
                                          is available.

                                       CMD3 - Utilities
                                       CMD7 - Main DCP Menu









X <--- Enter selection

MDI=PP01 Step=   3
```

01-835
Updating UDT Entries on Diskette

Example Display: Information

```
                              SYSTEM CONFIGURE

                                Information

The UDT will be read into a temporary work area in storage.
   (temporary UDT buffer).

This temporary UDT can be:
   - updated
   - displayed or printed
   - written to the DIAG21 diskette

The UDT on either the disk or diskette can also be displayed or printed.









Enter-Continue    Cmd7-End
```

The diagnostic diskettes contain diagnostic tests for all devices that can be attached to System/36. These devices have different descriptions and storage sizes. Therefore, you must describe the system hardware configuration for the diagnostic control programs.

When you describe the system configuration, a unit definition table (UDT) is generated in a temporary UDT buffer in storage. This table contains an entry for each device. Each entry contains the device ID, the device address, and configuration data (such as storage size for disk storage devices, print image for the system printer, and type of keyboard and display for the system console).

When you have completed the configuration description, you can select the option to write the UDT to the DIAG21 diskette (DIAG41 for Stage 3 systems). To update the UDT and diagnostic programs on disk, you must run the system customize utility (01-840).

To Load the System Configure Utility

1. Insert the DIAG21 diskette (DIAG41 for Stage 3 systems) or the diagnostic magazine.

Do you want to run the configure utility concurrently with customer jobs?

Y **N**

   - Ensure that the Security switch is in the Service position.
   - Load the dedicated DCP supervisor (01-150).
   - Select the Utilities option.
   - Go to step 3 and continue.

2. Key in CONCR (01-155).

3. Select the system configure utility.

4. Follow the displayed instructions to display, update, or delete UDT entries.

Associated Procedures

Displaying UDT Entries	01-290
Updating UDT Entries and Microcode on Disk	01-840
Verifying UDT Entries on Disk	01-845

Additional Information

Tasks Associated with Diagnostic Utilities	01-185

Example Display: Input to Temporary UDT Buffer

```
                    SYSTEM CONFIGURE UDT SELECTION

                    Input to Temporary UDT Buffer

Select one of the following:

   1. UDT from disk
   2. UDT from diskette

Option: _









Cmd7-End
```

You can select the UDT to be used in the temporary UDT buffer. Normally, you would select option 2 (UDT from diskette) to change the system configuration and, using option 5 of the System Configure Primary menu, write the UDT back to the DIAG21 diskette. Using option 1 (UDT from disk), you can copy the existing system UDT to a DIAG21 diskette that is not configured, or is not configured correctly.

Note: For Stage 3 systems, use the DIAG41 diskette.

To Copy the UDT from Disk to a DIAG21 Diskette, Using the Temporary UDT Buffer

1. Select option 1 (UDT from disk).
2. Select option 5 (write the temporary UDT to a DIAG21 diskette) from the System Configure Primary menu.

   Note: For Stage 3 systems, use the DIAG41 diskette.
3. Press the Enter key (no RPQs).
4. When the temporary UDT has been written to the DIAG21 diskette, press the Cmd7 key to end the configuration operation.

   Note: For Stage 3 systems, use the DIAG41 diskette.

01-835 (continued)
Updating UDT Entries on Diskette

Example Display: System Configure Primary Menu

```
                    SYSTEM CONFIGURE PRIMARY MENU

Select one of the following:

   1. Display UDT entries
   2. Print UDT entries
   3. Delete all entries from the temporary UDT buffer
   4. Configure a device in the temporary UDT
   5. Write the temporary UDT to a DIAG21 diskette
      (RPQs can be selected during this option.)

Option: _









Cmd3-Back up    Cmd7-End
```

Summary of Configure Options

Options 1 and 2 of the System Configure Primary menu let you display or print the UDT entries from the temporary UDT buffer, from the UDT on disk, or from the UDT on the DIAG21 diskette (DIAG41 for Stage 3 systems).

Option 3 lets you delete all entries from the temporary UDT. When you have deleted all entries, the system configure utility generates a basic system entry and CSP storage entry in the temporary UDT, and displays additional information.

Option 4 lets you configure device entries in the temporary UDT.

Option 5 lets you write the temporary UDT to a DIAG21 diskette (DIAG41 for Stage 3 systems). RPQs for the system being configured can be included at this time.

To update the UDT and diagnostic programs on disk, you must run the system customize utility (01-840) under dedicated DCP.

Example Display: Delete All Entries from the Temporary UDT Buffer

```
                          SYSTEM CONFIGURE

            Delete All Entries from the Temporary UDT Buffer

All entries have been deleted from the temporary UDT buffer.

Note:  Configure all devices.









Enter-Device selection  Cmd3-Primary menu  Cmd7-End
```

If you are configuring a DIAG21 diskette (DIAG41 for Stage 3 systems) for another system, you can delete all UDT entries before configuring the specific devices for that system.

To Delete all Entries from the Temporary UDT

1. Select option 3 (delete all entries from the temporary UDT buffer) from the System Configure Primary menu.

2. When you have deleted all entries from the temporary UDT buffer, the system configure utility generates a basic system entry and a CSP storage entry in the temporary UDT buffer, and displays additional information.

Note: If you attempt to write a temporary UDT (to a DIAG21 or DIAG41 diskette) that does not contain UDT entries for a minimum system, you are prompted to configure the necessary devices.

01-835 (continued)
Updating UDT Entries on Diskette

Example Display: System Configure Menu

```
                              SYSTEM CONFIGURE

Select one of the following:

   1. Machine serial number
   2. MSP storage
   3. Tape/disk/diskette
   4. Work station
   5. System printer
   6. Communications
   7. 1255 magnetic character reader
   8. Local area network
   9. End configure option

Note: RPQs can be selected during the write UDT option
      (System Configure Primary menu, option 5)

Option: _


Cmd3-Back up   Cmd7-End
```

When configuring devices for a system, you can:

- Add one or more devices
- Delete one or more devices
- Change the configuration of one or more devices
- Generate a new system configuration by configuring all devices

To Configure Device Entries in the Temporary UDT

1. Select option 4 (configure a device in the temporary UDT) from the System Configure Primary menu.
2. Select a device.
3. Follow the displayed instructions.
4. Repeat steps 1, 2, and 3 for each UDT entry you want to configure.
5. When you have configured all the necessary UDT entries, select option 5 from the System Configure Primary menu to configure RPQs and (or) write the temporary UDT to a DIAG21 diskette (DIAG41 for Stage 3 systems).

   Note: If you attempt to write a temporary UDT (to a DIAG21 or DIAG41 diskette) that does not contain UDT entries for a minimum system, you are prompted to configure the necessary devices.

Example Display: Configure RPQ

Notes:
1. This menu appears only if more than one RPQ module is found on the RPQ diskette. Then options 1 through n-1 are the RPQ modules.
2. For Stage 3 systems, use the DIAG41 diskette.

```
                          SYSTEM CONFIGURE

                           Configure RPQ

Select one of the following:

   1.
   2.
   3.
   4.
   n. End configure of this diskette

Option: _




Cmd3-Back up   Cmd7-End
```

When you select the option to write the UDT from the temporary UDT buffer to a DIAG21 or DIAG41 diskette, you are also given the option to configure RPQs. If there are no RPQs to configure, the UDT is written to diskette and the configuration operation is done.

Note: If you attempt to write a temporary UDT (to a DIAG21 or DIAG41 diskette) that does not contain UDT entries for a minimum system, you are prompted to configure the necessary devices.

To Configure RPQs

1. Select option 5 (write the temporary UDT to a DIAG21 or DIAG41 diskette) from the System Configure Primary menu.

Do you want to configure RPQs?

Y **N**

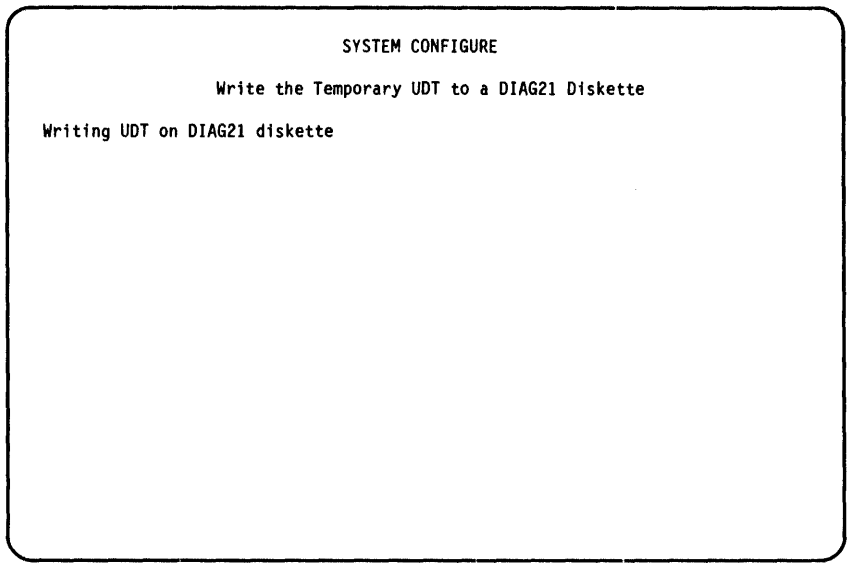
– Use the procedure *to Write the Temporary UDT to Diskette.*

2. Select option 1 (yes) to configure RPQs.
3. Configure each RPQ module on the RPQ diskette (I/O slot 2 for 72MD).
4. When you have configured all RPQ diskettes, the temporary UDT is written to a DIAG21 or DIAG41 diskette.
5. When the temporary UDT has been written to diskette, press the Cmd7 key to end the configuration operation.

01-835 (continued)
Updating UDT Entries on Diskette

Example Display: Write Temporary UDT to a DIAG21 Diskette

Note: For Stage 3 systems, use the DIAG41 diskette.



When you select the option to write the UDT from the temporary UDT buffer to a DIAG21 or DIAG41 diskette, and there are no RPQs to configure, the UDT is written to diskette and the configuration operation is done.

Note: If you attempt to write a temporary UDT (to a DIAG21 or DIAG41 diskette) that does not contain UDT entries for a minimum system, you are prompted to configure the necessary devices.

To Write the Temporary UDT to Diskette

1. Select option 5 (write the temporary UDT to a DIAG21 or DIAG41 diskette) from the System Configure Primary menu.

Do you want to write the UDT to diskette without configuring RPQs?

Y **N**

| – Use the procedure to *Configure RPQs*.

2. Bypass RPQ configuration.

Example Display: System Configure Is Done

Note: For Stage 3 systems, use the DIAG41 diskette.

When the temporary UDT buffer has been written to a DIAG21 or DIAG41 diskette, the following information display appears.

```
                              SYSTEM CONFIGURE

                    Write the Temporary UDT to a DIAG21 Diskette

System configure is done.

Note: You must CSIPL the DIAG21 diskette to load
      the new updated UDT from diskette into storage.

      You should run the wraps from diskette before
      running the customize utility.

      To run the customize utility,
      see the General MIM (01-840).




Cmd7-End
```

Press the Cmd7 key to end the configuration operation.

01-840
Updating UDT Entries and Microcode on Disk

The system customize utility runs under dedicated DCP only.

The system customize utility reads the UDT entries and the microcode from the DIAG21, DIAG22, and DIAG24 diskettes (DIAG41, DIAG42, and DIAG44, respectively, for Stage 3 systems) and writes the UDT entries and the microcode to disk storage. These diskettes are supplied as updates to the existing microcode. The system must be configured (01-835) and the system hardware, software, and microcode must be at compatible levels to ensure correct system operation. Therefore, some test procedures must be performed by the customize utility and by you to ensure compatibility.

To ensure compatibility, the customize utility:

- Displays a list of prerequisites; you ensure that all prerequisites are installed
- Tests the patch table and displays all patches (including free-lance patches) that are on disk but not on diskettes

CAUTION
Customize destroys all patches (including free-lance patches) on disk. If these patches are needed, they must be applied again.

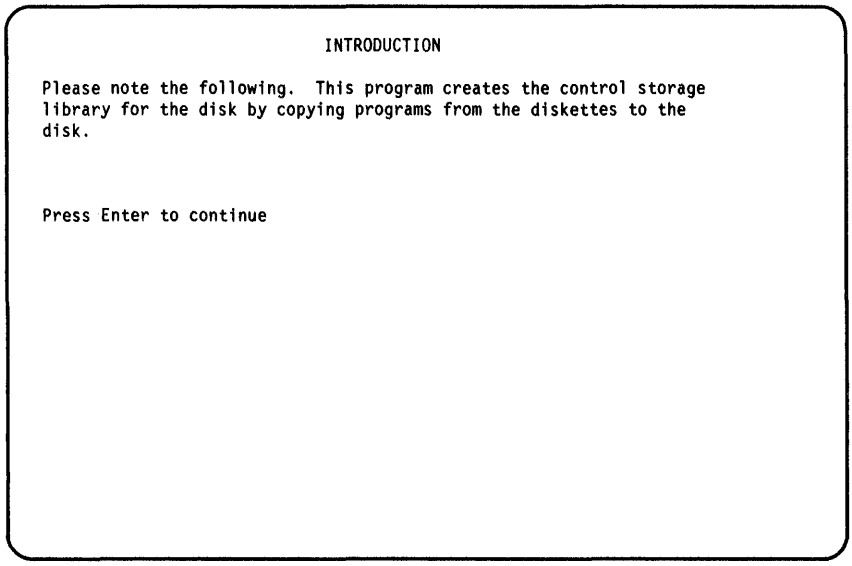
You have the option to end the customize utility if you determine that the utility should not be run at this time. If you end the utility, the system microcode is not changed.

If an initialized disk is being customized, the customize utility generates new error log tables, using the existing system date.

To Update the UDT and Microcode on Disk

1. Insert the DIAG21 diskette (DIAG41 for Stage 3 systems) or the diagnostic magazine.
2. Load dedicated DCP (01-150).
3. Select the Utilities option.
4. Select the system customize option.
5. Follow the displayed instructions.

Example Display: Customize Utility



Associated Procedures

Displaying UDT Entries	01-290
Updating UDT Entries on Diskette	01-835
Verifying UDT Entries on Disk	01-845

Additional Information

Tasks Associated with Diagnostic Utilities	01-185

01-845
Verifying UDT Entries on Disk

This procedure assumes that SSP is loaded and running.

Normally, to display the UDT entries, you will use the system configure utility under concurrent DCP or dedicated DCP (01-290). The system configure utility gives you a summary of useful information about the system and attached I/O devices.

However, it might be necessary to get more information than is displayed or printed, using the configure utility. To do this, you can use the alter/display utility (alter/display disk storage option) to inspect the UDT entries on disk. The UDT entries are located on drive A starting at hex address 00003B.

Example Display: Alter/Display Disk Storage

```
2 - ALTER/DISPLAY DISK STORAGE

REPLY FORMATS: F SSSSSS
               S SSSSSS
               R
               E



ENTER OPTION PARAMETERS -> F 00003B  (A)
```

CAUTION

Do not use the alter/display utility to change the UDT entries on disk. Data that is not correct can cause the system load procedures to fail.

To Display the UDT Entries on Disk

1. Start the alter/display utility (01-210).
2. Select option 2 (alter/display disk storage).
3. Enter the option parameters F 00003B (A) to display the UDT entries.

Example Display: Sector 00003B

```
SSS  00003B(A)

0000   01FFFFFF  FF000421  013A0C8E  08000080     ................
0010   0036A343  40D200C2  E200C400  0066063C     ..T. K.BS.D.....
0020   07300166  00410005  003B00F4  00B00026     ...........4....
0030   00F40000  00000000  00000000  00000000     .4..............
0040   00000000  0000E2E8  E2E3C5D4  40C5D5E3     ......SYSTEM ENT
0050   D9E810FF  FFFFFF00  04210002  0E0800C3     RY.............C
0060   61E240D7  D9D6C3C5  E2E2D6D9  FFFFFF60     /S PROCESSOR ...
0070   FFFF0004  2100040E  00800036  D461E240     .............M/S
0080   D7D9D6C3  C5E2E2D6  D9406180  FFFFFF60     PROCESSOR /....-
0090   06230101  0E3000D4  D3C3C140  C3D6D5E3     .......MLCA CONT
00A0   D9D6D3C5  D961C0FF  FFFF2004  2103020E     ROLER/..........
00B0   10000F10  00E661E2  40C3D6D5  E3D9D6D3     .....W/S CONTROL
00C0   D3C5D9C2  C0C0FF00  34042101  020E00A0     LERB............
00D0   A4E661E2  40C1E3E3  C1C3C8D4  C5D5E365     UW/S ATTACHMENT.
00E0   FFA0FFFF  65052200  010AA2C6  C9D3C540     ..........SFILE
00F0   C4E2C140  40818010  FF01740C  8101060C     DSA A.......A...
```

Use the roll keys to display additional entries in the UDT. Compare your displayed records with the UDT entry tables included later in this procedure.

Press the Print key for printed copies of these displays.

To End the Alter/Display Disk Storage Option from This Display

Enter an E after the disk address (A), or press any attention identification (AID) key except the Roll↑ key, the Roll↓ key, the Enter key, the Cmd1 key, or the Cmd2 key.

Associated Procedures

Displaying UDT Entries	01-290
Updating UDT Entries on Diskette	01-835
Updating UDT Entries and Microcode on Disk	01-840

Additional Information

Tasks Associated with Diagnostic Utilities	01-185

01-845 (continued) Verifying UDT Entries on Disk

Unit Definition Table Descriptions

This section contains the unit definition table (UDT) entries for the system and each device. The following general information pertains to these entries.

- UDT bytes 1 through 5 describe the UDT entry as follows:

Byte	Description
1	Device ID
2	Device address 1 (channel address of controller)
3	Device address 2 (controller port address)
4	Device address 3 (usually DSA port address)
5	Unit address
Note: Bytes 2 through 5 are hex FF if not needed.	

- UDT byte 6, the program support flag, specifies functions for DCP. The program support flag is assigned as follows:

Bit	Description
0	Not used
1	TU select support
2	CSIPL wrap support
3	CSU support
4	Concurrent DCP support
5	MDI support
6	Exerciser support
7	Device has dedicated DCP diagnostics on disk

- UDT byte 7 contains the slot number for a 72MD I/O slot or magazine. For example, hex 01 is I/O slot 1; hex 04 is magazine 1, slot 1.

- UDT byte 8 contains the ID of the diskette containing the diagnostic programs for the device. For example, hex 21 is diagnostic diskette DIAG21. (For Stage 3 systems, use the DIAG41/MDS diskette.)

- UDT bytes 9 through 11 contain the length of the variable-length fields as follows:

Byte	Description
9	Number of customize bytes
10	Number of configure bytes
11	Number of bytes in the name field

- The UDT bytes from byte 12 to the end of the entry contain the variable-length customize, configure, and name fields.

DCP IOB Flags and Parameters

The IOB flags and parameters for DCP are described as follows:

IOB Bytes	Description
1-4	Start address
5-8	Present address
9-12	End address
13	Storage type and sector size
14	Sector count minus 1
15-16	Buffer address
17-24	Program ID
25	Slot number for 72MD magazine
26	Diskette ID

Summary of Device IDs

The device ID is the first byte of each UDT entry. The following table contains a summary of the valid device IDs for System/36.

ID	Device or Unit
01	System entry
10	CSP storage
20	MSP storage
40	1255 magnetic character reader
61	Communications controller
61	Data storage controller
61	Work station controller 1
61	Work station controller 2
65	Data storage adapter 1 (DSA 1)
65	Data storage adapter 3 (DSA3)
65	Data storage adapter 2 (DSA2)
81	Communications: SLCA (feature 2500) or MLCA (feature 4500)
82	Communications: ELCA (feature 4550)
84	Communications: SLCA (feature 2550)
A2	21ED disk storage device
A3	10SR disk storage device
B1	8809 tape drive
B2	6157 tape subsystem
C2	Work station adapter 2
C2	System console
D2	Diskette storage device
E2	3262 printer
EA	Work station printer

01-845 (continued)
Verifying UDT Entries on Disk

System Entry Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			01 FF FF FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			00	Program flag
7			04	Slot number for 72MD magazine
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			01	Number of customize bytes
10			26	Number of configure bytes
11 12	 1		0E 8E	Length of name field Customize byte 1
13		1	xx	Control storage *Hex* *Meaning* 08 32K words 10 64K words (Stage 2 systems)
14		2	xx	Control storage type *Hex* *Meaning* 00 Not ECC 80 ECC
15-16		3-4	xxxx	Main storage size The configured value is equal to the size of the largest main storage card times the number of main storage cards installed. For example, with three cards installed and the largest card being 512K bytes, the configured size should be 1536K bytes (0300). *Hex* *Meaning* 0000 Main storage not configured 0040 128K bytes 0080 256K bytes 00C0 384K bytes 0100 512K bytes 0180 768K bytes 0200 1024K bytes 0300 1536K bytes 0400 2048K bytes 0600 3072K bytes 0800 4096K bytes 0A00 5120K bytes 0C00 6144K bytes 0E00 7168K bytes 1000 8192K bytes

System Entry Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
17		2	xx	Main storage configuration byte *Bits* *Meaning* 0-1 Card size in 01A-A1R2 2-3 Card size in 01A-A1S2 4-5 Card size in 01A-A1T2 6-7 Card size in 01A-A1U2 *Card Size* 00 = No card 01 = 128K card (not Stage 3) 01 = 1024K card (Stage 3) 10 = 256K card (not Stage 3) 10 = 2048K card (Stage 3) 11 = 512K card (not Stage 3) 11 = Not used (Stage 3)
18		6	xx	Largest storage card size and type-storage interface register data (see also *MSP Storage Description, Byte 15.* *Bits* *Card Size and Refresh Rate* 0 0 = Not Stage 3 1 = Stage 3 1-2 01 = 128K (not Stage 3) 01 = 1024K (Stage 3) 10 = 256K (not Stage 3) 10 = 2048K (Stage 3) 11 = 512K (not Stage 3) 11 = Not used (Stage 3) 3-7 16 = Refresh rate
19		7	xx	Disk device ID *Hex* *Meaning* A2 21ED disk storage device A3 10SR disk storage device
20		8	xx	Disk storage size *Hex* *Meaning* 11 358 megabytes 13 716 megabytes 17 1074 megabytes 1F 1432 megabytes 41 200 megabytes 43 400 megabytes 47 600 megabytes 4F 800 megabytes 57 758 megabytes 5F 1116 megabytes 82 30 megabytes 86 60 megabytes

01-845 (continued)
Verifying UDT Entries on Disk

System Entry Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
21		9	xx	Diskette drive type *Hex* *Meaning* 20 72MD diskette magazine drive 40 51TD diskette drive
22		10	D2	Diskette drive ID
23-24		11-12	C200	System console work station ID
25-26		13-14	xxxx	System printer ID *Hex* *Meaning* E200 3262 printer EAxx Work station printer (xx = unit address)
27		15	xx	System flag for DCP and programs *Bit* *Meaning (If Bit Is Active)* 0 System configured 1 CSIPL device is disk 2 Reserved for CSP use 3 System printer is configured 4 Alternative printer is configured 5 IPL diskette is a diskette 2D 6 Reserved for MSIPL flag 7 Not used
28		16	00	5360 system unit
29-30		17-18	xxxx	Sequential sector of SSP IPL module
31-32		19-20	xxxx	Sector address of MSP IPL module
33-34		21-22	xxxx	Sector address of DCP control storage code
35-36		23-24	xxxx	Sector address of DCP main storage code
37-38		25-26	0041	Sequential sector of control storage library directory on disk
39-40		27-28	xxxx	Number of sectors in control storage library directory
41-42		29-30	003B	Sequential sector address of UDT on disk
43-44		31-32	xxxx	Number of sectors for SSP IPL load
45-46		33-34	xxxx	Number of sectors for DCP control storage load
47-48		35-36	xxxx	Number of sectors for DCP main storage load
49-50		37-38	xxxx	Number of sectors for MSP IPL load
51-64			xx-xx	S/36 SN/xxxxxx (EBCDIC name field)

Note: The customize utility updates the necessary information in bytes 27 through 50 when the UDT is moved to the control storage library on disk. A diskette that is not configured contains only the system entry.

CSP Storage Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			10 FF 00 FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			00	Program flag
7			04	Slot number for 72MD (magazine 1, slot 1)
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			00	Number of customize bytes
10			02	Number of configure bytes
11			0B	Length of name field
12		1	xx	Control storage *Hex* *Meaning* 08 32K words 10 64K words (Stage 2 systems)
13		2	xx	Control storage type *Hex* *Meaning* 00 Not ECC 80 ECC
14-24			xx-xx	CSP STORAGE (EBCDIC name field)

01-845
Verifying UDT Entries on Disk

MSP Storage Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			20 FF FF FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			00	Program flag
7			04	Slot number for 72MD (magazine 1, slot 1)
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			00	Number of customize bytes
10			04	Number of configure bytes
11			0B	Length of name field
12-13		1-2	xxxx	Main storage size The configured value is equal to the size of the largest main storage card times the number of main storage cards installed. For example, with three cards installed and the largest card being 512K bytes, the configured size should be 1536K bytes (0300). *Hex* *Meaning* 0000 Main storage not configured 0040 128K bytes 0080 256K bytes 00C0 384K bytes 0100 512K bytes 0180 768K bytes 0200 1 megabyte 0300 1536K bytes 0400 2048K bytes 0600 3072K bytes 0800 4096K bytes 0A00 5120K bytes 0C00 6144K bytes 0E00 7168K bytes 1000 8192K bytes

MSP Storage Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
14		3	xx	Main storage configuration byte *Bits* *Meaning* 0-1 Card size in 01A-A1R2 2-3 Card size in 01A-A1S2 4-5 Card size in 01A-A1T2 6-7 Card size in 01A-A1U2 *Card Size* 00 = No card 01 = 128K card (not Stage 3) 01 = 1024K card (Stage 3) 10 = 256K card (not Stage 3) 10 = 2048K card (Stage 3) 11 = 512K card (not Stage 3) 11 = Not used (Stage 3)
15		4	xx	Largest storage card size and type data (see also *System Entry Description*, Byte 18) *Bits* *Card Size and Refresh Rate* 0 0 = Not Stage 3 1 = Stage 3 1-2 01 = 128K (not Stage 3) 01 = 1024K (Stage 3) 10 = 256K (not Stage 3) 10 = 2048K (Stage 3) 11 = 512K (not Stage 3) 11 = Not used (Stage 3) 3-7 16 = Refresh rate
16-24			xx-xx	MSP STORAGE (EBCDIC name field)

01-845 (continued)
Verifying UDT Entries on Disk

Communications Controller Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			61	Device ID
			xx	Device address 1 *Hex* *Meaning* 40 ELCA feature 4550 80 MLCA feature 4500
			FF	Device address 2
			FF	Device address 3
			FF	Unit address
6			xx	Program flag *Hex* *Meaning* 60 ELCA feature 4550 60 MLCA feature 4500
7			06	Slot number for 72MD (magazine 1, slot 3)
8			23	Diagnostic diskette DIAG23 (DIAG43 for Stage 3)
9			00	Number of customize bytes
10			02	Number of configure bytes
11			0F	Length of name field
12		1	xx	Controller storage size *Hex* *Meaning* 04 16K words 08 32K words (expansion feature) 10 64K words (ELCA feature 4550)
13		2	xx	MLCA/ELCA line number *Bit* *Meaning (If Bit Is Active)* 0 Line 1 1 Line 2 2 Line 3 3 Line 4 4 Line 5 (ELCA feature 4550) 5 Line 6 (ELCA feature 4550) 6 Line 7 (ELCA feature 4550) 7 Line 8 (E:CA feature 4550)
14-28			xx-xx	ELCA or (MLCA) CONTROLLER (EBCDIC name field)

Data Storage Controller Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			61 A0 FF FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			61	Program flag
7			05	Slot number for 72MD (magazine 1, slot 2)
8			22	Diagnostic diskette DIAG22 (DIAG42 for Stage 3)
9			04	Number of customize bytes
10			01	Number of configure bytes
11			0E	Length of name field
12	1		60	Customize byte 1
13	2		61	Customize byte 2
14	3		64	Customize byte 3
15	4		77	Customize byte 4
16		1	40	Data storage controller size (64K words)
17-30			xx-xx	DATA STG CNTLR (EBCDIC name field)

01-845 (continued)
Verifying UDT Entries on Disk

Work Station Controller 1 Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			61 C0 FF FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			20	Program flag
7			04	Slot number for 72MD (magazine 1, slot 1)
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			0A	Number of customize bytes
10			02	Number of configure bytes
11			0C	Length of name field
12	1		0F	Customize byte 1
13	2		xx	Languages *Hex* *Meaning* 10 United States 11 Swiss (French) 12 Austria/Germany 13 Belgium 14 Swiss (German) 15 Canadian French 16 Denmark 17 Finland 18 International (RPQ) 19 France (QWERTY) 1A France (AZERTY) 1B Italy 1C Norway 1D Portugal 1E Spain 1F Spanish-speaking 20 Sweden 21 United Kingdom 22 Japan (Katakana) or Japanese (Kanji) 23 Japan (English) **Note:** High-order bit set on (active) for multinational except Katakana.

01-845/845 Work Station Controller Description

Work Station Controller 1 Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
14	3		xx	Overstrike (expansion feature only) *Hex* *Meaning* 00 No A2 Yes (default)
15	4		xx	Japanese Kanji or text *Hex* *Meaning* 00 No expansion A4 Japanese Kanji A8 Text (default)
16	5		xx	3270 emulation (expansion feature only) *Hex* *Meaning* 00 No A6 Yes (default)
17	6		xx	Magnetic stripe reader (expansion feature only) *Hex* *Meaning* 00 No A7 Yes (default)
18	7		xx	Katakana (expansion feature only) or cursive Arabic function (RPQ) *Hex* *Meaning* 00 No expansion feature or expansion feature and not Katakana (default) 0C Cursive Arabic function (RPQ)
19	8		09	Customize byte 8
20	9		00	Customize byte 9
21	10		xx	Work station controller 2 *Hex* *Meaning* 00 Not installed A5 Installed
22		1	xx	Expansion feature *Bit* *Meaning (If Bit Is Active)* 0 No expansion feature 1 Expansion feature installed 2 Work station controller 2 installed 3-6 Not used 7 Extended field
23		2	00	Not used
24-25			xx-xx	WRKSTN CNTLR (EBCDIC name field)

01-845 (continued)
Verifying UDT Entries on Disk

System Console Description (Work Station Adapter 1) continued

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			C2 C0 C0 FF 00	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			30	Program flag
7			04	Slot number for 72MD (magazine 1, slot 1)
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			00	Number of customize bytes
10			02	Number of configure bytes
11			0E	Length of name field
12		1	xx	Documentation group (display language code) *Hex* *Meaning* 09 Netherlands 10 United States 12 Austria/Germany 13 Belgium/French 14 Belgium/Dutch 15 Canada (Canadian French) 16 Denmark 17 Finland 19 France 1B Italy 1C Norway 1D Portugal 1E Spain 1F Spanish-speaking 20 Sweden 21 United Kingdom 22 Japan (Japanese) 23 Japan (English)
13		2	xx	System console description *Bit* *Meaning (If Bit Is Active)* 0 Ideographic display 1 Ideographic keyboard 2-7 Not used

System Console Description (Work Station Adapter 1) continued

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
15-29			xx-xx	SYSTEM CONSOLE (EBCDIC name field)

Work Station Controller 2 Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			61 90 FF FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			20	Program flag
7			04	Slot number for 72MD (magazine 1, slot 1)
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			01	Number of customize bytes
10			01	Number of configure bytes
11			0E	Length of name field
12			1 00	Customize byte 1
13			xx	Configure byte 1 *Hex* *Meaning* 20 Work station controller 2 installed 40 Work station controller 1 expansion feature installed

01-845 (continued)
Verifying UDT Entries on Disk

Work Station Adapter 2 Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			C2 90 C0 FF 00	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			24	Program flag
7			04	Slot number for 72MD (magazine 1, slot 1)
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			00	Number of customize bytes
10			02	Number of configure bytes
11			0D	Length of name field
12		1	00	Configure byte 1
31		2	00	Configure byte 2

Data Storage Adapter 1 Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			65	Device ID
			xx	Device address 1 *Hex* *Meaning* A0 Data storage controller installed FF No data storage controller installed
			A0	Device address 2
			FF	Device address 3
			FF	Unit address
6			61	Program flag
7			05	Slot number for 72MD (magazine 1, slot 2)
8			22	Diagnostic diskette DIAG22 (DIAG42 for Stage 3)
9			00	Number of customize bytes
10			00	Number of configure bytes
11			0F	Length of name field
12-26			xx-xx	DISK/DSKT DSA 1 (EBCDIC name field)

Data Storage Adapter 2 Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			65	Device ID
			A0	Device address 1
			B0	Device address 2
			FF	Device address 3
			FF	Unit address
6			60	Program flag
7			05	Slot number for 72MD (magazine 1, slot 2)
8			22	Diagnostic diskette DIAG22 (DIAG42 for Stage 3)
9			00	Number of customize bytes
10			00	Number of configure bytes
11			0A	Length of name field
12-21			xx-xx	7709 DSA 2 (EBCDIC name field)

01-845 (continued)
Verifying UDT Entries on Disk

Data Storage Adapter 3 Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			65	Device ID
			B0	Device address 1
			B0	Device address 2
			FF	Device address 1
			FF	Unit address
6			70	Program flag
7			05	Slot number for 72MD (magazine 1, slot 2)
8			22	Diagnostic diskette DIAG22 (DIAG42 for Stage 3)
9			00	Number of customize bytes
10			00	Number on configure bytes
11			0A	Length of name field
12-21			xx-xx	6157 DSA 3 (EBCDIC name field)

Work Station Printer Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			EA C0 C0 FF xx	Device ID Device address 1 Device address 2 Device address 3 Unit address Valid addresses are: 01-06 (port 0, address 1-6) 10-16 (port 1, address 0-6) 20-26 (port 2, address 0-6) 30-36 (port 3, address 0-6) 40-46 (port 4, address 0-6) 50-56 (port 5, address 0-6) 60-66 (port 6, address 0-6) 70-76 (port 7, address 0-6) 80-86 (port 8, address 0-6) 90-96 (port 9, address 0-6) A0-A6 (port 10, address 0-6) B0-B6 (port 11, address 0-6)
6			00	Program flag
7			04	Slot number for 72MD (magazine 1, slot 1)
8			21	Diagnostic diskette DIAG21 (DIAG41 for Stage 3)
9			01	Number of customize bytes
10			03	Number of configure bytes
11			0E	Length of name field
12	1		4A	DCP work station I/O
13		1	00	Not used
14		2	xx	Printer type and speed *Bit* *Meaning (If Bit Is Active)* 0 System printer 1-7 Not used
15		3	00	Not used
16-29			xx-xx	WRKSTN PRINTER (EBCDIC name field)

01-845 (continued)
Verifying UDT Entries on Disk

3262 Printer Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			E2 E0 E0 FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			7E	Program flag
7			06	Slot number for 72MD (magazine 1, slot 3)
8			23	Diagnostic diskette DIAG23 (DIAG43 for Stage 3)
9			03	Number of customize bytes
10			03	Number of configure bytes
11			0C	Length of name field
12	1		49	Customize byte 1
13	2		xx	Customize byte 2 *Hex* *Meaning*
14	3		xx	Customize byte 3 *Hex* *Meaning* 00 Work station controller 2 not installed 4B Work station controller 2 installed
15		1	xx	3262 belt description *Bit* *Meaning (If Bit Is Active)* 0 96-character Katakana 1 128-character Katakana 2 52-character Austrian/German 3 188-character multinational (belt 188) 4 48-character standard (belt 48) 5 64-character standard (belt 64B) 6 96-character standard (belt 96) 7 64-character optimized (belt 64C)

3262 Printer Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
16		2	xx	Printer type and speed *Bit* *Meaning (If Bit Is Active)* 0 System printer 1 Alternative printer 2 Not used 3 650 lines per minute 4-7 Not used
17		3	00	Not used
18-29			xx-xx	3262 PRINTER (EBCDIC name field)

01-845 (continued)
Verifying UDT Entries on Disk

Disk Storage Device Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			xx	Device ID (A2 = 21ED; A3 = 10SR)
			xx	Device address 1 *Hex* *Meaning* A0 Data storage controller installed FF No data storage controller installed
			A0	Device address 2
			xx	Device address 3 *Hex* *Meaning* 01 Drive 1 02 Drive 2 03 Drive 3 (10SR only) 04 Drive 4 (10SR only)
			01	Unit address
6			66	Program flag
7			05	Slot number for 72MD (magazine 1, slot 2)
8			22	Diagnostic diskette DIAG22 (DIAG42 for Stage 3)
9			02	Number of customize bytes
10			04	Number of configure bytes
11			0B	Length of name field
12	1		xx	Device type *Hex* *Meaning* 40 10SR 41 21ED
13	2		xx	Device type with data storage controller *Hex* *Meaning* 00 No data storage controller 62 21ED with data storage controller 63 10SR with data storage controller
14	3		xx	*Hex* *Meaning* 00 21ED or 10SR (Model 1 only) 71 10SR (Model 2 only) 72 10SR (both models on system)
15	4		xx	*Hex* *Meaning* 00 21ED or 10SR (Model 1) and file controller 74 10SR (Model 2) and file controller 75 10SR with both models on system and a file controller

Disk Storage Device Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
16		1	xx	Total disk storage size *Hex* — *Meaning* 11 — 358 megabytes 13 — 716 megabytes 17 — 1074 megabytes 1F — 1432 megabytes 41 — 200 megabytes 43 — 400 megabytes 47 — 600 megabytes 4F — 800 megabytes 57 — 758 megabytes 5F — 1116 megabytes 82 — 30 megabytes 86 — 60 megabytes
17-18		2-3	xxxx	CE cylinder ID *Hex* — *Meaning* 01BC — 21ED (30-megabyte drive) 023A — 10SR Model 1 (200-megabyte drive) 03FE — 10SR Model 2 (358-megabyte drive)
19		4	xx	Flag for MAPs *Hex* — *Meaning* A1 — First 21ED adapter on A1 board (without data storage controller) A2 — 10SR adapters on A2 board (with or without data storage controller) or first 21ED adapter on A2 board (with data storage controller) A3 — Second 21ED adapter on A1 board (without data storage controller) A4 — Second 21ED adapter on A2 board (with data storage controller)
20-30			xx-xx	21ED or 10SR DISK A, B, C, or D (EBCDIC name field)
Note: There is a separate UDT entry for each disk drive installed.				

01-845 (continued)
Verifying UDT Entries on Disk

6157 Tape Storage Device Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			B2 B0 B0 02 70	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			30	Program flag
7			04	Slot number for 72MD (magazine 1, slot 2)
8			21	Diagnostic diskette DIAG21
9			01	Number of customize bytes
10			00	Number of configure bytes
11			09	Length of name field
12-20	1		78	6157 Tape (EBCDIC name field)
Note: There is a separate UDT entry for each tape drive installed.				

8809 Tape Storage Device Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			B1 A0 B0 05 xx	Device ID Device address 1 Device address 2 Device address 3 Unit address *Hex* *Meaning* 00 Tape drive 1 01 Tape drive 2
6			xx	Program flag *Hex* *Meaning* 7E Tape drive 1 0A Tape drive 2
7			05	Slot number for 72MD (magazine 1, slot 2)
8			22	Diagnostic diskette DIAG22 (DIAG42 for Stage 3)
9			00	Number of customize bytes
10			01	Number of configure bytes
11			0B	Length of name field
12		1	B2	Last configure byte for MDI MAPs
13-23			xx-xx	8809 TAPE 1 or 2 (EBCDIC name field)
Note: There is a separate UDT entry for each tape drive installed.				

01-845 (continued)
Verifying UDT Entries on Disk

Diskette Storage Device Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			D2	Device ID
			xx	Device address 1 *Hex* *Meaning* A0 Data storage controller installed FF No data storage controller installed
			A0	Device address 2
			06	Device address 3
			01	Unit address
6			6F	Program flag
7			05	Slot number for 72MD (magazine 1, slot 2)
8			22	Diagnostic diskette DIAG22 (DIAG42 for Stage 3)
9			02	Number of customize bytes
10			02	Number of configure bytes
11			0D	Length of name field
12	1		xx	Diskette drive type (customize) *Hex* *Meaning* 50 72MD diskette magazine drive 51 51TD diskette drive
13	2		xx	Diskette with tape attachment *Hex* *Meaning* 00 No data storage controller installed 65 72MD with data storage controller installed 66 51TD with data storage controller installed
14		1	xx	Diskette drive type (configure) *Hex* *Meaning* 20 72MD diskette magazine drive 40 51TD diskette drive
15		2	xx	Flag for MAPs *Hex* *Meaning* A1 Diskette adapter on A1 board (21ED disk without data storage controller) A2 Diskette adapter on A2 board (10SR disk with or without data storage controller, or 21ED disk with data storage controller)
16-28			xx-xx	51TD or 72MD DISKETTE (EBCDIC name field)

01-845/845 8809 Diskette Storage Device Description

1255 Magnetic Character Reader Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			40 50 50 FF FF	Device ID Device address 1 Device address 2 Device address 3 Unit address
6			66	Program flag
7			06	Slot number for 72MD (magazine 1, slot 3)
8			23	Diagnostic diskette DIAG23 (DIAG43 for Stage 3)
9			01	Number of customize bytes
10			01	Number of configure bytes
11			08	Length of name field
12	1		5A	Customize byte
13		1	xx	Configuration byte 1 *Bit* *Meaning* 0=0 6K 1255 controller storage 0=1 34K 1255 controller storage 1-2 Not used 3=1 12 pocket sort (bit 5=0) 4=1 Dash symbol transmit on 5=0 6 pocket standard sort 5=1 6 pocket alternate sort 6-7 Not used

01-845 (continued)
Verifying UDT Entries on Disk

SLCA Feature (2500) and MLCA Lines Feature (4500) Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			81	Device ID (SLCA feature 2500 or MLCA feature 4500)
			xx	Device address 1 *Hex* *Meaning* 80 MLCA (feature 4500 FF SLCA (feature 2500)
			xx	Device address 2 *Hex* *Meaning* 10 MLCA line 1 20 MLCA line 2 40 MLCA line 3 80 MLCA line 4 80 SLCA
			FF	Device address 3 (MLCA and SLCA)
			xx	Unit address *Hex* *Meaning* 00 SLCA 01 MLCA line 1 02 MLCA line 2 03 MLCA line 3 04 MLCA line 4
6			74	Program flag
7			06	Slot number for 72MD (magazine 1, slot 3)
8			23	Diagnostic diskette DIAG23 (DIAG43 for Stage 3)
9			01	Number of customize bytes
10			05	Number of configure bytes
11			0B	Length of name field
12	1		xx	Customize byte 1 *Hex* *Meaning* 30 MLCA 31 SLCA

SLCA Feature (2500) and MLCA Lines Feature (4500) Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
13		1	xx	Configuration byte 1 *Bit* — *Meaning (If Bit Is Active)* 0 — Self-test cable needed (Japan) 1 — IBM modem with wrap feature 2 — Answer tone (World Trade only) 3 — Switched network backup–standby (see note) 4 — Nonswitched multipoint control 5 — Nonswitched multipoint tributary 6 — Switched line 7 — Point-to-point nonswitched
14		2	xx	Configuration byte 2 *Bit* — *Meaning (If Bit Is Active)* 0 — Internal clock 1 — Not used 2 — SEP trap (autocall only) (see note) 3 — EON trap (autocall only) (see note) 4 — NRZI (SDLC only) 5 — Half-rate select (see note) 6 — Continuous carrier 7 — X.25
15		3	xx	Configuration byte 3 *Hex* — *Meaning* 12 — IBM 1200-bps integrated modem 21 — X.21 35 — V.35 56 — DDSA (56K bps) AC — Autocall DD — DDSA (9600 bps or less) EC — External modem (EIA/CCITT interface)

Note: These bits are set on or set off by a utility or a main storage task. These bits can be on or off when the UDT entries are displayed.

01-845 (continued)
Verifying UDT Entries on Disk

SLCA Feature (2500) and MLCA Lines Feature (4500) Description (continued)

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
16		4	xx	Configuration byte 4 *Bit* — *Meaning (If Bit Is Active)* 0 — Modem supports LPDA commands 1 — Not used 2 — World Trade 3 — Not used 4 — Not used 5-7 — See below *5-7* — *Meaning* 000 — No autocall installed 001 — Associated communications line on line 1 (valid if autocall is installed on line 2) 010 — Autocall is installed on line 2 (valid if EIA/CCITT interface is installed) 011 — Autocall communications line on line 3 (valid if autocall is installed on line 4) 100 — Autocall is instaled on line 4 (valid if EIA/CCITT interface is installed)
				Valid if EIA/CCITT interface is installed on this line *Hex* — *Meaning* 02 — Autocall is installed on line 2 04 — Autocall is installed on line 4
				Valid if autocall is installed on this line *Hex* — *Meaning* 01 — Associated communications line on line 1 03 — Associated communications line on line 3
17		5	15	Configuration byte 5 *Bits* — *Meaning* 0-3 — SDLC retry count (1x is default) 4-7 — Time-out value (x5 is default)
18-37			xx-xx	MLCA line 1, 2, 3, or 4, or SLCA (EBCDIC name field)

ELCA Feature Description

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
1-5			xx	Device ID *ID* *Meaning* 82 (ELCA feature 4550) 84 (SLCA feature 2550)
			xx	Device address 1 *ID* *Meaning* 40 (ELCA feature 4550) FF (SLCA feature 2550)
			xx	Device address 2 *Hex* *Meaning* 40 Line 1 (ELCA and SLCA) 50 Line 2 (ELCA only) 60 Line 3 (ELCA only) 70 Line 4 (ELCA only) 80 Line 5 (ELCA only) 90 Line 6 (ELCA only) A0 Line 7 (ELCA only) B0 Line 8 (ELCA only)
			xx	Device address 3 *Hex* *Meaning* 01 EIA/CCITT adapter 02 DDSA adapter 03 X.21 adapter 04 V.35 adapter
			xx	Unit address *Hex* *Meaning* 00 Line 1 (SLCA) 01 Line 1 (ELCA) 02 Line 2 (ELCA) 03 Line 3 (ELCA) 04 Line 4 (ELCA) 05 Line 5 (ELCA) 06 Line 6 (ELCA) 07 Line 7 (ELCA) 08 Line 8 (ELCA)
6			30	Program flag
7			06	Slot number for 72MD (magazine 1, slot 3)
8			23	Diagnostic diskette DIAG23 (DIAG43 for Stage 3)
9			01	Number of customize bytes
10			05	Number of configure bytes
11			0B	Length of name field

01-845 (continued)
Verifying UDT Entries on Disk

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
12	1		xx	Customize byte *Hex* *Meaning* 68 (ELCA feature 4550) 69 (SLCA feature 2550)
13		1	xx	C b 1 *Bit* *Meaning (If Bit Is Active)* 0 Self-test cable needed (Japan) 1 IBM modem with wrap feature 2 Answer tone (World Trade only) 3 Switched network backup–standby (see note) 4 Nonswitched multipoint control 5 Nonswitched multipoint tributary 6 Switched line 7 Point-to-point nonswitched
14		2	xx	Configuration byte 2 *Bit* *Meaning (If Bit Is Active)* 0 Internal clock 1 ELCA feature 4550 installed or SLCA feature 2550 2 SEP trap (autocall only) (see note) 3 EON trap (autocall only) (see note) 4 NRZI (SDLC only) 5 Half-rate select (see note) 6 Continuous carrier 7 X.25 (see note)
15		3	xx	Configuration byte 3 *Hex* *Meaning* 21 X.21 35 V.35 D1 DDSA (2400 bps) D2 DDSA (4800 bps) D4 DDSA (9600 bps) D8 DDSA (56K bps) EC External modem (EIA/CCITT interface)

Note: These bits are set on or off by a utility or a main storage task. These bits can be on or off when the UDT entries are displayed.

Entry Byte	Customize Byte	Configure Byte	Value (Hex)	Description
16		4	xx	Configuration byte 4 *Bit* — *Meaning (If Bit Is Active)* 0 — Modem supports LPDA commands (IBM 386x modems) 1 — X.21 short-hold mode (see note) 2 — World Trade 3 — Not used 4 — Not used 5-7 *Hex* — *Meaning* 000 — No autocall installed 001 — Autocall is installed on line 1 011 — Autocall is installed on line 3 101 — Autocall is installed on line 5 111 — Autocall is installed on line 7
17		5	15	Configuration byte 5 *Bits* — *Meaning* 0-3 — SDLC retry count (1x is default) 4-7 — Time-out value (x5 is default)
18-37			xx-xx	ELCA line 1, 2, 3, 4, 5, 6, 7, 8, or SLCA (EBCDIC name field)

Note: This bit is set on or off by a utility or a main storage task. This bit can be on or off when the UDT entries are displayed.

01-850
Patching Data on Diskette

This procedure assumes that SSP is running.

The patch utility lets you display and patch diskette storage. When password security is active, the patch utility can be run from any work station with service aid authorization; without password security, the patch utility can be run only from the system console or the selected system service device. The patch utility does not install controlled patches (01-830) or update the patch table.

Example Display: S/36 Patch Diskette Utility

```
                    S/36 PATCH DISKETTE UTILITY                    W2

Select diskette sector(s).

Reply formats:  SSSSSS  S          Diskette sequential sector address
                CCHHSS  C          Diskette cylinder head record address
                SSSSSS  L          Diskette label sector address
                        E          Exit option
                 020001 C    (A)   Hex (hex,dec)




Cmd7-End
```

CAUTION

The patch utility lets you patch some critical areas. Ensure that the patch data is correct.

_____

_____

_____

_____

o Patch Data on Diskette

1. To load and run the utility that patches data on disk or diskette storage, use the Main Help menu (01-165), or key in HELP PATCH I1.

2. Key in I1 on the patch procedure prompt.

The patch utility prompts you for the diskette sector address. Enter the option parameter (A), using one of the displayed reply formats.

The first part of the selected sector is displayed with the sector address. Use the Roll↑ key and the Roll↓ key to display other parts of the sector data. Use the Cmd1 key to display the next sector, or the Cmd2 key to display the previous sector.

You can also display other areas of the diskette by changing the sector address (S), the label sector address (L), or the cylinder head record address (C).

Example Display: Diskette Data

```
                    S/36 PATCH DISKETTE UTILITY                          W2

SS@= 000001F   CHR= 020001   Hexadecimal
    ADDR    00        04        08        0C
    0000    00000000  00000000  00000000  00000000   *0000000000000000*
    0010    00000000  00000000  00000000  00000000   *0000000000000000*
    0020    00000000  00000000  00000000  00000000   *0000000000000000*
    0030    00000000  00000000  00000000  00000000   *0000000000000000*
    0040    00000000  00000000  00000000  00000000   *0000000000000000*
    0050    00000000  00000000  00000000  00000000   *0000000000000000*
    0060    00000000  00000000  00000000  00000000   *0000000000000000*
    0070    00000000  00000000  00000000  00000000   *0000000000000000*
    0080    00000000  00000000  00000000  00000000   *0000000000000000*
    0090    00000000  00000000  00000000  00000000   *0000000000000000*
    00A0    00000000  00000000  00000000  00000000   *0000000000000000*
    00B0    00000000  00000000  00000000  00000000   *0000000000000000*
    00C0    00000000  00000000  00000000  00000000   *0000000000000000*
    00D0    00000000  00000000  00000000  00000000   *0000000000000000*
    00E0    00000000  00000000  00000000  00000000   *0000000000000000*
    00F0    00000000  00000000  00000000  00000000   *0000000000000000*

Cmd1-Next sector   Cmd2-Previous sector   Cmd7-End   Roll keys-Page sector
```

To change part of the diskette sector (SS@=), enter the new data and add the character P after the sector address (SSSSSSP). The patch utility can change any sector except alternative sectors.

01-852
Patching Data on Disk

This procedure assumes that SSP is running.

The patch utility lets you display and patch disk storage. When password security is active, the patch utility can be run from any work station with service aid authorization; without password security, the patch utility can be run only from the system console or the selected system service device.

Example Display: S/36 Patch Disk Utility

```
                        S/36 PATCH DISK UTILITY                          W2

Select disk sector(s).

Reply formats:  SSSSSSS  S          Disk sequential sector address
                         E          Exit option
                002FFFF  S  (A)    Hex (hex,dec)









Cmd7-End
```

CAUTION

The patch utility lets you patch some critical system data areas. Ensure that the patch data is correct.

To Patch Data on Disk

1. To load and run the utility that patches data on disk storage, use the Main Help menu (01-165), or key in HELP PATCH F1.

2. Key in F1 on the patch procedure prompt.

The patch utility prompts you for the disk sector address. Enter the option parameter (A), using one of the displayed reply formats.

The first part of the selected sector is displayed with the sector address. Use the Roll↑ key and the Roll↓ key to display other parts of the sector data. Use the Cmd1 key to display the next sector, or the Cmd2 key to display the previous sector.

You can also display other areas of the disk by changing the sector address.

Example Display: Disk Data

```
                    S/36 PATCH DISK UTILITY                          W2

SS@= 002FFFF P
    ADDR    00        04        08        0C
    0000    00000000  00000000  00000000  00000000   *................*
    0010    00000000  00000000  00000000  00000000   *................*
    0020    00000000  00000000  00000000  00000000   *................*
    0030    00000000  00000000  00000000  00000000   *................*
    0040    00000000  00000000  00000000  00000000   *................*
    0050    00000000  00000000  00000000  00000000   *................*
    0060    00000000  00000000  00000000  00000000   *................*
    0070    00000000  00000000  00000000  00000000   *................*
    0080    00000000  00000000  00000000  00000000   *................*
    0090    00000000  00000000  00000000  00000000   *................*
    00A0    00000000  00000000  00000000  00000000   *................*
    00B0    00000000  00000000  00000000  00000000   *................*
    00C0    00000000  00000000  00000000  00000000   *................*
    00D0    00000000  00000000  00000000  00000000   *................*
    00E0    00000000  00000000  00000000  00000000   *................*
    00F0    00000000  00000000  00000000  00000000   *................*

Cmd1-Next sector   Cmd2-Previous sector   Cmd7-End
```

To change part of the disk sector (SS@=), enter the new data and add the character P after the sector address in the second input field (SSSSSSS P). The patch utility can change any sector starting with the first sector following the control storage library up to but not including the CE cylinder. Also, the alternative sectors cannot be patched, using this utility.

01-855
Installing Program Temporary Fixes

When errors are found in the system support program (SSP) or in a program product (PP), they are usually repaired by installing new modules or program temporary fixes (PTFs) from a release update diskette, using the PTF procedure. Notices of IBM-supplied PTFs are available on the RETAIN system.

Sometimes, because of critical errors, a field-developed PTF must be installed until a normal IBM-supplied PTF is available. This procedure also lets you make changes to any library module: object, subroutine, source, or procedure.

To Install PTFs

To install, copy, remove, or list PTFs, use the Main Help menu (01-165), or key in HELP PTF, or use the procedures described in the manual *Program Problem Diagnosis and Diagnostic Aids*.

Summary of PTF Parameters

You can perform tasks associated with PTFs, using the PTF procedure and the following parameters:

- COPY: Copy PTFs to a work file on disk
- APPLY: Install PTFs from a work file to specified libraries
- REMOVE: Remove a PTF from a specified library
- DIRECT: Install PTFs directly from an IBM-supplied PTF diskette to specified libraries
- SAVE: Save a library on diskette
- RESTORE: Restore a library from diskette
- DELETE: Delete the PTF backup library
- LIST: List the PTFs installed to a library
- PATCH: Install a field-developed patch to a PTF library member on disk

Note: PTF DIRECT and PTF APPLY to #LIBRARY can be started only from the system console; customer jobs must not be running.

Associated Procedures

Displaying System Records	01-285
Patching Diagnostic Programs	01-830
Patching Data on Diskette	01-850
Patching Data on Disk	01-852
Installing Microprogram Temporary Fixes	01-858

01-858
Installing Microprogram Temporary Fixes

When errors are found in the system microcode, they are usually repaired by installing MPTFs (microcode program temporary fixes) from a release update diskette, using the PTF procedure. MPTFs are word patches to the control storage library, not complete modules. Notices of IBM-supplied MPTFs are available on the RETAIN system.

Generally, MPTFs are installed as follows:

- Copy the MPTFs to a standard library (default is CSPTFLIB), using the PTF procedure
- Load the system to automatically install the MPTFs to the microcode modules on disk
- Load the system again to ensure that any resident microcode routines that are patched are loaded again to control storage.

To Copy, Install, or Remove MPTFs

If it is necessary for you to copy, install, or remove MPTFs, use the procedures described in the manual *Program Problem Diagnosis and Diagnostic Aids*.

Summary of MPTF Parameters

You can perform tasks associated with MPTFs, using the PTF procedure and the following parameters:

- MCOPY: Copy the MPTFs from diskette to a microcode PTF library (default is CSPTFLIB) on disk
- MAPPLY: Install all MPTFs or a specified MPTF to the control storage library from the microcode PTF library
- MREMOVE: Remove a specified MPTF from the control storage library

Note: The system must be loaded again after running PTF MAPPLY and PTF MREMOVE to ensure that any resident microcode routines that are patched are loaded again to control storage.

Associated Procedures

01-860
Collecting APAR Data

The authorized program analysis report utility (APAR) collects and copies, to one or more diskettes/tapes, data that can be sent with an APAR or used later by IBM service representatives for diagnosing a system problem.

Data areas always copied to the APAR diskette/tape include:

- Control storage
- System service log
- Error log tables
- Microcode tables
- I/O controller storage dump area
- #PTFLOGs for the system and all program product libraries
- System product level data file

Data areas copied in some cases to the APAR diskette/tape include:

- Trace files
- System file (#SYSWORK)
  - Volume label
  - IPL record
  - Trace work area
  - System configuration record
  - Diskette VTOC
  - Disk VTOC
  - Security work area
  - Apply PTF dump file
- Task dump file
- Disk trace file

Optional data areas that can be copied to the APAR diskette/tape include:

- History file
- Spool file
- Input job queue
- Message file

Most of the data areas copied by the APAR utility can be displayed, using the dump procedure (01-865).

The APAR utility should be run at IPL after an abnormal termination for the information to be valid.

To Collect APAR Data

To load and run the utility that collects data for an authorized program analysis report (APAR), use the Main Help menu (01-165), or key in HELP APAR.

If the system termination utility (01-125) is used to collect system information after a program check, you will be prompted to run the APAR procedure at the next IPL.

Example Display: APAR Procedure

```
                        APAR PROCEDURE                    Optional-*

          Collects diagnostic information that helps IBM programming
          representatives to correct programming problems that might
          occur in the system.

Volume ID of diskette . . . . . .

Name of load member to be copied . . . . . *

Name of source member to be copied . . . . . *

Name of procedure member to be copied . . . . . *

Name of dump file to be copied . . . . . 0,NAME *

Location of diskette . . . . . S1,S2,S3,M1.NN,M2.NN  S1

Automatic advance to next slot or magazine . . . . . AUTO,NOAUTO  AUTO


Cmd3-Previous menu                              c  1984 IBM CORP.
```

01-865
Displaying APAR Data

The DUMP utility formats and lists the system data areas necessary for solving system problems. This data can be on the disk dump file or on diskettes generated by the APAR procedure (01-860).

Data areas that can be formatted include:

- Task or system dump file
- Control storage dump file
- Selected disk or diskette sectors
- I/O controller storage dump area
- Input job queue
- Microcode tables
- Library PTF logs
- System service log
- Spool file
- Disk trace file
- Task work area
- Disk VTOC

To Dump the System Data Areas

To load and run the utility that formats and lists the system data areas, use the Main Help menu (01-165), or key in HELP DUMP.

Example Display: DUMP Procedure

```
                          DUMP PROCEDURE                          Optional-*

          Formats and lists system data areas
          necessary for solving system problems.


Area to be dumped . . . . . MAIN,CONTROL,DISK,IOC,JOBQ,MCODE,
                      PLD,PTF,SERVLOG,SPOOL,STATUS,TRACE,TWA,VTOC  MAIN

Output device . . . . . PRINTER,CRT,printer-ID     PRINTER

Location of file . . . . . F1 ,I1           F1

Name of library or disk file . . . . . O,NAME,LIBRARY            *




Cmd2-Page back       Cmd4-Put on job queue              Copr IBM Corp. 1985
```

01-870
Analyzing Dump Files

This procedure lets you analyze selected data from the disk dump file or from APAR diskettes/tapes.

To Display or Print the Dump File

To load and run the utility that displays or prints information from the dump file, use the Main Help menu (01-165), or key in HELP DFA.

Example Display: DFA Procedure Prompt

```
                          DFA PROCEDURE                          OPTIONAL-*

          Retrieves selected data from a dump
          file, formats that data and lists it.


Output location . . . . . . . . . . . . PRINTER,CRT,printer-ID  PRINTER

Type of dump file . . . . . . . . . . . . . . . .F1 ,I1          F1

 Name of dump file to be formatted . . . . . . . . . . . 0,NAME             *









Cmd3-Previous menu                                    Copr IBM CORP. 1985
```

01-875
Tracing System Events

This procedure lets you keep a record of selected system events. The system has one main trace table and up to 15 alternative trace tables. Each trace table can contain from 16 to 512 entries. Each entry contains register and parameter list information.

The system displays the status of each table. You can select the size of each table and the events to be traced.

The trace tables are wraparound tables; if the table is full, the newest entry overlays the oldest entry. However, if logging to disk is active, the contents of each table are written to disk before the table is used again.

To Select the Events to Be Traced

To load and run the utility that keeps a record of selected events in the system, use the Run Service Aids menu (01-170), or key in HELP TRACE.

Example Display: S/36 Trace Utility Prompt

```
                          S/36 TRACE UTILITY                          W1

                     Main trace table: #TRACE00                 1  of  1

Status: Number of trace entries . . . . . .  16          (0.5K)
        Trace file block size . . . . . .  50
        Logging to disk active. . . . . .  N


Select one of the following:
   1. Modify tracing events
   2. Start logging to disk
   3.
   4. Create alternate trace table
   5.

Option . . . . . .

Number of trace entries  . . . . . .  16-512


Roll keys-Page trace tables    Cmd7-End
```

01-880
Setting Address Compare Dump Values

This procedure lets you dump tasks without stopping the main storage processor. You enter the hardware address compare values and, as an option, the software address compare values. When a hardware address compare occurs, the software address compare values are tested. If the software values were set, and if a software address compare also occurs, the task is dumped.

On a Stage 3 system, always use the verify dump option when you specify a real main storage address of 000000 through 0007FF.

Only one dump occurs. However, you can use other options to perform a SETDUMP restart, disable the address compare hardware, or temporarily stop the SETDUMP utility.

Example Display: SETDUMP Procedure

```
                          SETDUMP PROCEDURE                              W1

          Debug main storage programs at predefined break
          points, without stopping the main storage processor.

Function to be run  . . . . . .  ADDRESS,OFF,RESTART,TASK  ADDRESS









Cmd3-Previous menu    Cmd4-Put on job queue
```

To Set the Address Compare Dump Values

To load and run the utility that lets you set the address compare dump values for programs in main storage, use the Run Service Aids menu (01-170), or key in HELP SETDUMP

Options include:

- ADDRESS: This option lets you set the hardware and software address compare values.
- OFF: This option disables the address compare hardware if no task dump was taken.
- RESTART: This option lets you dump another task, using the same address compare conditions.
- TASK: This option lets you dump an active task.

Example Display: Set Hardware Address Compare Dump Values

```
                        S/36 SETDUMP UTILITY                          W1

                Set Hardware Address Compare Dump Values

Address Compare Option . . . . . . . . . . . . . . . . . . . A,V A
  A - Set the hardware address values
  V - Bypass setting the hardware address values

Main Storage Address . . . . . . . . . . . . . . . . . . . .

Main Storage Address Type. . . . . . . . . . . . . . . . . . L,R R
  L - Logical
  R - Real

Enter Y (for at least one) or N for one or more of the
  following compare conditions

  MS Processor References Instruction at Specified Address . Y
  MS Processor References Data at Specified Address  . . . . N
  CS Processor References Data at Specified Address  . . . . N


Cmd7-End
```

Example Display: Set Software Address Compare Dump Values

```
                        S/36 SETDUMP UTILITY                          W1

                Set Software Address Compare Dump Values
Dump Option. . . . . . . . . . . . . . . . . . . . . . . . V,T,R,E R
  V - Verify, T - Task, R - Reset, E - Exit

Verify Address . . . . . . . . . . . . . . . . . . . . . . .

Verify Data. . . . . . . . . . . . . . . . . . . . . . . . .

Verify Option. . . . . . . . . . . . . . . . . . . . . . . S,D,N,F S
  S - Same, D - Different, N - Ones, F - Zeros

Verify Address Type. . . . . . . . . . . . . . . . . . . . . L,R L
  L - Logical, R - Real

Job Name or TB Address   . . . . . . . . . . . . . . . . . . .

Enter Y to suspend the task  . . . . . . . . . . . . . . . . N

Note - Job Name or TB Address must be specified if the verify address
       is logical, or the dump option is task, or the task is to be
       suspended.  For system tasks, only the TB Address is entered.


Cmd7-End
```

This page is intentionally left blank.

Appendix A. Character Code Charts

Contents

About This Appendix

This appendix contains the following character code charts for general reference:

- ASCII
- EBCD
- EBCDIC/DP
- EBCDIC/WP

These character code charts are for general reference only. Use the charts for the machine on which you are working to ensure that the character codes are correct.

ASCII Character Code Chart

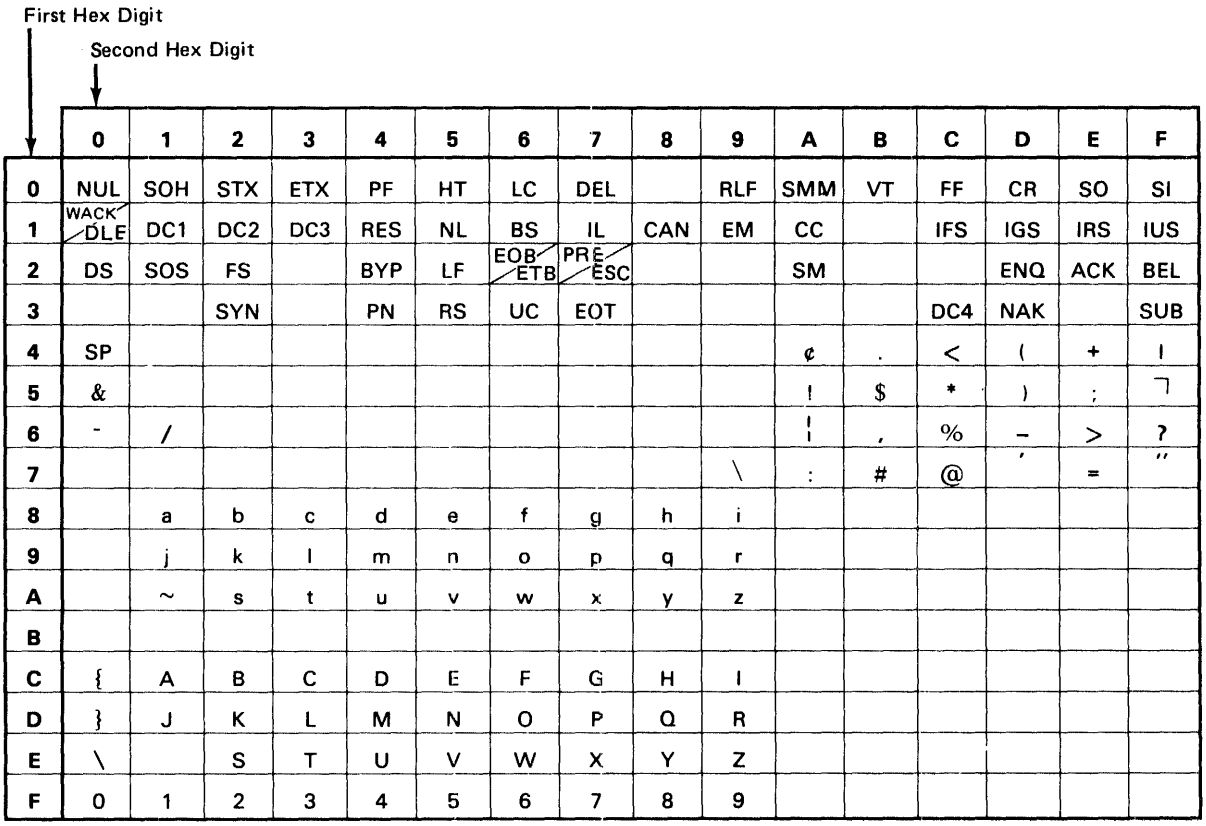
First Hex Digit ↓ / Second Hex Digit →

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2	SP	! or |	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^ or ¬	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL

EBCD Character Code Chart

	Bit Value							
Lowercase	B	A	8	4	2	1	C	Uppercase
.	B	A	8		2	1		¬
$	B		8		2	1	C	!
,		A	8		2	1	C	!
*#			8		2	1		"
@		A						¢
&	B	A					C	+
-	B							-
/		A				1	C	?
1						1		=
2					2			<
3					2	1	C	;
4				4				:
5				4		1	C	%
6				4	2		C	'
7				4	2	1		>
8			8					*
9			8			1	C	(
0			8		2		C	)
a	B	A				1		A
b	B	A			2			B
c	B	A			2	1	C	C
d	B	A		4				D
e	B	A		4		1	C	E
f	B	A		4	2		C	F
g	B	A		4	2	1		G
h	B	A	8					H
i	B	A	8			1	C	I
j	B					1	C	J
k	B				2		C	K
l	B				2	1		L
m	B			4			C	M
n	B			4		1		N
o	B			4	2			O
p	B			4	2	1	C	P
q	B		8				C	Q
r	B		8			1		R
s		A			2		C	S
t		A			2	1		T
u		A		4			C	U
v		A		4		1		V
w		A		4	2			W
x		A		4	2	1	C	X
y		A	8				C	Y
z		A	8			1		Z
Function Codes								Meaning
PN			8	4			C	Punch On
BY		A	8	4				Bypass
RES	B		8	4				Restore
PF	B	A	8	4			C	Punch Off
RS			8	4		1		Reader Stop
LF		A	8	4		1	C	Line Feed
NL	B		8	4		1	C	New Line (Carrier Return and Line Feed)
HT	B	A	8	4		1		Horizontal Tab
UC			8	4	2			Uppercase
EOB		A	8	4	2		C	End of Block
BS	B		8	4	2		C	Backspace
LC	B	A	8	4	2			Lowercase
EOT			8	4	2	1	C	End of Transmission
PRE		A	8	4	2	1		Prefix
IL	B		8	4	2	1		Idle
DEL	B	A	8	4	2	1	C	Delete
Space							C	Space

EBCDIC/DP Character Code Chart



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	PF	HT	LC	DEL		RLF	SMM	VT	FF	CR	SO	SI
1	WACK / DLE	DC1	DC2	DC3	RES	NL	BS	IL	CAN	EM	CC		IFS	IGS	IRS	IUS
2	DS	SOS	FS		BYP	LF	EOB / ETB	PRE / ESC			SM			ENQ	ACK	BEL
3			SYN		PN	RS	UC	EOT					DC4	NAK		SUB
4	SP										¢	.	<	(	+	!
5	&										!	$	*	)	;	¬
6	-	/									¦	,	%	_	>	?
7										\	:	#	@	'	=	"
8		a	b	c	d	e	f	g	h	i						
9		j	k	l	m	n	o	p	q	r						
A		~	s	t	u	v	w	x	y	z						
B																
C	{	A	B	C	D	E	F	G	H	I						
D	}	J	K	L	M	N	O	P	Q	R						
E	\		S	T	U	V	W	X	Y	Z						
F	0	1	2	3	4	5	6	7	8	9						

Duplicate Assignment

ACK 0 = 1070
ACK 1 = 1061
TTD = 022D
RVI = 107C

EBCDIC/WP Character Code Chart

First Hex Digit

Second Hex Digit

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX		HT	RNL	DEL		SPS	RPT		FF			
1	WACK / DLE	DC1	DC2	DC3		NL	BS				UBS			IGS	IRS	ITB
2				WUS		LF	ETB	ESC			SW	CUZ		ENQ		BEL
3			SYN	IRT			NBS	EOT	SBS	IT	RFF			NAK		
4	SP	RSP									¢	.	§ / <	(	+	! / ¦
5	&										!	$	*	)	;	¢ / ¬
6	Reo /	/									¦	,	%	_	¶ / >	?
7										± / \	:	#	@	'	=	"
8		a	b	c	d	e	f	g	h	i						
9		j	k	l	m	n	o	p	q	r						
A		~	s	t	u	v	w	x	y	z						
B																
C	2 / {	A	B	C	D	E	F	G	H	I	DH Y					
D	3 / }	J	K	L	M	N	O	P	Q	R						
E	1/4	NSP	S	T	U	V	W	X	Y	Z						
F	0	1	2	3	4	5	6	7	8	9						

Duplicate Assignment

ACK 0 = 1070
ACK 1 = 1061
TTD = 022D
RVI = 107C

This page is intentionally left blank.

Glossary of Terms and Abbreviations

This glossary includes terms and definitions from the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699.

#LIBRARY: The system library.

A: Ampere; AND circuit.

abort: Cancel.

abortive disconnect: In data communications, a disconnect that is not performed in the correct sequence.

absolute address: A storage address that is equal to an actual physical storage location; an address that is not translated.

access barred: Access is not permitted.

access lines: In diskette storage devices, the pulses on these lines cause the selected stepper motor to advance one or more steps.

ACE: Action control element.

ACK: Acknowledge character.

acknowledge character (ACK): In binary synchronous communications, a transmission control character transmitted to the sending station by a receiving station as a positive response to a data transmission.

acknowledgment: In binary synchronous communications, the transmission of acknowledge characters. See *acknowledge character, negative acknowledge character.*

ACK0: In binary synchronous communications, the even-numbered positive acknowledge sequence. See *acknowledge character.*

ACK1: In binary synchronous communications, the odd-numbered positive acknowledge sequence. See *acknowledge character.*

ACR: Address compare register; abandon call and retry.

ACRE: Address compare register extend.

ACRH: Address compare register high.

ACRL: Address compare register low.

activate logical unit (ACTLU): An SNA session control command to start a session with a user.

activate physical unit (ACTPU): An SNA session control command to start a session with a network node.

activity: The quality or state of being active.

ACTLU: Activate logical unit.

ACTPU: Activate physical unit.

addr: Address.

address compare register (ACR): A main storage processor register that is used during address compare operations. See also *diagnostic address compare register.*

address mark (AM): AM on a diskette is an address mark that identifies the start of the ID field (AM1) and the data field (AM2).

address recall register (ARR): A local storage register in the main storage processor that is used for temporary storage of an address that will be used later by the instruction being performed or the program being run.

address translation registers (ATR): Registers that change the addresses specified by the program into the main storage addresses in which the program is stored. These registers also are used for main storage security.

addressable: Having the ability to be addressed.

adr cmp: Address compare.

affirmative: Pertaining to a positive response or action.

AGC: Automatic gain control.

agency: See *RPOA.*

AID: Attention identification (key). See also *cmd.*

allocate: To assign a device for a specific task. See also *deallocate.*

alter: To change something. See also *modify*.

ALTERCOM: Alter communications status (procedure).

alternative cylinder: A cylinder on a diskette that is used by the system when the selected cylinder cannot be used.

alternative sector: A sector on a disk that is used by the system when the selected sector cannot be used.

ALU: Arithmetic and logic unit.

AM: Address mark.

amplify: To increase the amplitude of a signal or waveshape using an amplifier.

ANS: Auto network shutdown.

ANSC: Auto network shutdown complete.

APAR: Authorized program analysis report.

apply PTF: Install program temporary fix.

AR-DIFF: An electronic circuit (named a differential amplifier) whose output signal is a function of the time rate of change of the input signal.

arc suppressor: A circuit that prevents an electrical arc.

architecture: See *systems network architecture*.

ARR: Address recall register.

assignment: A specified task or amount of work assigned.

asynchronous transmission: In data communications, a mode of transmission in which the bits included in a character or block of characters occur during a fixed interval. However, the start of each character or block of characters can occur at any time during this interval.

ATR: Address translation register.

attachment: Circuits that connect the system to an I/O device. The attachment controls the read, write, and control information passed between the system and the I/O device.

attenuate: To decrease the amplitude of a signal.

Attn: Attention (key).

authorization: See *password authorization*.

authorized program analysis report (APAR): A request for correction of a problem caused by a defect in the present release of a program.

auto: Automatic.

auto network shutdown (ANS): An SNA network control command that stops network operations.

auto network shutdown complete (ANSC): An SNA network control command that indicates network operations have been stopped.

autoanswer: A communications feature that permits one processing unit to automatically answer an incoming call over telephone lines. See also *manual answer*.

autocall: A communications feature that permits one processing unit to automatically place a call over telephone lines. See also *manual call*.

autoloader: The part of the 72MD diskette magazine drive that permits selecting diskettes from one of 23 diskette positions. These positions include three I/O slots and two magazine positions. Each magazine holds up to 10 diskettes. See also *magazine*.

backup: Pertaining to a system, device, or file that can be used in the event of a failure or loss of data. See *backup mode register, backup copy, backup diskette, and switched network backup*.

backup copy: A copy of a file or data set that is kept for reference in the event the original file or data set is destroyed. See also *backup diskette*.

backup diskette: A diskette that contains information that was copied from a diskette or from disk. The backup diskette is used in the event the original information is accidentally altered or destroyed. See also *backup copy*.

backup mode register (BMR): A register that selects a different 16K block of storage for keeping the system support program if an error occurs in the first 16K block of storage when diagnostics are run during CSIPL.

backward creep test: A diagnostic test for the 8809 tape drive that runs under the I/O exerciser.

band: See *guard band.*

bandpass filter: A filter that decreases the amplitude of low- and high-frequency signals and passes medium-frequency signals without change.

bandwidth: A range of frequencies passed by a bandpass filter, amplifier, or telephone network.

barred: See *access barred.*

base cycle steal: An interrupt level on the channel that is used by an I/O adapter. See also *cycle steal* and *multiple-byte base cycle steal.*

batch: A group of records or jobs put together for processing or transmission.

BC: Byte counter.

BCC: Block check character.

BCD: Binary-coded decimal.

BCR: Buffer compare register.

BCRE: Buffer compare register extended.

beginning: Start. See also *BOT.*

beginning-of-tape marker: A reflective marker on tape to indicate the start of the tape. See also *end-of-tape marker.*

behind home: A condition of a disk storage device where the heads are behind cylinder 0.

BEL: In data communications, a control character that indicates an incoming call on a switched line.

bi-di: Bidirectional.

BID: In SNA, a data flow control command.

bidirectional: A term that describes a line that carries signals, controls, or data in two directions.

binary synchronous communications (BSC): A type of line control with a set of rules for transmitting data over a communications line connecting two devices that use a communications adapter.

binary synchronous transmission: Data transmission in which synchronization of characters is controlled by timing signals generated at the sending and receiving stations.

BIND: In SNA, a request to activate a session between two logical units.

bit-cell time: The time during which a bit is expected to occur.

block check character (BCC): In binary synchronous communications, the data link control character that checks that all bits transmitted were received.

block processor clock (BPC): A signal used during base cycle steal and multiple-byte base cycle steal operations that stops the control storage processor (and the main storage processor if the operation is to main storage) to prevent access to storage during a data transfer operation.

BMR: Backup mode register.

BNC: Bayonet naval connector.

bootstrap: (1) A method or device used to put itself into a desired state by means of its own action; for example, a machine routine whose first few instructions are enough to fetch itself into the computer from an input device. (2) To use a bootstrap.

BOT: Beginning of tape; beginning of transmission.

BPC: Block processor clock.

BPI: Bytes per inch.

bps: Bits per second.

BSB: Backspace block.

BSC: Binary synchronous communications.

BSCTEST: BSC online test (procedure). See also *COMMTEST, SDLCTEST,* and *STATEST.*

BSF: Backspace file.

BSS: Bank select switch.

buffer: (1) An area of storage that is temporarily reserved for use in performing an I/O operation, into which data is read or from which data is written. (2) A temporary storage unit, especially one that receives information at one rate and sends it at another rate.

buffer compare register (BCR): In systems with ECC main storage, an MSP register used to hold the storage address of the contents of the storage buffer.

burst: See *Phase-encoded identification burst*.

byte counter (BC): A binary counter that is used by the diskette attachment for sector sequence control and data transfer control.

cable tower: An area of a machine where I/O cables are connected to the system. This area is accessible by the customer.

call: (1) A service call. (2) To activate a program or procedure at its entry point. (3) In data communications, the action performed by the calling person or station, or the operations necessary in making a call, or the effective use made of a connection between two stations.

call progress signal (CPS): In data communications, an X.21 protocol signal that indicates the status of a call.

call request (CRQ): To request a call. See also *call*.

called station: On a switched line, in data communications, the location to which a connection is made.

calling station: On a switched line, in data communications, the location making a connection.

callout: See *FRU callout MAP*.

cancellation: To cancel a job, task, or session.

carrier: A continuous frequency that can be modulated with a second (information carrying) signal. See also *continuous carrier*.

carrier detect (CD): A data communications signal that indicates when a valid line signal is being received.

cathode-ray tube (CRT): The part of a display station that displays graphic information.

CB: Circuit breaker.

CBI: Command bus in.

CBO: Command bus out.

CB1: The mainline circuit breaker.

CCB: Channel command bus.

CCBO: Controller command bus out.

CCHHSS: Cylinder, head, and sector; a real address.

CCHS: Cylinder, head, and sector; a relative address.

CCITT: The International Telegraph and Telephone Consultative Committee.

CCR: Configuration control register.

CCT: Coupler cut through.

CD: Carrier detect.

CDBI: Controller data bus in.

CDBO: Controller data bus out.

CE: Customer engineer (World Trade countries). See also *CSR*.

CE cylinder: An area on disk that is used as a read/write area for diagnostic testing.

CE track: See *CE cylinder*.

CEB: Channel error byte.

cell: See *bit-cell time*.

chan: Channel.

char: Character.

characteristics: See *device characteristics*.

checksum: The sum (result of addition) of a group of data items associated with the group for checking purposes.

chk: Check.

CHR: Cylinder, head, and record.

clamp: (1) A part used to lock another part. (2) To lock parts together. (3) To center and hold a diskette against the drive hub. (4) In data communications, to inhibit a signal from its normal state.

clocking: In data communications, the use of clock pulses to control synchronization of data and control characters.

cmd: Command (key). See also *AID*.

cmp: See *adr cmp*.

CMR: Control mode register.

CNFIGSSP: Configure SSP (procedure).

cntl: Control.

CNTLCOMM: Control communications (procedure).

cntlr: Controller.

comm: Communications.

common carrier: In data communications, any business that supplies communication services to the general public.

COMMTEST: Communications concurrent diagnostic tests (procedure). See also *BSCTEST*, *SDLCTEST*, and *STATEST*.

communications adapter: A hardware feature that enables System/36 to become a part of a data communications network.

complement: Pertaining to an operation that inverts data.

completion code: See *condition code*.

CONCR: Concurrent (procedure).

cond: Condition.

condition code: A code that shows the results of a processing operation.

configuration control register (CCR): A register in the main storage processor that defines main storage size and the use of the address compare logic.

configure: To make or describe a configuration. See also *system configure utility*.

congestion: A condition that occurs when too many calls come to a receiving point (such as a telephone exchange) at the same time.

contention: A condition that occurs when two or more jobs or tasks attempt to use a processor or communications line at the same time.

continuous carrier: A continuous frequency without a second (information carrying) modulated signal. See also *carrier*.

control mode register (CMR): A register in the main storage processor that the control storage processor can use to control main storage addressing.

control panel: A panel that contains keys, lights, and displays used by the operator (for normal operation) and by the CE/CSR (for system maintenance).

control station: The primary processing unit in a multipoint data communications configuration. The control station controls the sending and receiving of data.

control storage directory: An area on disk that contains the address of all programs in the control storage library.

control storage initial program load (CSIPL): The loading of control storage microcode from disk or diskette to control storage.

control storage library: An area on disk that contains the diagnostic programs that are loaded to control storage.

COPYI1: Copy diskette (procedure).

coupler: A device that connects a modem to a telephone network.

coupler cut through (CCT): A data communications interface signal that indicates when a coupler is ready.

CPS: Call progress signal.

cradle: The part of a telephone that holds the handset.

CRC: Cyclic redundancy check (character).

create: Generate.

cross-reference: (1) A reference in a MAP to another MAP or to a maintenance information manual. (2) A reference in one part of a manual to information in another part of the same or different manual.

crosstalk: (1) The transfer of signal interference from one circuit to another circuit. (2) Pertaining to the sensing of data bits from one track while reading data from another track.

CRQ: Call request.

CRT: Cathode-ray tube.

CS: Cycle steal; control storage; control supply (power).

CSDIR: Control storage directory.

CSIPL: Control storage initial program load.

CSP: Control storage processor.

CS processor: Control storage processor.

CSR: Customer service representative (U.S.). See also *CE*.

CSU: Customer setup.

ctl: Control.

CTS: Clear to send.

CU: Cable unseated.

customize: To update the unit definition table and system microcode on disk. See also *system customize utility*.

cycle steal (CS): The process by which a device uses cycles of another machine or device. If, for example, the processing unit is performing an ALU operation when the disk needs service, the ALU operation is stopped while a byte of data is moved to or from the disk. See also *base cycle steal* and *multiple-byte base cycle steal*.

cyclic redundancy check character (CRC): A character code used for error sensing and correction.

cylinder: In disk and diskette storage devices, a cylinder contains all the data under all heads without moving the actuator or the head and carriage assembly.

DA: Device address.

DAC: Digital-to-analog converter.

DACR: Diagnostic address compare register.

DACTLU: Deactivate logical unit.

DACTPU: Deactivate physical unit.

DAF: Destination address field.

data communications attachment: The part of the system that permits the sending or receiving of data to or from a remote device over a data link.

data count field (DCF): In SNA, a field in the transmission header that indicates the number of bytes in this transmission.

data link: The equipment and rules for sending data over a communications line.

data link escape character (DLE): In binary synchronous communications, a transmission control character used in transparent text mode to indicate that the next character is a transmission control character.

data ring (DR): A line from a modem to a coupler that, together with data tip (DT), carries the transmitted data over telephone lines.

data set ready (DSR): A communications signal that indicates the modem is ready to transmit or receive data.

data stream: All data that is transmitted during a single transmit or receive operation.

data terminal equipment (DTE): The data processing unit that uses data communications lines.

data terminal ready (DTR): An EIA/CCITT interface line that signals the modem when the terminal is ready to transmit or receive data.

data tip (DT): A line from a modem to a coupler that, together with data ring (DR), carries the transmitted data over telephone lines.

dB: Decibel.

DBI: Data bus in.

dBm: Decibel based on one milliwatt.

DBO: Data bus out.

DCE: Data communications equipment.

DCF: Data count field.

DCP: Diagnostic control program.

DDSA: Digital Data Service Adapter.

DE: Disk enclosure.

deactivate logical unit (DACTLU): An SNA session control command to stop a session with a user.

deactivate physical unit (DACTPU): An SNA session control command to stop a session with a network node.

dead: Pertaining to a circuit or communications line that is no longer functional.

deallocate: To release a device assigned to a specific task. See also *allocate.*

debug: To detect, to trace, and to correct mistakes in computer programs or in other software.

decibel (dB): A unit of measure that is the ratio of two power or voltage levels.

decr: Decrement.

decrement: (1) The quantity by which a variable is decreased. (2) To decrease the value of a counter or register by a specified value.

dedicated: (1) Pertaining to one application or purpose. (2) A time during maintenance when no customer jobs are running.

defect: (1) A failure. (2) A bad area on a disk, diskette, or tape surface. (3) An error in a released program or program module.

defective: The result of a failure occurring.

demodulate: To set a modulated signal to its original state.

deserialize: To change serial data to parallel (byte) data.

deskew: Logic that aligns 9 bits from nine tape tracks to make 1 byte of data.

destination address field (DAF): In SNA, a field in the transmission header that contains the address of the node to which the record is sent.

det: Detect.

detach: Disconnect.

determination: See *problem determination.*

device address (DA): The system address assigned to a specific device or station, which could be attached locally or remotely.

device characteristics: Information about a device that are not specifications.

DFA: Dump file analysis.

DIAGCOPY: Diagnostic copy (diskette).

DIAGDEV: Diagnose device failures (menu).

DIAGINIT: Diagnostic initialize (diskette).

diagnostic address compare register (DACR): A main storage processor register that is used during diagnostic address compare operations. See also *address compare register.*

diagnostic control program (DCP): The supervisor program that controls diagnostic programs.

diagnostic linked series (DLS): Pertaining to a series of standalone tape diagnostic tests that can be run sequentially.

diagram: See *FLD.*

DIAGxx: Diagnostic (diskette).

dibit: Two bits.

differential phase shift keying (DPSK): A method of signal modulation used by modems.

Digital Data Service Adapter (DDSA): In data communications, a device used in place of a modem when transmitting data over the AT&T Digital Data Service Network. (A DDSA can also be used for local connections.)

digital-to-analog converter (DAC): An electronic device that changes digital signals to analog signals.

directory: See *control storage directory* and *diskette directory*.

disc: Disconnect.

disk enclosure (DE): The sealed unit of the disk storage device that contains the disks, the spindle, and the actuator. See also *head/disk assembly*.

diskette directory: An area of a diskette that contains the addresses of all records on the diskette.

diskette slot: The physical opening in the diskette device in which the diskette is inserted before being written or read. See also *I/O slot* and *magazine slot*.

diskette 1: Any diskette that is the medium used to record single-density information on one side.

diskette 2D: Any diskette that is the medium used to record double-density information on both sides.

dispatch: To allocate time on a processor to jobs or tasks that are ready to run.

dispatcher: See *task dispatcher*.

displacement: (1) The distance from the start of a record or block to the start of a specific field. (2) A byte in an indexed instruction that is added to an index register to obtain a real address or to change the contents of an index register.

displayable characters: Pertains to characters that can be displayed.

distant: Remote; at some distance.

DLE: Data link escape (character).

DLO: Data line occupied.

DM: Disconnected mode.

DMR: Data modem ready.

DPR: Digit present.

DPSK: Differential phase shift keying.

DR: Data ring.

drop: Deactivate or disconnect.

DSA: Data storage attachment.

DSC: Distant station connected.

dskt: Diskette.

DSKTEST: Diskette test (procedure).

DSR: Data set ready.

DT: Data tip.

DTE: Data terminal equipment.

DTR: Data terminal ready.

dump: (1) To copy the contents of all or part of storage, usually from storage to an output device. (2) Data that has been dumped. (3) To unload a tape reel.

duplex: A data communications network that permits data communications in opposite directions at the same time. See also *half duplex*.

E-cycle: The machine cycle used to perform an instruction.

EC: Engineering change.

ECC: Error correction code.

EIA: Electronic Industries Association.

elapse timer: A register whose output changes at regular intervals in such a way as to measure time.

ELCA: Eight-line communications adapter/attachment.

ELF: Error log function.

ELLC: Enhanced logical link control.

emulation: Permitting a device or program for one computer to be used on another computer.

enclosure: See *disk enclosure*.

end-of-tape marker: A reflective marker on tape to indicate the end of the tape. See also *beginning-of-tape marker*.

end-op: End operation.

ENQ: In binary synchronous communications, the control character used to request a response from the remote system.

enqueue: To place items on a queue.

enquiry: Inquiry.

envelope check: A hardware sense of data on a read-after-write operation.

EON: In data communications with the autocall feature, the end-of-number (telephone number) character (hex 5C). This indicates to the autocall unit that all digits have been dialed for a specific phone number.

EOT: (1) In binary synchronous communications, the end-of-transmission character. (2) End of tape.

equalization: The correction of the waveshape of the signal to make it more suitable for a telephone network.

equalizer: A device that corrects the waveshape of the signal to make it more suitable for a telephone network.

ERAP: Error recording analysis procedure.

ERG: Erase gap (command).

ERP: Error recovery procedure.

escape: See *data link escape character*.

establish a connection: In communications, to make a connection between two points.

established: In communications, having made a connection between two points.

ETB: In binary synchronous communications, the end-of-transmission-block character.

ETX: In binary synchronous communications, the end-of-text character.

exchange: A room or building with manual or automatic switching equipment that can connect telecommunication lines terminated there.

execute: Run.

ext: External.

facility: A service of an operating system, for a specific purpose; for example, the system measurement facility. See *SMF*.

fast: Quickly.

fast task switch: See *PATR* and *PREG*.

fetch: To locate and load a quantity of data from storage.

FID: Format identification (field).

File-Protect light: A light on the tape drive operator panel.

file-protect ring: A ring that, when inserted in the back of a tape reel, permits data to be recorded on tape. See also *write-enable ring*.

file-protected reel: A tape reel with the file-protect (write-enable) ring removed.

final: See *P/F*.

fix: See *PTF*.

FLD: Field logic diagrams.

FM: Frequency modulation.

formatted diskette: A diskette on which track and sector control information has been written but which may or may not contain any data.

free-lance: To diagnose machine problems with minimum instructions.

FRIEND: Fast-running interpreter enabling natural diagnosis. In System/36, this interpreter (part of some device exercisers) lets you assemble a small exerciser (maximum of nine commands) to test a device.

FRMR: Frame reject.

FRU: Field-replaceable unit.

FRU callout MAP: A MAP that identifies FRUs that cause failures during the good machine path MAPs.

FRU isolation MAP: A MAP that isolates FRUs for a specific failure.

FSB: Forward space block.

FSK: Frequency shift keying.

full duplex: Same as *duplex.*

gather: Collect.

GLP: General logic probe.

gnd: Ground.

guard band: An area of the disk that contains data patterns written at the factory. The guard band is not used for data storage. See also *landing zone.*

half duplex: Permitting data communications in opposite directions, but not at the same time. See also *duplex.*

halt instruction: A machine instruction that stops the running of a program.

handler: See *input/output control handler.*

handset: The part of a telephone that sends and receives sound.

HDA: Head/disk assembly.

hdr: Header.

head/disk assembly (HDA): The sealed unit of the disk storage device that contains the disks, the spindle, and the actuator. See also *disk enclosure.*

header (HDR): Control information that precedes user data. See also *data count field* and *destination address field.*

Help: (1) A key on System/36 keyboards. (2) A display that gives additional information about the task you are performing. (3) A system procedure that displays a sequence of menus associated with system tasks.

hex: Hexadecimal.

high-order: The leftmost bit or byte in a series of bits or bytes.

HISTCRT: Display the history log (procedure).

HISTORY: Print the history log (procedure).

hitchback: In streaming mode, a movement of the tape that must occur if the command is not received by the tape drive at the correct time.

hub: A part that clamps and turns a tape reel.

I/O: Input/output.

I/O slot: Input/output slot. There are three I/O slots on the 72MD autoloader. These slots are named S1, S2, and S3. See also *diskette slot* and *magazine slot.*

I-cycle: The machine cycle used to fetch an instruction.

IAR: Instruction address register.

IBG: Interblock gap.

ICF: Interactive communications feature.

ICFDEBUG: Interactive communications feature debug (procedure).

ICVERIFY: Interactive communications feature verify (procedure).

ID: Identifier.

identifier (ID): A label or name that identifies something.

ideographic: Consisting of both graphics and symbols.

IGC: Ideographic character.

IL: Interrupt level.

ILBB: Interrupt level backup byte.

ILP: Integrated logic probe.

IM: Integrated modem.

IMPL: Initial microprogram load. See *CSIPL* and *MSIPL.*

IMPSS: Impression control single-shot.

inactivity time-out: A time-out condition caused by no activity on a communications line.

incr: Increment.

increment: (1) The quantity by which a variable is increased. (2) To increase the value of a counter or register by a specified value.

ind: Indicate.

indexed address: An address that is changed by the content of an index register before or when an instruction is performed.

indexed instruction: An instruction that uses an indexed address.

indication: See *PWI*.

INIT: Initialize (procedure).

initial: First time.

initial program load (IPL): A sequence of events that loads the system programs and prepares the system to run jobs.

input/output block (IOB): A data area that can be used to move, from the calling program to the input/output supervisor, the information necessary for data operations.

input/output control handler (IOCH): Control storage processor routines that control the interface between the input/output supervisor and the I/O device or the device controller.

input/output supervisor (IOS): Routines that move data between main storage and the input/output control handler.

int: Interrupt. See also *IRPT*.

interactive communications feature (ICF): A feature of the system support program product (SSP) that includes interactive support for BSC and SNA communications, as well as communications between programs on the system.

interblock gap (IBG): Space between data blocks.

intermediate block check: In binary synchronous communications, a function that permits checking each record, instead of checking the contents of the total buffer, when large buffers of data are received.

interrupt level (IL): An assigned priority to control concurrent interrupts from different sources.

intrpt req: Interrupt request.

invalid: Not valid.

invoke: To activate a procedure at one of its entry points.

IOB: Input/output block.

IOC: Input/output controller.

IOCH: Input/output control handler.

IPL: Initial program load.

IPS: Inches per second.

irpt: Interrupt. See also *INT*.

isolation: See *FRU isolation MAP*.

ITB: In data communications, the intermediate-text-block character.

ITC: Individual table of contents.

JCB: Job control block.

JOBQ: Job queue.

K: (1) 1024, when making reference to a quantity of data or data storage. (2) Kelvin.

Kb: 1024 bytes. (Kb may be displayed as KB.)

LAN: Local area network.

landing zone: An area of the disk surface where the heads are located when the disks are not turning at the correct speed, or when the disk drive is powered off. See also *guard band*.

LC: Logical channel.

LCGN: Logical channel group number.

LCI: Logical channel indicator.

LCRR: Length count recall register.

LED: Light-emitting diode.

length count recall register (LCRR): A local storage register of the main storage processor that stores part of the SVC instruction.

light-emitting diode (LED): An electronic part used as a source of light.

lightning protection card: A device that protects a machine from electrical surges caused by severe electrical weather.

line cord: A cable used to connect a machine to an AC power source.

line filter: A device used to prevent ripple or electrical noise on the AC power source from reaching machine power supplies and to prevent ripple or electrical noise generated by a machine from reaching the AC power source.

linkage: In computer programming, the part of a program or program module (or a single instruction or an address) that passes control and parameters between separate parts of the program or program module.

linked: Having been made part of a link or series. See also *diagnostic linked series.*

LLC: Logical link control.

local storage register (LSR): A register used for general-purpose storage.

local storage registers: Two groups of registers, one group in the control storage processor, and the second group in the main storage processor, used for general-purpose storage.

log: (1) A document containing written entries. (2) A system record containing recorded entries. (3) To write or record an entry in a log. See also *post.*

logged: Having written or recorded an entry in a log.

logical: Binary (as in add logical characters).

logical sector address: An address assigned by the system to a part of a track on a disk.

logical storage address: The address of a byte of storage data that is equal to a real storage address. See also *real storage address* and *virtual storage address.*

logical unit (LU): A unit that permits a user to access an SNA network to communicate with another user.

loopback test: A test in which signals are looped from a test unit, through a data set or loopback switch, and back to the test unit for measurement.

low-order: The rightmost bit or byte in a series of bits or bytes.

LPI: Lines per inch.

LSR: Local storage register.

LU: Logical unit.

LUSTAT: Logical unit status.

M: 1 048 576, when making reference to a quantity of data or data storage. See also *megabyte.*

MAB: Microinstruction address backup register.

machine reel: The tape reel that is permanently attached to the tape drive.

magazine: A storage container for up to 10 diskettes.

magazine position: There are two magazine positions on the 72MD autoloader. These positions are named M1 or M2. See also *magazine slot.*

magazine slot: There are 10 slots in a diskette magazine. These slots are named M1.nn or M2.nn, where nn is the slot number. See also *diskette slot, I/O slot,* and *magazine position.*

magnetic media: Storage media (such as disk, diskette, and tape) that use magnetic properties to store data.

magnetized: Pertaining to fields of force around an electrical conductor or permanent magnet.

management: The function of controlling something. For example: data management, session management, or system management.

manual answer: In data communications, operator actions to receive a call over a switched line. See also *autoanswer.*

manual call: In data communications, operator actions to make a connection with another station over a switched line. See also *autocall.*

MAP: Maintenance analysis procedure.

MAR: Microinstruction address register.

mask: A pattern of characters that control the keeping, deleting, or testing of parts of another pattern of characters.

Mb: 1 048 576 bytes. (Mb may be displayed as MB.) See also *megabyte*.

MCI: Machine check interrupt.

MCODE: Microcode.

MCR: Magnetic character reader.

MDI: MAP diagnostic integration.

media: See *magnetic media*.

megabyte: 1 000 000 bytes, when making reference specifically to the storage size of a disk storage device. See also *M* and *Mb*.

memory: Storage.

message identification code (MIC): A 4-digit number that identifies a record in a message. This number can be part of the message identifier.

MFM: Modified frequency modulation.

MIC: Message identification code.

microinstruction: A CSP or I/O controller instruction that generates a single machine operation.

MICROSEC: Microsecond.

MIM: Maintenance information manual.

minibus: A voltage distribution bus.

mismatch: Does not compare.

MLCA: Multiline communications attachment/adapter.

MLM: Maintenance library manual.

MOD: Modifier.

modification level: A distribution of all program temporary fixes (PTFs) that were shipped since the preceding modification level. A new modification level normally does not include new function. When a new release of a program is shipped, the modification level is set to 0. When a release is shipped that includes all PTFs since the last modification level, the modification level is incremented by 1. See also *release, version, authorized program analysis report,* and *program temporary fix*.

modifier: Something that modifies or changes.

modify: To change something. See also *alter*.

modulation: The process of changing the frequency or amplitude of the write signal.

MOR: Micro-operation register.

motion: Movement.

MPTF: Microprogram temporary fix.

MS: Main storage.

MSP: Main storage processor.

MSAR: Main storage address register.

MSIPL: Main storage initial program load.

MS processor: Main storage processor.

MSRJE: Multiple session remote job entry.

MST: Monolithic storage technology.

multi: More than one; a position of the Technology switch on a general or integrated logic probe.

multidevice: More than one device.

multiframe: More than one frame.

multileaving: Two-directional transmission of a variable number of data streams between terminals and computers.

multiline: More than one communications line.

multinational: More than one country.

multiple: More than one.

multiple-byte base cycle steal: A base cycle steal operation that transfers up to 256 bytes of data between the system and the I/O attachment.

multiple session remote job entry: A program that permits System/36 users to send jobs to and obtain results from a host system, using a BSC or an SDLC communications line.

multiplex: To concurrently transmit two or more units of data on a single channel.

multipoint: In data communications, a network that has more than one station.

NAK: Negative acknowledge character.

negative acknowledge character (NAK): In binary synchronous communications, a transmission control character transmitted by a station as a negative response to the station that the connection is set up with.

net: Network.

NET list: A list of point-to-point circuits that can be probed.

no-op: No operation.

nonideographic: Pertaining to characters that do not consist of both graphics and symbols.

nonproductive: Not performing a task or the amount of work assigned.

nonresettable: Cannot be reset.

nonsequenced: Not in a specific sequence.

Nr: Number of frames received (SDLC).

NRZI: Non-return-to-zero inverted.

Ns: Number of frames sent (SDLC).

NS: Nonsequenced.

NSW: Nonswitched.

OC: Overcurrent.

OCL: Operation control language.

odd parity: A condition in which a parity bit is activated or deactivated to make the total of all active bits in a group of binary bits an odd-numbered digit.

off hook (OH): (1) Not on the cradle (a position of the telephone handset). (2) An interface signal that indicates the off hook condition.

OH: Off hook.

OP: Operation (code).

operand: A quantity of data that is operated on.

operand address: The address in a computer instruction of data to be operated on.

orient: To move the 72MD autoloader to the home position, which is I/O slot 1.

osc: Oscillator.

oscillator (osc): A circuit that supplies a timing signal to the system.

OV: Overvoltage.

overcurrent (OC): A condition that occurs when power supply current is too high.

overstrike: A multinational feature that permits writing over displayed or printed characters to make new characters.

overview: A summary.

overvoltage (OV): A condition that occurs when power supply voltage is too high.

OXREF: A cross-reference from one module to another.

P: Parity.

P/F: Poll/final (bit).

packet: A sequence of binary data and control signals that is switched as a unit. The data, control signals and possibly error control information, are arranged in a specific format.

packet assembly/disassembly: A functional unit that enables data terminal equipment (DTEs) not made for packet switching to access a packet-switching network.

PACT: Prefix address contained translation.

PAD: See *packet assembly/disassembly*.

par: Parity.

parameter: A variable that is given a constant value for a specific operation.

password authorization: A feature that lets a word be entered at a work station to identify the operator and permit access to the system or to a specific document.

patch: To change or repair a program module on disk or diskette. See also *program patch*.

PATR: A PACT register that contains the address translation information used during a fast task switch operation.

PC: Parity check; printed circuit.

PCR: Processor condition register.

PCSP: A PACT register that contains the address translation information used during a CSP access of main storage.

PDIR: A PACT register that contains the address translation information used to address operands with direct addressing.

PE: Phase-encoded.

PEB: Processor error byte.

peer: In SNA, any functional unit that is in the same layer as another functional unit.

PEID: Phase-encoded identifier.

PEID burst: See *phase-encoded identifier burst*.

PG: Parity generate; parity generator.

phase-encoded: A format for data on tape.

phase-encoded identifier burst: Information recorded in the parity track of the tape used to verify the recording density of the tape. This information overlaps the BOT tape mark.

phototransistor (PTX): An electronic part that senses light.

PIAR: A PACT register that contains the address translation information used for instruction fetch operations.

PID: Program Information Department.

PIU: Path information unit.

PL: Parameter list.

PLO: Phase lock oscillator.

PMR: Program mode register.

PND: Present next digit.

POR: Power-on reset.

post: (1) To enter information in a record. (2) To record the ending of an event. See also *log*.

PP: Program product.

PPF: Primary power fault.

PRATR: An MSP LSR that contains the MSP address of the ATR bank.

PREG: A PACT register that contains the address translation information for a fast task switch operation.

preload card: A logic card on the A3 board for MLCA communications (30-620).

previous: Preceding.

prime menu: The primary or main menu.

problem determination: The process of identifying why the system is not working. Often this process identifies programs, equipment, data communications facilities, or user errors as the source of the problem.

proceed to select: In data communications, an X.21 protocol signal that enables a station to place a call.

profile: See *SNA profile*.

program mode register (PMR): A register in the main storage processor that identifies control information pertaining to a program.

program patch: The change or repair to a program module on disk or diskette. See also *patch*.

program patch utility: A diagnostic utility that updates programs or program modules on diagnostic diskettes or on disk.

program temporary fix (PTF): A temporary solution or bypass of a problem diagnosed by IBM service representatives as a result of a defect in an existing program. See also *authorized program analysis report* and *modification level.*

protection: See *lightning protection card.*

protective coupler: A coupler that protects the devices or communications line on either side of the coupler.

protocol: In SNA, the rules for transmitting and receiving data.

PRPCT: An MSP LSR that contains the MSP address of the PACT registers.

PSATR: An MSP LSR that contains the low-order bytes of the main storage address of data to be loaded to the MSP ATRs.

PSH: Physical services header.

PSN: Public switched network.

PSR: Program status register.

PSREG: An MSP LSR that contains the low-order bytes of the main storage address of data to be loaded to the MSP registers.

PSS: Print subscan.

PTF: Program temporary fix.

PTX: Phototransistor.

PU: Physical unit.

public: Pertaining to all persons or groups (not private).

public switched network: A telephone business through which users can be connected by dialing specific telephone numbers.

PUMP: Pack utility maintenance program.

PVC: Permanent virtual circuit.

PWI: Power indication.

PXR1: An MSP LSR that contains the address translation information for indexed addresses.

PXR2: An MSP LSR that contains the address translation information for indexed addresses.

QLLC: Qualified logical link control.

qualifier: A name that identifies another name.

R/W: Read/write.

RAM: Random access memory.

RB: Request block.

rclk: Receive clock.

rcv: Receive.

RD: Request disconnect.

RDS: Receive data space.

re-enable: To enable again.

re-IPL: To perform an initial program load again.

readback: Reading after writing.

real storage: The main storage in a virtual storage system. Real storage and main storage are the same. However, real storage is only part of the range of addresses available in a virtual storage system. See also *translated storage* and *virtual storage.*

real storage address: The actual address of a byte of main storage data. See also *logical storage address* and *virtual storage address.*

rec: Record.

receive initial command: In binary synchronous communications, a command that permits the communications adapter to receive synchronization characters.

receive time-out: In data communications, a signal to indicate that no data has been received by a BSC or SDLC communications adapter in a given interval.

RECFMS: Recorded formatted maintenance status.

ref code: See system reference code.

reg: Register.

region: The amount of main storage that is available to a program.

reinstruct: To instruct again.

release: A distribution of new function and APAR fixes for an existing program. Numbering of releases starts with 1. See also *modification level, version, program temporary fix,* and *authorized program analysis report.*

reliability: The quality or state of being reliable.

reload: To load again.

rename: To change a name, or to name again.

replace: Return to an original position. For example: replace the telephone receiver means to place the handset on the cradle.

reply: To answer or respond.

reposition: To position again.

req: Request. See *sys req.* See also *TESTREQ.*

REQMS: Request maintenance status.

REQTEST: Request test.

requestor routine: In BSC and SDLC online tests, a routine that requests a response from a responder routine.

require: Need.

requirement: A special condition, need, or specification.

resolution: Pertaining to an action to determine the condition of a diskette drive read/write head assembly.

resource: Any service of a unit of a computer system needed by a job or a task, including main storage, control storage, input/output devices, the processing unit, data sets, control or processing programs, or communications network.

responder routine: In BSC and SDLC online tests, a routine that responds to a request from a requestor routine.

restore: Return to an original value or image.

RETAIN: Remote technical assistance information network.

retransmit: To transmit again.

retries: Attempts again.

retrieve: Get.

retry: An attempt to perform an operation a specified number of times, or until the operation is completed.

RI: Ring indicate.

RLD: Relocation dictionary.

RLL code: Run length limited code.

RLSD: Received line signal detector.

RNR: Receive not ready.

rolling: Pertains to movement of a display screen; either horizontally, vertically, or a combination of both.

ROS: Read-only storage.

RPOA: Recognized private operating agency.

RPQ: Request for price quotation.

RR: Receive ready.

RS-232-C: An EIA interface specification.

RSHUTD: Request shutdown.

RSP: Response.

RTR: Ready to receive.

RTS: Request to send.

run length limited (RLL) code: The code used to record data on disk drives.

RWS: Remote work station.

SA: Surface analysis.

SABM: Set asynchronous balanced mode.

SAR: Storage address register.

SB: Storage block.

scheduler: See *transient scheduler*.

scratch: A tape or diskette containing data that is not needed.

SDLC: Synchronous data link control.

SDLCTEST: SDLC online test (procedure). See also *BSCTEST, COMMTEST,* and *STATEST*.

SDR: Storage data register.

SDT: Start data traffic.

sector: (1) An area on a disk track or a diskette track reserved to record a unit of data. (2) The smallest area that can be addressed on a disk or diskette during a single read or write operation.

sel: Select. See also *stg sel*.

SEP: In data communications with the autocall feature, the character (hex 7D) that is used with some autocall units to separate the groups of digits to be dialed to different telephone exchanges.

serialize: To change byte data to serial data.

SERVLOG: Service log (procedure).

SETDUMP: Set dump address (procedure).

SG: Signal ground.

SH: Switch hook.

shot: Single shot.

shroud: A machine cover for protection.

SHUTC: Shutdown complete.

SHUTD: Shutdown.

shutdown: See *auto network shutdown* and *auto network shutdown complete*.

sig: Signal.

SILSB: Sense interrupt level status byte.

SIO: Start input/output.

SIR: Storage interface register.

SLCA: Single-line communications adapter.

slot: See *diskette slot, I/O slot,* and *magazine slot*.

SLT: Solid logic technology.

SMF: System measurement facility (procedure).

SMFPRINT: Print the system measurement results (procedure).

SMFSTART: Start the system measurement facility (procedure).

SMFSTOP: Stop the system measurement facility (procedure).

SN: Serial number.

SNA: Systems network architecture.

SNA profile: A description of the characteristics of a systems network architecture protocol.

SNBU: Switched network backup.

SNRM: Set normal response mode.

SOH: In binary synchronous communications, the start-of-header character.

spindle: The shaft that turns the disk.

spool: Simultaneous peripheral operations online. See also *spooling*.

spool writer: An output device, usually a printer, that receives the output in a spooling operation.

spooling: The reading of input data streams and the writing of output data streams on auxiliary storage devices, concurrently with other jobs, in a format for later processing or output operations.

SRC: System reference code.

SSA: Sequential sector address.

SSP: System support program.

start/stop mode: The mode in which the tape can stop in each interblock gap, waiting for the next command. (Tape runs at 12.5 IPS.)

STATEST: Station test (procedure). See also *BSCTEST, COMMTEST,* and *SDLCTEST.*

statistical: Pertaining to statistics.

stdby: Standby.

steal: See *base cycle steal, cycle steal,* and *multiple-byte base cycle steal.*

stepper: Pertains to advancing one step at a time.

stg sel: Storage select.

streaming mode: The mode in which tape runs continuously through the interblock gaps without stopping. (Tape runs at 100 IPS.)

stretch marks: Visible marks showing damage to the recording surface of magnetic tape.

string: A sequence of elements such as characters or bits.

STSN: Set text sequence number.

STX: In binary synchronous communications, the start-of-text character.

subconsole: A display station that controls the printer or printers assigned to it.

subtask: A task that is started or stopped by a higher order task.

supervisor call (SVC): An instruction that causes control to be passed to the control storage processor.

suspend: To stop a task and prevent contention for a processor.

suspended state: A software state in which a task is not dispatched by the system and is not contending for the processor.

SVC: Supervisor call; switched virtual circuit.

SW: Switched.

switched network backup (SNBU): In data communications, an alternative method of connecting two systems over telephone lines when the primary method of connection is by leased lines.

SYN: In binary synchronous communications, the synchronous idle character.

synchronous data link control (SDLC): Rules that control data movement over a communications line connecting two devices that use a communications adapter.

sys req: System request (key).

system configure utility: A utility under concurrent DCP and dedicated DCP that lets you describe the system hardware configuration (UDT).

system customize utility: A utility under dedicated DCP that lets you update the UDT and system microcode on disk, using the DIAG24 and other diagnostic diskettes.

system reference code (SRC): A 4-character code displayed as part of a system message, as part of a diagnostic message, or displayed in the control panel display. System reference codes are described in MAPs 0114, 0115, and 0116.

system services control point: In SNA, a network addressable unit that supplies configuration, maintenance, and session services for physical units and logical units.

system termination utility: A system utility that, when you attempt a system restart after a program check occurs, lets you dump the system data areas to save information associated with the error condition.

systems network architecture (SNA): An IBM communications protocol for controlling information transfer in a data communications network.

SYSTEST: System test.

tag: One or more characters attached to a set of data, that contain information about the set, including its identification.

tape mark: The BOT or EOT reflective mark on tape.

task: A unit of work.

task block: A block of control information associated with a specific task or program.

task dispatcher: A program or routine that allocates time on a processor to tasks.

TB: Terminal block; task block.

TCC: Top card connector.

TD: Time delay.

TDS: Transmit data space.

Tektronix: Trademark of Tektronix, Inc.

terminate: (1) To install a load (resistor) at the end of a line or cable to match the normal load for that line or cable. (2) To end an operation.

termination: See *system termination utility*.

terminator switch: A switch used to terminate the twinaxial cable at the last display station or printer in a series. This switch is part of the Cable Thru feature on a display station.

TESTREQ: Test request (procedure).

TI: Test indicate.

tower: See *cable tower*.

TP: Test point.

track: In disk and diskette drives, a track contains all the data under one head without moving the actuator or the head carriage assembly.

trade: See *World Trade*.

traffic: In data communications, transmitted or received messages.

transfer: To send data to one place and to receive data at another place.

transient: (1) A temporary change in a circuit because of a sudden change of voltage or of load. (2) Data temporarily existing in storage.

transient area: A place in main storage for temporary data.

transient scheduler: A program or routine that determines when data is placed in the transient area.

translate: (1) To change data from one language to another. (2) To change a logical program address to a real storage address.

translated storage: A method of assigning main storage to an application program or task, using logical addresses. The logical address is translated to a real address when the program or data is stored to or fetched from main storage. See also *real storage* and *virtual storage*.

translation: Action. (1) Changing data from one language to another. (2) Changing a logical program address to a real storage address. See also *address translation registers*.

transmission control characters: In data communications, special characters that are included in a message to control communication over a data link. For example, the sending station and the receiving station use transmission control characters to exchange status information; the receiving station uses transmission control characters to flag errors in data it receives.

transmission header: In SNA, a block of control and identification information at the start of a data transmission.

transparency: In data communications, a mode of transmission that permits control characters to be transmitted as data.

transparent text mode: In data communications, a mode of binary synchronous transmission in which only transmission control characters preceded by the DLE control character are operated on as line control characters. All other characters that have the same bit pattern as transmission control characters are transmitted as data.

tributary station: Any station other than the control station in a network.

trouble: An error or a failure.

truncate: To remove the ending elements in a series of elements.

TS: Transmission subsystem.

TU: Test unit.

TUB: Terminal unit block.

turnaround: Going from transmit mode to receive mode or from receive mode to transmit mode.

twinaxial cable: A twisted-pair shielded cable that connects a keyboard/display or work station printer to the system.

UA: Unnumbered acknowledge.

UDT: Unit definition table.

UE: Unit emergency (switch).

unavailable: Not available.

UNBIND: In SNA, a request to deactivate a session between two logical units.

uncontrolled: Not controlled.

underrun: (1) Action, such as movement or printing, before a specified point. (2) Loss of data because the transmitting device did not send data at the rate specified.

undervoltage (UV): A condition that occurs when power supply voltage is too low.

unequal: Not equal.

unexpected: Not expected.

unit definition table (UDT): An area on disk or in storage that contains entries that describe the devices that run under control of the SSP.

unload: To release a tape from the read/write heads.

unnumbered: Not numbered.

upline session: A communications session between a system and a host system.

UV: Undervoltage.

V: Volt.

Vac: Volts, alternating current.

Vdc: Volts, direct current.

version: A separate program product, similar to an existing program product, that usually has important new code or new function. Numbering of versions starts with 1. See also *modification level* and *release.*

VFO: Variable frequency oscillator.

virtual storage: Storage space that may be used as addressable main storage by a program or task in a computer system in which virtual addresses are converted to real addresses. The size of virtual storage is limited by the number of addresses available and by the amount of auxiliary storage available, and not by the actual number of main storage locations. See also *real storage* and *translated storage.*

virtual storage address: The address of a byte of data in virtual storage converted to a real storage address. See also *logical storage address* and *real storage address.*

voice-grade telephone line: A telephone line that can be used for transmission of voice or data.

vol: Volume.

VOLID: Volume identifier.

VTL: Vendor transistor logic.

VTOC: Volume table of contents.

W/S: Work station.

WACK: In binary synchronous communications, the DLE sequence sent by a receiving station to indicate that it cannot receive data.

work station: A device that lets a person transmit information to or receive information from a processing unit as needed to perform a task; for example, a keyboard/display or a work station printer.

work station attachment: The device that is used to attach a local work station to the System/36 channel.

work station controller: The device that is used to attach a remote work station to the System/36 communications adapter.

World Trade: Pertaining to all countries except the U.S. and Canada.

WR: Work register.

wraparound table: A table in which the oldest entry is lost when a new entry is added, and the table is full.

wrap tests: I/O device diagnostic tests that are run when the Load key is pressed.

write driver: An electronic circuit that supplies current to the write heads.

write echo: Data read back to the attachment, while the attachment is writing, to verify that the write operation is correct.

write-enable ring: A ring that, when inserted in the back of a tape reel, permits data to be recorded on tape. See also *file-protect ring*.

writer: See *spool writer*.

WRKSTN: Work station.

WS: Work station.

WSA: Work station attachment.

WSC: Work station controller.

WSCF: Work station control field.

xclk: Transmit clock.

XID: Exchange identification.

xmit: Transmit.

XR1: Index register 1.

XR2: Index register 2.

zone: See *landing zone*.

A

B

C

D

E

F

G

H

I

J

K

L

M

O

P

R

S

T

U

V

W

Numeric

READER'S COMMENT FORM

Please use this form only to identify publication errors or to request changes in publications. Direct any requests for additional publications, technical questions about IBM systems, changes in IBM programming support, and so on, to your IBM representative or to your IBM-approved remarketer. You may use this form to communicate your comments about this publication, its organization, or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

☐ If your comment does not need a reply (for example, pointing out a typing error), check this box and do not include your name and address below. If your comment is applicable, we will include it in the next revision of the manual.

☐ If you would like a reply, check this box. Be sure to print your name and address below.

Page number(s): Comment(s):

Please contact your IBM representative or your IBM-approved remarketer to request additional publications.

Name _____

Company or Organization _____

Address _____

_____
City State Zip Code

Phone No. _____
Area Code

No postage necessary if mailed in the U.S.A.

Cut Along Line

Fold and tape. **Please do not staple.**

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS / PERMIT NO. 40 / ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

International Business Machines Corporation
Information Development
Department 245
Rochester, Minnesota, U.S.A. 55901

Fold and tape. **Please do not staple.**

Cut Along Line

IBM