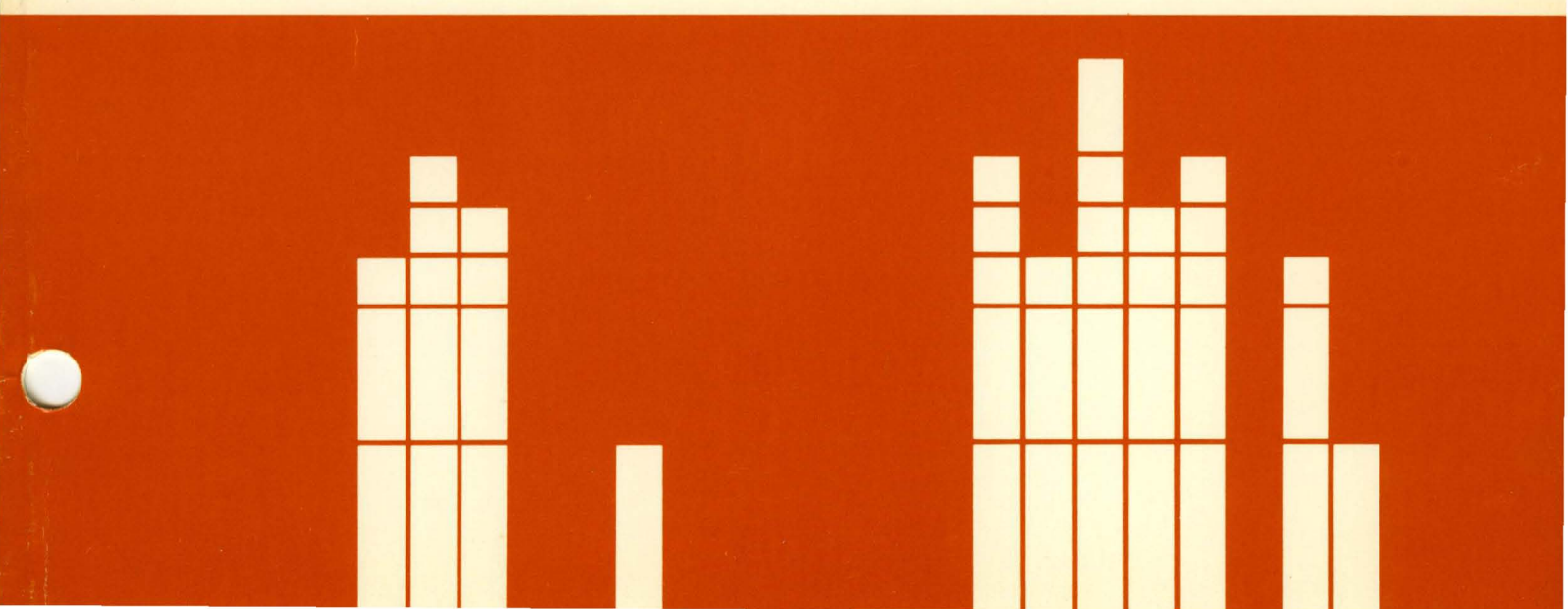
Publication Number
GC31-2033-1

4700 Finance Communication System

Subsystem Problem Determination Guide

IBM



4700 Finance Communication System

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File Number
S370/4300/8100/S34-00

Publication Number
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Summary of Changes to GC31-2033-0 by GC31-2033-1

This revision includes a new problem determination procedure for the Alternative Line Attachment feature, adds support for the diskette and disk to the controller procedure, and adds support for multiple host links to the Host procedure. Minor corrections and additions have also been made.

Second Edition (September 1983)

It is the responsibility of the user to establish and maintain appropriate operating procedures for the equipment and system, including those related to the integrity and security of the system, together with audit and control measures.

This edition, GC31-2033-1, is a major revision of GC31-2033-0, which is obsolete. It incorporates new and enhanced 4700 features and functions.

Changes occur often to the information herein; before using this publication in connection with the installation or operation of IBM equipment, consult the latest IBM System/370 Bibliography of Industry Systems and Application Programs, GC20-0370, for the editions that are applicable and current.

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Preface

This manual is for customer personnel who are diagnosing problems in the IBM 4700 Finance Communication System. Its detailed procedures describe how to analyze each of the major elements of the system and find the source of a system problem.

This manual is also for system support personnel who have the responsibility for maintaining and trouble-shooting the 4700. With some training, the manual can be used by personnel at a branch location.

The user of this manual should:

1. Be able to access the system monitor.
2. Be able to use the system monitor to retrieve data or request function.
3. Be familiar with the operator control panel on the controller.
4. Know the location of the speed and address switches on the terminals and how to set them.
5. Know how to initiate the internal stand-alone tests of the modems.
6. Be able to read a loop layout diagram and trace the loop cabling.

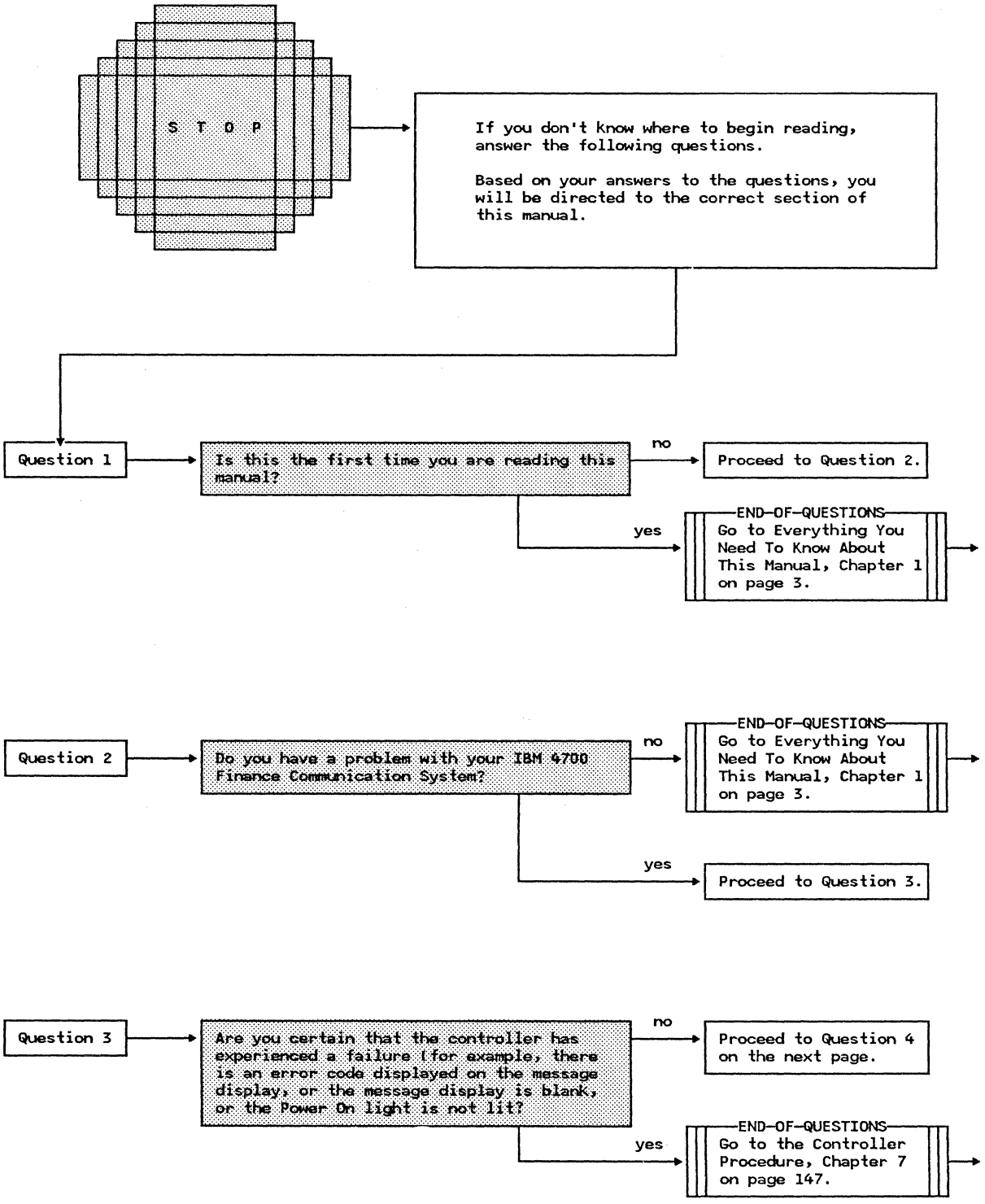
This publication contains these sections:

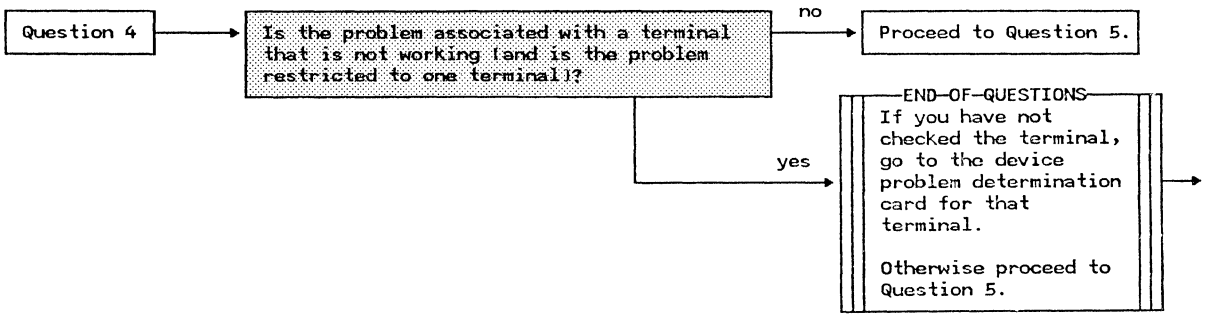
- An explanation of the manual which you should read before attempting to use the procedures.
- A procedure to find meaningful symptoms of the problem.
- Functional procedures to use in finding the source of the problem.
- A description of how the major system functions work.

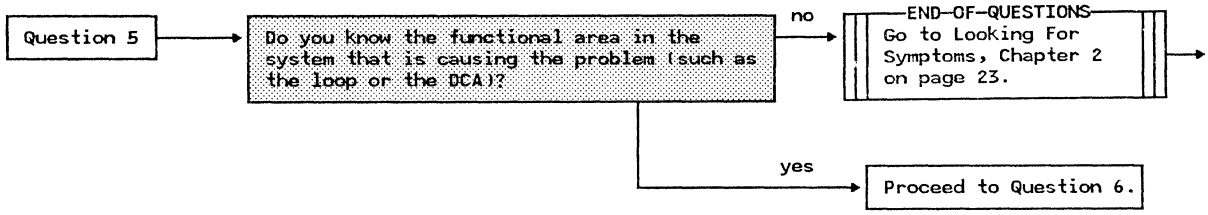
Related publications include:

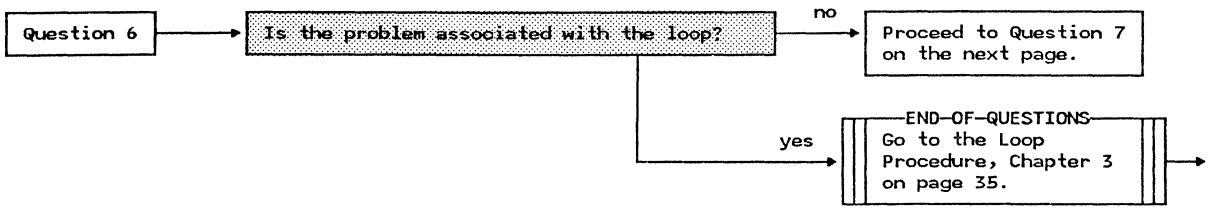
- IBM 4704 Display Station Problem Determination Card, GC31-2035
- IBM 4710 Receipt/Validation Printer Problem Determination Card, GC31-2036
- IBM 4700 Finance Communication System Subsystem Operating Procedures, GC31-2032

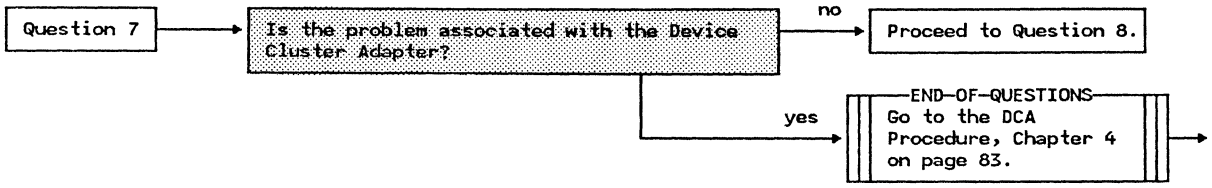
> Before attempting to use the procedures in this manual, read "Chapter 1, Everything You Need to Know About This Manual."

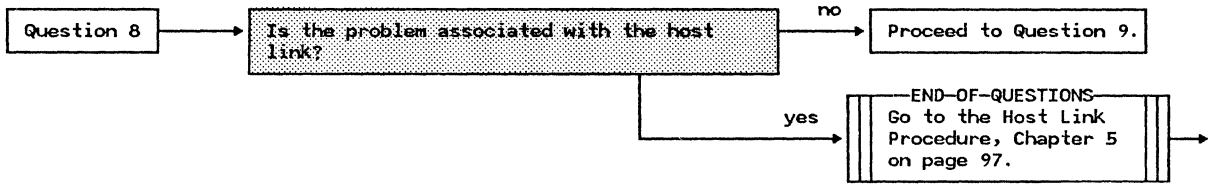

S T O P
If you don't know where to begin reading, answer the following questions.
Based on your answers to the questions, you will be directed to the correct section of this manual.
Question 1
Is this the first time you are reading this manual?
no
Proceed to Question 2.
yes
END-OF-QUESTIONS
Go to Everything You Need To Know About This Manual, Chapter 1 on page 3.
Question 2
Do you have a problem with your IBM 4700 Finance Communication System?
no
END-OF-QUESTIONS
Go to Everything You Need To Know About This Manual, Chapter 1 on page 3.
yes
Proceed to Question 3.
Question 3
Are you certain that the controller has experienced a failure (for example, there is an error code displayed on the message display, or the message display is blank, or the Power On light is not lit?
no
Proceed to Question 4 on the next page.
yes
END-OF-QUESTIONS
Go to the Controller Procedure, Chapter 7 on page 147.

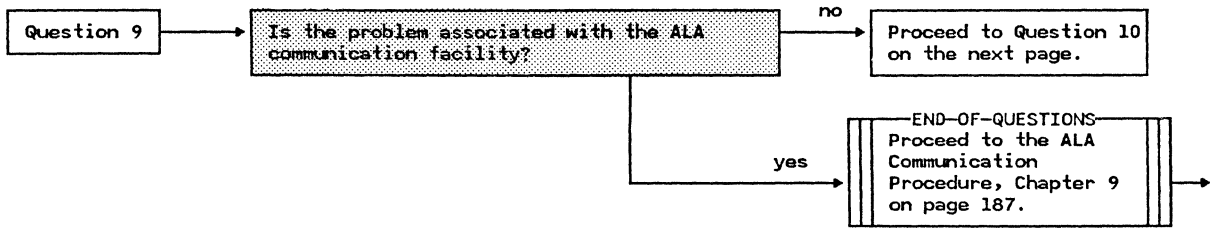

Question 4
Is the problem associated with a terminal that is not working (and is the problem restricted to one terminal)?
no
Proceed to Question 5.
yes
END-OF-QUESTIONS
If you have not checked the terminal, go to the device problem determination card for that terminal.
Otherwise proceed to Question 5.

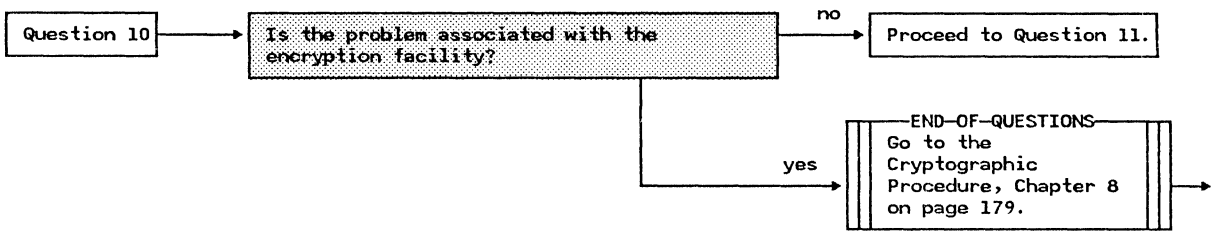

Question 5
Do you know the functional area in the system that is causing the problem (such as the loop or the DCA)?
no
END-OF-QUESTIONS
Go to Looking For Symptoms, Chapter 2 on page 23.
yes
Proceed to Question 6.


Question 6
Is the problem associated with the loop?
no
Proceed to Question 7 on the next page.
yes
END-OF-QUESTIONS
Go to the Loop Procedure, Chapter 3 on page 35.


Question 7
Is the problem associated with the Device Cluster Adapter?
no
Proceed to Question 8.
yes
END-OF-QUESTIONS
Go to the DCA Procedure, Chapter 4 on page 83.


Question 8
Is the problem associated with the host link?
no
Proceed to Question 9.
yes
END-OF-QUESTIONS
Go to the Host Link Procedure, Chapter 5 on page 97.


Question 9
Is the problem associated with the ALA communication facility?
no
Proceed to Question 10 on the next page.
yes
END-OF-QUESTIONS
Proceed to the ALA Communication Procedure, Chapter 9 on page 187.


Question 10
Is the problem associated with the encryption facility?
no
Proceed to Question 11.
yes
END-OF-QUESTIONS
Go to the Cryptographic Procedure, Chapter 8 on page 179.

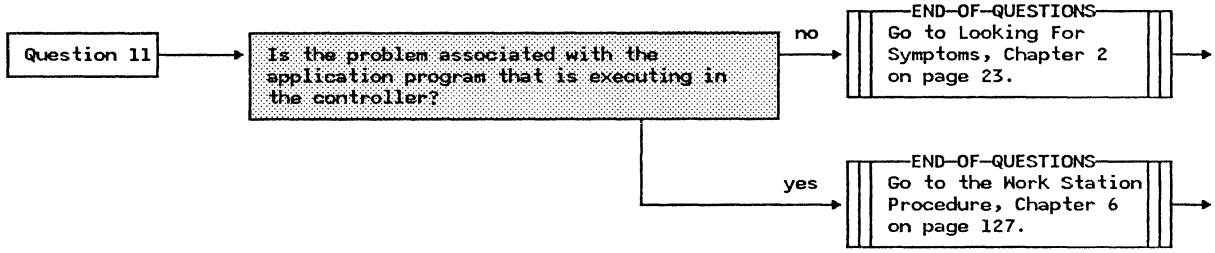

Question 11
Is the problem associated with the application program that is executing in the controller?
no
END-OF-QUESTIONS
Go to Looking For Symptoms, Chapter 2 on page 23.
yes
END-OF-QUESTIONS
Go to the Work Station Procedure, Chapter 6 on page 127.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Purpose of the Manual

This manual is intended for use by customer personnel in diagnosing problems in the IBM 4700 Finance Communication System.

It tells in detail how to examine each major system element to find the source of a system problem.

Organization of the Manual

The manual is organized into four main sections:

1. The Introduction - explains the contents of this manual and how it should be used. You are now in this section.

2. Searching For Symptoms of the Problem - directs you through an inspection of the 4700 log messages and system indicators for identifying meaningful symptoms.

3. Functional Procedures - are a series of detailed actions for you to perform in isolating the problem to something that can be replaced or repaired. These procedures cover the major functional areas of the controller (such as the loop, the DCA, the host link).

   The Functional Procedures are the major part of this manual. They are designed like road maps that you can follow in determining the cause of the problem that is affecting your institution's operation. They detail, in an easily understood way, a method for inspecting the 4700 System. The objective of these procedures is to isolate the source of a system problem to a specific component in your system. These procedures should give you the necessary assistance to restore your system to a fully operational status with minimum loss of time.

4. Information About Major System Functions - is an explanation of some of the major components in the system. For example, the loop protocol is explained in great detail.

   This level of knowledge is not required to use the Functional Procedures but is included for those readers interested in further knowledge on the subject.

The System Monitor

The system monitor is an application program supplied with the 4700 System that enables you to exercise operational control over the system. Through the use of this multi-function facility you can change system operating parameters, determine statistical counts for various functional parts of the system and for all of the attached devices, retrieve both system and application generated log messages, obtain application program debugging assistance, and perform data transfer type testing of attached devices.

The use of the system monitor is an integral part of the problem determination procedures in this manual. Familiarity with the operation of the system monitor is thus one of the requirements for using these procedures.

The IBM 4700 System permits two methods of user connection to the system monitor:

1. Direct connection of one of the display terminals attached to the controller (either a local or remote loop connected terminal, or a DCA connected terminal), and

2. Remote access connection which is the method of communicating with the system monitor using a terminal that is not connected to the IBM 4701 Controller (this terminal is connected to some other element in the overall system which is in turn connected to the controller normally via a telecommunications link). The remote access connection is usually made with the feature of the Communications Network Management (CNM) program that executes in the host system and the controller. In the absence of CNM, you can make the remote access connection using the Programmable Input Control facility of the IBM 4700 System.

Direct Terminal Connection to the System Monitor

You can use any loop-connected or DCA-connected display terminal that is connected to the IBM 4701 Controller to communicate with the system monitor in direct terminal connection mode. A terminal used in this fashion is referred to as a Control Operator Terminal.

Only one control operator terminal can be active on a controller at any one time. The terminal that assumes the role of the control operator terminal must be either a terminal in the 'free pool' or, if connected to a work station, the work station must be in the 'idle state' (the work station must have issued an LEXIT instruction).

You indicate to the 4701 controller that you want to assign a specific display terminal as a control operator terminal by pressing the Reset key on the keyboard three (3) times. If this terminal can be assigned as a control operator terminal the system will signify this fact by requesting the input of an appropriate identification code. This control operator identification code is established by your organization as part of system security restrictions of control operations to those individuals who are authorized to perform them.

A more complete description of this direct terminal connection to the system monitor is in the IBM 4700 Finance Communication System Subsystem Operating Procedures, GC31-2032.

Remote Access Connection to the System Monitor

In addition to direct terminal connection to the system monitor, the capabilities of the system monitor can also be invoked by someone who does not have access to a terminal that is connected to the controller. This manner of access is referred to as remote access connection and uses a terminal on a system that is connected to the controller normally through a telecommunication link (such as a terminal on the host processor).

Remote Access Connection Using Communications Network Management

A system support operator using a terminal on a host system that has the Communications Network Management (CNM) program installed can invoke system monitor functions in a manner that is identical to the direct terminal connection. The same commands are used to request system monitor functions whether the operator is using a terminal on the controller or a terminal on a telecommunication linked system with the controller. Thus the procedures do not differentiate between the two forms of terminal connection when suggesting performing a System Monitor function.

Remote Access Connection Using the Programmed Input Facility

If remote access connection is desired without using CNM, you must use the Programmed Input Facility of the 4700. This facility enables a work station in the controller (or more than one work station in the controller) to communicate with the work station executing the system monitor application program.

You must write an application program must be written to execute in the controller that will communicate with the system monitor work station and with a host application program. This companion application program executing in the host will be responsible for accepting terminal input containing the system monitor commands, transmitting these commands to the controller program, and displaying the responses from the controller.

Statistical Counters

Statistical counters record counts of events related to functional components in the system such as terminals and communication facilities. The content of these counters are referred to by the procedures in this manual.

To ensure that the counters continue to increment when they reach their maximum value (they will wrap from 255 to 128), the STATS parameter of the STARTGEN statement in the CPGEN should specify the WRAP option.

Format of the Procedures

The format of these procedures has been specifically chosen to make the series of actions that make up the procedure readable and understandable. These actions are tasks for you to do in the process of diagnosing the problem. The format of each action has three parts (see Figure 1):

1. The 'Action' describes the task you are to perform.

2. The 'Method of Analysis' details how to perform the action.

3. The 'Recommendations' indicates, if the source of the problem has been determined, how to correct the problem, or, if the procedure is not yet complete, the next action in the procedure to perform.

   A unique recommendation box (labeled 'END OF PROCEDURE') identifies when you have reached the final action in the procedure (see the recommendation associated with the 'no' answer in Figure 1).

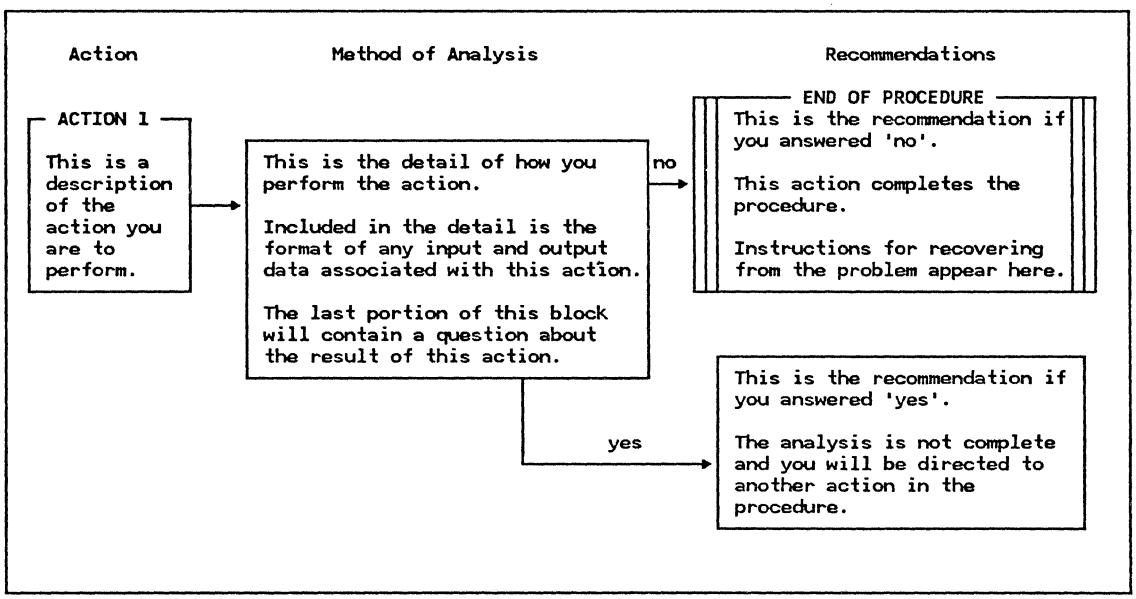


Figure 1. Format of the Procedures

Nomenclature and Terminology Used in the Procedures

Terminology: The Message Display

The message display is on the Operator Control Panel and has four alphameric character displays (see Figure 2). During system startup, this four-character display indicates the diagnostic routine that is currently executing and, in the event of a detected failure, displays a failure code.

When system startup completes and the system is operational, the message display defines the operational status of the major functional components of the subsystem (that is, the alternative line attachment (ALA) host links, the loop, and the Device Cluster Adapter).

Each of these system components has been assigned a specific display character. Thus, the first character of the message display indicates the status of the ALA lines, the second character indicates the status of the host link, and the third character indicates the status of the loop, and the fourth character indicates the status of the Device Cluster Adapter.

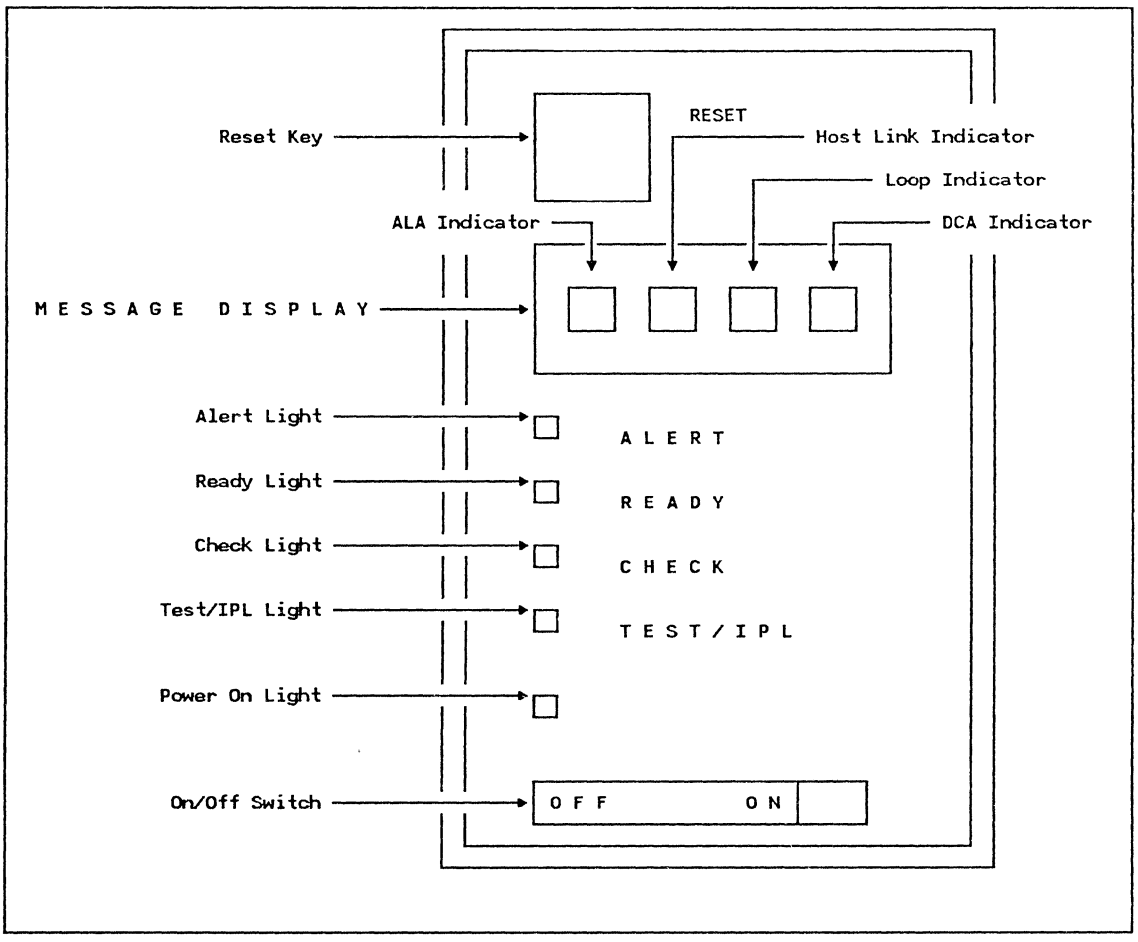


Figure 2. Controller Operator Control Panel

Terminology: Requesting System Monitor Commands in the Procedures

The system monitor is a multi-function facility in the 4700 that enables the user to retrieve system data and to control devices on the system. This capability is used extensively in the problem determination procedures in this manual.

The procedures assume that you have accessed the system monitor before beginning the procedure. Thus, the procedures do not direct you (nor indicate how) to 'log on' to the system monitor. Detailed instructions for gaining access to the system monitor are in the IBM 4700 Finance Communication System Subsystem Operating Procedures, GC31-2032.

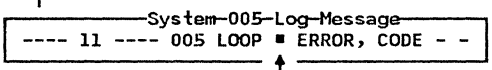
When the procedures direct you to perform a system monitor operation, the format of the input message to the system monitor will appear like this example from the loop procedure:

Using the system monitor:

1. Issue the Log Selective Display command to display any log messages associated with the loop. This command is requested by entering 301 005 from the control operator terminal.

The display of the data that will result from entering a directed system monitor command will appear like this example from the Loop Procedure:

The 005 log message is displayed in the following format:



Loop Number

This display of the output data will consist of the constant data in the log message (for example, the word LOOP in the 005 log message), dashes for fields that are not of interest at the moment, and black boxes (that is, ■ in the 005 log message above) indicating the data of interest. Arrows will also identify the fields of interest.

Terminology: Terminal Ready Indicators

All terminals that connect to a 4701 controller (such as, loop or DCA terminals) display the terminal Ready indicator when a valid connection is made between the terminal and the controller.

The Ready indicator is a light on some terminals (such as, the IBM 4710 Receipt Validation printer or the IBM 3604 Display) and a symbol on other terminals (such as, the IBM 4704 Display or the IBM 3278 Display). The symbol used on the IBM 4704 Display is a lightning bolt beside the word 'OK'. The IBM 3278 Display uses the digits '4700' as the symbol for the Ready indicator.

To determine the type of Ready indicator for a specific terminal and its location on the terminal, refer to the Operating Reference Manual for that terminal.

Terminology: Direction to Another Action

To minimize the probability of your going to the wrong action, the procedure uses these variations in wording to indicate whether you are directed to the next sequential action, to an action beyond the next sequential action, or to an earlier action:

1. If the next action is the next sequential action, the recommendation is worded: "Proceed to Action --."
2. If the next action is beyond the next sequential action, the recommendation is worded: "Go to Action --."
3. If the next action is an earlier numbered action, the recommendation is worded: "Go back to Action --."

Terminology: Your Institution's Procedures

When you have completed a procedure, the 'End of Procedure' usually directs you to obtain service for some component in the IBM 4700 system.

You can have some devices repaired at a Service Center. Other devices may be serviced at your site. How service is obtained varies from institution to institution.

IBM recommends that your institution create a definition of how you will obtain service for each device type. This service definition will be part of a procedure for your institution that reflects what is unique to your system.

Your 'institution procedure' should also address application level problem determination. It should include a procedure that is tailored to the application program. This procedure should probably follow the same format as the procedures in this manual to avoid any reader confusion.

Terminology: Loop Layout Diagram

The loop is an integral part of the 4700 system and is one of the ways of connecting terminals to the controller. The loop has been designed to provide efficient and effective data transmission as well as sophisticated error recovery. In addition, the loop has integrated problem determination capability to permit a high degree of serviceability.

Performing problem determination on the loop requires knowledge of the physical layout of the loop cables and the direction of the signal path. When the installation layout plan is complete, you should develop a Loop Layout Diagram similar to the Loop Layout Diagram in Figure 4. As an example, the form in this figure has been filled out with data to reflect the loop configuration shown in Figure 3.

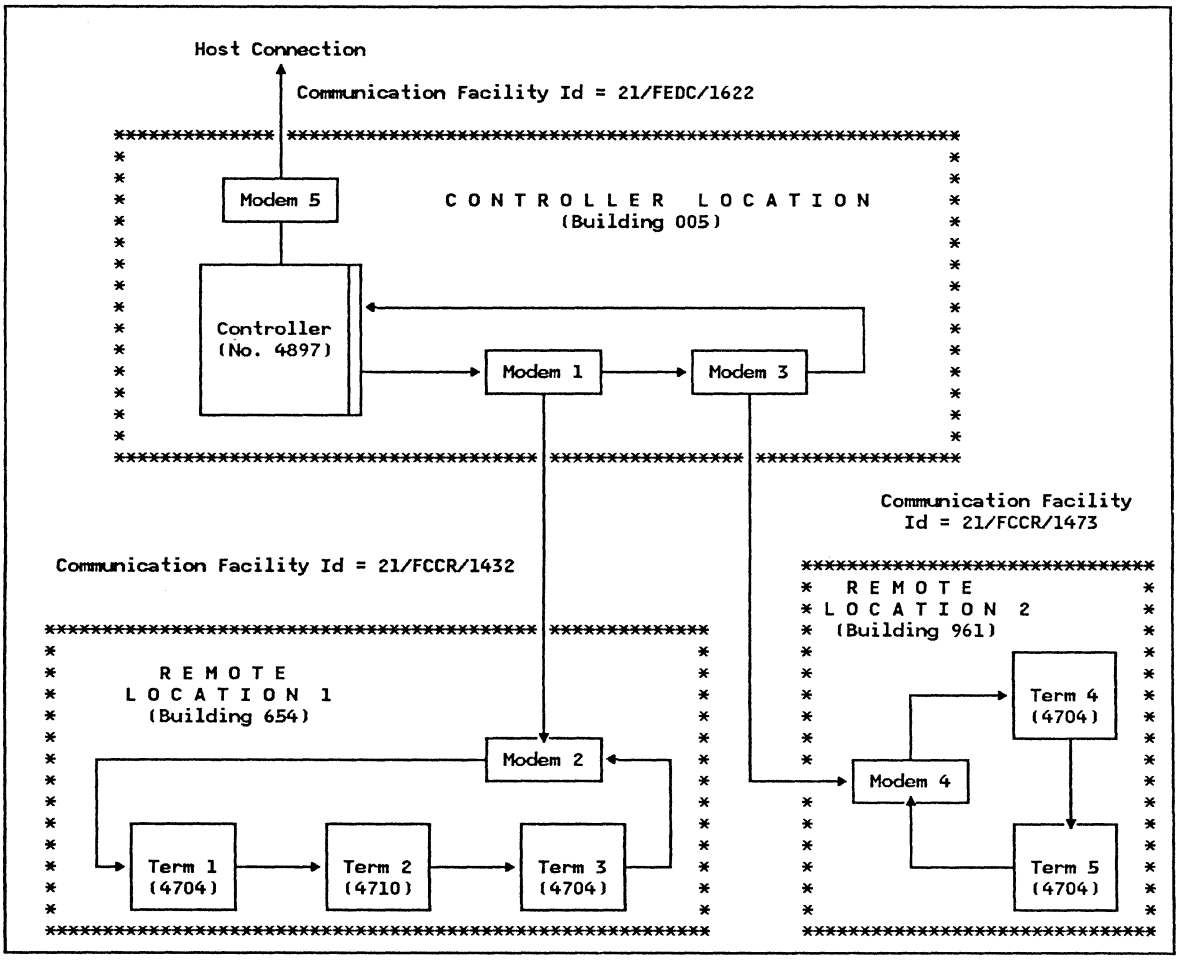
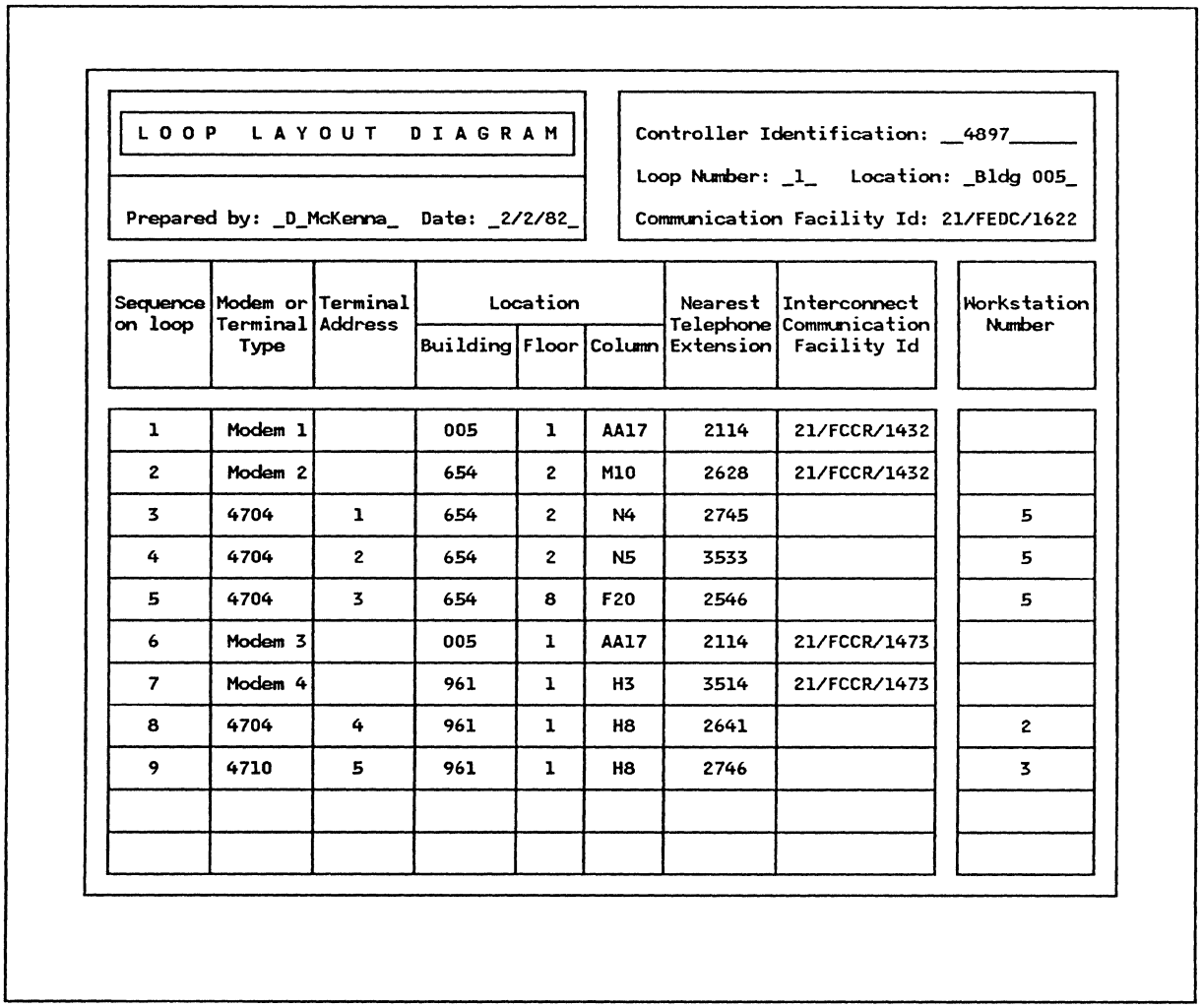


Figure 3. Example of a Remote Loop Configuration

Sequence on the loop refers to the direction of data flow on the loop. The data signals leave the controller from the portion of the loop receptacle on the controller that accepts the male cable connector. The terminals should be in the order that they receive the data signals.

A copy of the Loop Layout Diagram is in the appendix of this manual and also in the IBM 4700 Finance Communication System Installation Planning Manual, GC31-2018.



L O O P L A Y O U T D I A G R A M

Prepared by: _D_McKenna_ Date: _2/2/82_

Controller Identification: __4897_____

Loop Number: _1_ Location: _Bldg 005_

Communication Facility Id: 21/FEDC/1622

Sequence on loop	Modem or Terminal Type	Terminal Address	Location			Nearest Telephone Extension	Interconnect Communication Facility Id	Workstation Number
			Building	Floor	Column			
1	Modem 1		005	1	AA17	2114	21/FCCR/1432	
2	Modem 2		654	2	M10	2628	21/FCCR/1432	
3	4704	1	654	2	N4	2745		5
4	4704	2	654	2	N5	3533		5
5	4704	3	654	8	F20	2546		5
6	Modem 3		005	1	AA17	2114	21/FCCR/1473	
7	Modem 4		961	1	H3	3514	21/FCCR/1473	
8	4704	4	961	1	H8	2641		2
9	4710	5	961	1	H8	2746		3

Figure 4. Loop Layout Diagram

An Example of the Procedures

To help you to understand the format of the procedures, a sample procedure has been developed that addresses the problem that you might experience when your house feels uncomfortably cold. This procedure details the actions one should perform in determining the cause of the problem and is shown, with an explanation of each action, in the following sections. The objective of the procedure is to determine what to do to restore the house to a comfortable temperature.

To keep the procedure as simple as possible, the assumption is made that the heating system is electric and controlled from within the house by means of a thermostat. A thermostat is an electro-mechanical control device that is an integral part of the heating system and which is used to regulate the temperature of the house. The thermostat consists of a settable indicator that is used to define the desired temperature for the house and a temperature measurement facility for determining the current temperature of the house. When the house temperature drops below the desired temperature (that which has been set on the indicator) the thermostat causes the heating system to operate and will keep the heating system operating until the house temperature reaches the desired temperature.

It is further assumed that the electrical system is protected by fuses and the user of this procedure knows the location of the fuse box and how to change a fuse.

Action 1 — Determine the Setting of the Thermostat (see Figure 5.1)

The first action is to determine the setting of the thermostat. The 'Method of Analysis' block in Action 1 directs you to check this setting and shows, by means of a diagram, what you should look for when examining the thermostat. No question is asked of you at this time and so only one 'Recommendation' block is defined. This directs the reader to proceed to Action 2.

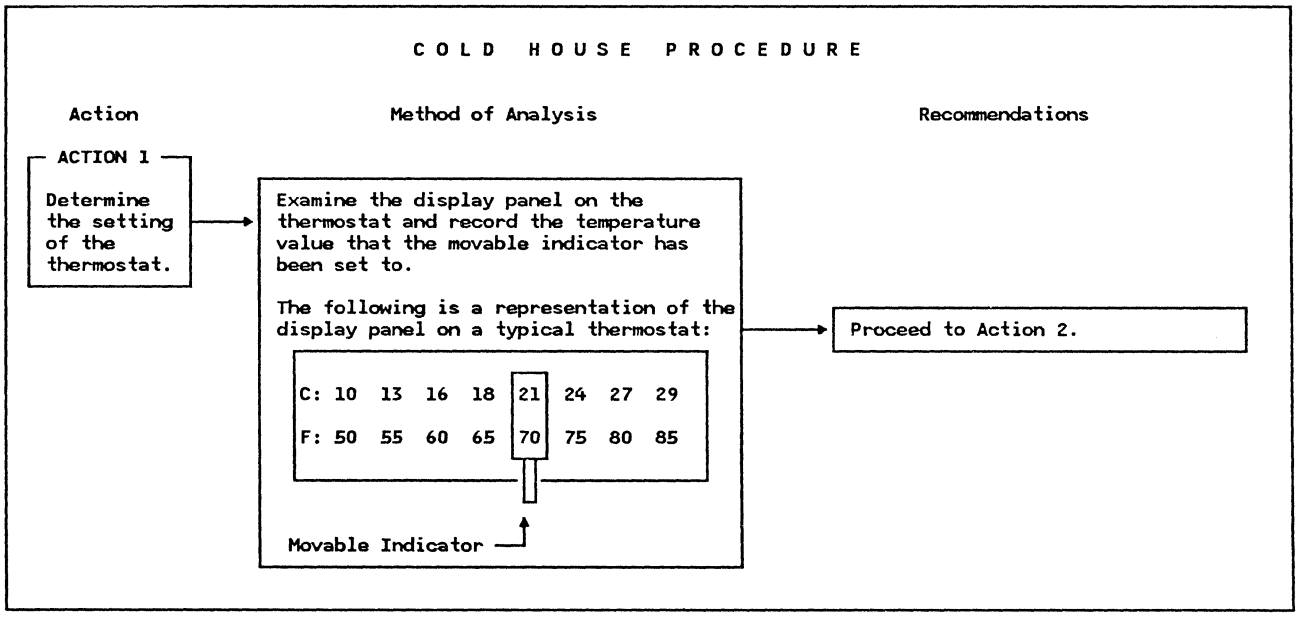


Figure 5.1. Action 1 of the Cold House Procedure

Action 2 — Determine the Current Temperature (see Figure 5.2)

The second action (Action 2) determines whether the temperature is outside the limits of the thermostat setting. We do this by reading a thermometer. If the temperature in the house matches the setting of the thermostat, we can assume the heating system is operating correctly. The reason the house feels cold is probably due to too low a setting of the thermostat. However, feeling cold could also be the result of the person not wearing an adequate amount of clothing.

If the temperature matches the setting of the thermostat, the procedure ends at this action. The recommendation block that is associated with the 'yes' answer to the question is an 'End of Procedure' block (signified by the three lines on each side of the block). It recommends several solutions including elevation of the thermostat setting.

If the thermometer registers a value less than the thermostat setting, further examination is necessary and thus you are directed to proceed to Action 3.

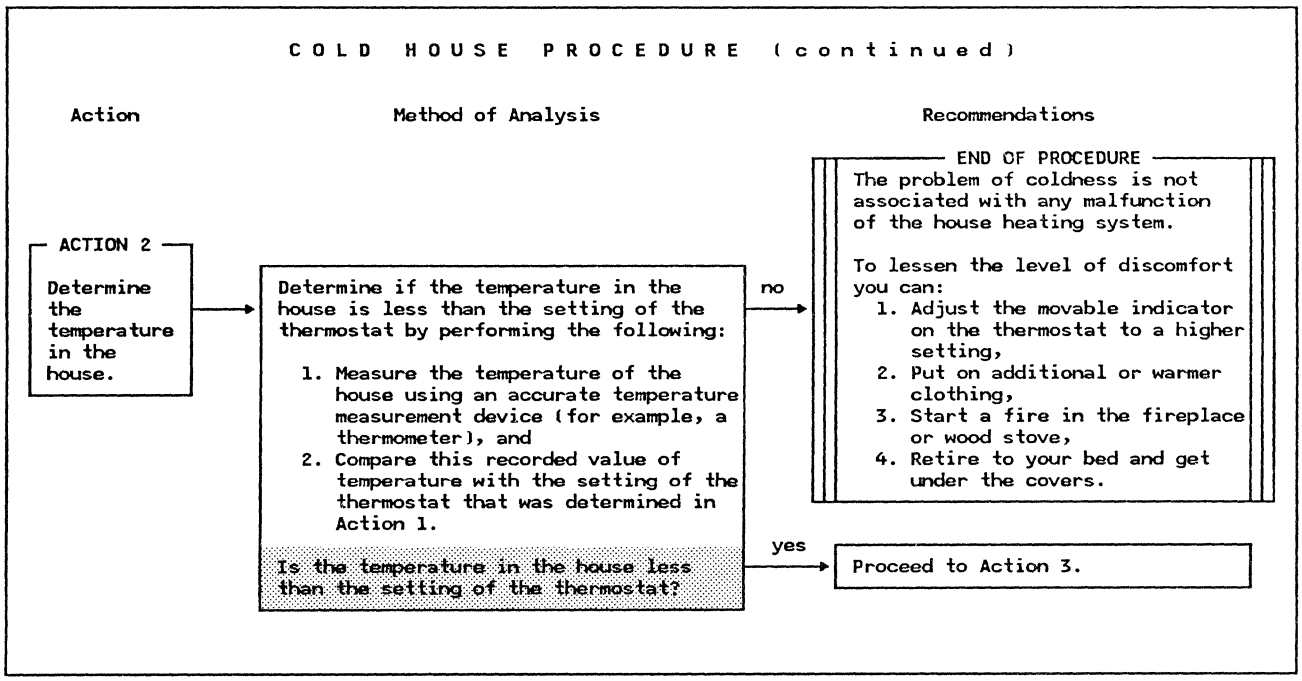


Figure 5.2. Action 2 of the Cold House Procedure

Action 3 — Verify Availability of Electricity (see Figure 5.3)

Reaching this point in the procedure indicates that the temperature of the house does not match the setting of the thermostat. One of the possible causes for this condition could be that the heating system is not operating as a result of an interruption in electric service to the house.

The procedure in Action 3 directs the reader to verify that there is electricity available at this time. The method of performing this verification that is suggested is to attempt to operate an electric appliance or to light a lamp. This should indicate, if the appliance operates (or doesn't operate) whether electricity is present or not present. If there is no electricity, the recommendation block associated with a 'no' answer directs the reader to notify the appropriate utility company of this fact. At this point, the procedure is finished because the cause of the problem has been identified and a method of resolving the problem has been suggested. This 'no' recommendation block is thus an 'End of Procedure' block.

If electric service is present in the house, further examination is necessary and thus the reader is directed to proceed to Action 4.

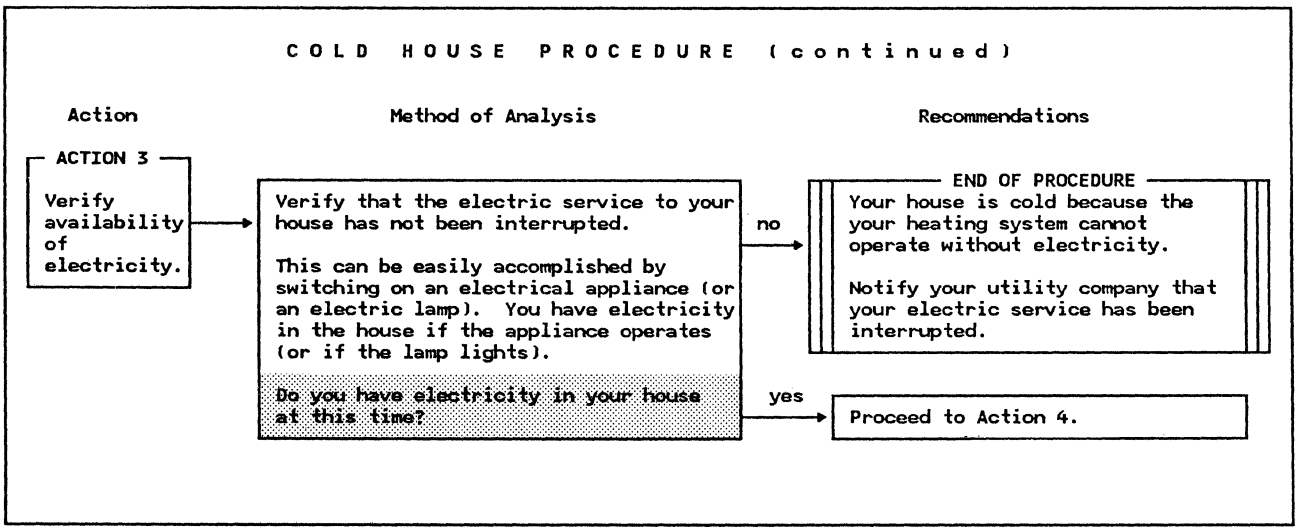


Figure 5.3. Action 3 of the Cold House Procedure

Action 4 — Check the Heating System Fuse (see Figure 5.4)

At this point in the procedure it has been determined that the electric service to the house has not been interrupted. However, there may not be electricity available at the heating system because the associated fuse may have interrupted the electric service because of an overload condition.

The procedure in Action 4 directs the reader to replace the fuse associated with the heating system to determine whether the fuse had 'blown'. If this action causes the heating system to again operate (it is assumed that operation of the heating system can be determined by, for instance, hearing the blowers begin to operate), the problem has been solved. The coldness of the house was due to an interruption of electricity to the heating system caused by a 'blown' fuse.

If replacing the fuse does not correct the problem, further testing is beyond the capability of an average homeowner. The recommendation in this case is to call a heating specialist for service.

This action completes the procedure.

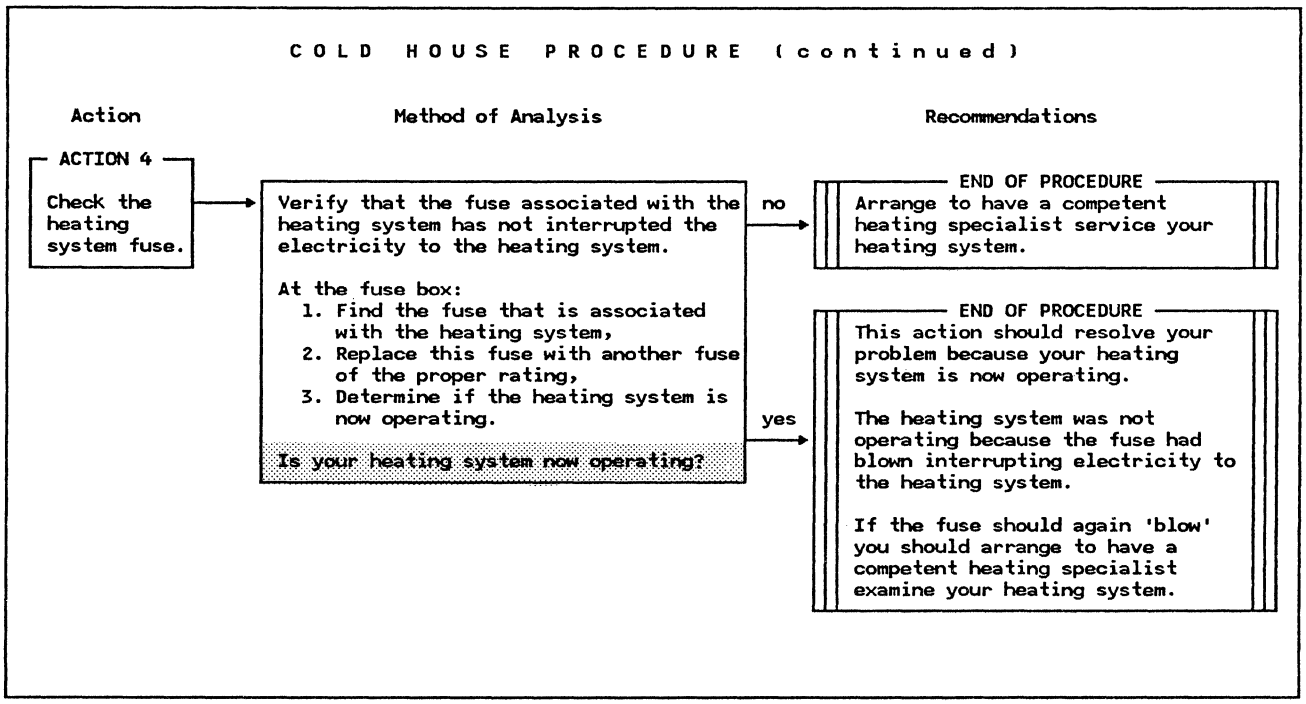


Figure 5.4. Action 4 of the Cold House Procedure

Definition of Terms

address sharing. A feature of the 4700 terminals that permits more than one terminal to be assigned to the same terminal address.

ALA. See Alternative Line Attachment.

Alert light. This is the topmost light on the IBM 4701 Controller. It comes on when a log message, that should be examined by the control operator, has been written to the controller log file. The Alert light goes off when log messages are displayed (using a system monitor command).

Alternative Line Attachment (ALA). A point-to-point or multidrop communication medium used to exchange messages between the controller and terminals. Several communication protocols are supported.

application program. That portion of the controller programming that is written for or by the user and performs the customer application function. In your installation, this may be a program product from a vendor.

auxiliary diskette drive. The drive in an expansion unit. This may be the primary or the secondary diskette drive (depending on whether or not it contains the operating diskette).

CNM. See Communication Network Management.

Communications Network Management (CNM). A facility in the controller and the host processor for accomplishing network problem determination. This facility permits an operator at the host processor to remotely control the 4700 system and solicit statistical data for error and performance analysis.

controller diskette drive. The drive in the controller. This may be the primary or the secondary diskette drive (depending on whether or not it contains the operating diskette).

controller log file. That portion of the temporary file on your operating diskette where system, and user, log messages are recorded.

control operator terminal. A terminal that has been used to access the system monitor. Only one terminal on the controller can be a Control Operator Terminal at any one time. This terminal is used to perform system functions (for example, starting the host link or displaying statistical counter data).

CPGEN. The collection of configuration instructions that defines the physical and logical configuration of the IBM 4701 Controller and associated terminals.

DCA. See Device Cluster Adapter.

Device Cluster Adapter (DCA). A feature of the 4700 system that provides a very high data rate terminal connection capability on the controller. Terminals are connected to the controller with coaxial cables and data is transmitted to and from the terminals at a data rate in the millions-of-bits per second.

diagnostic phase of startup. The initial processing in the controller that verifies correct operation of the controller hardware.

direction of loop data flow. The data signals leave the controller from the loop port that accepts the male cable connector and return to the controller through the female cable connector.

EIA cable. A cable, using a standard connection interface defined by the Electronics Industries Association, that connects the controller to a modem.

finance loop. A communication medium (utilizing the finance loop protocol) used to exchange messages between the controller and its associated terminals. The physical loop uses a shielded pair of twisted conductors for local segments. Remote segments require the use of modems.

finance loop protocol. Communication on the finance loop involves a strict line discipline. The bit pattern on the loop is grouped into basic elements called slots and frames which carry the control orders, terminal orders, and the data that makes up the messages.

frame. A logical collection of bits on the Finance Loop. A frame consists of a unique beginning slot, used to identify the frame, and followed by 16 data/command slots associated (by slot number) with the terminals on the loop.

free pool. The collection of devices that have been specified in the CPGEN but have not been assigned to specific work station. These devices can be associated with a work station through the use of system monitor commands or by using the ASSIGN instruction in an application program.

hexadecimal digit. One of the counting elements in a number system with a base of 16. The digits are 0-9 and A-F (where A is equivalent to 10 and F is equivalent to 15).

hexdigit. See hexadecimal digit.

host processor. The computing system that the controller is connected to via the host link.

host link. The physical and logical connection between the host processor and the controller.

idle state. The condition of an application work station when the application program has completed execution (that is, issued a LEXIT instruction) or has not yet begun executing.

log file. See controller log file.

logical work station. A portion of the controller storage that is dedicated to the execution of an application program on behalf of input from terminals that make up an associated physical work station.

loop layout diagram. A form used to record the sequence of terminal connections on a loop and the communication facility identification of all telecommunication links.

loop protocol. See finance loop protocol.

loop segment. That portion of the loop that services a single physical location on a loop that services multiple locations.

Loop Station Connector (LSC). An outlet socket that provides quick physical connection of devices to the IBM Multiuse Communications Loop. It contains capability to channel data signals on the loop past a device that is powered off or unplugged.

LSC. See Loop Station Connector.

modem. A signal-conversion device located at the end of a telecommunication line. At a transmitting location, the modem converts data bits to signals suitable for transmission over the telecommunication line. At the receiving location, it converts the transmitted signals back to data bits.

Multiuse Communication Loop. The unit data link feature on an IBM 8100 System for remote attachment or direct connection of terminals or controllers using a SDLC data transmission protocol.

operational loading phase of startup. That portion of startup when system data is loaded into the controller storage and initialized.

operational phase of startup. The final phase of controller startup. The work stations are active and the application programs are executing. The controller has been tested and found to be operational. The system data has been successfully loaded from the diskette and initialized.

operator control panel. The front panel of the controller that contains the operational keys and display indicators (the Alert light and the message display are on this panel).

PDP. See problem determination procedure.

physical unit. Systems Network Architecture (SNA) terminology for that function in the controller that communicates with the system services control point in the host processor to establish and end communication sessions between the controller and the host processor. This function is also responsible for sending maintenance statistics to the host processor.

physical work station. The collection of terminals that are logically related to the execution of an application program. These terminals are all associated with a logical work station.

primary diskette drive. The diskette drive which contains the operating diskette and from which the starting of the controller is controlled. It may be physically the controller diskette drive or the expansion unit diskette drive.

problem determination procedure (PDP). A sequence of one or more actions that assist in the resolution of a problem.

Programmed Input Facility. The application level interface to the system monitor. This facility enables an application program, executing in the controller, to communicate with the system monitor and request system monitor functions.

PU. See physical unit.

Ready indicator. A visual indicator on the terminal that indicates when the terminal can communicate with the controller. This indicator, in almost all cases, is a light (for example, the Ready indicator on the IBM 4710 Printer) or a generated symbol (a lightning bolt followed by the characters OK) written to a fixed location of a display screen (for example, the Ready indicator on the IBM 4704 Display).

Reset key. The top blue button on the operator panel of the controller. Pressing this key starts the controller.

secondary diskette drive. In a system with two diskette drives, this is the drive that does not contain the operating diskette (see primary diskette drive).

slot. The basic transmission block in the finance loop protocol. A slot consists of 18 bits (two data bytes and two control bits) and is normally associated with a specific terminal on the loop.

slot group. Those slots in the frame that are associated with a given terminal address.

SSCP. See System Services Control Point.

SSCP-PU Session. The initial logical connection that must be established under the Systems Network Architecture communications protocol before a device can communicate with its host processor.

statistical counters. That portion of the controller storage that is used to record counts of events related to terminals and communication lines attached to the controller.

System Monitor. A system provided application program that executes as part of the controller control program. It is used to perform various system functions requested either from the control operator terminal or from an application program using the Programmed Input Facility.

System Services Control Point (SSCP). The portion of the Systems Network Architecture (SNA) function in the host processor that is responsible for establishing, managing, and ending host-controller communication sessions.

temporary file. A file on the diskette that is used to store data that will not be retained when the controller is restarted.

work station. See logical work station.

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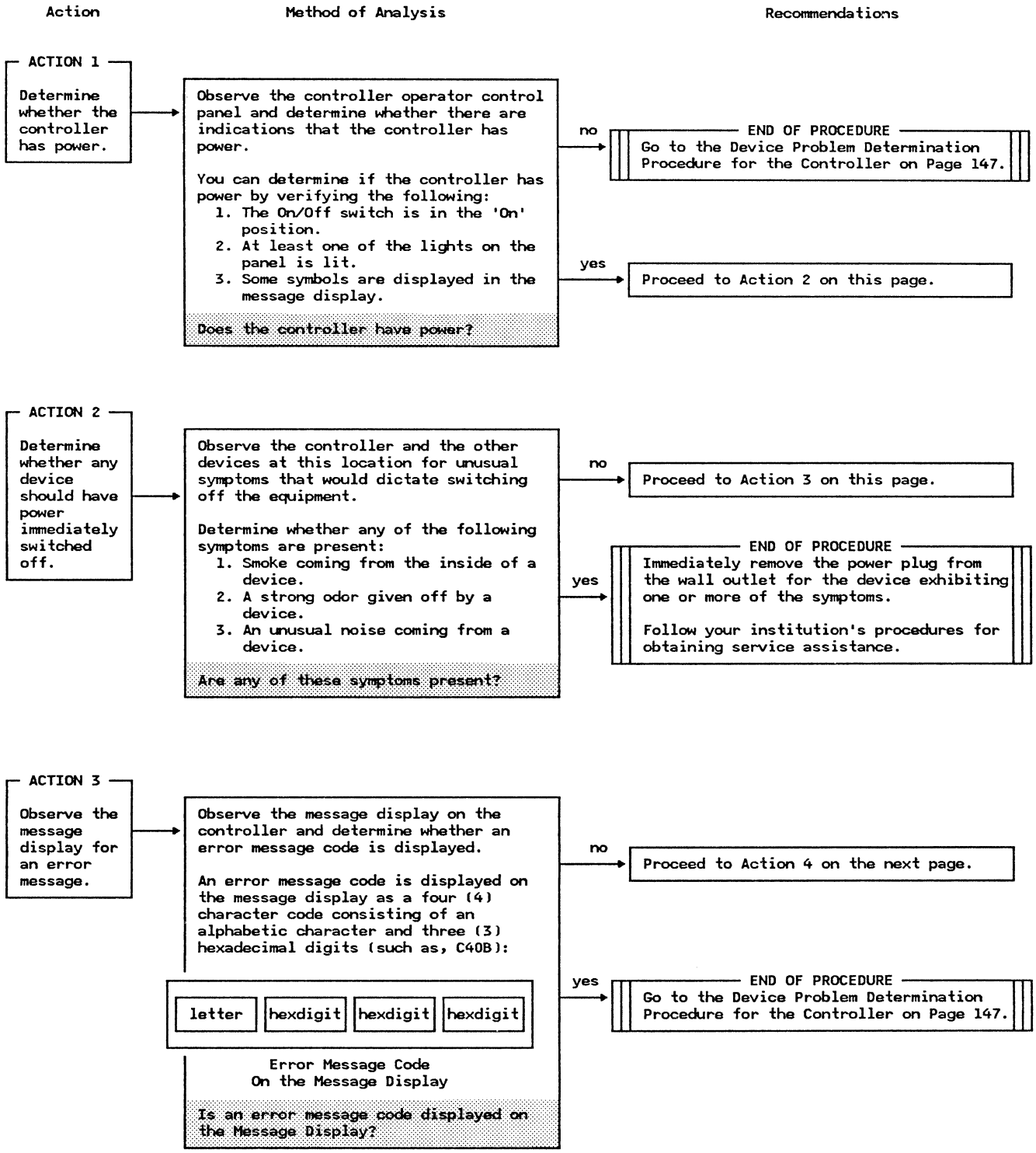
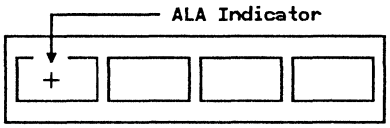
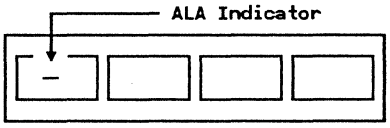
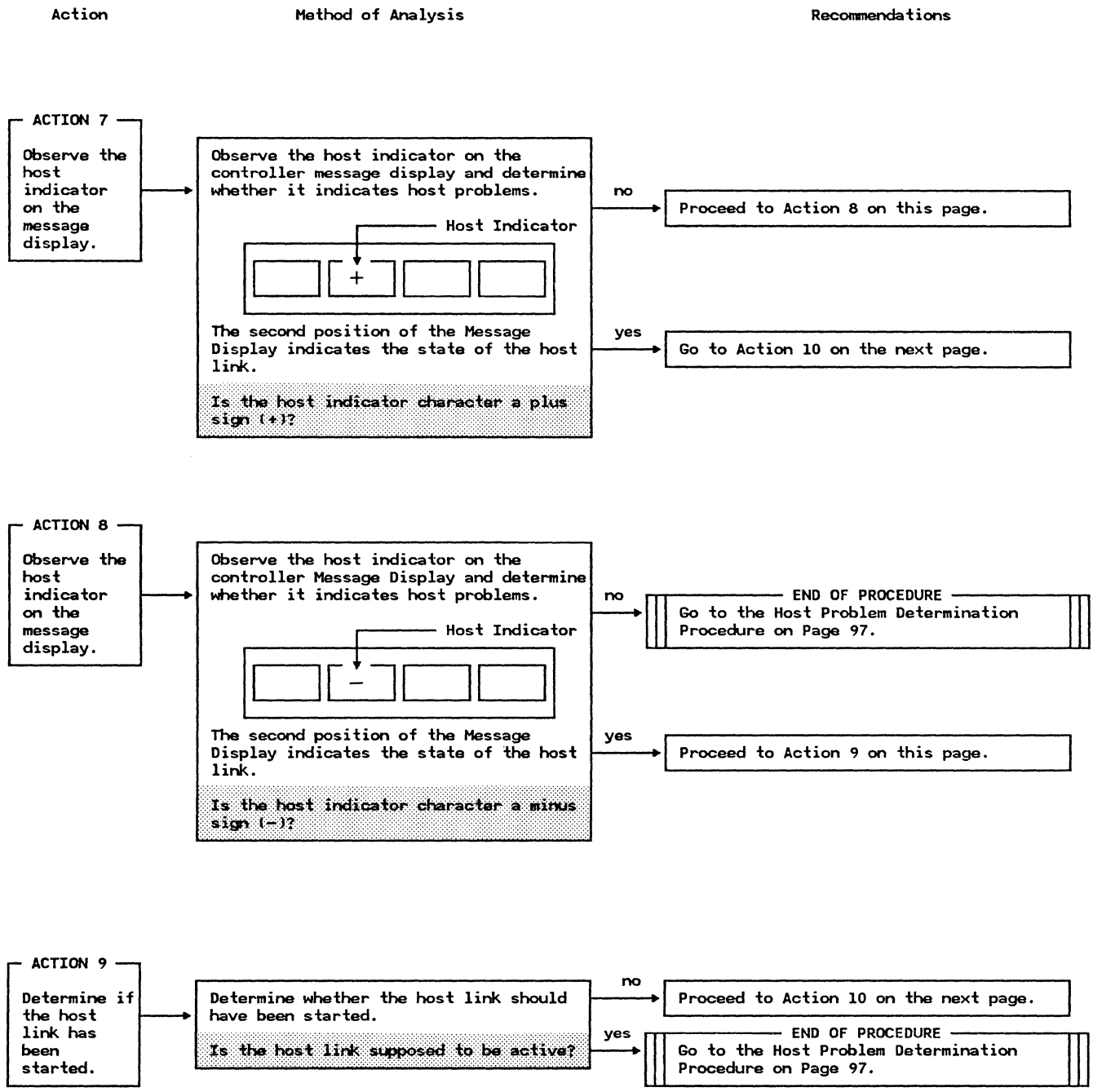
Looking for Symptoms Procedure



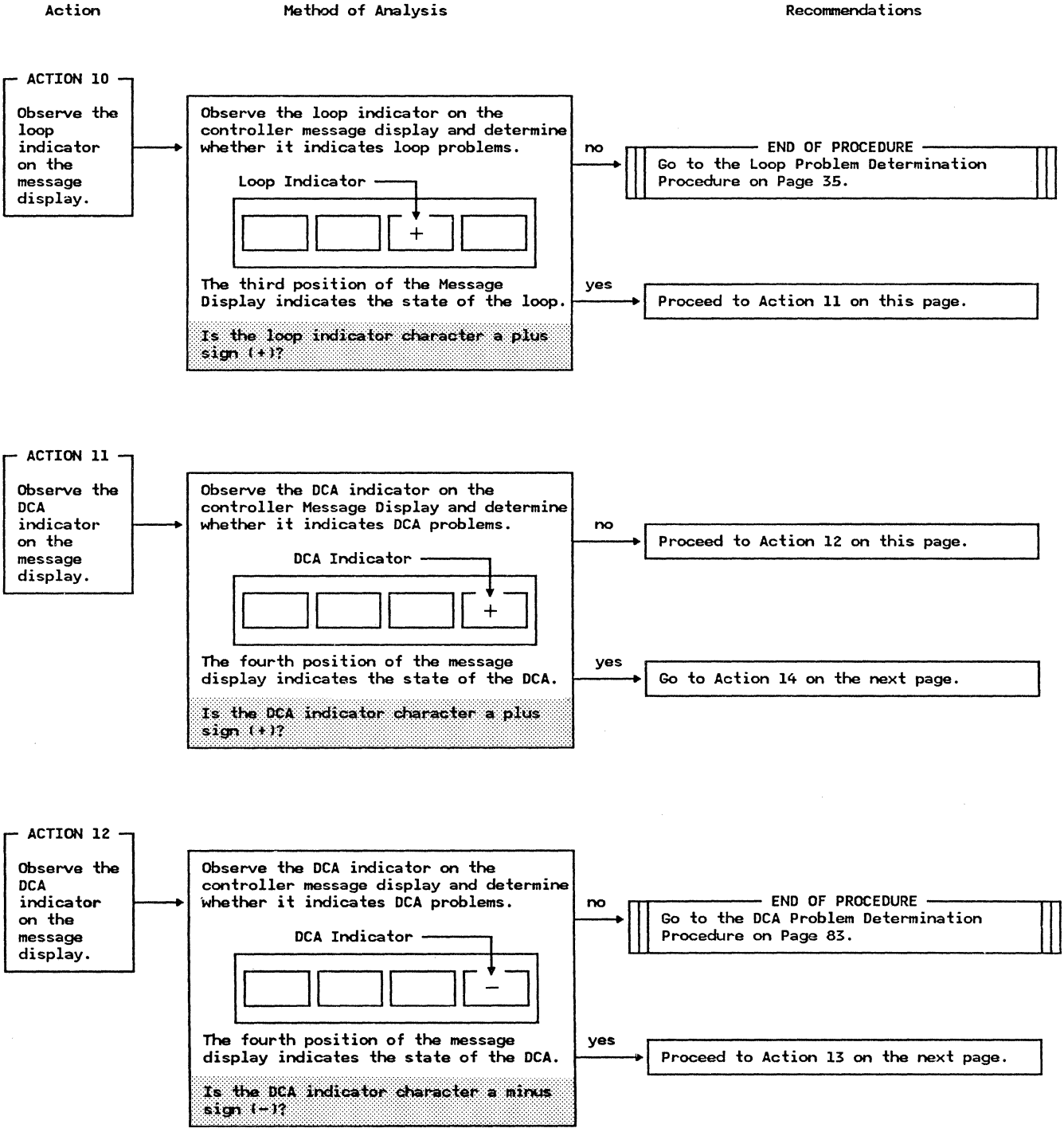
Looking for Symptoms Procedure (continued)

Action	Method of Analysis	Recommendations
ACTION 4 Observe the ALA indicator on the message display.	Observe the ALA indicator on the controller message display and determine whether it indicates ALA problems.  The first position of the Message Display indicates the state of the ALA line(s). **Is the ALA indicator character a plus sign (+)?**	no → Proceed to Action 5 on this page. yes → Go to Action 7 on the next page.
ACTION 5 Observe the ALA indicator on the message display.	Observe the ALA indicator on the controller Message Display and determine whether it indicates ALA problems.  The first position of the Message Display indicates the state of the ALA link. **Is the ALA indicator character a minus sign (–)?**	no → END OF PROCEDURE Go to the ALA Problem Determination Procedure on Page 187. yes → Proceed to Action 6 on this page.
ACTION 6 Determine if the ALA link has been started.	Determine whether the ALA link should have been started. **Is the ALA link supposed to be active?**	no → Proceed to Action 7 on the next page. yes → END OF PROCEDURE Go to the ALA Problem Determination Procedure on Page 187.

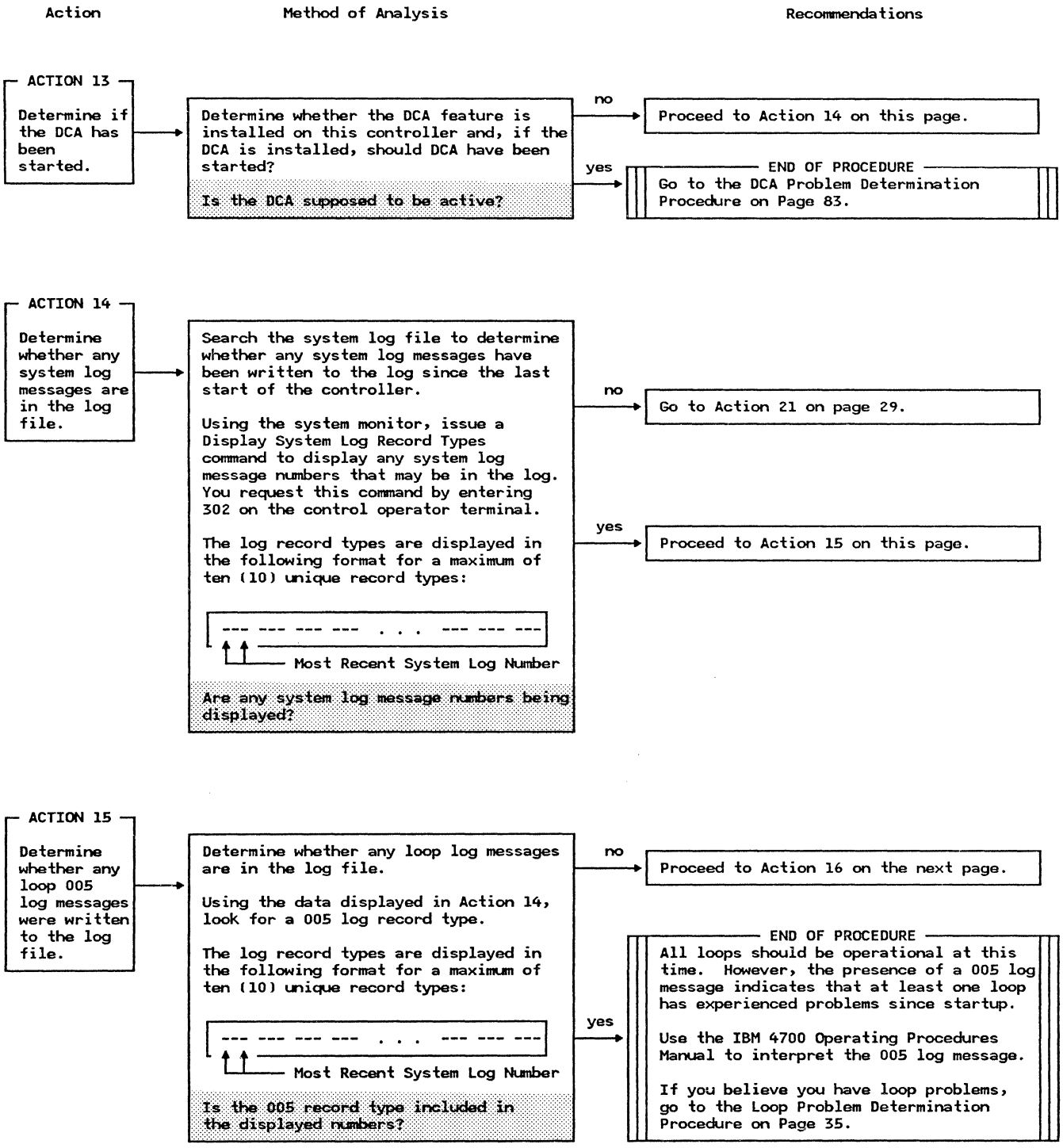
Looking for Symptoms Procedure (continued)



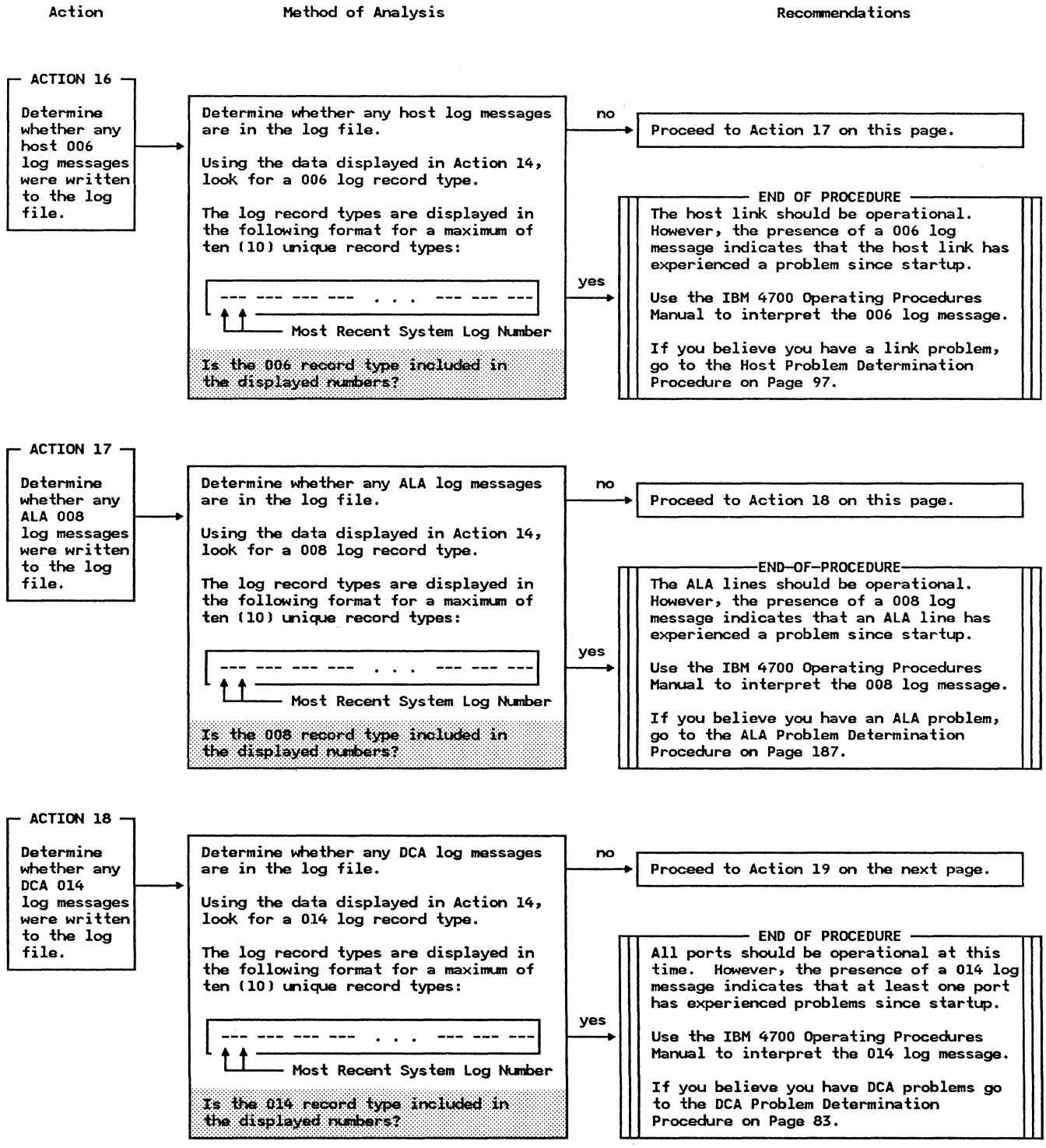
Looking for Symptoms Procedure (continued)



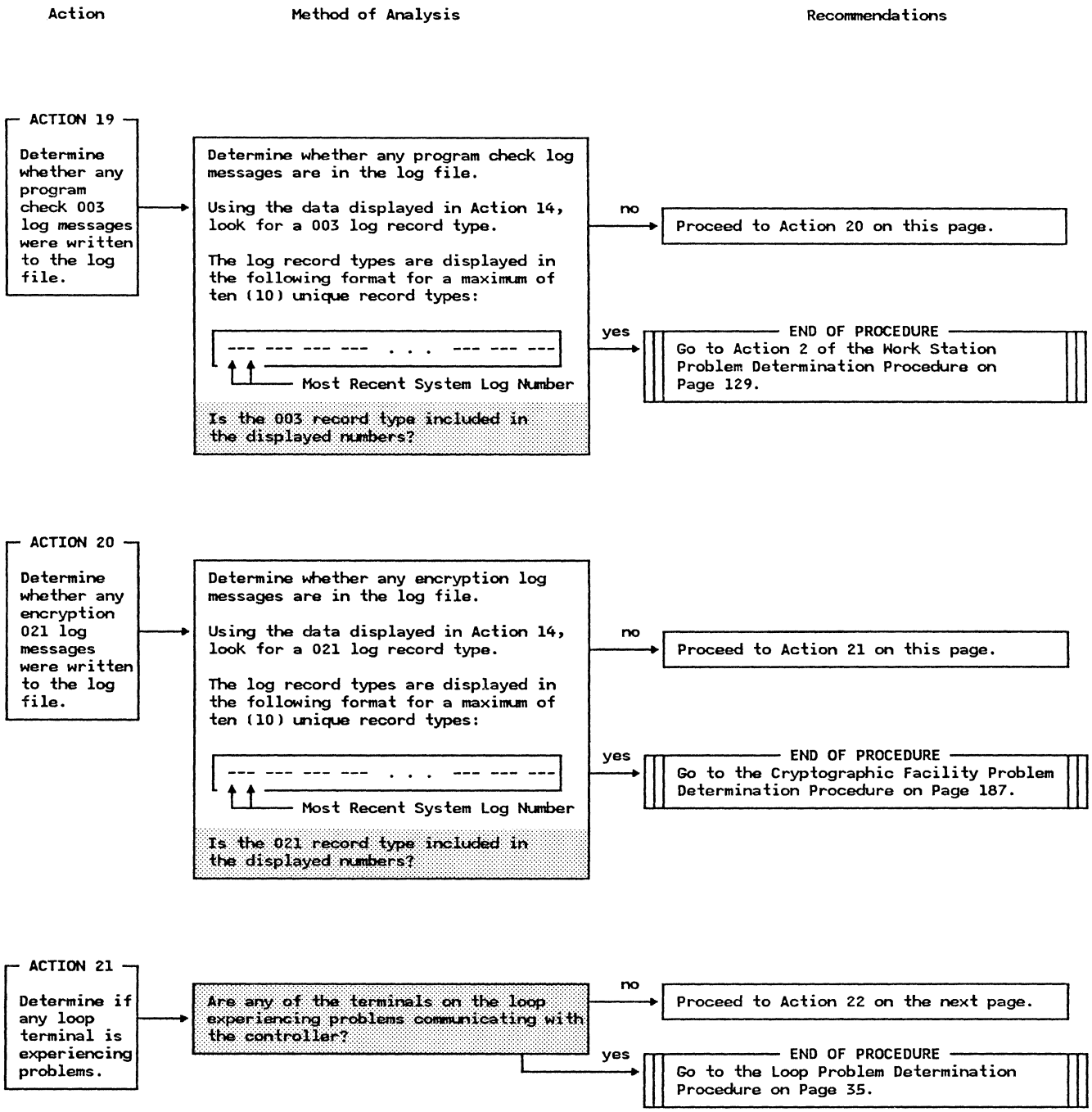
Looking for Symptoms Procedure (continued)



Looking for Symptoms Procedure (continued)

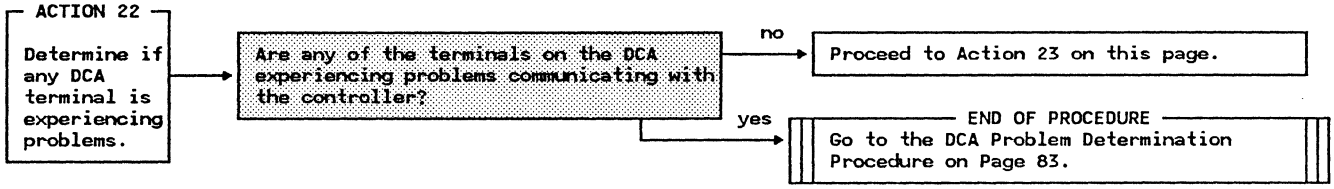


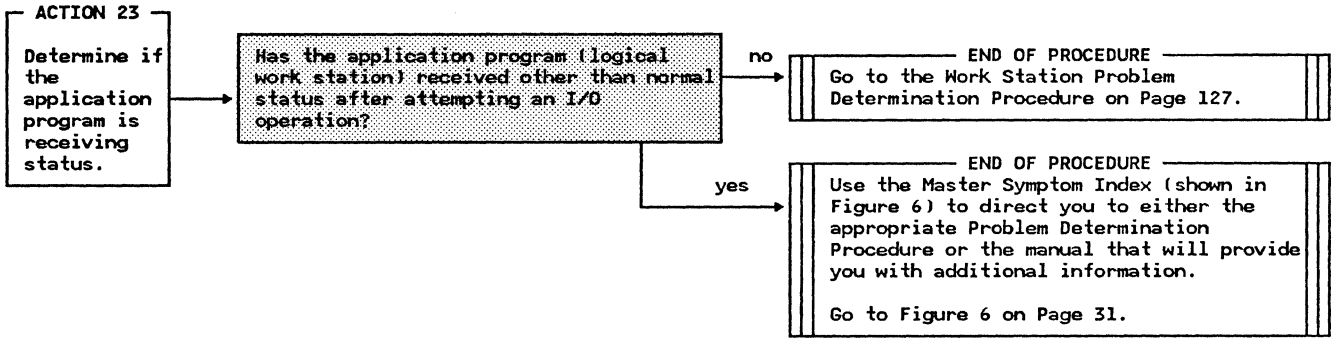
Looking for Symptoms Procedure (continued)



Looking for Symptoms Procedure (continued)

Action	Method of Analysis	Recommendations





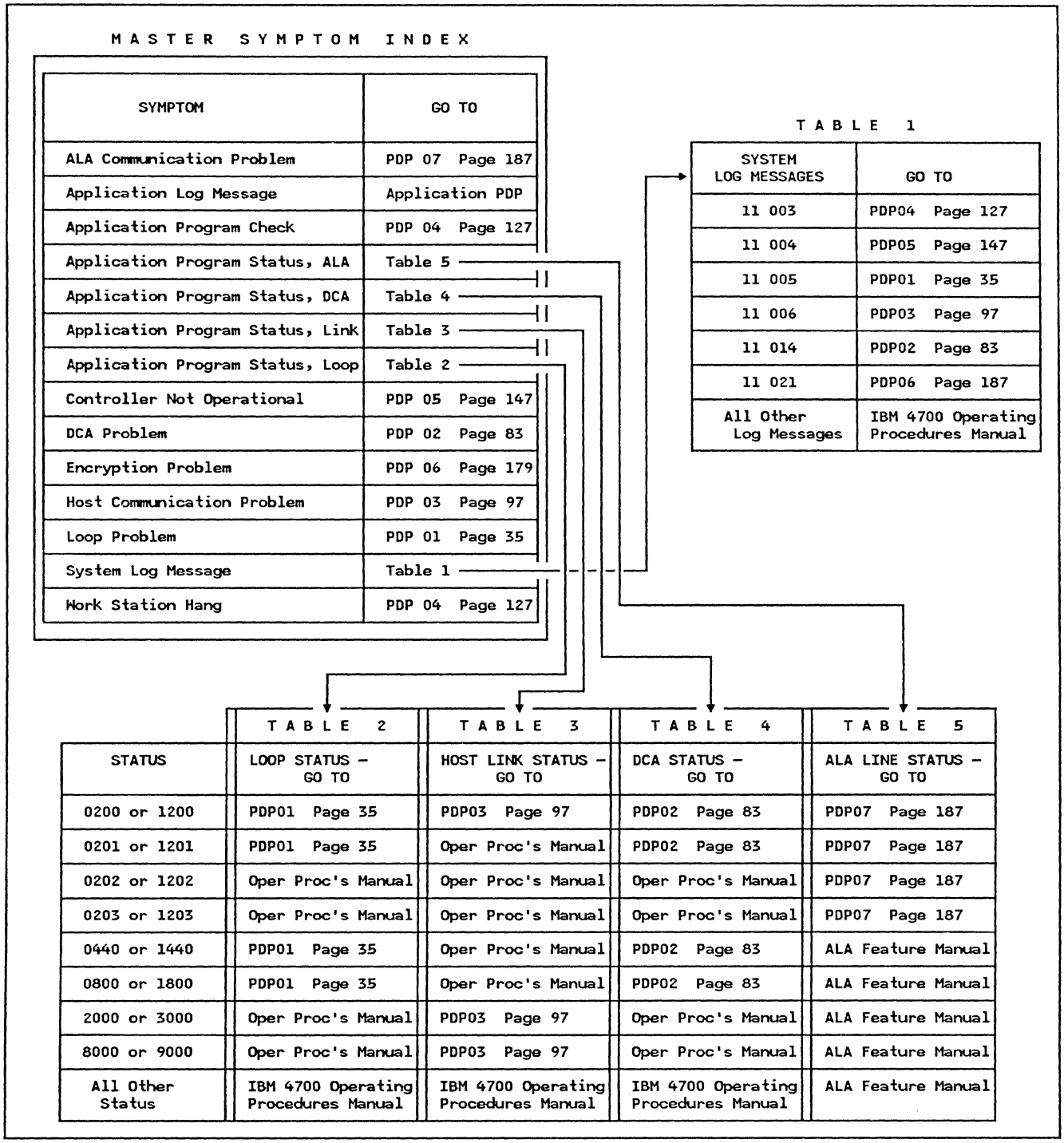


Figure 6. Master Symptom Index

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PDP01 - Finance Loop Problem Determination Procedure

Action	Method of Analysis	Recommendations

ACTION 1

Observe the loop indicator on the controller message display.

Loop Indicator → (loop)

The third position of the controller message display indicates the state of the loops.

Is a number currently being displayed for the loop indicator?

no → The plus sign (+) indicates, in terms of data transmission capability, that all of the loops are operational.

However, it is possible that terminals on a loop may be experiencing problems communicating with the controller.

Go to Action 40 on page 62.

yes → The loop whose number is displayed is not operational.

Proceed to Action 2 on this page.

ACTION 2

Observe the system log for loop messages.

Find the system log message that contains information about the loop whose number is displayed on the loop indicator of the message display.

Using the system monitor:

1. Issue the Log Selective Display command to display any log messages associated with the loop. This command is requested by entering 301 005 from the control operator terminal.
2. Look for a system 005 message that refers to the failing loop.

The 005 log message is displayed in the following format:

System 005 Log Message

```
---- 11 ---- 005 LOOP ■ ERROR, CODE - -
```

Loop Number

Did you find a 005 log message for the loop that is not operational?

no → If you did not find a system 005 log message for the failing loop, it was probably because the log area on the diskette is full.

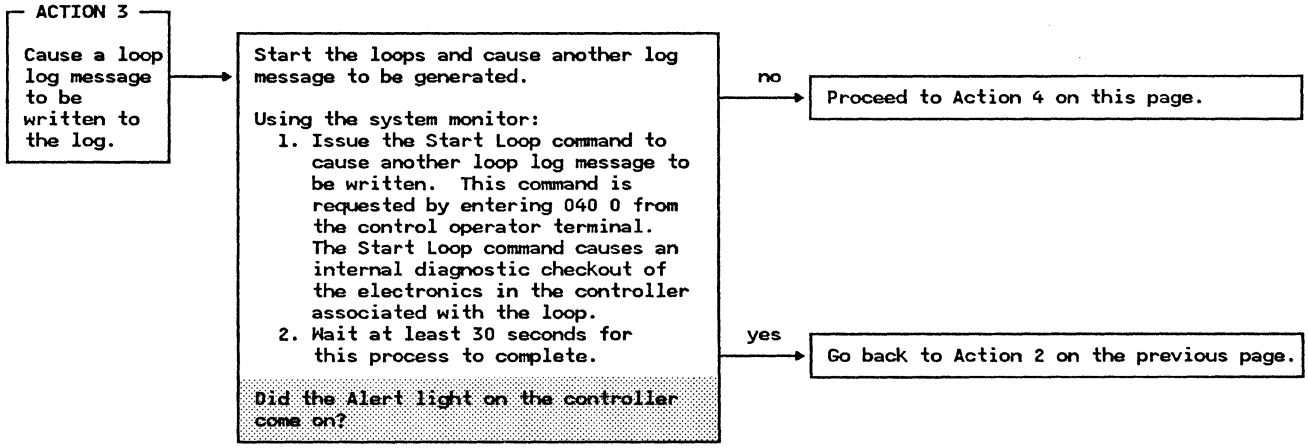
You may be able to re-create the log message and display it using the log message buffer in the controller.

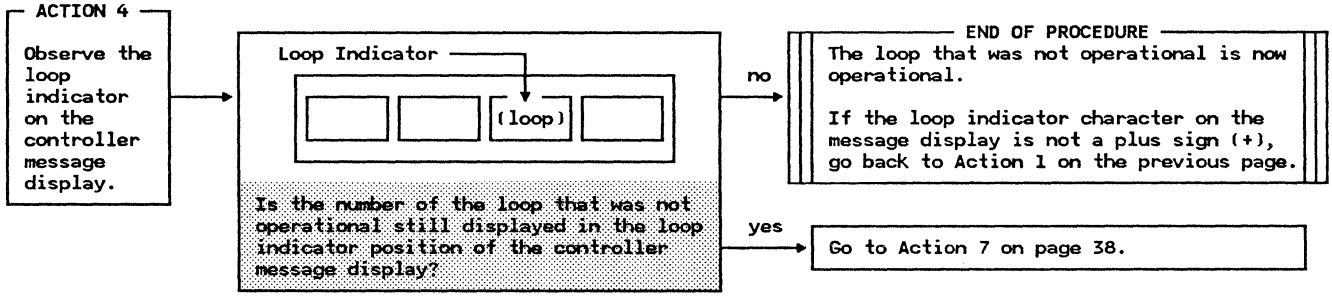
Proceed to Action 3 on the next page.

yes → Go to Action 5 on page 37.

PDP01 - Finance Loop Problem Determination Procedure (continued)

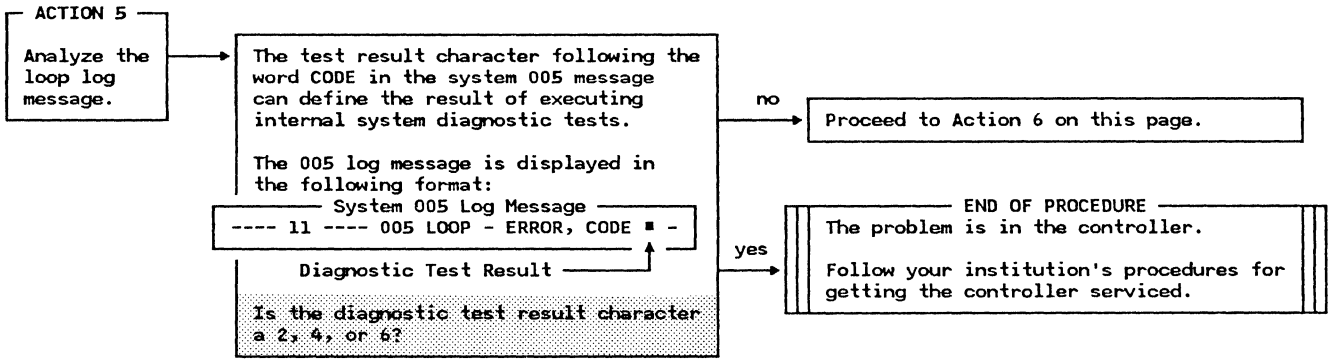
Action	Method of Analysis	Recommendations

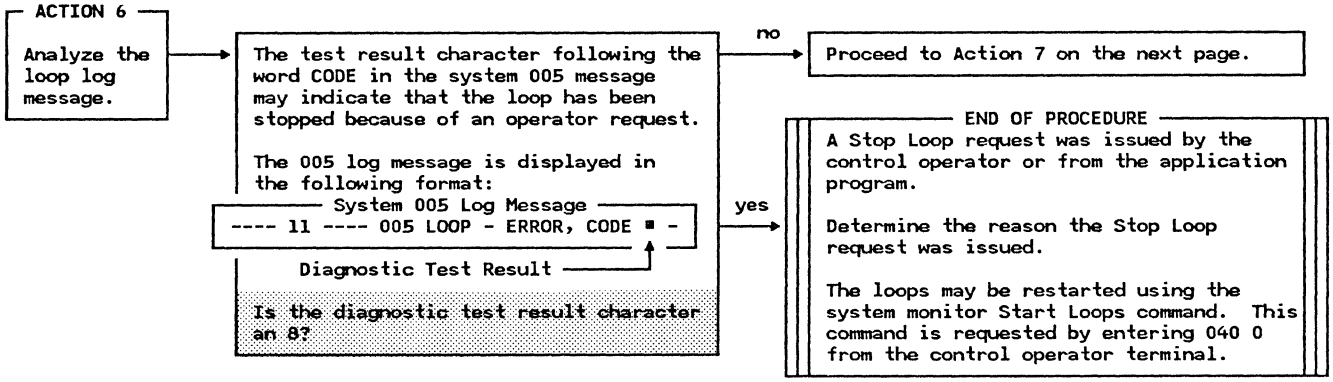




PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations





PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

ACTION 7

Ensure that a loose connection is not the cause of the problem.

Verify that all loop cable connectors for the loop whose number is displayed in the loop indicator are securely and properly connected.

You should check the loop cable connections:

1. At the rear of the controller if the loop number is 1–4 or at the rear of expansion unit 4 if the loop number is a 5 or 6.
2. Those that are associated with the terminals.
3. On the modems, if there are remote loop segments.

Did you find any connectors that were partially or fully unplugged?

no → Go to Action 9 on the next page.

yes → Proceed to Action 8 on this page.

ACTION 8

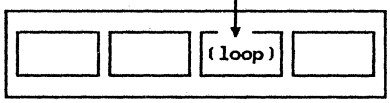
Determine whether replugging the loop connectors fixes the problem.

Replug the loose loop cable connections that were found in Action 7.

Determine whether this action restores the loop by:

1. Wait at least one (1) minute for the diagnostics to complete.
2. Examine the loop indicator on the controller message display.

Loop Indicator



Is the number of the loop that was not operational still being displayed?

no →

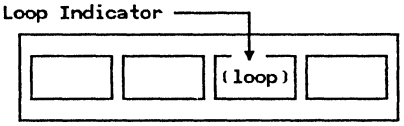
END OF PROCEDURE

The cause of the problem has been found and the loop is now operational.

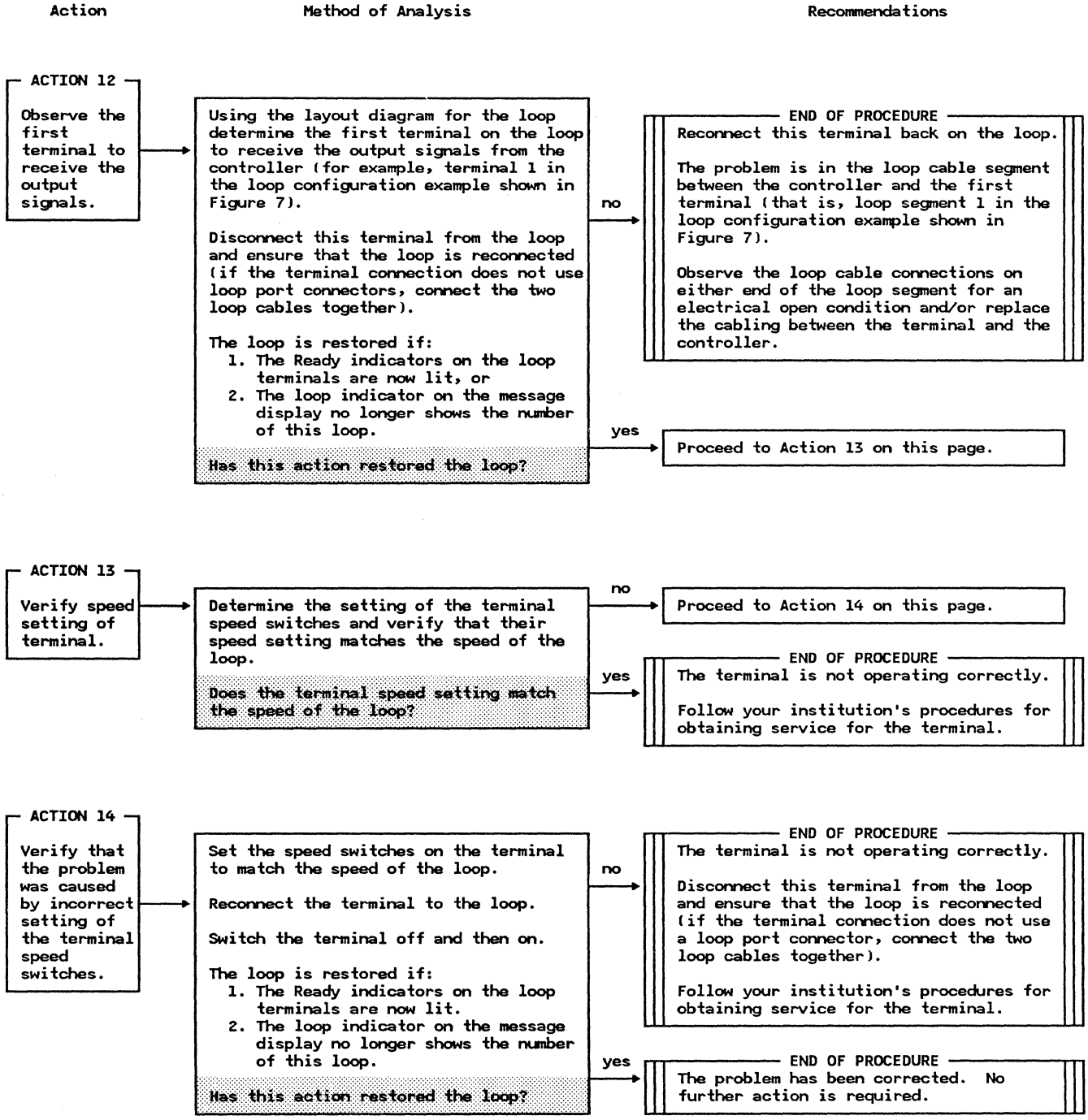
If the loop indicator character on the message display is not a plus sign (+) go back to Action 1 of this procedure on page 35.

yes → Proceed to Action 9 on the next page.

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations
ACTION 9 Isolate the problem to the loop, expansion unit, or the controller.	Determine if the problem is external to the controller by doing the following: 1. Unplug both loop cables for the failing loop from the rear of the controller for loop numbers 1–4 or from the rear of expansion unit 4 for loop numbers 5 or 6. 2. Wait at least one (1) minute for the diagnostics to complete. 3. Examine the loop indicator on the controller message display.  **Is the number of the loop that was not operational still being displayed?**	no → The problem is external to the controller (and the expansion unit). Reconnect the loop cables that were disconnected. Proceed to Action 10 on this page. yes → END OF PROCEDURE If the loop number is 1–4, the problem is associated with the controller. If the loop number is 5 or 6, the problem is associated with expansion unit 4. Follow your institution's procedures for getting the controller or the expansion unit serviced.
ACTION 10 Determine if this loop contains any remote segments.	Using the loop layout diagram that corresponds to this loop, determine whether this loop contains any remote loop segments. **Does the failing loop contain any remote segments?**	no → Proceed to Action 11 on this page. yes → Go to Action 19 on page 44.
ACTION 11 Check the Ready indicator on the loop terminals.	Observe the Ready indicator on all the terminals on the loop that are switched on. **Are any Ready indicators flashing?**	no → Proceed to Action 12 on the next page. yes → Go to Action 15 on page 42.

PDP01 - Finance Loop Problem Determination Procedure (continued)



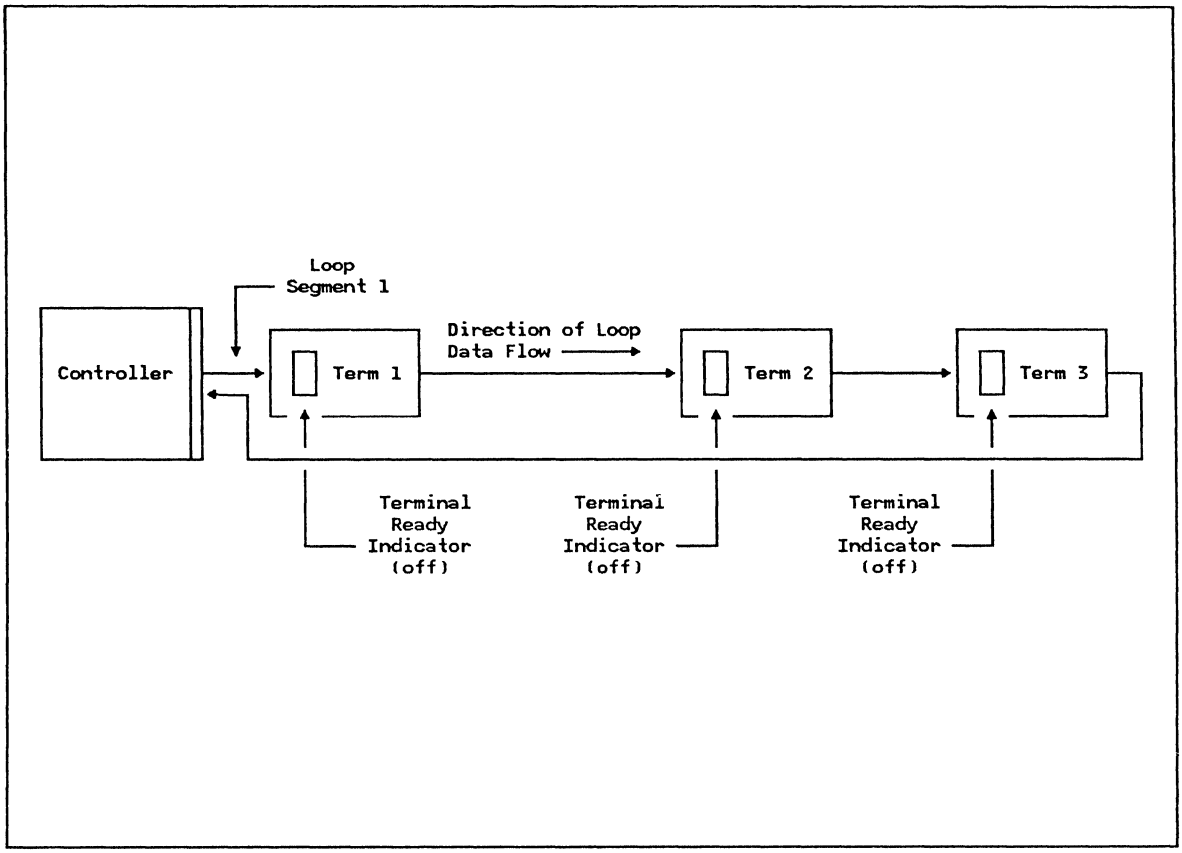
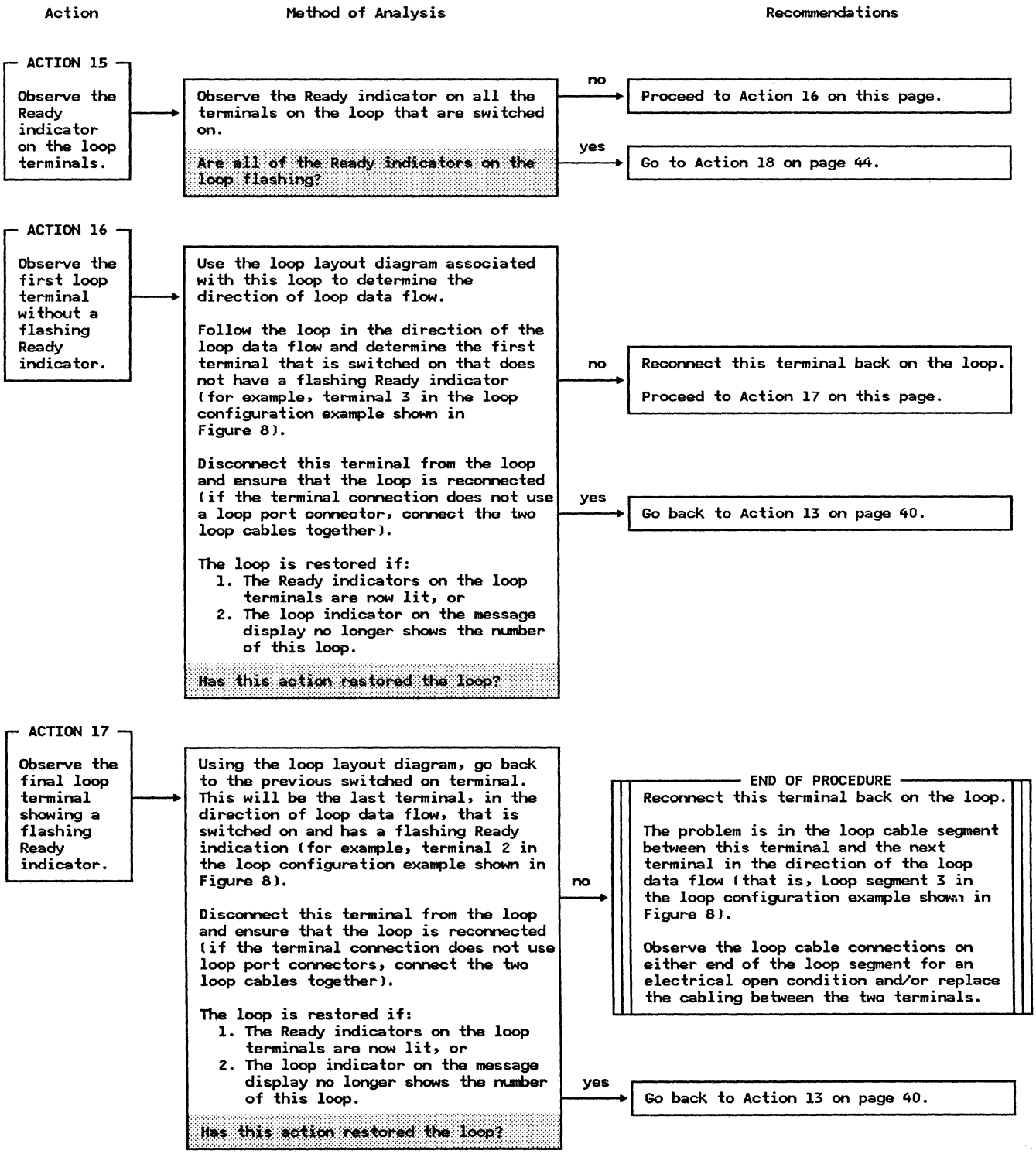


Figure 7. Example of a Local Loop Configuration With No Terminal Ready Indicators Flashing

PDP01 - Finance Loop Problem Determination Procedure (continued)



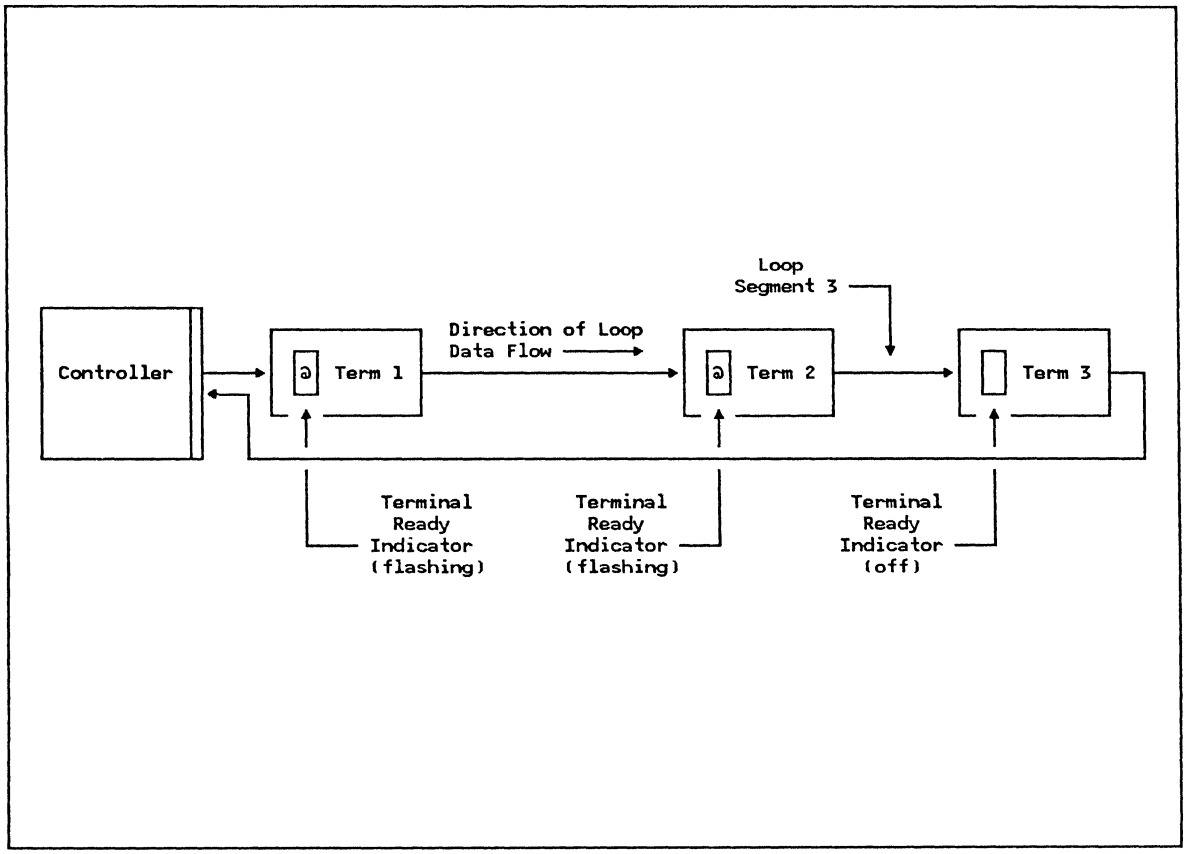
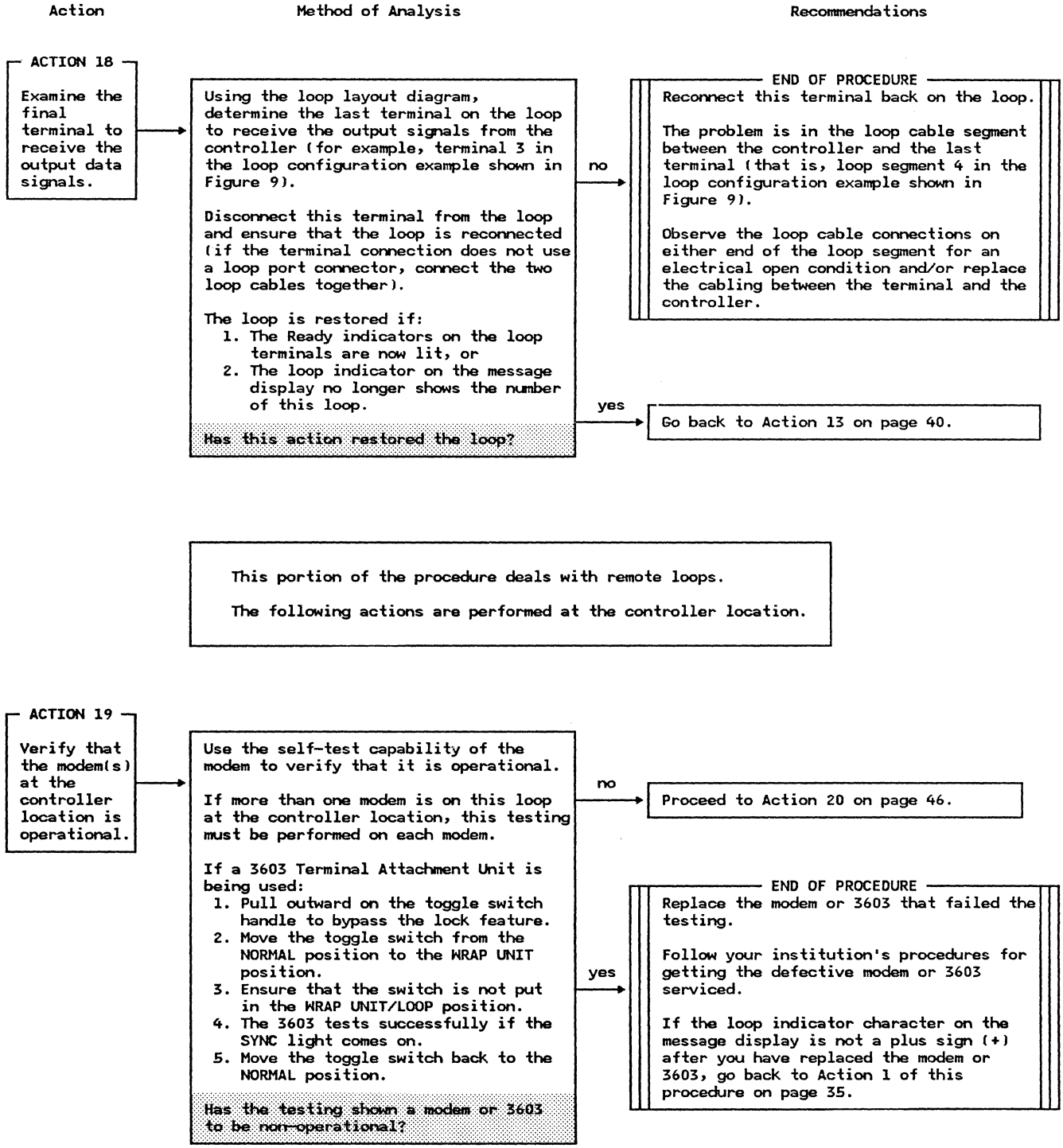


Figure 8. Example of a Local Loop Configuration With Some Terminal Ready Indicators Flashing

PDP01 - Finance Loop Problem Determination Procedure (continued)



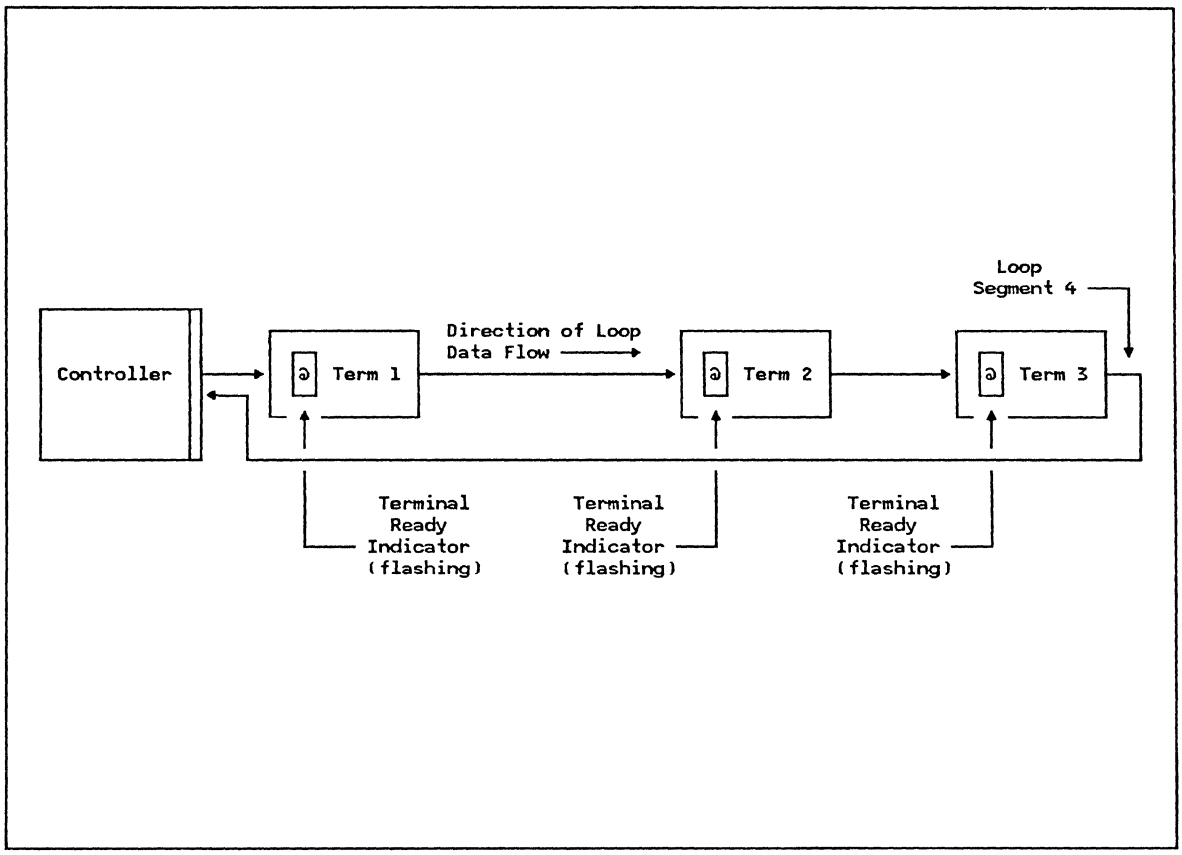
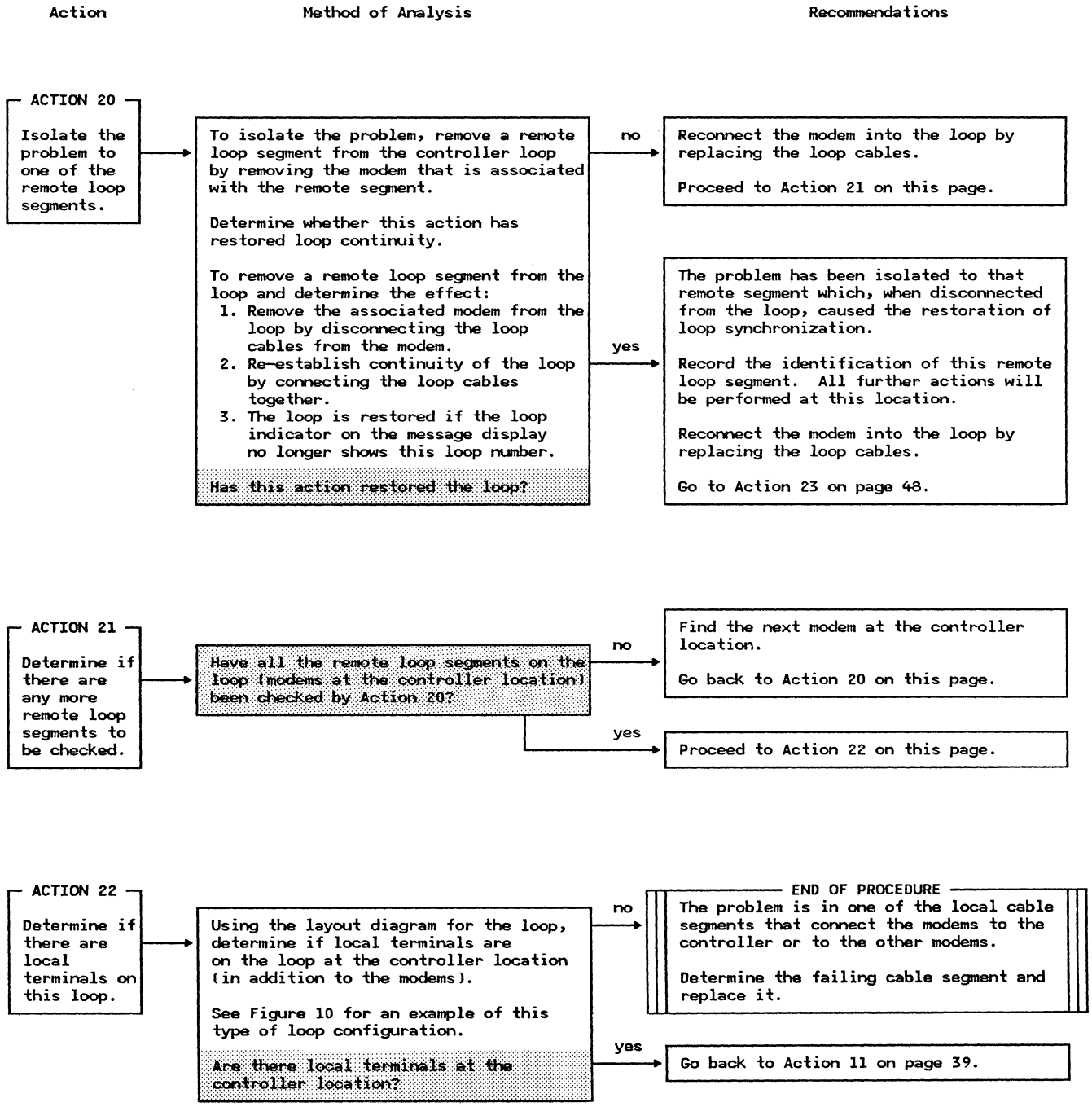


Figure 9. Example of a Local Loop Configuration With All Terminal Ready Indicators Flashing

PDP01 - Finance Loop Problem Determination Procedure (continued)



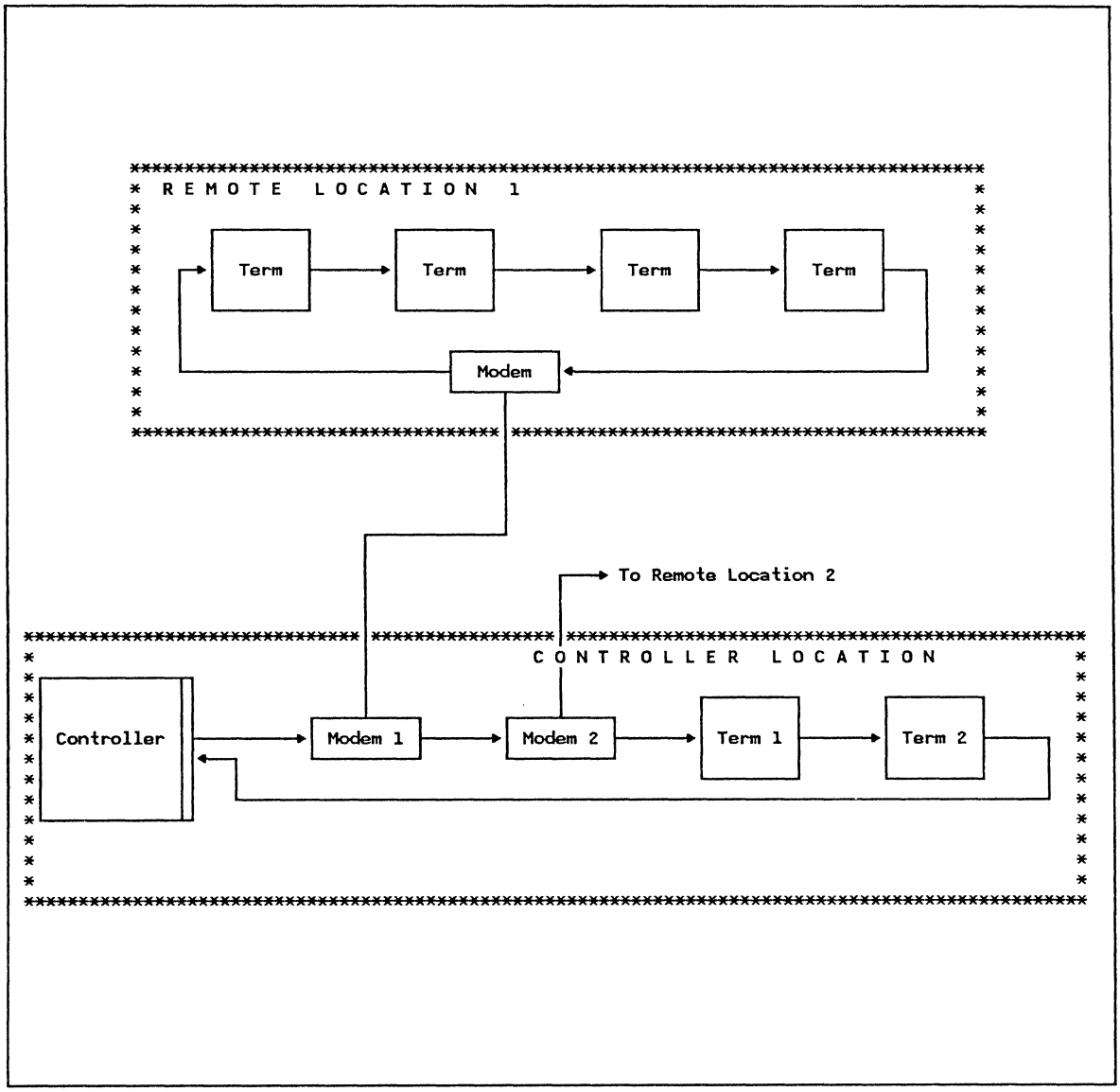


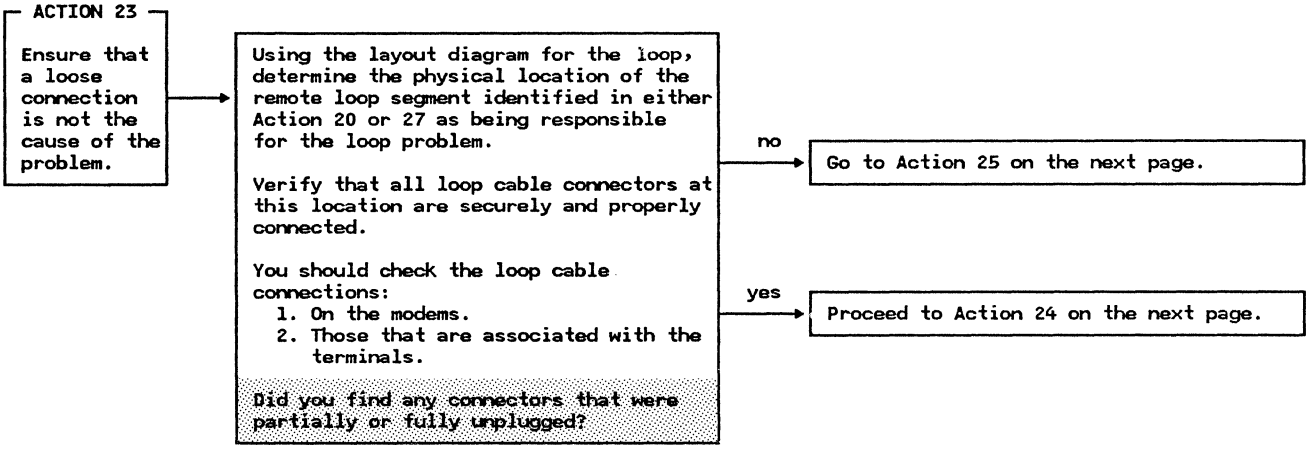
Figure 10. Example of a Remote Loop Configuration

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure deals with remote loops.

The following actions are performed at the remote location.



PDP01 - Finance Loop Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

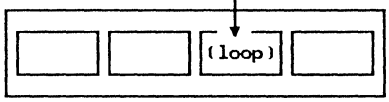
ACTION 24

Determine whether replugging the loop connectors fixes the problem.

Replug the loose loop cable connections that were found in Action 23.

Determine whether this action restores the loop:
1. Wait at least one (1) minute for the diagnostics to complete.
2. Examine the loop indicator on the controller message display.

Loop Indicator



Is the number of the loop that was not operational still being displayed?

no → **END OF PROCEDURE**
The cause of the problem has been found and the loop is now operational.

If the loop indicator character on the message display is not a plus sign (+), go back to Action 1 of this procedure on page 35.

yes → Proceed to Action 25 on this page.

ACTION 25

Verify that the modem(s) at the remote location is operational.

At the remote location, use the self-test capability of each modem to verify that the modem is operational.

If more than one modem is on this loop at this remote location, this testing must be performed on each modem.

If a 3603 Terminal Attachment Unit is being used:
1. Pull outward on the toggle switch handle to bypass the lock feature.
2. Move the toggle switch from the NORMAL position to the WRAP UNIT position.
3. Ensure that the switch is not put in the WRAP UNIT/LOOP position.
4. The 3603 tests successfully if the SYNC light comes on.
5. Move the toggle switch back to the NORMAL position.

Has the testing shown a modem or 3603 to be nonoperational?

no → Proceed to Action 26 on the next page.

yes → **END OF PROCEDURE**
Replace the modem or 3603 that failed the testing.

Follow your institution's procedures for getting the defective modem or 3603 serviced.

If the loop indicator character on the message display is not a plus sign (+) after you have replaced the modem or 3603, go back to Action 1 of this procedure on page 35.

Action	Method of Analysis		Recommendations
ACTION 26 Determine if secondary remote segments are configured from this remote location.	Using the loop layout diagram for this loop, determine whether any remote loop segments are configured from this remote location (if there are secondary remote loop segments, there will be more than one modem in the loop at this location). See the example of a loop configuration having secondary remote loop segments in Figure 11. **Are secondary remote loop segments configured from this location?**	no	Go to Action 29 on page 52.
		yes	Proceed to Action 27 on this page.
ACTION 27 Isolate the problem to one of the remote loop segments.	To isolate the problem, remove a secondary remote loop segment from the loop by removing the modem that is associated with the remote segment (for example, secondary remote loop segment 1 shown in Figure 11). Determine whether this action has restored loop continuity. To remove a remote loop segment from the loop and determine the effect: 1. Remove the associated modem from the loop by disconnecting the loop cables from the modem. 2. Re-establish continuity of the loop by connecting the loop cables together. 3. The loop is restored if the loop indicator on the message display no longer shows this loop number. **Has this action restored the loop?**	no	Reconnect the modem into the loop by replacing the loop cables. Proceed to Action 28 on page 52.
		yes	The problem has been isolated to that remote segment which, when disconnected from the loop, caused the restoration of loop synchronization. Record the identification of this remote loop segment. All further actions will be performed at this location. Reconnect the modem into the loop by replacing the loop cables. Go back to Action 23 on page 48.

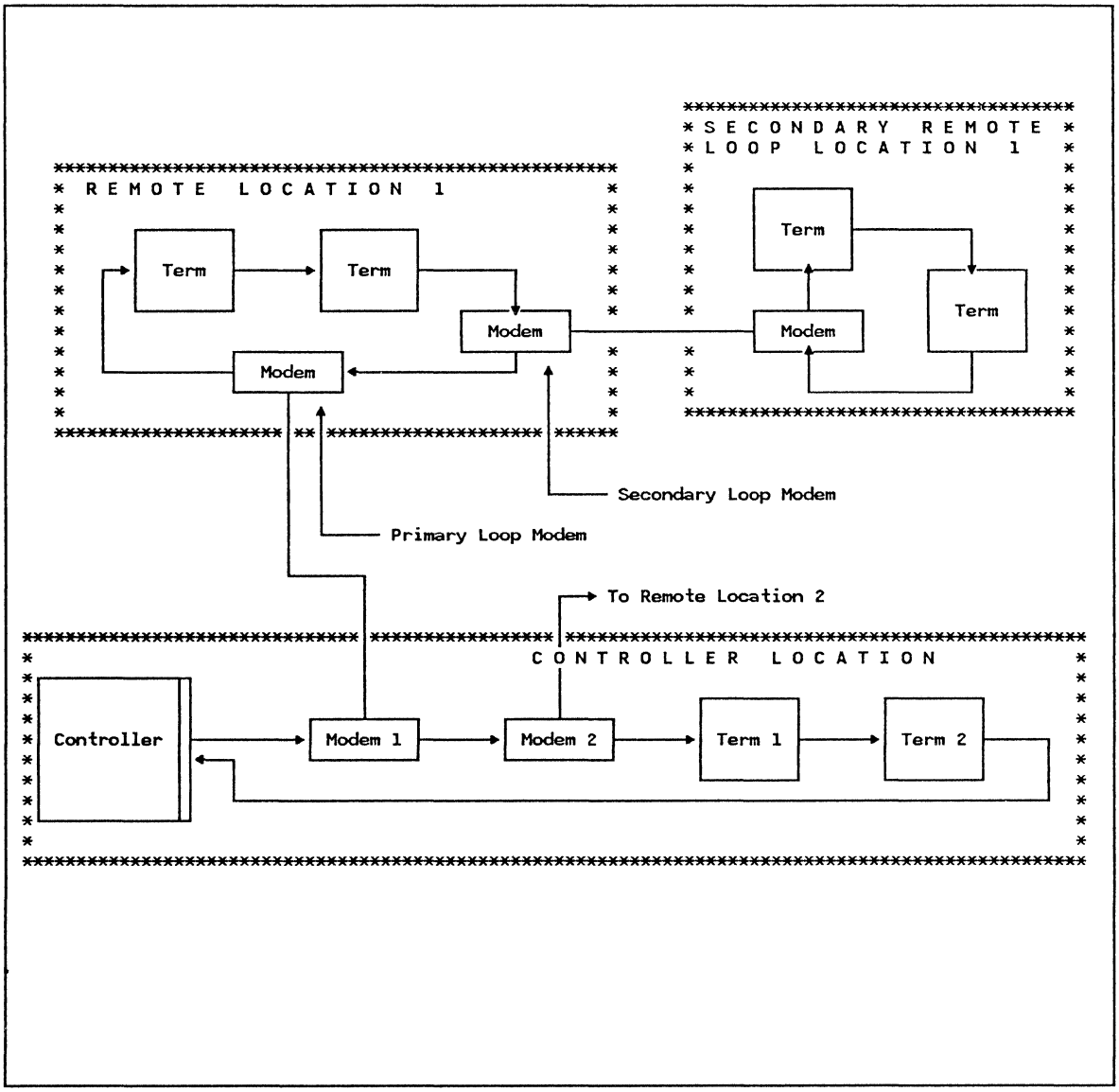


Figure 11. Example of a Remote Loop Configuration With Secondary Remote Loop Segments

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations
ACTION 28 Determine if all secondary remote loop segments have been inspected.	Have all the secondary remote loop segments (secondary loop modems) at the remote loop location been inspected by Action 27?	no → Inspect the next secondary loop modem at the remote loop location. Go back to Action 27 on page 50.
		yes → Proceed to Action 29 on this page.
ACTION 29 Isolate the problem to either this remote loop segment or the portion of the loop that drives this remote location.	Disconnect the loop cables from the primary loop modem at this remote location. If an IBM 3603 Terminal Attachment Unit is not being used, connect both ends of a single piece of loop cable to the primary loop modem in the place of the loop cables you just removed. This operation is shown in Figure 12. The loop is restored if the loop indicator on the controller display panel no longer shows this loop number. Has this action restored the loop?	no → END OF PROCEDURE The problem is in the telecommunication link connecting this location with the previous location. If the modem is not an IBM 3603, remove the loop cable that was connected to the modem in this action. Reconnect the loop cables to the modem. To restore the remainder of the loop until the telecommunication link problem can be fixed, disconnect the secondary loop modem at the previous location from the loop. Follow your institution's procedures for obtaining service from the common carrier.
		yes → Reconnect the loop cables to the modem. Proceed to Action 30 on page 54.

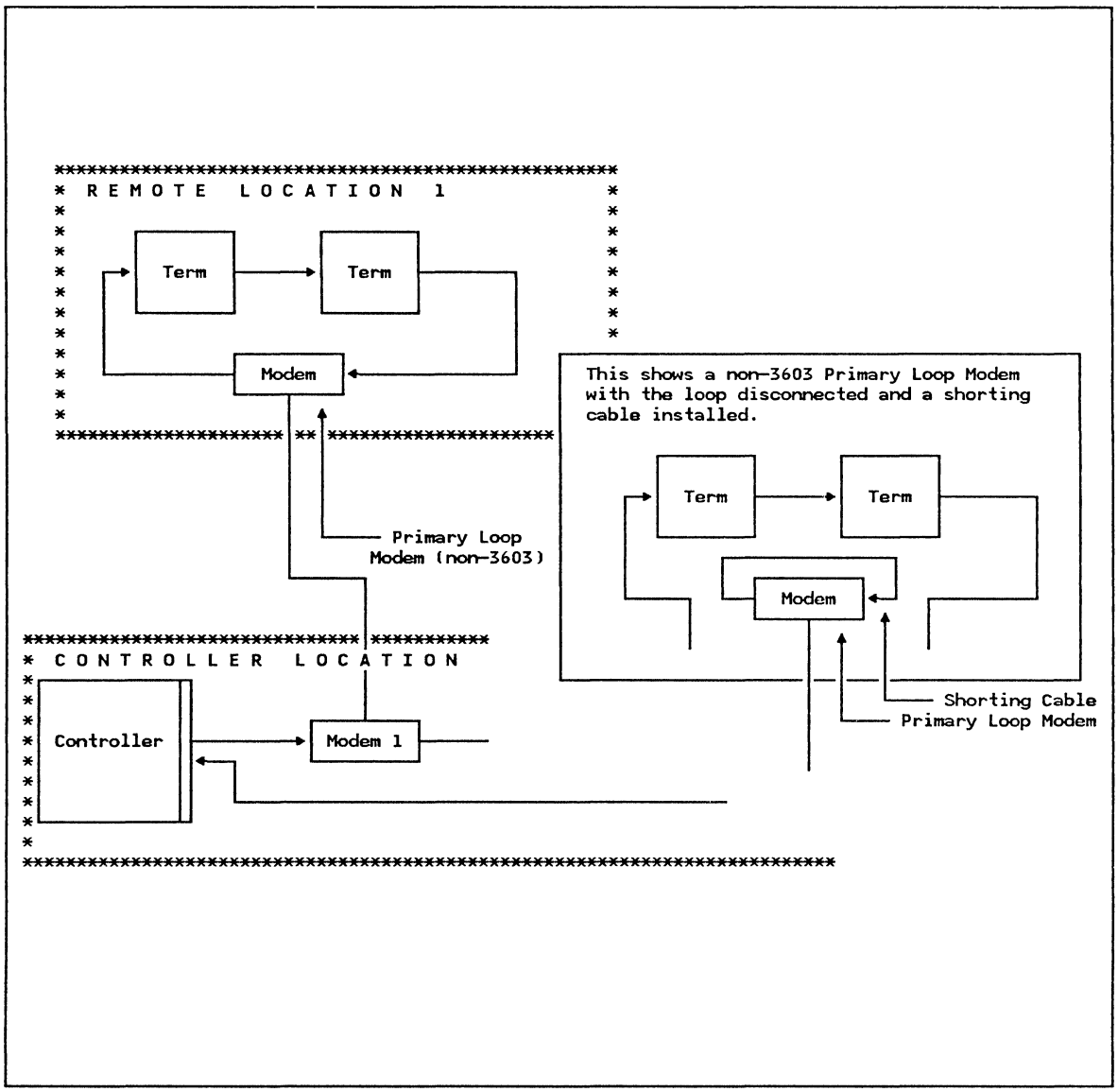
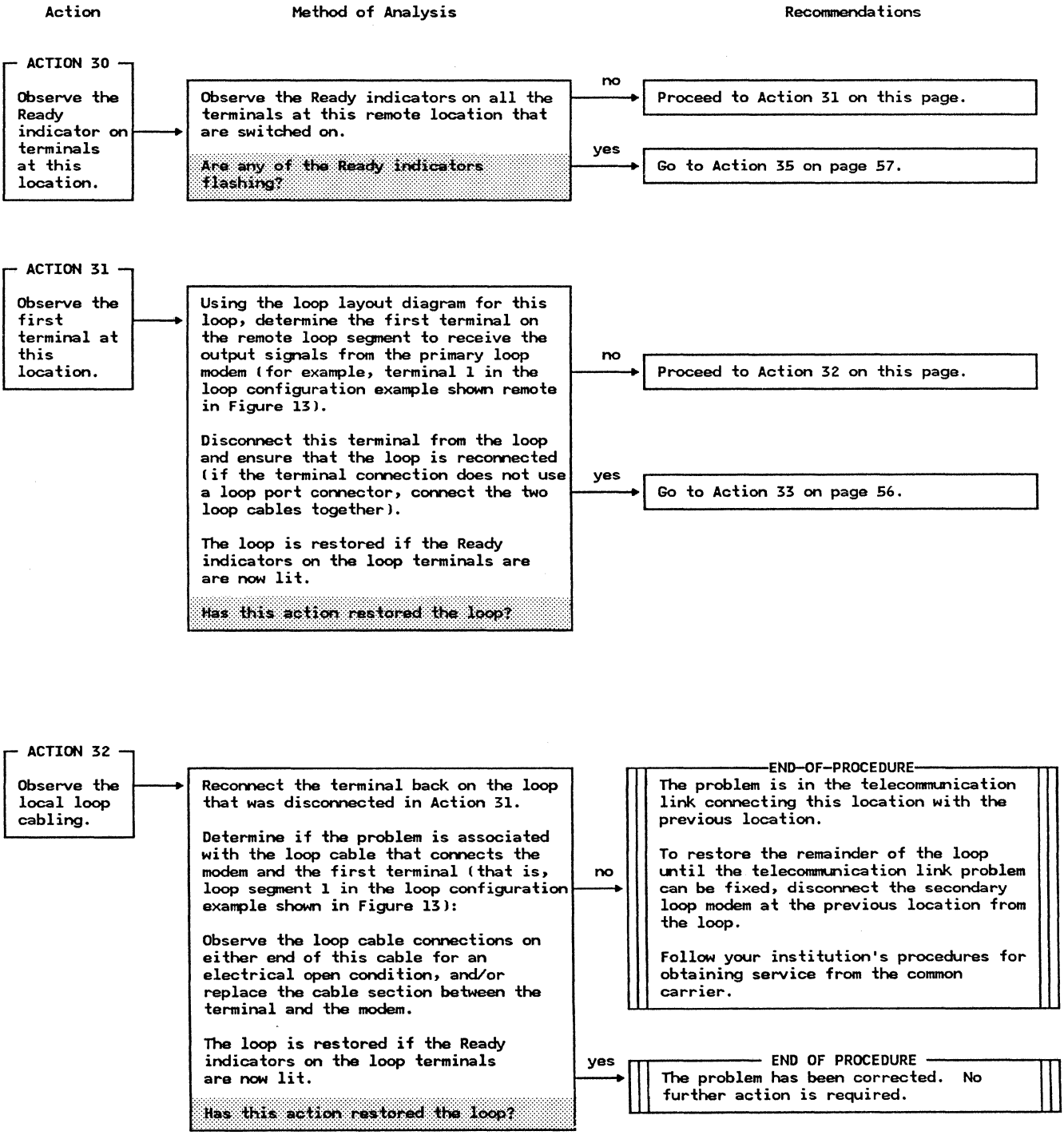


Figure 12. Example of a Remote Loop Configuration Showing the Loop Cables Disconnected From a Non-3603 Primary Loop Modem.

PDP01 - Finance Loop Problem Determination Procedure (continued)



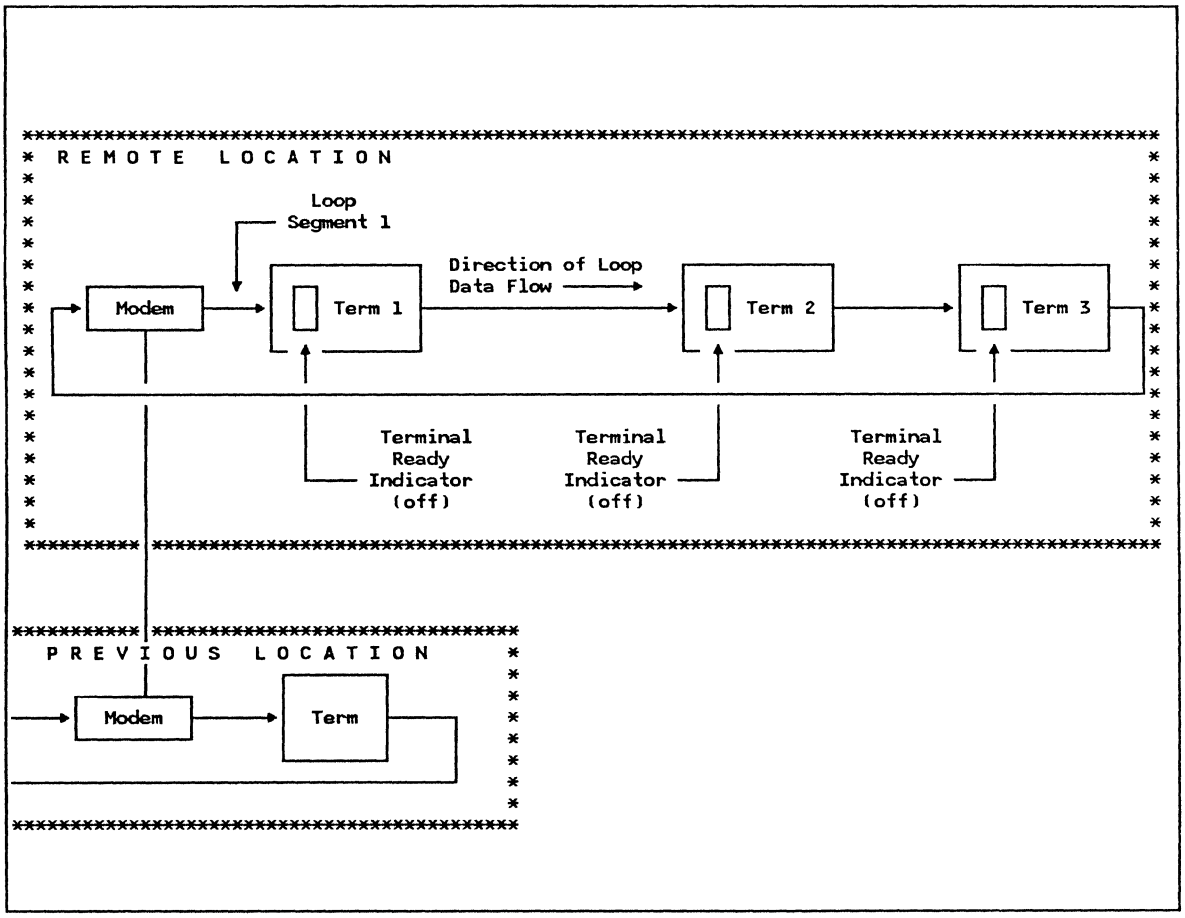
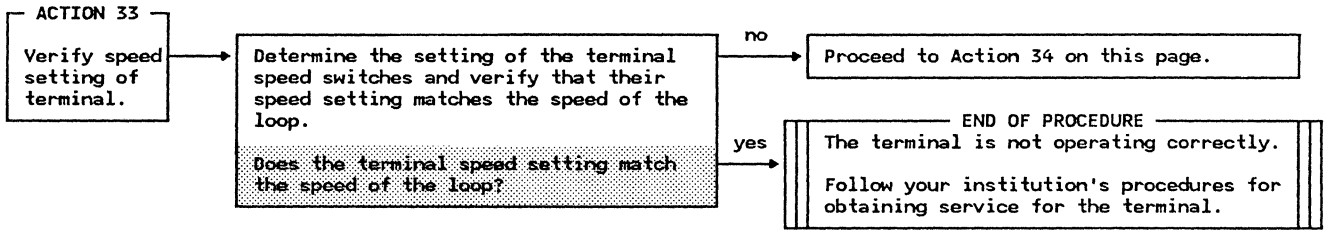
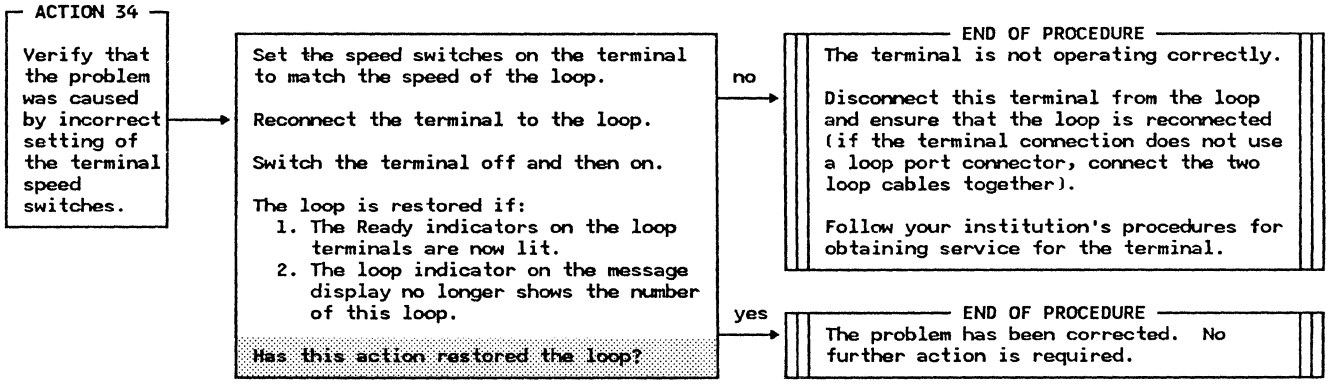


Figure 13. Example of a Remote Loop Configuration With No Ready Indicators Flashing

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

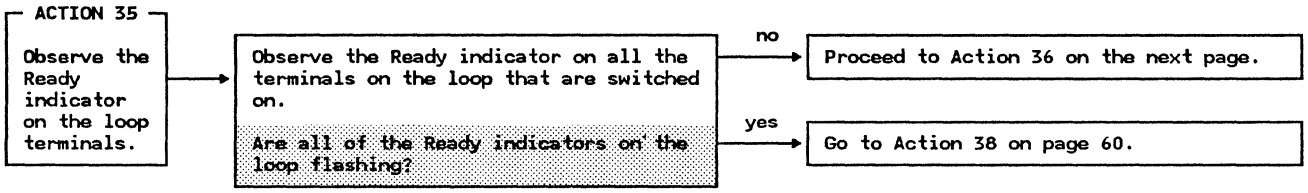




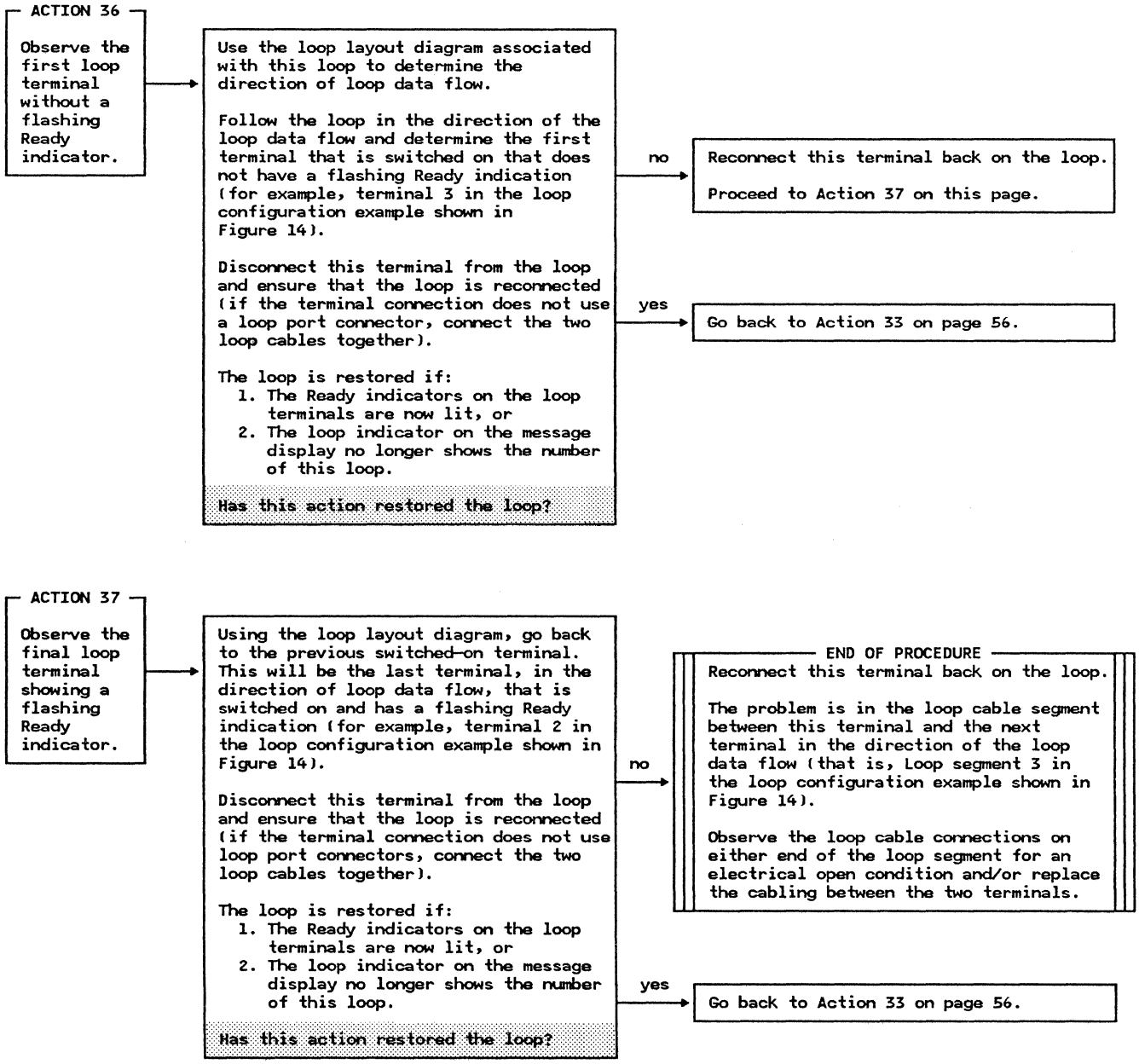
Action	Method of Analysis	Recommendations

At this point you should have at least one terminal that has a flashing Ready indicator.

The next action is to determine if all of the switched-on terminals have Ready indicators that are flashing.



PDP01 - Finance Loop Problem Determination Procedure (continued)



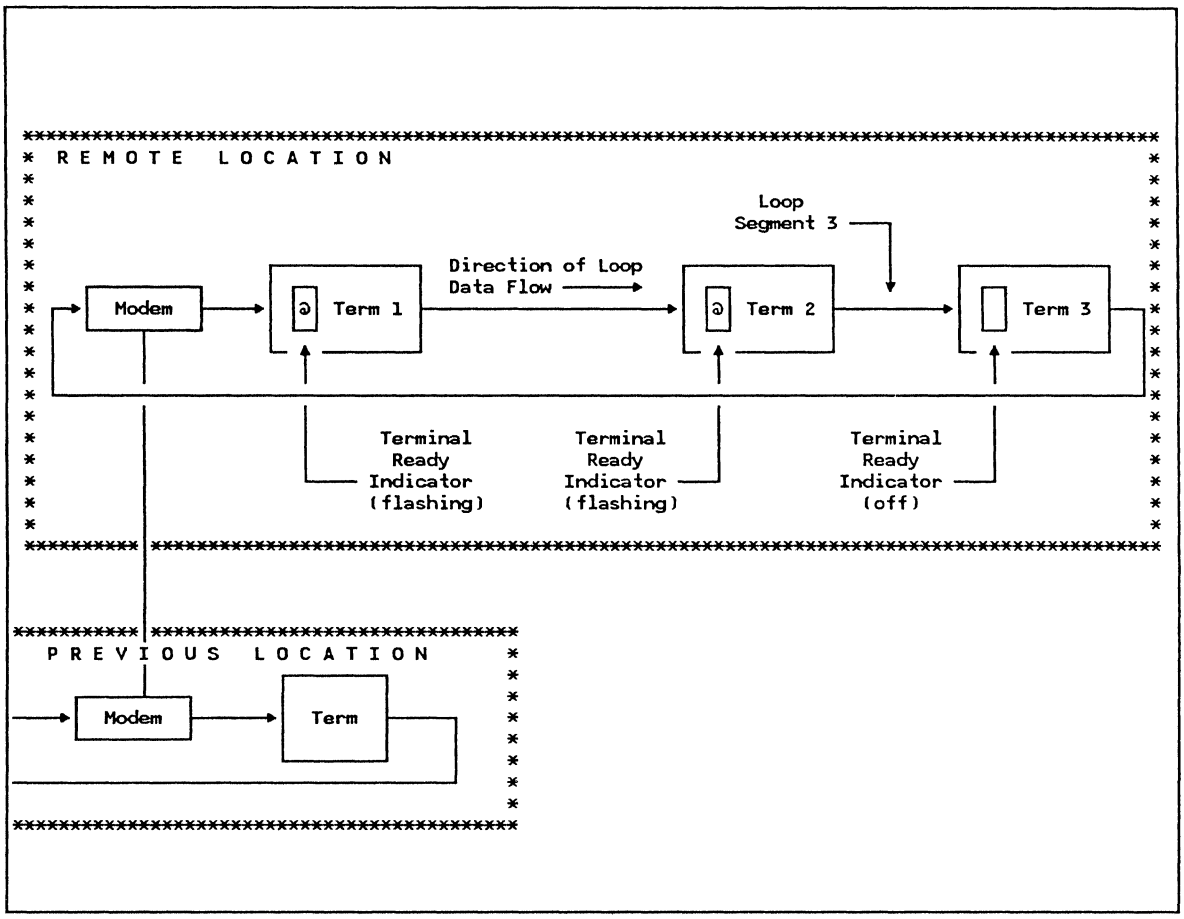
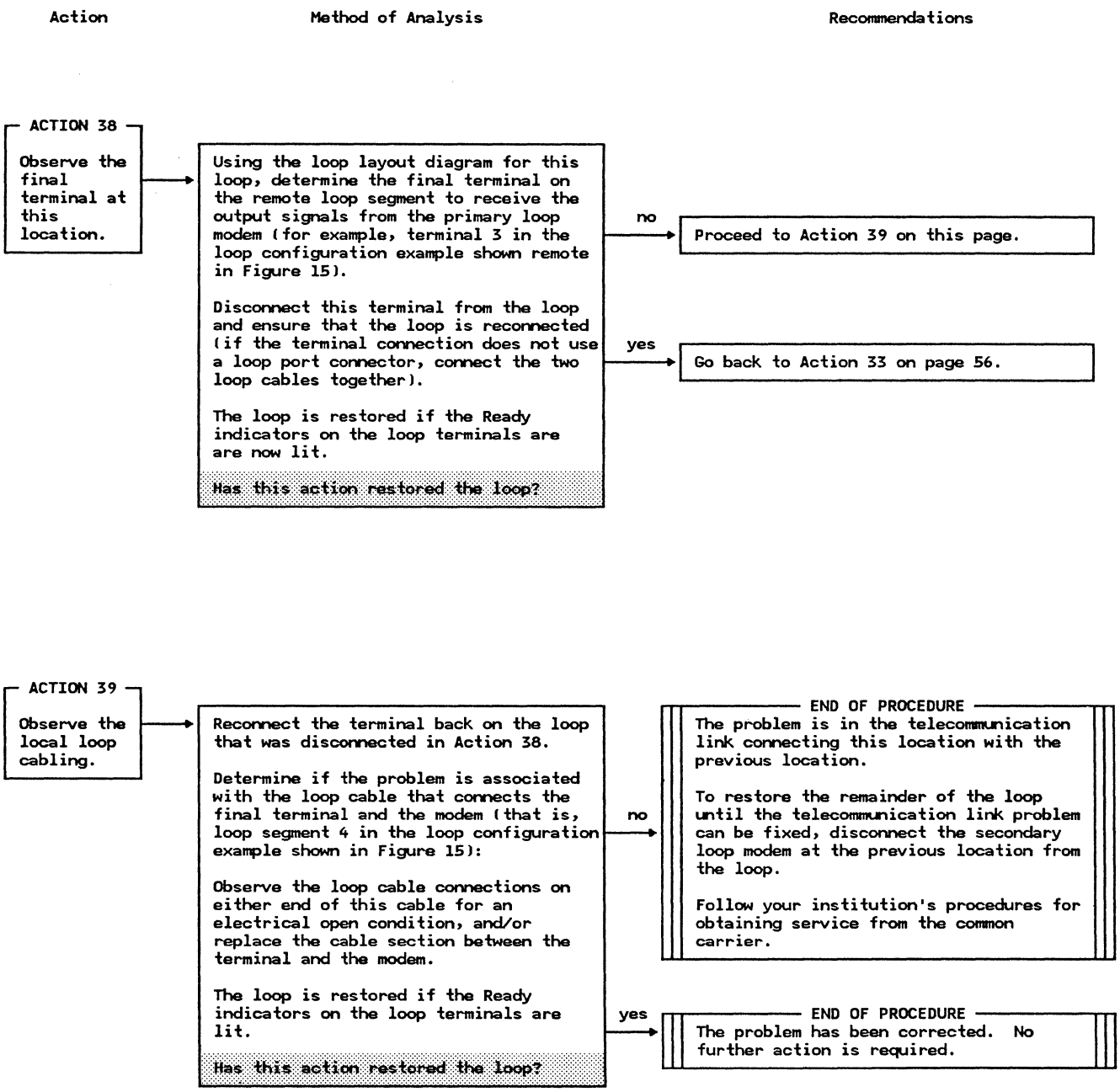


Figure 14. Example of a Remote Loop Configuration With Some Ready Indicators Flashing

PDP01 - Finance Loop Problem Determination Procedure (continued)



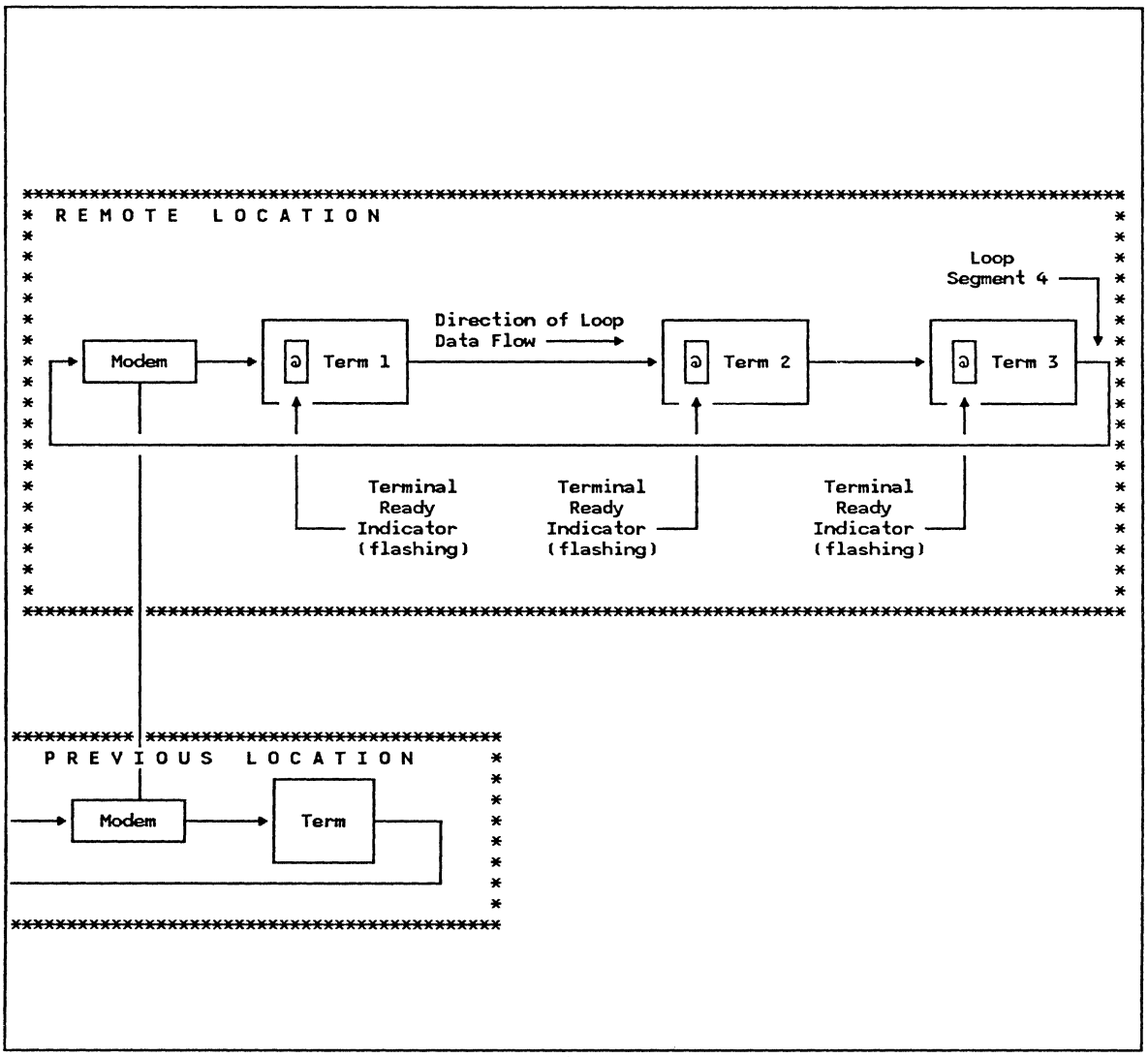
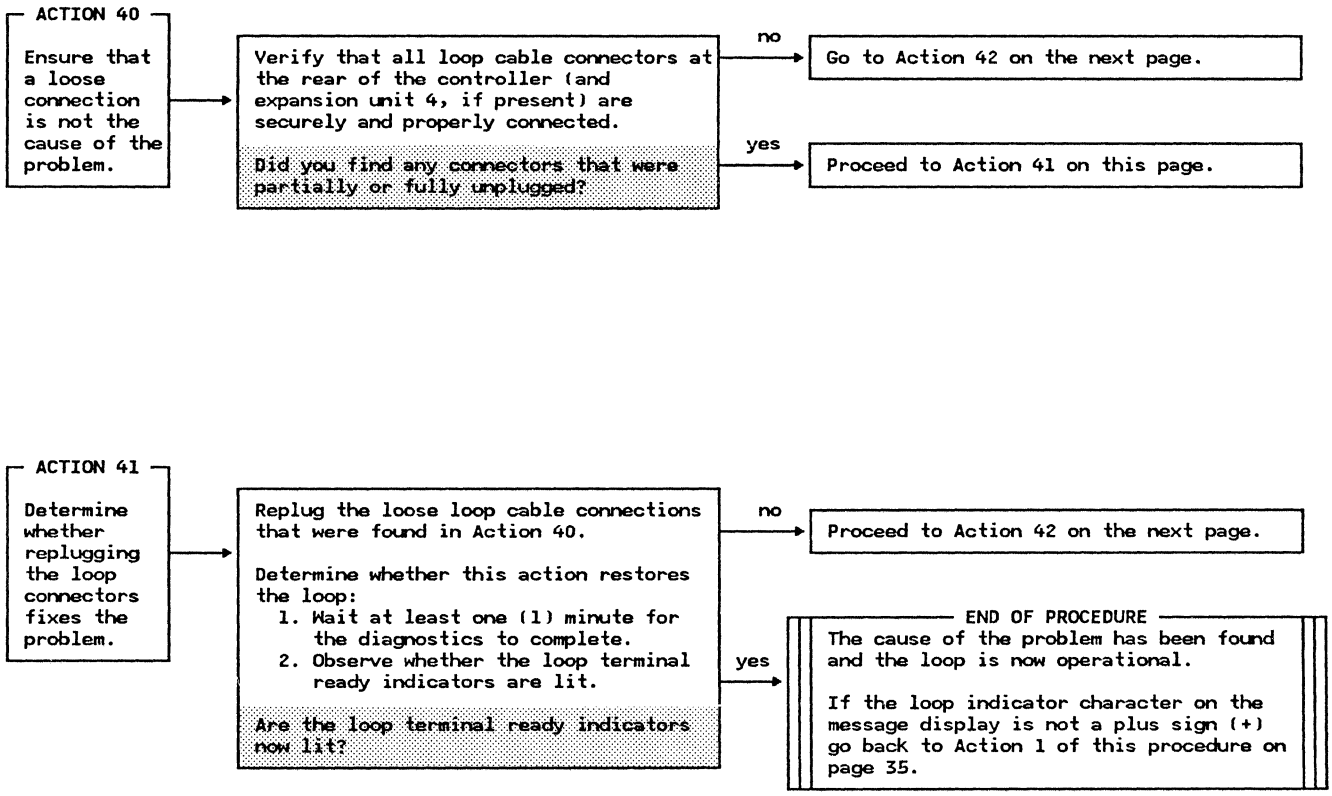


Figure 15. Example of a Remote Loop Configuration With All Ready Indicators Flashing

PDP01 - Finance Loop Problem Determination Procedure (continued)



PDP01 - Finance Loop Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

This portion of the procedure deals with those loop problems that do not cause the loop to become inoperable but cause a terminal(s) to be unable to communicate with the controller.

ACTION 42

Determine if there is a terminal problem.

Are any terminals on the loop:
1. Experiencing problems communicating with the controller.
2. Experiencing a noticeable slowdown in the rate that data is being displayed on the screen?

no → **END OF PROCEDURE**

It appears that you are in the wrong problem determination procedure for the problem that you are experiencing.

Your responses to the questions in this procedure have caused you to reach this block, which indicates that your problem is not associated with the loop.

Go to the Looking For Symptoms procedure on page 23 for assistance.

yes → Proceed to Action 43 on this page.

ACTION 43

Determine the type of terminal problem.

Terminal communication problems can occur in one of three ways:
1. The problem is permanent and the terminal cannot communicate with the controller.
2. The problem is intermittent and the terminal can at times successfully communicate with the controller.
3. The terminal can always communicate with the controller but the screen data is being displayed slower than it should.

Is this a permanent problem where the terminal cannot communicate with the controller at any time?

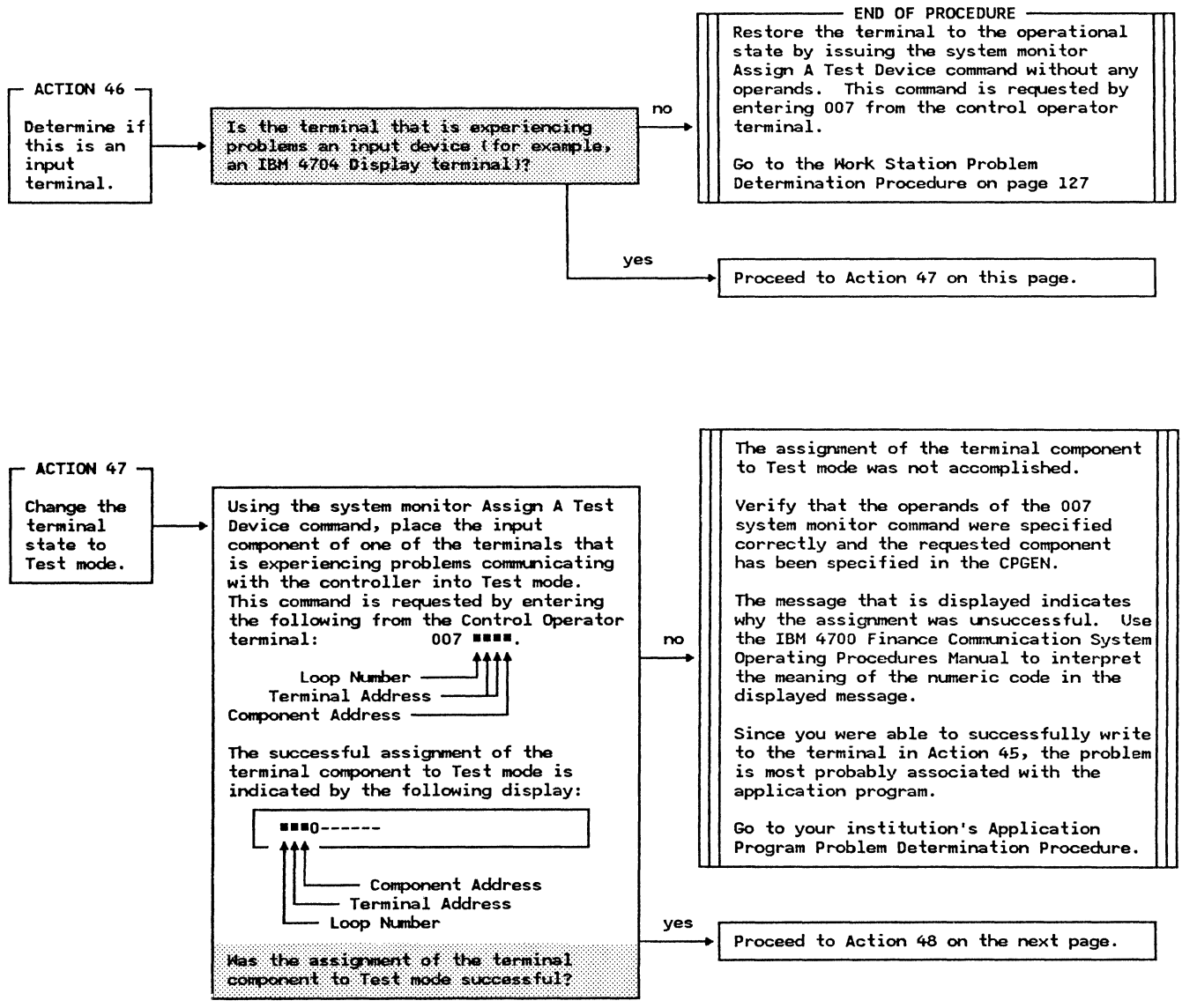
no → Go to Action 58 on page 72.

yes → Proceed to Action 44 on the next page.

PDP01 - Finance Loop Problem Determination Procedure (continued)

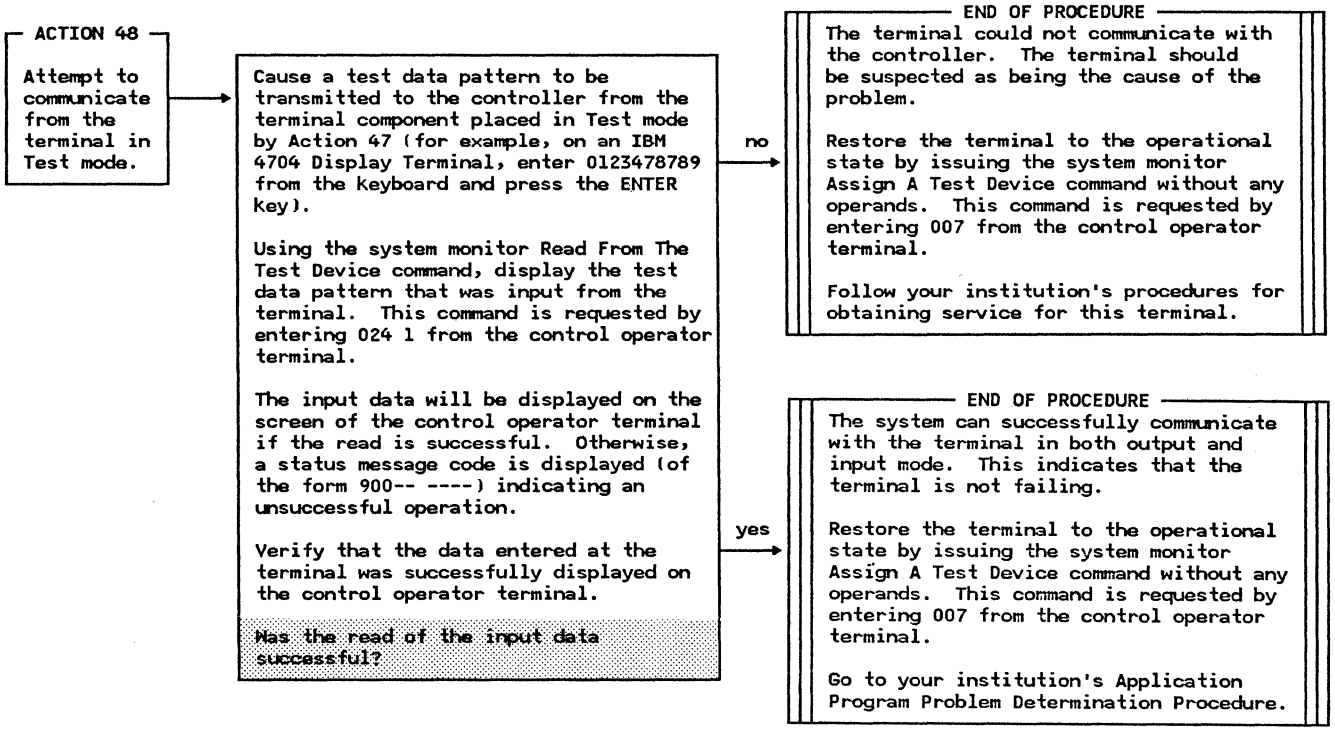
Action	Method of Analysis	Recommendations
ACTION 44 Change the terminal state to Test mode.	Using the system monitor Assign A Test Device command, place the output component of one of the terminals that is experiencing problems communicating with the controller into Test mode. This command is requested by entering the following from the Control Operator terminal: 007 ■■■■. Loop Number Terminal Address Component Address The successful assignment of the terminal component to Test mode is indicated by the following display: ■■■0------ Component Address Terminal Address Loop Number **Was the assignment of the terminal component to Test mode successful?**	no → Verify that the operands of the 007 system monitor command were specified correctly and the requested component has been specified in the CPGEN. The message that is displayed indicates why the assignment was unsuccessful. Use the IBM 4700 Finance Communication System Operating Procedures Manual to interpret the meaning of the numeric code in the displayed message. Go to Action 56 on page 71. yes → Proceed to Action 45 on this page.
ACTION 45 Attempt to communicate with the terminal in Test mode.	Using the system monitor Write To The Test Device command, transmit a test data pattern to the terminal that was put into Test mode by Action 44. This command is requested by entering 025 1 0123478789 from the control operator terminal. If the write of the test data is successful, the greater-than symbol (>) is displayed on the next display screen line of the control operator terminal. Otherwise, a status message code is displayed (of the form 900-- ----) indicating an unsuccessful operation. **Is a status message code displayed on the screen of the control operator terminal?**	no → The system could communicate successfully with the terminal. Proceed to Action 46 on the next page. yes → Go to Action 49 on page 67.

PDP01 - Finance Loop Problem Determination Procedure (continued)



PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

You have not successfully written test data to a terminal.

The next two actions will determine whether device status 0201 was received as a result of the I/O operation.

ACTION 49

Determine if device status was received.

Device status received as a result of an I/O operation to a test terminal is displayed on the screen of the control operator terminal in the following format:

```
90008 ----
```

Is the status message code 90008 displayed?

no →

END OF PROCEDURE

Use the IBM 4700 Finance Communication System Operating Procedures Manual to determine the meaning of the message code.

NOTE: If the 025 command was entered incorrectly, go back to Action 45 on page 64.

yes →

Proceed to Action 50 on this page.

ACTION 50

Observe the status that resulted from the write of test data.

Determine if the status that resulted from the I/O operation was 0201.

Device status is displayed in the following format:

```
90008 ■■■■
      ↑ ↑
      Device Status
```

Is the returned status 0201?

no →

END OF PROCEDURE

Use the IBM 4700 Finance Communication System Operating Procedures Manual to determine the meaning of the I/O status.

yes →

Proceed to Action 51 on the next page.

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure determines whether the problem is caused by incorrect setting of the terminal switches.

ACTION 51

Verify that the terminal address and speed switches are set correctly.

Determine whether the terminal switches are set to the correct address and loop speed setting:

1. Switch the terminal power off and then on.
2. Read the current setting of the address and speed switches.
3. Verify that the address setting matches the CPGEN specification.
4. Verify that the speed setting matches the controller setting for loop speed.

Are the terminal switches set correctly?

no → Set the terminal address and/or speed switches to the correct setting.

Proceed to Action 52 on this page.

yes → Go to Action 55 on the next page.

ACTION 52

Attempt to communicate with the terminal in Test mode.

Using the system monitor Write To The Test Device command, transmit a test data pattern to the terminal that was put into Test mode by Action 44. This command is requested by entering 025 1 0123478789 from the control operator terminal.

If the write of the test data is successful, the greater than symbol (>) is displayed on the next display screen line of the control operator terminal. Otherwise, a status message code is displayed (of the form 900-- ----) indicating an unsuccessful operation.

Is a status message code displayed on the screen of the control operator terminal?

no → **END OF PROCEDURE**

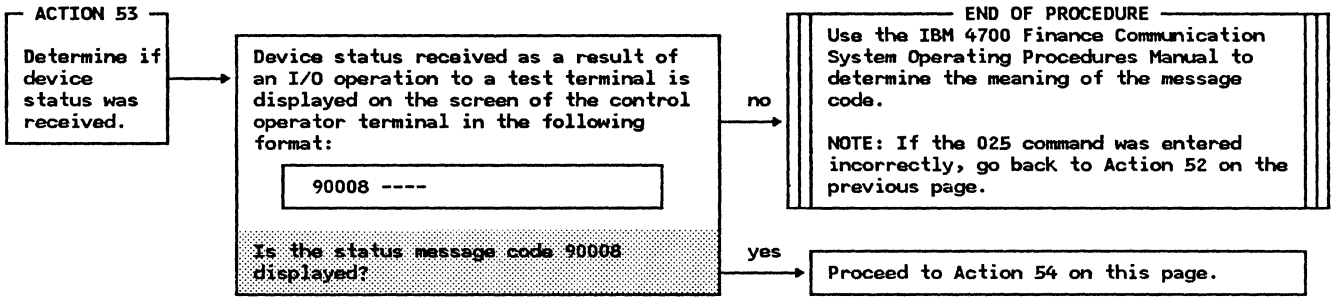
The system can successfully communicate with the terminal. The switch change appears to have corrected the problem.

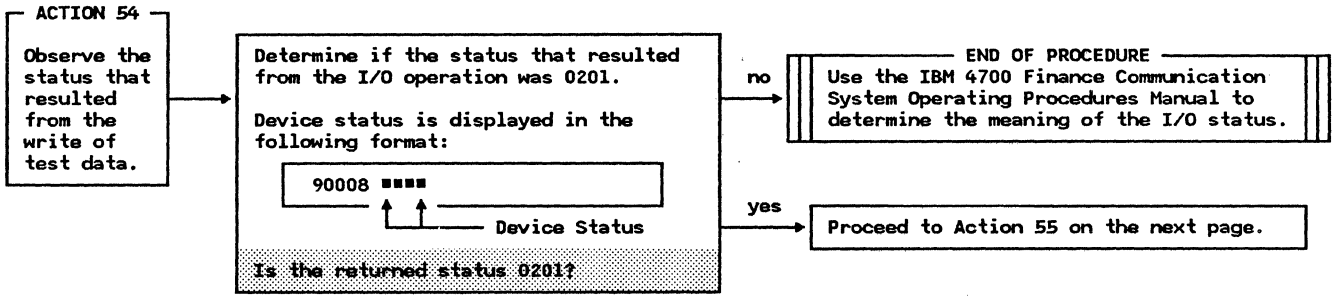
Restore the terminal to the operational state by issuing the system monitor Assign A Test Device command without any operands. This command is requested by entering 007 from the control operator terminal.

yes → Proceed to Action 53 on the next page.

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations





PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure checks for the possibility that more than one terminal has the same loop address (the same base slot assignment).

ACTION 55

Test for identical address settings on multiple terminals.

There is a possibility that more than one terminal has been physically assigned to the same address (slot) on the loop.

Switch off the terminal that has been put in Test mode in Action 44.

Using the system monitor Write To The Test Device command, transmit a test data pattern to the terminal. This command is requested by entering 025 1 0123478789 from the control operator terminal.

If the write of the test data is successful, the greater-than symbol (>) is displayed on the next display screen line of the control operator terminal. Otherwise, a status message code is displayed (of the form 900-- ----) indicating an unsuccessful operation.

Is a status message code displayed on the screen of the control operator terminal?

no →

END OF PROCEDURE

The lack of returned status when writing to a terminal that has been switched off indicates that another terminal has the identical loop address (base slot assignment).

Find the other terminal and correct this dual address problem.

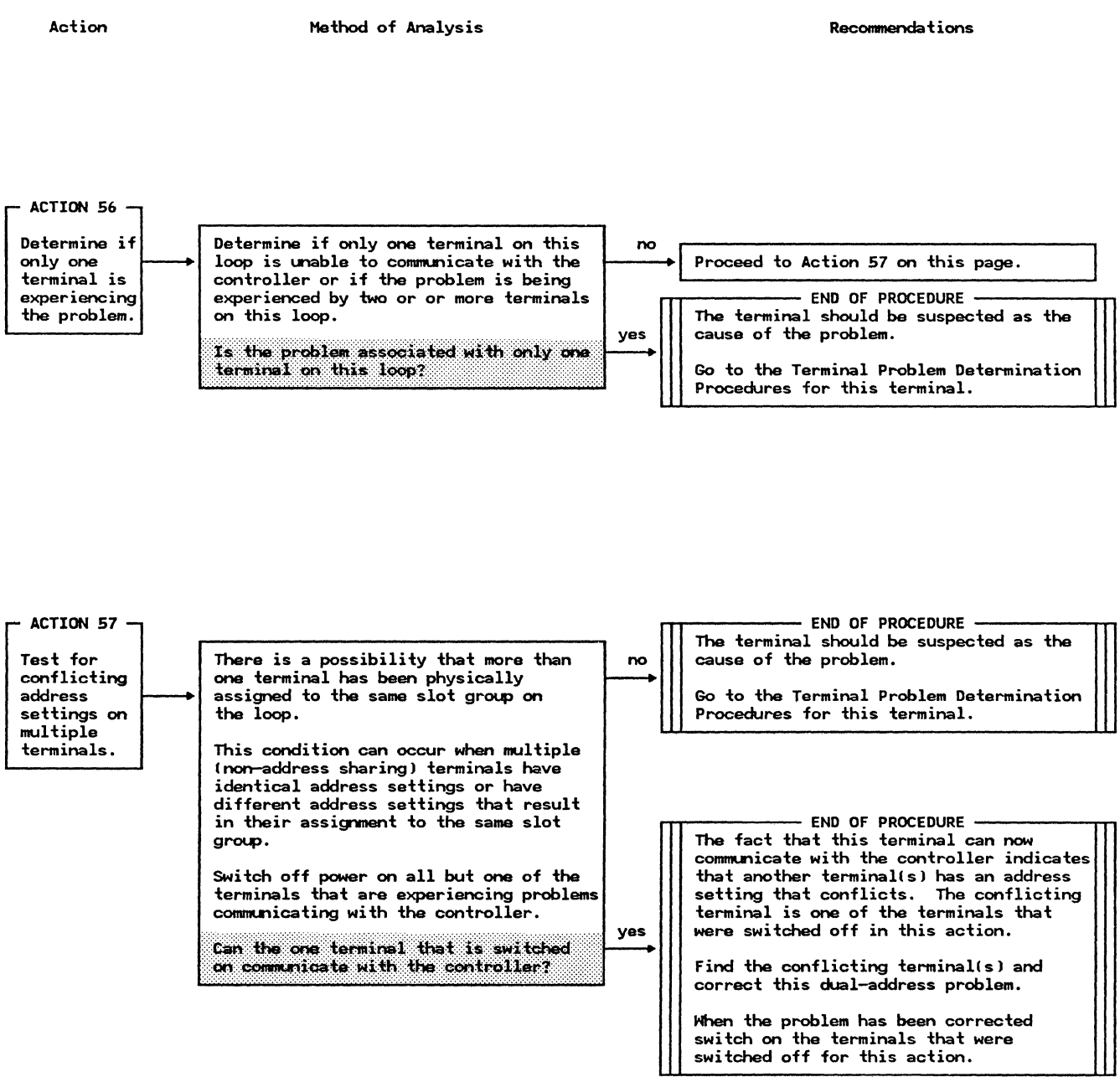
When the problem has been corrected switch on the terminal.

Restore the terminal to the operational state by issuing the system monitor Assign A Test Device command without any operands. This command is requested by entering 007 from the control operator terminal.

yes →

Proceed to Action 56 on the next page.

PDP01 - Finance Loop Problem Determination Procedure (continued)

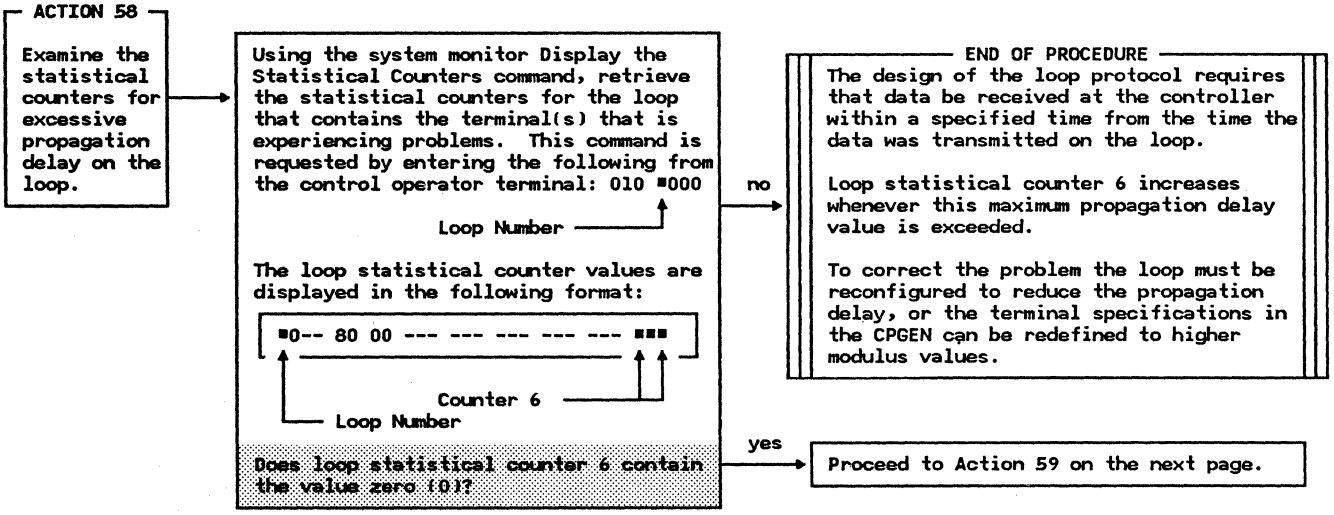


PDP01 - Finance Loop Problem Determination Procedure (continued)

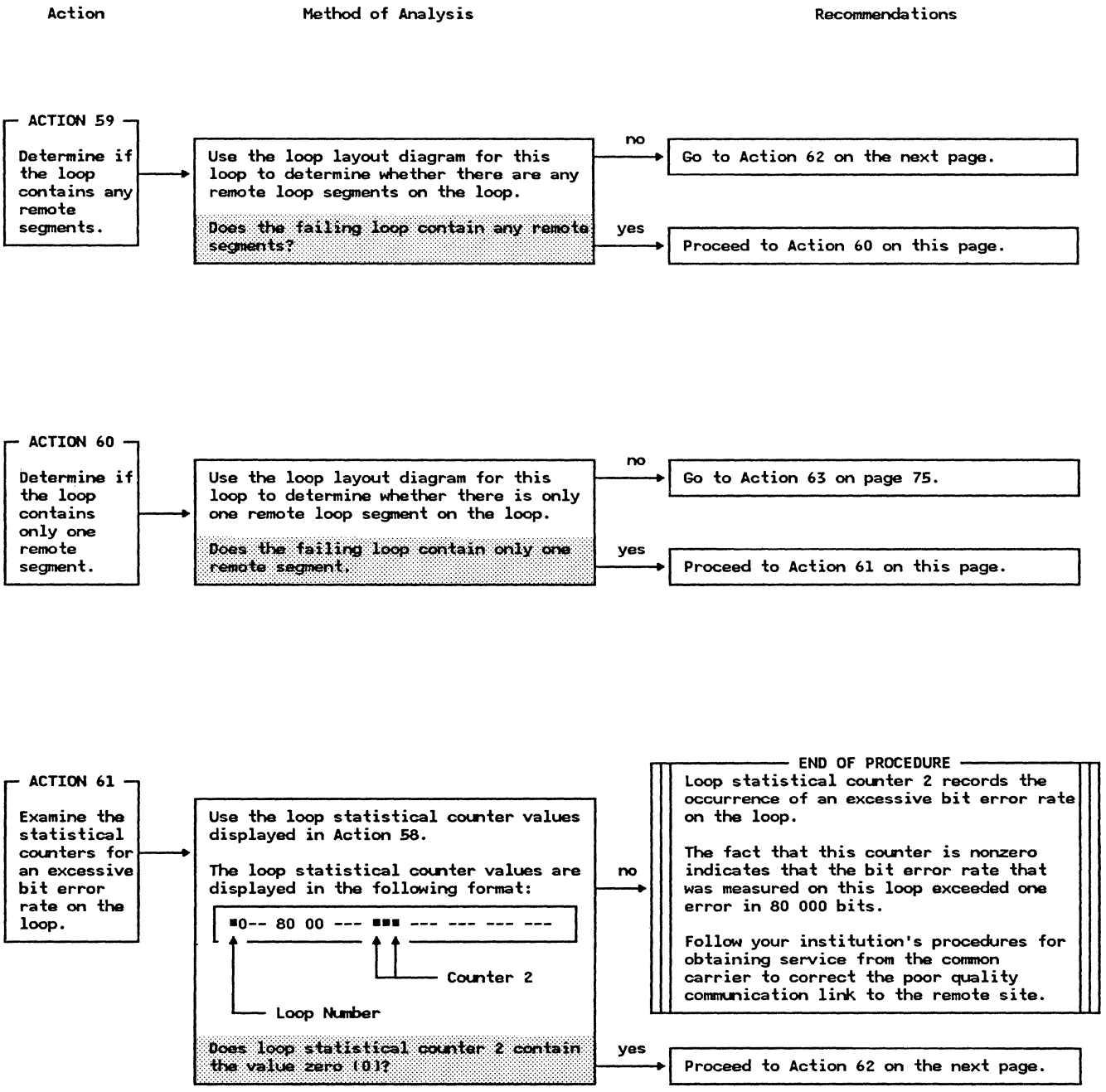
Action	Method of Analysis	Recommendations

This portion of the procedure deals with intermittent loop problems.

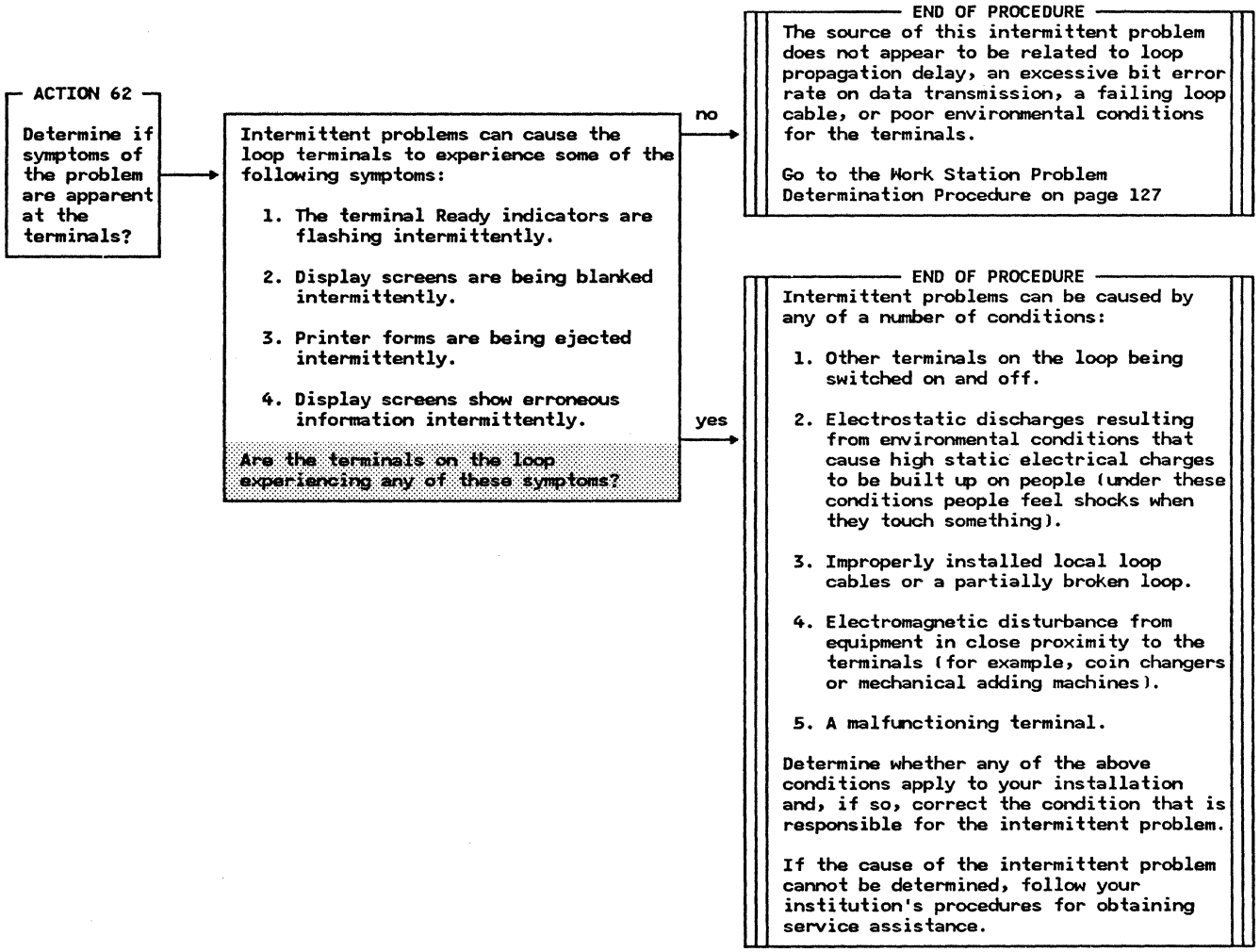
The problems are such that all terminals at a given location will experience difficulty at times communicating with the controller.



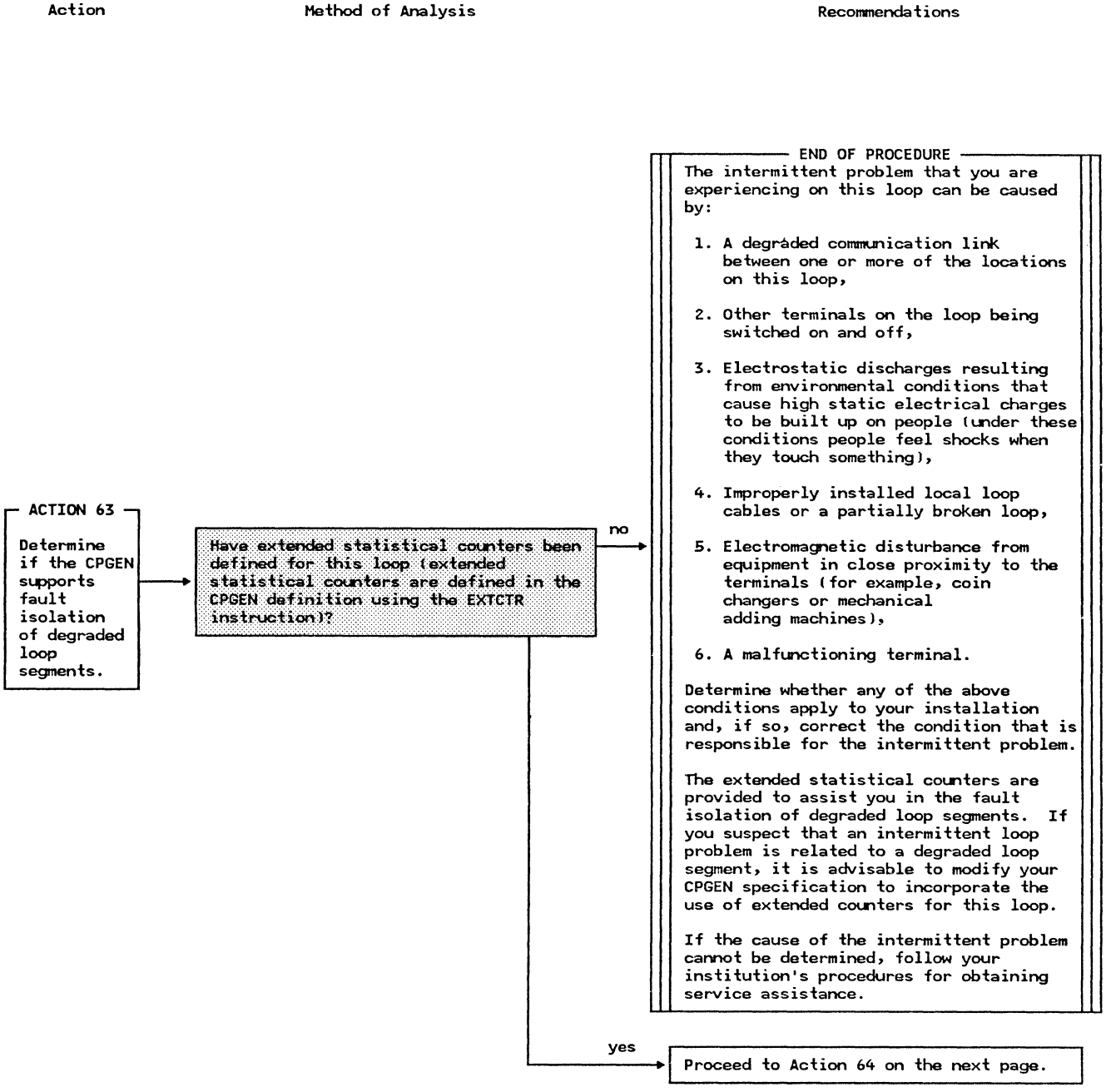
PDP01 - Finance Loop Problem Determination Procedure (continued)



PDP01 - Finance Loop Problem Determination Procedure (continued)



PDP01 - Finance Loop Problem Determination Procedure (continued)



PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

ACTION 64

Observe the extended statistical counter for the loop.

Using the system monitor Display the Extended Statistical Counters command, retrieve the extended statistical counter that records loop noise errors. This command is requested by entering the following from the control operator terminal: 072 1 ■000

Loop Number

The extended statistical counter values are displayed in the following format:

---------- ------ --- ■■■.■■

Error Byte Percentage

Record the portion of the displayed data that shows the percentage of error bytes that were received.

You should have recorded the following information:

Extended Counter	Error Percentage
Loop	---.-- %

Proceed to Action 65 on this page.

ACTION 65

Observe the extended statistical counters for the devices on the loop.

Using the system monitor Display the Extended Statistical Counters command, retrieve the extended statistical counters for the devices on the loop. This command is requested by entering the following from the control operators terminal: 072 1 ■■■■

Loop Number
Loop Address
Component Id
Subaddress (or zero)

The extended statistical counter values are displayed in the following format:

---------- ------ --- ■■■.■■

Error Byte Percentage

Record the portion of the displayed data that shows the percentage of error bytes that were received for each device.

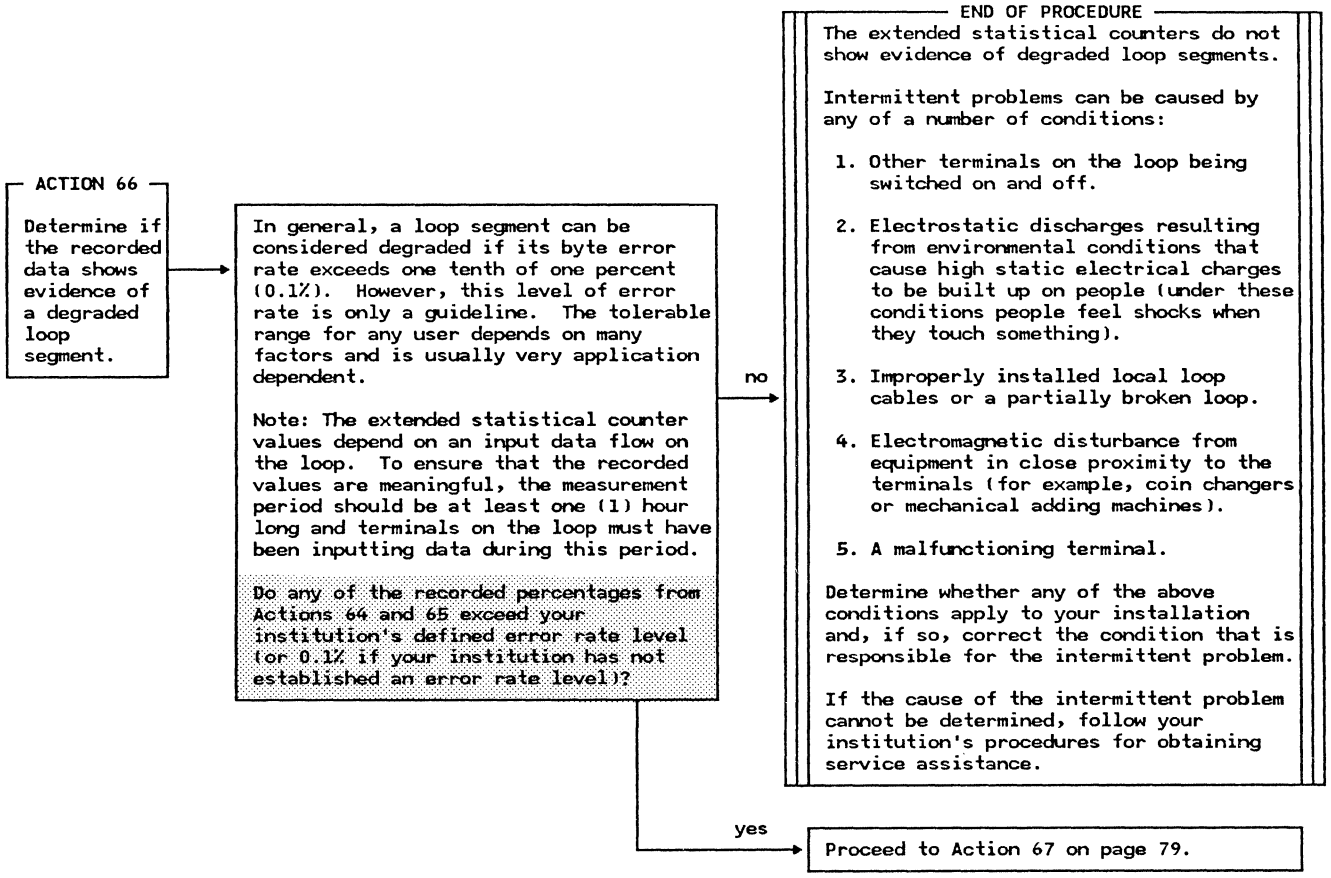
You should have recorded the following information:

Extended Counter	Error Percentage
Loop	---.-- %
Location 1	---.-- %
Location 2	---.-- %
o	o
o	o
o	o
Location n	---.-- %

Proceed to Action 66 on the next page.

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



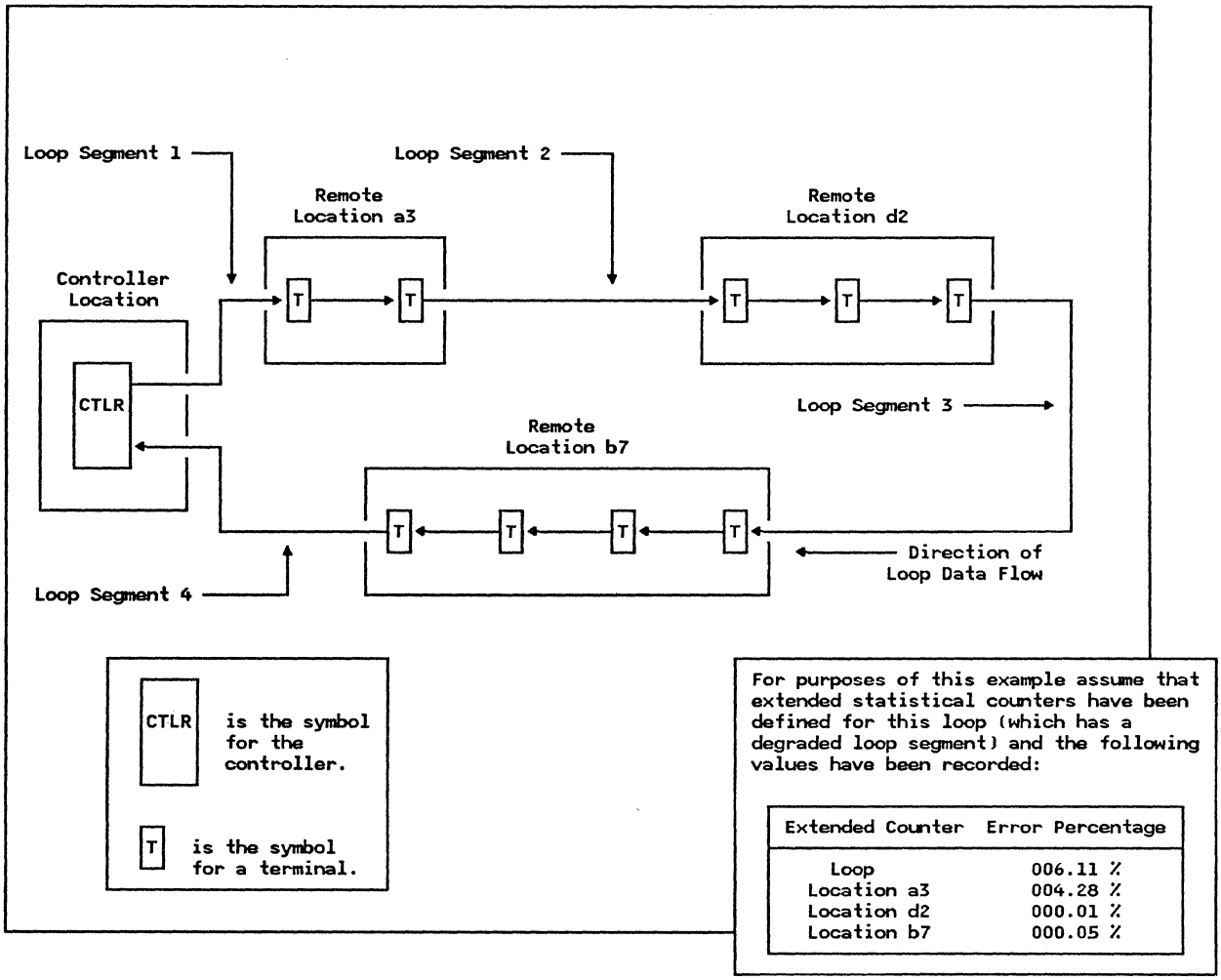


Figure 16. Example of a Multilocation Loop Configuration With a Degraded Loop Segment (loop segment 2)

PDP01 - Finance Loop Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

ACTION 67

Sequence the extended statistical counter error data.

Sequence the data recorded in Actions 64 and 65 to match the sequence of the locations on the loop.

See Figure 16 for an example of a loop layout that incorporates three (3) different locations. Arbitrary values have been assigned to the extended statistical counters associated with the loop and with each location.

You should have recorded the following information (data shown refers to the example shown in Figure 16):

Extended Counter	Error Percentage
Loop	006.11 %
Location a3	004.28 %
Location d2	000.01 %
Location b7	000.05 %

Proceed to Action 68 on this page.

ACTION 68

Evaluate the data sequenced in Action 67.

Determine from the sequenced list of locations that was created in Action 67 the two adjacent locations where the one location has an excessive error percentage and the other location has an error percentage that is at an acceptable level.

Using the error percentage numbers that were arbitrarily assigned the loop configuration example in Figure 16, the two locations to consider are locations a3 and d2.

Loop	006.11 %
Location a3	004.28 % ←
Location d2	000.01 % ←
Location b7	000.05 %

In this example loop, segment 2 should be suspected as being degraded.

END OF PROCEDURE

The communication link between these two locations is likely to be the cause of the intermittent problem you are experiencing on this loop.

Follow your institution's procedures for obtaining service from the common carrier to correct the poor quality communication link between these two locations.

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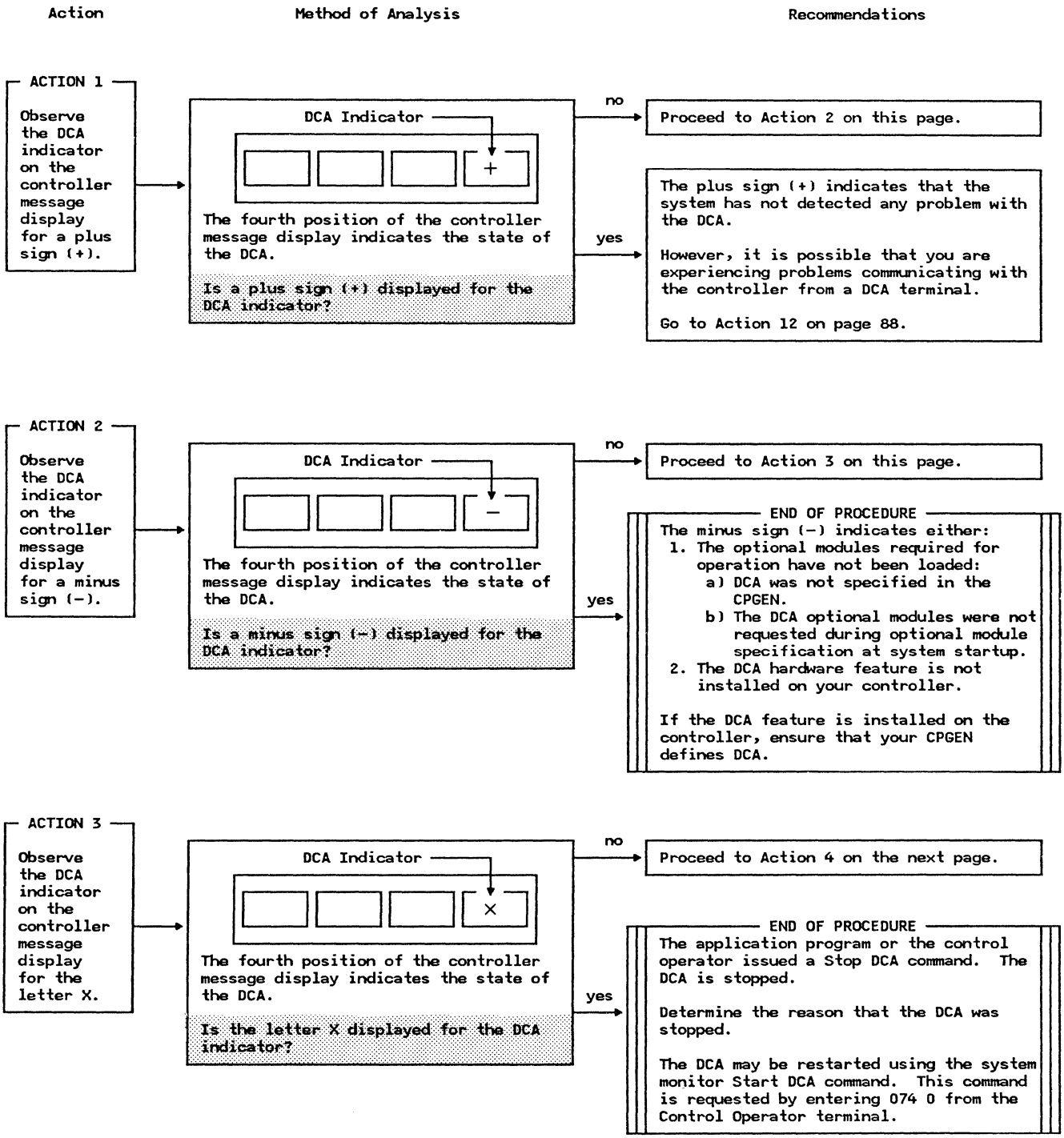
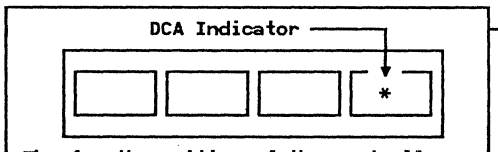
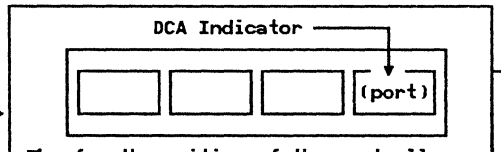
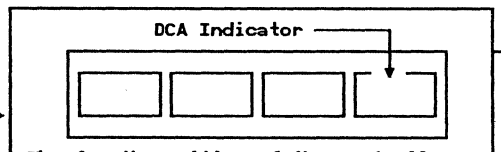
PDP02 - DCA Problem Determination Procedure



PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations
ACTION 4 Observe the DCA indicator on the controller message display for an asterisk.	 The fourth position of the controller message display indicates the state of the DCA. **Is an asterisk displayed for the DCA indicator?**	no → Proceed to Action 5 on this page. yes → **END OF PROCEDURE** The DCA has been stopped because a DCA failure has been detected. The other portions of the controller should still be operational. Follow your institution's procedures for obtaining service for the controller.
ACTION 5 Observe the DCA indicator on the controller message display for a port number.	 The fourth position of the controller message display indicates the state of the DCA. **Is this character one of the following: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, or F?**	no → Proceed to Action 6 on this page. yes → The number that is displayed is the identification of a stopped port. Go to Action 7 on the next page.
ACTION 6 Verify that the DCA indicator on the controller message display is valid.	 The fourth position of the controller message display indicates the state of the DCA. **Is this character one of the following: +, −, X, *, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, or F?**	no → **END OF PROCEDURE** It is very probable that there is a failure in the message display and the symbol displayed is invalid. However, it is also possible that you are using a back-level copy of this manual and the character displayed is a valid symbol not supported by this version. Verify that you are using the latest version of this manual. If this is the latest version of the manual, follow your institution's procedures for calling IBM for assistance. yes → Go back to Action 1 of this procedure on page 83.

PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure involves the analysis of DCA log messages related to a specific port.

To reach this point in the procedure you will be experiencing problems with a DCA terminal. These problems may or may not cause the associated DCA port to be stopped.

ACTION 7

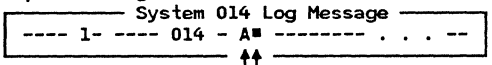
Observe the system log for DCA log messages.

Determine if there is a DCA log message containing information about the DCA port whose number is displayed on the DCA indicator of the controller message display.

Using the system monitor:

1. Issue a Display System Log Selective command to retrieve DCA log messages from the system log. This command is requested by entering 301 014 from the control operator terminal.
2. Look for a system 014 message with port identifier field containing the character A and having a port number field that matches the number displayed on the DCA indicator of the message display.

The 014 log message is displayed in the following format:



Port Identifier
Port Number

Did you find a 014 log message for the port whose number is displayed in the DCA indicator?

no → The problem you are experiencing with the DCA port whose number is displayed on the controller message display probably did not cause a log message to be written to the log file.

However, one or more of the statistical counters associated with the port have increased.

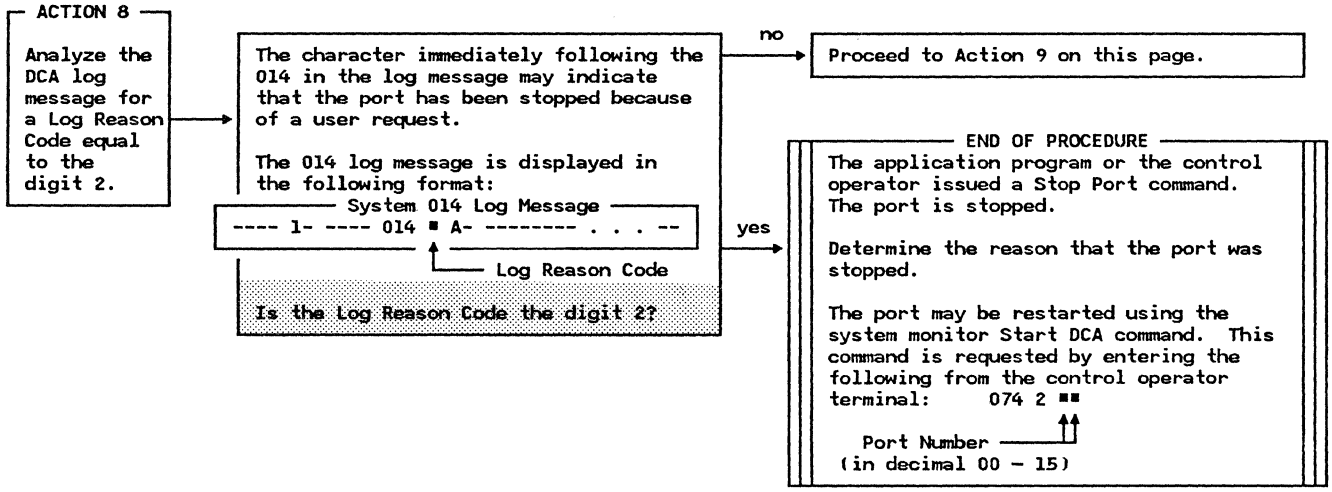
We will use the statistical counters to determine the reason the port is not operational.

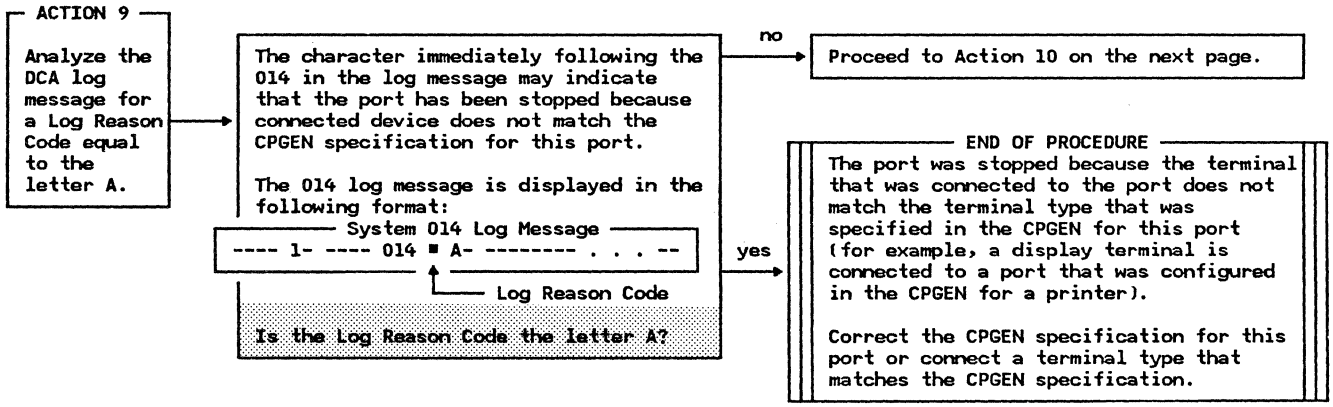
Go to Action 12 on page 88.

yes → Proceed to Action 8 on the next page.

PDP02 - DCA Problem Determination Procedure (continued)

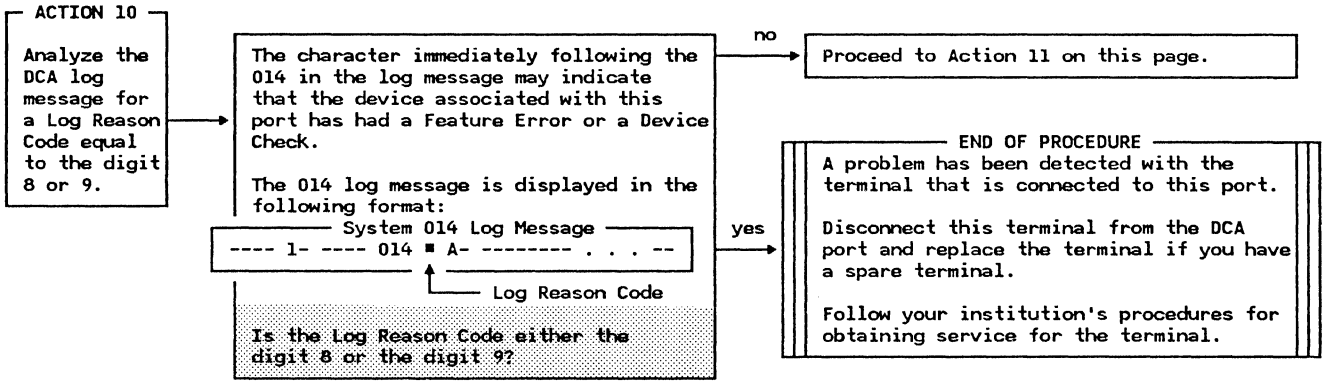
Action	Method of Analysis	Recommendations

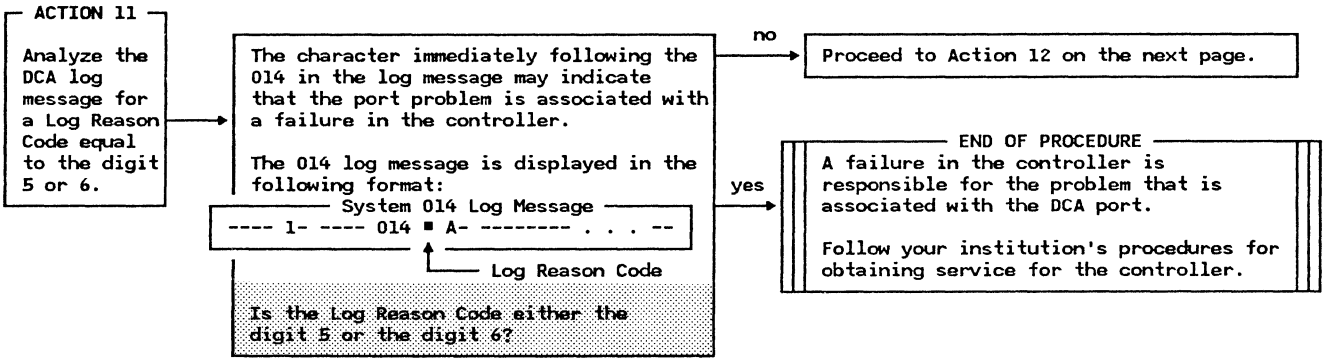




PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations





PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure involves the analysis of the DCA statistical counters associated with a specific port.

To reach this point in the procedure you will probably be experiencing problems with a DCA terminal that have not caused the port to be stopped.

ACTION 12

Observe statistical counter 1 for the port that is having problems.

Determine whether statistical counter 1, for the port having the problem, has increased.

Use the system monitor Display Statistical Counters command to display the counters associated with the port having problems. This command is requested by entering the following from the control operators terminal:

```
010 A■■0
      ↑↑
      └── Port Number
          (in decimal 00 - 15)
```

The statistical counter values are displayed in the following format:

```
A■00 00 00 - ■■■ --- --- . . . ---
└ ↑ ──────── ↑ ↑ ↑ ↑ ──────── ↑ ↑
  └ Port No.
Counter 1 ──┘ │ │ │            │ │
Counter 2 ────┘ │ │            │ │
Counter 8 ──────┘ │            │ │
                  └────────────┘ │
                                 └
```

Has port statistical counter 1 increased (that is, is it nonzero)?

no → Proceed to Action 13 on the next page.

yes →

Counter 1 increases if the controller detects that the terminal on this port is failing to respond to polling commands.

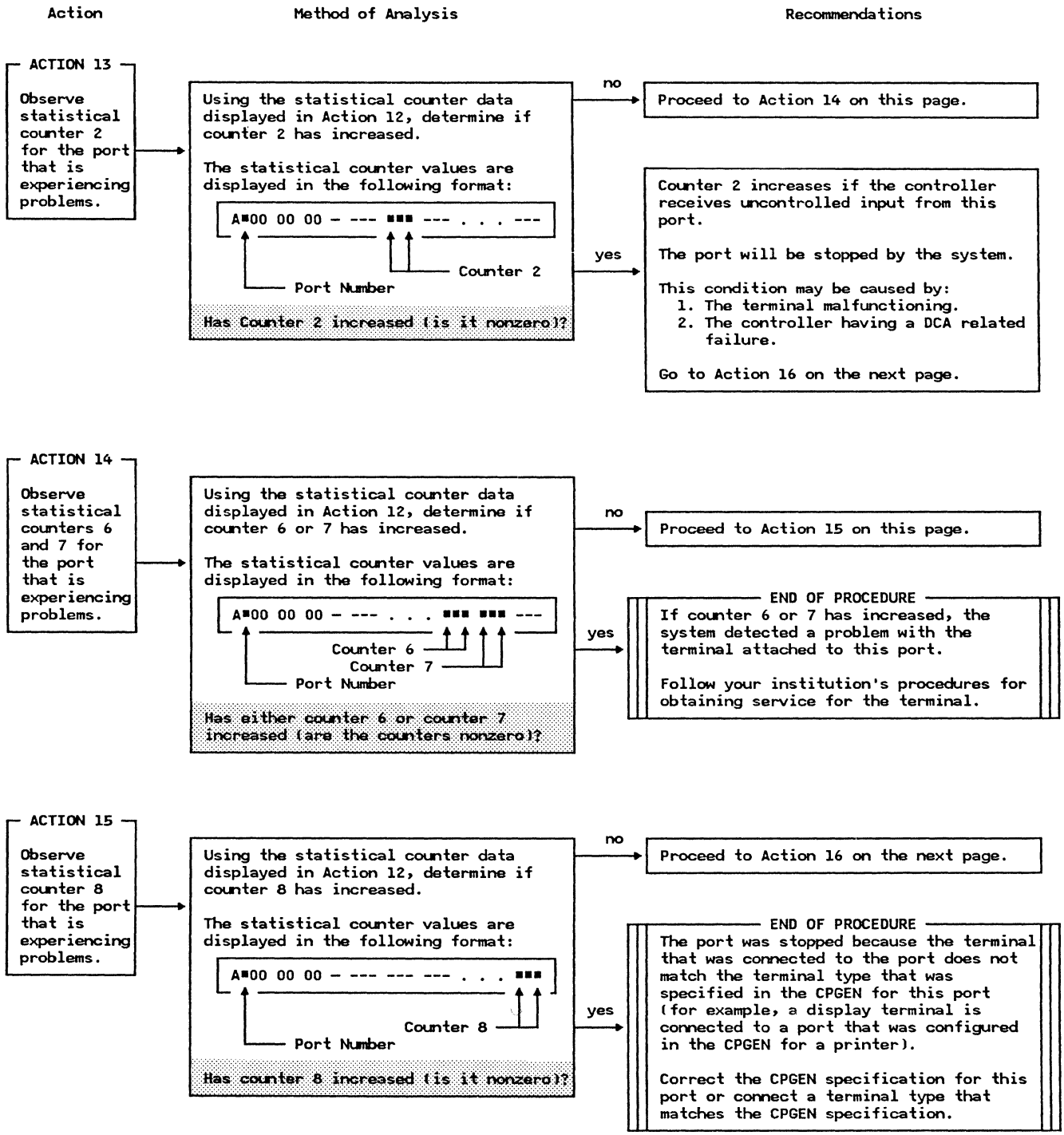
The associated terminal must have previously been in communication with the controller (it had previously responded to polling commands).

This condition may be caused by:

1. The terminal being switched off.
2. The terminal being disconnected from the controller.
3. The terminal malfunctioning.
4. The controller having a DCA related failure.

Go to Action 16 on page 90.

PDP02 - DCA Problem Determination Procedure (continued)



PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

We will verify that the problem with the DCA port is not caused by a loose or open coaxial cable connection at the controller or the terminal.

ACTION 16

Ensure that a loose connection is not the cause of the problem.

Verify that the DCA cable connectors for this DCA port are securely and properly connected.

You should check the DCA cable connections:
1. At the rear of the controller.
2. At the terminal.

Did you find any connections that were partially or fully unplugged?

no → Go to Action 18 on the next page.

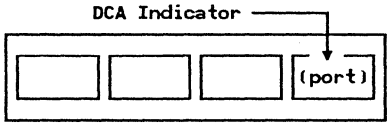
yes → Proceed to Action 17 on this page.

ACTION 17

Determine whether replugging the DCA connectors fixes the problem.

Replug the loose DCA cable connections that were found in Action 12.

Determine whether this action restores the terminal to operational state:
1. Switch the terminal off and on.
2. Observe the DCA indicator on the controller message display.



Is the number of the port that was not operational still being displayed?

no → END OF PROCEDURE

The cause of the problem has been found and the DCA port is now operational.

If the DCA indicator character on the message display is not a plus sign (+) go back to Action 1 of this procedure on page 83.

yes → Proceed to Action 18 on the next page.

PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

In this portion of the procedure we shall determine the source of the problem by using a substitute terminal of the same type, if one is available, or by trying the inoperable terminal on a different DCA port.

ACTION 18

Determine whether a similar DCA terminal is available to test the port.

→ Determine if an operational DCA terminal is available that is the same type as the terminal currently connected to the port (if the terminal currently attached to the port is a display, the substitute terminal should also be a display; if a printer is attached to the port, the substitute terminal should be a printer).

Is an operational DCA terminal available that can be substituted for the terminal currently having problems?

no → Because a terminal of a similar type is not available to test the port having the problem, another port will be used to determine whether the problem is with the terminal.

Go to Action 20 on page 93.

yes → Proceed to Action 19 on the next page.

PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

Another terminal of the same type as the inoperative terminal is available for use as a test terminal.

We will connect this test terminal to the port that is having the problem. If this substitute terminal becomes operational the indication is that the originally connected terminal (or the coaxial cable that connects it to the controller) is failing. If the terminal does not become operational, the DCA port is failing and the controller requires service.

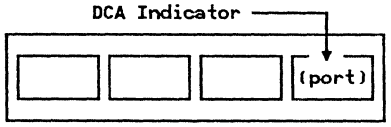
ACTION 19

Test the port with an operational terminal of the same type.

To determine if the problem is associated with the controller, connect an operational terminal (of the same type) to the port that is having the problem.

Perform the following steps to accomplish this test of the DCA port:

1. Remove the terminal that is having the problem from the controller by disconnecting the controller end of the coaxial cable.
2. Attach the substitute terminal to the controller using a different coaxial cable.
3. Switch the substitute terminal off and on.
4. Observe the DCA indicator on the controller message display.



Is the number of the port that was not operational still being displayed?

no →

END OF PROCEDURE

The fact that the number of the failing port is no longer displayed in the DCA indicator of the controller message display indicates that the currently attached terminal is operational.

The originally connected terminal, or the coaxial cable that connects the terminal to the controller, is failing.

Verify that the coaxial cable associated with the inoperable terminal is not failing by replacing it with a known good cable and determining whether the terminal becomes operational.

If the coaxial cable is not the cause of the problem, follow your institution's procedures for getting the terminal serviced.

yes →

END OF PROCEDURE

The replacement terminal is experiencing the same problem as the originally connected terminal.

The controller is malfunctioning.

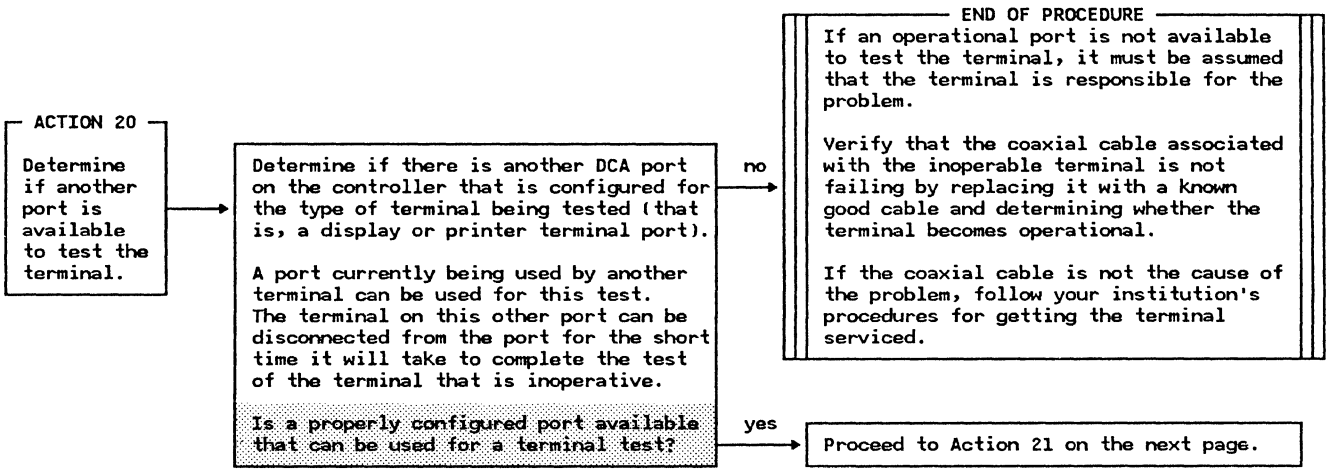
Follow your institution's procedures for obtaining service for the controller.

PDP02 - DCA Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

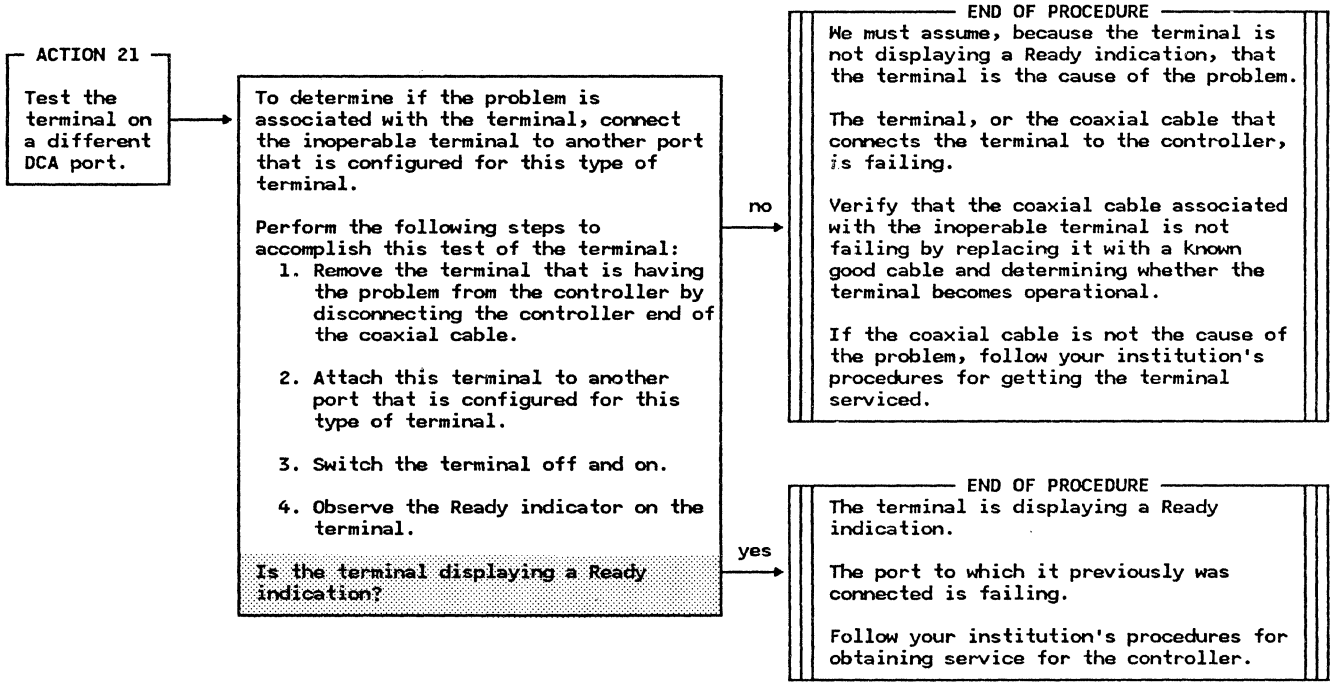
A terminal that can be used as a test terminal (of the same type as the inoperable terminal) is not available.

The inoperable terminal will be connected to a different port (if there is a properly configured port available) to test the terminal. If the terminal become operational, the port that it was previously connected to is failing and the controller requires service. If the terminal does not become operational, the problem is with the terminal.



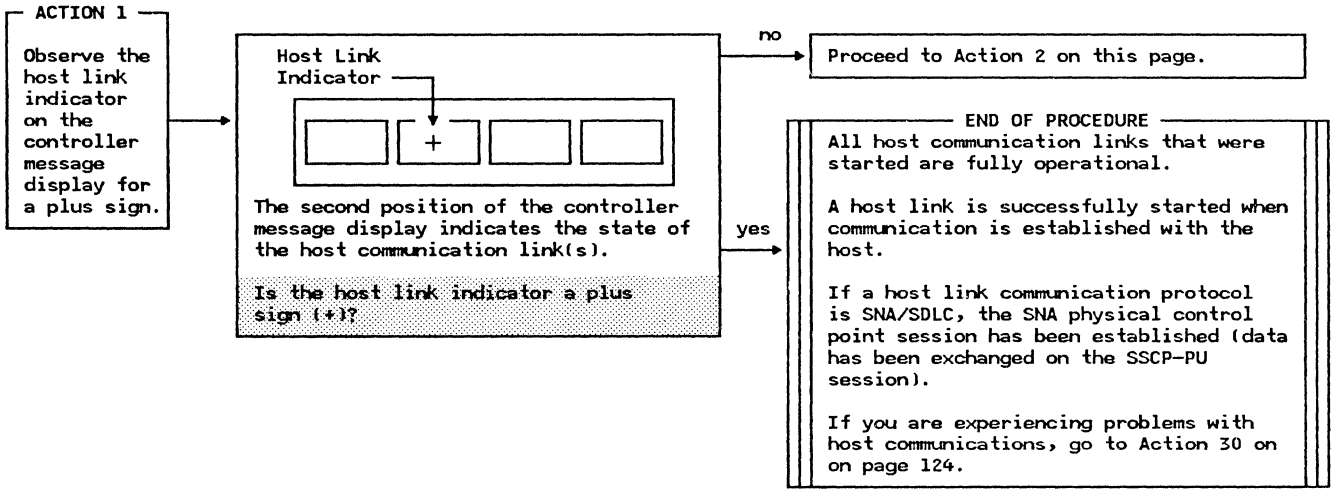
PDP02 - DCA Problem Determination Procedure (continued)

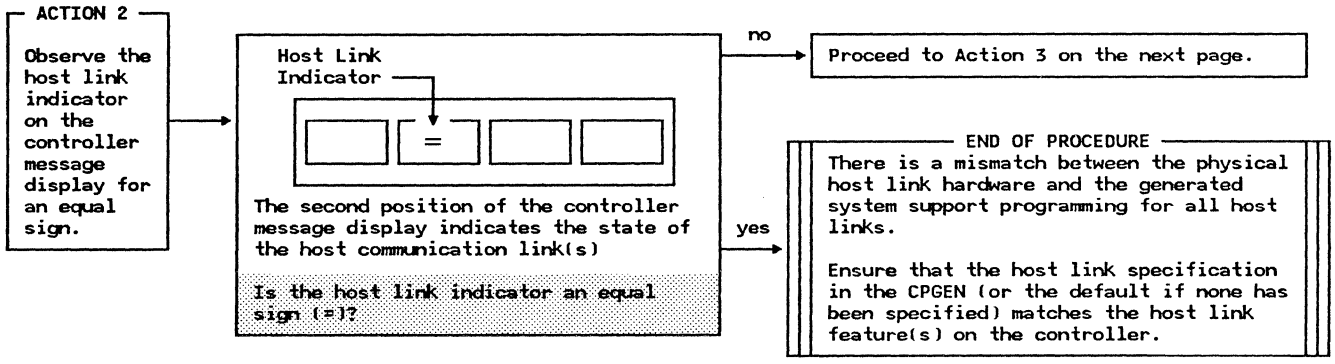
Action	Method of Analysis	Recommendations



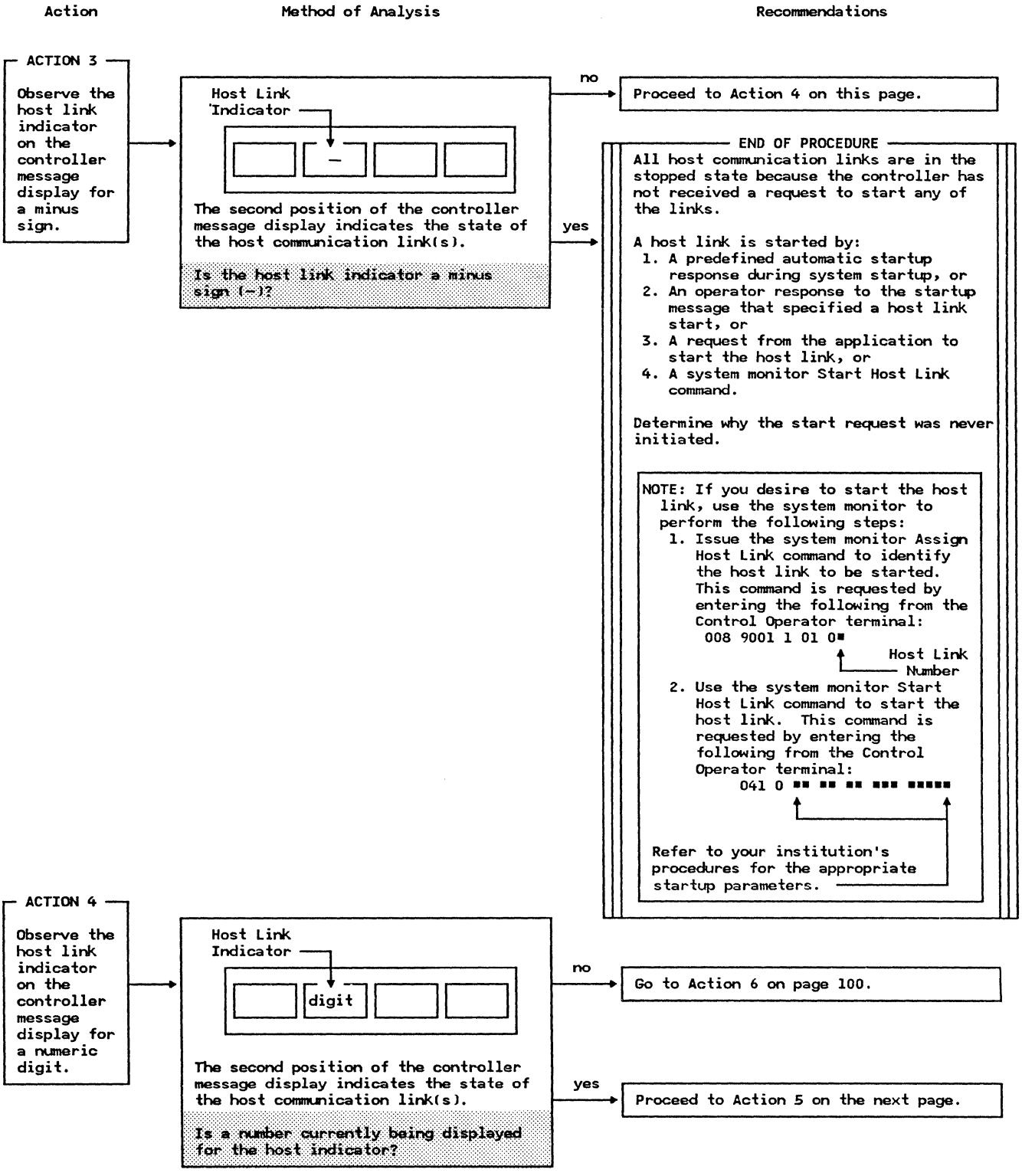
PDP03 - Host Link Problem Determination Procedure

Action	Method of Analysis	Recommendations





PDP03 - Host Link Problem Determination Procedure (continued)



PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

The display of a digit in the Host Indicator position of the controller message display indicates that there is more than one host link on the controller and the link associated with the digit is not fully operational.

Because only one position on the controller message display is allocated to the host links, the number displayed is associated with the first link that becomes not fully operational. The status of the the other link(s) is not displayed until the first link beomes operational or is stopped. However, you can determine the status of all the links using the system monitor Display Operator Control Panel command (see Action 5 for details).

The following action (Action 5) will retrieve the state symbol associated with the host link whose number is displayed on the message display. The state symbol will define the operational state of that link.

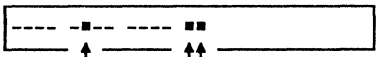
This state symbol will be referenced in the remainder of this procedure.

ACTION 5

Determine the operational state of the host links.

Use the system monitor Display Operator Control Panel command to display the operational state of the host links. You can request this command by entering 075 from the Control Operator terminal.

The host link indicator on the controller message display and the host link state symbols are displayed in the following format:



Host Link Indicator

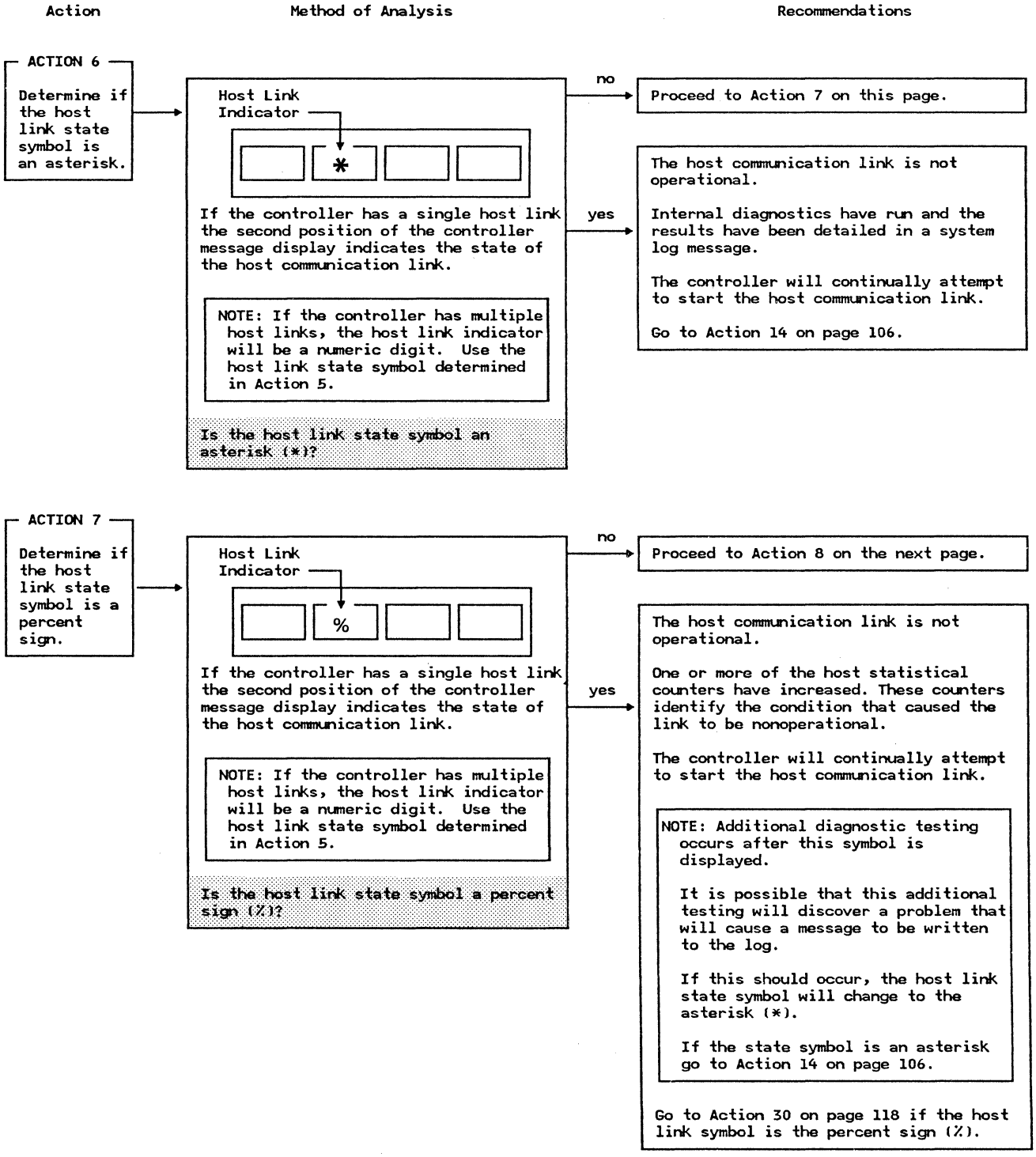
Host Link State Symbols
- Host Link 1
- Host Link 2

Determine the state symbol that is associated with the host link number displayed in the host link indicator position of the message display.

Use the state symbol for the appropriate host link in the following actions.

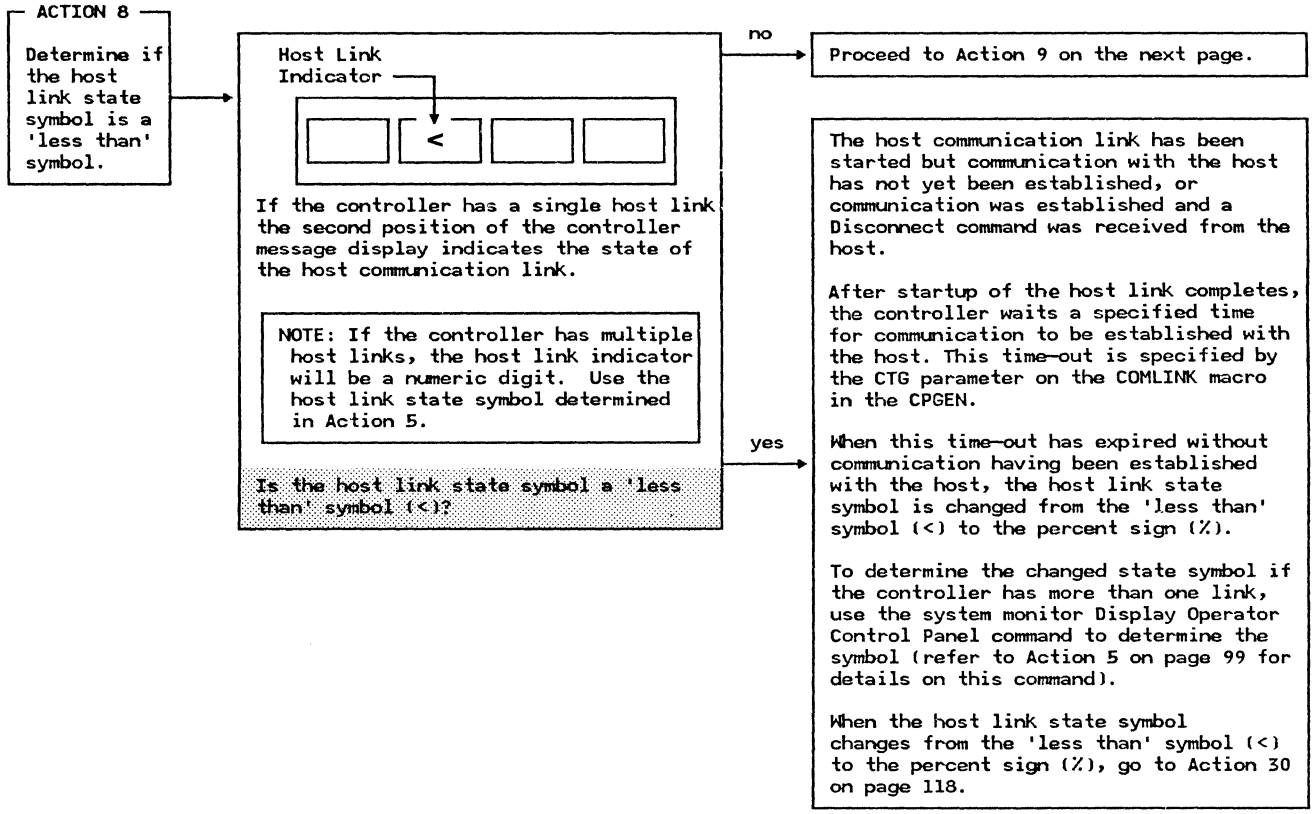
Proceed to Action 6 on the next page.

PDP03 - Host Link Problem Determination Procedure (continued)



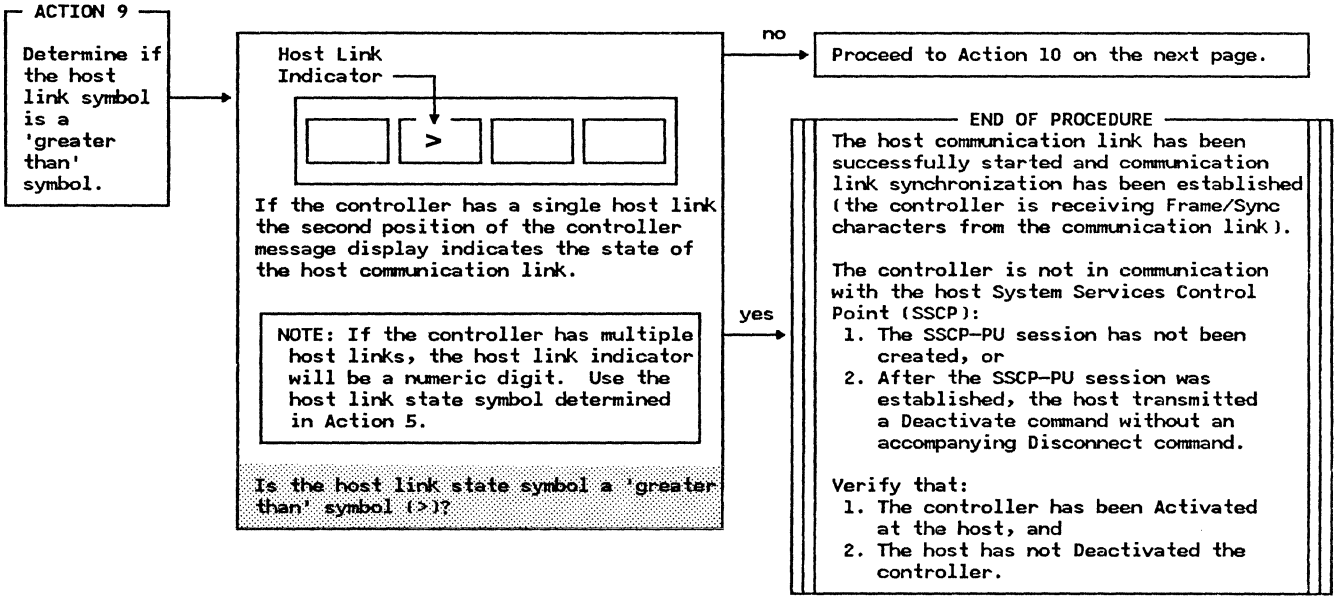
PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



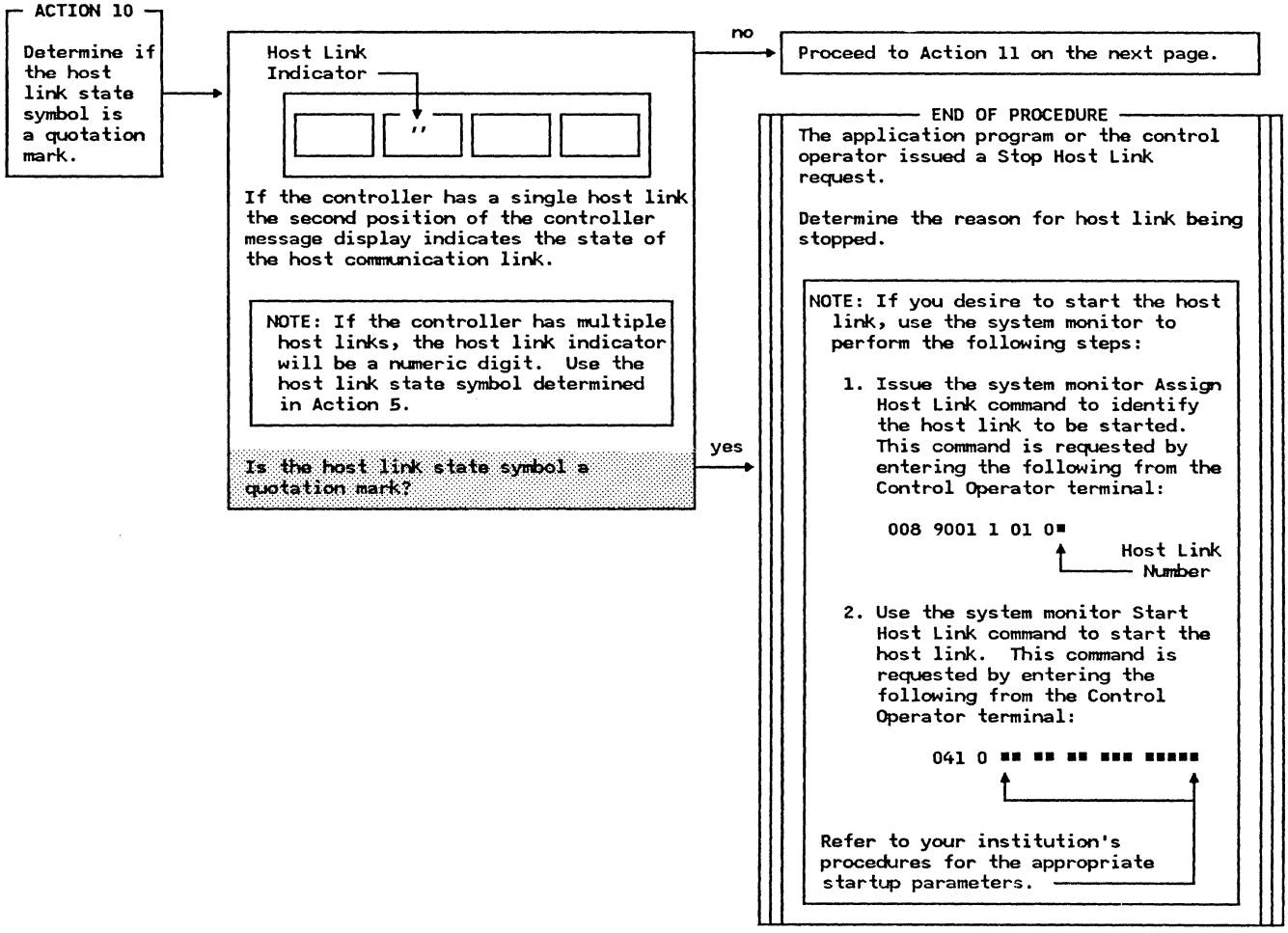
PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP03 - Host Link Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

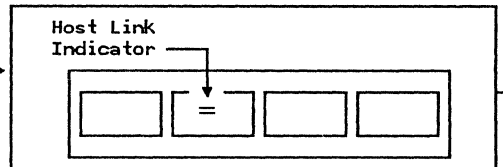


PDP03 - Host Link Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

ACTION 11

Determine if the host link state symbol is an equal sign.



If the controller has a single host link the second position of the controller message display indicates the state of the host communication link.

NOTE: If the controller has multiple host links, the host link indicator will be a numeric digit. Use the host link state symbol determined in Action 5.

Is the host link state symbol an 'equal sign'?

no → Proceed to Action 12 on this page.

yes →

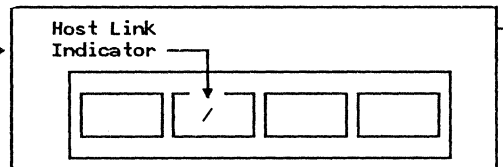
END OF PROCEDURE

There is a mismatch between the physical host link hardware and the generated system support programming.

Ensure that the host link specification in the CPGEN (or the default if none has been specified) matches the host link feature on the controller.

ACTION 12

Determine if the host link state symbol is a slash.



If the controller has a single host link the second position of the controller message display indicates the state of the host communication link.

NOTE: If the controller has multiple host links, the host link indicator will be a numeric digit. Use the host link state symbol determined in Action 5.

Is the host link state symbol a slash?

no → Proceed to Action 13 on the next page.

yes →

END OF PROCEDURE

The host link for this controller is connected to the IBM Multiuse Communications Loop and contact with the host has been lost.

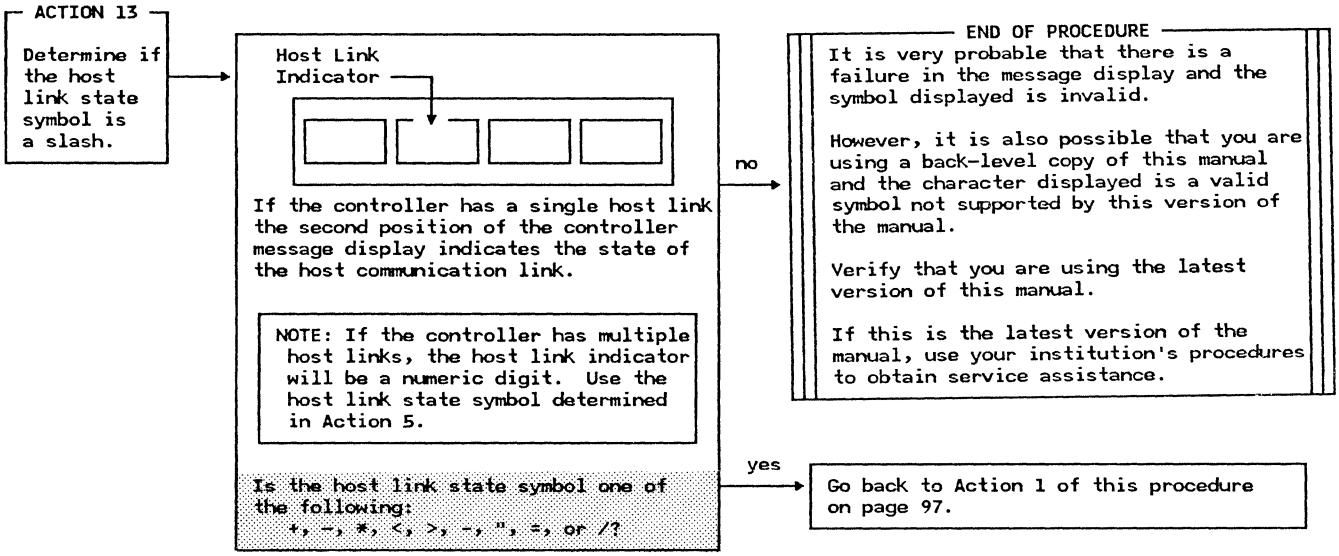
This symbol is displayed eight (8) seconds after contact has been lost, regardless of the time-out interval that was specified in the CTG parameter of the COMLINK macro in the CPGEN.

If the CPGEN specified time-out interval expires without host contact being re-established, the symbol displayed will be changed to the percent sign signifying that a statistical counter (time-out) has increased.

Follow the Problem Determination Procedures for the IBM Multiuse Communications Loop in the host system manuals.

PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure involves the analysis of the host related system log messages.

You should now have an asterisk (*) for the host link state symbol.

ACTION 14

Observe the system log.

Find the system log message that contains information about the host link.

Using the System Monitor:

1. Issue the Log Selective Display command to display any log messages associated with the host link. This command is requested by entering 301 006 from the Control Operator terminal.
2. Look for a System 006 log message that contains the digit 1 in the Format Identifier field.

The 006 log message is displayed in the following format:

System 006 Log Message

```
---- 11 ---- 006 ■■----------------
```

Format Identifier

Host Link Number

Did you find a system 006 log message containing the digit 1 in the format Identifier field?

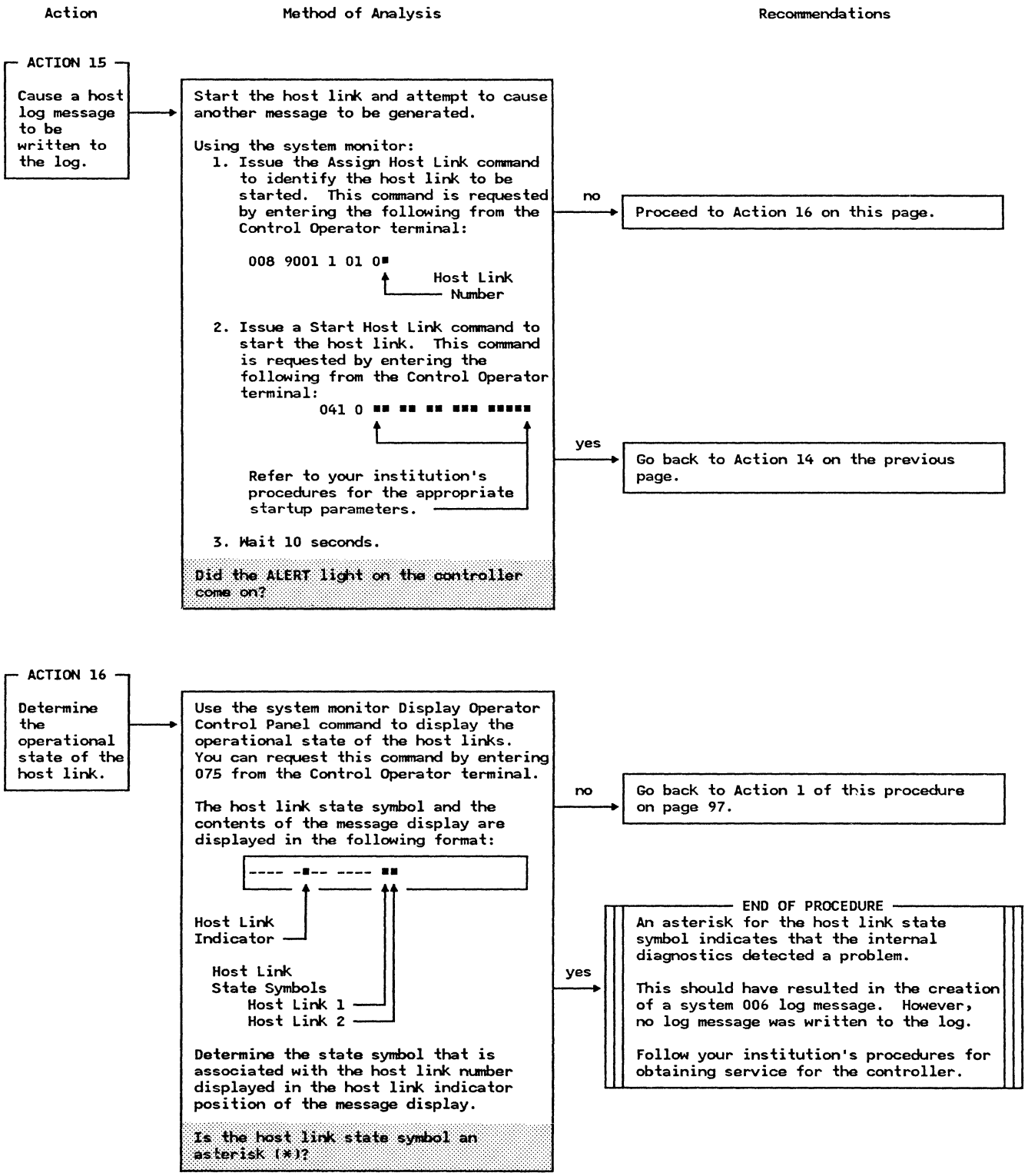
no → If you did not find a system 006 log message for the failing link it was probably because the log area on the diskette is full.

You can re-create the log message and display it using the log message buffer in the controller.

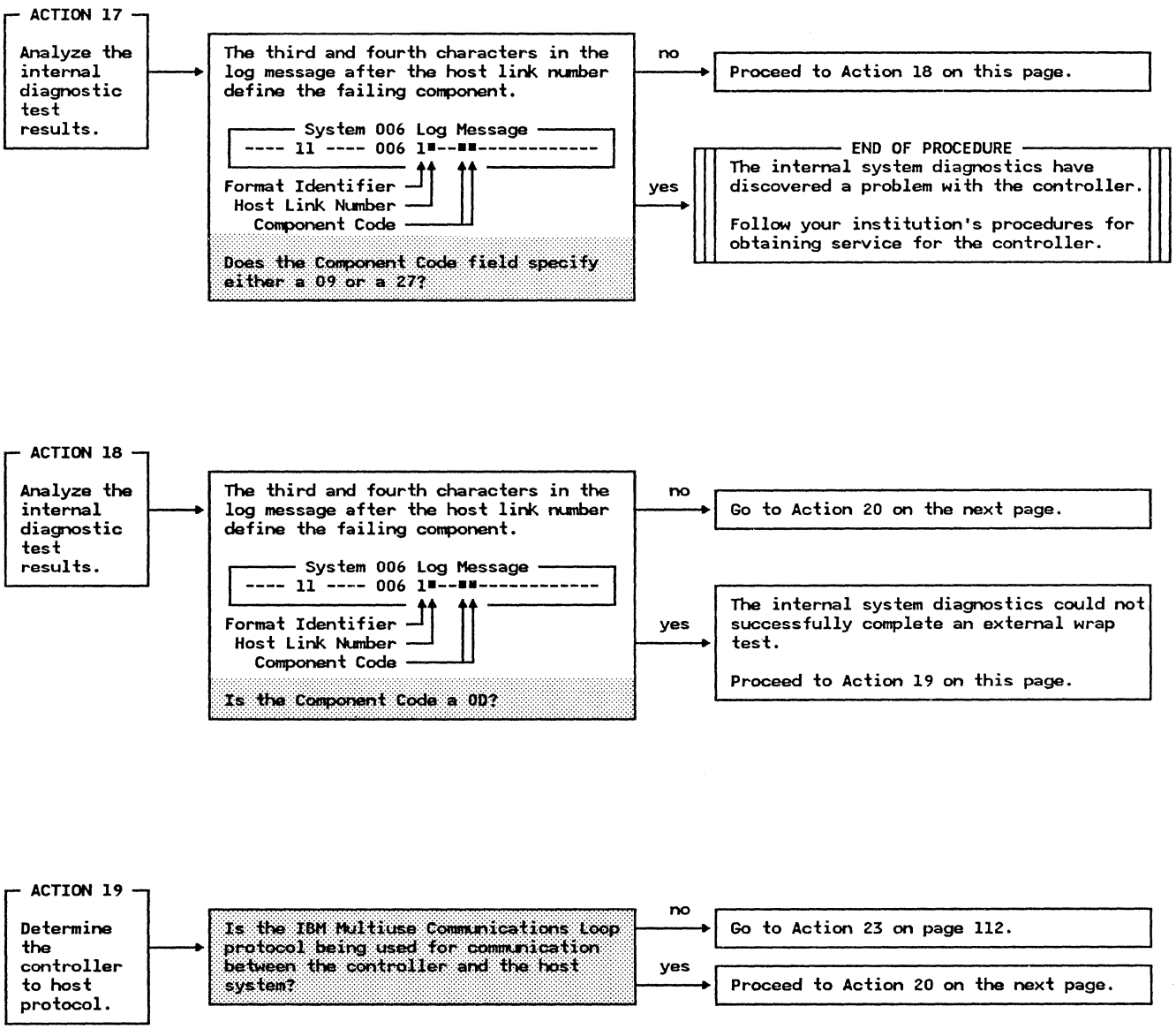
Proceed to Action 15 on the next page.

yes → Go to Action 17 on page 108.

PDP03 - Host Link Problem Determination Procedure (continued)



PDP03 - Host Link Problem Determination Procedure (continued)

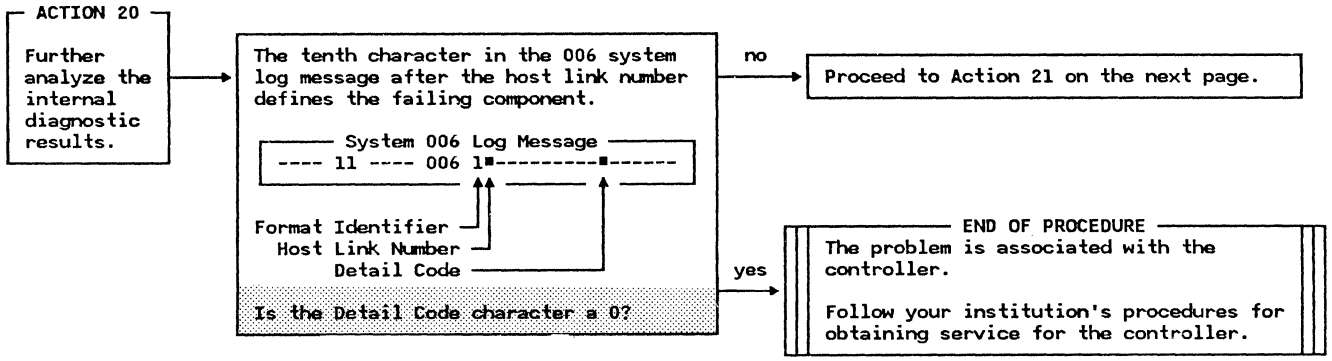


PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

It was determined in Action 19 that the IBM Multiuse Communications Loop is used for the link between the controller and the host.

The following action (Action 20) further analyzes the 006 log message.



PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

ACTION 21

Perform a diagnostic wrap test on the cable to the LSC.

Ensure that the cable connecting the controller and the LSC is operational.

Using the system monitor to initiate the test, perform the following steps to test the cable:

1. Disconnect the cable from the LSC and install a wrap plug on the end of the cable.
2. Issue the system monitor Assign Host Link command to identify the host link to be wrapped. This command is requested by entering the following from the Control Operator terminal:

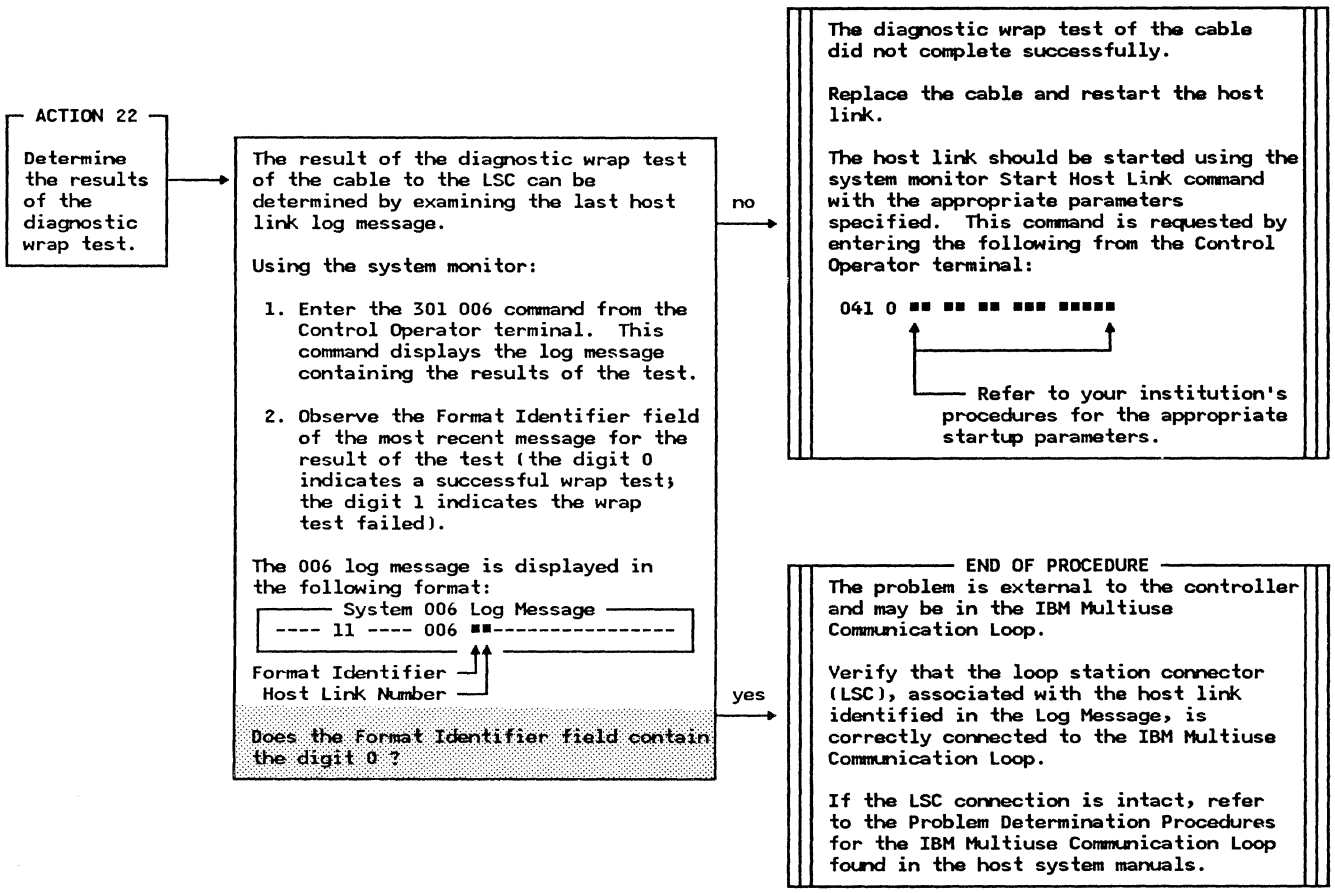
   ```
   008 9001 1 01 0■
                  ↑
                  └── Host Link Number
   ```

3. Issue a system monitor Stop Host Link command to cause the host link to be stopped. This command is requested by entering 041 1 from the Control Operator terminal.
4. Turn off the ALERT light on the operator control panel by issuing the system monitor Display Log Messages command. This command is requested by entering 001 from the Control Operator terminal.
5. Issue a system monitor Start Host Link command to cause a diagnostic wrap test to be performed. This command is requested by entering 041 0 40 from the Control Operator terminal.
6. Wait thirty (30) seconds for the diagnostic routines to complete the test. The test has completed when the ALERT light on the controller display panel is turned on indicating that a message containing the result of the test has been written to the log.

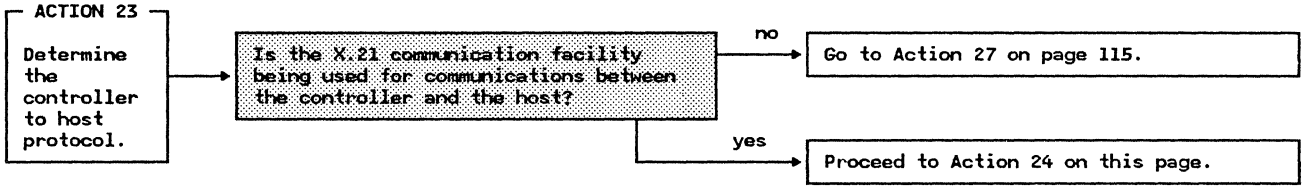
Proceed to Action 22 on the next page.

PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

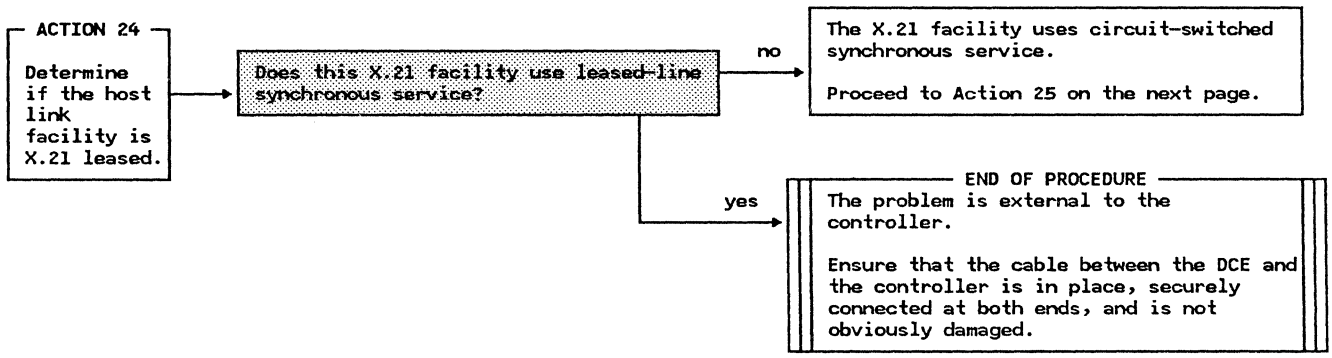


Action	Method of Analysis	Recommendations



It was determined in Action 23 that the X.21 Communication facility is used for the link between the controller and the host.

The next three actions pertain to this facility.



PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations
ACTION 25 Perform a diagnostic wrap test on the X.21 control logic in the controller.	Ensure that the X.21 control logic in the controller is fully operational by performing a wrap test on the appropriate host link. Using the system monitor to initiate the test, perform the following steps to test the host link logic: 1. Disconnect, at the rear of the controller, the cable that connects the controller to the appropriate DCE. 2. Insert the host link wrap plug in the controller in the place of the host link cable connector. 3. Issue the system monitor Assign Host Link command to identify the host link to be wrapped. This command is requested by entering the following from the Control Operator terminal: 008 9001 1 01 0■ Host Link Number 4. Issue a system monitor Stop Host Link command to cause the host link to be stopped. This command is requested by entering 041 1 from the Control Operator terminal. 5. Turn off the ALERT light on the operator control panel by issuing the system monitor Display Log Messages command. This command is requested by entering 001 from the Control Operator terminal. 6. Issue a system monitor Start Host Link command to cause a diagnostic wrap test to be performed. This command is requested by entering 041 0 40 from the Control Operator terminal. 7. Wait thirty (30) seconds for the diagnostic routines to complete the test. The test has completed when the ALERT light on the controller display panel is turned on indicating that a message containing the result of the test has been written to the log.	Proceed to Action 26 on the next page.

PDP03 - Host Link Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

ACTION 26

Determine the results of the diagnostic wrap test.

The result of the diagnostic wrap test of the X.21 control logic can be determined by examining the last host link log message.

Using the system monitor to initiate the test, perform the following steps to test the host link logic:

1. Issue the system monitor Log Selective Display command to display the log message containing the result of the test. This command is requested by entering 301 006 from from the Control Operator terminal.

2. Observe the Format Identifier field of the most recent message for the result of the test (the digit 0 indicates a successful wrap test; the digit 1 indicates the wrap test failed).

The 006 log message is displayed in the following format:

System 006 Log Message

```
---- 11 ---- 006 ■■----------------
```

Format Identifier
Host Link Number

Does the Format Identifier field contain the digit 0 ?

no →

END OF PROCEDURE

The problem is associated with the controller.

Follow your institution's procedures for obtaining service for the controller.

yes →

END OF PROCEDURE

The wrap test completed successfully.

The problem is located outside of the controller.

Ensure that the cable connection to the DCE is in place, securely connected at both ends, and that the cable has not been obviously damaged.

Remove the host link wrap plug and reconnect the cable to the controller.

NOTE: If the controller has a single host link, the host indicator on the message display will show a quotation mark (") signifying the host link is stopped.

If there are multiple host links on the controller, the number of the host link that was just tested will no longer be displayed in the host indicator on the message display.

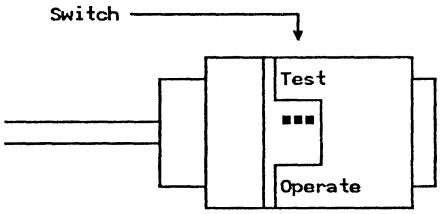
You may elect, at this point, to restart the host link even though the physical link is currently not operational. If the host link is started, the controller will continually monitor the state of the link and when the link becomes operational the controller will complete the start procedure.

The host link should be started using the system monitor Start Host Link command with the appropriate parameters specified. This command is requested by entering the following from the Control Operator terminal:

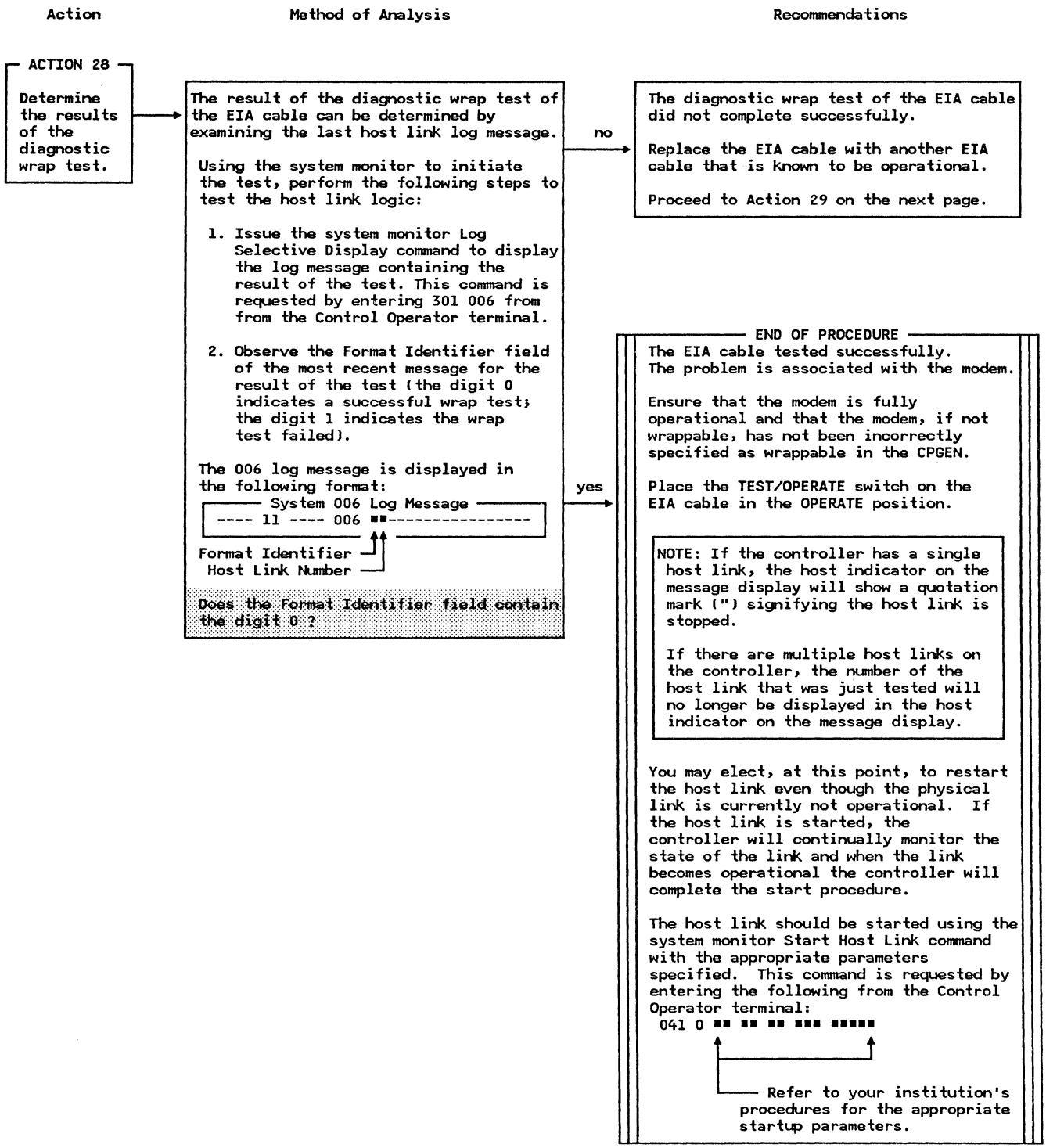
```
041 0 ■■ ■■ ■■ ■■■ ■■■■■
```

Refer to your institution's procedures for the appropriate startup parameters.

PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations
ACTION 27 Perform a diagnostic wrap test on the EIA cable to the modem.	Ensure that the EIA cable on the appropriate host link is operational. Using the system monitor to initiate the the test, perform the following steps to test the EIA cable: 1. Place the TEST/OPERATE switch located on the modem end of the appropriate EIA cable (the cable that connects the modem to the controller) into the TEST position.  Modem End of Cable 2. Issue the system monitor Assign Host Link command to identify the host link to be wrapped. This command is requested by entering the following from the Control Operator terminal: 008 9001 1 01 0■ Host Link Number 3. Issue a system monitor Stop Host Link command to cause the host link to be stopped. This command is requested by entering 041 1 from the Control Operator terminal. 4. Turn off the ALERT light on the operator control panel by issuing the system monitor Display Log Messages command. This command is requested by entering 001 from the Control Operator terminal. 5. Issue a system monitor Start Host Link command to cause a diagnostic wrap test to be performed. This command is requested by entering 041 0 40 from the Control Operator terminal. 6. Wait thirty (30) seconds for the diagnostic routines to complete the test. The test has completed when the ALERT light on the controller display panel is turned on indicating that a message containing the result of the test has been written to the log.	Proceed to Action 28 on the next page.

PDP03 - Host Link Problem Determination Procedure (continued)



PDP03 - Host Link Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

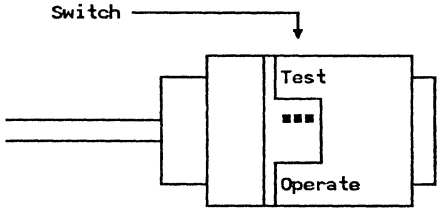
ACTION 29

Perform a diagnostic wrap test on the new EIA cable to the modem.

Test the replacement EIA cable to ensure the cable is operational.

Using the system monitor to initiate the test, perform the following steps to test the EIA cable:

1. Place the TEST/OPERATE switch located on the modem end of the replacement EIA cable into the TEST position.



Modem End of Cable

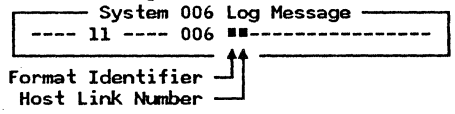
2. Issue a system monitor Start Host Link command to cause a diagnostic wrap test to be performed on the EIA cable. This command is requested by entering 041 0 40 from the Control Operator terminal.

3. Wait thirty (30) seconds for the diagnostic routines to complete the test. The test has completed when the ALERT light on the operator control panel is turned on indicating that a message containing the result of the test has been written to the log.

4. Issue the system monitor Log Selective Display command to display the log message containing the result of the test. This command is requested by entering 301 006 from the Control Operator terminal.

5. Observe the Format Identifier field of the most recent message for the result of the test (the digit 0 indicates a successful wrap test; the digit 1 indicates the wrap test failed).

The 006 log message is displayed in the following format:



Does the Format Identifier field contain the digit 0 ?

no →

END OF PROCEDURE

The problem is associated with the controller.

Follow your institution's procedures for obtaining service for the controller.

yes →

END OF PROCEDURE

The internal diagnostics have successfully tested the replacement EIA cable.

The host link should now be operational.

Place the TEST/OPERATE switch on the EIA cable in the OPERATE position.

The host link should be started using the System Monitor Start Host Link command with the appropriate parameters specified. This command is requested by entering the following from the Control Operator terminal:

041 0 ■■ ■■ ■■ ■■■ ■■■■■

Refer to your institution's procedures for the appropriate start-up parameters.

NOTE: If the character displayed for the host link indicator on the controller message display does not change to a plus sign (+) after the Start Host Link command is issued, go back to Action 1 of this procedure on page 97.

PDP03 - Host Link Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

The host link state symbol, for the host link being analysed, should be a percent sign (%). If the state symbol is something other than the percent sign, go back to Action 1 of this procedure, on page 97.

The % indicates that the host communication link is not operational because of one of the following:

1. Communication with the host system has been lost after it had been established.
2. The controller attempted to establish communication with the system and the host system failed to respond within the time-out specified in the CPGEN.
3. The controller could not establish a connection with the modem.
4. The controller could not successfully transmit a message to the host system after making 20 attempts.
5. Invalid internal status was detected during normal operation.
6. Either of two signal lines was lost from the IBM Multiuse Communications Loop.

Because one or more of the host statistical counters have increased as a result of this condition, the following actions will analyze these counters.

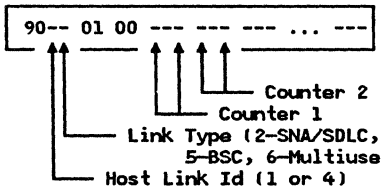
ACTION 30

Determine a reference point for an examination of the host link statistical counters.

Determine the initial values associated with specific host link statistical counters.

Use the system monitor Display The Statistical Counters command to retrieve the appropriate host link counters. This command is requested by entering from the Control Operator terminal 010 9001 for host link 1 or 010 9004 for host link 2.

The statistical counter values are displayed in the following format:



Record the values associated with counters 4, 7, 8, 11, 14, 17, and 18.

You should have recorded the following information:

Statistical Counter	First Reading	Second Reading
Counter 4	nnn	
Counter 7	nnn	
Counter 8	nnn	
Counter 11	nnn	
Counter 14	nnn	
Counter 17	nnn	
Counter 18	nnn	

The system is attempting to restart the host link. If the host link start is again unsuccessful, one or more of the statistical counters will be increased.

You must wait a sufficient amount of time to ensure completion of the restart attempt. This time interval should be greater than the time-out interval specified in the CTG parameter of the COMLINK macro in the CPGEN.

Proceed to Action 31 on the next page.

PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

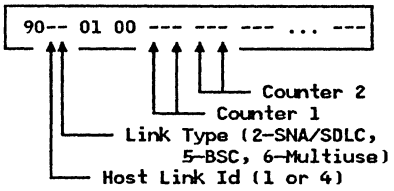
ACTION 31

Determine if specific statistical counters for the host link are increasing.

Determine the updated values associated with the host link statistical counters recorded in Action 30.

Use the system monitor Display The Statistical Counters command to retrieve the appropriate host link counters. This command is requested by entering from the Control Operator terminal 010 9001 for host link 1 or 010 9004 for host link 2.

The statistical counter values are displayed in the following format:



Record the values associated with counters 4, 7, 8, 11, 14, 17, and 18 next to the set of first readings to permit a comparison to be made.

You should have recorded the following information:

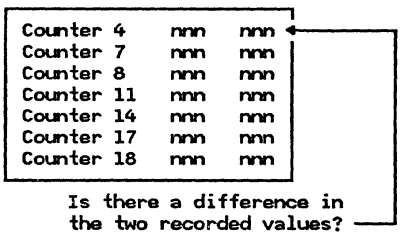
Statistical Counter	First Reading	Second Reading
Counter 4	nnn	nnn
Counter 7	nnn	nnn
Counter 8	nnn	nnn
Counter 11	nnn	nnn
Counter 14	nnn	nnn
Counter 17	nnn	nnn
Counter 18	nnn	nnn

Proceed to Action 32 on this page.

ACTION 32

Determine if host link statistical counter 4 increased.

Using the data recorded in Actions 30 and 31, determine if counter 4 has increased.



Has host link statistical counter 4 been increased?

no → Go to Action 35 on page 121.

yes →

The host communication link is not operational because either:

1. Communication with the host has been lost after it had been established, or
2. The controller attempted to establish communication with the host and the host failed to respond within the time-out specified in the CPGEN.

Proceed to Action 33 on the next page.

PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

ACTION 33

Determine if all elements in the host controller link are operational.

Determine whether the host system is operational, is polling the controller, and the following communication link elements are operational:

1. Common carrier facility,
2. Data communications equipment (DCE) (for example, a modem or LSC),
3. Cable connecting the controller to the DCE.

Are the host link elements operational and is the controller being polled?

no →

END OF PROCEDURE

Arrange to have the source of the problem corrected.

When the problem is corrected the controller should automatically start the host link.

yes →

Proceed to Action 34 on this page.

ACTION 34

Determine if the problem is associated with the control unit address.

If communications with the host has never been established, it is possible that the Control Unit Address of the controller does not match the address the host is using to poll the controller.

Retrieve the Control Unit Address currently established for the controller using the system monitor Display Level Data command. This command is requested by entering 076 from the Control Operator terminal.

The resultant data is displayed in the following format:

```
IR=--.-     EC=------    PAT=-- CPG=--.-
GENID=-------  SERIAL NO=------ CUA=■■
```

Control Unit Address (CUA)

Verify that the Control Unit Address matches the host polling address.

Do the addresses match?

no →

END OF PROCEDURE

The Control Unit Address of the controller is specified by setting the control unit address switches on the front of the controller.

If these switches are set to zero, the Control Unit Address is defined by:

1. Specification during the diskette create process, or
2. Operator specification when the controller is started, or
3. Specified when the host link was started, or
4. The system default of 'C1'.

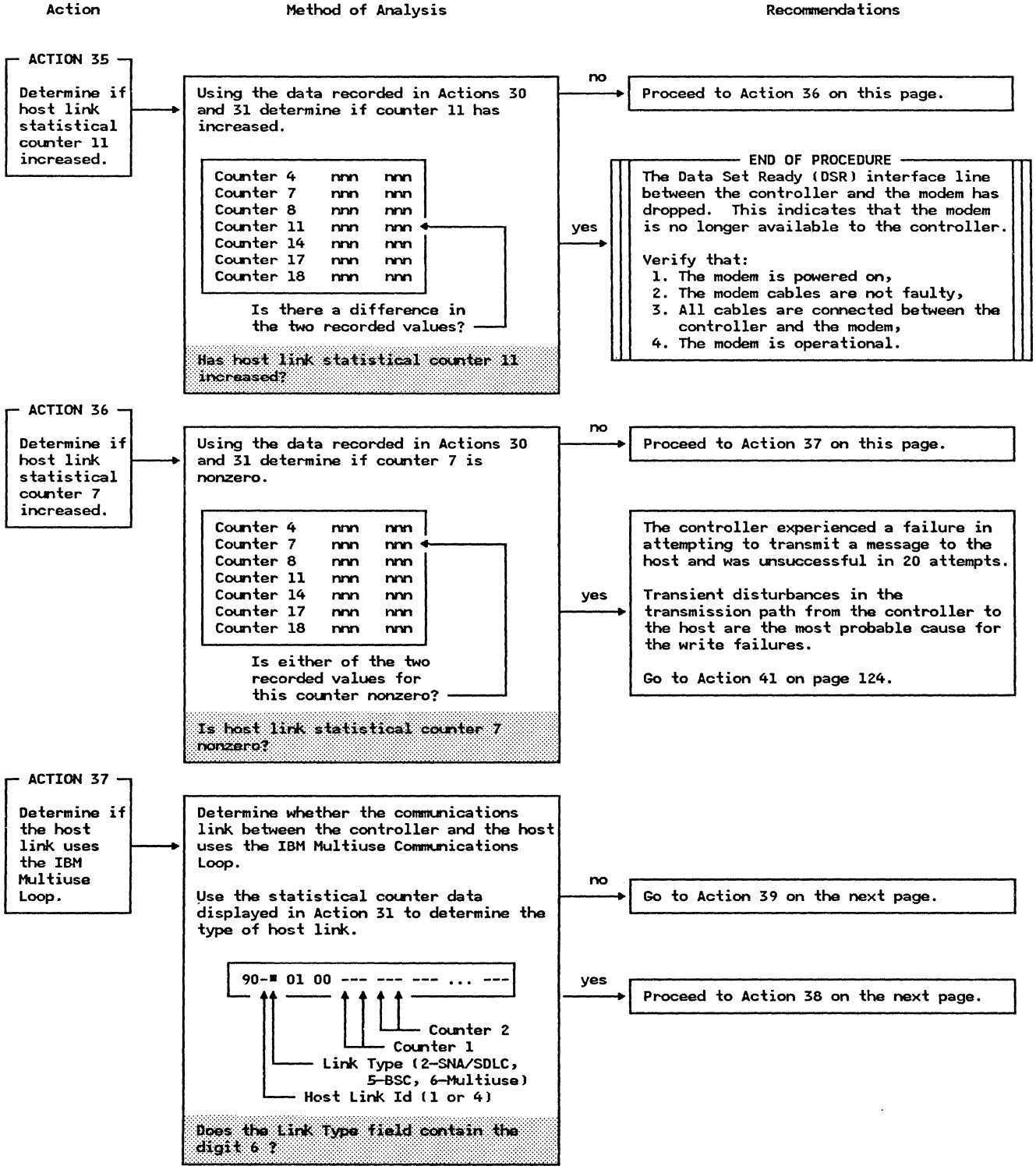
Set the Control Unit Address to match the host polling address or change the host polling address.

yes →

END-OF-PROCEDURE

Verify that the host link specifications in the CPGEN are correct for the host link (for example, NZRI/Non-NZRI).

PDP03 - Host Link Problem Determination Procedure (continued)

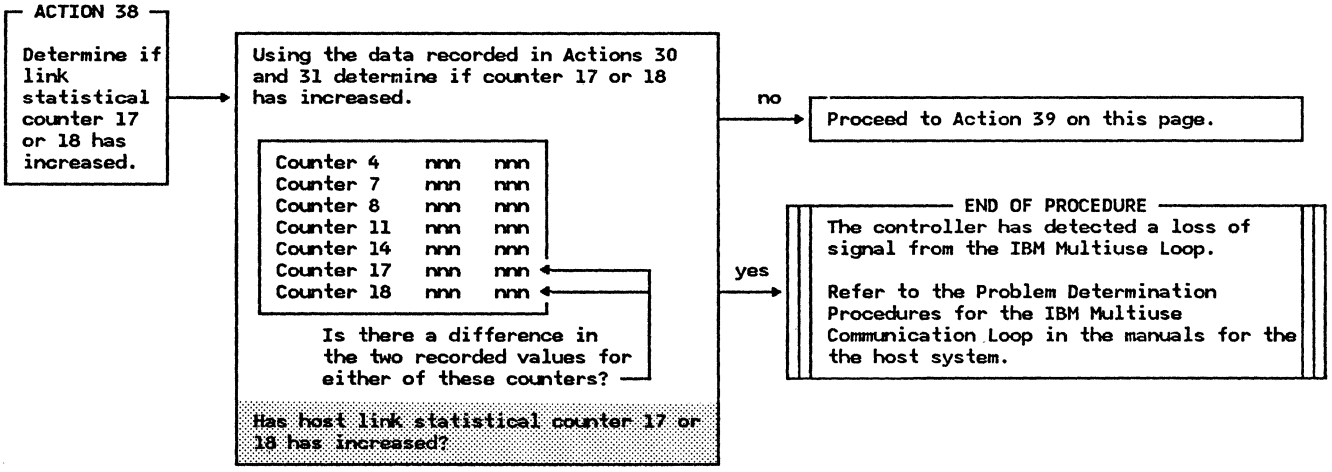


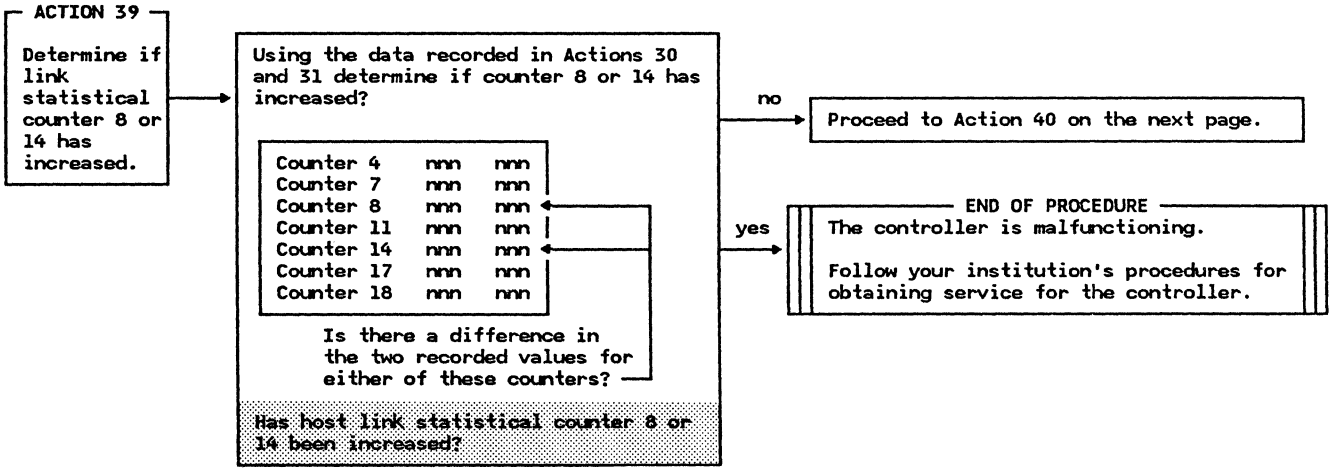
PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

The IBM Multiuse Communication Loop is used for the link between the controller and the host.

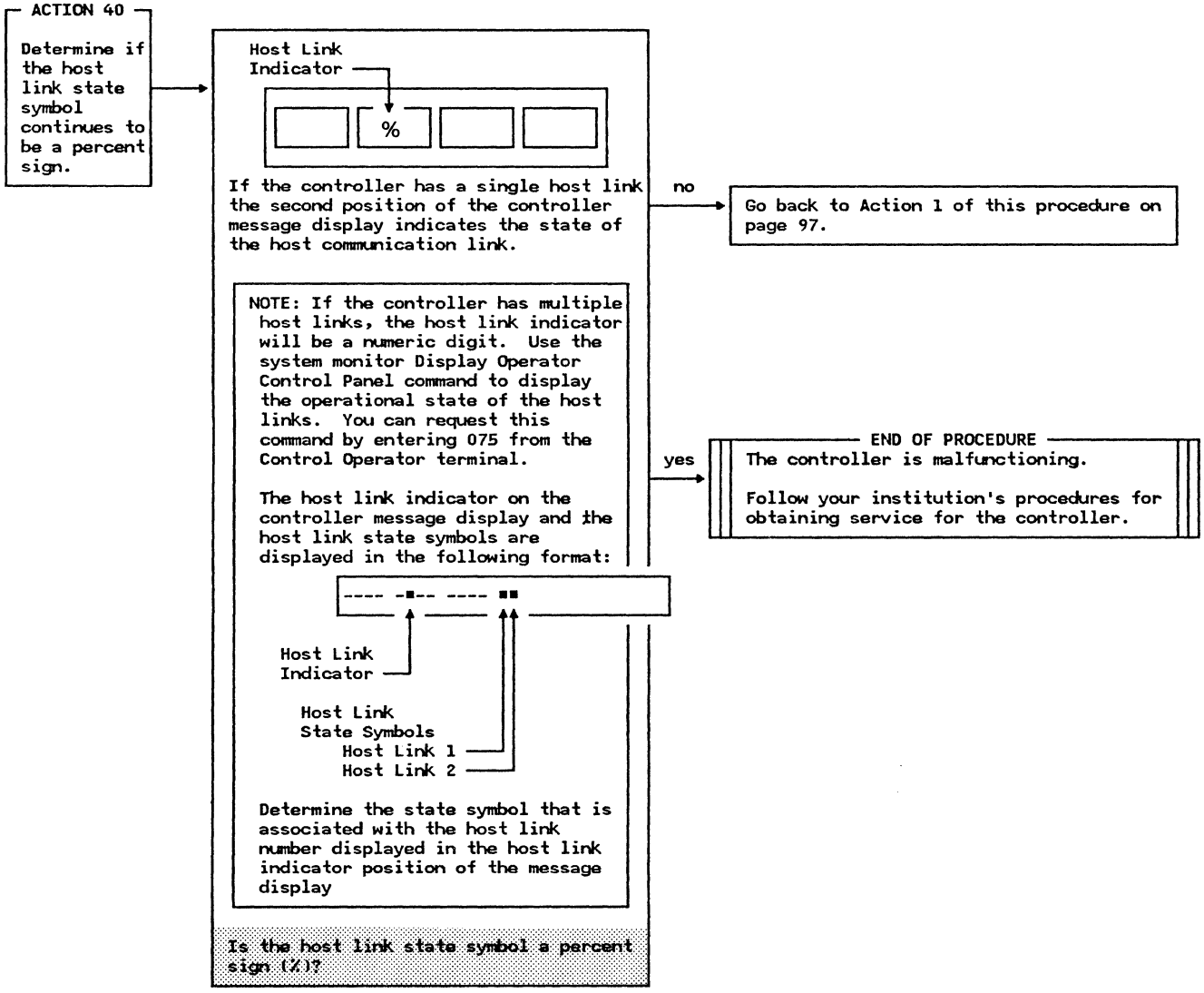
Action 38 analyzes two of the host statistical counters that are unique to this communication protocol.





PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP03 - Host Link Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure determines whether the bit error rate on the host communication facility is excessive.

ACTION 41

Analyze the system log.

Find the system log message that contains information about the bit error rate on the host link.

Using the system monitor:

1. Issue the Log Selective Display command to display any log messages associated with the host link. This command is requested by entering 301 006 from the Control Operator terminal.
2. Look for a System 006 log message that contains the digit 7 in the Format Identifier field.

The 006 log message is displayed in the following format:

System 006 Log Message

```
---- 11 ---- 006 ■■----------------
```

Format Identifier
Host Link Number

Did you locate a system 006 log message containing the digit 7 in the Format Identifier field?

no →

END OF PROCEDURE

The host communication link is fully operational with no problems detected by the controller.

Communication has been established with the host system and the controller has no excessive bit error rate on data transmission.

If you have problems with communicating with the host, go to the Work Station Problem Determination Procedure on page 127.

yes →

END OF PROCEDURE

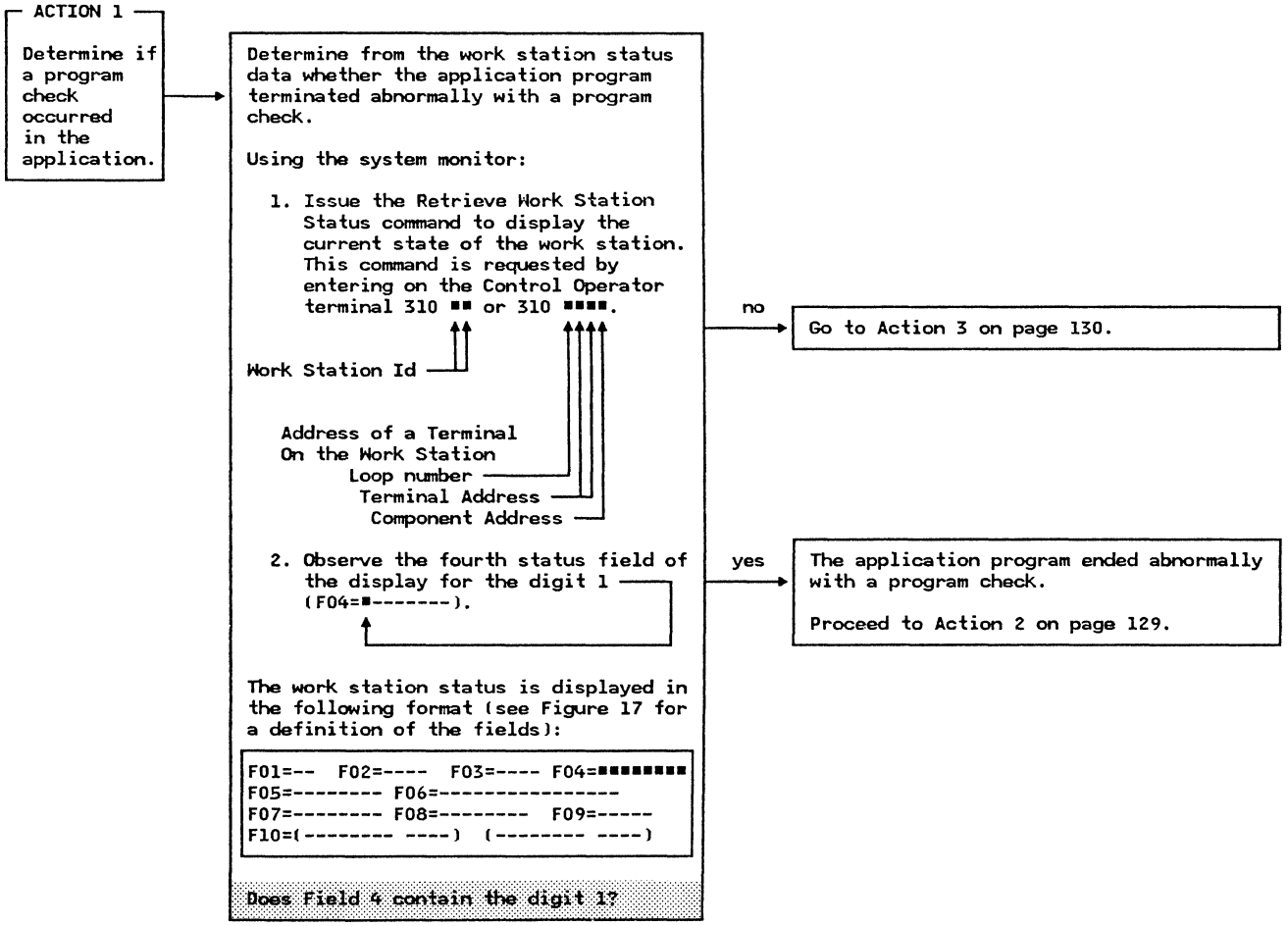
The communication facility (identified by the Host Link Number) has excessive transient disturbances that are affecting data transmissions between the controller and the host.

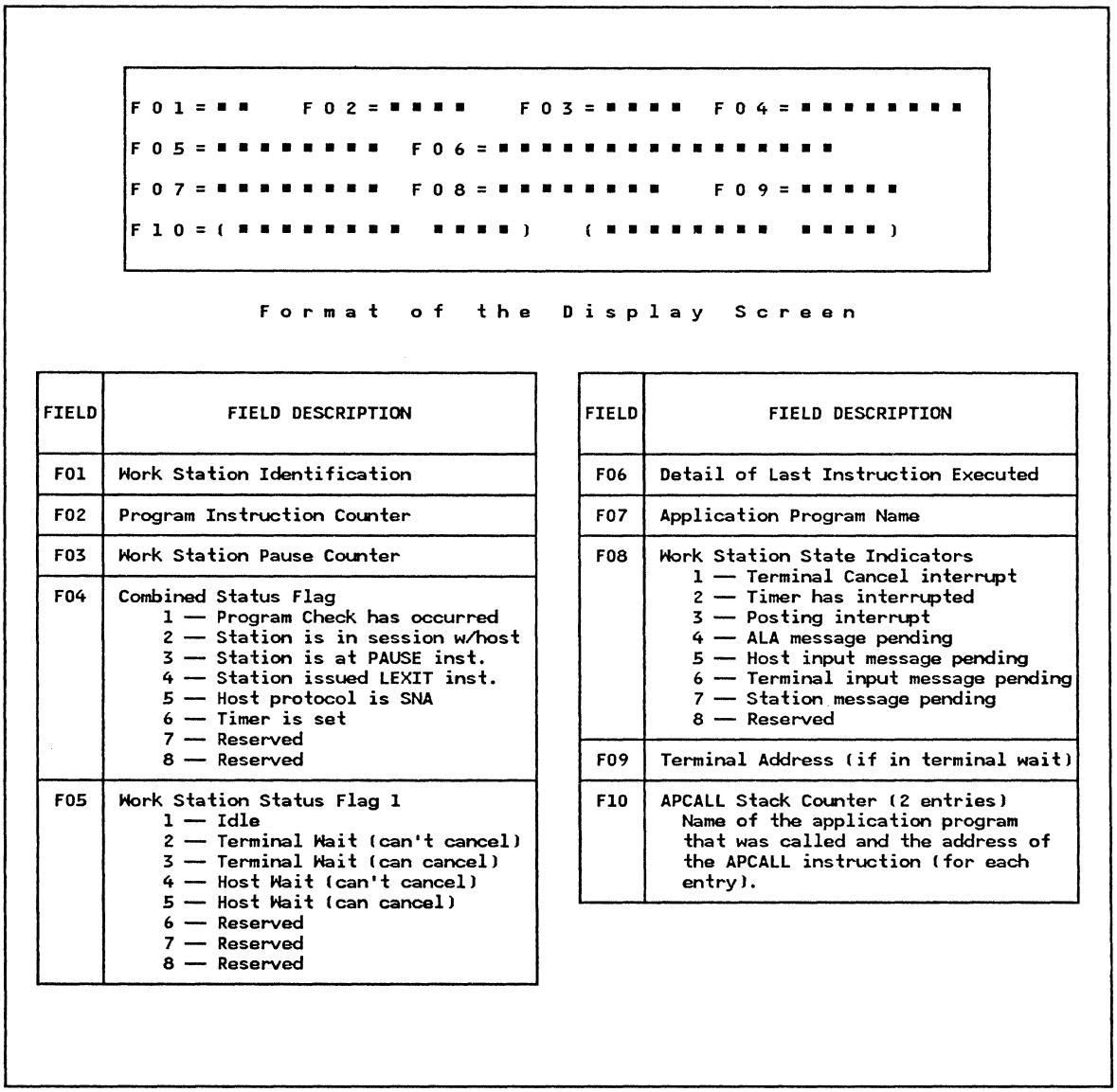
The controller has recorded 32 messages received or transmitted in error in a total of less than 256 messages.

Follow your institution's procedures for notifying the common carrier that the bit error rate on the host link is excessive.

PDP04 - Work Station Problem Determination Procedure

Action	Method of Analysis	Recommendations





Format of the Display Screen

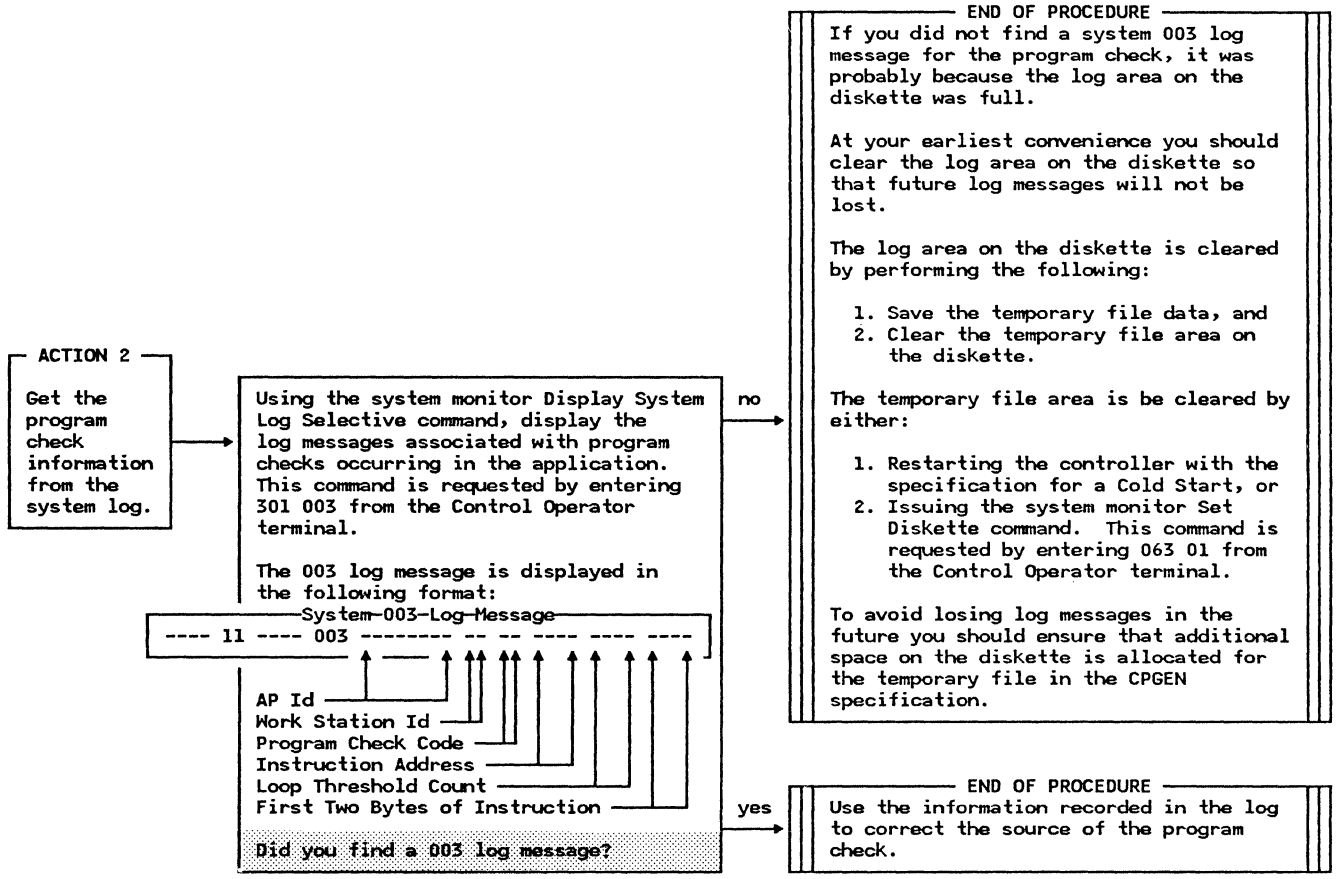
FIELD	FIELD DESCRIPTION
F01	Work Station Identification
F02	Program Instruction Counter
F03	Work Station Pause Counter
F04	Combined Status Flag 1 — Program Check has occurred 2 — Station is in session w/host 3 — Station is at PAUSE inst. 4 — Station issued LEXIT inst. 5 — Host protocol is SNA 6 — Timer is set 7 — Reserved 8 — Reserved
F05	Work Station Status Flag 1 1 — Idle 2 — Terminal Wait (can't cancel) 3 — Terminal Wait (can cancel) 4 — Host Wait (can't cancel) 5 — Host Wait (can cancel) 6 — Reserved 7 — Reserved 8 — Reserved

FIELD	FIELD DESCRIPTION
F06	Detail of Last Instruction Executed
F07	Application Program Name
F08	Work Station State Indicators 1 — Terminal Cancel interrupt 2 — Timer has interrupted 3 — Posting interrupt 4 — ALA message pending 5 — Host input message pending 6 — Terminal input message pending 7 — Station message pending 8 — Reserved
F09	Terminal Address (if in terminal wait)
F10	APCALL Stack Counter (2 entries) Name of the application program that was called and the address of the APCALL instruction (for each entry).

Figure 17. The Display Associated With the System Monitor Display Work Station Status Command.

PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

ACTION 3

Determine if the work station is currently active.

Using the work station data displayed in Action 1, determine if the application program associated with the work station is currently active.

Observe the fifth status field of the display for the digit 1 (F05=■-------).

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=---- F04=--------
F05=■■■■■■■■ F06=----------------
F07=-------- F08=--------  F09=-----
F10=(-------- ----)  (-------- ----)
```

Does Field 5 contain the digit 1?

no → Proceed to Action 4 on this page.

yes → Go to Action 24 on page 144.

ACTION 4

Determine if the last instruction was a PAUSE.

Using the work station data displayed in Action 1, determine if the application program associated with the work station has just issued a PAUSE instruction.

Observe the fourth status field of the display for the digit 3 (F04=--■-----).

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=---- F04=■■■■■■■■
F05=-------- F06=----------------
F07=-------- F08=--------  F09=-----
F10=(-------- ----)  (-------- ----)
```

Does Field 4 contain the digit 3?

no → Go to Action 6 on page 132.

yes → Proceed to Action 5 on the next page.

PDP04 - Work Station Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

The last application instruction executed was a PAUSE.

We shall determine whether the work station executed an unusually large number of PAUSE instructions.

ACTION 5

Determine if the work station is executing a large number of PAUSE instructions

The last instruction executed was a PAUSE instruction.

Using the work station data displayed in Action 1, determine if the work station is executing an unusually large number of PAUSE instructions.

Note: Executing a large number of PAUSE instructions may be a legitimate occurrence based on the design of the application. However, a large number may indicate that the work station is waiting for a system resource that is not becoming available.

Using the data in the third status field of the display, determine the number (in hexadecimal notation) of PAUSE instructions that have been executed since the work station became active (this count is reset to zero whenever the application executes an LEXIT instruction) (F03=■■■■).

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=■■■■ F04=--------
F05=-------- F06=----------------
F07=-------- F08=---------  F09=-----
F10=(-------- ----)  (-------- ----)
```

Is the value in Field 3 unusually large?

no → Proceed to Action 6 on the next page.

yes →

END OF PROCEDURE

The work station executed an unusually large number of PAUSE instructions.

Using the instruction counter address displayed in the second status field (F02=■■■■) and the application program listing whose name is displayed in the seventh status field (F07=■■■■■■■■), determine why the application is executing this large number of PAUSE instructions and correct the problem.

PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

ACTION 6

Determine if the work station is waiting for completion of host I/O.

Using the work station data displayed in Action 1, determine if the work station is in the wait state because of the execution of an I/O operation to the host.

Observe the fifth status field of the display for the digit 4 or 5 (F05=---■■---).

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=---- F04=--------
F05=■■■■■■■■ F06=----------------
F07=-------- F08=--------  F09=-----
F10=(-------- ----)  (-------- ----)
```

Does Field 5 contain the digit 4 or 5?

no → Go to Action 9 on page 134.

yes → The work station is waiting for the completion of a host I/O operation.

Proceed to Action 7 on this page.

ACTION 7

Determine if the host protocol is SNA/SDLC.

Using the work station data displayed in Action 1, determine if the communication protocol between the controller and the host is SNA/SDLC.

Examine the fourth status field of the display for the digit 5 (F04=----■---).

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=---- F04=■■■■■■■■
F05=-------- F06=----------------
F07=-------- F08=--------  F09=-----
F10=(-------- ----)  (-------- ----)
```

Does Field 4 contain the digit 5?

no → END OF PROCEDURE

The work station is waiting for the completion of an I/O operation to the host.

Determine why the I/O operation has not completed.

yes → Proceed to Action 8 on the next page.

PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

The work station is waiting for the completion of a host directed I/O operation and the host communication protocol is SNA/SDLC.

The next action will determine if the work station is in session with the host.

ACTION 8

Determine if the work station is in session with the host.

Using the work station data displayed in Action 1, determine if there is an active session between this work station and the host.

Observe the fourth status field of the display for the digit 2 (F04=-■------).

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=---- F04=■■■■■■■■
F05=-------- F06=----------------
F07=-------- F08=--------  F09=-----
F10={-------- ----)  (-------- ----)
```

Does Field 4 contain the digit 2?

no →

END OF PROCEDURE

The work station is waiting for the completion of an I/O operation to the host but no active session is in progress.

Determine why no session is established and correct this situation.

yes →

END OF PROCEDURE

The work station is waiting for the completion of an I/O operation to the host.

Determine why the I/O operation has not completed.

PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

ACTION 9

Determine if the Application program is waiting for completion of terminal I/O.

Using the work station data displayed in Action 1, determine if the work station is in the Wait state because of the execution of an I/O operation to a terminal.

Observe the fifth status field of the display for the digit 2 or 3 (F05=-■■-----).

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=---- F04=--------
F05=■■■■■■■■ F06=----------------
F07=-------- F08=--------  F09=-----
F10=(-------- ----)  (-------- ----)
```

Does Field 5 contain the digit 2 or 3?

no → Go to Action 24 on page 144.

yes → The work station is waiting for the completion of an I/O operation to a terminal.

Proceed to Action 10 on this page.

ACTION 10

Determine the address of the terminal associated with the I/O.

Using the work station data displayed in Action 1, determine the address of the terminal associated with the I/O instruction that caused the work station to be placed in the Wait state.

Determine the address of the terminal associated with the I/O instruction from the ninth status field (F09=■■■■-).

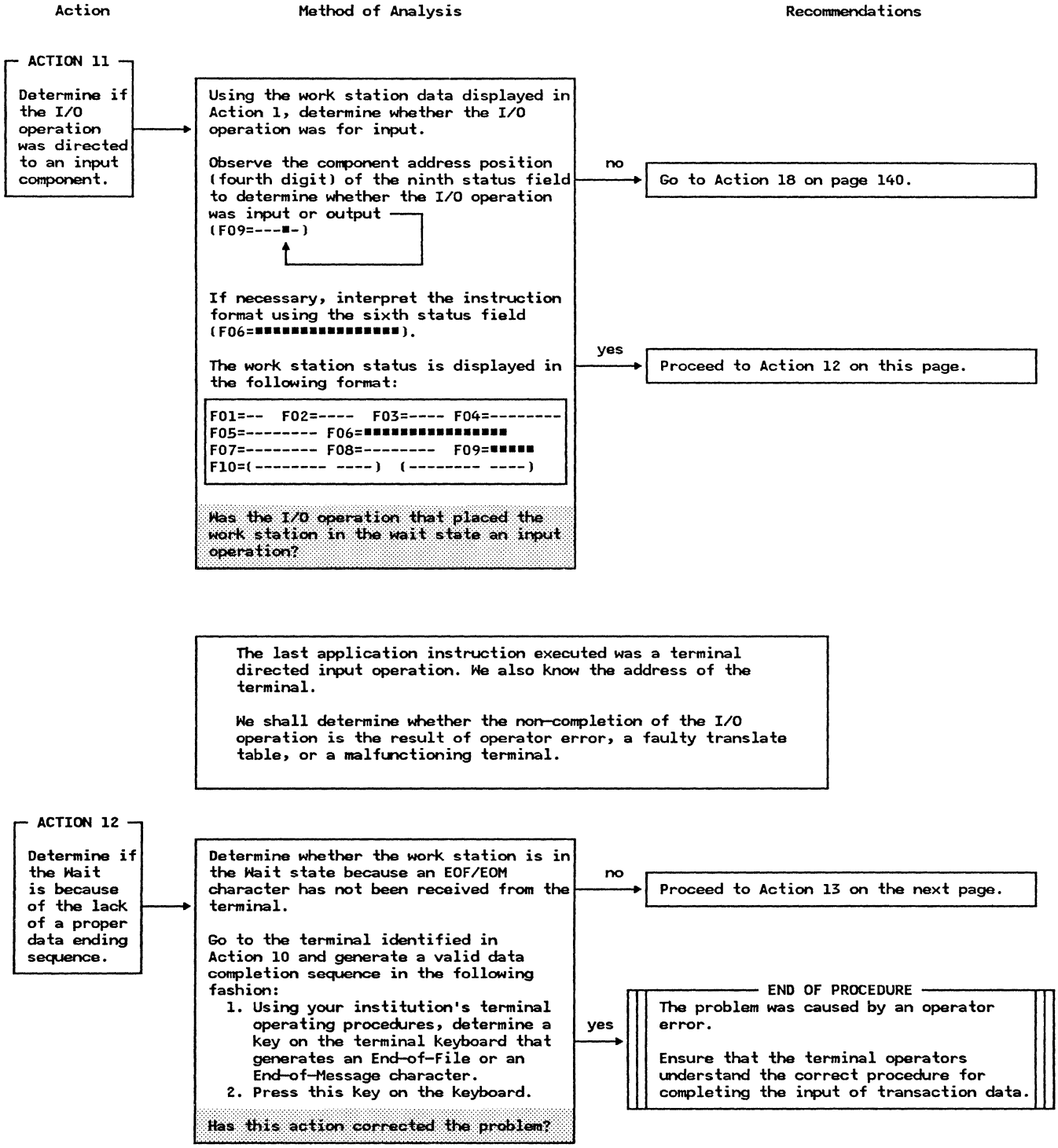
Loop number
Terminal Address
Component Address

The work station status is displayed in the following format:

```
F01=--  F02=----  F03=---- F04=--------
F05=-------- F06=----------------
F07=-------- F08=--------  F09=■■■■■
F10=(-------- ----)  (-------- ----)
```

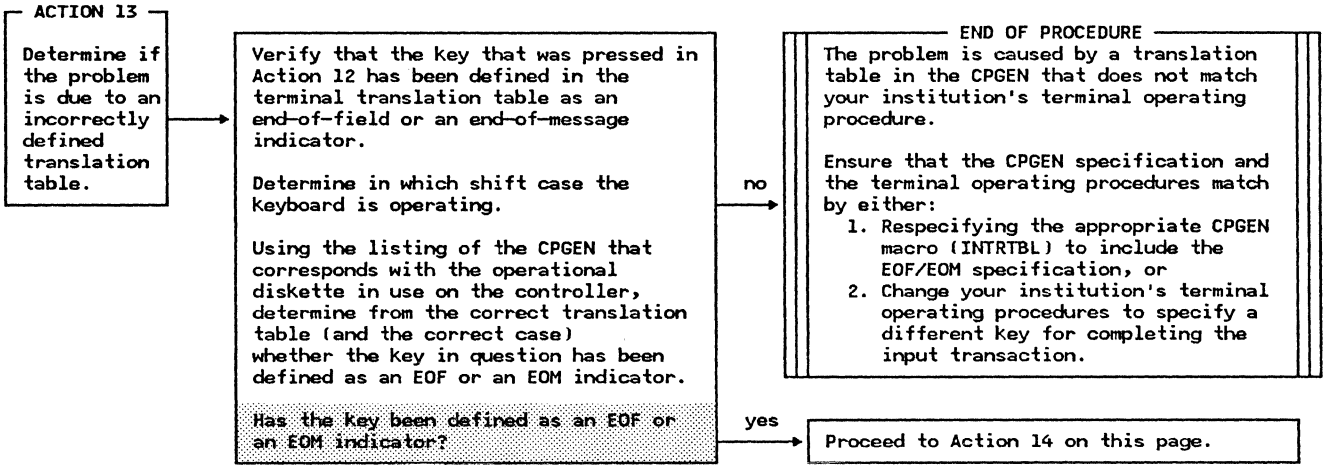
→ Proceed to Action 11 on the next page.

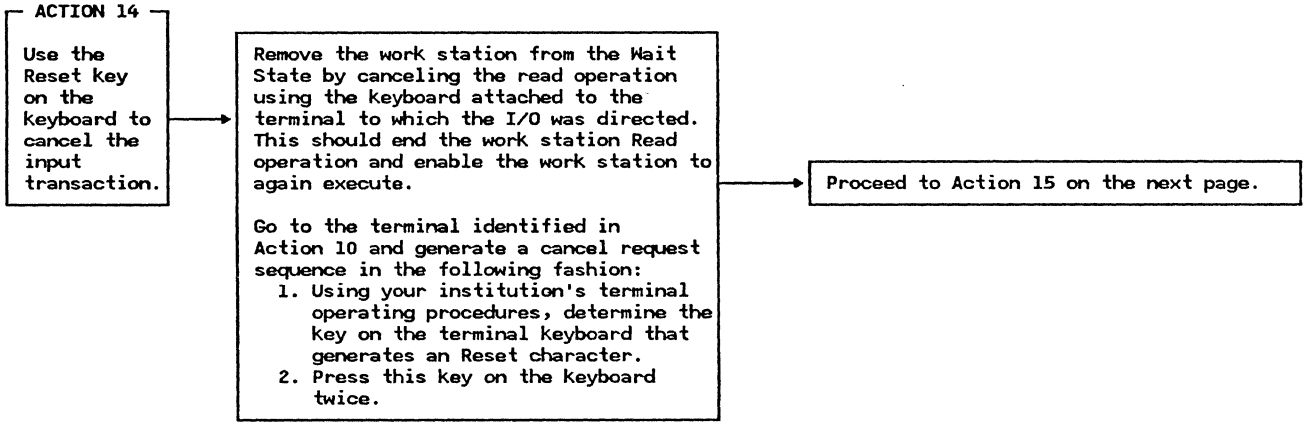
PDP04 - Work Station Problem Determination Procedure (continued)



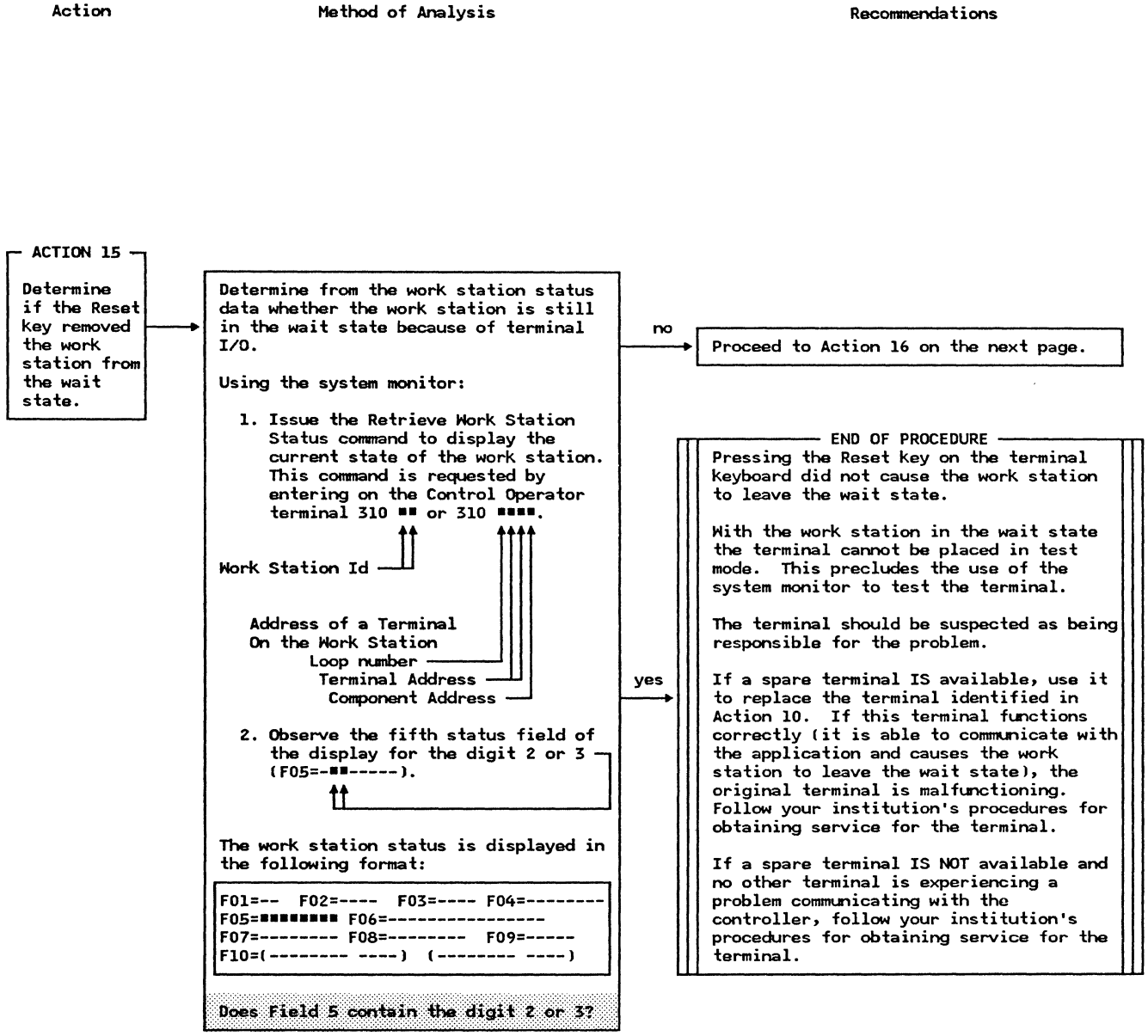
PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



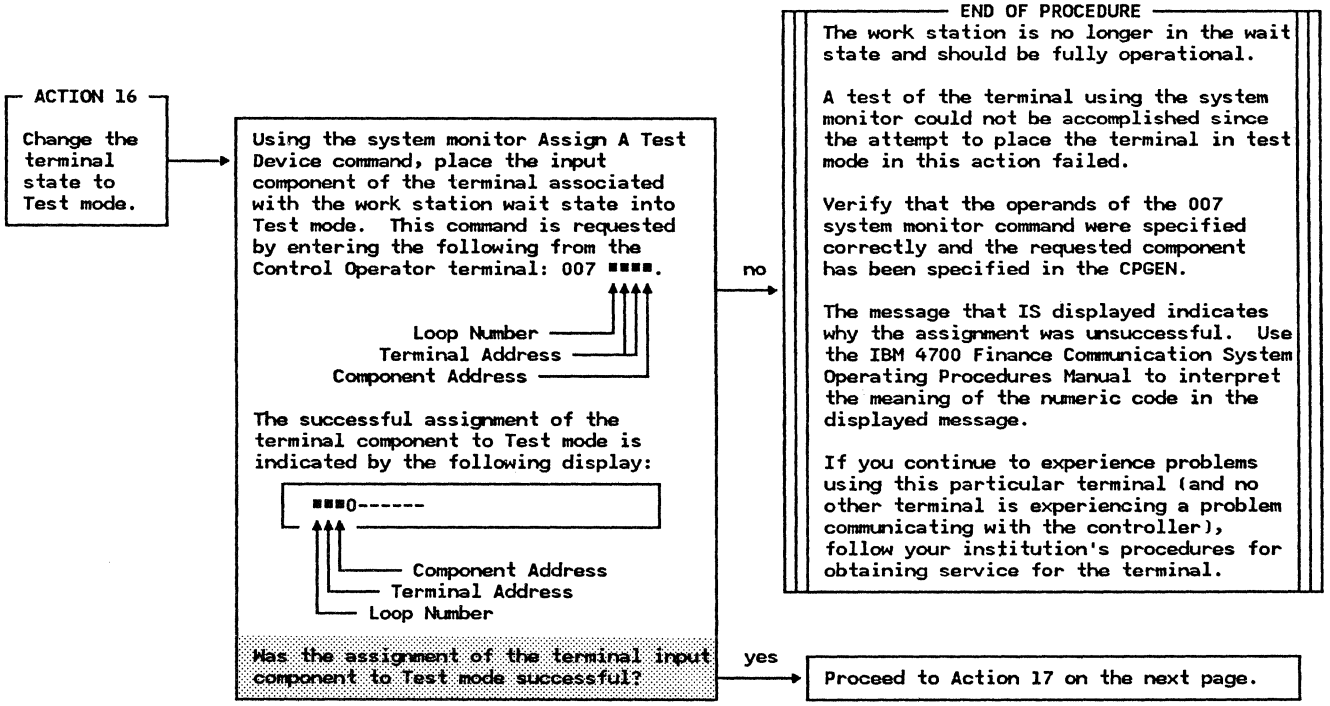


PDP04 - Work Station Problem Determination Procedure (continued)



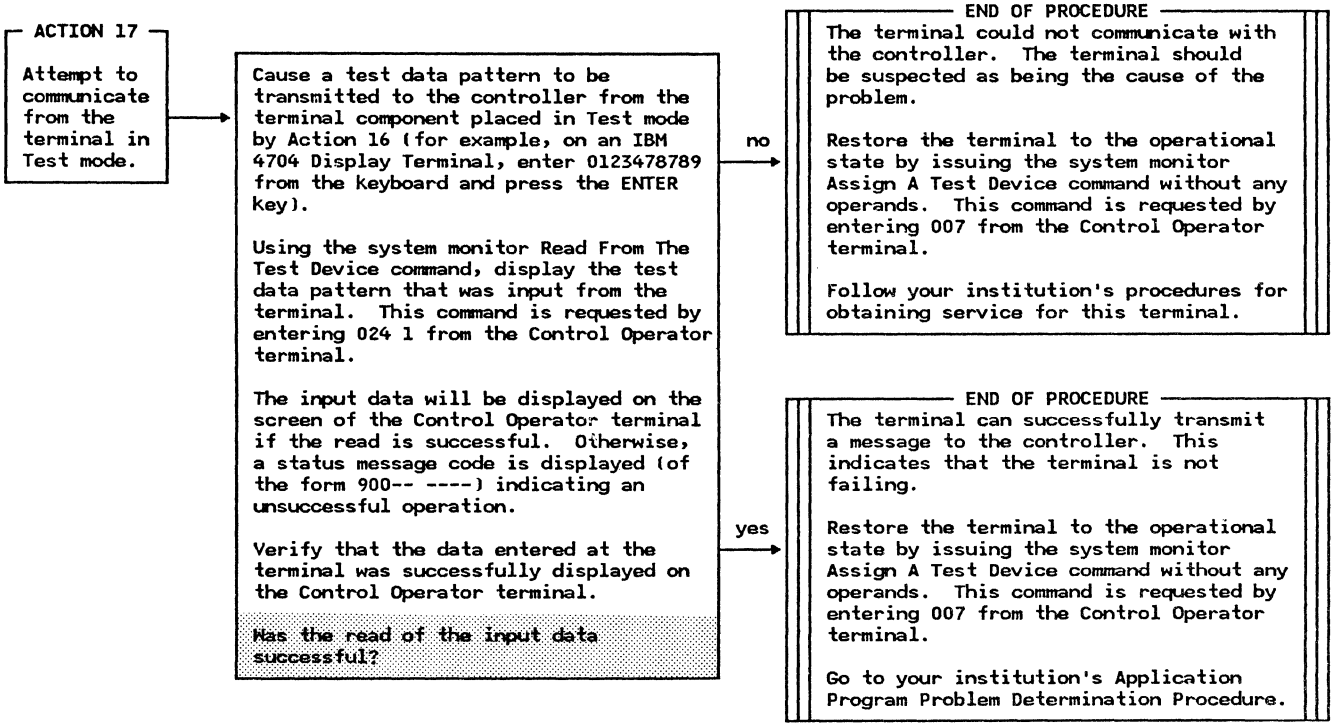
PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations

The last application instruction executed was a terminal directed output operation. We also know the address of the terminal.

We shall determine whether the non-completion of the I/O operation is the result of operator error, or is caused by a malfunctioning terminal.

ACTION 18

Determine if this device requires the generation of a Start indication before data transmission occurs.

→ Determine whether the terminal operating procedures require the generation of a Start indication before data transmission can occur (for example, some printers require you to press a Start button or insert a form before printing can occur).

Does this terminal require a Start indication before receiving data?

- no → Go to Action 20 on the next page.
- yes → Proceed to Action 19 on this page.

ACTION 19

Determine if the wait is because of the lack of a start indication.

→ Determine whether the work station is in the wait state because a start indication has not been received from terminal.

Go to the terminal identified in Action 10 and generate a start indication (for example, the IBM 4710 printer requires a form to be inserted in the printer before printing occurs; other printers require you to press the Start button to initiate printing).

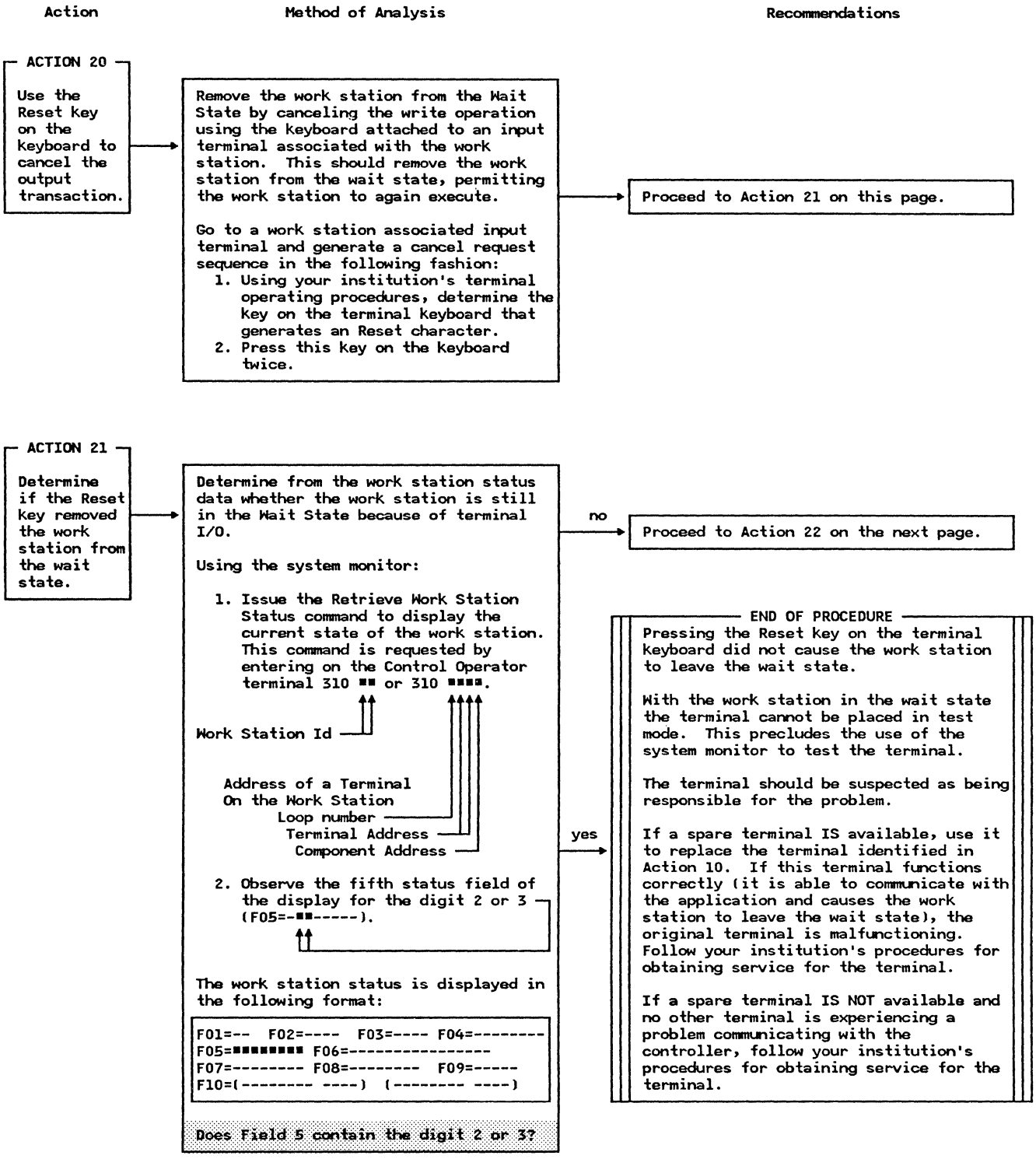
Has this action corrected the problem?

- no → Proceed to Action 20 on the next page.
- yes → END OF PROCEDURE

The problem was caused by an operator error.

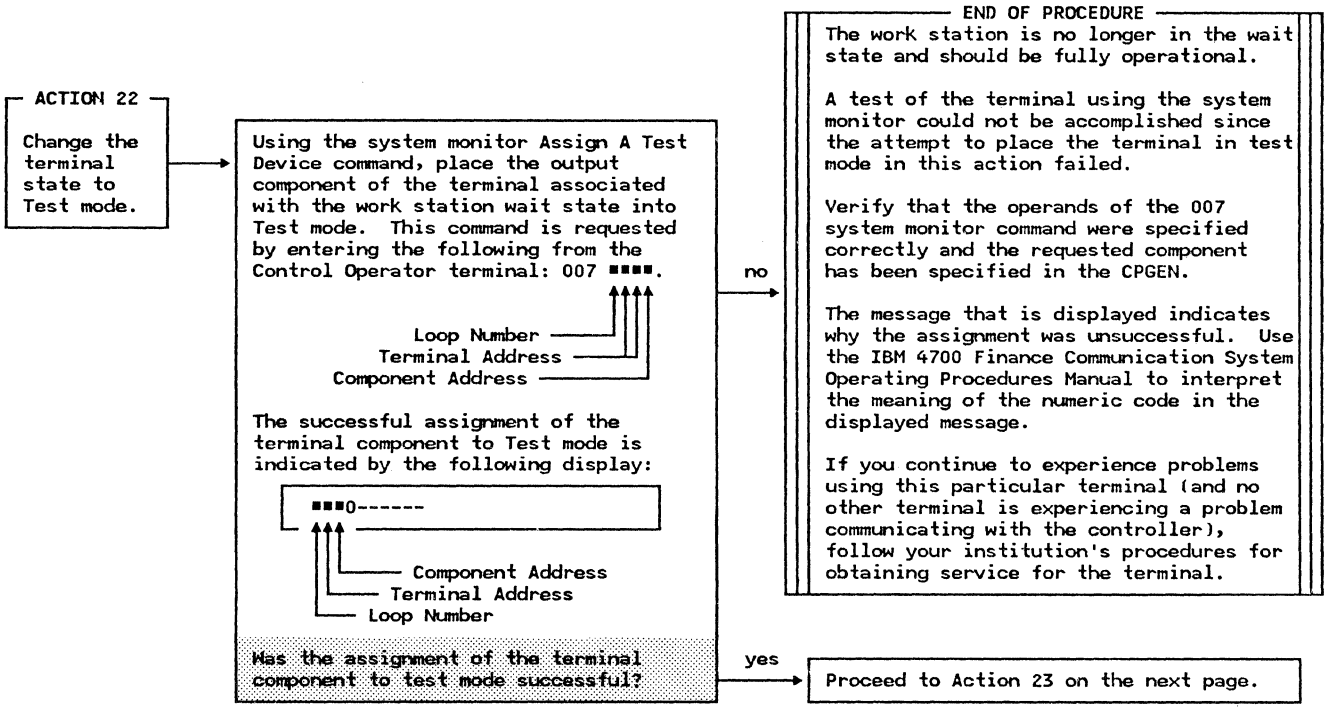
Ensure that the terminal operators understand the correct procedure for obtaining output data.

PDP04 - Work Station Problem Determination Procedure (continued)



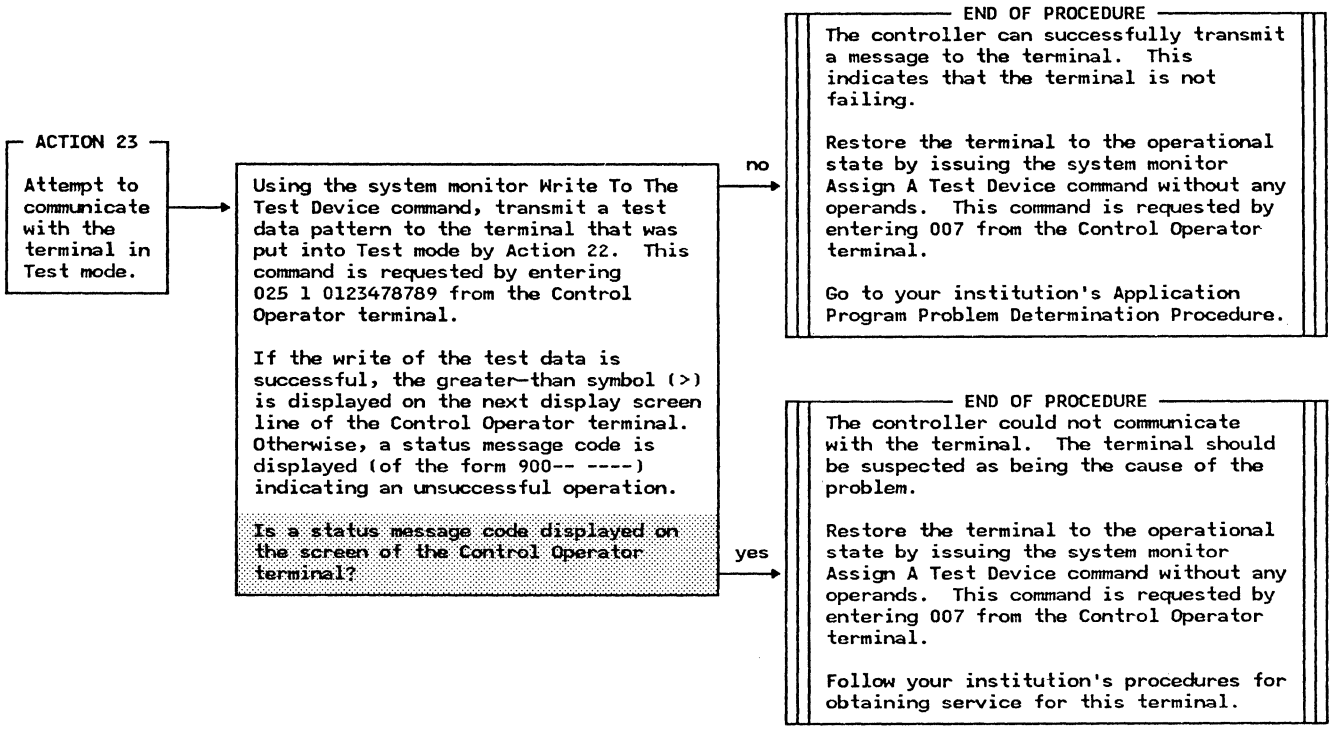
PDP04 - Work Station Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations



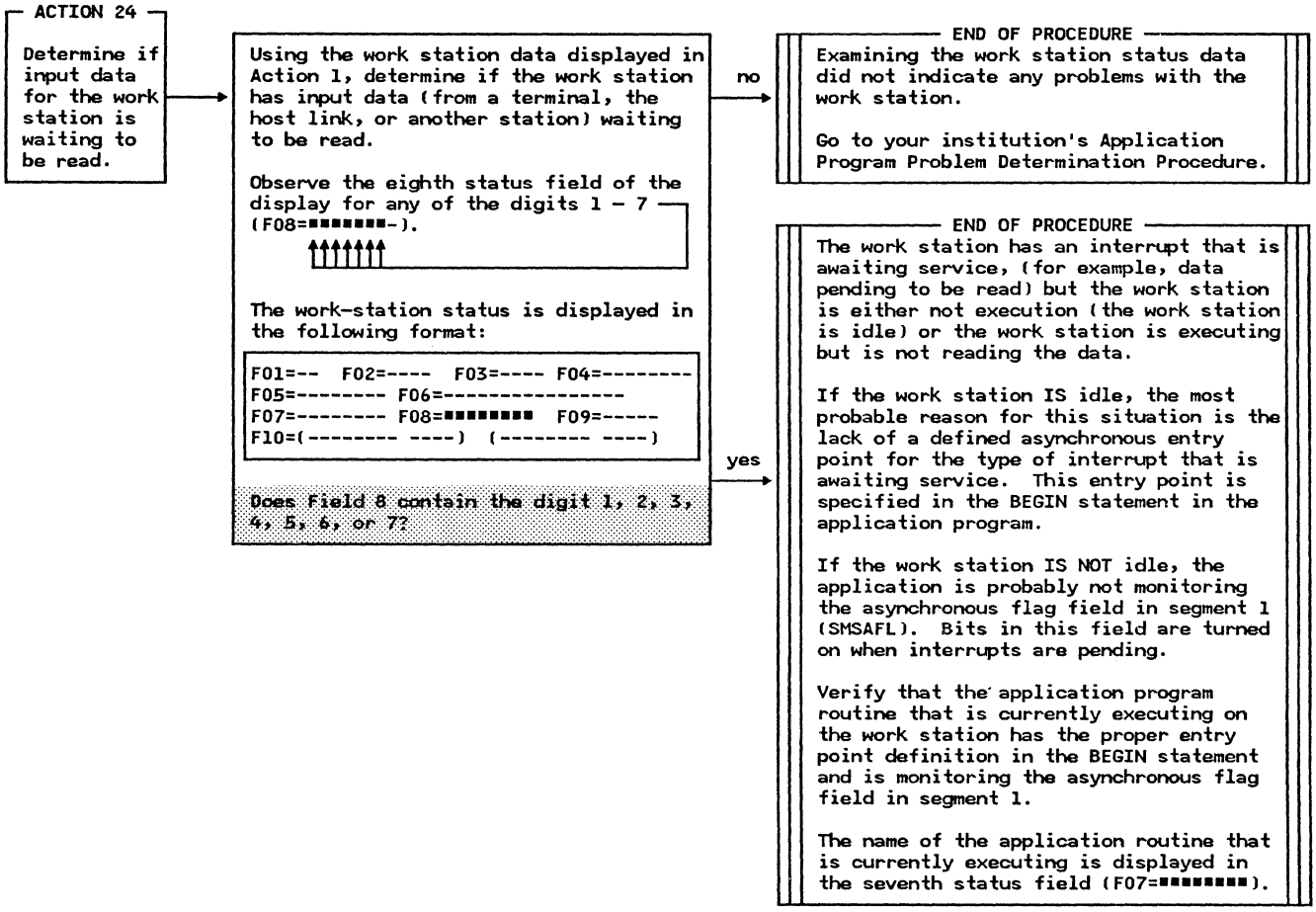
PDP04 - Work Station Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

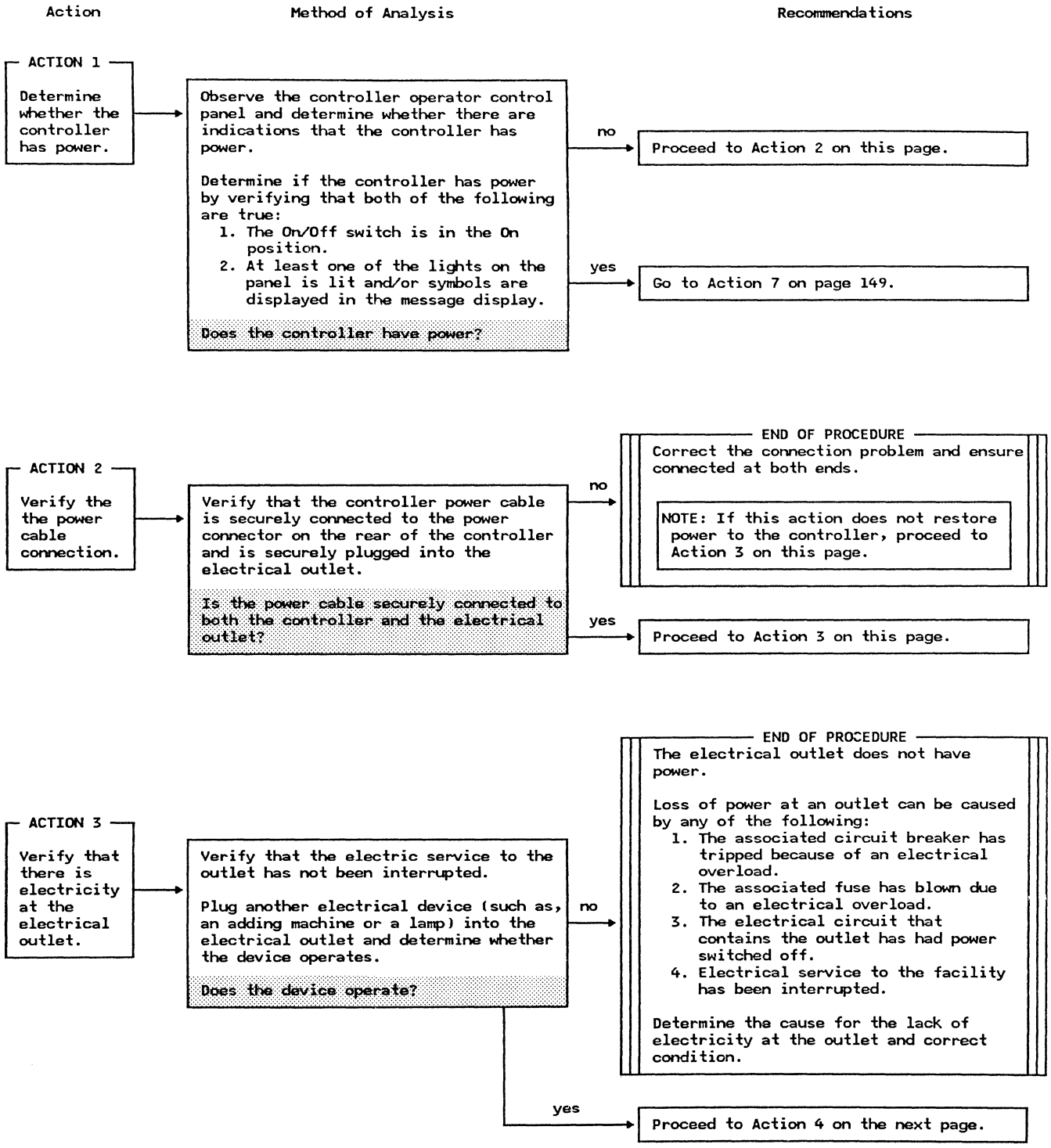


PDP04 - Work Station Problem Determination Procedure (continued)

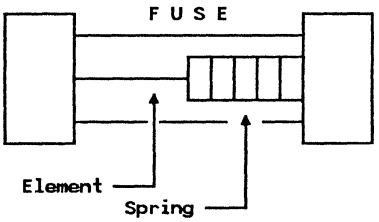
Action	Method of Analysis	Recommendations



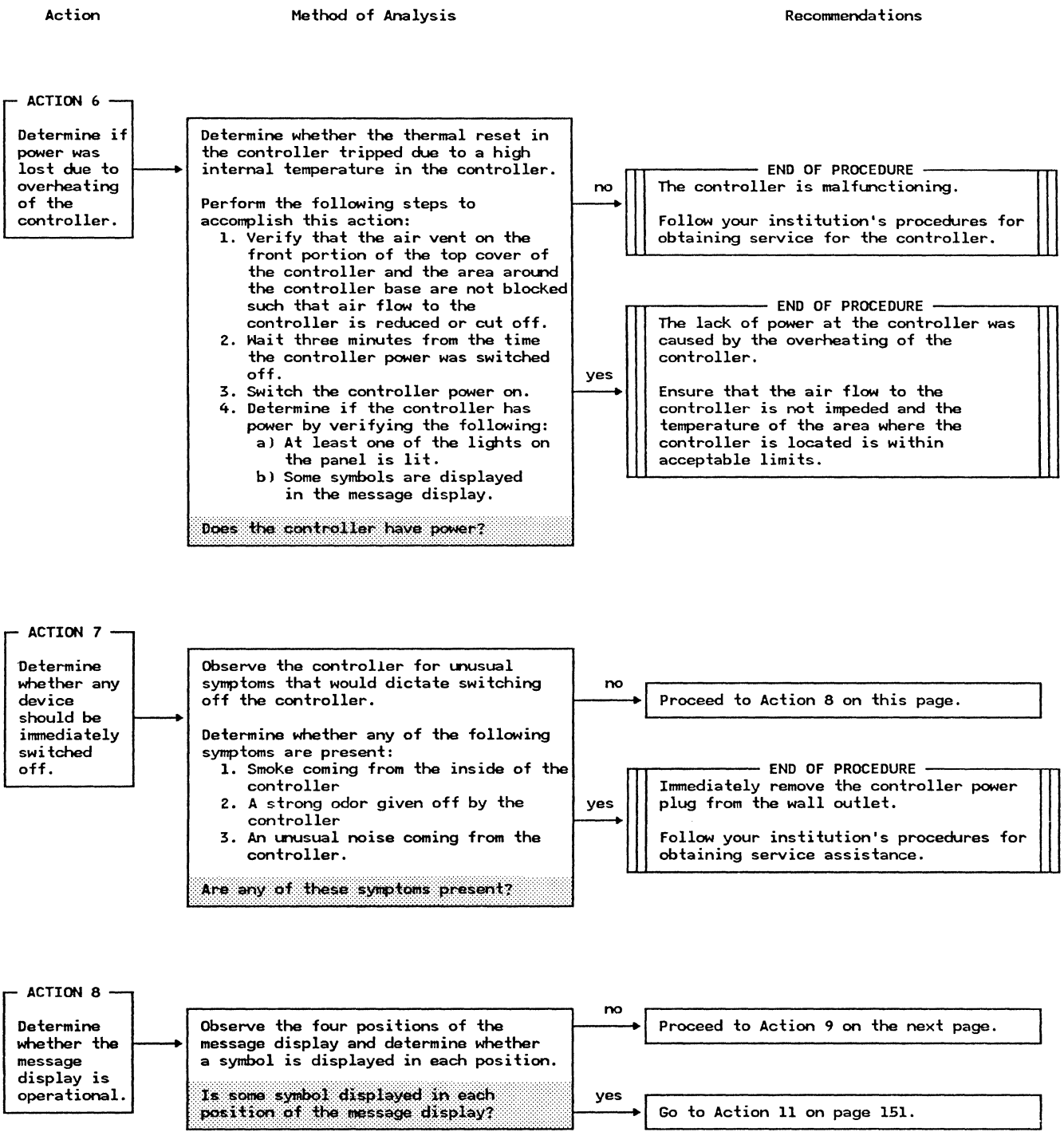
PDP05 - Device Problem Determination Procedure for the Controller



PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis		Recommendations
ACTION 4 Determine if the controller fuse has blown.	The controller is electrically protected with a fuse that is located on the lower portion of the rear panel. Determine whether this fuse has blown by performing the following steps: 1. Switch the controller power off. 2. Remove the fuse by turning the fuse cap in a counterclockwise direction until it becomes unscrewed. 3. Observe the element inside the fuse and determine whether the element is intact. This element will look like a wire connected between one end of the fuse and a spring that is connected to the other end of the fuse. If the fuse has blown, this element will be broken.  **Is the element in the fuse broken?**	no	Replace the fuse in the fuse holder and secure it by pushing in on the fuse cap while turning the cap in a clockwise direction. Go to Action 6 on next page.
		yes	The lack of power at the controller is due to a blown fuse. Proceed to Action 5 on this page.
ACTION 5 Replace the blown fuse in the controller.	Replace the controller fuse and determine whether power is restored to the controller. Accomplish this action by performing the following steps: 1. Determine the proper rating and type of replacement fuse from the specification on the label located below the fuse holder. It is important that the replacement fuse be EXACTLY this rating and type. 2. Insert the fuse in the fuse holder and secure it by pushing in on the fuse cap while turning the cap in a clockwise direction. 3. Switch on the controller. 4. Determine if the controller has power by verifying the following: a) At least one of the lights on the panel is lit, b) Some symbols are displayed in the message display. **Does the controller have power?**	no	END OF PROCEDURE The controller is malfunctioning. Follow your institution's procedures for obtaining service for the controller.
		yes	END OF PROCEDURE The controller should be operational. If power is again lost at the controller and the fuse is responsible (it has again blown), DO NOT replace the fuse a second time. Follow your institution's procedures for obtaining service for the controller.

PDP05 - Device Problem Determination Procedure for the Controller (continued)



PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations

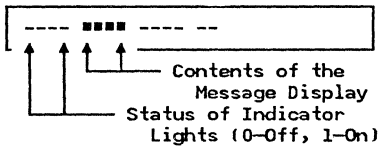
ACTION 9

Determine the correct contents of the message display.

The message display on the controller operator panel is probably failing since some of the positions are not displaying a symbol.

The contents of the display can be determined using the system monitor Display Operator Control Panel command. This command is requested by entering 075 from the control operator terminal.

The state of the operator control panel indicator lights and the contents of the message display are displayed in the following format:



Were you able to communicate with the system monitor and display the state of the operator control panel?

no →

The controller is not operational and the current contents of the message display cannot be determined.

The controller should be restarted.

Proceed to Action 10 on this page.

yes →

Use the control operator terminal display (rather than the message display on the controller) when performing the actions in the remainder of this procedure.

NOTE: If the message display is the only failing component on the controller, you may elect to defer obtaining service until it is convenient to stop the controller. The controller can function successfully without an operational message display.

Go to Action 11 on the next page.

ACTION 10

Attempt to restart the controller.

Restart the controller by pressing the Reset button on the operator control panel of the controller.

You can determine whether the controller is being started by observing the lights and the message display on the operator control panel. These lights and indicators will light for a short time and then four character message codes will display on the message display. These message codes will change at intervals of ten (10) seconds or less.

Does the controller appear to be starting normally?

no →

END OF PROCEDURE

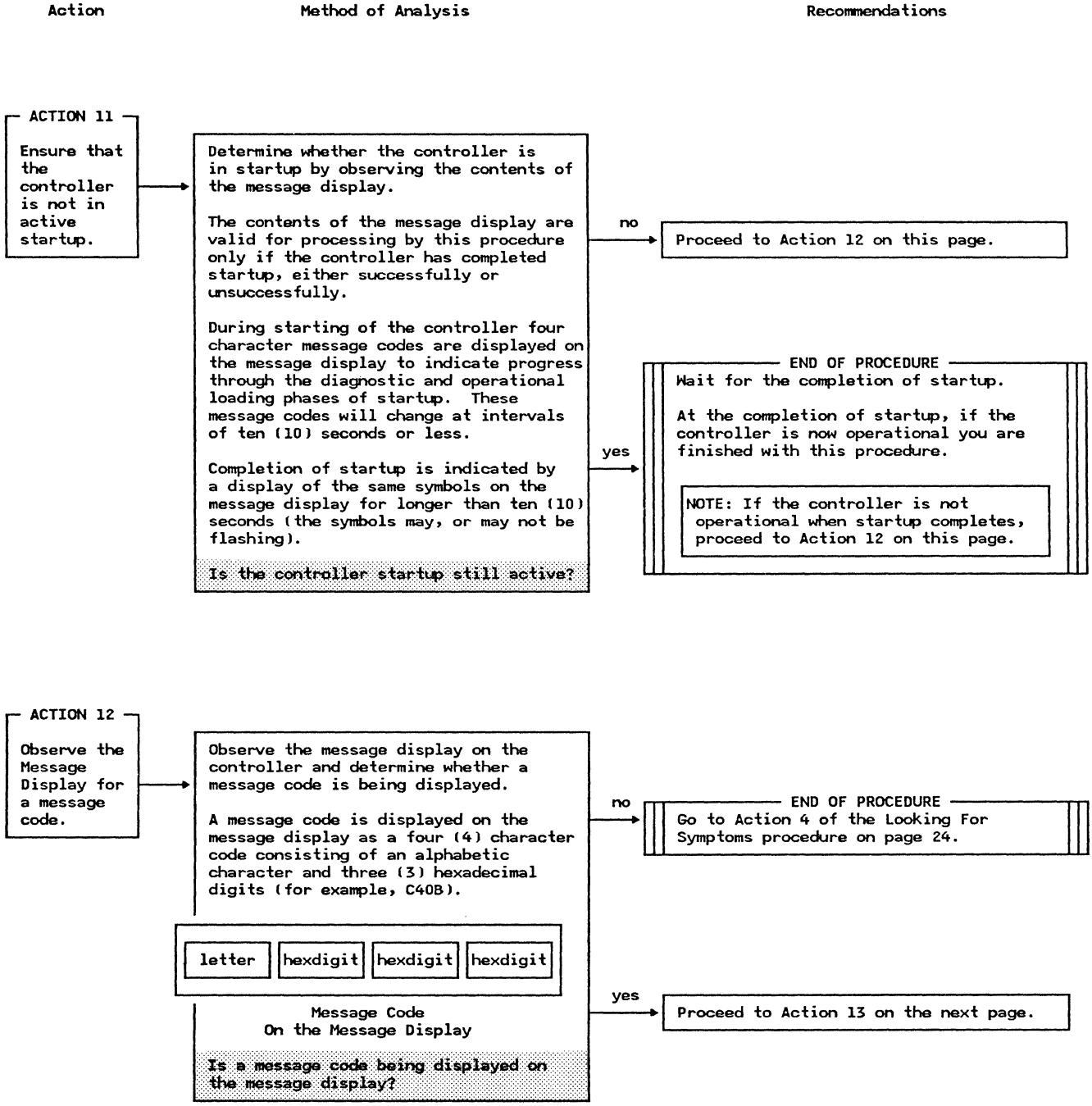
The controller is malfunctioning.

Follow your institution's procedures for obtaining service for the controller.

yes →

Proceed to Action 11 on the next page.

PDP05 - Device Problem Determination Procedure for the Controller (continued)

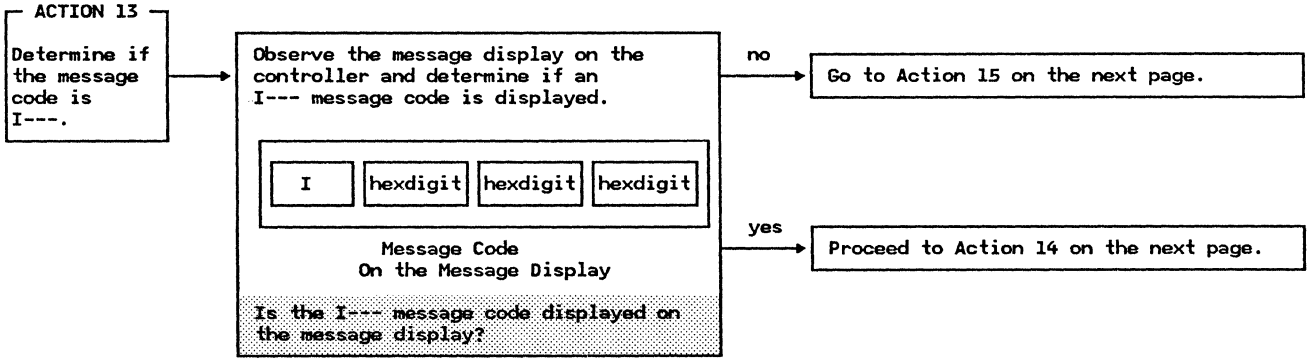


Action | Method of Analysis | Recommendations

A message code is displayed on the message display.

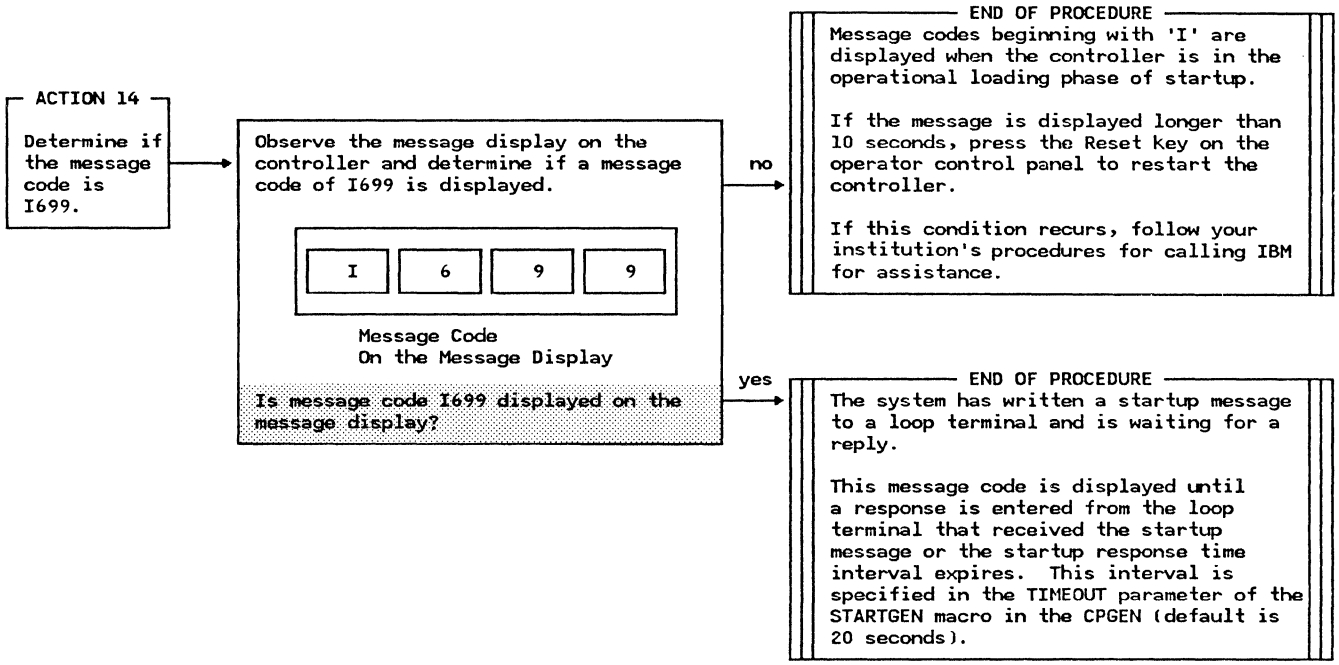
To rapidly determine the appropriate action in this procedure that deals with this message code, use the following chart to determine the next action to perform:

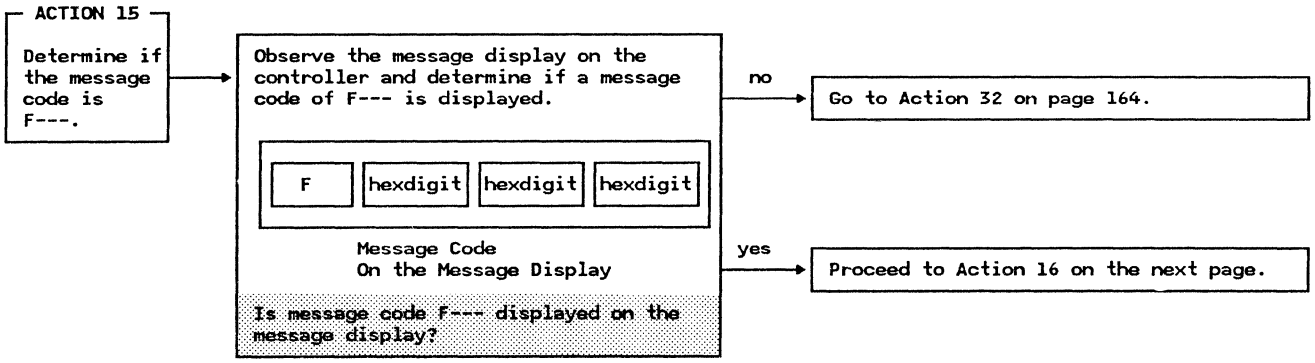
Message Code	Action
C - - -	Go to Action 49 on page 172.
D - - -	Go to Action 41 on page 168.
E - - -	Go to Action 33 on page 165.
F - - -	Go to Action 16 on page 154.
I - - -	Go to Action 14 on the next page.
T - - -	Go to Action 53 on page 174.
X - - -	Go to Action 55 on page 175.



PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action | Method of Analysis | Recommendations

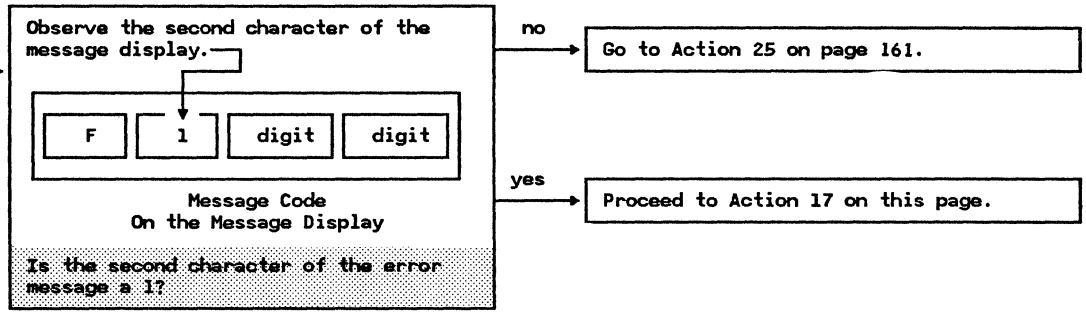




Action	Method of Analysis	Recommendations

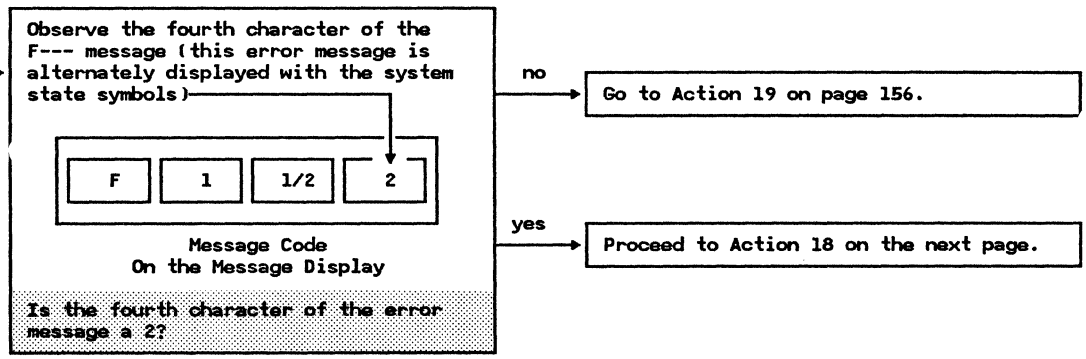
ACTION 16

Determine if there is a problem with the diskette drive(s).



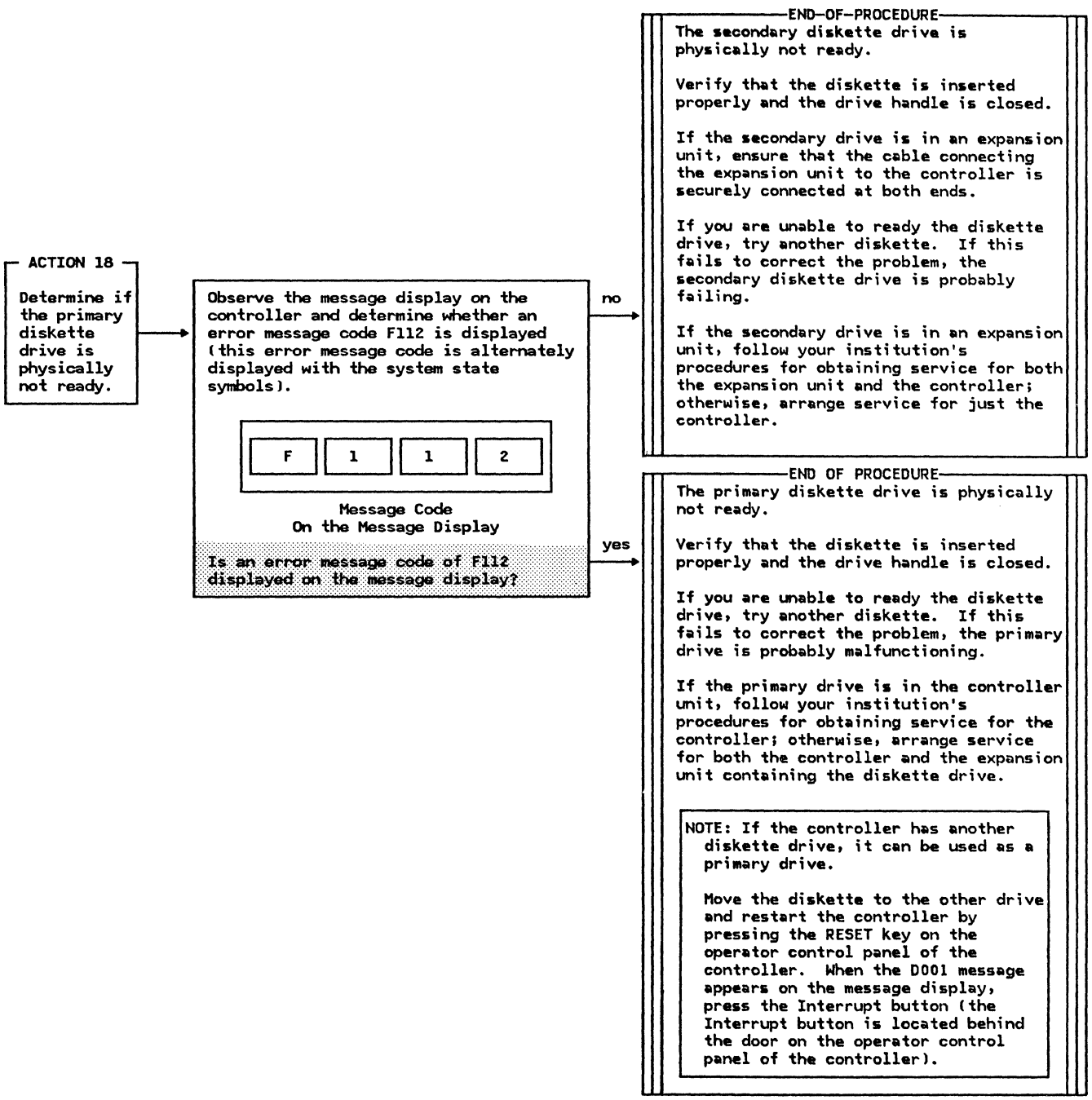
ACTION 17

Determine if the problem is caused by a not ready diskette drive.

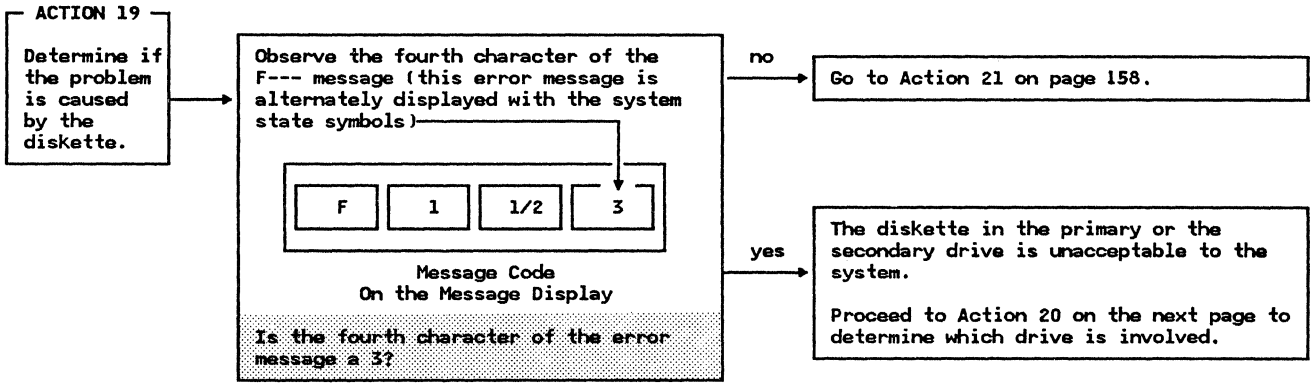


PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action | Method of Analysis | Recommendations



Action	Method of Analysis	Recommendations



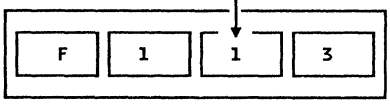
PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations

ACTION 20

Determine which diskette drive has the problem.

Observe the third position of the message display



Message Code
On the Message Display

Is the third position of the error message a 1?

no

The diskette in the secondary diskette drive is unacceptable to the system.

The following conditions cause this message code to be displayed:
1. Incompatible or invalid diskette type
2. An index or data block did not contain the current session ID.

Ensure that the correct diskette is being used. If the diskette is correct, try another diskette. If this fails to correct the problem, the secondary diskette drive has probably failed.

If the secondary drive is in an expansion unit, follow your institution's procedures for obtaining service for both the expansion unit and the controller; otherwise, arrange service for just the controller.

yes

The diskette in the primary diskette drive is unacceptable to the system.

The following conditions cause this message code to be displayed:
1. Incompatible or invalid diskette type
2. An index or data block did not contain the current session ID.

Ensure that the correct diskette is being used. If the diskette is correct, try another diskette. If this fails to correct the problem, the primary diskette drive has probably failed.

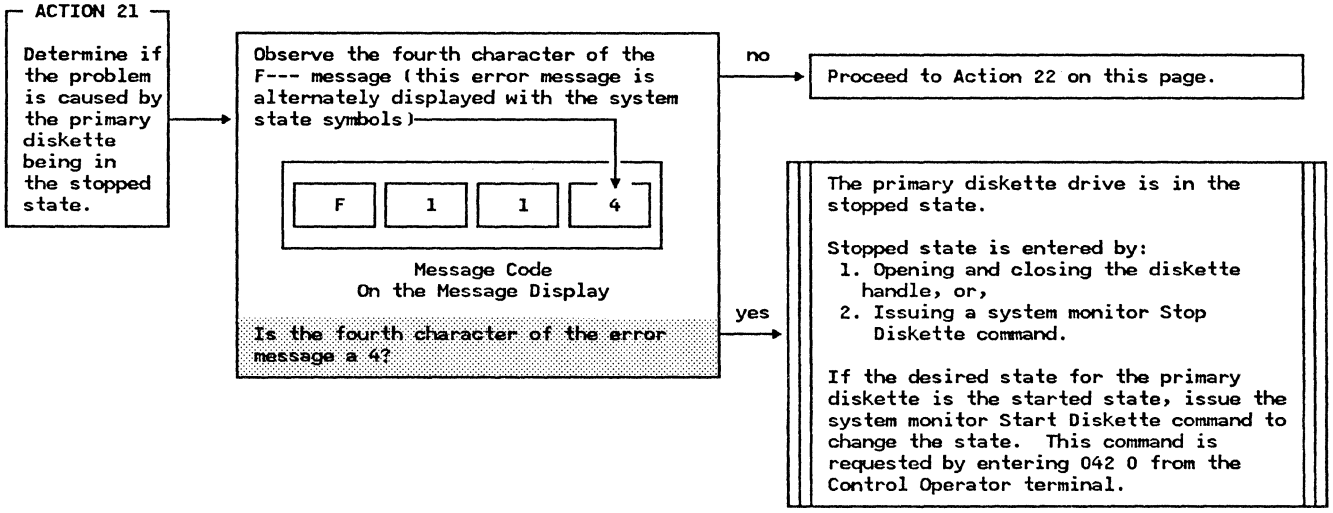
If the primary drive is in the controller unit, follow your institution's procedures for obtaining service for the controller; otherwise, arrange service for both the controller and the expansion unit containing the diskette drive.

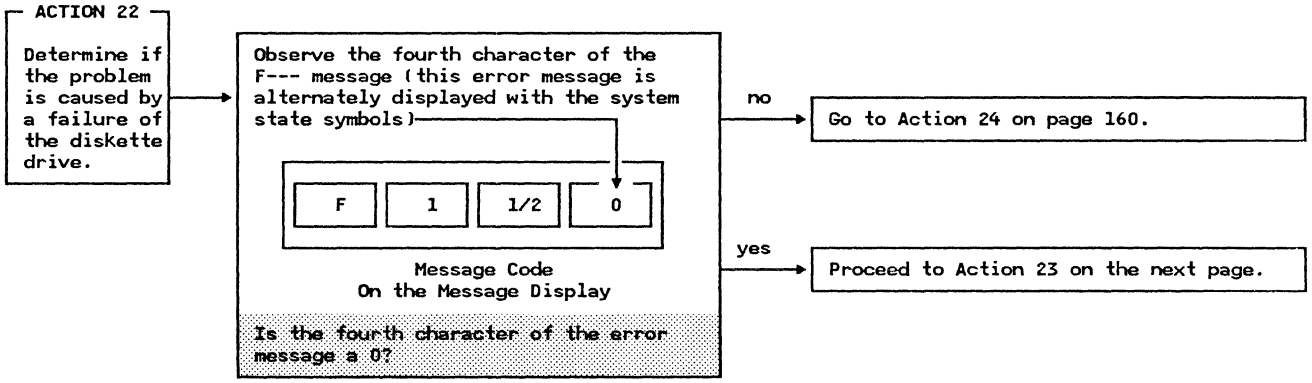
NOTE: If the controller has another diskette drive, it can be used as a primary drive.

Move the diskette to the other drive and restart the controller by pressing the RESET key on the operator control panel of the controller. When the D001 message appears on the message display, press the Interrupt button (the Interrupt button is located behind the door on the operator control panel of the controller).

PDP05 - Device Problem Determination Procedure for the Controller (continued)

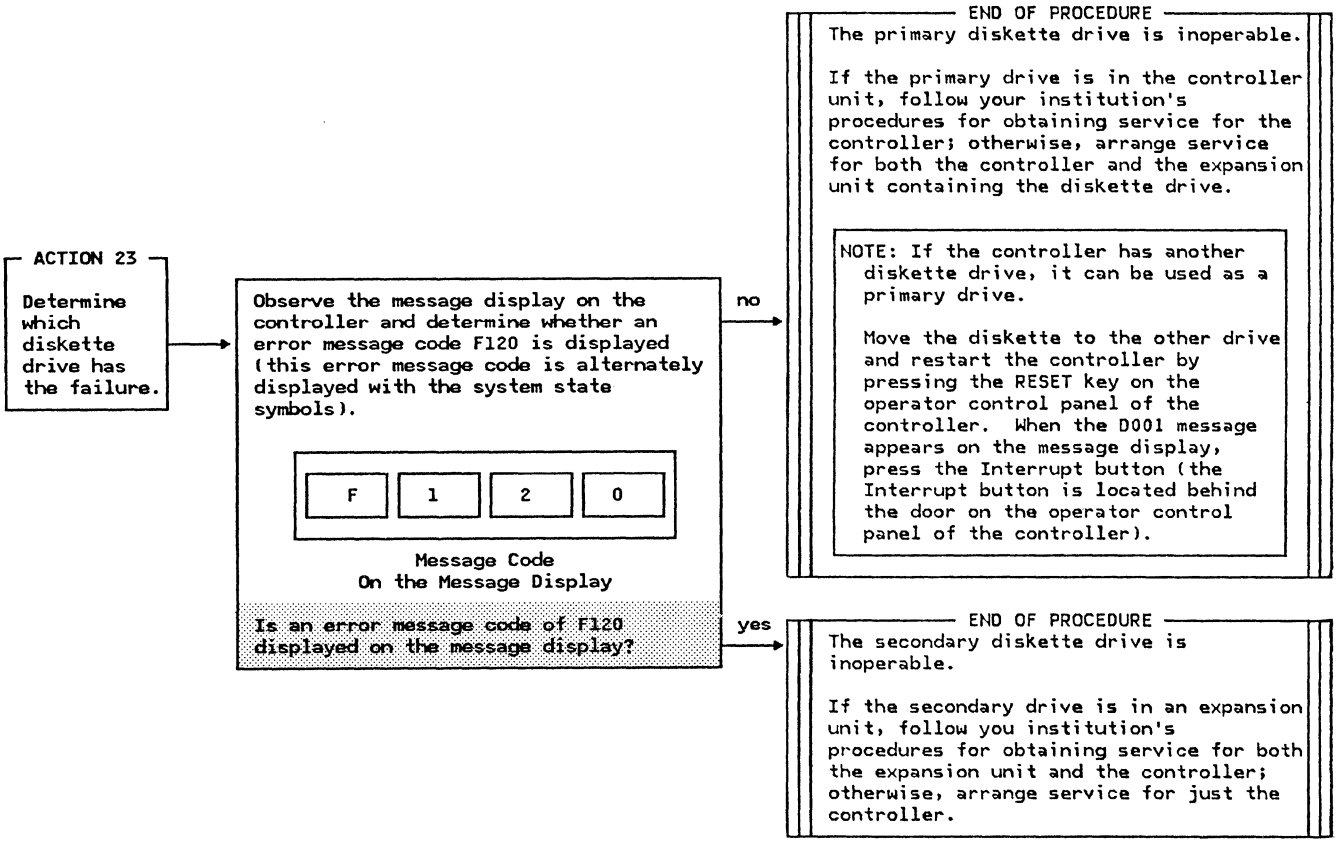
Action	Method of Analysis	Recommendations





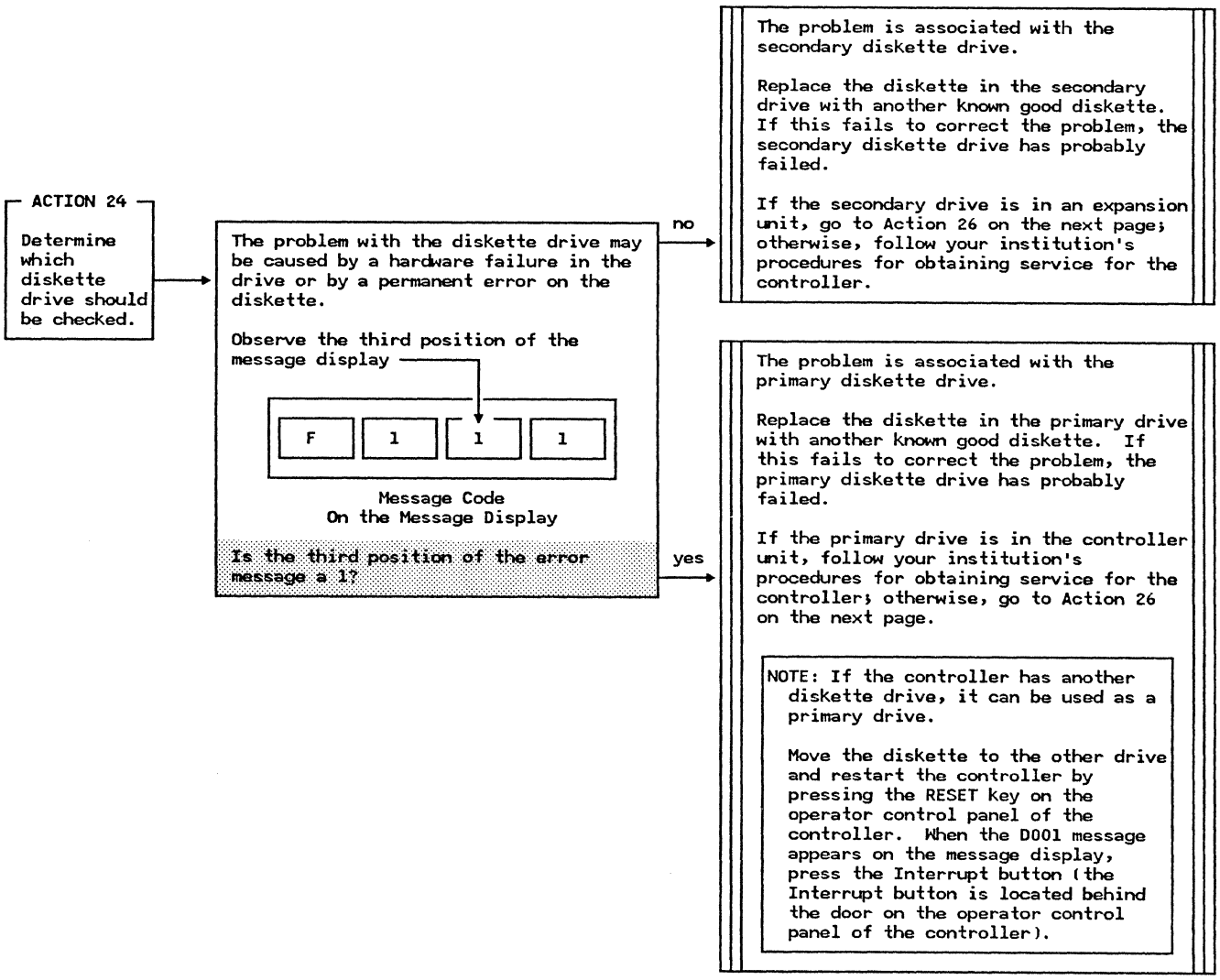
PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations



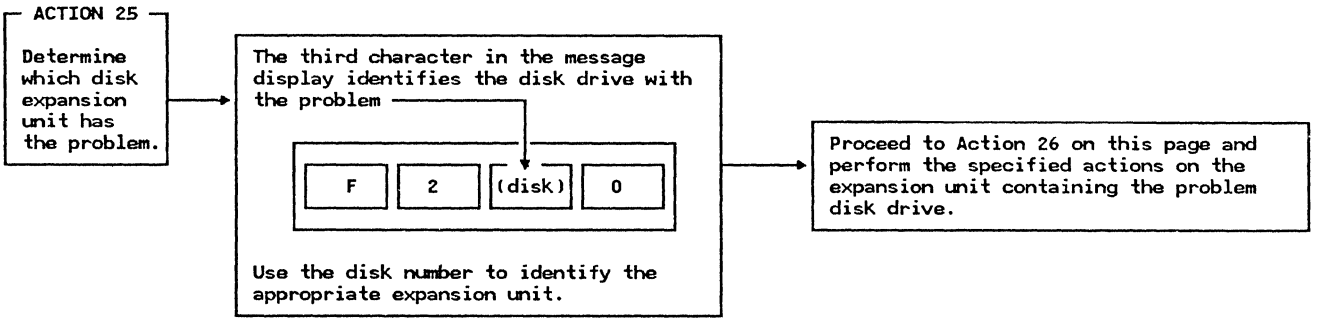
PDP05 - Device Problem Determination Procedure for the Controller (continued)

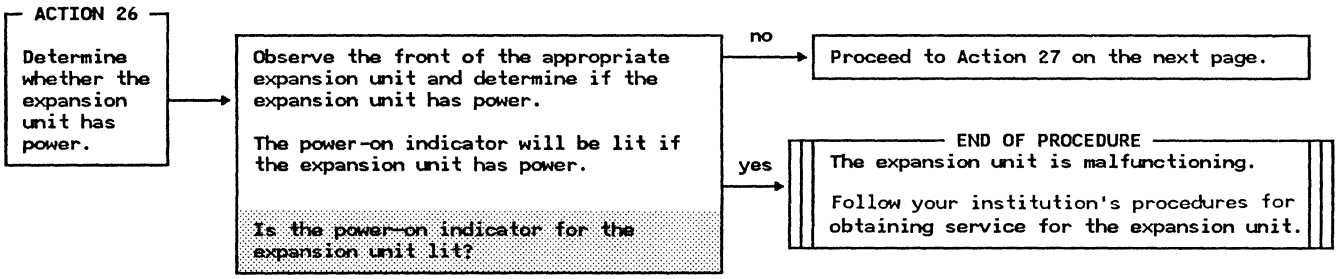
Action	Method of Analysis	Recommendations



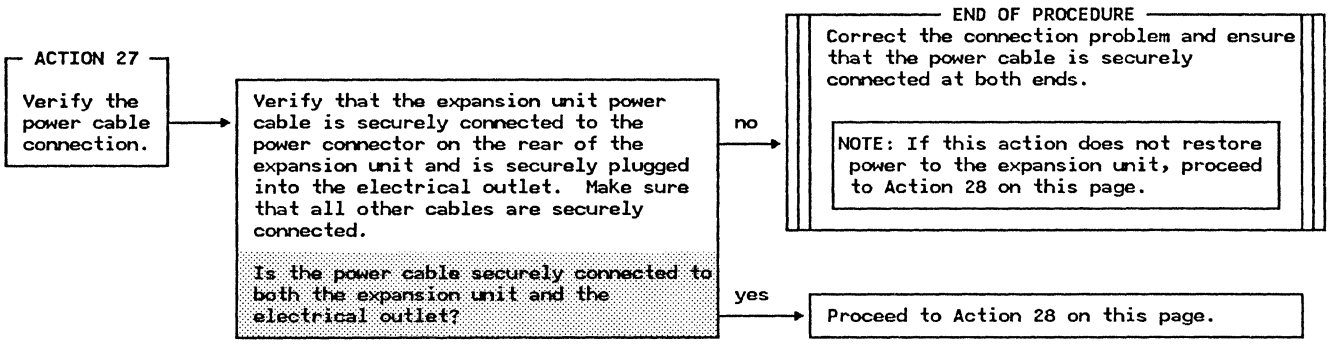
PDP05 - Device Problem Determination Procedure for the Controller (continued)

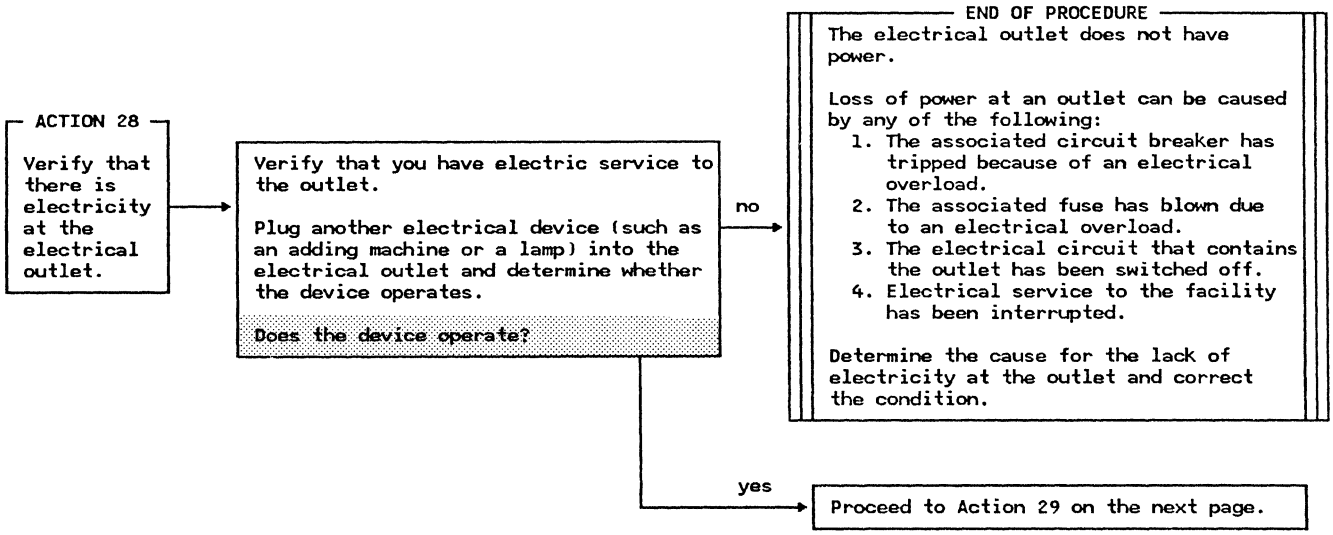
Action	Method of Analysis	Recommendations



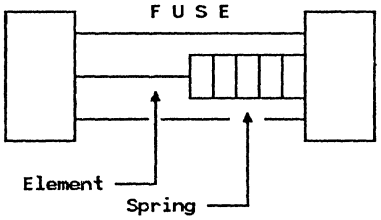


Action | Method of Analysis | Recommendations



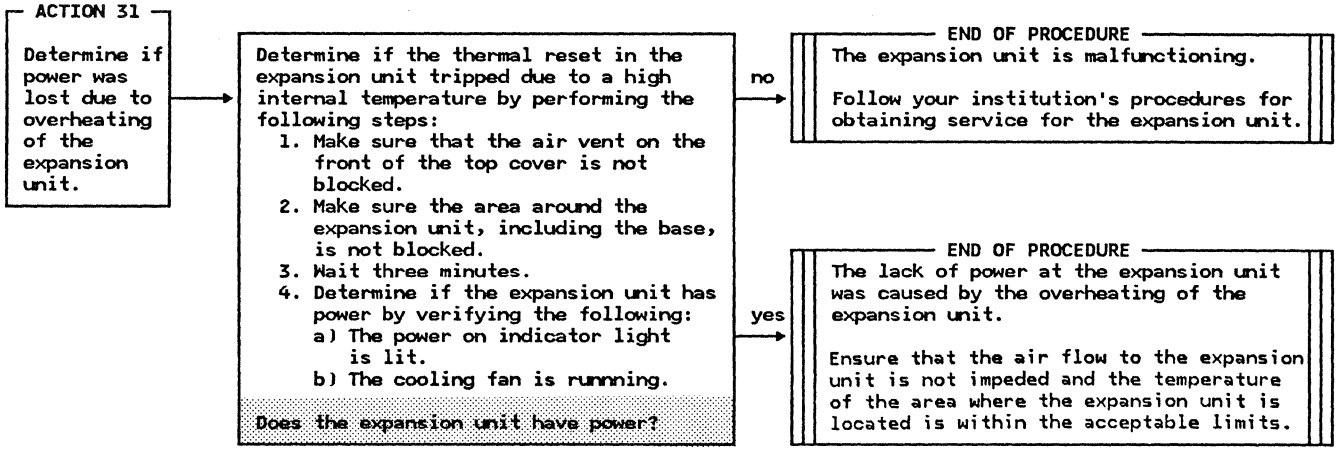


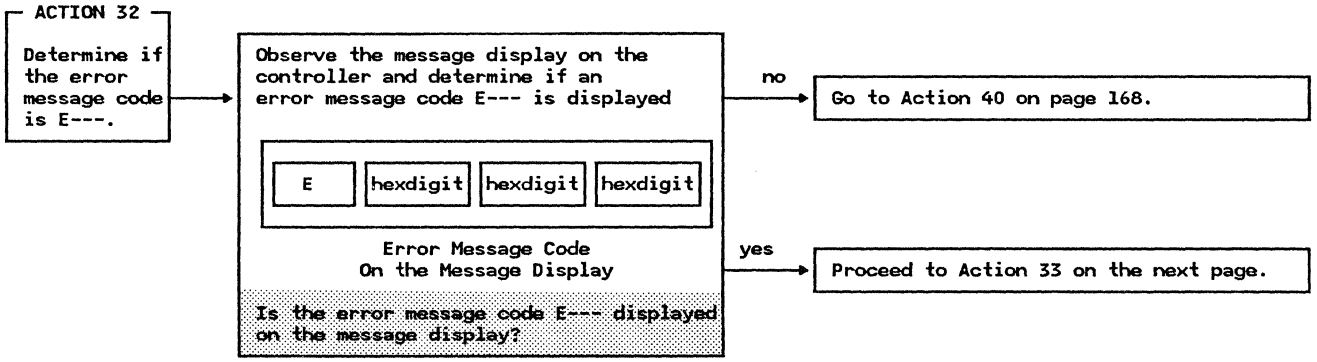
PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations
ACTION 29 Determine if the expansion unit fuse has blown.	The expansion unit is electrically protected with a fuse that is located on the lower portion of the rear panel. Determine if the fuse has blown by performing the following steps: 1. Remove the fuse by turning the fuse cap in a counterclockwise direction until the fuse cap comes off. 2. Observe the element inside the fuse and determine if the element is intact. This element looks like a wire connected between one end of the fuse and a spring that is connected to the other end of the fuse. If the fuse has blown, this element will be broken.  **Is the element in the fuse broken?**	no → Replace the fuse in the fuse holder and secure it by pushing in on the fuse cap while turning the cap in a clockwise direction. Go to Action 31 on the next page. yes → The lack of power at the expansion unit is due to a blown fuse. Proceed to action 30 on this page.
ACTION 30 Replace the blown fuse in the expansion unit.	Replace the expansion unit fuse and determine if the power is restored to the expansion unit. To replace the fuse, follow these steps: 1. Make sure the replacement fuse is EXACTLY the same rating and type as the old fuse. The fuse specification is on the label located below the fuse holder. 2. Insert the fuse in the fuse holder and secure it by pushing in on the fuse cap while turning the cap in a clockwise direction. 3. Determine if the expansion unit has power by verifying the following: a) The power-on indicator light is lit. b) The cooling fan is running. **Does the expansion unit have power?**	no → END OF PROCEDURE The expansion unit is malfunctioning Follow your institution's procedures for obtaining service for the expansion unit. yes → END OF PROCEDURE The expansion unit should be operational. If power is again lost at the expansion unit because the fuse has blown, DO NOT replace the the fuse a second time. Follow your institution's procedures for obtaining service for the expansion unit.

PDP05 - Device Problem Determination Procedure for the Controller (continued)

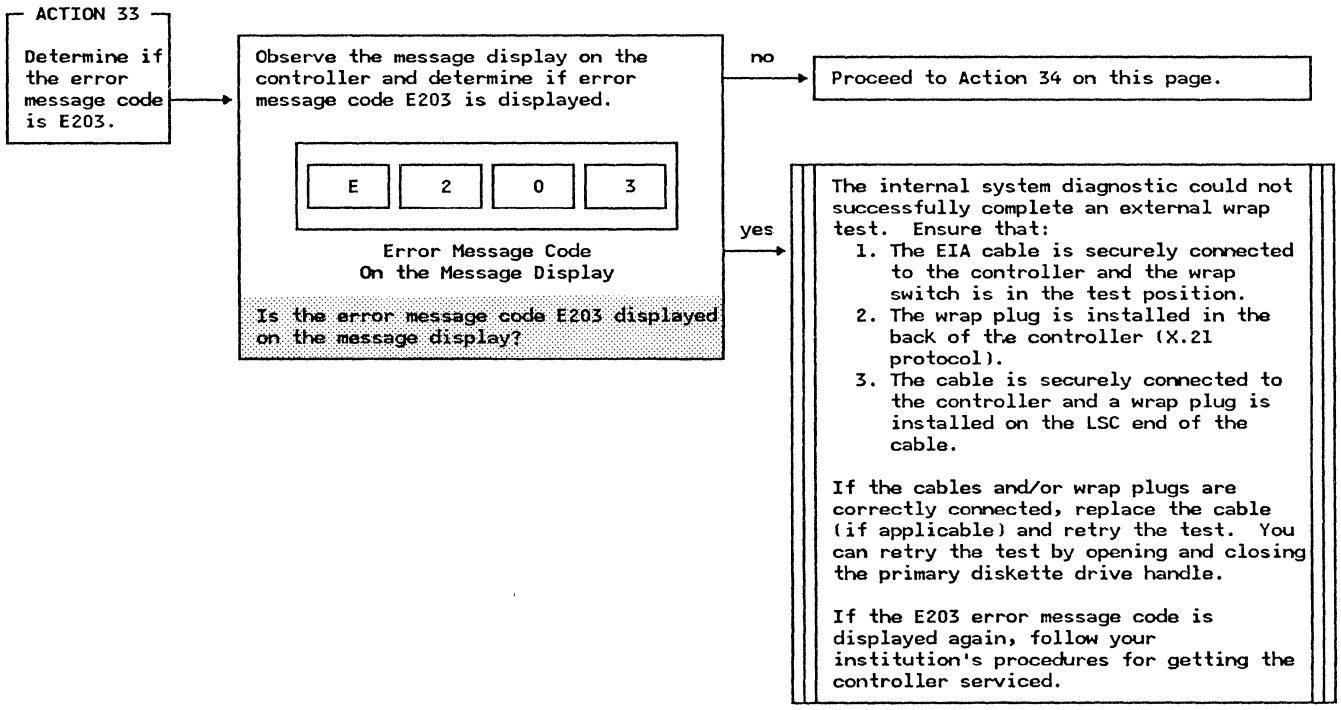
Action	Method of Analysis	Recommendations

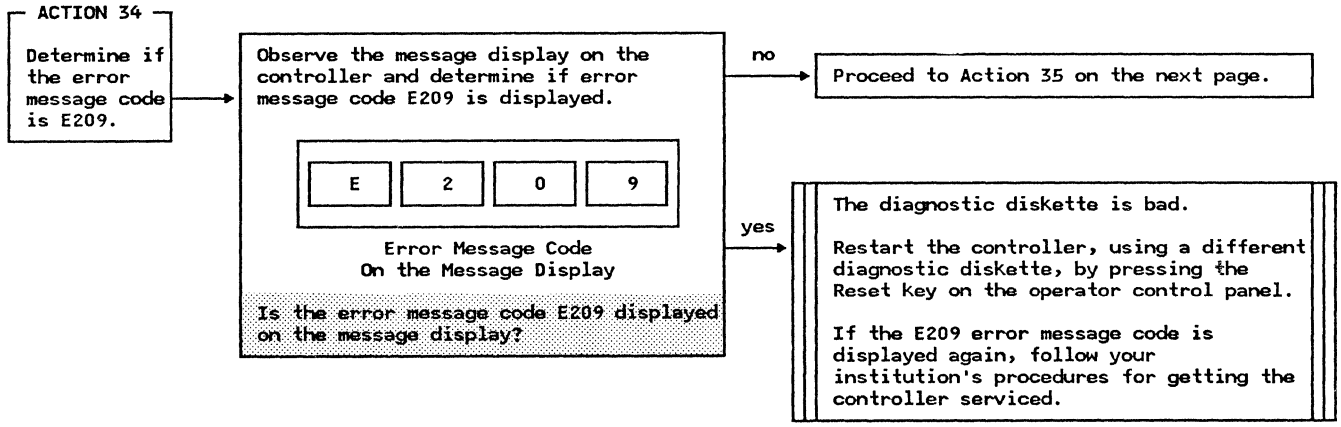




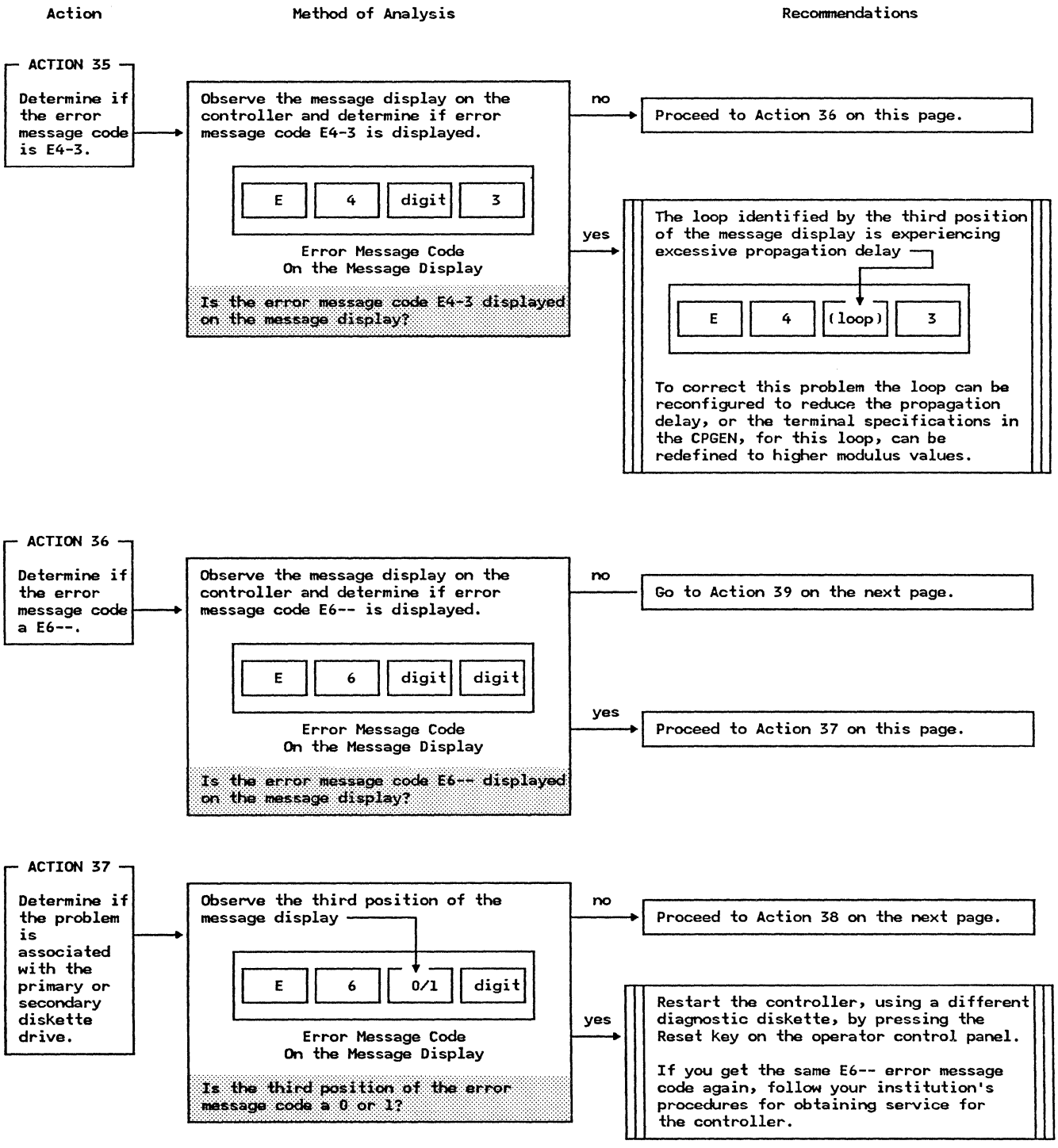
PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations



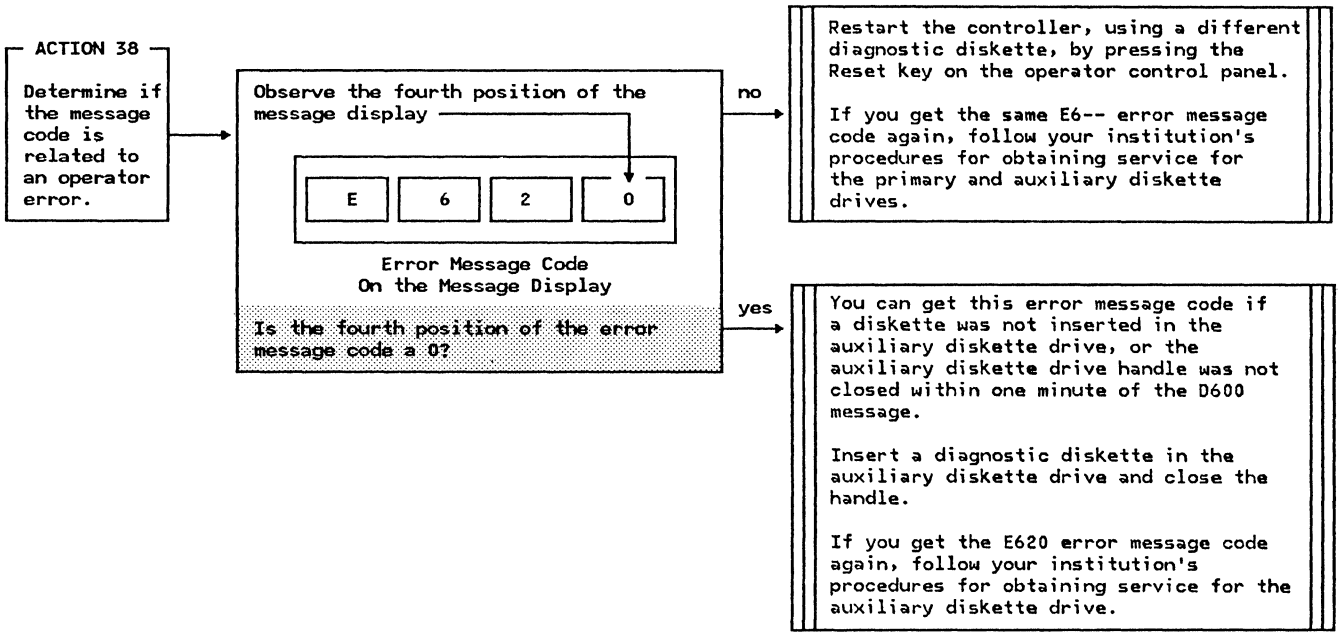


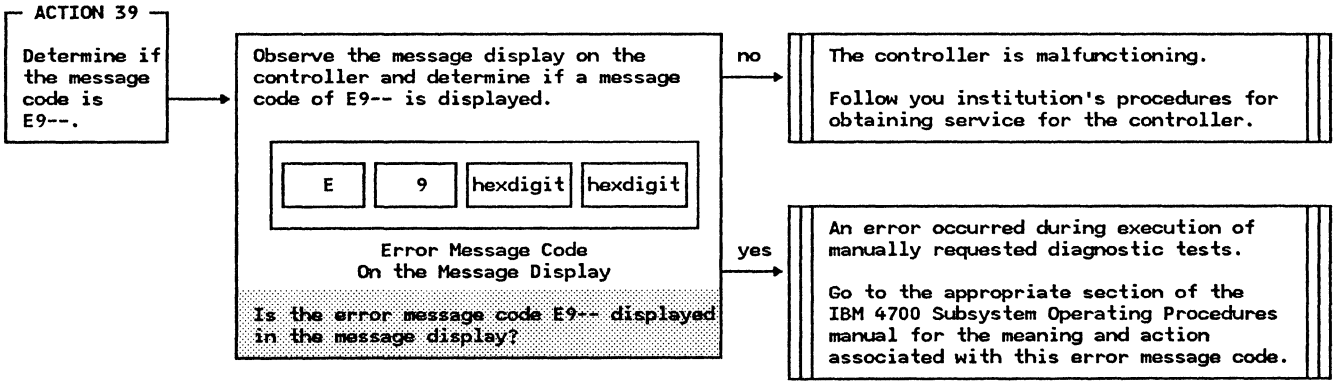
PDP05 - Device Problem Determination Procedure for the Controller (continued)



PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations





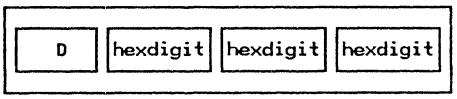
PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations

ACTION 40

Determine if the message code is of the form D---.

Observe the message display on the controller and determine whether a message code of the form D--- is displayed.



Message Code
On the Message Display

Is the message code D--- displayed on the message display?

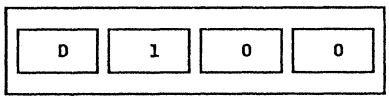
no → Go to Action 48 on page 172.

yes → Proceed to Action 41 on this page.

ACTION 41

Determine if the message code is D100.

Observe the message display on the controller and determine whether a message code of D100 is displayed.



Informational Message Code
On the Message Display

Is a message code of D100 displayed on the message display?

no → Proceed to Action 42 on the next page.

yes →

END OF PROCEDURE

The Interrupt button has been pressed and the system is prepared to dump the controller data to a scratch diskette.

If the Interrupt button has been pressed by mistake, press the Reset button on operator control panel and restart the controller.

If a dump of the controller data is desired, perform the following steps:

1. Remove the operational diskette from the primary diskette drive.
2. Insert a scratch diskette in the primary drive. When the diskette drive becomes ready the recording of the controller data will begin.
3. The dump of the controller data is complete when a D200 message code is displayed on the message display. Remove the dump diskette from the controller.

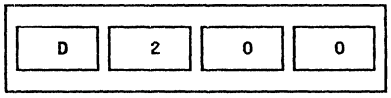
PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations

ACTION 42

Determine if the message code is D200.

Observe the message display on the controller and determine whether a message code of D200 is displayed.



Informational Message Code
On the Message Display

Is a message code of D200 displayed on the message display?

no → Proceed to Action 43 on this page.

yes →

END OF PROCEDURE

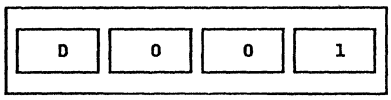
A dump of the controller was requested and the recording of this data on a diskette has completed.

Remove the dump diskette from the controller.

ACTION 43

Determine if the error message code is D001.

Observe the message display on the controller and determine whether an error message code of D001 is displayed (this error code will be flashing).



Error Message Code
On the Message Display

Is an error message code of D001 displayed on the message display?

no → Proceed to Action 44 on the next page.

yes →

END OF PROCEDURE

The primary diskette drive is not ready.

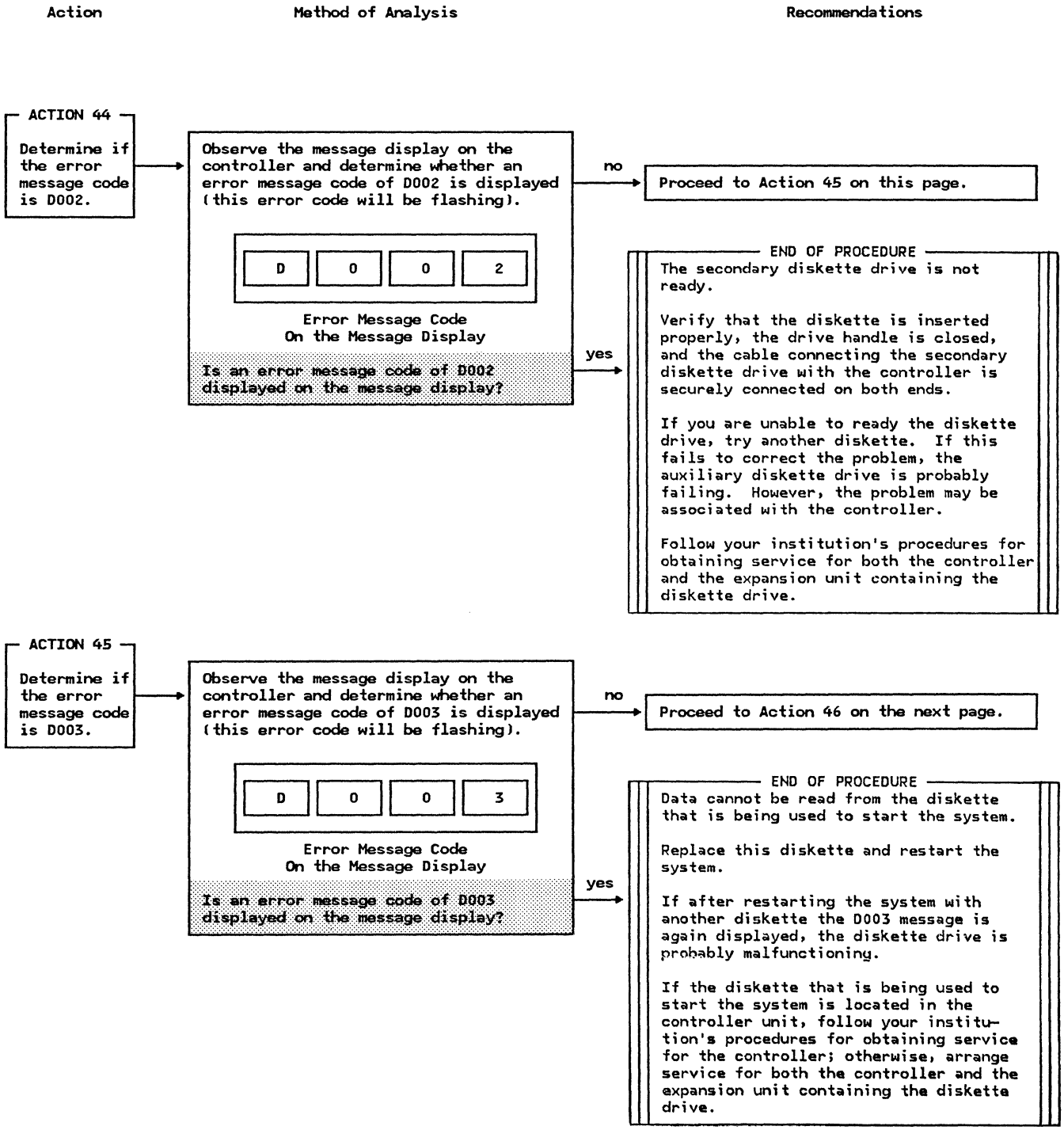
Verify that the diskette is inserted properly and the drive handle is closed.

If you are unable to ready the diskette drive, try another diskette. If this fails to correct the problem, the controller is probably malfunctioning. Follow your institution's procedures for obtaining service for the controller.

NOTE: If the controller has a secondary drive, it can be used as a replacement for the primary drive.

Move the diskette to the secondary drive and press the Interrupt button (the Interrupt button is located behind the door on the operator control panel of the controller).

PDP05 - Device Problem Determination Procedure for the Controller (continued)



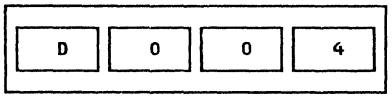
PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action	Method of Analysis	Recommendations

ACTION 46

Determine if the error message code is D004.

Observe the message display on the controller and determine whether an error message code of D004 is displayed (this error code will be flashing).



Error Message Code
On the Message Display

Is an error message code of D004 displayed on the message display?

no → Proceed to Action 47 on this page.

yes →

END OF PROCEDURE

The diskette being used to start the system is not properly formatted.

Replace this diskette and restart the system.

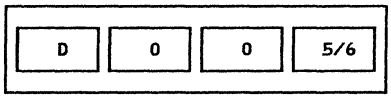
If after restarting the system with another diskette the D004 message is again displayed, the diskette drive is probably malfunctioning.

If the diskette that is being used to start the system is located in the controller unit, follow your institution's procedures for obtaining service for the controller; otherwise, arranga service for both the controller and the expansion unit containing the diskette drive.

ACTION 47

Determine if the error message code is D005 or D006.

Observe the message display on the controller and determine whether an error message code of D005 or D006 is displayed (these error codes will be flashing).



Error Message Code
On the Message Display

Is an error message code of D005 or D006 displayed on the message display?

no → Proceed to Action 48 on the next page.

yes →

END OF PROCEDURE

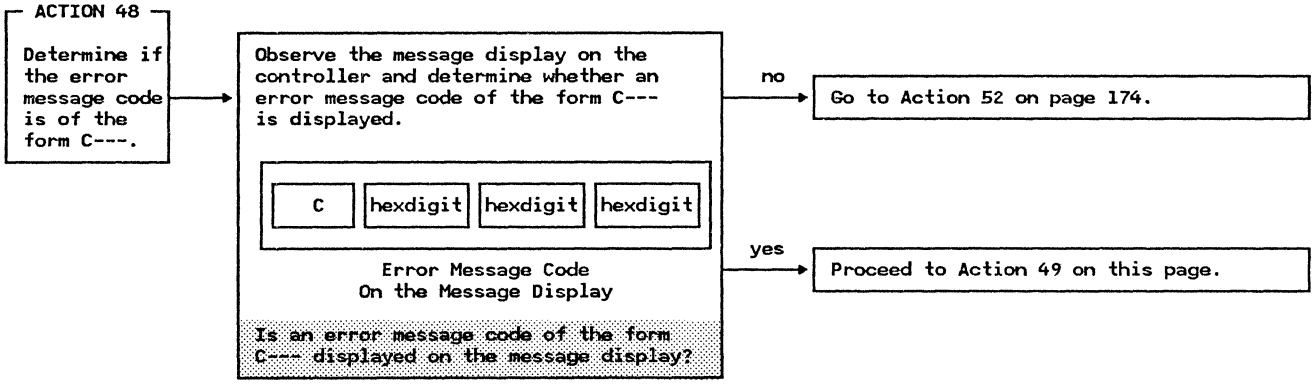
The read of system data from the diskette did not complete successfully.

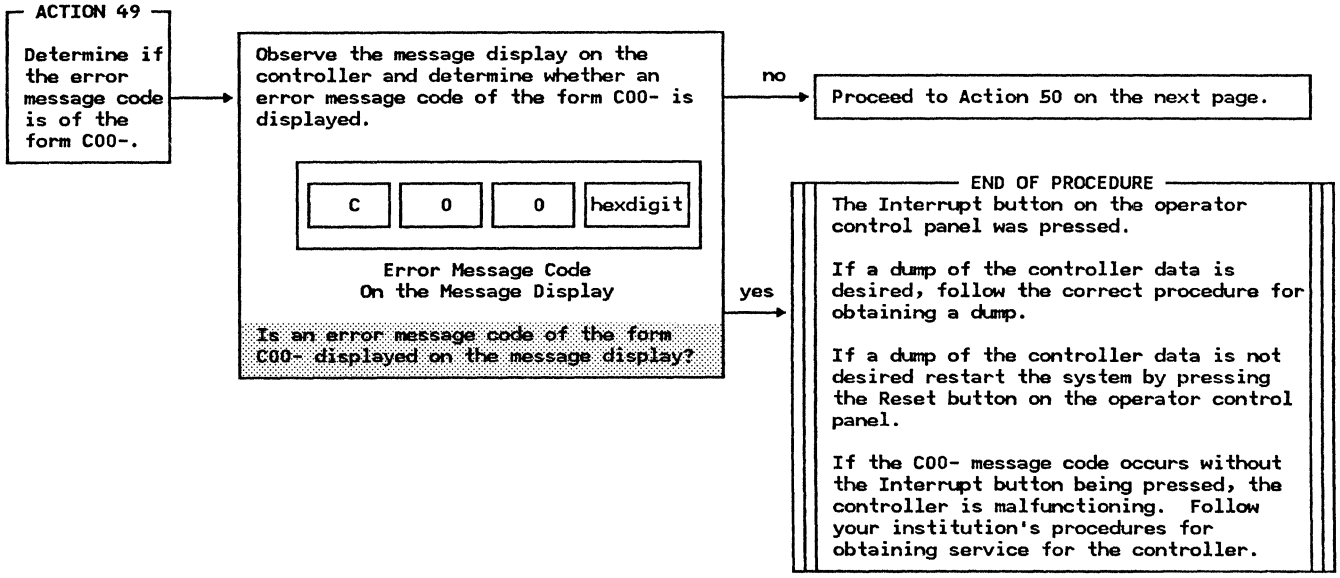
Press the Reset button on the operator control panel to restart the system and retry the read.

If after restarting the system a D005 or D006 error message is again displayed, replace this diskette with a good diskette and restart the system.

PDP05 - Device Problem Determination Procedure for the Controller (continued)

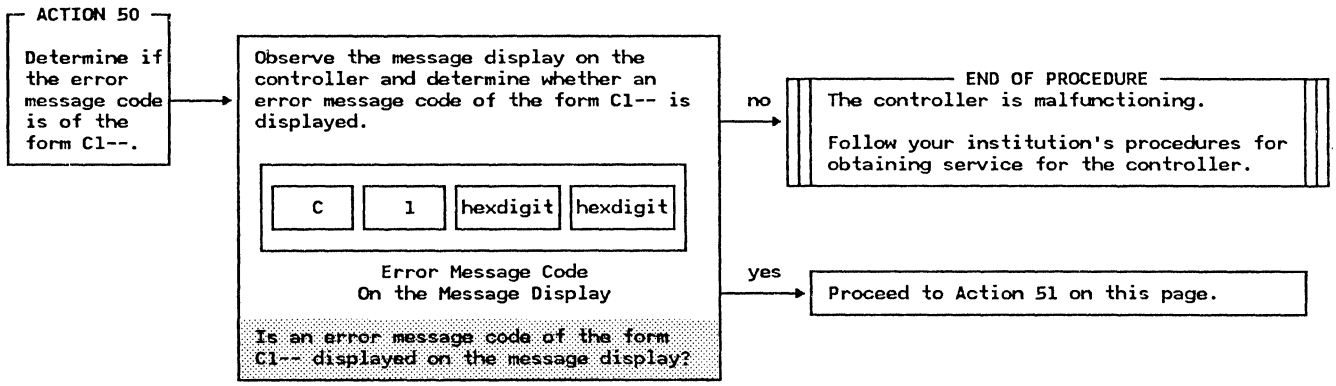
Action	Method of Analysis	Recommendations

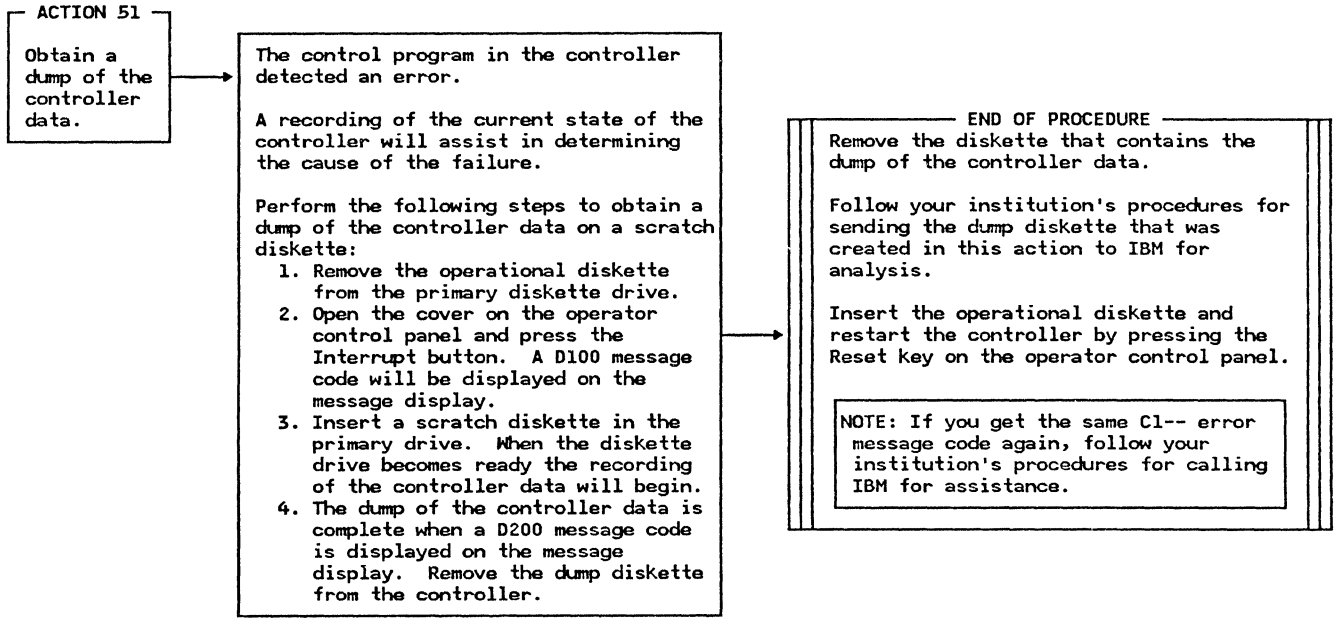




PDP05 - Device Problem Determination Procedure for the Controller (continued)

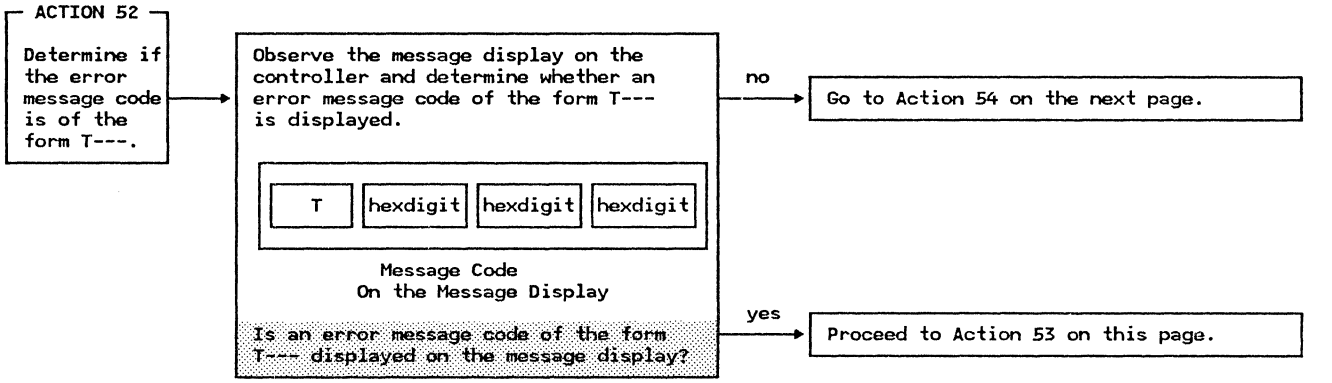
Action	Method of Analysis	Recommendations

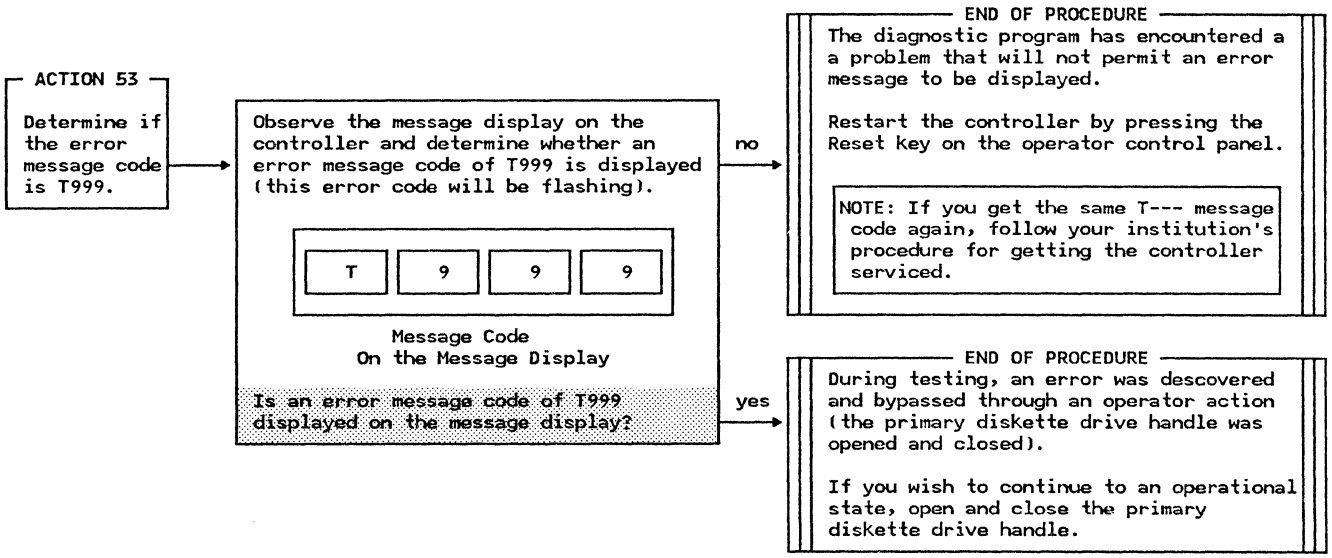




PDP05 - Device Problem Determination Procedure for the Controller (continued)

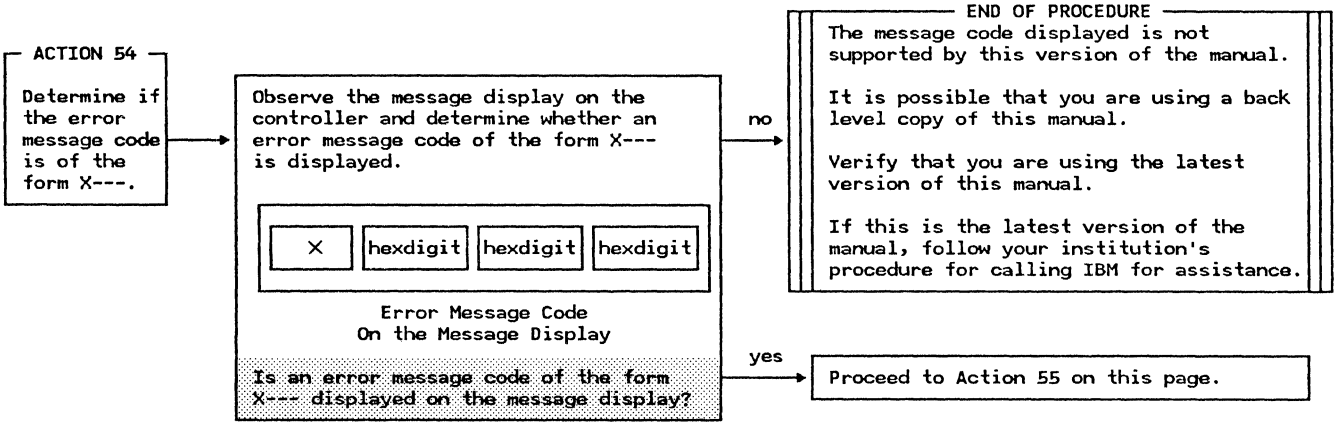
Action | Method of Analysis | Recommendations

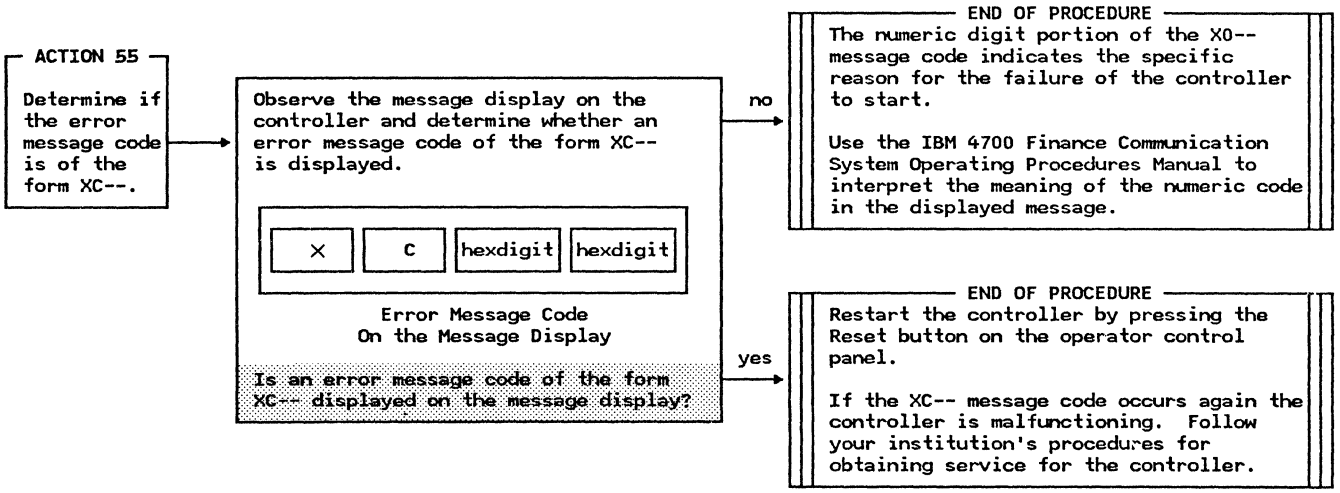




PDP05 - Device Problem Determination Procedure for the Controller (continued)

Action | Method of Analysis | Recommendations





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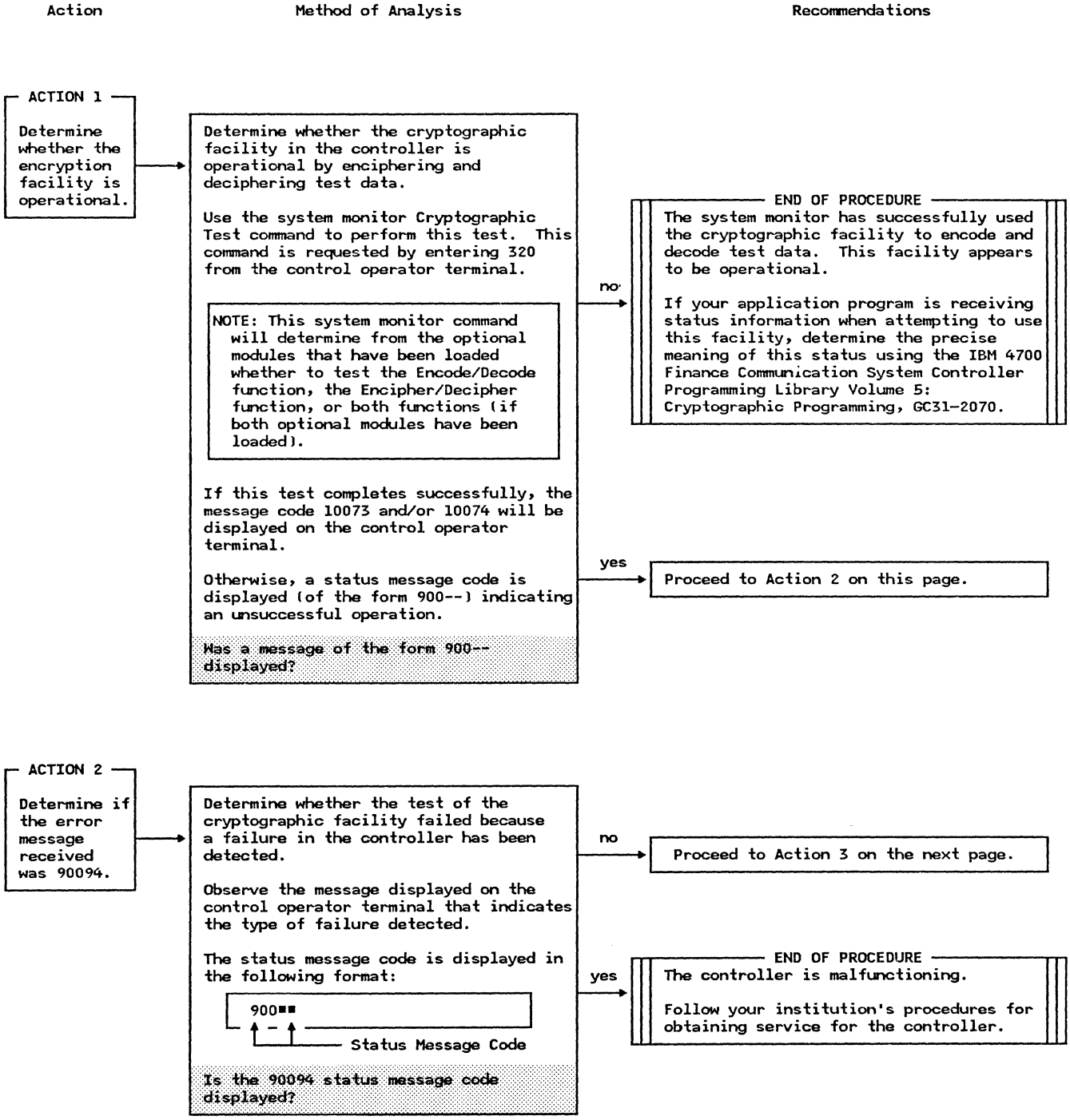
PDP06 - Cryptographic Facility Problem Determination Procedure



PDP06 - Cryptographic Facility Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

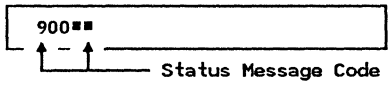
ACTION 3

Determine if the error message received was 90092.

Determine whether the failure detected during the test of the cryptographic facility was associated with the Encode/Decode function in the controller.

Observe the message displayed on the control operator terminal that indicates the type of failure detected.

The status message code is displayed in the following format:



Is the 90092 status message code displayed?

no → Proceed to Action 4 on this page.

yes →

END OF PROCEDURE

The Encode/Decode function is not operating correctly.

Follow your institution's procedures for obtaining service for the controller.

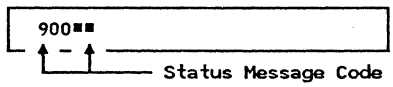
ACTION 4

Determine if the error message received was 90093.

Determine whether the failure detected during the test of the cryptographic facility was associated with the Encipher/Decipher function in the controller.

Observe the message displayed on the control operator terminal that indicates the type of failure detected.

The status message code is displayed in the following format:



Is the 90093 status message code displayed?

no →

END OF PROCEDURE

Verify that the system monitor command was requested correctly.

Use the IBM 4700 Finance Communication System Operating Procedures Manual to interpret the meaning of the 900-- status message code you received.

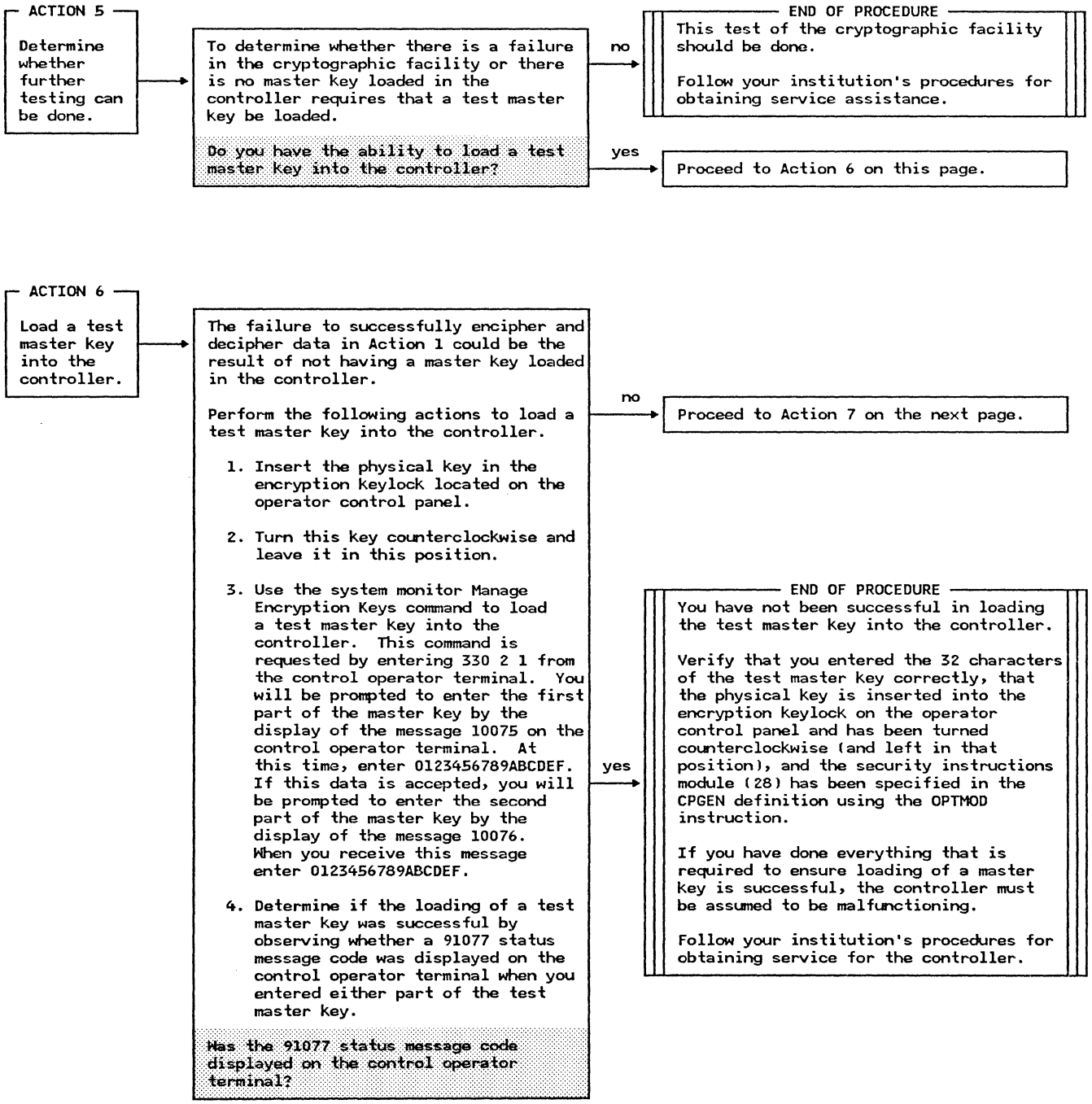
yes →

The Encipher/Decipher function is not operating correctly.

This could be caused by the lack of a master key in the cryptographic facility or by a failure in the controller.

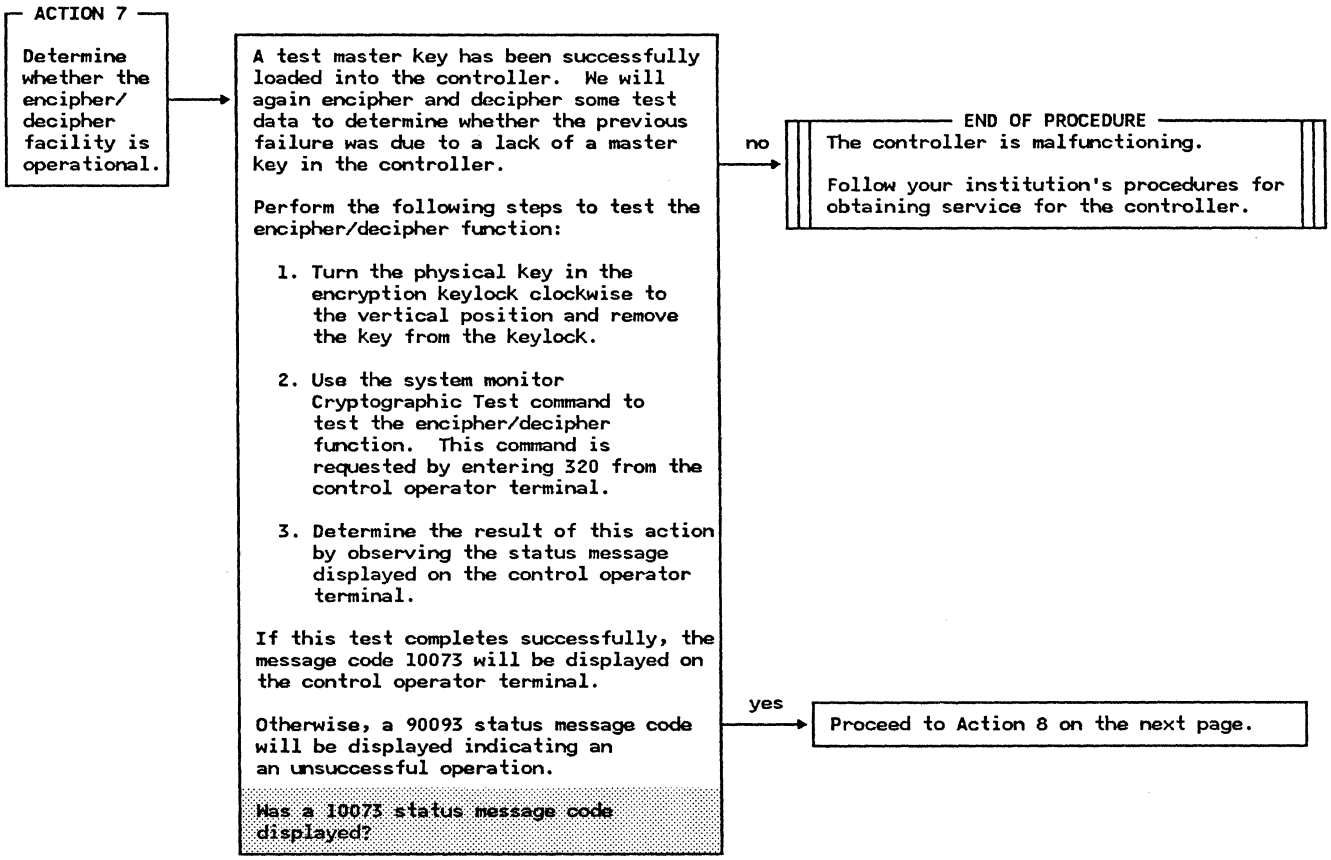
Proceed to Action 5 on the next page.

PDP06 - Cryptographic Facility Problem Determination Procedure (continued)



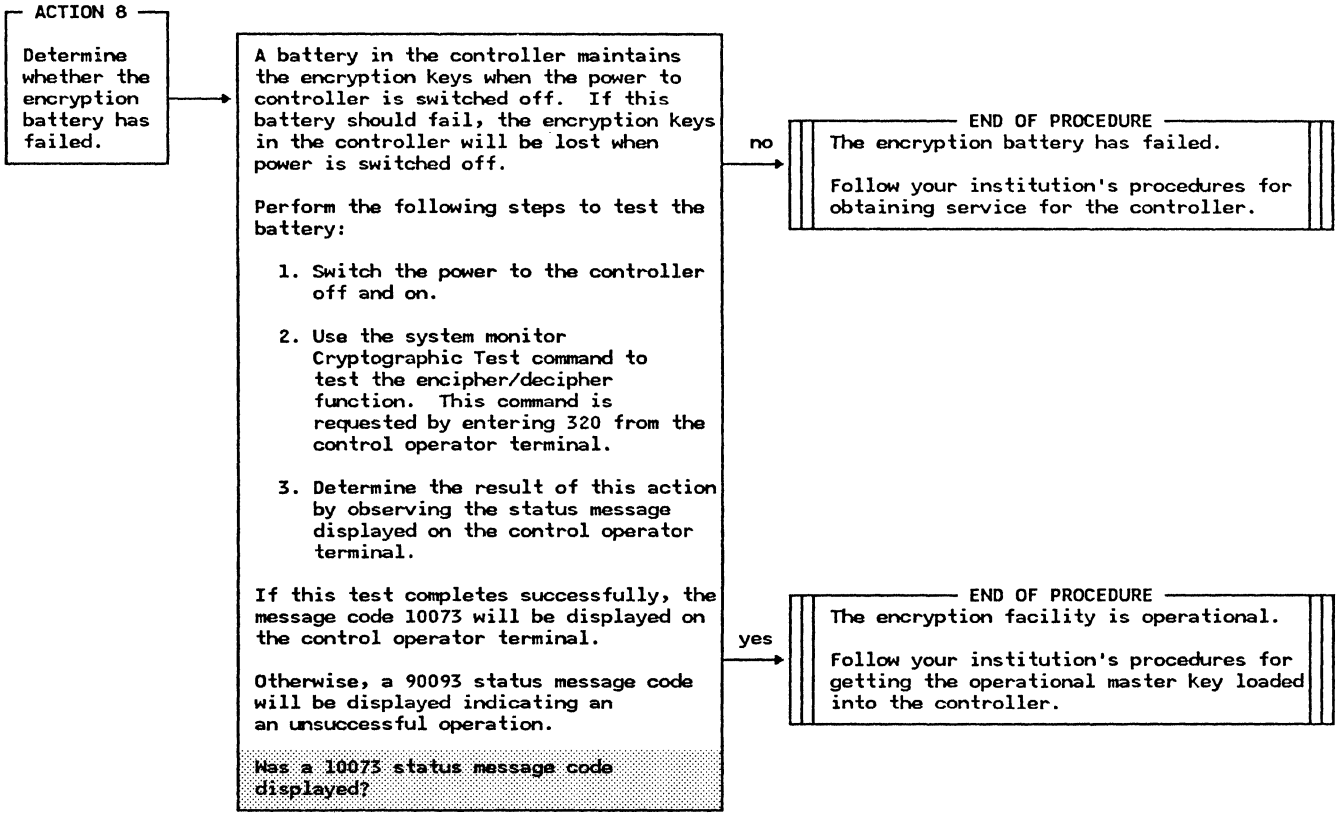
PDP06 - Cryptographic Facility Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP06 - Cryptographic Facility Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



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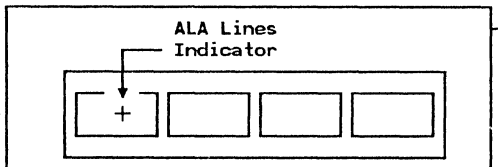
PDP07 - ALA Line Problem Determination Procedure

Action | Method of Analysis | Recommendations

ACTION 1

Observe the ALA lines indicator on the controller message display for a plus sign.



The first position of the controller message display indicates the state of the ALA Lines.

Is this character a plus sign (+)?

no → Proceed to Action 2 on this page.

yes →

END OF PROCEDURE

All ALA lines that have been started are fully operational.

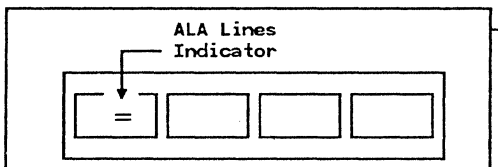
An ALA line is successfully started when communication has been established with all devices on the line that were specified by the ALACU instruction in the CPGEN.

If the ALA line communication protocol is SNA/SDLC (this is an SNA-Primary line), the SNA physical control point session has been established (data has been exchanged on the SSCP-PU session).

NOTE: If you are experiencing a problem with the ALA lines, go to Action 26 on page 203.

ACTION 2

Observe the ALA lines indicator on the controller message display for a equal sign.



The first position of the controller message display indicates the state of the ALA lines.

Is this character an equal sign (=)?

no → Proceed to Action 3 on the next page.

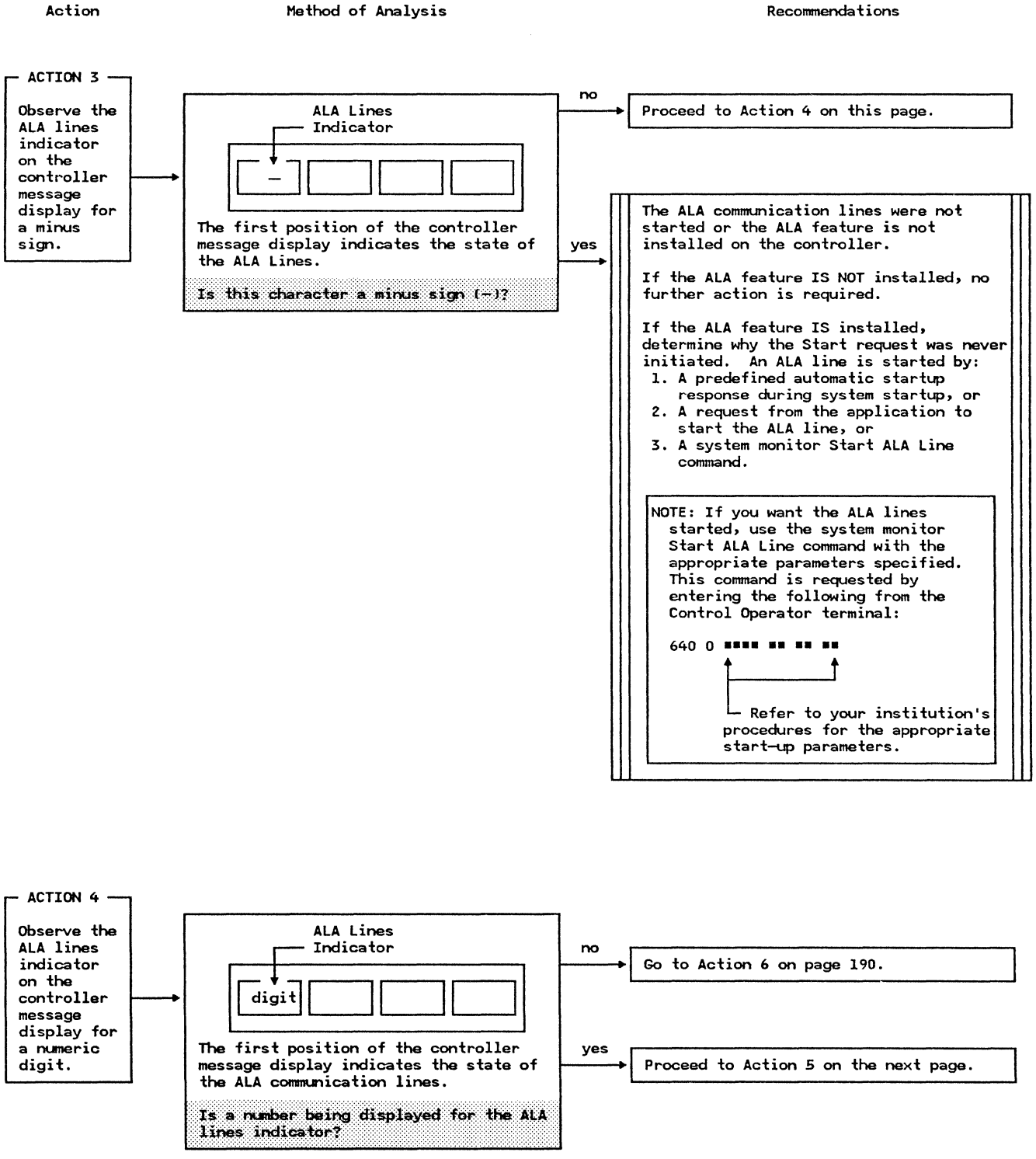
yes →

END OF PROCEDURE

There is a mismatch between the physical ALA line hardware and the generated system support programming for all ALA lines.

Ensure that the ALA line specification (LAM = parameter of the ALALINE macro) in the CPGEN matches the ALA line feature(s) on the controller.

PDP07 - ALA Line Problem Determination Procedure (continued)



PDP07 - ALA Line Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

One of the multiple ALA lines on the controller is not fully operational. The number of that ALA line is displayed in the ALA lines indicator position of the message display.

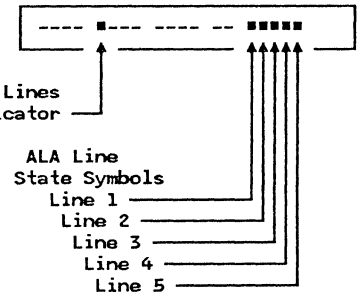
Action 5 will determine the operational state of the line by displaying the associated state symbol. This symbol will be referenced in the remainder of the procedure.

ACTION 5

Determine the operational state symbol for the ALA lines.

Use the system monitor Display Operator Control Panel command to display the operational state of the ALA line. You can request this command by entering 075 from the Control Operator terminal.

The state of the operator control panel indicator lights and the contents of the message display are displayed in the following format:

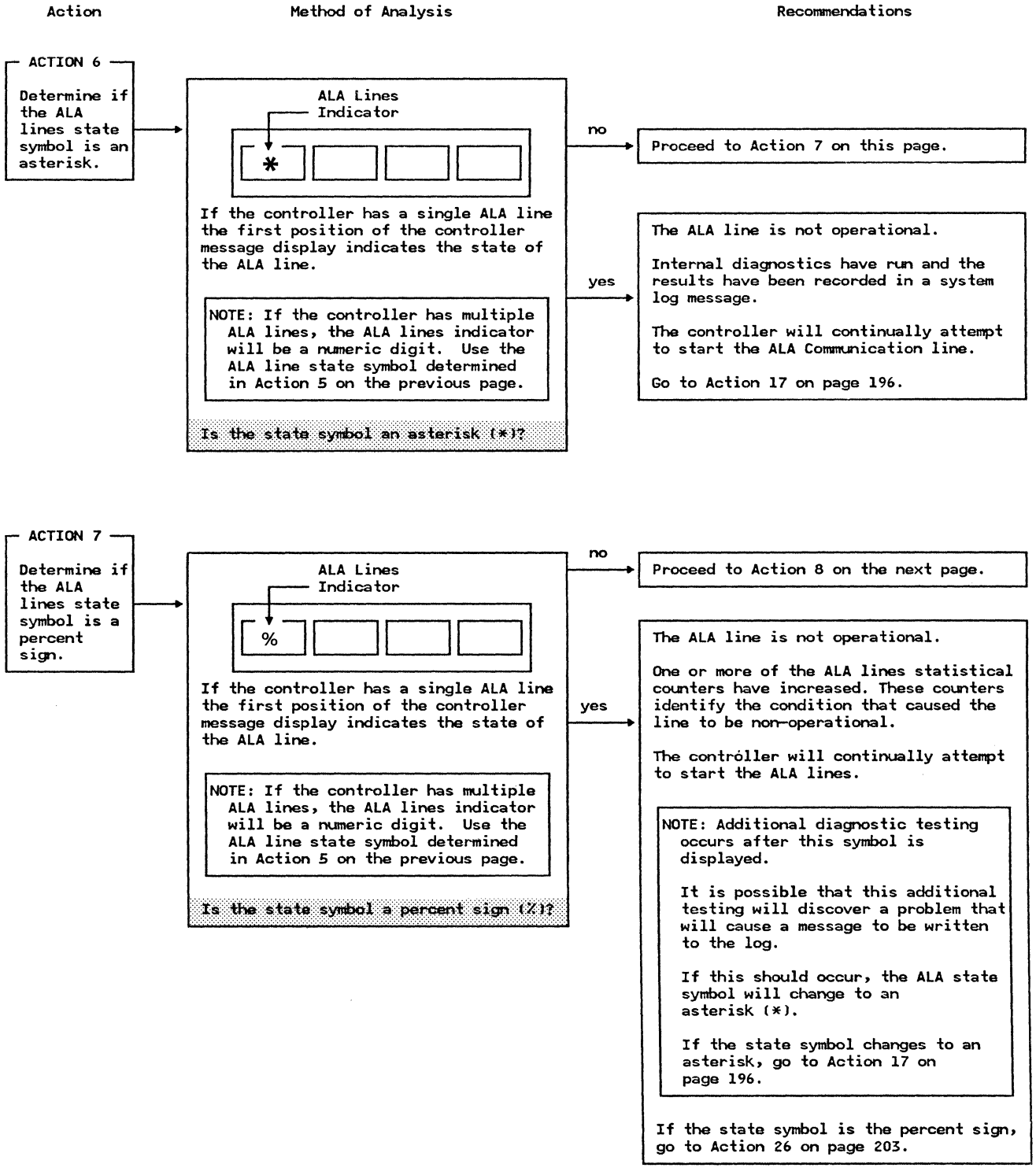


Determine the state symbol that is associated with the ALA lines number displayed in the ALA line indicator.

Use this state symbol for the following actions.

Proceed to Action 6 on the next page.

PDP07 - ALA Line Problem Determination Procedure (continued)

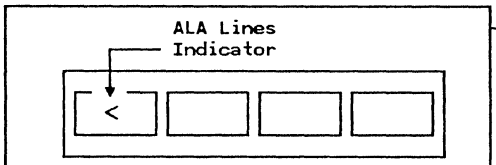


PDP07 - ALA Line Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

ACTION 8

Determine if the ALA lines state symbol is a 'less than' symbol.



If the controller has a single ALA line the first position of the controller message display indicates the state of the ALA line.

NOTE: If the controller has multiple ALA lines, the ALA line indicator will be a numeric digit. Use the ALA line state symbol determined in Action 5 on page 189.

Is the state symbol a 'less than' (<) symbol?

no → Proceed to Action 9 on the next page.

yes →

The ALA line was started and all control units on the line (identified by the ALACU macro in the CPGEN) are not active. The control units may be all varied offline.

Determine why the control units on the line are not active.

NOTE: You can change the state of a control unit on an ALA line (activate the control unit) with the following sequence of system monitor commands:

1. Issue the Assign ALA Control Unit command to logically connect the control unit to the system monitor. This command is requested by entering the following from the Control Operator terminal:

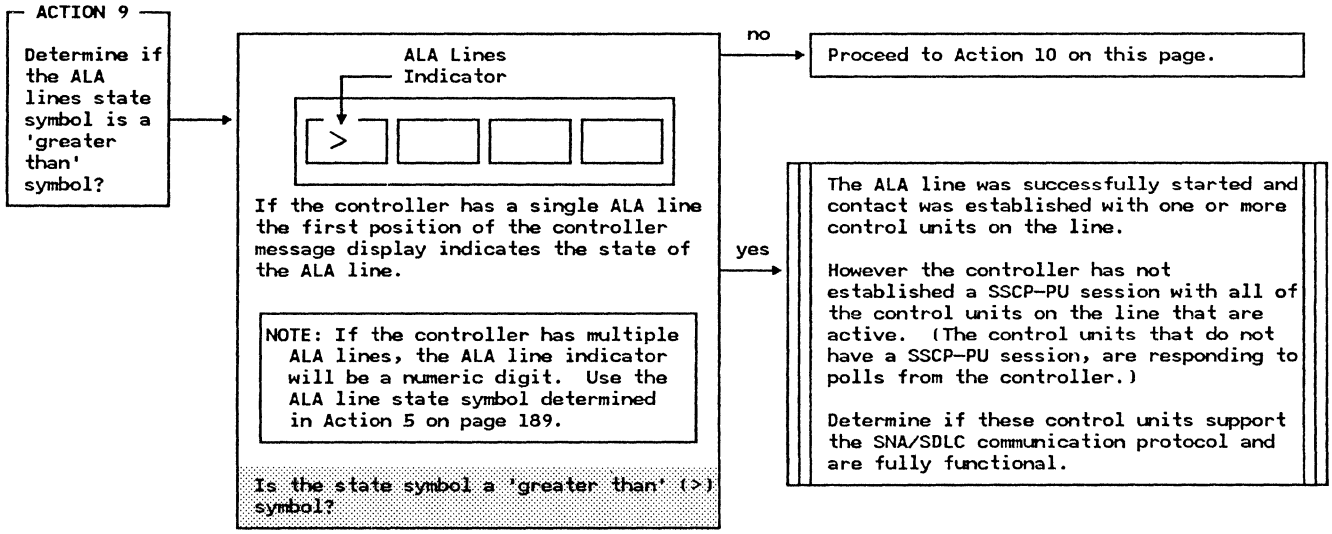
   607 ■■■■
   Network Id of Control Unit

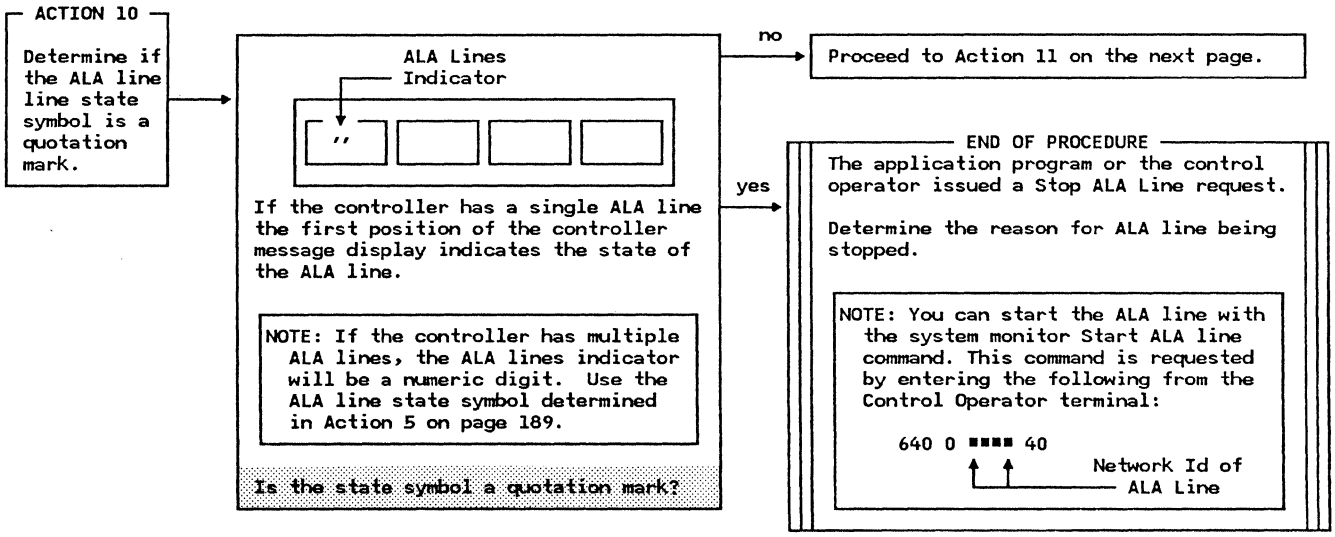
2. Issue the ALA Change State command to vary the control unit offline. This command is requested by entering 601 1 from the Control Operator terminal.

3. Issue the ALA Change State command to vary the control unit online. This command is requested by entering 601 0 from the Control Operator terminal.

4. Restore the control unit to operational mode (disconnect it from the system monitor) by reissuing the Assign ALA Control Unit command. This command is requested by entering 607 from the Control Operator terminal.

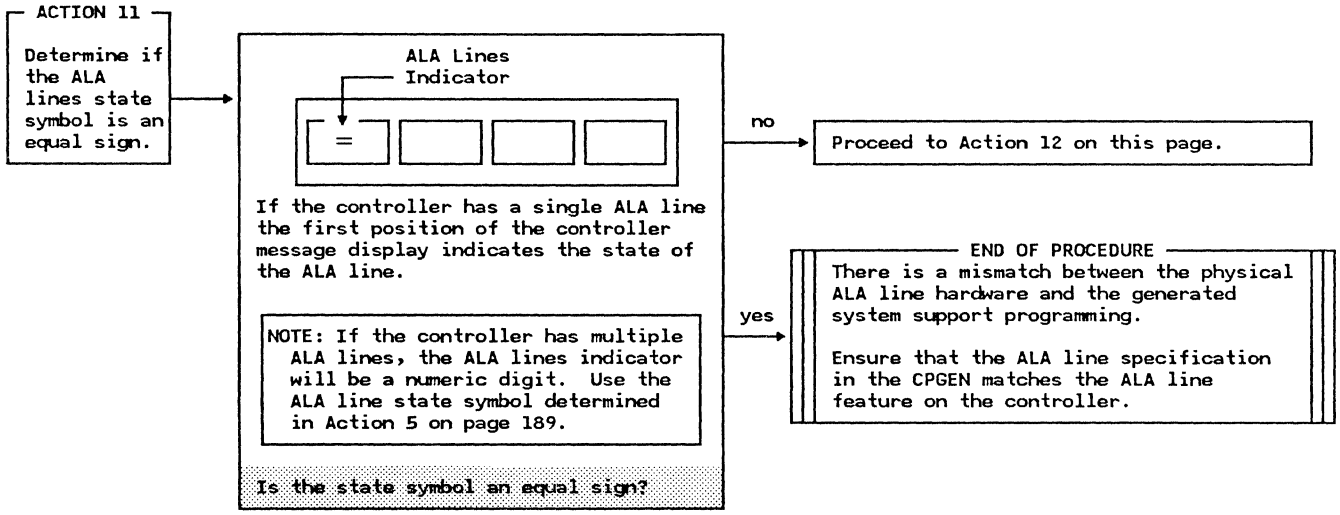
Action | Method of Analysis | Recommendations

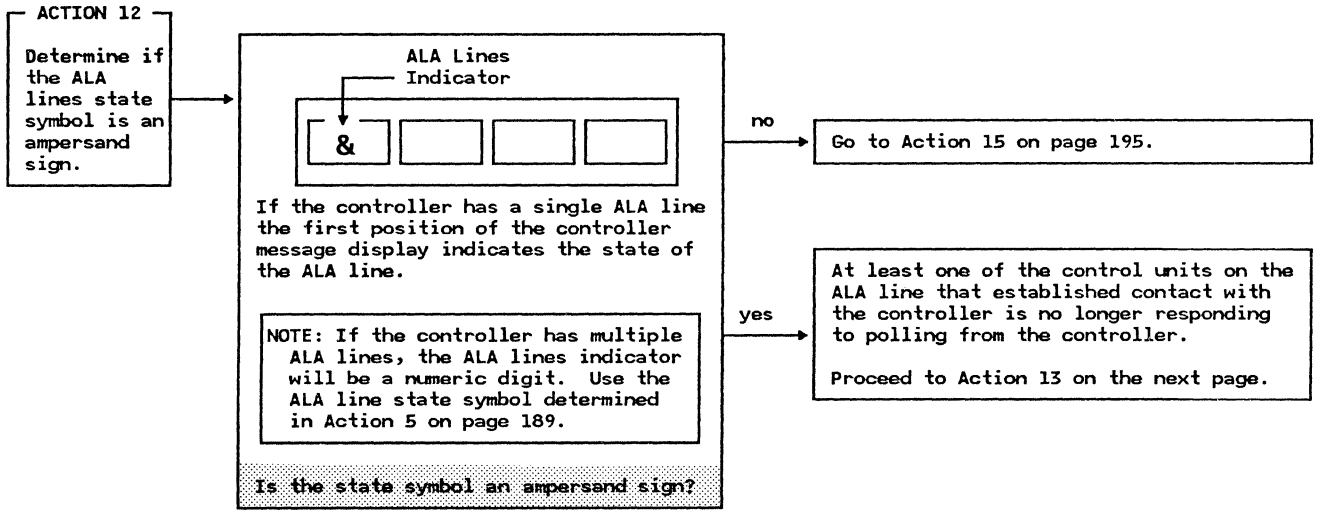




PDP07 - ALA Line Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations





PDP07 - ALA Line Problem Determination Procedure (continued)

Action | **Method of Analysis** | **Recommendations**

ACTION 13

Determine the network ID of the control unit(s) on the ALA line that are not responding to polling from the controller.

At least one of the control units on the ALA line that established contact with the controller is no longer responding to polling from the controller.

Determine the control unit(s) that is not responding to polling by examining the sense data for each control unit network ID on the ALA line.

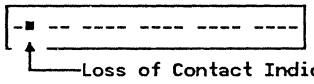
Using the system monitor:

1. Retrieve the sense data for a control unit using the Display ALA CU Sense Data command. This command is requested by entering the following from the Control Operator terminal:

   610 ■■■■ 0
   (Network Id of Control Unit)

2. Determine from the sense data whether the loss of contact indicator is the digit 1 or 3.

The sense data is displayed on more than one line. The first line has the following format:



Is the Loss of Contact Indicator either a 1 or 3?

no → Proceed to Action 14 on this page.

yes →

The control unit is not responding to the polling from the controller.

Ensure that the control unit has power, is fully operational, and is properly connected to the communications facility.

NOTE: If you are unable to establish communication between the control unit and the controller, you should vary the control unit offline.

1. Issue the Assign ALA Control Unit command to logically connect the control unit to the system monitor. This command is requested by entering the following from the Control Operator terminal:

   607 ■■■■
   (Network Id of Control Unit)

2. Issue the ALA Change State command to vary the control unit offline. This command is requested by entering 601 1 from the Control Operator terminal.

3. Restore the control unit to operational mode (disconnect it from system monitor) by reissuing the Assign ALA Control Unit command. This command is requested by entering 607 from the Control Operator terminal.

Proceed to Action 14 on this page.

ACTION 14

Determine if there are any more control units to be checked.

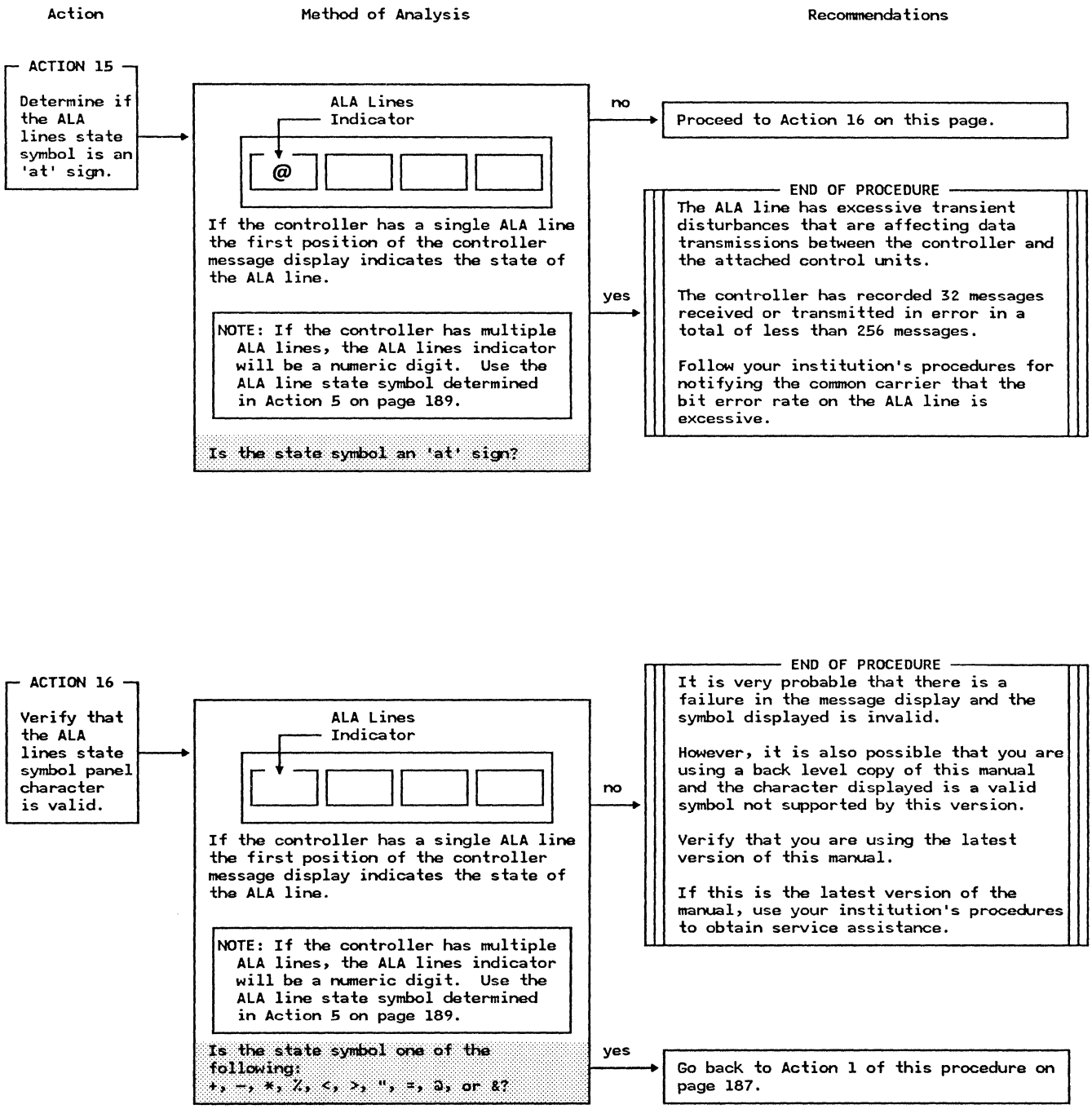
Has the sense data for all the control units on the ALA line been examined by Action 13 on this page?

no → Determine the network ID of the next control unit on the ALA line.

Go back to Action 13 on this page.

yes → Go back to Action 1 of this procedure on page 187.

PDP07 - ALA Line Problem Determination Procedure (continued)



PDP07 - ALA Line Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

This portion of the procedure involves the analysis of the ALA related system log messages.

At this point you should have an asterisk (*) for the ALA lines state symbol.

ACTION-17

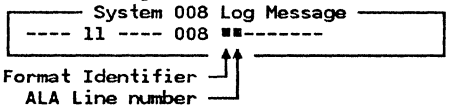
Observe the system log for an ALA log message.

Find the system log message that contains information about the ALA line.

Using the System Monitor:

1. Issue the Log Selective Display command to display any log message associated with the ALA line. This command is requested by entering 301 008 from the Control Operator terminal.
2. Look for a System 008 log message that contains the digit 2 in the Format Identifier field.

The 008 log message is displayed in the following format:



Did you find a system 008 log message containing the digit 2 in the Format Identifier field?

no → If you did not find a system 008 log message for the failing line it was probably because the log area on the diskette is full.

You should be able to re-create the log message and display it using the log message buffer in the controller.

Proceed to Action 18 on this page.

yes → Go to Action 20 on the next page.

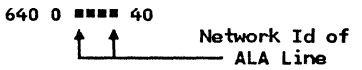
ACTION 18

Cause a ALA log message to be written to the log.

Start the ALA line and attempt to cause another log message to be generated.

Using the system monitor:

1. Issue a Start ALA Line command. This command is requested by entering the following from the Control Operator terminal:



2. Wait 10 seconds.

Did the Alert light on the controller come on?

no → Proceed to Action 19 on the next page.

yes → Go back to Action 17 on this page.

PDP07 - ALA Line Problem Determination Procedure (continued)

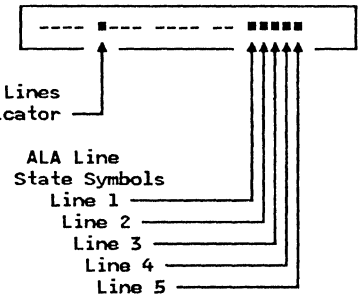
Action	Method of Analysis	Recommendations

ACTION 19

Determine the operational state of the ALA line.

Use the system monitor, Display The Status Of The System command to display the operational state of the ALA lines. You can request this command by entering the 075 from the Control Operator terminal.

The state of the operator control panel indicator lights, the contents of the message display, and the host and ALA line state symbols are displayed in the following format:



Determine the state symbol that is associated with the ALA line number displayed in the ALA line indicator.

Is the state symbol an asterisk (*)?

no → Go back to Action 1 of this procedure on page 187.

yes → END OF PROCEDURE

The ALA line state symbol is an asterisk which indicates that the internal diagnostics detected a problem.

This should have resulted in the creation of a system 008 log message. However, no log message was written to the log.

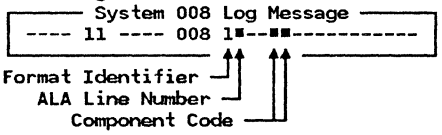
Follow your institution's procedures for obtaining service for the controller.

ACTION 20

Analyze the internal diagnostic test results.

The third and fourth characters in the log message after the ALA line number define the failing component.

The 008 log message is displayed in the following format:



Does the Component Code field specify a 09?

no → The internal system diagnostics could not successfully complete an external wrap test.

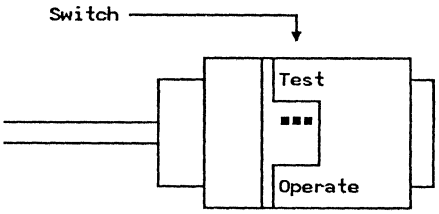
Proceed to Action 21 on the next page.

yes → END OF PROCEDURE

The internal system diagnostics have discovered a problem with the controller.

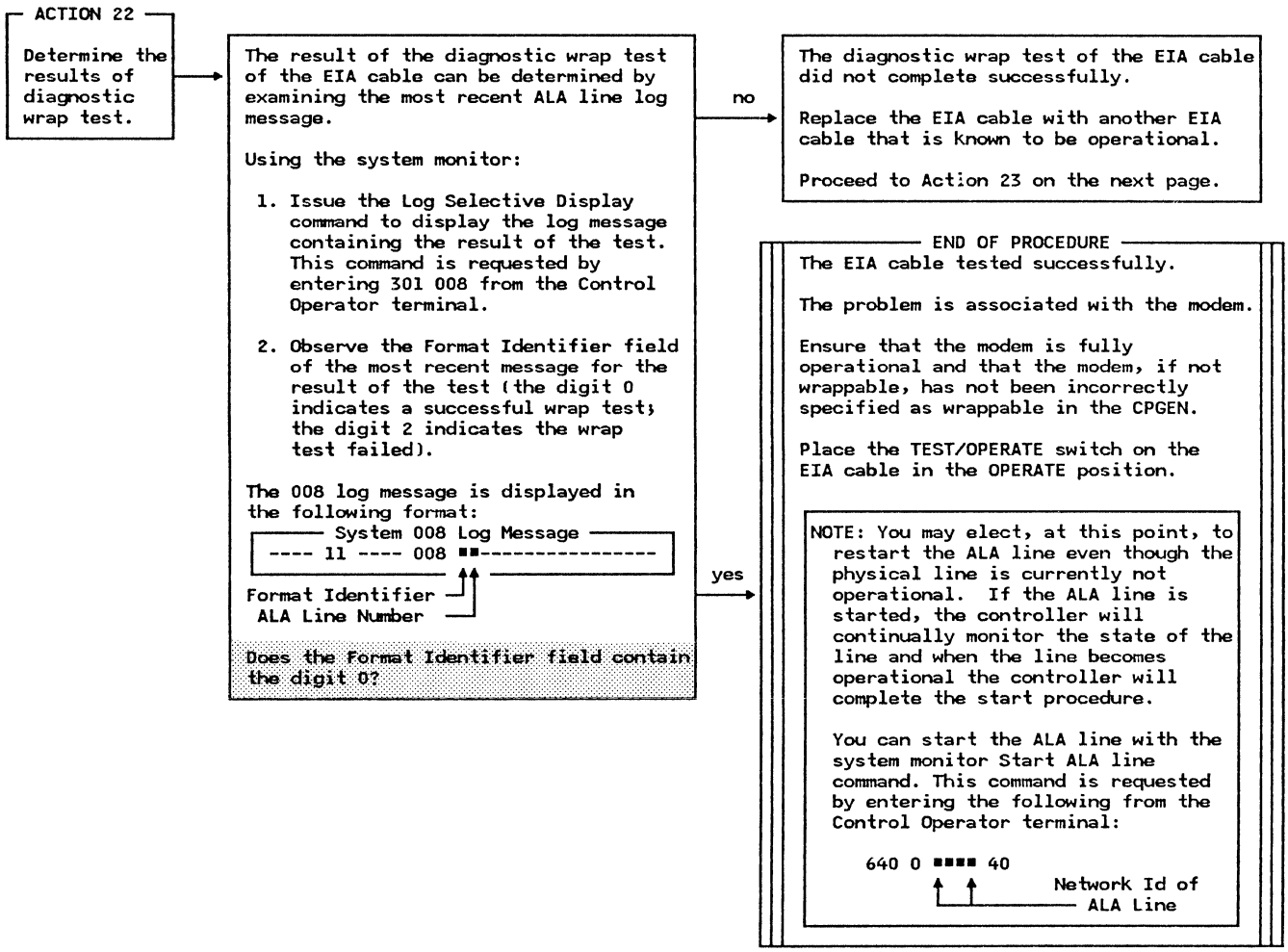
Follow your institution's procedures for obtaining service for the controller.

PDP07 - ALA Line Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations
ACTION 21 Perform a diagnostic wrap test on the EIA cable to the modem.	Ensure that the EIA cable on the appropriate ALA line is operational. Using the system monitor to initiate the the test, perform the following steps to test the EIA cable: 1. Place the TEST/OPERATE switch located on the modem end of the appropriate EIA cable (the cable that connects the modem to the controller) into the TEST position.  Modem End of Cable 2. Issue a Stop ALA Line command to cause the ALA line to be stopped. This command is requested by entering the following from the Control Operator terminal: 640 1 ■■■■ Network Id of ALA Line 3. Turn off the Alert light on the operator control panel by entering the system monitor Display Log Message command. This command is requested by entering 001 from the Control Operator terminal. 4. Issue a Start ALA line command to cause the ALA line to be wrapped. This command is requested by entering the following from the Control Operator terminal: 640 0 ■■■■ 40 Network Id of ALA Line 5. Wait thirty (30) seconds for the diagnostic routines to complete the test. The test has completed when the ALERT light on the controller display panel is turned on indicating that a message containing the result of the test has been written to the log.	Proceed to Action 22 on the next page.

PDP07 - ALA Line Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



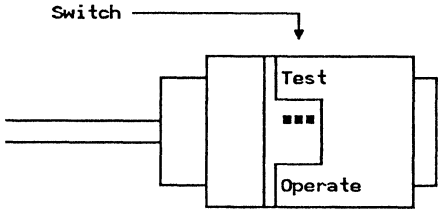
PDP07 - ALA Line Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

ACTION 23

Perform a diagnostic wrap test on the new EIA cable to the modem.

Place the TEST/OPERATE switch on the modem end of the replacement EIA cable into the TEST position.



Modem End of Cable

Using the System Monitor:

1. Issue the Start ALA line command to cause the ALA line to be wrapped. This command is requested by entering the following from the Control Operator terminal:

   640 0 ■■■■ 40
   Network Id of ALA Line

2. Wait thirty (30) seconds for the diagnostic routines to complete the test. The test has completed when the ALERT light on the operator control panel is turned on indicating that a message containing the result of the test has been written to the log.

3. Issue the Log Selective Display command to display the log message containing the result of the test. This command is requested by entering 301 008 from the Control Operator terminal.

4. Observe the Format Identifier field of the most recent message for the result of the test (the digit 0 indicates a successful wrap test; the digit 2 indicates the wrap test failed).

The 008 log message is displayed in the following format:

System 008 Log Message
---- 11 ---- 008 ■■----------

Format Identifier
ALA Line Number

Does the Format Identifier field contain the digit 0?

no →

END OF PROCEDURE

The problem is associated with the controller.

Follow your institution's procedures for obtaining service for the controller.

yes →

END OF PROCEDURE

The internal diagnostics have successfully tested the replacement EIA cable.

The ALA line should now be operational.

Place the TEST/OPERATE switch on the EIA cable in the OPERATE position.

The ALA line should be started using the System Monitor Start ALA Line command with the appropriate parameters specified. This command is requested by entering the following from the Control Operator terminal:

640 0 ■■■■ ■■ ■■ ■■

Refer to your institution's procedures for the appropriate start-up parameters.

NOTE: If the ALA line state symbol has not become a 'plus sign' (+), go back to Action 1 of this procedure on page 187.

Action | Method of Analysis | Recommendations

The ALA line state symbol should be a percent sign (%). If it IS NOT, go back to Action 1 of this procedure on page 187.

The percent sign indicates that the ALA line is not operational, or experiencing problems, because of one of the following:

1. An interface line between the controller and an ALA modem (or data communications equipment (DCE)) has dropped indicating the modem (or DCE) is no longer available.
2. An unsupported communication protocol has been encountered during communication with a device attached to the ALA line.

Because one or more of the ALA line statistical counters may have increased as a result of this condition, the following actions will analyze these counters.

ACTION 24

Observe the contents of the ALA line statistical counter 4.

Using the system monitor Display the Statistical Counters command, retrieve the statistical counters for the ALA line. This command is requested by entering the following command from the Control Operator terminal:

```
010 903■
        └ ALA Line Number
```

The counter values are displayed in the following format:

```
93■0 03 -- --- --- --- ■■■ ... ---
```

ALA Line Number

ALA Line Counters
Counter 1
Counter 2
Counter 4

Observe the contents of counter 4.

Is the contents of counter 4 zero?

no →

END OF PROCEDURE

The data Set Ready (DSR) interface line between the controller and the modem (or DCE) has dropped. This indicates that the modem (or DCE) is no longer available.

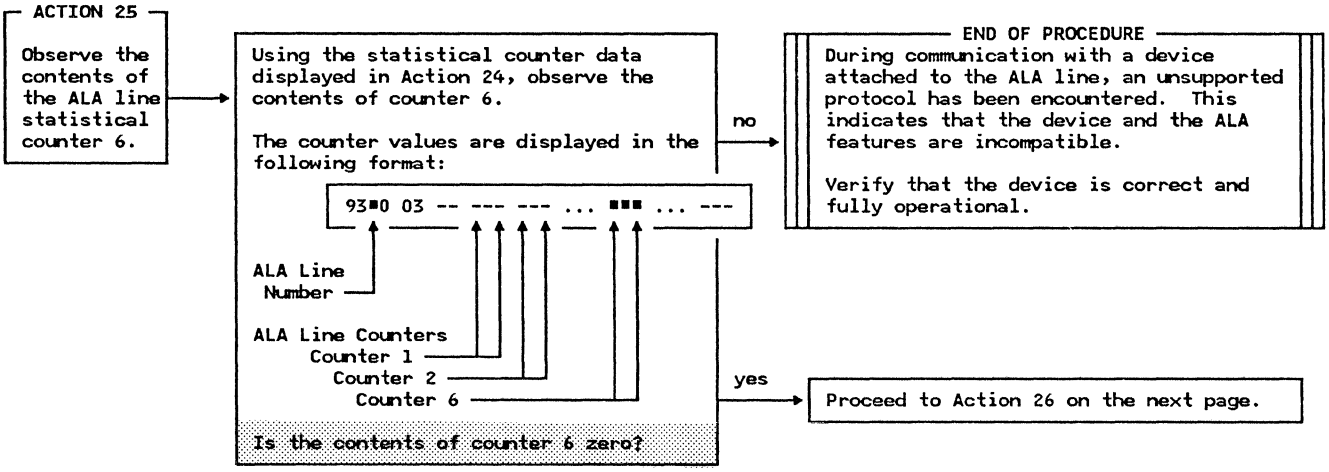
Verify that:
1. The modem is powered on.
2. The modem cables are not faulty.
3. All cables are connected between the controller and the modem (or DCE).
4. The modem is operational.

yes →

Proceed to Action 25 on the next page.

PDP07 - ALA Line Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations



PDP07 - ALA Line Problem Determination Procedure (continued)

Action	Method of Analysis	Recommendations

The ALA line should be fully operational since no line problems have been detected. If you are experiencing problems communicating with one or more control units on the line it probably is due to problems associated with the control units rather then the ALA line.

These control units may not be operational because of one of the following:

1. The controller was unable to successfully complete a section sequence to a control unit.
2. A message to a control unit was not acknowledged or a negative response was received (retransmission of the message was attempted the number of times specified for retry in the CPGEN).
3. A message was received that exceeded the size of the input buffer.
4. A SNA protocol error occurred.

Because one or more of the ALA control unit statistical counters may have increased as a result of this condition, the following actions will analyze these counters.

ACTION 26

Determine a reference point for an examination of an ALA control unit statistical counters.

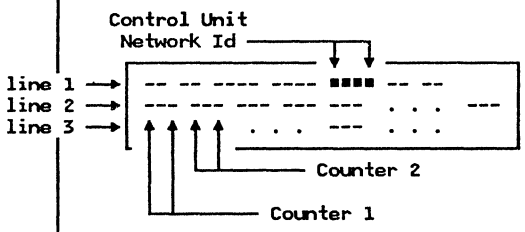
Determine the initial values associated with specific ALA control unit line statistical counters.

Use the system monitor Display the Statistical Counters command to display the statistical counters associated with a control unit on the ALA line. This command is requested by entering the following from the Control Operator terminal:

```
610 ■■■■
    ↑ ↑
    └─── Control Unit Network ID
```

The first line of the output from the 610 command contains informational data about the control unit.

The statistical counter values are displayed on line 2 (and possibly line 3).



Record the values associated with counters 1, 2, 3, 4, 6, 10, 11, 12, and 13.

You should have recorded the following information:

Statistical Counter	First Reading	Second Reading
Counter 1	nnn	
Counter 2	nnn	
Counter 3	nnn	
Counter 4	nnn	
Counter 6	nnn	
Counter 10	nnn	
Counter 11	nnn	
Counter 12	nnn	
Counter 13	nnn	

The system is attempting to establish contact with the control unit. If the attempt is unsuccessful, one or more of the statistical counters will increase.

Proceed to Action 27 on the next page.

PDP07 - ALA Line Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations

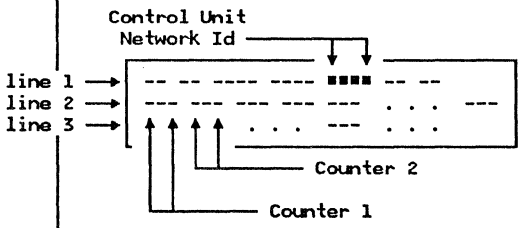
ACTION 27

Determine if specific statistical counters for the ALA control unit are increasing.

Determine the updated values associated with the ALA control unit statistical counters recorded in Action 26.

Using the system monitor Display the Statistical Counters command to retrieve the statistical counters associated with a control unit on the ALA line. This command is requested by entering the following from the Control Operator terminal:

The statistical counter values are displayed on line 2 (and possibly line 3).



Record the values associated with counters 1, 2, 3, 4, 6, 10, 11, 12, and 13.

You should have recorded the following information:

Statistical Counter	First Reading	Second Reading
Counter 1	nnn	nnn
Counter 2	nnn	nnn
Counter 3	nnn	nnn
Counter 4	nnn	nnn
Counter 6	nnn	nnn
Counter 10	nnn	nnn
Counter 11	nnn	nnn
Counter 12	nnn	nnn
Counter 13	nnn	nnn

Proceed to Action 28 on this page.

ACTION 28

Determine if ALA control unit statistical counter 1 or 2 has increased.

Using the data recorded in Actions 26 and 27, determine if counter 1 or 2 has increased.

Counter 1	nnn	nnn
Counter 2	nnn	nnn
Counter 3	nnn	nnn
Counter 4	nnn	nnn
Counter 6	nnn	nnn
Counter 10	nnn	nnn
Counter 11	nnn	nnn
Counter 12	nnn	nnn
Counter 13	nnn	nnn

Is there a difference in the two recorded values for either of these counters?

Has ALA control unit statistical counter 1 or 2 increased?

no → Proceed to Action 29 on the next page.

yes →

END OF PROCEDURE

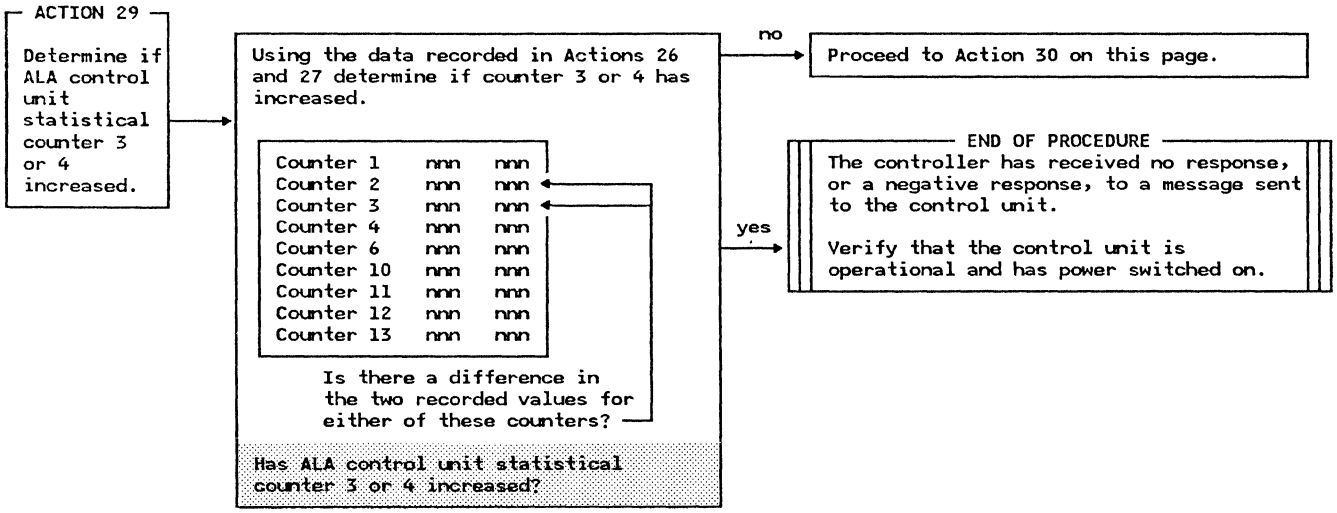
Communication with the control unit has not been established because the controller has received no response, or a negative response, to a selection sequence transmitted from the controller.

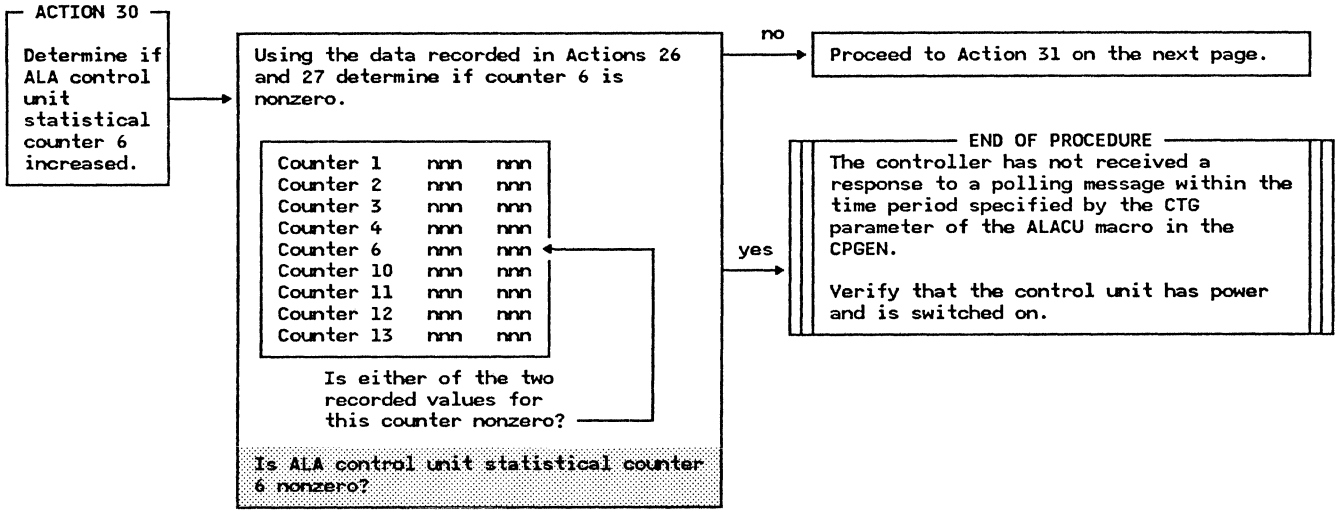
If the protocol is SNA a SDLC sequence error was detected.

Verify that the control unit is operational and has power switched on.

PDP07 - ALA Line Problem Determination Procedure (continued)

Action | Method of Analysis | Recommendations





Action | Method of Analysis | Recommendations

ACTION 31

Determine if ALA control unit statistical counter 10 increased.

Using the data recorded in Actions 26 and 27 determine if counter 10 is nonzero.

Counter 1	nnn	nnn
Counter 2	nnn	nnn
Counter 3	nnn	nnn
Counter 4	nnn	nnn
Counter 6	nnn	nnn
Counter 10	nnn	nnn
Counter 11	nnn	nnn
Counter 12	nnn	nnn
Counter 13	nnn	nnn

Is either of the two recorded values for this counter nonzero?

Is ALA control unit statistical counter 10 nonzero?

no → Proceed to Action 32 on this page.

yes →

END OF PROCEDURE

A message was received at the controller that exceeded the size of the controller's input buffer. The buffer size was either too small, or if dynamic buffering is being used, no buffer was available to store the remainder of the message.

If the message size is valid, you should accomplish one or more of the following:

1. Specify a larger buffer size in the ALABUFF macro in the CPGEN.
2. Specify more buffers in the ALABUFF macro in the CPGEN.
3. Change the application program logic to clear the read buffers sooner.

ACTION 32

Determine if ALA control unit statistical counter 11, 12, or 13 increased.

Using the data recorded in Actions 26 and 27 determine if counter 11, 12, or 13 is nonzero.

Counter 1	nnn	nnn
Counter 2	nnn	nnn
Counter 3	nnn	nnn
Counter 4	nnn	nnn
Counter 6	nnn	nnn
Counter 10	nnn	nnn
Counter 11	nnn	nnn
Counter 12	nnn	nnn
Counter 13	nnn	nnn

Is either of the two recorded values for these counters nonzero?

Is ALA control unit statistical counter 11, 12, or 13 nonzero?

no →

END OF PROCEDURE

The ALA communication line is fully operational with no problems detected by the controller.

Communication has been established with all active control units and the controller has no excessive bit error rate on data transmission.

If you have problems communicating with a control unit(s), go to the Work Station Problem Determination Procedure on page 187.

yes →

END OF PROCEDURE

A SNA protocol error has been encountered or an invalid (or unsupported) command was received from a control unit.

Verify that the control unit is compatible with the 4700 SNA support and is operational.

Appendix One
Description of the Finance Loop

Appendix One
Description of the Finance Loop

Finance Loop Interface

The finance loop is a communication medium used to exchange messages between the controller and its associated terminals. The associated terminals are arranged on one or more loops (local and remote).

The controller manages the message flow on the finance loop, and the terminals must observe the discipline imposed by the controller.

The finance loop interface is the logical and physical connection between a controller or terminal and the physical loop. If the loop is remote, external modems connect it to the controller over a communication network.

The logical interface (connection) to the loop employs a strict line discipline to achieve a uniform flow of information over the loop. This flow consists of controls, commands, and data necessary to facilitate the message exchange.

The physical interface consists of the physical connection and such specifications as the signal levels and modulation techniques.

Loop speed is specified when the system is configured to accommodate the user's application and supporting terminals. Loop speed can be 1200, 2400, or 4800 bps.

Physical Loop Interface

The physical loop connects the controller and terminals in a serial arrangement. The physical loop is a shielded pair of twisted conductors. Each active terminal on the loop acts as a regenerative repeater, reclocking and repowering the line signals that are received, and retransmitting them to the next terminal. If a terminal is powered off, the terminal's driver and receiver circuits are electrically and physically disconnected from the loop. If a terminal is removed from the loop, means must be provided to maintain the electrical continuity, such as through the use of a loop terminal port self-shorting outlet.

Each interconnecting cable segment used in the loop cabling of local loops or remote subloops can be as long as 2000 feet (610 meters). That is, the driving or redriving capability of the controller and of each interconnected terminal is 2000 feet (610 meters). To provide this capability, an interconnected terminal must be powered-on. A powered-off terminal is automatically bypassed in a way that maintains loop continuity.

Logical Loop Interface

The logical loop interface uses a strict line discipline to control the message exchange between the controller and the terminals. This line discipline provides techniques for synchronizing, transmitting and receiving messages, and error checking.

The loop is a one-way device that begins and ends at the controller. The terminals are attached to the loop in a serial arrangement and must propagate the signals that are received to the next terminal on the loop. Signal propagation by each terminal eventually returns the signals to the controller. The signals that are transmitted and propagated on the loop are the synchronization, command, and data bit patterns. Each terminal on the loop represents a one-bit delay in propagating the received bit patterns. By the time a terminal has assembled a complete bit pattern, the terminal has propagated all but the last bit that it has received from the loop.

Slot/Frame Format

Each bit pattern that is transmitted and propagated on the loop contains 18 bits and is called a slot. The slot is the basic transmission block and specifies a command, data, or a synchronization pattern. The bits within the slot are grouped in distinct fields. Seventeen slots make up a frame (see Figure 18).

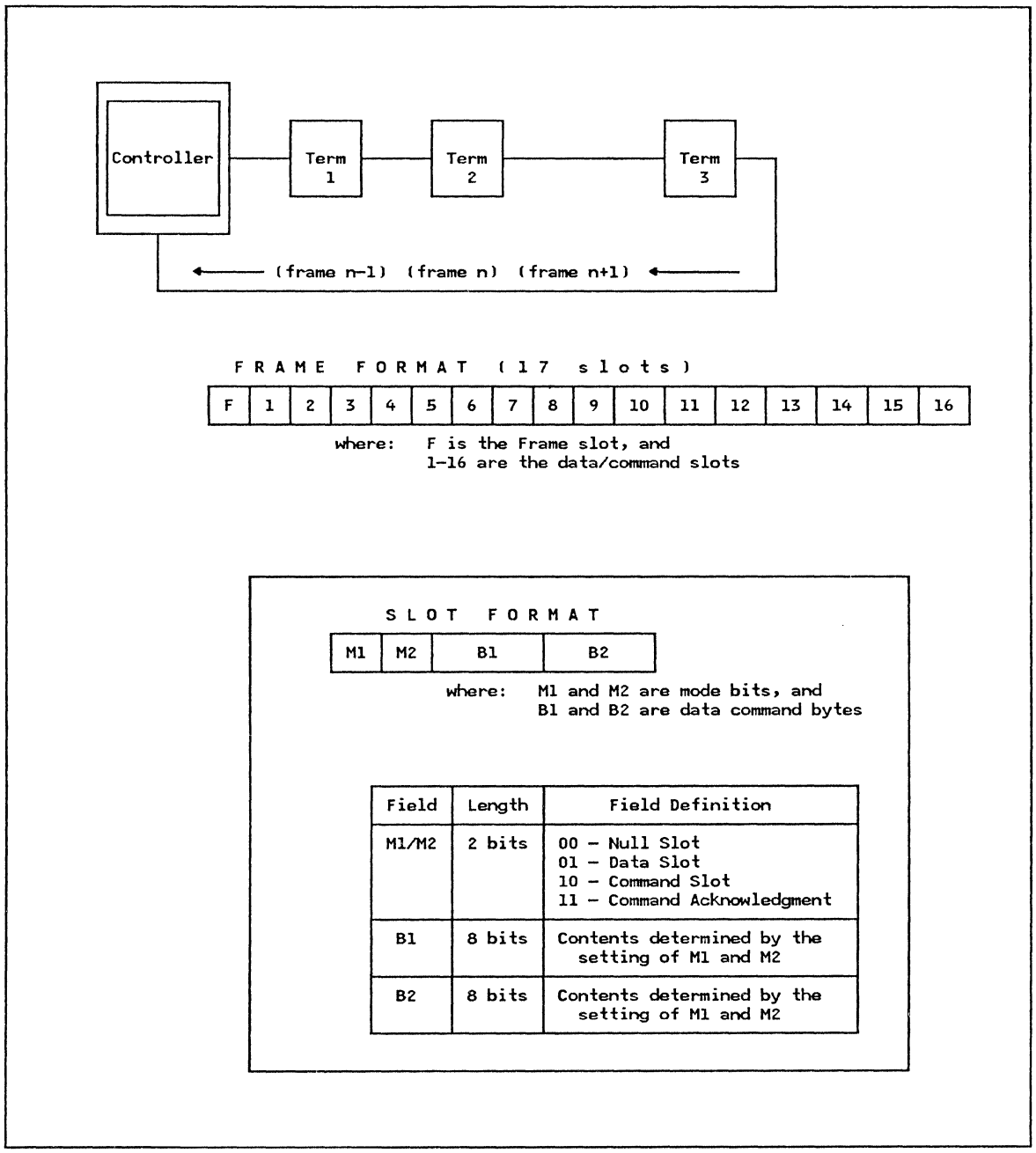
The first slot of a frame is the synchronization bit pattern, and is called the framing slot. The other slots of the frame are identified by their relative position to the framing slot. Each terminal has at least one slot assigned to it. The assigned slot is determined by the terminal's base address (explained under "Addressing"). Additional slots may be allocated to a terminal by the execution of a Set Modulus command.

Terminal Addressing

Each terminal installed on the loop is assigned a distinct address (1-16), which is mechanically set as 0-15 (where 0 signifies address 16) in address switches within the terminal. This address is referred to as the base address, and identifies the corresponding slot that is dedicated to the terminal or group of terminals sharing slots.

The terminals on the loop identify their dedicated slots within the frame by the slot's relative position to the framing slot. The bit pattern of the framing slot is 1111111101111111110. Each terminal assembles and passes on to the next terminal the slots that are received from the loop. When the framing slot is assembled and identified, the terminal counts the following slots to locate its dedicated slot. The dedicated slot is assembled and may contain commands or data to the controller.

When coming online (powered up), the terminal repeats the loop serial data, as received, and searches for the framing pattern. When two consecutive framing patterns are detected with proper spacing (17 slots), the terminal has established the in-sync condition. Each following framing pattern is inspected, and, if not valid, the above search is repeated. Each terminal on the loop represents a one-bit delay as a result of the time that is required to receive the bit and repeat it to the loop.



Field	Length	Field Definition
M1/M2	2 bits	00 - Null Slot 01 - Data Slot 10 - Command Slot 11 - Command Acknowledgment
B1	8 bits	Contents determined by the setting of M1 and M2
B2	8 bits	Contents determined by the setting of M1 and M2

Figure 18. Finance Loop Frame and Slot Format

Component Addressing

A terminal can contain more than one component, such as the 4704 Display which could have three components (keyboard, display and magnetic stripe reader). Because these components use the terminal's dedicated and additionally allocated slots, they are assigned distinct addresses (component address). The component is specified in the Command slot format, as shown in Figure 19.

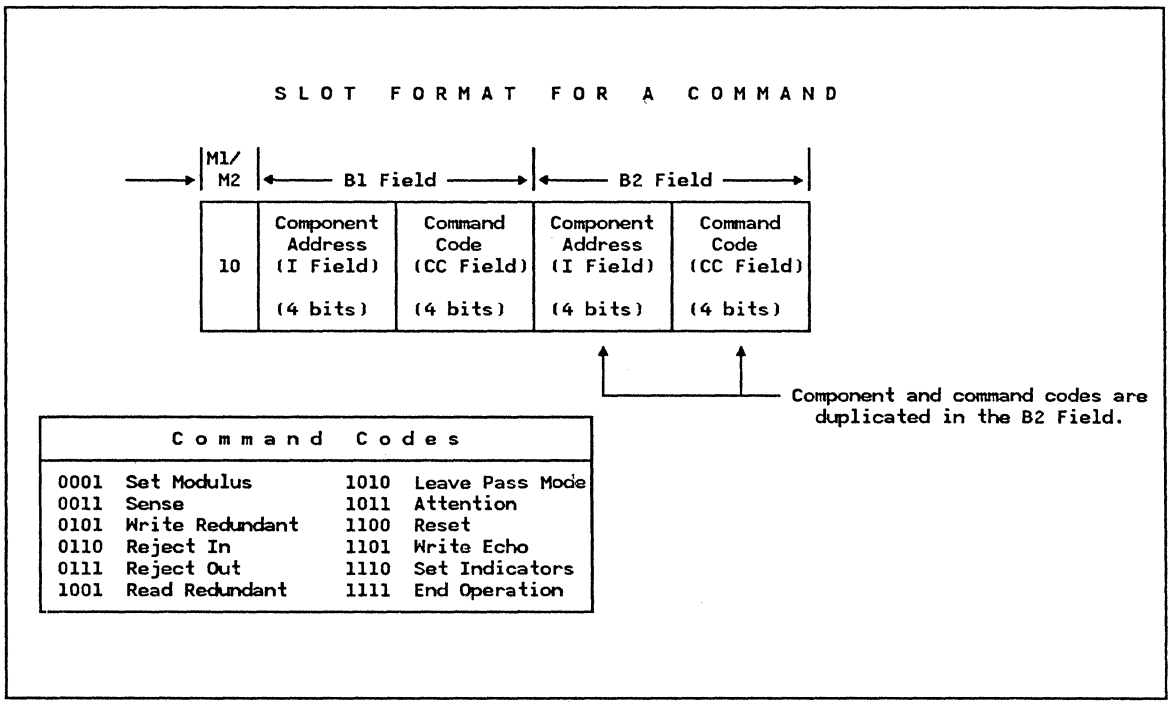


Figure 19. Format of A Command on the Loop

Command Issue

Command Issue falls into two categories: controller-initiated commands and terminal-initiated commands.

To issue a command to a terminal, the controller generates the necessary bit pattern to represent the command format (Mode field = 10), the component address (I field), and the command (CC fields).

The controller serially presents the command pattern to the loop in the designated terminal's slot. Assuming that the terminal has established synchronization (recognition of the framing slot), the terminal identifies and decodes its dedicated slot(s). If the terminal is not busy, it turns on the second mode bit (M2). When the slot returns to the controller, via the loop, the mode field of 11 indicates that the terminal has assembled the slot and was not busy. The B fields, which are duplicated in the command slot format, are compared by the terminal to detect a possible bit pick or drop during transmission. An unequal compare may indicate an invalid command or component address. If the comparison results are positive (equal compare of B1, B2), the command is executed. If the comparison results are negative (unequal compare of B1, B2), the command is treated as a No-Op (no operation is performed).

In summary, the conditions that must exist at the terminal for command execution are:

1. The terminal must be in synchronization (slot and frame).
2. The terminal is not busy (except for the Reset command which the terminal will always execute) attempting to transfer a previously received command to a component or complete the transfer of a Reject In or Attention command to the controller.
3. Fields B1 and B2 compare equally.

To issue a command to the controller, the terminal generates the necessary bit pattern to specify the command (as shown in Figure 19) and places this pattern in its dedicated slot(s). Upon receipt of this slot, the controller decodes the command and initiates the respective action.

Address Sharing

Address sharing is a procedure for sharing loop capacity dynamically between different terminals, on a message or transaction (application program controlled) basis. Slot sharing increases the number of terminals that may be attached to the loop. There is, however, some increase in response time due to the resulting contention for the slots.

Address sharing is accomplished by the introduction of the Pass Mode terminal state. While in this state, the terminal does not respond to service requests from its components, but only monitors its slot group for commands which can place it into an Active or Idle state.

A terminal enters the Pass Mode state under the following conditions:

1. When power is turned on.
2. If, while awaiting an Attention echo, an Attention is received for a different component.
3. If, while in the Idle state or Active state, an Attention command is received.
4. If, while awaiting an Attention echo, or in an Idle state or Active state, a Read, Write, or Sense command is received for a component not attached to the terminal.

The terminal always retains a pending service request from a component. If the terminal is forced into a Pass Mode state, or is forced into an

Active state through a Read, Write, or Sense command to an attached component, it presents the attention at the first opportunity.

For a terminal to leave the Pass Mode state, it must receive a Leave Pass Mode command, or receive a Read, Write, or Sense command addressed to the attached component. The issuing of this command is a controller function. The controller sends out the Leave Pass Mode command: (1) periodically, when no activity is taking place, all terminals are idle, (2) following an echoed Attention command, and (3) after the completion of a Write function request of the Read operation.

The controller application program can be organized to allow a terminal to hold the slot group on a transaction basis by not 'reading' terminal I/O until ready to begin a new transaction. With some added complexity, the application program can be designed to use the slot loop capacity more efficiently by multiplexing terminal I/O on a message basis.

A necessary condition for terminals to share a slot is that each terminal has unique component address(es). A desirable characteristic is that all input and output on the loop be in burst mode.

Loop Capacity Limitations

The loop capacity is a function of the loop's speed and is described in terms of maximum slot rate. For example, a 1200-bps loop has a slot rate of approximately 62 data slots per second; a 2400-bps loop has a slot rate of 124 data slots per second (the frame slot is not considered a data slot).

When an input component is sending data to the controller, a data byte is duplicated in the B fields of the slot. Therefore, its maximum byte rate is a function of the loop's slot rate and the number of slots, within the frames, that are allocated to the terminal. If additional slots are not allocated within a frame, the byte rate equals the slot rate.

When the controller is sending data to a terminal under control of a Write Redundant command, the byte rate is a function of the loop slot rate and the number of slots allocated within the frames. If data is sent under control of a Write Echo command, the byte rate is doubled because each B field contains a separate byte.

When sending data to a terminal under control of a Write Echo command, each slot must be returned to the controller for comparison of the B fields before the next data slot can be sent. Because of the delay in the loop and slot process time at the controller, consecutive slots cannot be allocated to the terminal.

Controller-Initiated Commands

Set Indicators

This command is used to set/reset, under program control, up to four indicators. The setting/resetting is determined by the contents of the I field of the command slot. If an I field bit is on, its corresponding indicator on the component comes on. If the I field bit is off, the indicator is goes off.

Set Modulus

This command allocates additional slots to a terminal to accommodate the byte rate of its attached components. The I field of the Set Modulus command contains the modulus value that the terminal uses to identify the additionally allocated slots.

The terminal, upon receipt of the Set Modulus command, sets the modulus value in a register and increases the base address value to identify the

additionally allocated slots. For example, the allocation of seven additional slots is accomplished by issuing a Set Modulus command with a modulus value of 2. Assuming a base address of 1, slots 3, 5, 7, 9, 11, 13, and 15 are allocated as a result of the execution of the Set Modulus command. Because the modulus value is 2 in the above example, every other slot is allocated to the terminal, which is the maximum allocation because of loop delay and slot process time in the controller. This command is always executed (even in Pass Mode state).

Read Redundant

This command initiates data transfers from the terminals with input components to the controller. Upon receipt of this command, the terminal returns a positive acknowledgment (M2 set to a 1) if it is in synchronization and not busy. If the B fields compare equally, the component is selected and a byte of data is read. This byte is inserted in the B1 and B2 fields of the next slot that is allocated to this terminal if the M1 bit of that slot is a 0. If the M1 bit is a 1, signifying a command, the byte is not sent, and the terminal responds to the command. The component continues to read bytes and inserts them into the B fields of the terminal's allocated slots. If the component does not have a byte to send, a Null bit pattern is inserted in the B fields.

After receiving the data slots from the terminal, the controller compares the B fields to determine if any bits were picked/dropped (distorted) during transmission. If the comparison results are negative (B1 not equal to B2), the controller sends a Reject command which initiates resending of the byte from the terminal. The data transfer continues until the controller sends the End Operation command.

Write Redundant

This command writes Read Redundant data from an input component to an output component. Use this command only with a Read Redundant command, its purpose is to provide a visual means of checking the Read Redundant (input) data.

When operating under control of a Write Redundant command, both components, input and output, share the same slots. The terminal inserts each byte of input data in duplicate in the B fields of the slot, and the output component receives each byte from the B fields.

Write Echo

The B fields of the associated data slots do not contain duplicate data. Each B field contains a separate byte and, therefore, the byte rate is twice the slot rate. If a message contains an odd number of bytes, the B2 field of the last slot of data contains a component No-Op.

Upon receiving the data slots from the terminal, the controller determines whether the B2 byte was inverted (signifying that the terminal accepted the slot). If the B2 byte was not inverted the controller transmits the slot contents to the terminal.

If the B2 byte was inverted, the controller re-inverts the byte and then compares the received data with the transmitted data to determine if any bits were picked/dropped (distorted) during transmission. If the comparison results are negative (received data does not compare with transmitted data), the controller sends a Reject command and then retransmits the slot contents to the terminal. The data transfer continues until the controller sends the End Operation command.

Sense

This command obtains status information from the terminal components. The operation of this command is identical with that for the Read Redundant command, with the exception that status information, instead of characters, is returned to the controller.

The terminal, after successful recognition and acknowledgement of this command, inserts status information in each allocated slot until all status has been sent. The status information is sent in duplicate in the B fields. After all status has been received by the controller, it sends an End Operation command.

Reject Out

This command is issued by the controller to signal non-acceptance of input data to the terminal. Non-acceptance of terminal input is determined by the B field compare and is described under Read Redundant and Write Echo commands.

Reset

The execution of this command is equivalent to a power-on reset of the terminal and components. This command is always executed when recognized by the terminal. If the terminal is busy upon receipt of this command, the M2 bit in the command is not set on.

End Operation

This command deselects the specified component. Before deselecting a Write Selected component, the terminal transfers the buffered data to the component.

Leave Pass Mode

This command causes all components associated with the slot group, that are in the Pass Mode state, to enter the Idle state. If a terminal had received a service request prior to being placed in the Pass Mode state, the terminal attempts to present the Attention upon entering the Idle state.

Terminal-Initiated Commands

Attention

The terminal sends this command when it receives an indication from a deselected component that requires an information transfer (data or status). The terminal honors the request if it is not busy, not in Pass Mode, or does not have a component selected under control of a Write Echo command. The request is held pending if any of the above conditions exist. The terminal sends the Attention command in each dedicated or allocated slot that does not have the M1 bit on. The terminal continues to send this command until it is acknowledged (echoed to the terminal) or reset by the controller.

Reject In

This command is issued by the terminal to signal non-acceptance of data that is sent from the controller. Non-acceptance of data is determined by the B field compare in the terminal.

This command is associated with the controller Write Redundant command.

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Appendix Two
Description of the Device Cluster Adapter

Appendix Two
Description of the Device Cluster Adapter

Device Cluster Adapter (DCA) Interface

The Device Cluster Adapter (DCA) is a halfword cycle steal adapter that provides a communication path from the controller to the coaxial interface to display and printer terminals that support that connection.

The DCA provides certain support functions as well as providing a communication path between terminals and the controller. Asynchronous polling of attached terminals for inputs or errors is performed by the adapter without active involvement of the controller.

To support multiple terminals, the DCA uses the cycle steal facility of the controller to transfer data to and from the controller storage. Multiple storage queues enable the DCA to operate asynchronously while maintaining data integrity and fast response. These queues, and their associated register pointers, are set up by the controller and used by the DCA through cycle steal operations.

DCA/Terminal Interface

Data to be transmitted from the DCA to a device or from a device to the DCA is carried on a single coaxial line. The coaxial type is RG62AU with a maximum length of 1.5 kilometers (4921 feet). Data is transmitted in a bit serial fashion using a binary Dipulse technique at 2.3587 million bits per second.

The communication protocol uses 12-bit words for the transmission of data across the coaxial connection. The first bit of the word is used to delimit successive words on the interface and is referred to as the "Synch bit". This bit is always at the one (1) state. The last bit of the word is the parity bit which is used to maintain even parity for the word. Word groups may be contiguous and, in this case, the Synch bit of a transmitted word must directly follow the parity bit of the preceding word with no intervening pad bits.

A word from the DCA to the device will be either a command or data. A command word contains an address portion and a command portion. The address portion of a command word is three (3) bits long (bits 2, 3, and 4) when addressing a base device and four bits long (bits 2, 3, 4, and 5) when addressing a feature of the base device. This provides for a five-bit command code to the base device (bits 5, 6, 7, 8, and 9) and a four-bit command code to a feature (bits 6, 7, 8, and 9).

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Appendix Three
Controller Description

Appendix Three
Controller Description

Starting the Controller

When the controller is started (by either switching on the controller or by pressing the Reset button), a series of diagnostic routines execute in the controller to verify that the controller is fully operational. These routines verify correct operation of the controller hardware including the control circuitry, the message display and status lights on the operator control panel, and all of storage. The ability to correctly read and write data from the diskette is also verified. This is the diagnostic phase of the startup processing.

When the diagnostic routines have verified that the controller is fully operational, the operating system data is read from the diskette and loaded into storage. This phase of the startup processing is referred to as the operational loading phase.

When the system data is loaded and has been initialized, the controller enters the operational phase. The work stations are now active and the application programs are executing.

The four character message display, located on the operator control panel is a multiple-use indicator. It is used to indicate the progress of the diagnostic routines as they execute in the diagnostic phase, the progress of the loading of the system data in the operational loading phase, and the operational state of the system when startup has completed and the system is in the operational phase.

If serious error conditions are detected during any of the three phases, the controller halts execution and the message display is used to alert the operator of this condition and provide information about the error condition. If you experience a serious error condition, the Device Problem Determination Procedure For The Controller (PDP05) in Chapter Seven will assist you in determining the proper course of action to correct the problem.

Errors that do not cause the controller to halt execution are recorded in internal statistical counters in the controller and/or on the system log. In addition, those errors related to the loop, the DCA, and the host line will cause the appropriate indicator on the message display to change from an operational state symbol to a symbol defining the error. The associated problem determination procedure will assist you in determining the cause of the problem.

Diagnostic Phase of the Controller Startup

Immediately after the IBM 4701 is switched on, the Power On indicator will light and will remain lit until the On/Off switch is switched off. If the Power On indicator goes off when the controller has not been switched off, the indication is that the controller has lost power. The electric service may have been interrupted or the controller may have experienced a failure.

The first test in the diagnostic sequence turns on the Alert, Ready, Check and Test/IPL status lights and all segments of the message display. You should verify at this point in startup that all lights and display segments are operational. After a short delay the Alert, Ready and Check lights are switched off and the diagnostic checkout of the controller begins. During execution of the diagnostic routines the message display will display message codes that identify the routine that is currently executing.

The Test/IPL light remains on throughout the diagnostic and operational loading phases of startup. Any message code displayed for more than ten (10) seconds indicates that a serious error condition has been detected and some type of recovery action is required.

The operational phase of startup is indicated by the Ready light on the operator control panel being lit and the Test/IPL light turning off. The message display will no longer display message codes. It will now be used to indicate the operational state of the loop, the DCA, and the host line.

The combination of operator control panel lights and message display codes that are present during the diagnostic and operational loading phases of startup are shown in Figure 20.

MESSAGE DISPLAY	READY LIGHT	CHECK LIGHT	TEST/IPL LIGHT	MEANING
	Off	Off	Off	The controller is switched off or it does not have power.
■ ■ ■ ■	On	On	On	Power has just been turned on or the Reset button has just been pressed.
C - - -	Off	On	Off	A failure has been detected during the operational phase.
D - - -	Off	Off	On	Operator action is required for the diskette drive(s).
E - - -	Off	On	On	A failure has been detected during the diagnostic phase of startup.
F 1 - -	On	Off	Off	A diskette problem has been detected while in operational phase.
F 2 - -	On	Off	Off	A disk problem has been detected while in operational phase.
I - - -	Off	Off	On	Operational loading phase of startup.
T - - -	?	Off	On	Diagnostic test phase of startup.
X - - -	Off	On	On	Operator action is required during the operational loading phase.

Legend:
- ■ indicates all segments of this position of the message display are lit.
- \- indicates that this position of the message display will contain a hexadecimal digit.
- ? indicates that the Ready Light may be either On or Off.

Figure 20. Meaning of the General Message Display Codes

Appendix Four
Description of Alternative Line Attachment

Appendix Four
Description of Alternative Line Attachment

Alternative Line Attachment

Alternative Line Attachment (ALA) is a feature of the 4700 system that provides another method of connecting devices to the controller (in addition to loop and DCA connection). It permits half-duplex, multipoint connection of devices and supports Start/Stop and Synchronous Data Link Control (SDLC) communication protocols

Multipoint refers to the scheduled allocation of the communication facility using a polling technique that permits multiple terminals to co-exist on the line. Half-duplex means that data can be either sent or received on the facility but not both simultaneously.

ALA Polling Technique

The polling technique used with ALA is Round Robin polling. Each entry in the polling list is polled one during each pass through the list. Polling on an ALA line is started automatically after the line is started assuming that at least one read buffer is available and at least one device on the line has been varied online.

ALA maintains a write over read priority meaning that if a write request is pending at the start of a polling operation the message is sent to the device before it is polled. If no write request is present, the polling cycle is continued.

ALA provides both a normal and a slow poll mode. A device is effectively removed from the normal poll list and is placed in slow poll mode if loss of contact is detected during a polling sequence. A device in slow poll mode is polled once for every 'n' passes through the normal poll list ('n' is specified in the CPGEN). The device is returned to the normal poll list when contact has been established.

Input Message Buffering

Although messages are written directly from a user's segment, data is read into intermediate buffers defined for each ALA line. You must define the number and size of the buffers during CPGEN as well as the type of buffer allocation scheme to be used in operations.

If you specify single buffer allocation in the ALALINE macro of the CPGEN, only one buffer will be used to hold an input message. Therefore, you should specify the buffer size as a value equal to or greater than the length of the largest input message from the ALA device. If the message does not fit into a single buffer, an overflow condition occurs and data is lost.

Dynamic buffer allocation, on the other hand, implies the use of multiple buffers. If an incoming message is too long to be contained in a single buffer, ALA obtains additional buffers to hold the input message. If insufficient buffers are available, a buffer overflow occurs and data is lost.

Systems Network Architecture - Primary

Systems Network Architecture - Primary (SNA-Primary), is one of the ALA supported protocols and provides support for SNA type terminals that will connect to the controller. This communications protocol uses the SDLC line discipline.

SNA support is provided by the controller when the ALA line is operating in Message Routing mode. When the ALA line is operating in Native mode, direct access to the SDLC line discipline is possible allowing other communication protocols to be used. The application program, when operating in Native mode, has the responsibility for managing the details of the protocol being used.

Physical Unit Types

SNA-Primary supports both Type 1 and Type 2 Physical Unit types and provides the following support:

1. Transmission Subsystem (TS) Profile 2, 3, 4, or 7 (defined when the session becomes active).

2. Function Management (FM) Profile 2, 3, 4, 7, or 18 (defined when the session becomes active).

SNA-Primary Polling Technique

A normal poll sequence consists of a Receive Ready (RR) command with the poll bit set; however, when an I-Frame is to be set, the I-Frame itself carries the poll flag. Only one I-Frame can be sent to a control unit before a confirmation is requested. This is accomplished by setting the poll flag in the I-Frame before transmission. When the control unit responds with either an I-Frame or SDLC response, acceptance of the message is determined.

For initial contact, a Set Normal Response Mode (SNRM) command is used. If, after initial contact, an out-of-buffers condition is encountered, polling continues with the Receive Not Ready (RNR) command. This causes the terminal to remain active but does not allow the terminal to send data.

When using dynamic buffer allocation and insufficient buffers are available to contain the input message, the SDLC I-Frame is not acknowledged. This causes retransmission of the message by the associated terminal. If the insufficient buffer condition persists on this message transmission for the number of retries specified in the CPGEN, data will be lost.

Appendix Five
Loop Layout Diagram

Appendix Five
Loop Layout Diagram

L O O P L A Y O U T D I A G R A M

Prepared by: _____ Date: _____

Controller Identification: _____

Loop Number: ___ Location: _____

Communication Facility Id: _____

Sequence on loop	Modem or Terminal Type	Terminal Address	Location			Nearest Telephone Extension	Interconnect Communication Facility Id	Work-Station Number
			Building	Floor	Column			

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