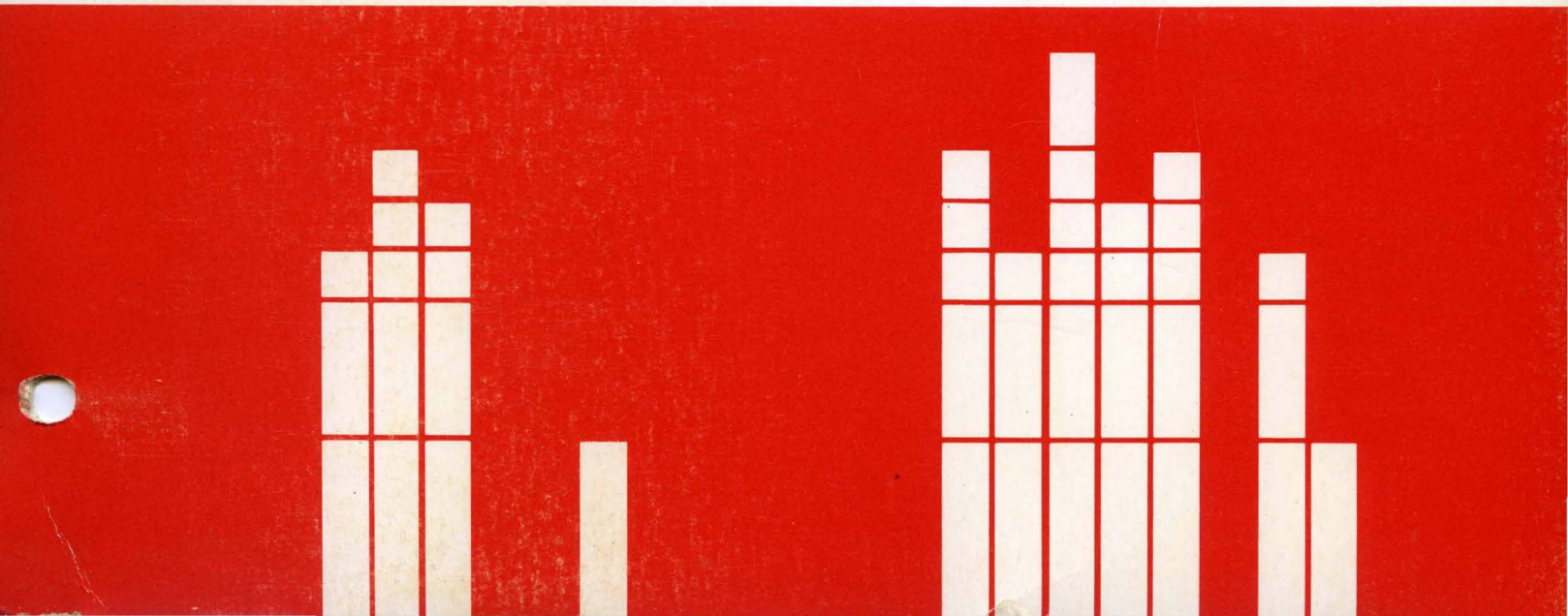
Publication Number
GC31-2033-3

4700 Finance Communication System

Subsystem Problem Determination Guide

IBM



4700 Finance Communication System

Subsystem Problem Determination Guide

Publication Number
GC31-2033-3

File Number
S370/4300/8100/S34/S36/S38-00

Fourth Edition (August 1985)

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This edition, GC31-2033-3, is a major revision of GC31-2033-2, which is obsolete. This publication is current with the following releases:

- Controller data support for IBM 4701 Controller Models 1 and 2, EC level 325250.
- Controller data support for IBM 4701 Controller Model 3 and for the IBM 4702 Processor, EC level 325251.

Technical changes are indicated by a vertical line to the left of each change.

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 4700 Finance Communication System Subsystem Operating Procedures*, GC31-2032.
- *IBM 4702 Branch Automation Processor Setup and Operating Instruction*, GC31-2570
- *IBM 4701 Controller Operating Instruction*, GC31-2022.

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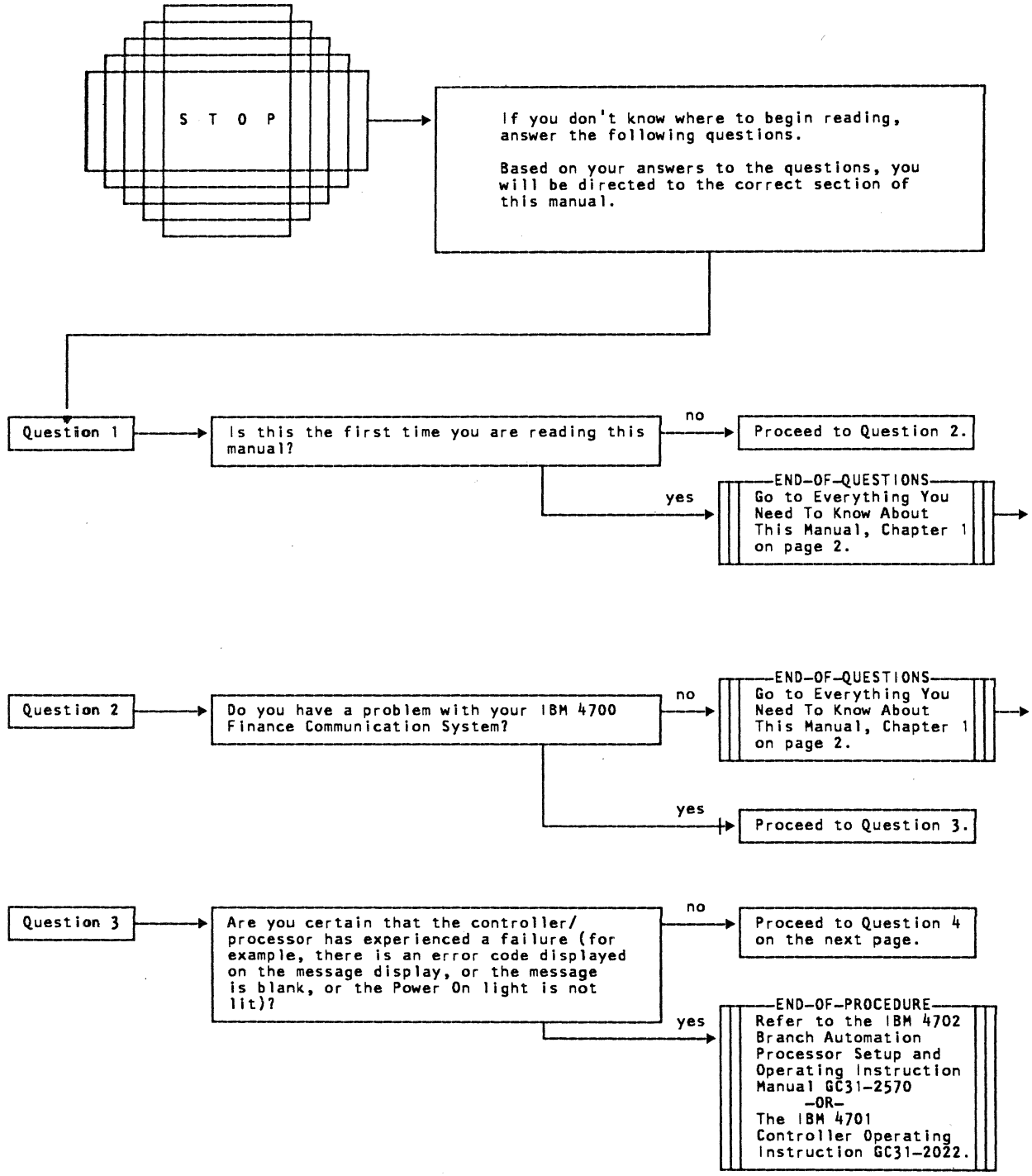
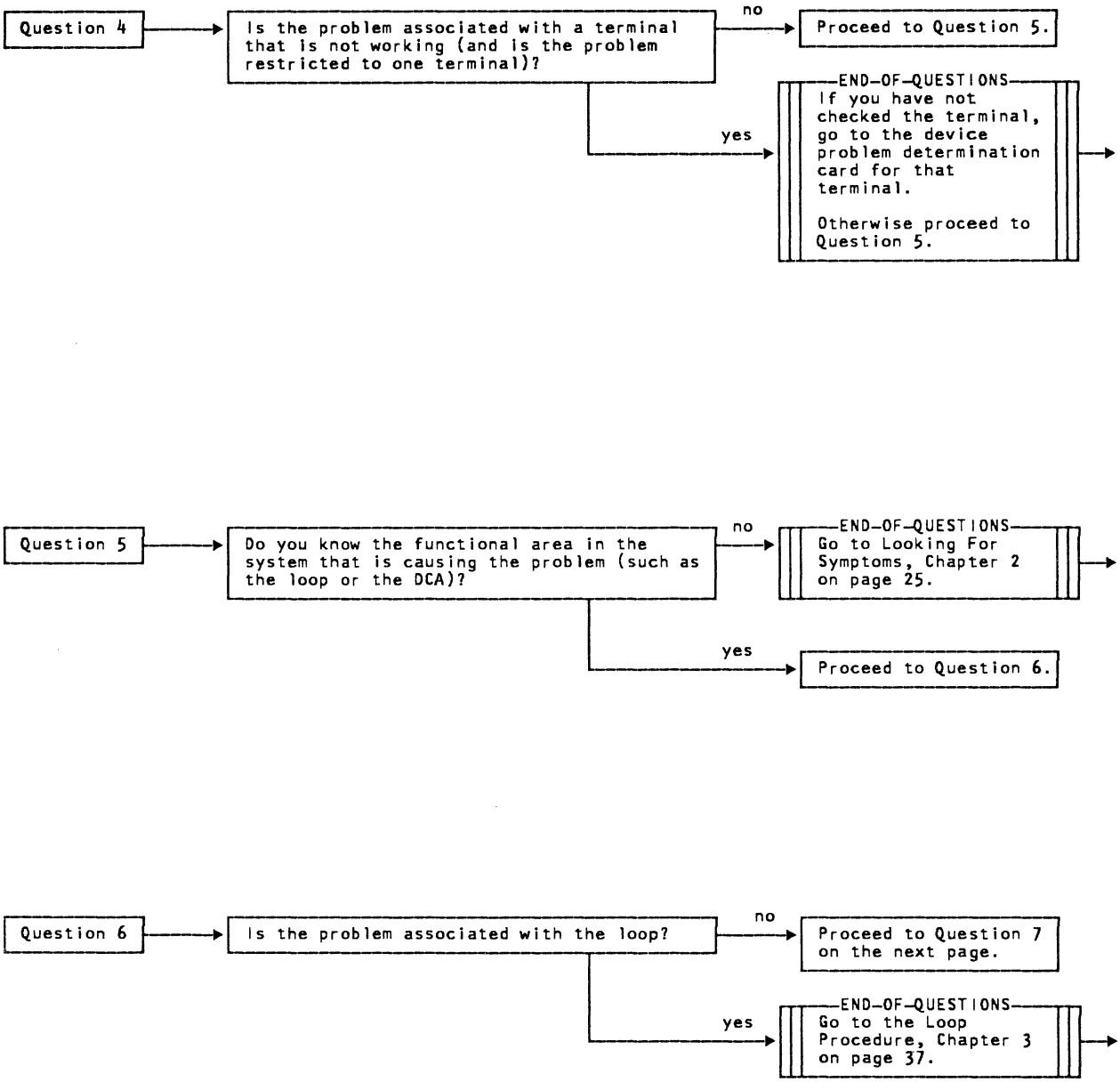
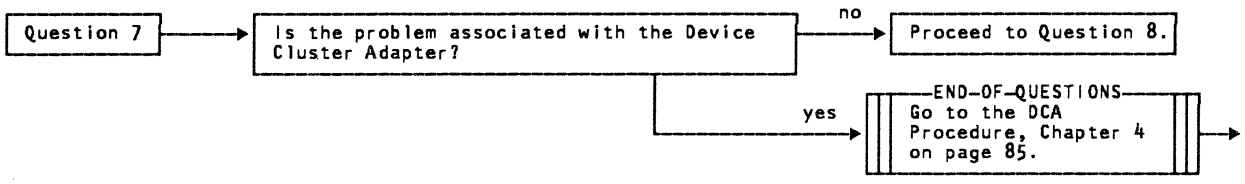
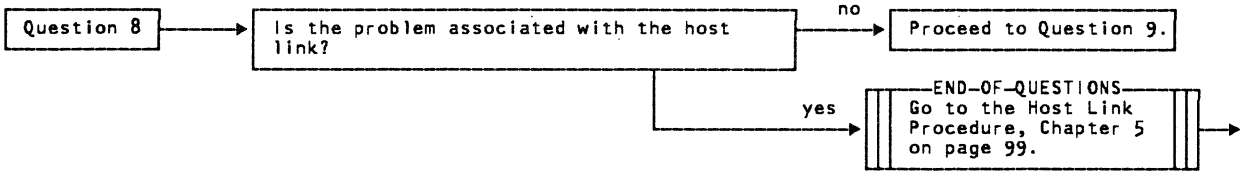
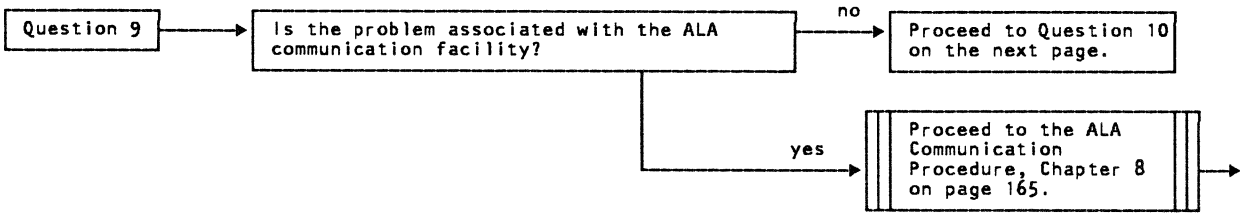
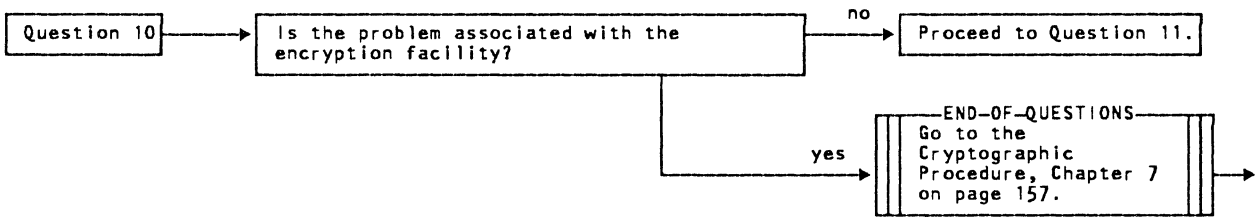

S T O P
If you don't know where to begin reading, answer the following questions.
Based on your answers to the questions, you will be directed to the correct section of this manual.
Question 1
Is this the first time you are reading this manual?
no
Proceed to Question 2.
yes
END-OF-QUESTIONS
Go to Everything You Need To Know About This Manual, Chapter 1 on page 2.
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 2.
yes
Proceed to Question 3.
Question 3
Are you certain that the controller/ processor has experienced a failure (for example, there is an error code displayed on the message display, or the message is blank, or the Power On light is not lit)?
no
Proceed to Question 4 on the next page.
yes
END-OF-PROCEDURE
Refer to the IBM 4702 Branch Automation Processor Setup and Operating Instruction Manual GC31-2570
-OR-
The IBM 4701 Controller Operating Instruction GC31-2022.

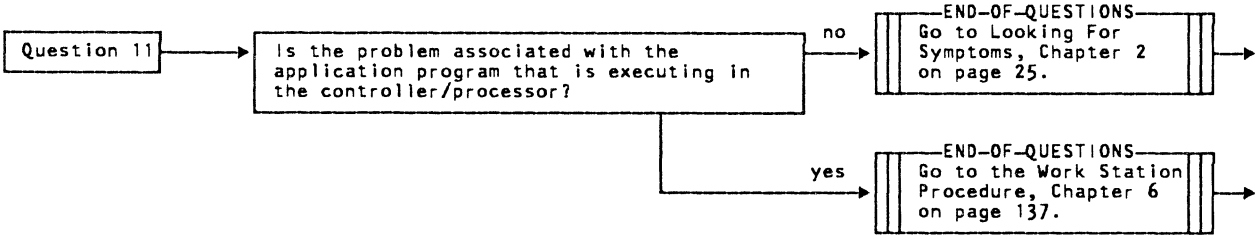

Question 4
Is the problem associated with a terminal that is not working (and is the problem restricted to one terminal)?
no
Proceed to Question 5.
yes
END-OF-QUESTIONS
If you have not checked the terminal, go to the device problem determination card for that terminal.
Otherwise proceed to Question 5.
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 25.
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 37.


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 85.


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 99.


Question 9
Is the problem associated with the ALA communication facility?
no
Proceed to Question 10 on the next page.
yes
Proceed to the ALA Communication Procedure, Chapter 8 on page 165.


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 7 on page 157.


Question 11
Is the problem associated with the application program that is executing in the controller/processor?
no
END-OF-QUESTIONS
Go to Looking For Symptoms, Chapter 2 on page 25.
yes
END-OF-QUESTIONS
Go to the Work Station Procedure, Chapter 6 on page 137.

Summary of Changes to GC31-2033-2 by GC31-2033-3

This revision includes substantial changes for the support of the IBM 4702. Specifically, there are changes to the Loop Problem Determination Procedure (PDP01), DCA Problem Determination Procedure (PDP02), and related changes to the Preface, Definition of Terms, and Looking for Symptoms. The Controller Problem Determination Procedure (PDP05) has been removed from this manual and is now described in the *IBM 4702 Branch Automation Processor Setup and Operating Instruction*, GC31-2570. The Controller Description, formerly Appendix 3, has also been deleted.

Contents

Figures

Chapter One
Everything You Need to Know About This Manual

Chapter One
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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:

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

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

- 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.

- 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/processor (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 or 4702 Processor (this terminal is connected to some other element in the overall system which is in turn connected to the controller/processor 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/processor. 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 or 4702 Processor 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/processor 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 a LEXIT instruction).

You indicate 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/processor. This manner of access is referred to as remote access connection and uses a terminal on a system that is connected 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/processor or a terminal on a telecommunication linked system. 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/processor (or more than one work station) to communicate with the work station executing the system monitor application program.

You must write an application program 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/processor program, and displaying the responses from the controller/processor.

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 increase 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).

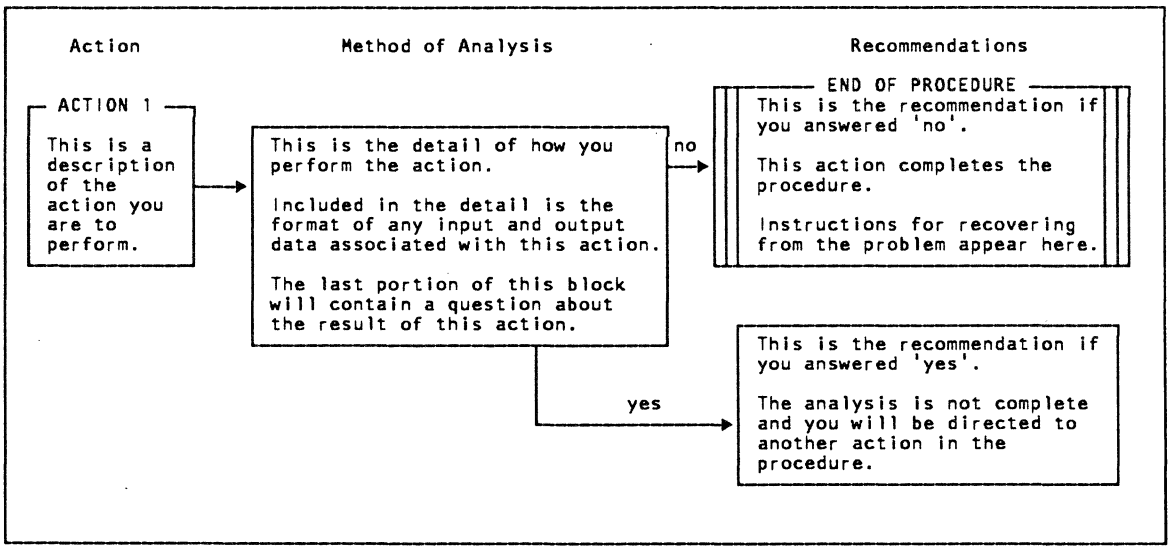


Figure 1. Format of the Procedures

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) and 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, the third character indicates the status of the loop, and the fourth character indicates the status of the Device Cluster Adapter.

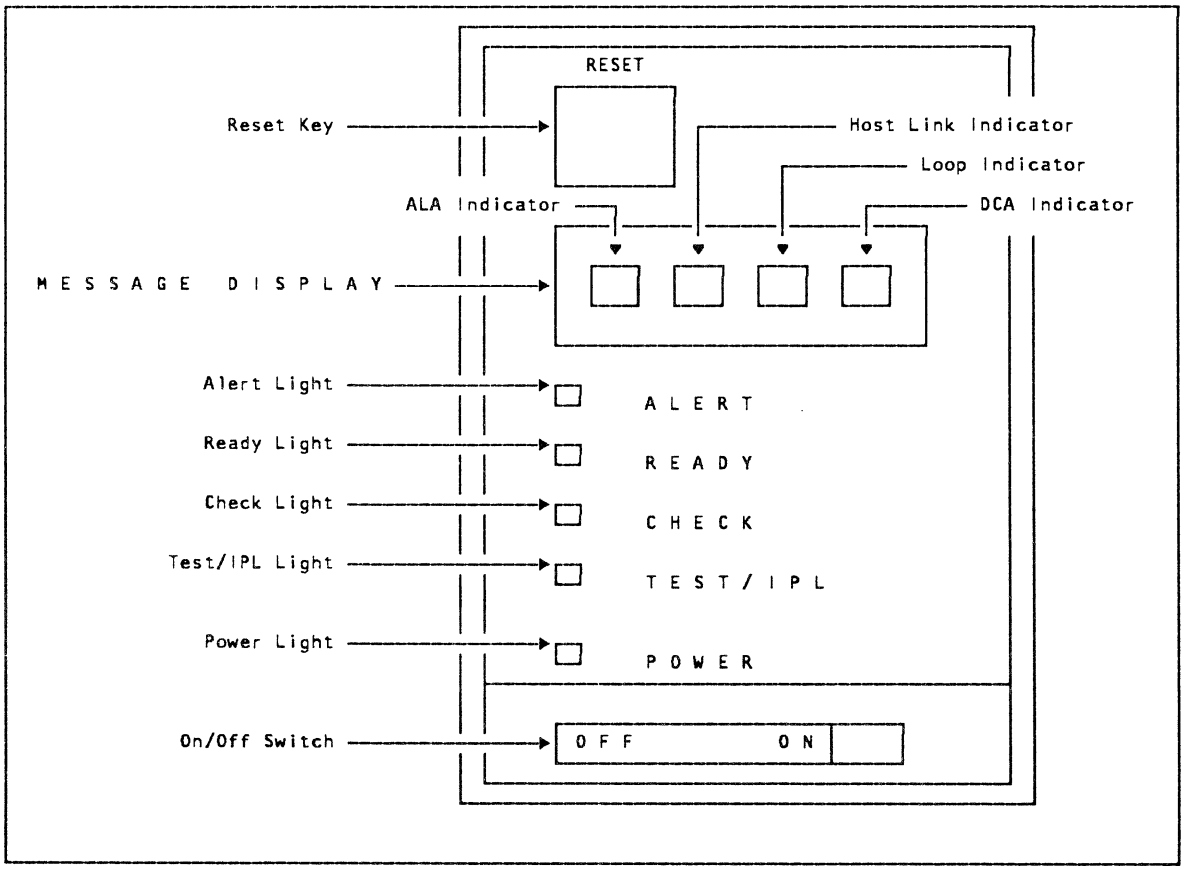
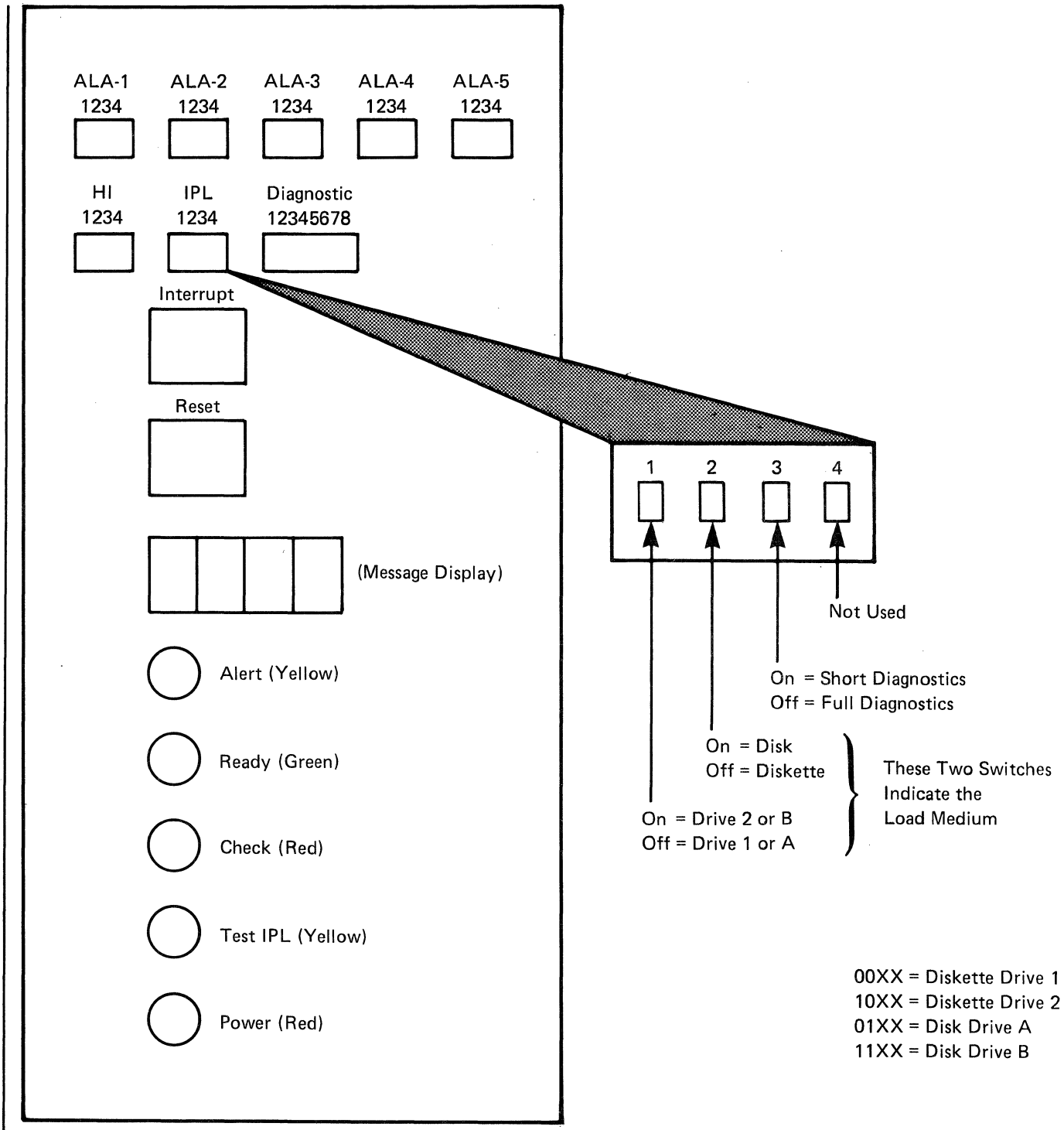


Figure 2. 4701 Operator Control Panel



4702 Operator Control Panel

Figure 3. 4702 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.

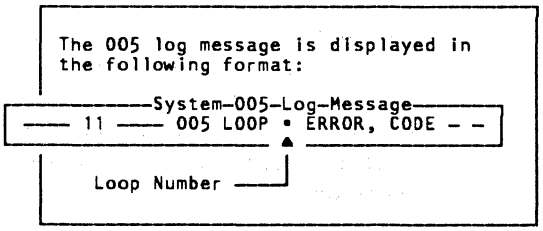
The procedures assume that you have accessed the system monitor before beginning the procedure. Thus, the procedures do not direct you (nor indicate how) to 'log on' to the system monitor. Detailed instructions for gaining access to the system monitor are in the *IBM 4700 Finance Communication System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



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 an IBM 4700 System (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/processor. 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 5. As an example, the form in this figure has been filled out with data to reflect the loop configuration shown in Figure 4.

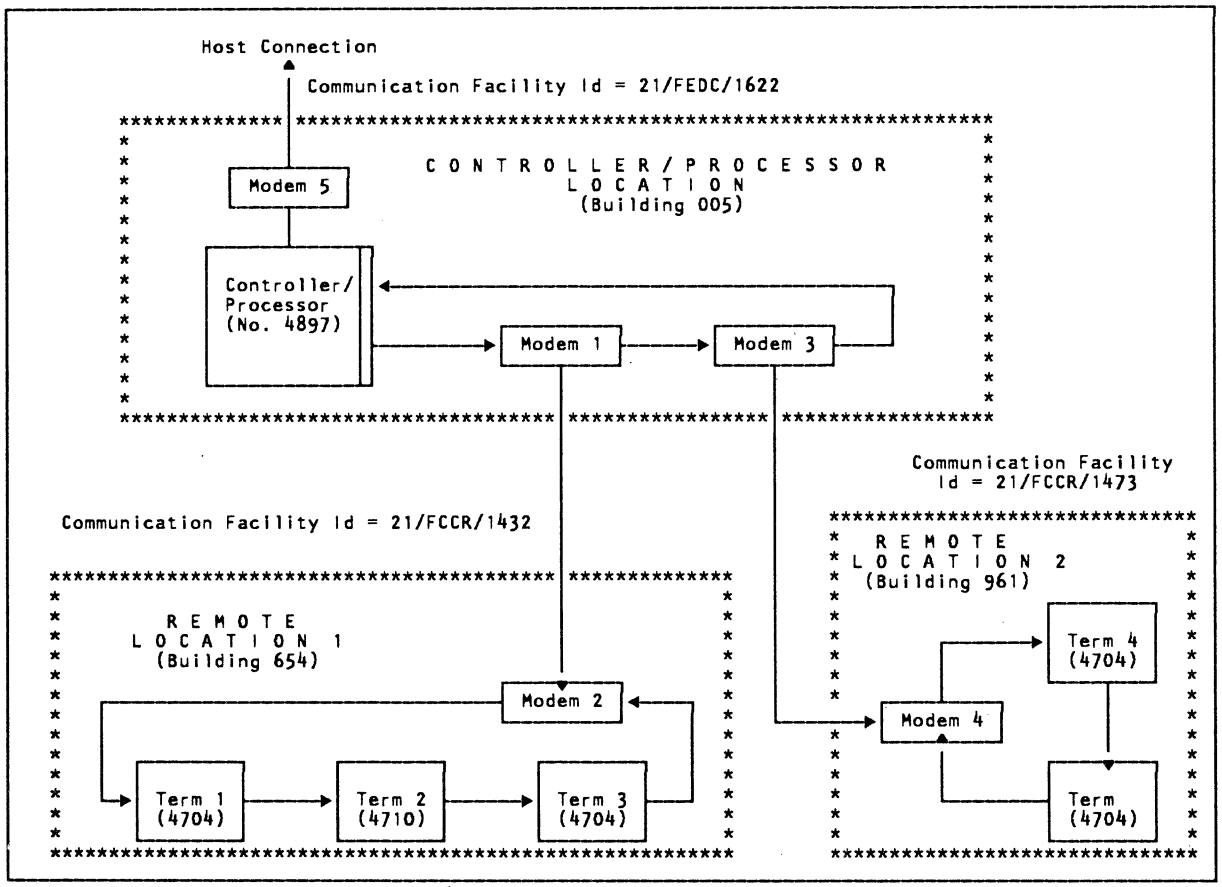


Figure 4. Example of a Remote Loop Configuration

Sequence on the loop refers to the direction of data flow on the loop. The data signals leave the controller/processor from the portion of the loop receptacle 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/Processor ID: __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 5. 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

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.

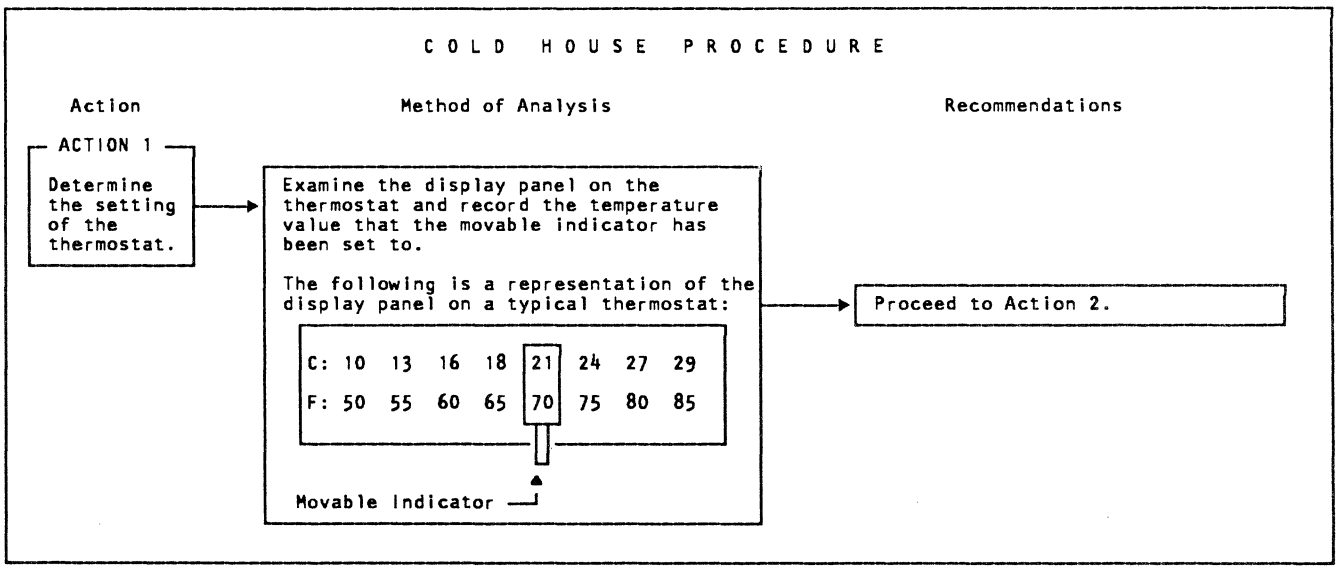


Figure 6. Action 1 of the Cold House Procedure

Action 2 - Determine the Current Temperature

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.

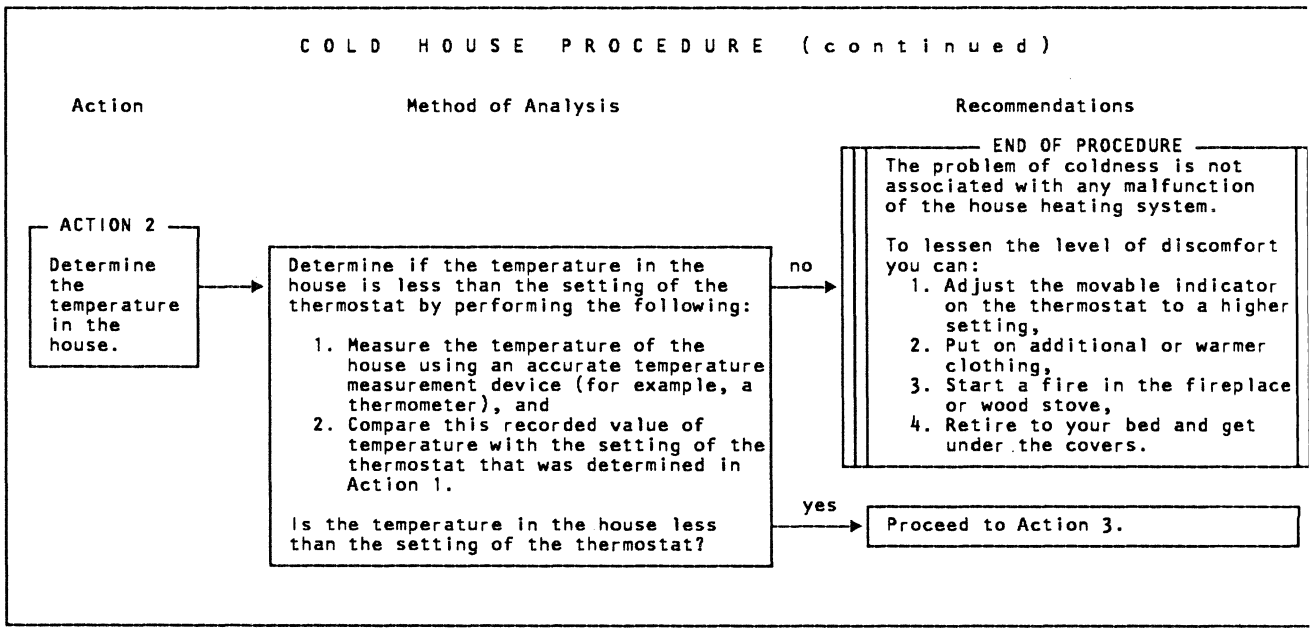


Figure 7. Action 2 of the Cold House Procedure

Action 3 - Verify Availability of Electricity

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.

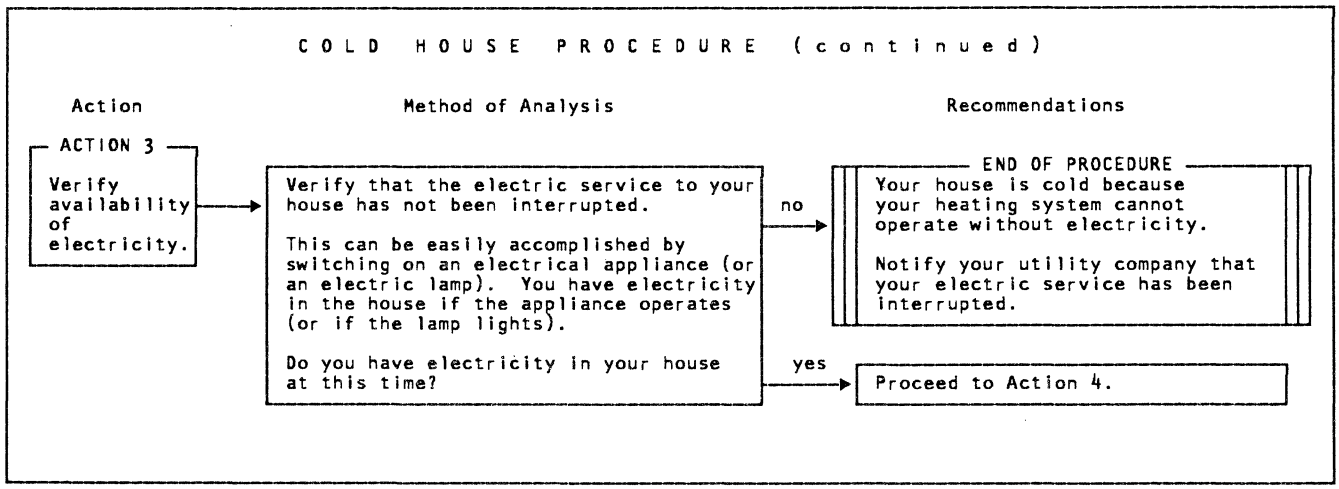


Figure 8. Action 3 of the Cold House Procedure

Action 4 - Check the Heating System Fuse

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.

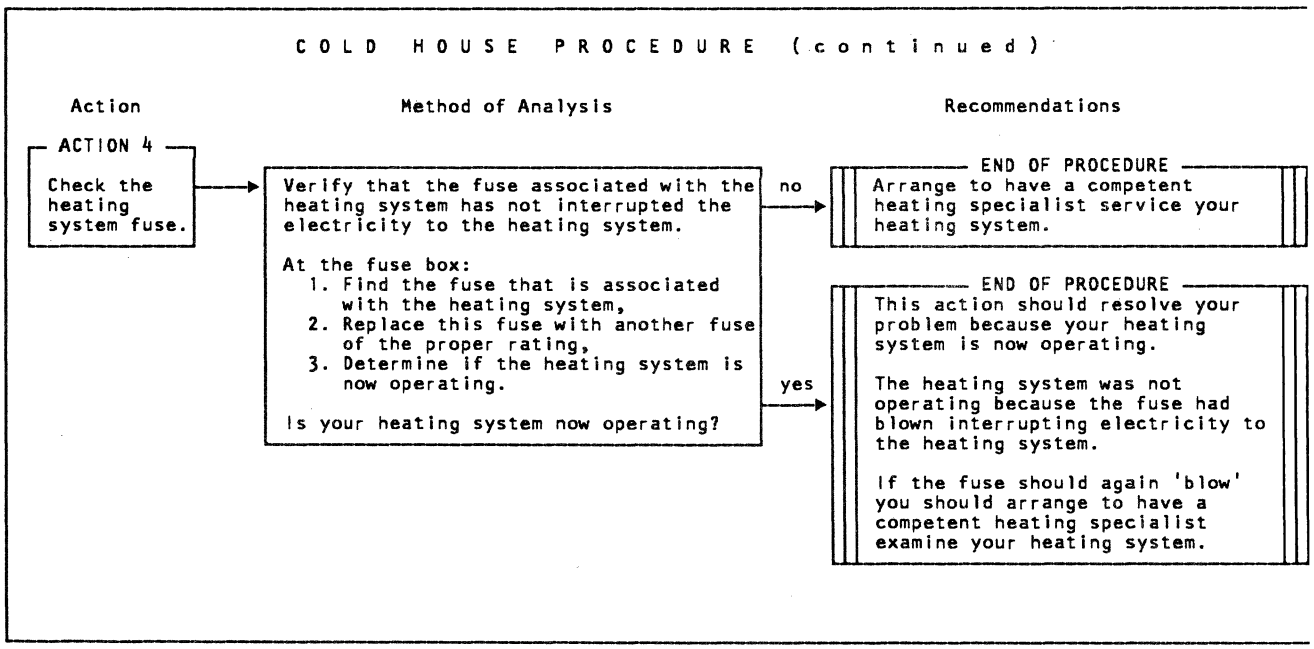


Figure 9. Action 4 of the Cold House Procedure

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 controller/processor. It comes on when a log message, that should be examined by the control operator, has been written to the 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/processor and terminals. Several communication protocols are supported.

application program
That portion of the controller/processor 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 the 4701 expansion unit.

CNM
See Communication Network Management.

Communications Network Management (CNM)
A facility in the controller/processor 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 4701 controller.

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 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 controller/processor 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/processor. Terminals are connected 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 that verifies correct operation of the controller/processor hardware.

direction of loop data flow

The data signals leave from the loop port that accepts the male cable connector and return through the female cable connector.

diskette drive 1

The drive from which you loaded (IPL'd) the 4701 controller, or the upper drive on the 4702 processor.

diskette drive 2

The drive NOT used to load (IPL) the 4701 controller, or the lower drive on the 4702 processor.

EIA cable

A cable, using a standard connection interface defined by the Electronics Industries Association, that connects the controller/processor to a modem. Also referred to as the RS232-C cable.

finance loop

A communication medium (utilizing the finance loop protocol) used to exchange messages between the controller/processor 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/processor is connected to via the host link.

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

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 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 controller/processors using a SDLC data transmission protocol.

operational loading phase of startup

That portion of startup when system data is loaded into the controller/processor storage and initialized.

operational phase of startup

The final phase of startup. The work stations are active and the application programs are executing. The controller/processor 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/processor 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 which communicates with the system services control point in the host processor to establish and end communication sessions between the controller/processor 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

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 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/processor. 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 button on the operator panel of the controller/processor. Pressing this key starts the controller/processor.

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 storage that is used to record counts of events related to terminals and communication lines attached to the controller/processor.

System Monitor

A system-provided application 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 communication sessions with the controller processor.

temporary file

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

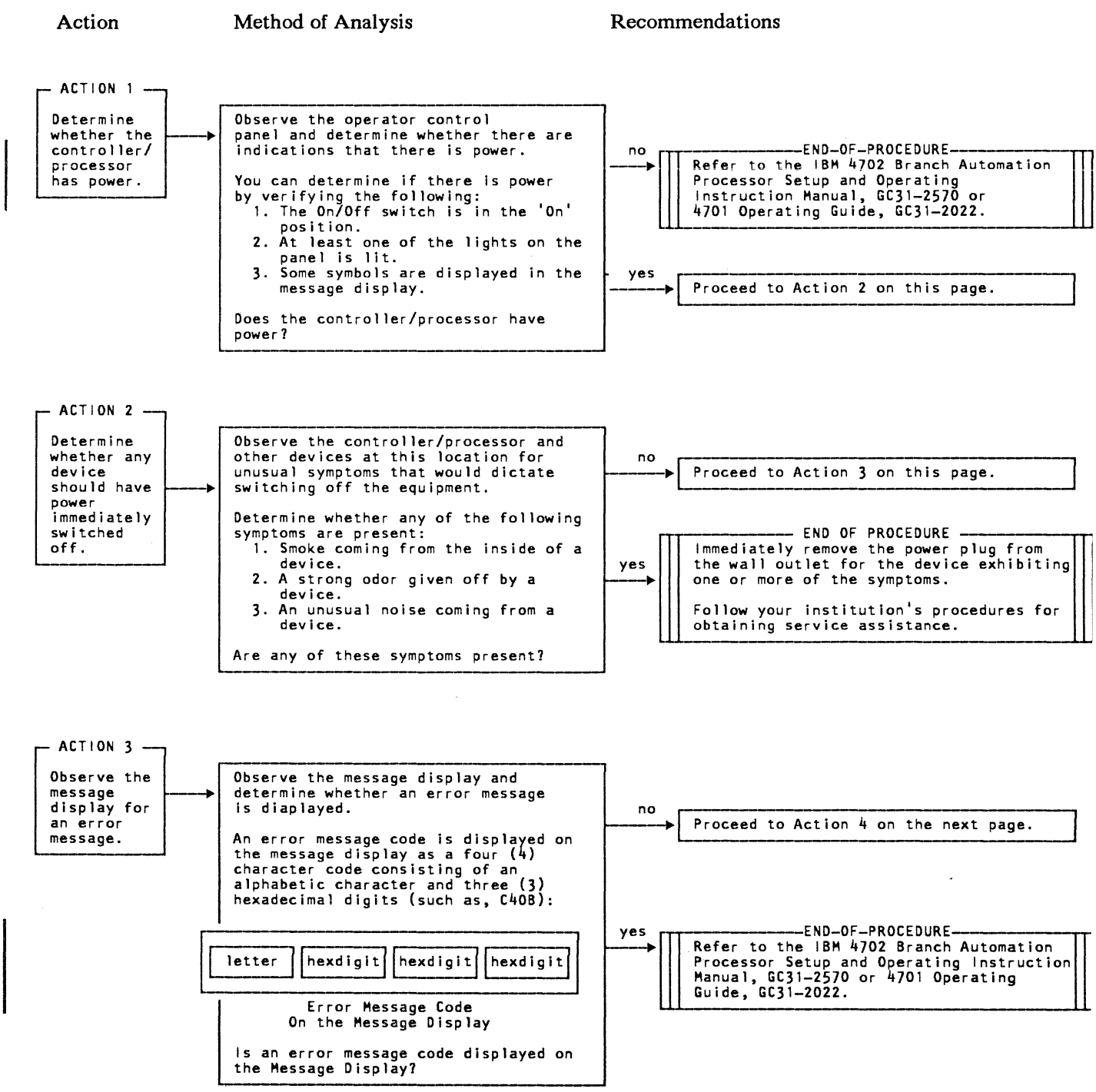
work station

See logical work station.

Chapter Two
Looking for Symptoms Procedure

Chapter Two
Looking for Symptoms Procedure

Looking for Symptoms Procedure

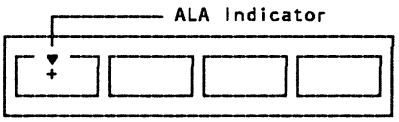


Action	Method of Analysis	Recommendations

ACTION 4

Observe the ALA indicator on the message display.

Observe the ALA indicator on the message display and determine whether it indicates ALA problems.



The first position of the message display indicates the state of the ALA line(s).

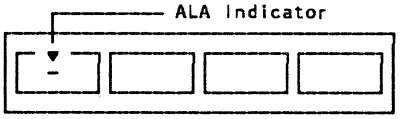
Is the ALA indicator character a plus sign (+)?

- 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 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 165.
- yes → Proceed to Action 6 on this page.

ACTION 6

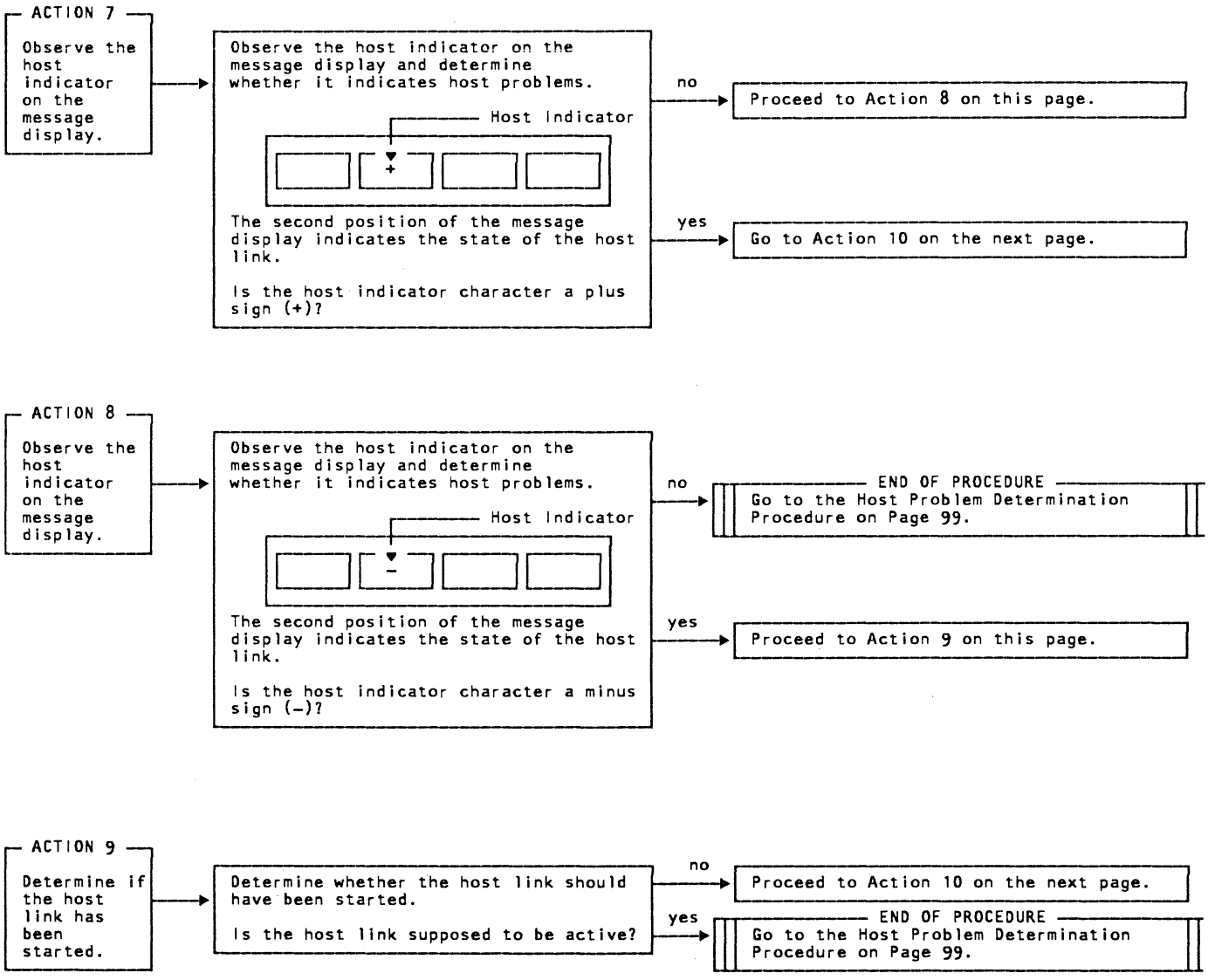
Determine if the ALA link has been started.

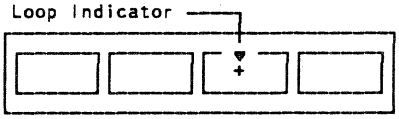
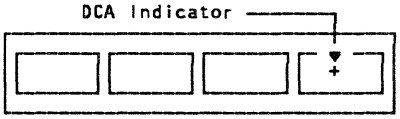
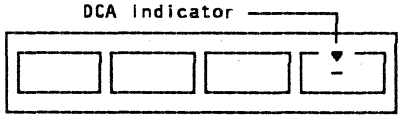
Determine whether the ALA link should have been started.

Is the ALA link supposed to be active?

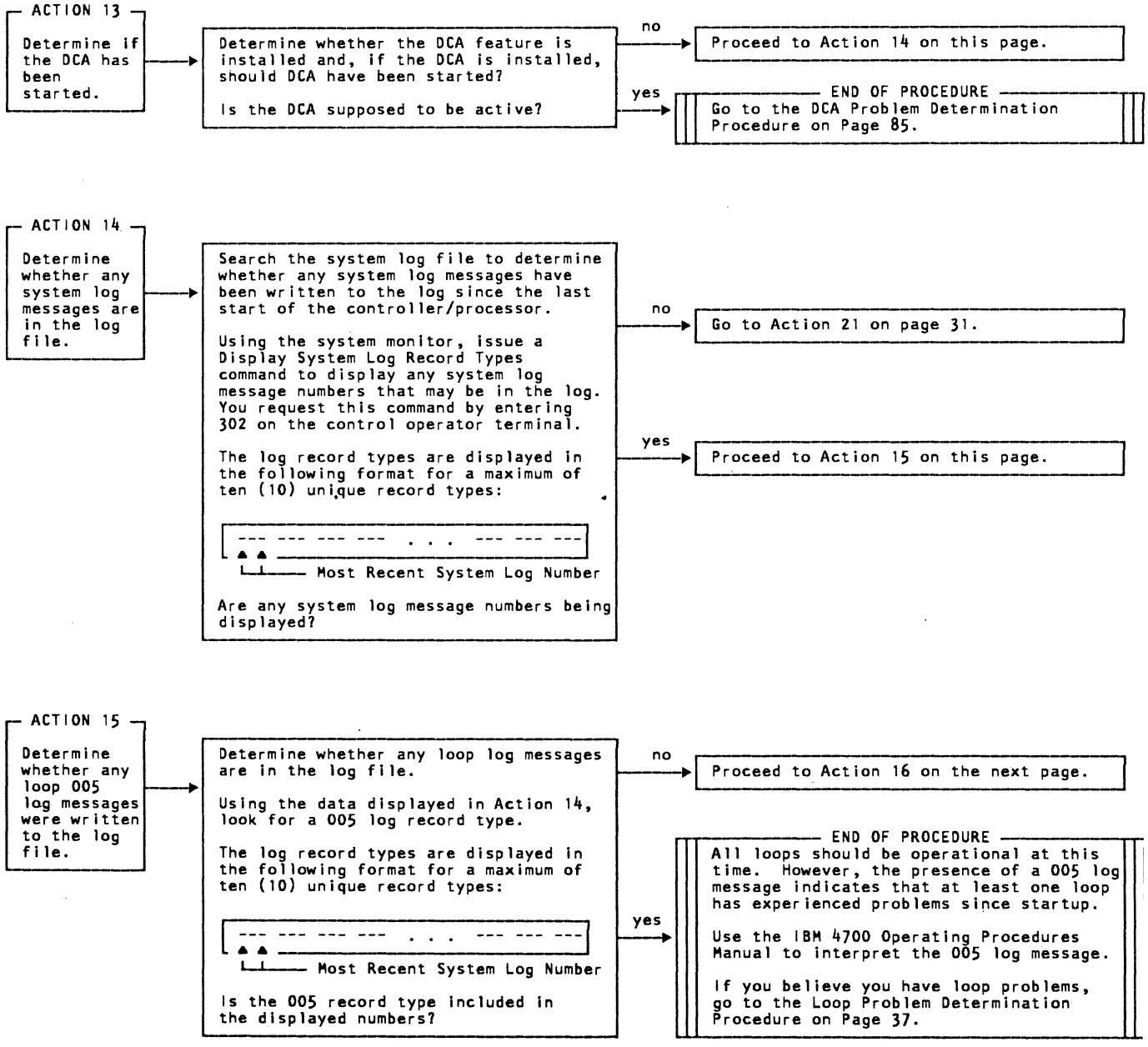
- no → Proceed to Action 7 on the next page.
- yes → END OF PROCEDURE — Go to the ALA Problem Determination Procedure on Page 165.

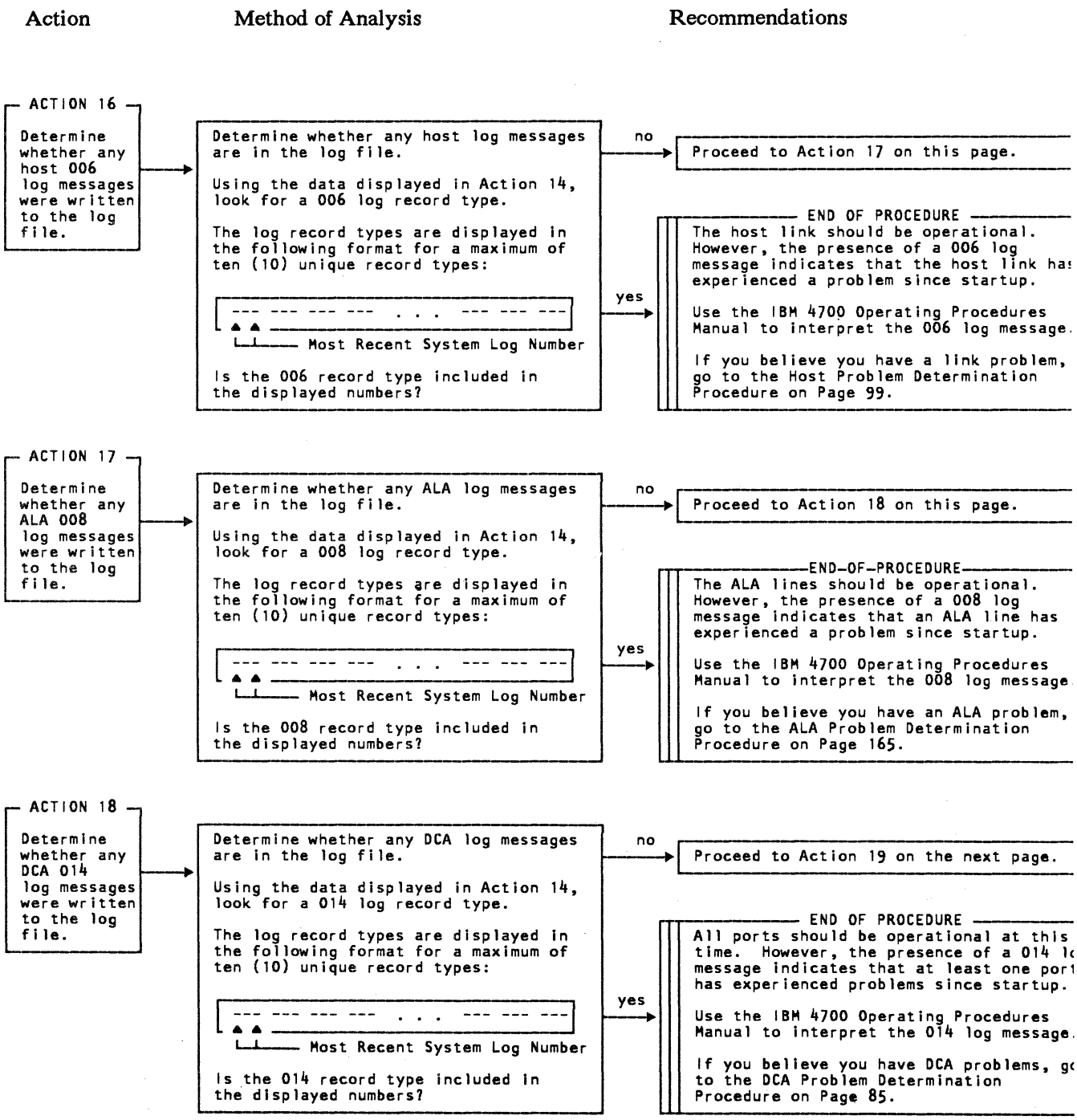
Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations
ACTION 10 Observe the loop indicator on the message display.	Observe the loop indicator on the message display and determine whether it indicates loop problems.  The third position of the message display indicates the state of the loop. Is the loop indicator character a plus sign (+)?	no → END OF PROCEDURE Go to the Loop Problem Determination Procedure on Page 37. yes → Proceed to Action 11 on this page.
ACTION 11 Observe the DCA indicator on the message display.	Observe the DCA indicator on the message display and determine whether it indicates DCA problems.  The fourth position of the message display indicates the state of the DCA. Is the DCA indicator character a plus sign (+)?	no → Proceed to Action 12 on this page. yes → Go to Action 14 on the next page.
ACTION 12 Observe the DCA indicator on the message display.	Observe the DCA indicator on the message display and determine whether it indicates DCA problems.  The fourth position of the message display indicates the state of the DCA. Is the DCA indicator character a minus sign (-)?	no → END OF PROCEDURE Go to the DCA Problem Determination Procedure on Page 85. yes → Proceed to Action 13 on the next page.

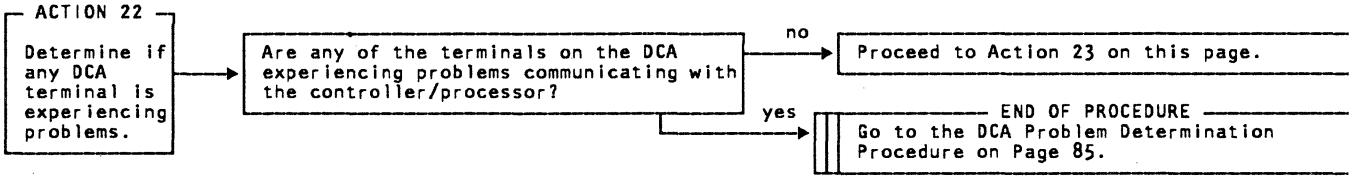
Action	Method of Analysis	Recommendations

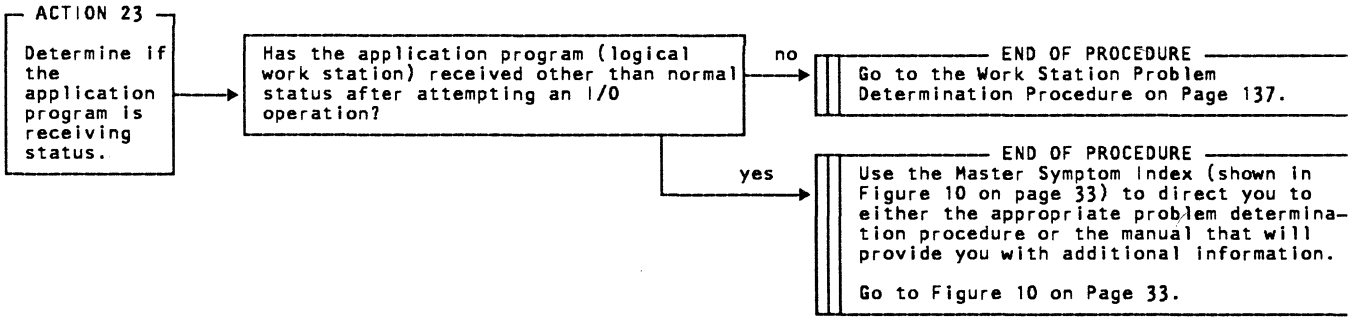


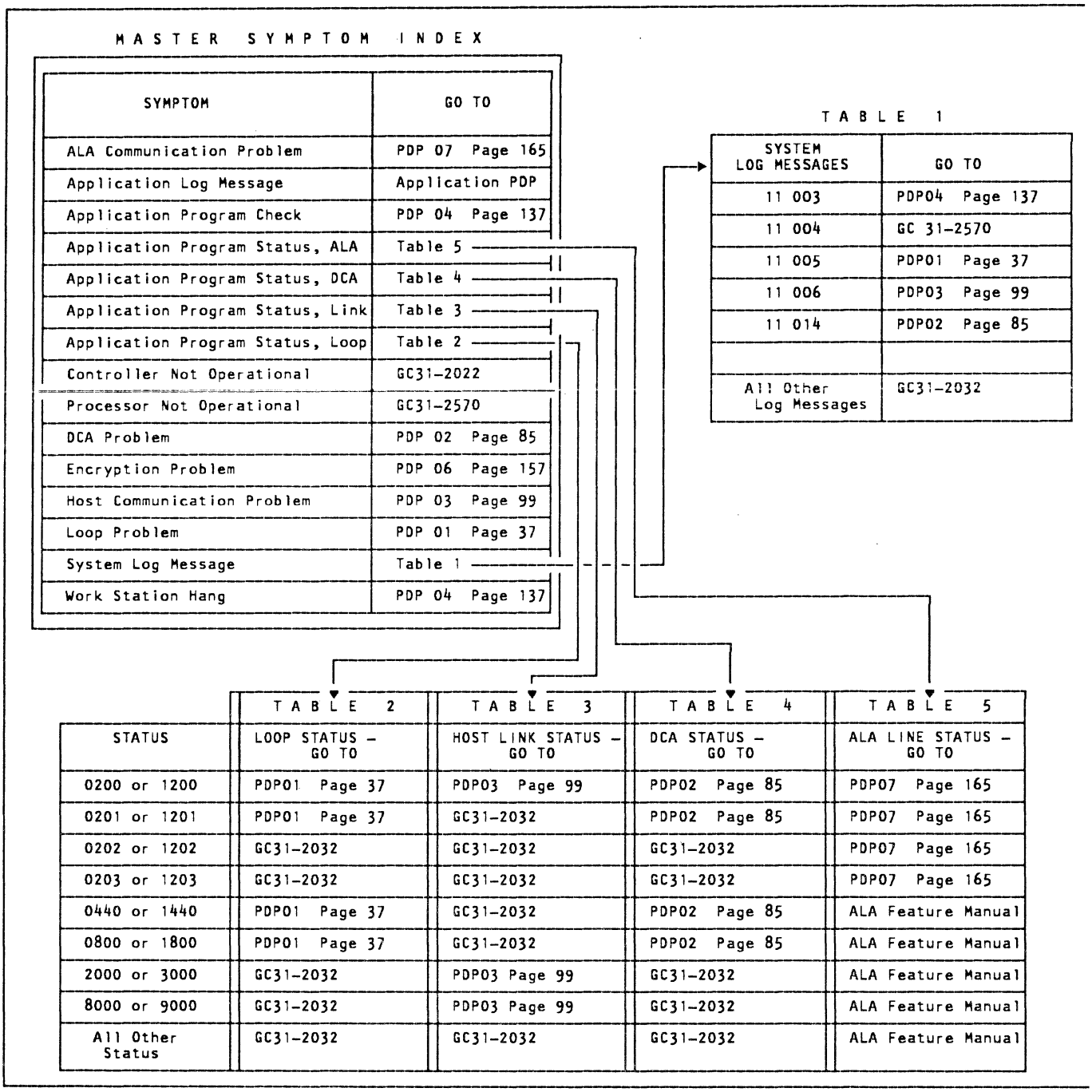

Action
Method of Analysis
Recommendations
ACTION 16
Determine whether any host 006 log messages were written to the log file.
Determine whether any host log messages are in the log file.
Using the data displayed in Action 14, look for a 006 log record type.
The log record types are displayed in the following format for a maximum of ten (10) unique record types:
--- --- --- --- . . . --- --- ---
Most Recent System Log Number
Is the 006 record type included in the displayed numbers?
no
Proceed to Action 17 on this page.
yes
END OF PROCEDURE
The host link should be operational. However, the presence of a 006 log message indicates that the host link has experienced a problem since startup.
Use the IBM 4700 Operating Procedures Manual to interpret the 006 log message.
If you believe you have a link problem, go to the Host Problem Determination Procedure on Page 99.
ACTION 17
Determine whether any ALA 008 log messages were written to the log file.
Determine whether any ALA log messages are in the log file.
Using the data displayed in Action 14, look for a 008 log record type.
The log record types are displayed in the following format for a maximum of ten (10) unique record types:
--- --- --- --- . . . --- --- ---
Most Recent System Log Number
Is the 008 record type included in the displayed numbers?
no
Proceed to Action 18 on this page.
yes
END-OF-PROCEDURE
The ALA lines should be operational. However, the presence of a 008 log message indicates that an ALA line has experienced a problem since startup.
Use the IBM 4700 Operating Procedures Manual to interpret the 008 log message.
If you believe you have an ALA problem, go to the ALA Problem Determination Procedure on Page 165.
ACTION 18
Determine whether any DCA 014 log messages were written to the log file.
Determine whether any DCA log messages are in the log file.
Using the data displayed in Action 14, look for a 014 log record type.
The log record types are displayed in the following format for a maximum of ten (10) unique record types:
--- --- --- --- . . . --- --- ---
Most Recent System Log Number
Is the 014 record type included in the displayed numbers?
no
Proceed to Action 19 on the next page.
yes
END OF PROCEDURE
All ports should be operational at this time. However, the presence of a 014 l
message indicates that at least one port has experienced problems since startup.
Use the IBM 4700 Operating Procedures Manual to interpret the 014 log message.
If you believe you have DCA problems, g
to the DCA Problem Determination Procedure on Page 85.

Action	Method of Analysis	Recommendations

Action	Method of Analysis	Recommendations







MASTER SYMPTOM INDEX

SYMPTOM	GO TO
ALA Communication Problem	PDP 07 Page 165
Application Log Message	Application PDP
Application Program Check	PDP 04 Page 137
Application Program Status, ALA	Table 5
Application Program Status, DCA	Table 4
Application Program Status, Link	Table 3
Application Program Status, Loop	Table 2
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Processor Not Operational	GC31-2570
DCA Problem	PDP 02 Page 85
Encryption Problem	PDP 06 Page 157
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System Log Message	Table 1
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TABLE 1

SYSTEM LOG MESSAGES	GO TO
11 003	PDP04 Page 137
11 004	GC 31-2570
11 005	PDP01 Page 37
11 006	PDP03 Page 99
11 014	PDP02 Page 85
All Other Log Messages	GC31-2032

STATUS	TABLE 2 LOOP STATUS – GO TO	TABLE 3 HOST LINK STATUS – GO TO	TABLE 4 DCA STATUS – GO TO	TABLE 5 ALA LINE STATUS – GO TO
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0201 or 1201	PDP01 Page 37	GC31-2032	PDP02 Page 85	PDP07 Page 165
0202 or 1202	GC31-2032	GC31-2032	GC31-2032	PDP07 Page 165
0203 or 1203	GC31-2032	GC31-2032	GC31-2032	PDP07 Page 165
0440 or 1440	PDP01 Page 37	GC31-2032	PDP02 Page 85	ALA Feature Manual
0800 or 1800	PDP01 Page 37	GC31-2032	PDP02 Page 85	ALA Feature Manual
2000 or 3000	GC31-2032	PDP03 Page 99	GC31-2032	ALA Feature Manual
8000 or 9000	GC31-2032	PDP03 Page 99	GC31-2032	ALA Feature Manual
All Other Status	GC31-2032	GC31-2032	GC31-2032	ALA Feature Manual

Figure 10. Master Symptom Index

Notes:

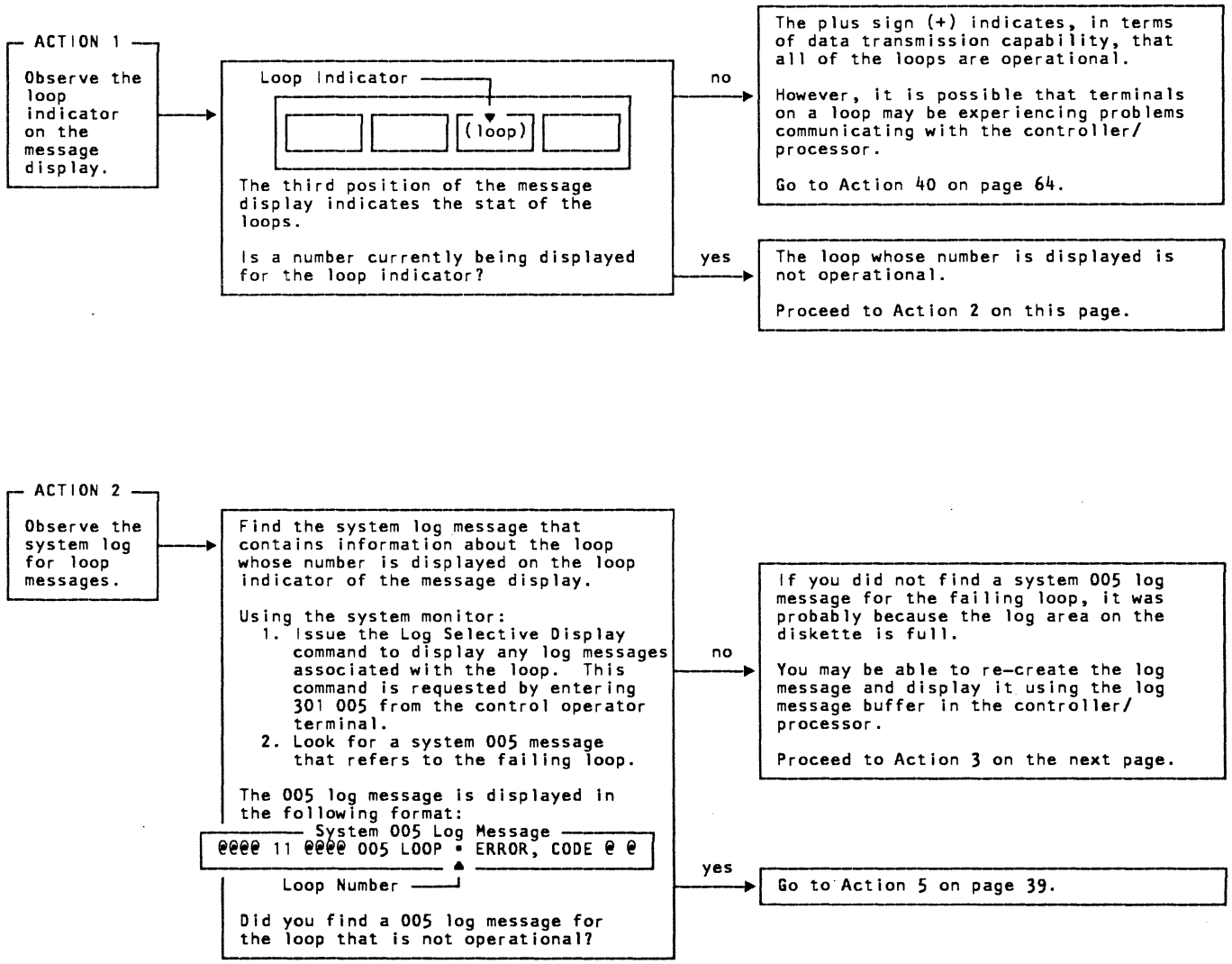
1. *GC31-2032 is the IBM 4700 Finance Communication System Subsystem Operating Procedures manual*
2. *GC31-2570 is the IBM 4702 Branch Automation Processor Setup and Operating Instruction manual*
3. *GC31-2022 is the IBM 4701 Controller Operating Instruction manual.*

ıpter Three
ıce Loop Problem Determination Procedure

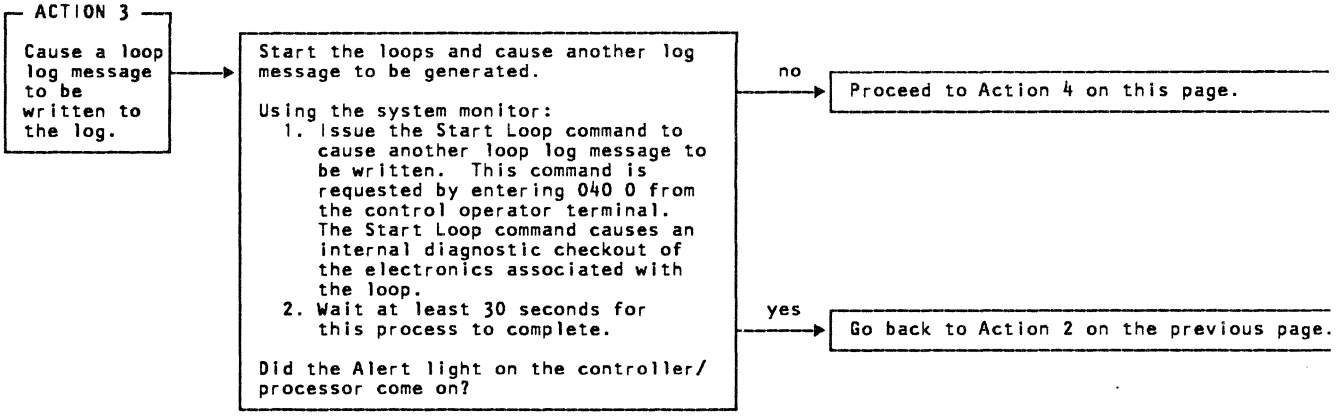
Chapter Three
Finance Loop Problem Determination Procedure

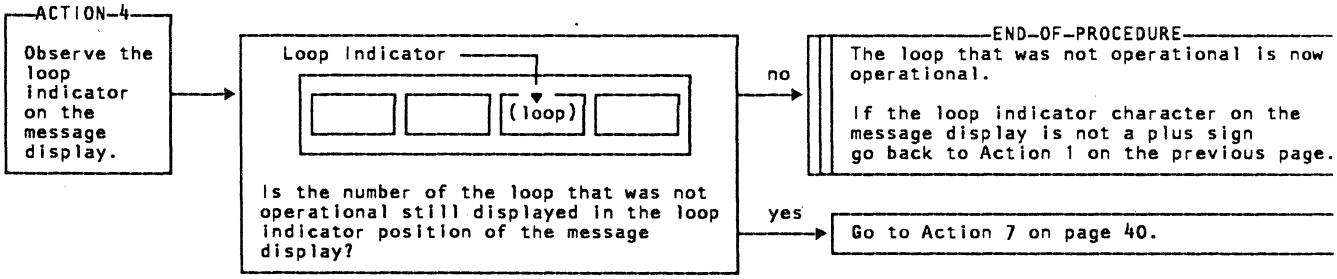
PDP01 - Finance Loop Problem Determination Procedure

Action	Method of Analysis	Recommendations

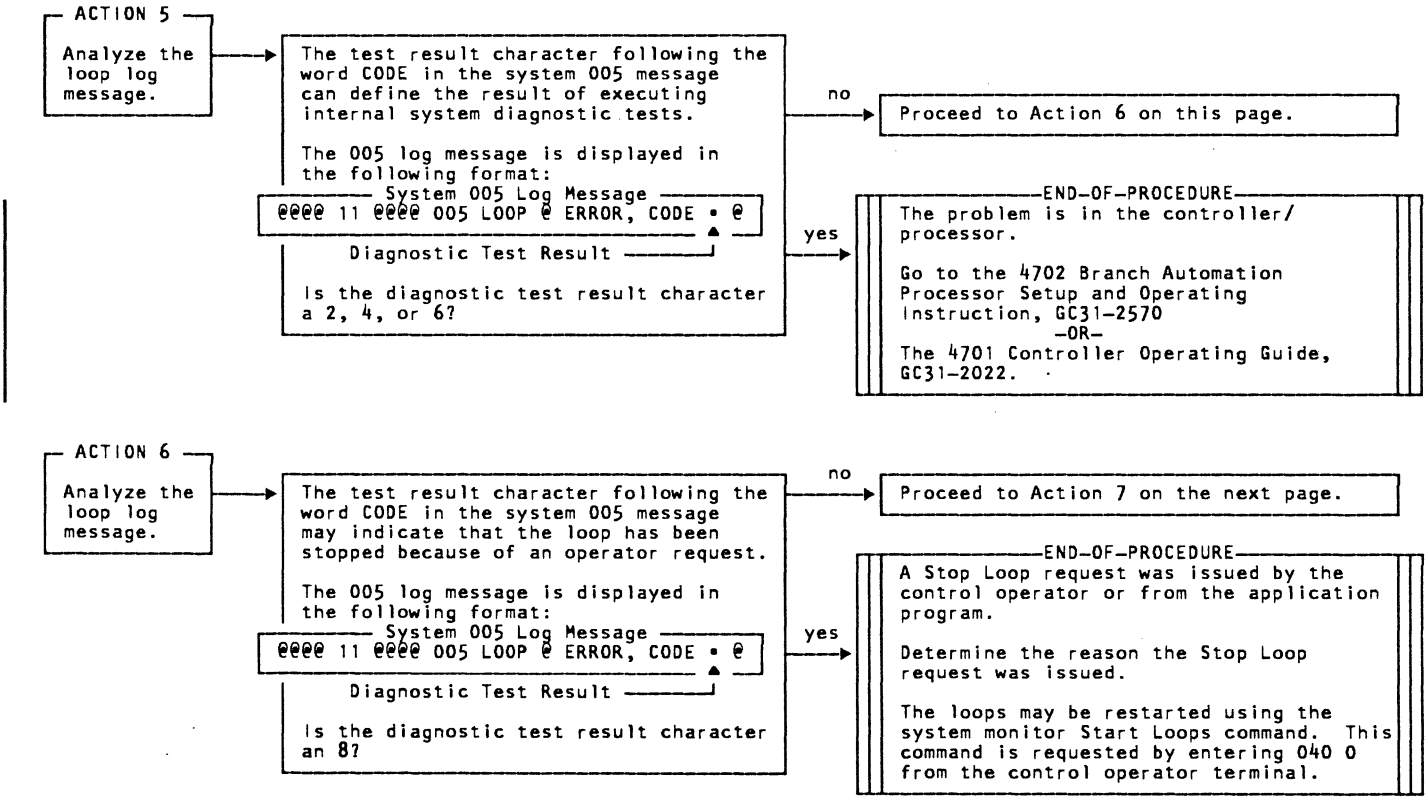


Action	Method of Analysis	Recommendations

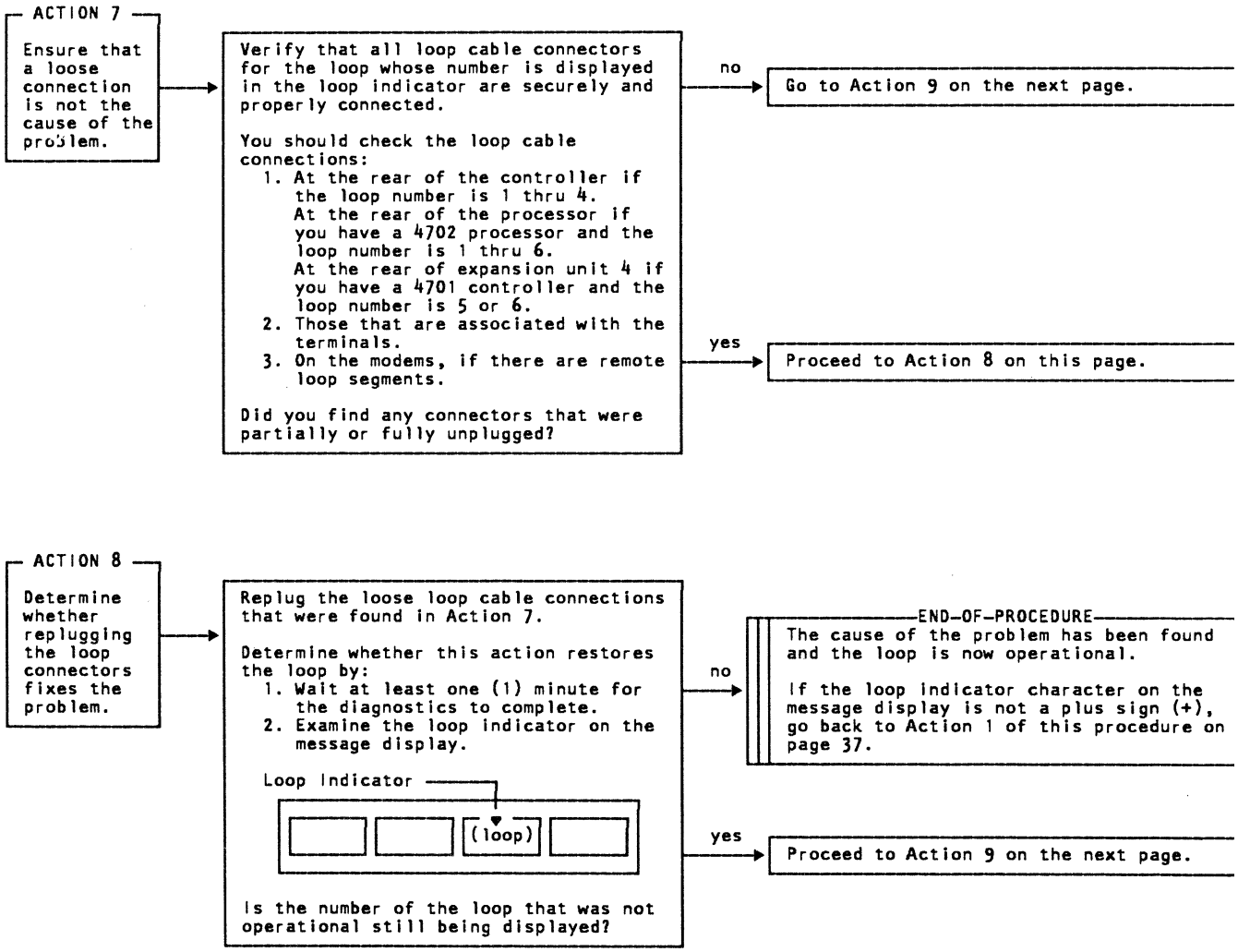




Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations

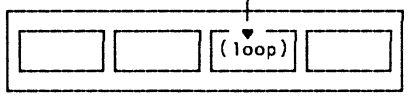
ACTION-9

Isolate the problem to the loop, expansion unit, or the controller/ processor.

Determine if the problem is external to the controller/processor by doing the following:

1. Unplug both loop cables for the failing loop from the rear of the controller for loop numbers 1 thru 4 (if you have a 4702 processor then loop numbers 1 thru 6), or if you have a 4701 controller and loop numbers 5 or 6 then unplug from the rear of expansion unit 4.
2. Wait at least one (1) minute for the diagnostics to complete.
3. Examine the loop indicator on the message display.

Loop Indicator



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

no → The problem is external to the controller/processor, or 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 you have a 4702 processor and if the loop number is 1 thru 6, the problem is associated with the processor.

If you have a 4701 controller and if the loop number is 5 or 6, the problem is associated with expansion unit 4.

Follow your institution's procedures for getting the 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 46.

ACTION-11

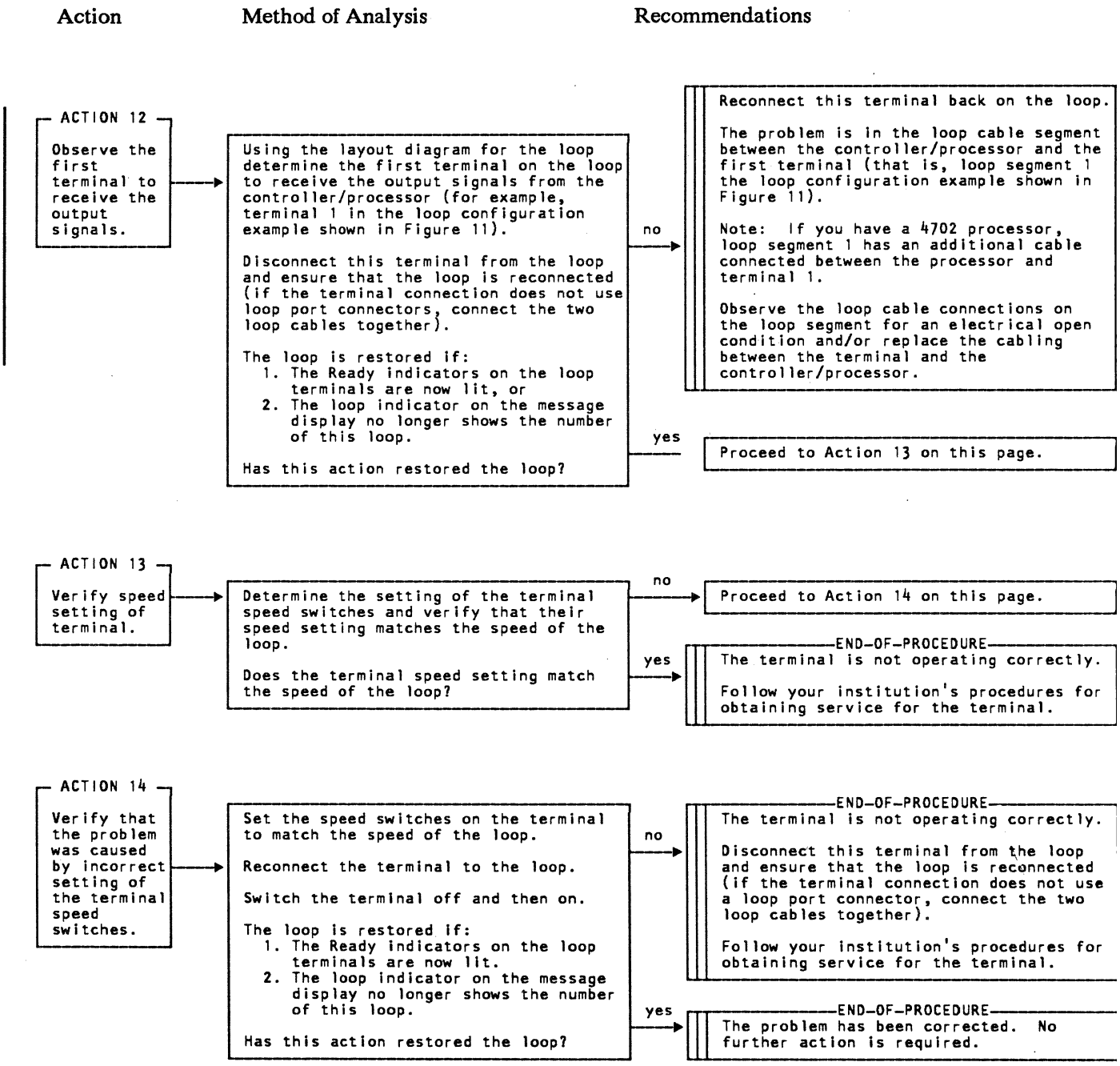
Check the Ready indicator on the loop terminals.

Observe the Ready indicator on all the terminals on the loop that are switched on.

Are any Ready indicators flashing?

→ Proceed to Action 12 on the next page.

→ Go to Action 15 on page 44.


Action
Method of Analysis
Recommendations
ACTION 12
Observe the first terminal to receive the output signals.
Using the layout diagram for the loop determine the first terminal on the loop to receive the output signals from the controller/processor (for example, terminal 1 in the loop configuration example shown in Figure 11).
Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use loop port connectors, connect the two loop cables together).
The loop is restored if:
1. The Ready indicators on the loop terminals are now lit, or
2. The loop indicator on the message display no longer shows the number of this loop.
Has this action restored the loop?
no
Reconnect this terminal back on the loop.
The problem is in the loop cable segment between the controller/processor and the first terminal (that is, loop segment 1 the loop configuration example shown in Figure 11).
Note: If you have a 4702 processor, loop segment 1 has an additional cable connected between the processor and terminal 1.
Observe the loop cable connections on the loop segment for an electrical open condition and/or replace the cabling between the terminal and the controller/processor.
yes
Proceed to Action 13 on this page.
ACTION 13
Verify speed setting of terminal.
Determine the setting of the terminal speed switches and verify that their speed setting matches the speed of the loop.
Does the terminal speed setting match the speed of the loop?
no
Proceed to Action 14 on this page.
yes
END-OF-PROCEDURE
The terminal is not operating correctly.
Follow your institution's procedures for obtaining service for the terminal.
ACTION 14
Verify that the problem was caused by incorrect setting of the terminal speed switches.
Set the speed switches on the terminal to match the speed of the loop.
Reconnect the terminal to the loop.
Switch the terminal off and then on.
The loop is restored if:
1. The Ready indicators on the loop terminals are now lit.
2. The loop indicator on the message display no longer shows the number of this loop.
Has this action restored the loop?
no
END-OF-PROCEDURE
The terminal is not operating correctly.
Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use a loop port connector, connect the two loop cables together).
Follow your institution's procedures for obtaining service for the terminal.
yes
END-OF-PROCEDURE
The problem has been corrected. No further action is required.

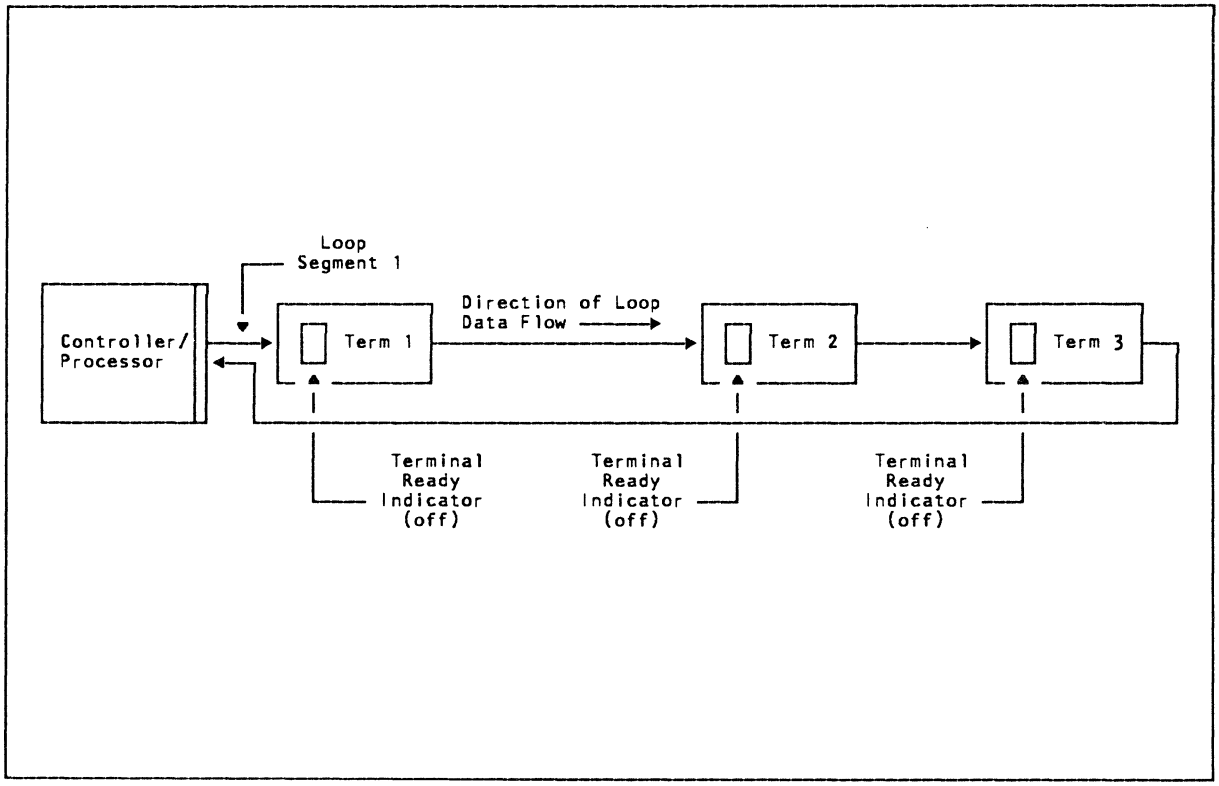
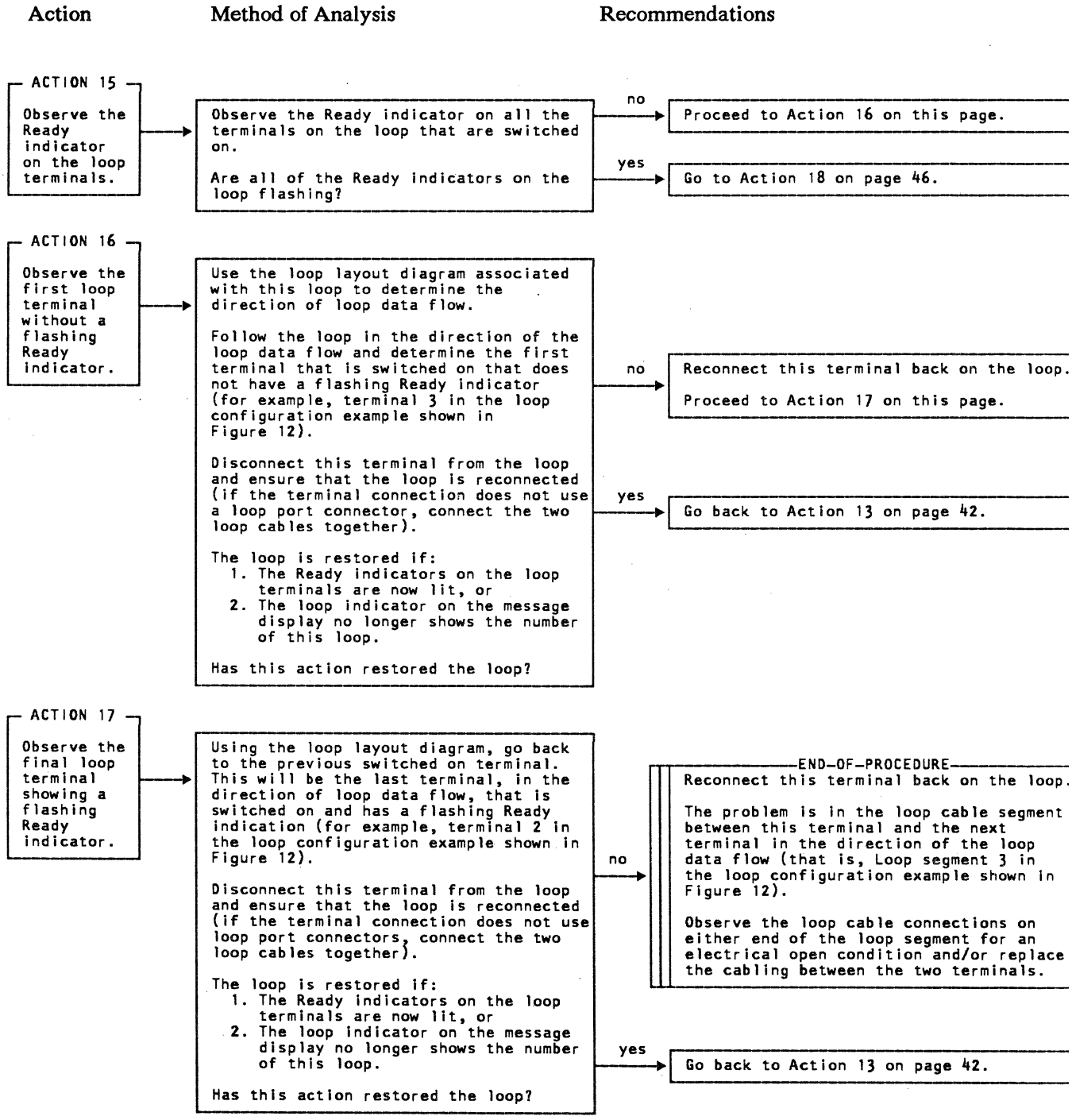


Figure 11. Example of a Local Loop Configuration with No Terminal Ready Indicators Flashing


Action
Method of Analysis
Recommendations
ACTION 15
Observe the Ready indicator on the loop terminals.
Observe the Ready indicator on all the terminals on the loop that are switched on.
Are all of the Ready indicators on the loop flashing?
no
Proceed to Action 16 on this page.
yes
Go to Action 18 on page 46.
ACTION 16
Observe the first loop terminal without a flashing Ready indicator.
Use the loop layout diagram associated with this loop to determine the direction of loop data flow.
Follow the loop in the direction of the loop data flow and determine the first terminal that is switched on that does not have a flashing Ready indicator (for example, terminal 3 in the loop configuration example shown in Figure 12).
Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use a loop port connector, connect the two loop cables together).
The loop is restored if:
1. The Ready indicators on the loop terminals are now lit, or
2. The loop indicator on the message display no longer shows the number of this loop.
Has this action restored the loop?
no
Reconnect this terminal back on the loop.
Proceed to Action 17 on this page.
yes
Go back to Action 13 on page 42.
ACTION 17
Observe the final loop terminal showing a flashing Ready indicator.
Using the loop layout diagram, go back to the previous switched on terminal. This will be the last terminal, in the direction of loop data flow, that is switched on and has a flashing Ready indication (for example, terminal 2 in the loop configuration example shown in Figure 12).
Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use loop port connectors, connect the two loop cables together).
The loop is restored if:
1. The Ready indicators on the loop terminals are now lit, or
2. The loop indicator on the message display no longer shows the number of this loop.
Has this action restored the loop?
no
END-OF-PROCEDURE
Reconnect this terminal back on the loop.
The problem is in the loop cable segment between this terminal and the next terminal in the direction of the loop data flow (that is, Loop segment 3 in the loop configuration example shown in Figure 12).
Observe the loop cable connections on either end of the loop segment for an electrical open condition and/or replace the cabling between the two terminals.
yes
Go back to Action 13 on page 42.

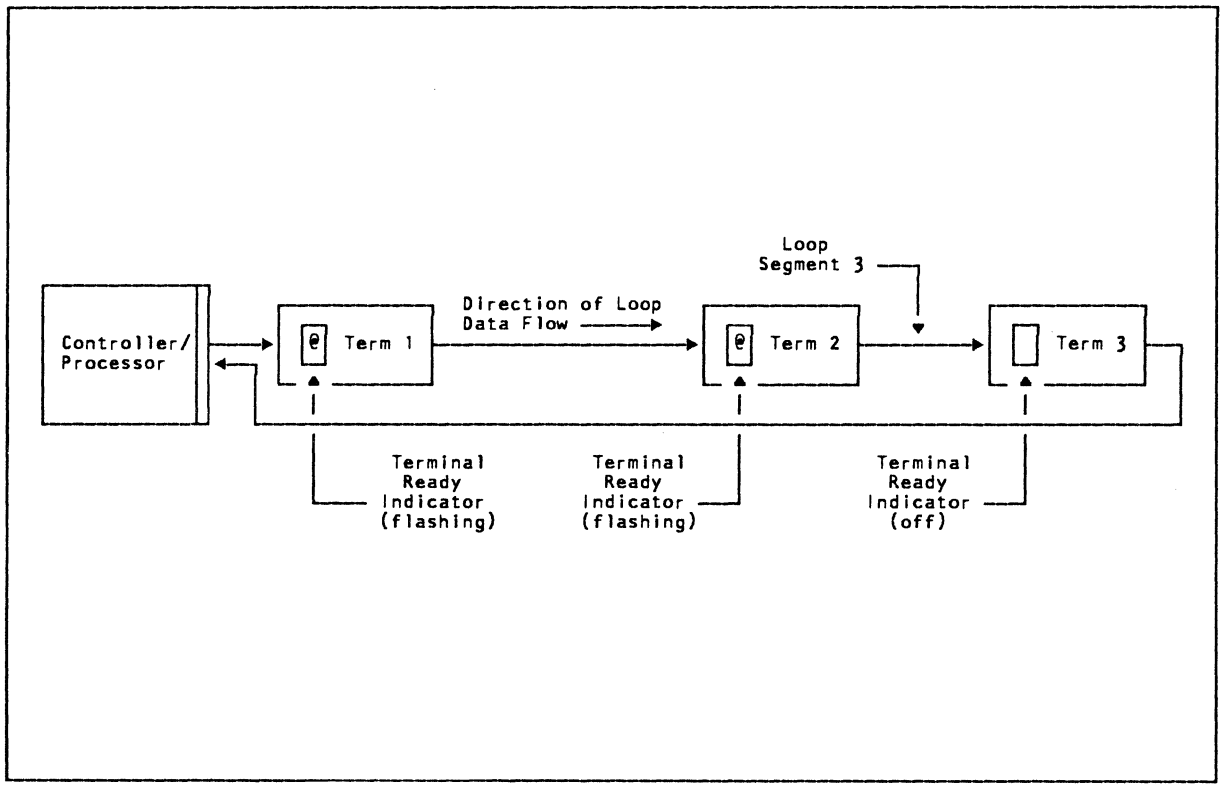


Figure 12. Example of a Local Loop Configuration with Some Terminal Ready Indicators Flashing

Action	Method of Analysis	Recommendations

ACTION 18

Examine the final terminal to receive the output data signals.

Using the loop layout diagram, determine the last terminal on the loop to receive the output signals from the controller (for example, terminal 3 in the loop configuration example shown in Figure 13).

Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use a loop port connector, connect the two loop cables together).

The loop is restored if:
1. The Ready indicators on the loop terminals are now lit, or
2. The loop indicator on the message display no longer shows the number of this loop.

Has this action restored the loop?

no → END-OF-PROCEDURE

Reconnect this terminal back on the loop.

The problem is in the loop cable segment between the controller/processor and the last terminal (that is, loop segment 4 in the loop configuration example shown in Figure 13).

NOTE: If you have a 4702 processor, loop segment 4 has an additional cable connected between terminal 3 and the processor.

Observe the loop cable connections on the loop segment for an electrical open condition and/or replace the cabling between the terminal and the controller/processor.

yes → Go back to Action 13 on page 42.

This portion of the procedure deals with remote loops.

The following actions are performed at the controller/processor location.

ACTION 19

Verify that the modem(s) at the controller/processor location is operational.

Use the self-test capability of the modem to verify that it is operational.

If more than one modem is on this loop, 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 non-operational?

no → Proceed to Action 20 on page 48.

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 37.

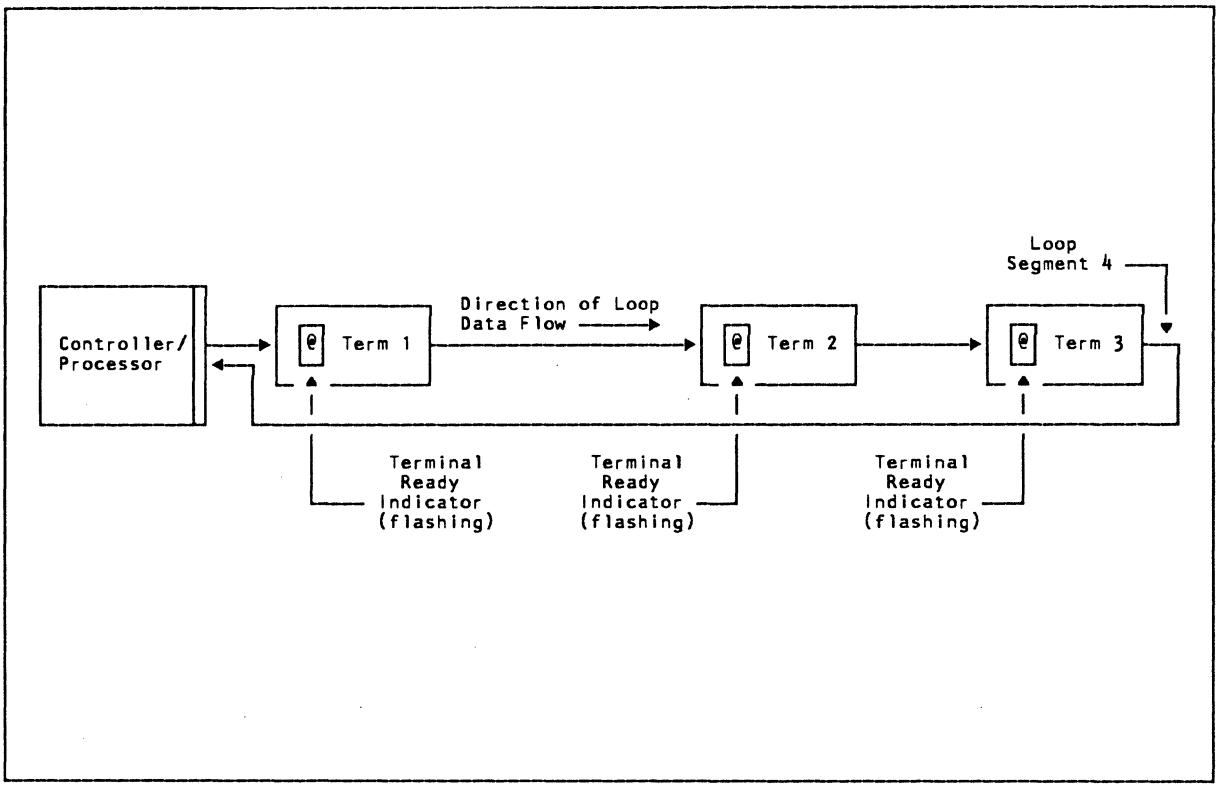


Figure 13. Example of a Local Loop Configuration with All Terminal Ready Indicators Flashing

Action	Method of Analysis	Recommendations
ACTION 20 Isolate the problem to one of the remote loop segments.	To isolate the problem, remove a remote loop segment from the controller/processor loop by removing the modem that is associated with the remote 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 21 on this page. 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 to Action 23 on page 50.
ACTION 21 Determine if there are any more remote loop segments to be checked.	Have all the remote loop segments on the loop (modems at the controller/processor location) been checked by Action 20?	no → Find the next modem at the controller/processor location. Go back to Action 20 on this page. yes → Proceed to Action 22 on this page.
ACTION 22 Determine if there are local terminals on this loop.	Using the layout diagram for the loop, determine if local terminals are on the loop at the controller/processor location (in addition to the modems). See Figure 14 for an example of this type of loop configuration. Are there local terminals at the controller/processor location?	yes → Go back to Action 11 on page 41. no → END-OF-PROCEDURE The problem is in one of the local cable segments that connect the modems to the controller/processor or to the other modems. Determine the failing cable segment and replace it.

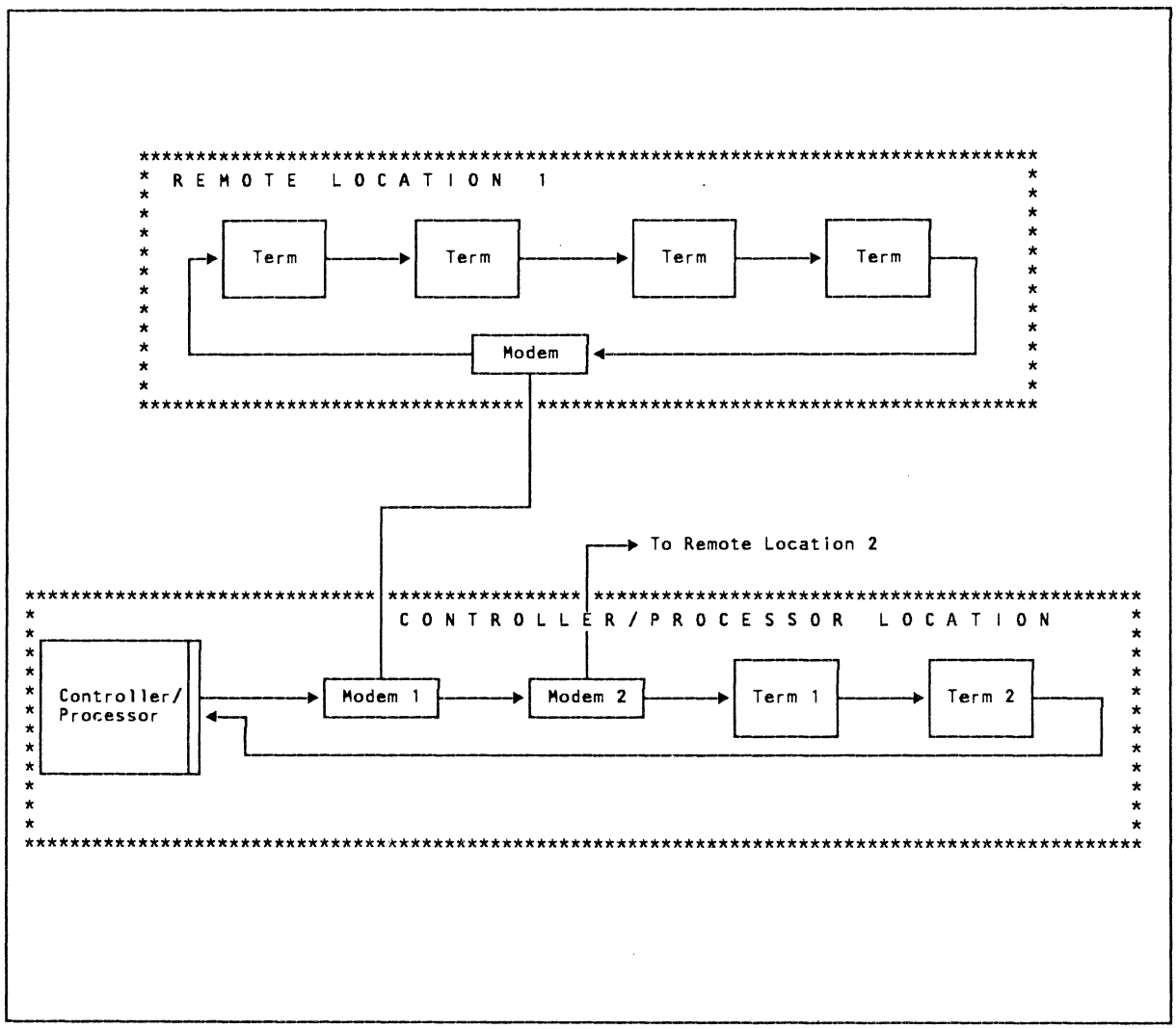
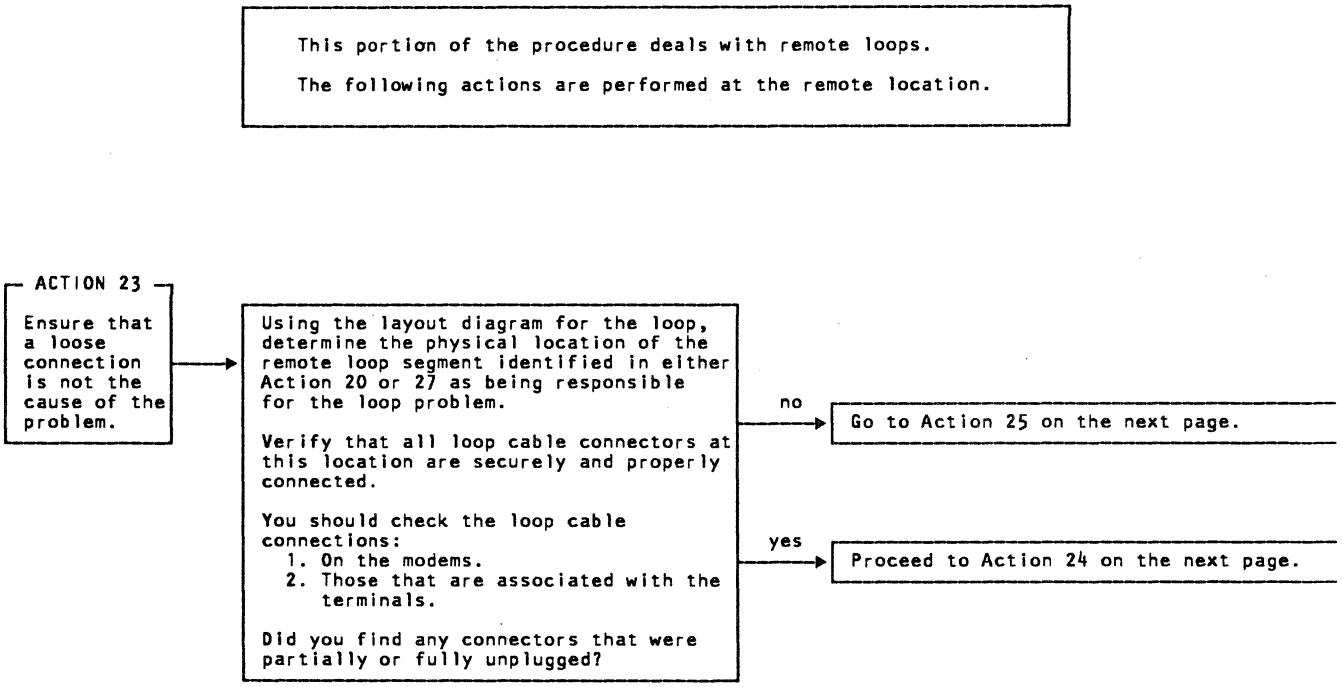
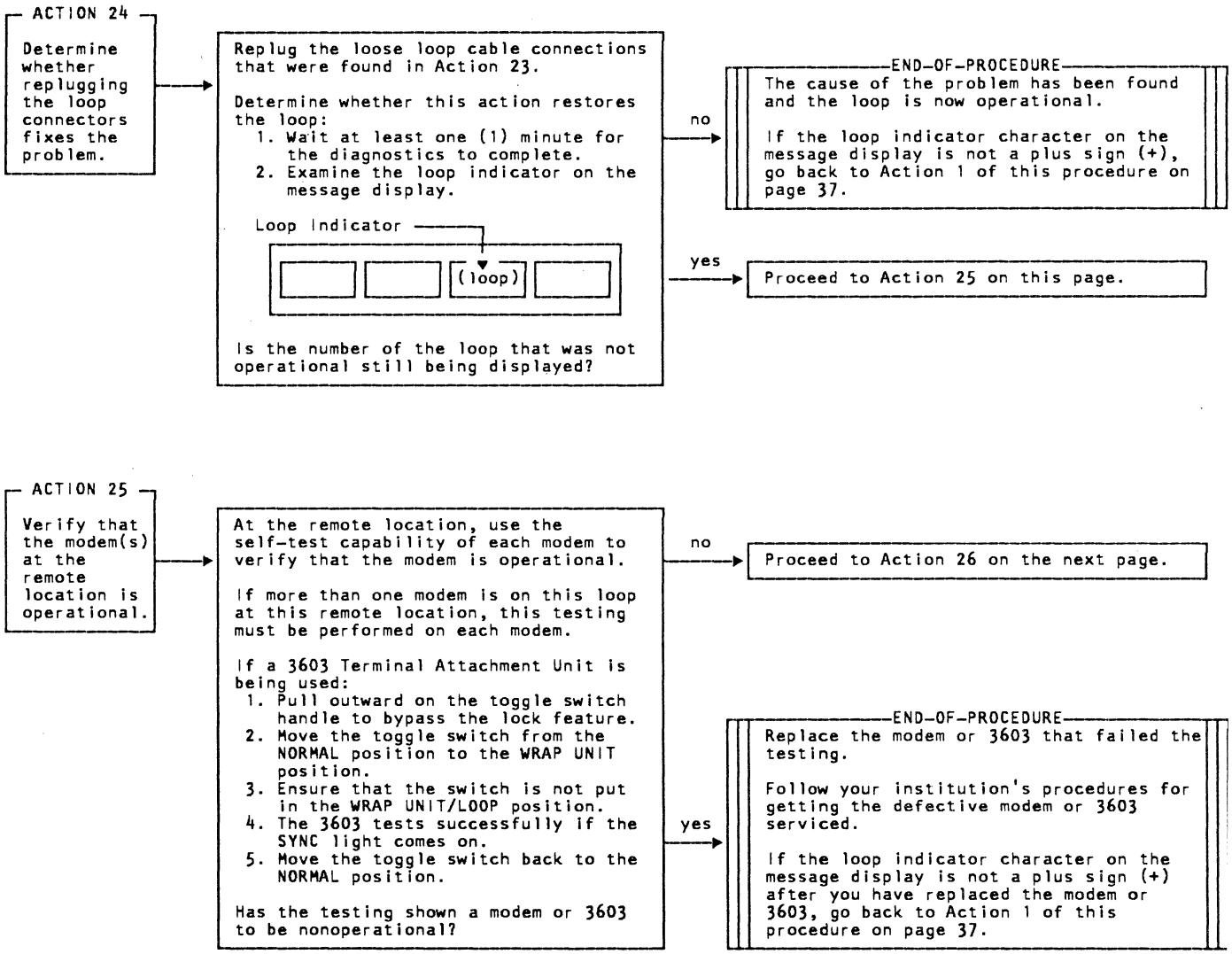


Figure 14. Example of a Remote Loop Configuration

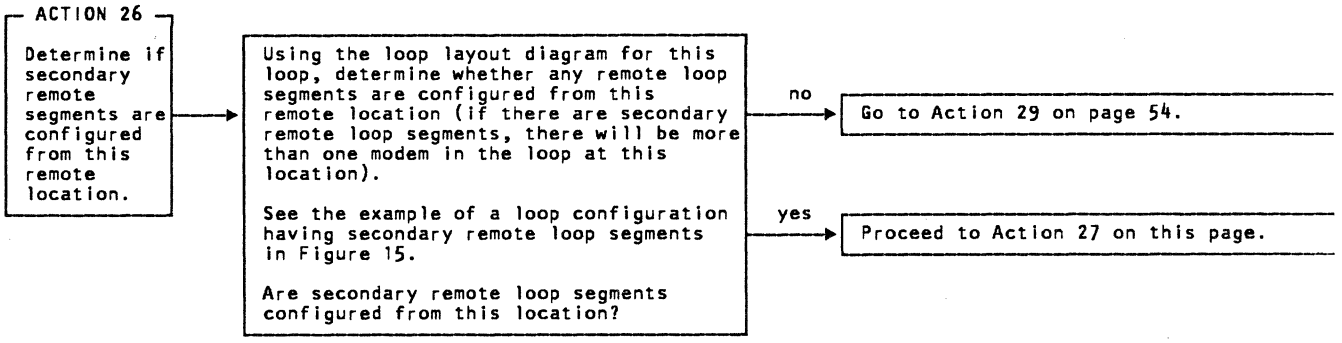
Action	Method of Analysis	Recommendations

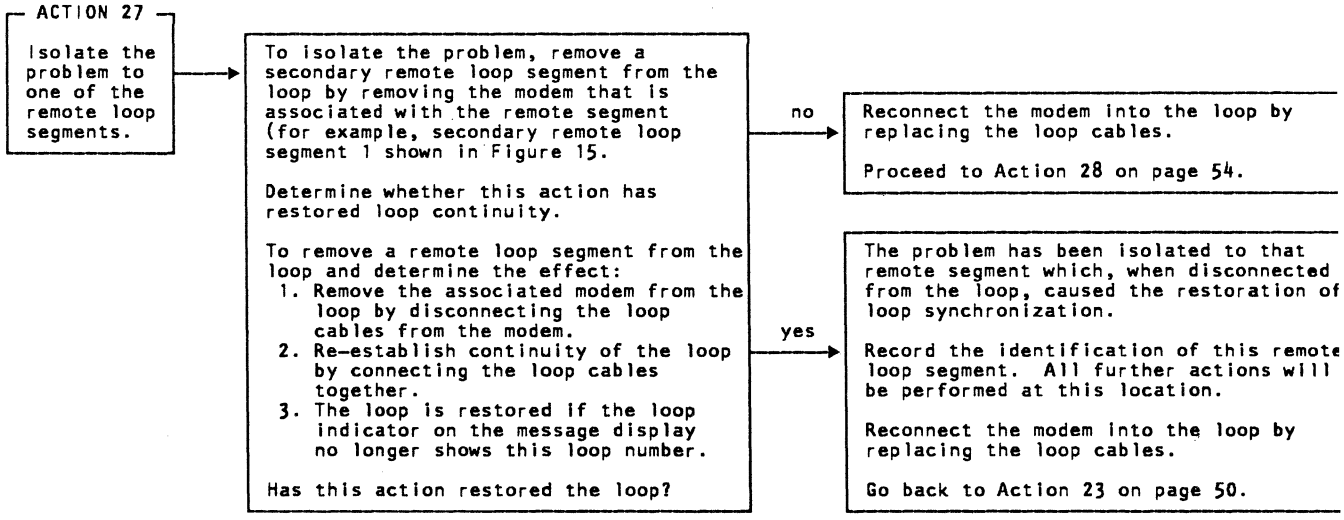


Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations





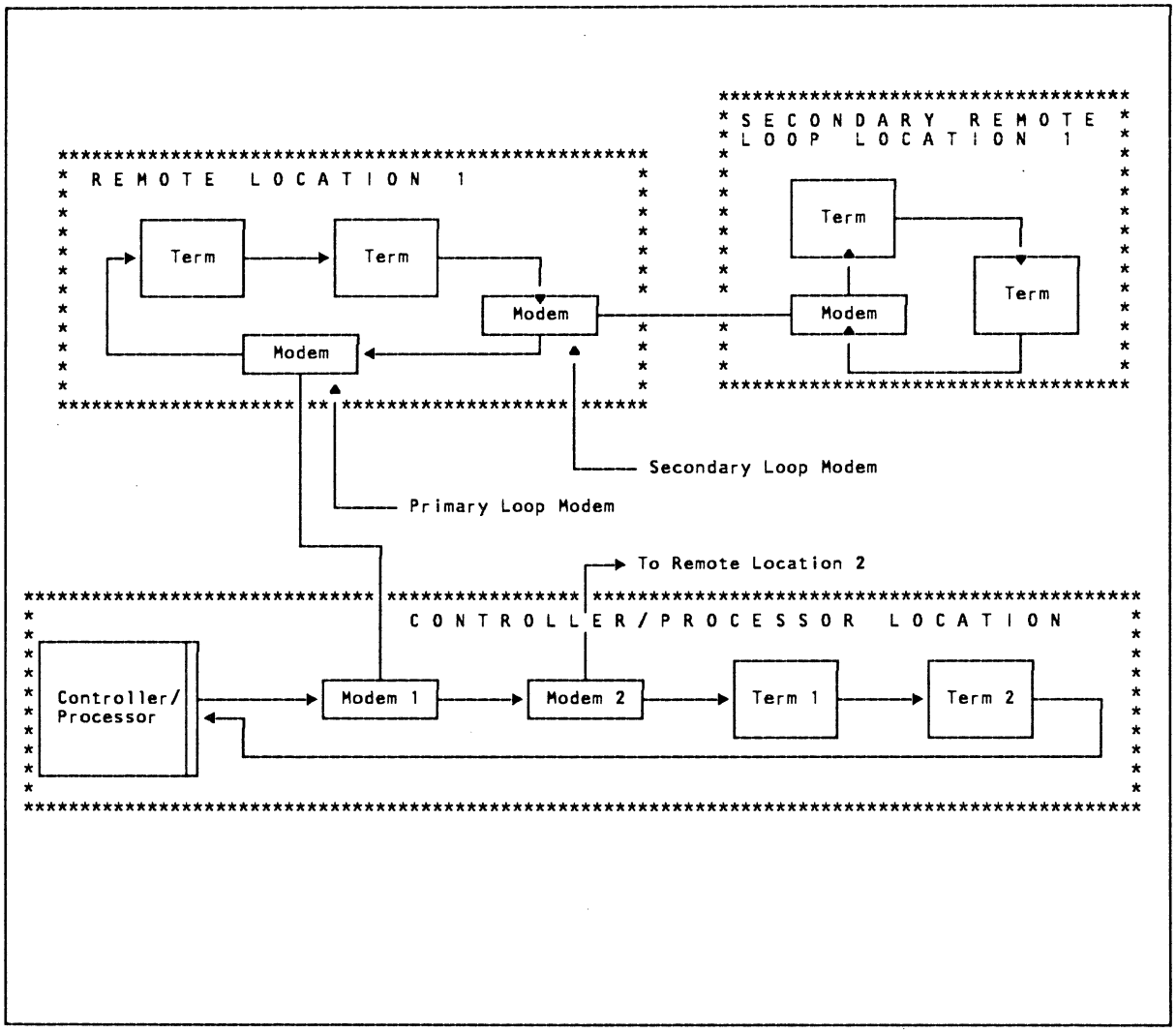
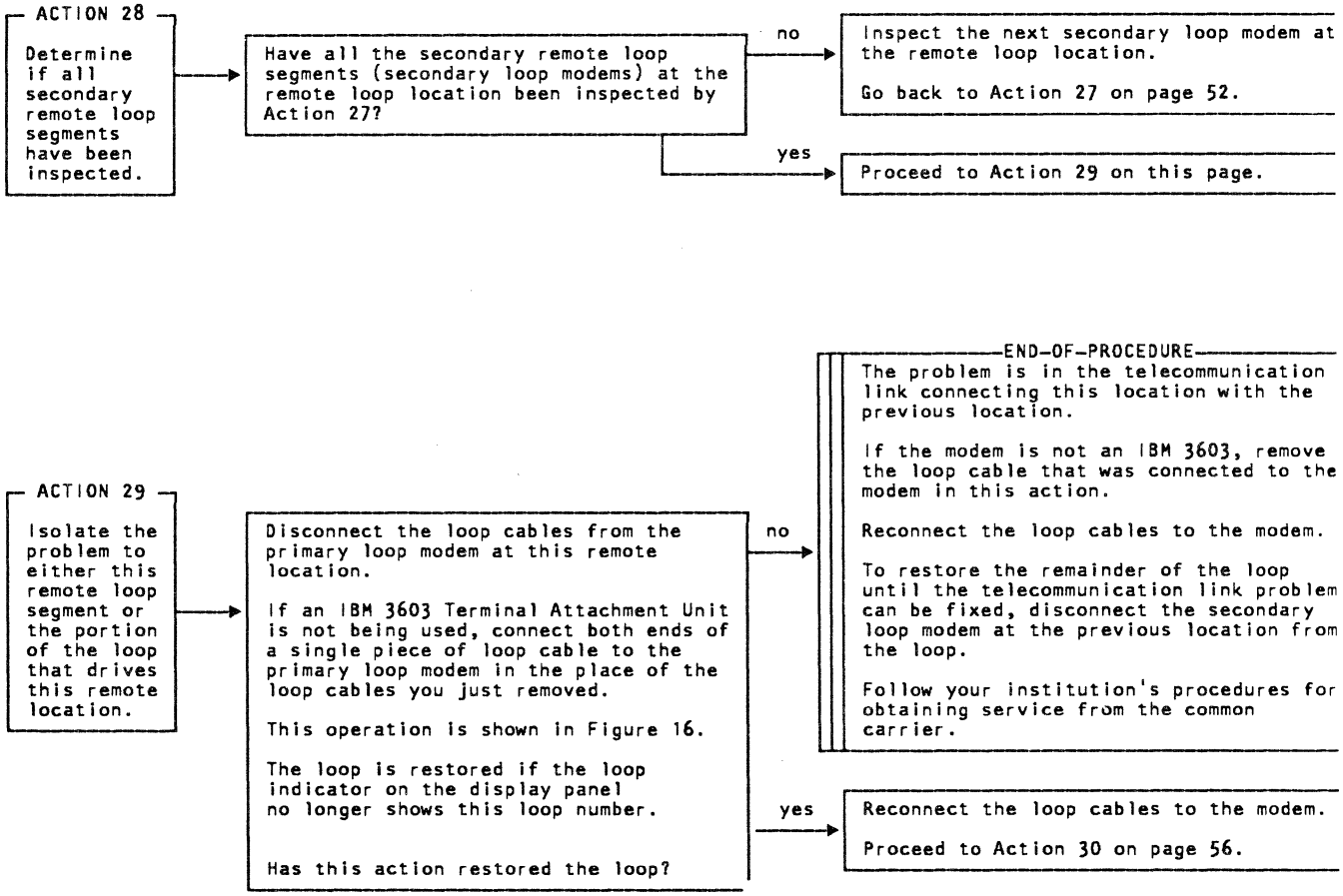


Figure 15. Example of a Remote Loop Configuration with Secondary Remote Loop Segments

Action	Method of Analysis	Recommendations



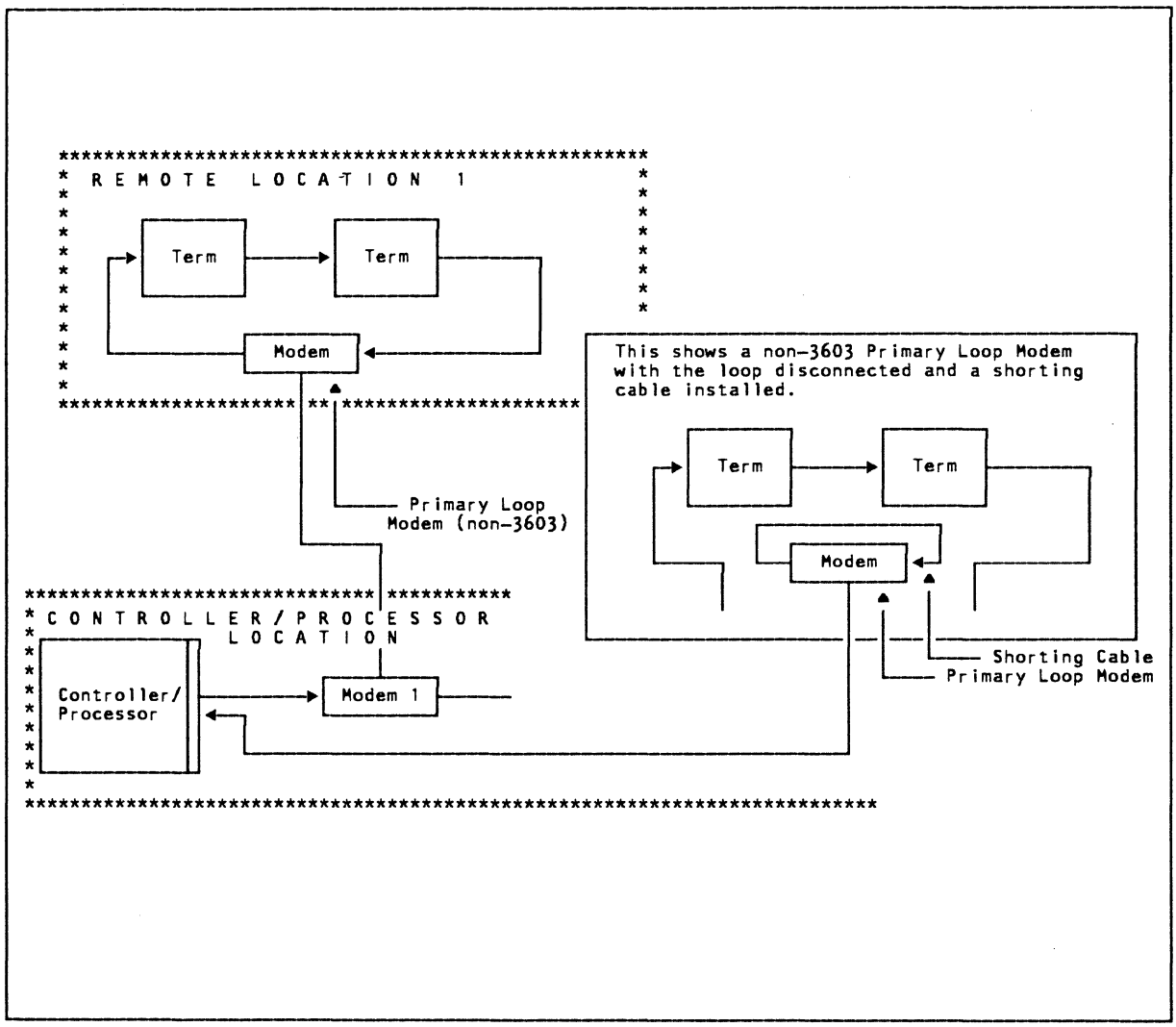
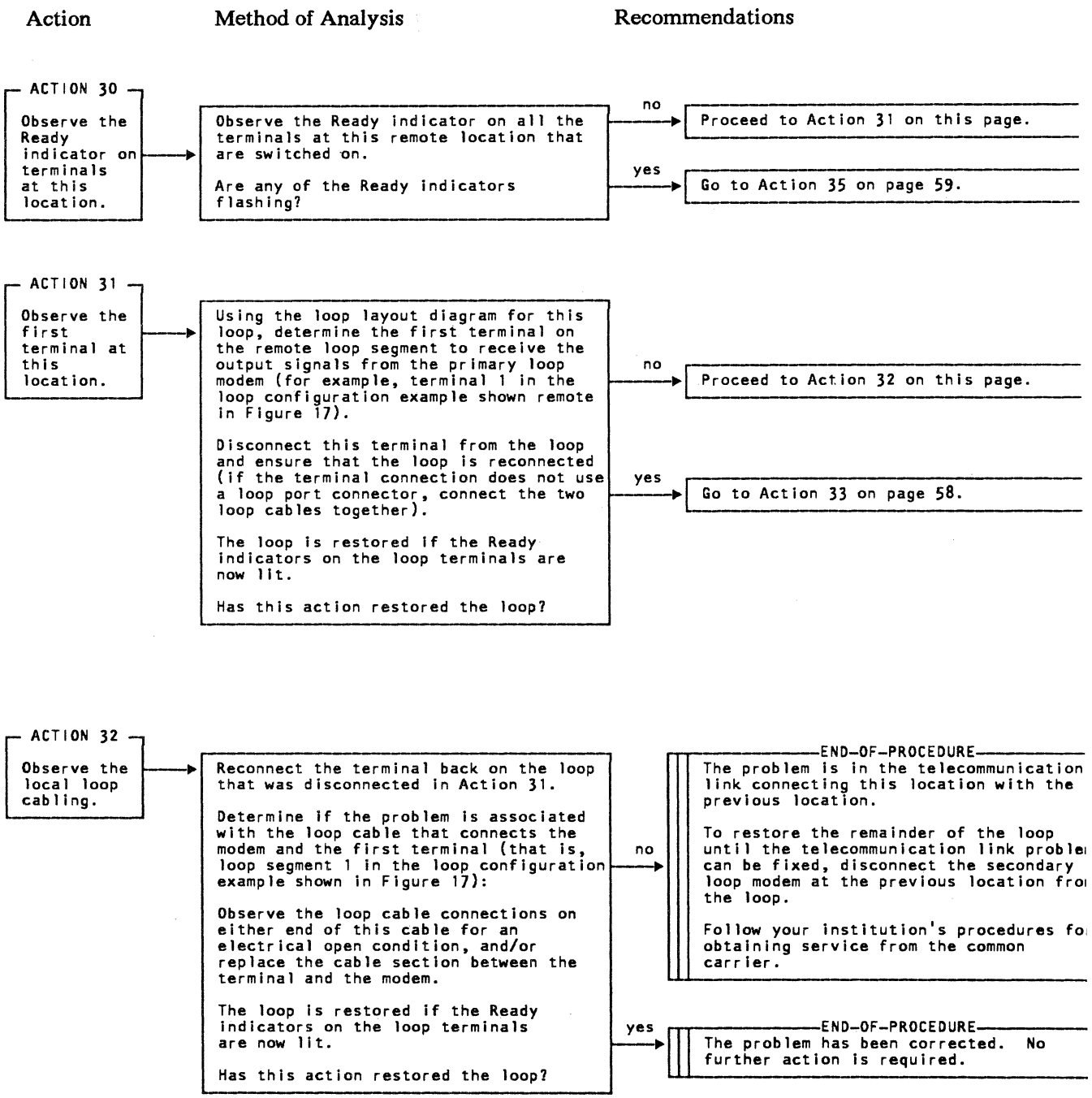


Figure 16. Example of a Remote Loop Configuration Showing the Cables Disconnected from a Non-3603 Primary Loop Modem


Action
Method of Analysis
Recommendations
ACTION 30
Observe the Ready indicator on terminals at this location.
Observe the Ready indicator on all the terminals at this remote location that are switched on.
Are any of the Ready indicators flashing?
no
Proceed to Action 31 on this page.
yes
Go to Action 35 on page 59.
ACTION 31
Observe the first terminal at this location.
Using the loop layout diagram for this loop, determine the first terminal on the remote loop segment to receive the output signals from the primary loop modem (for example, terminal 1 in the loop configuration example shown remote in Figure 17).
Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use a loop port connector, connect the two loop cables together).
The loop is restored if the Ready indicators on the loop terminals are now lit.
Has this action restored the loop?
no
Proceed to Action 32 on this page.
yes
Go to Action 33 on page 58.
ACTION 32
Observe the local loop cabling.
Reconnect the terminal back on the loop that was disconnected in Action 31.
Determine if the problem is associated with the loop cable that connects the modem and the first terminal (that is, loop segment 1 in the loop configuration example shown in Figure 17):
Observe the loop cable connections on either end of this cable for an electrical open condition, and/or replace the cable section between the terminal and the modem.
The loop is restored if the Ready indicators on the loop terminals are now lit.
Has this action restored the loop?
no
END-OF-PROCEDURE
The problem is in the telecommunication link connecting this location with the previous location.
To restore the remainder of the loop until the telecommunication link proble can be fixed, disconnect the secondary loop modem at the previous location fro the loop.
Follow your institution's procedures fo obtaining service from the common carrier.
yes
END-OF-PROCEDURE
The problem has been corrected. No further action is required.

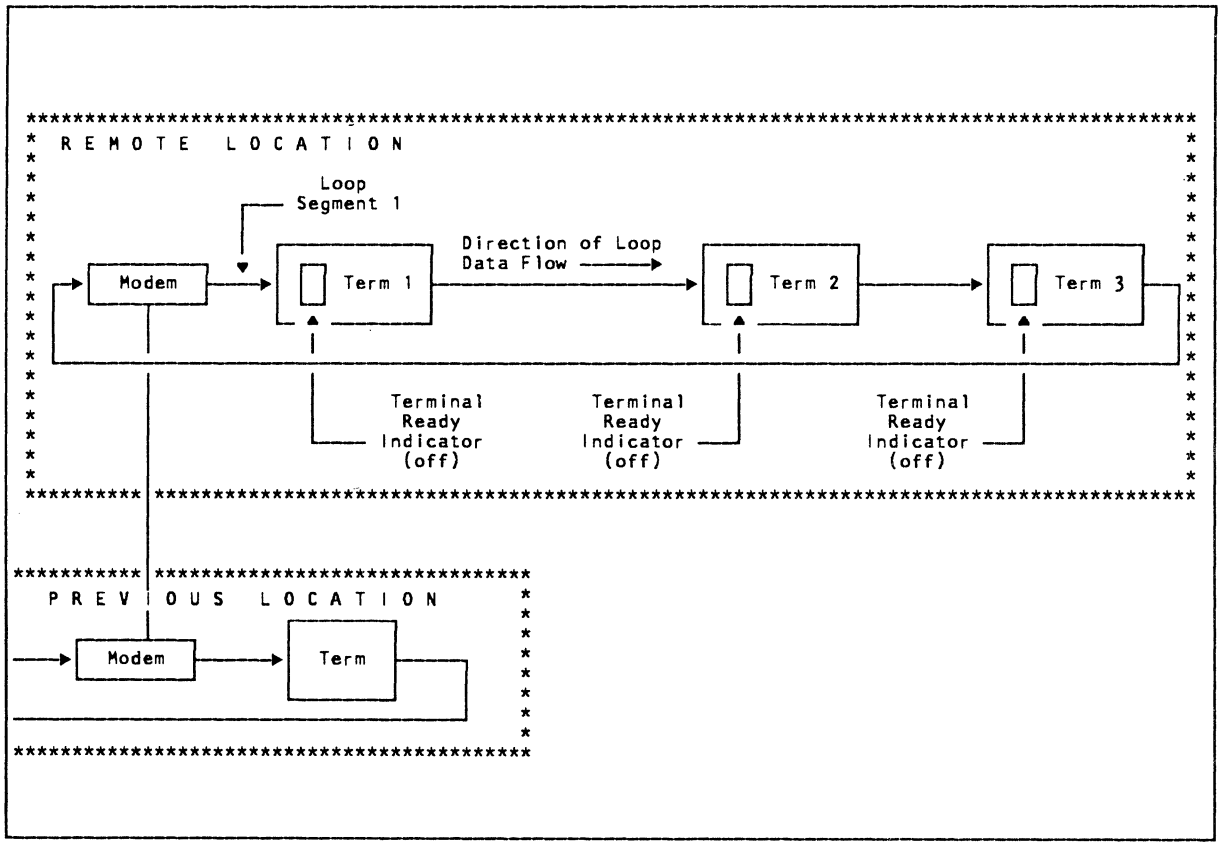
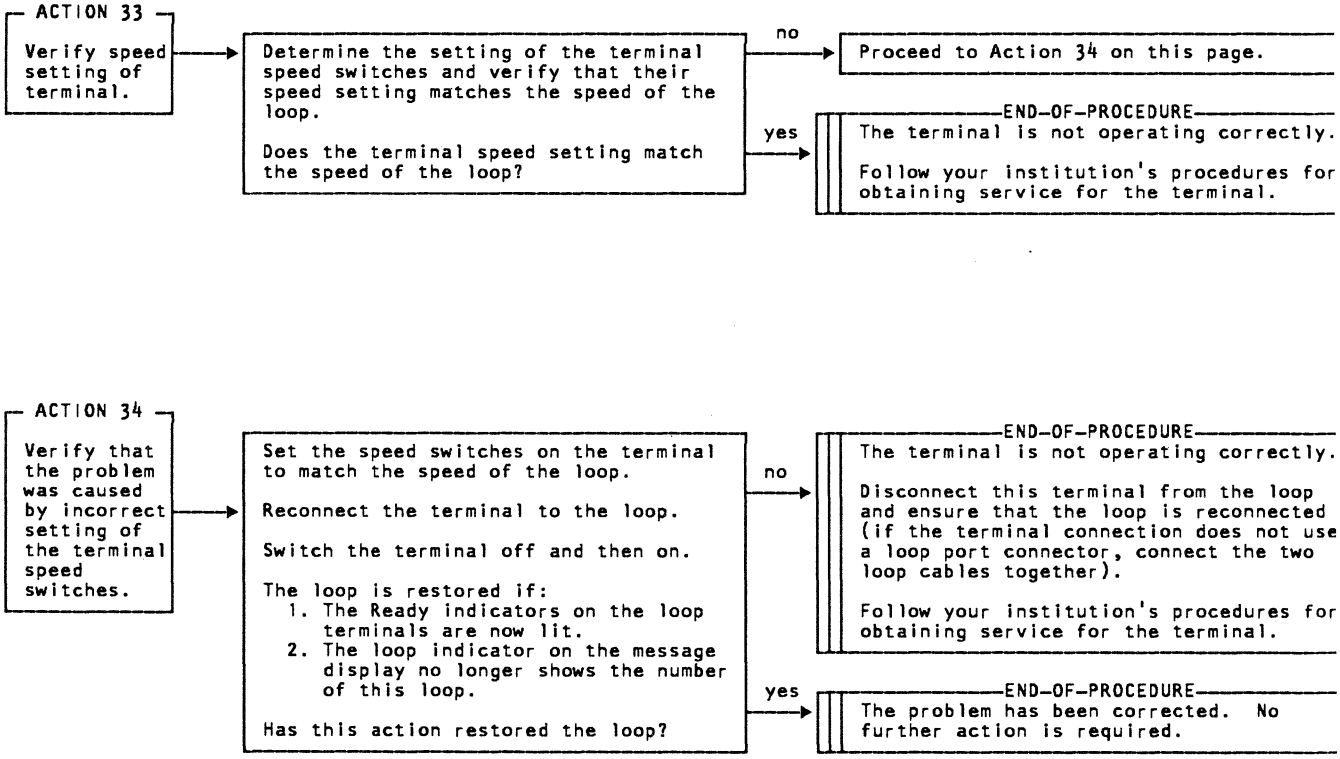


Figure 17. Example of a Remote Loop Configuration with No Ready Indicators Flashing

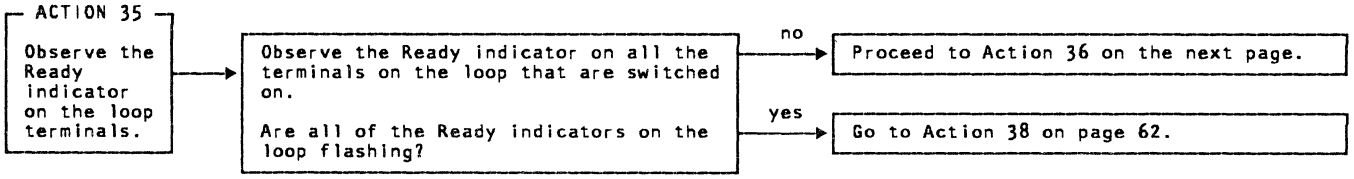
Action	Method of Analysis	Recommendations



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.



Action	Method of Analysis	Recommendations

ACTION 36

Observe the first loop terminal without a flashing Ready indicator.

Use the loop layout diagram associated with this loop to determine the direction of loop data flow.

Follow the loop in the direction of the loop data flow and determine the first terminal that is switched on that does not have a flashing Ready indication (for example, terminal 3 in the loop configuration example shown in Figure 18).

Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use a loop port connector, connect the two loop cables together).

The loop is restored if:
1. The Ready indicators on the loop terminals are now lit, or
2. The loop indicator on the message display no longer shows the number of this loop.

Has this action restored the loop?

no → Reconnect this terminal back on the loop.

Proceed to Action 37 on this page.

yes → Go back to Action 33 on page 58.

ACTION 37

Observe the final loop terminal showing a flashing Ready indicator.

Using the loop layout diagram, go back to the previous switched-on terminal. This will be the last terminal, in the direction of loop data flow, that is switched on and has a flashing Ready indication (for example, terminal 2 in the loop configuration example shown in Figure 18).

Disconnect this terminal from the loop and ensure that the loop is reconnected (if the terminal connection does not use loop port connectors, connect the two loop cables together).

The loop is restored if:
1. The Ready indicators on the loop terminals are now lit, or
2. The loop indicator on the message display no longer shows the number of this loop.

Has this action restored the loop?

no → END-OF-PROCEDURE

Reconnect this terminal back on the loop.

The problem is in the loop cable segment between this terminal and the next terminal in the direction of the loop data flow (that is, Loop segment 3 in the loop configuration example shown in Figure 18).

Observe the loop cable connections on either end of the loop segment for an electrical open condition and/or replace the cabling between the two terminals.

yes → Go back to Action 33 on page 58.

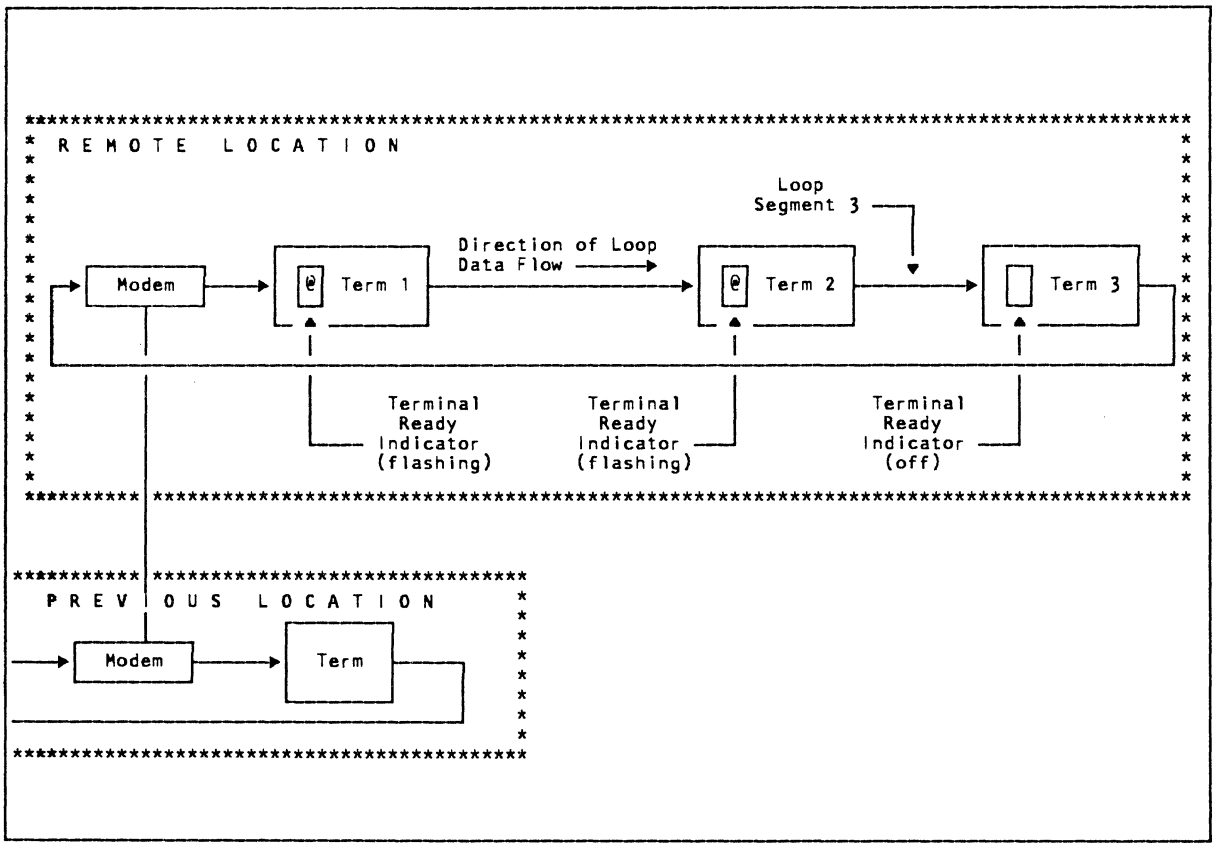
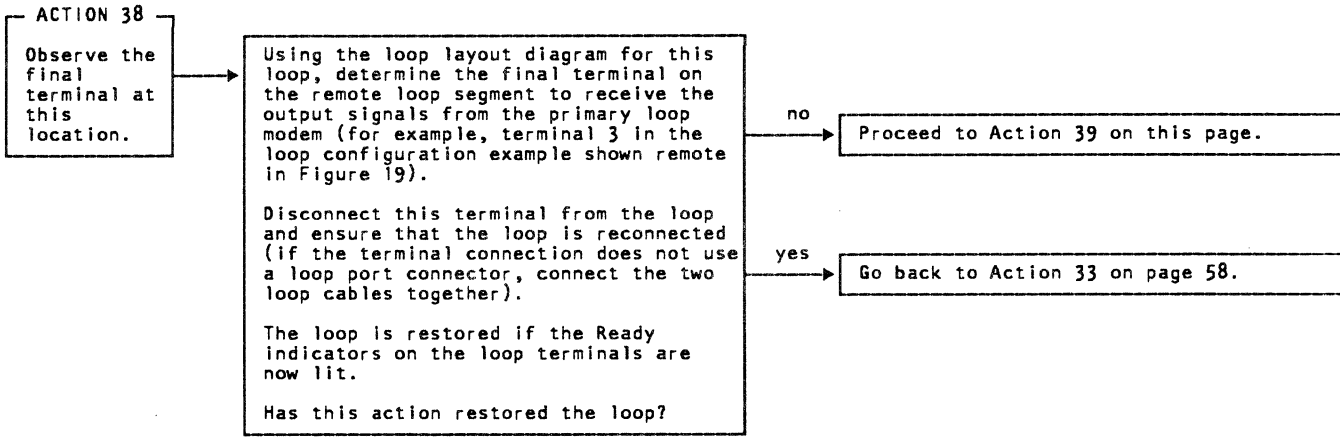
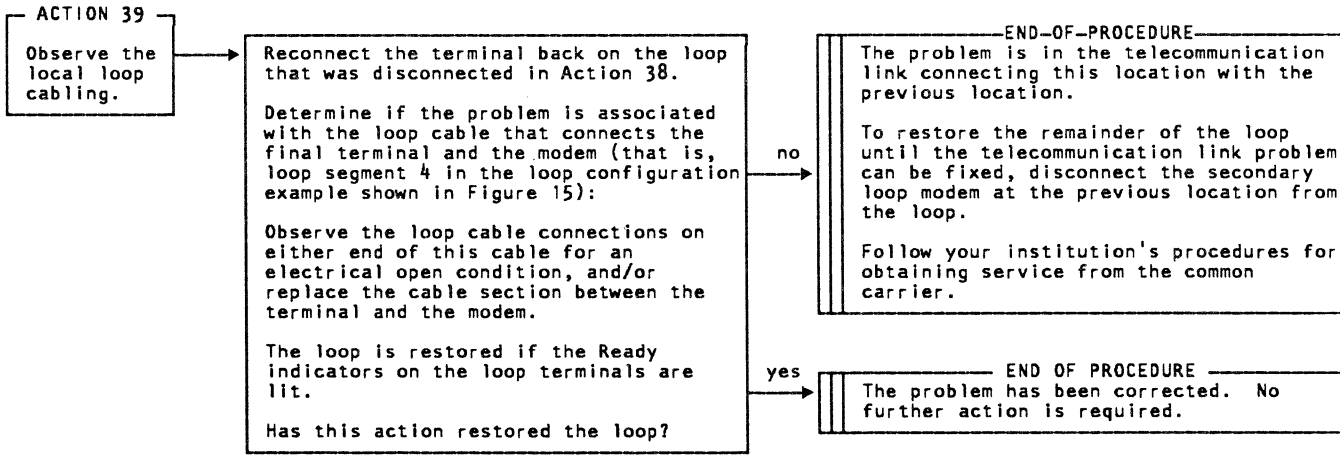


Figure 18. Example of a Remote Loop Configuration with Some Ready Indicators Flashing

Action	Method of Analysis	Recommendations





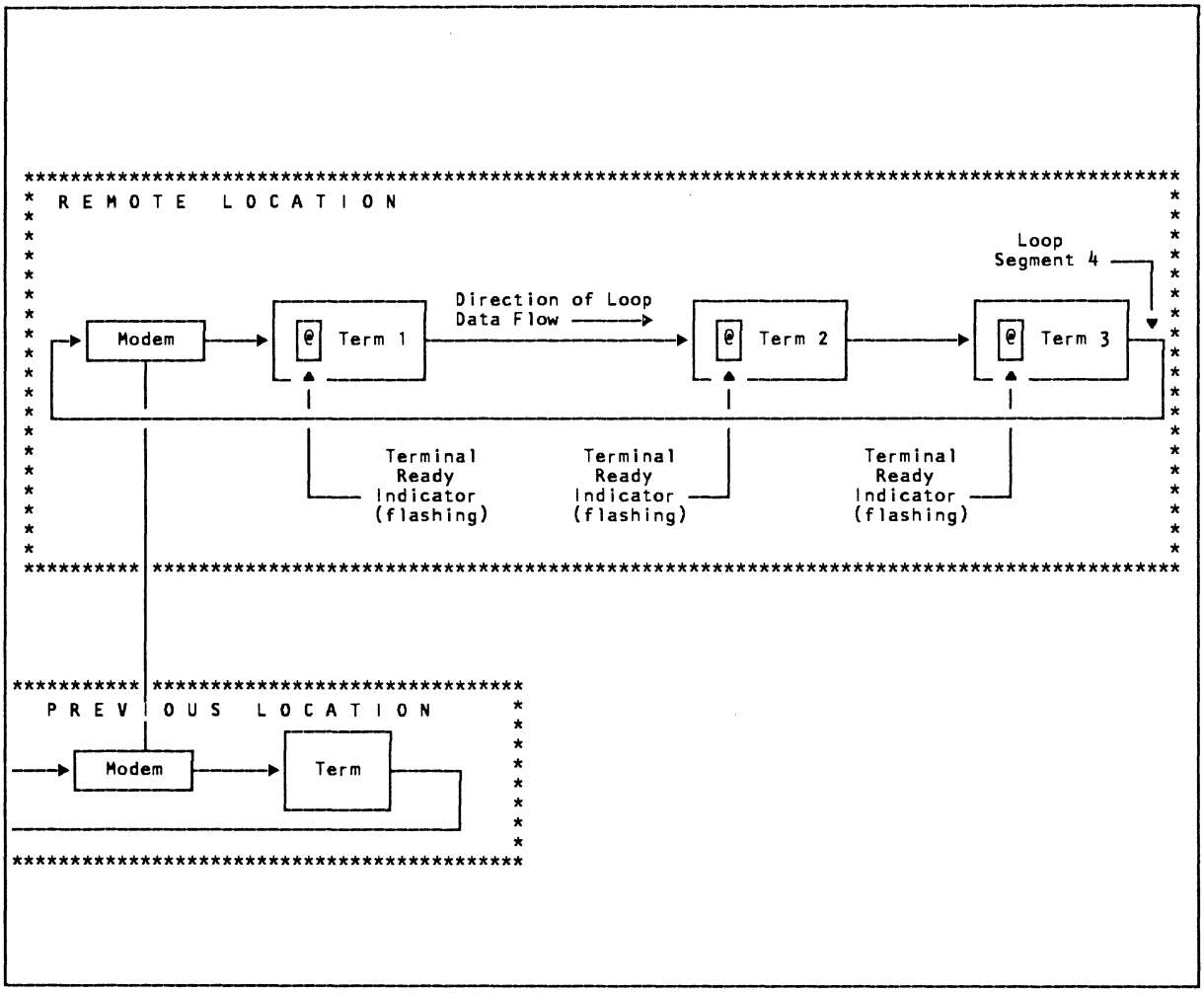
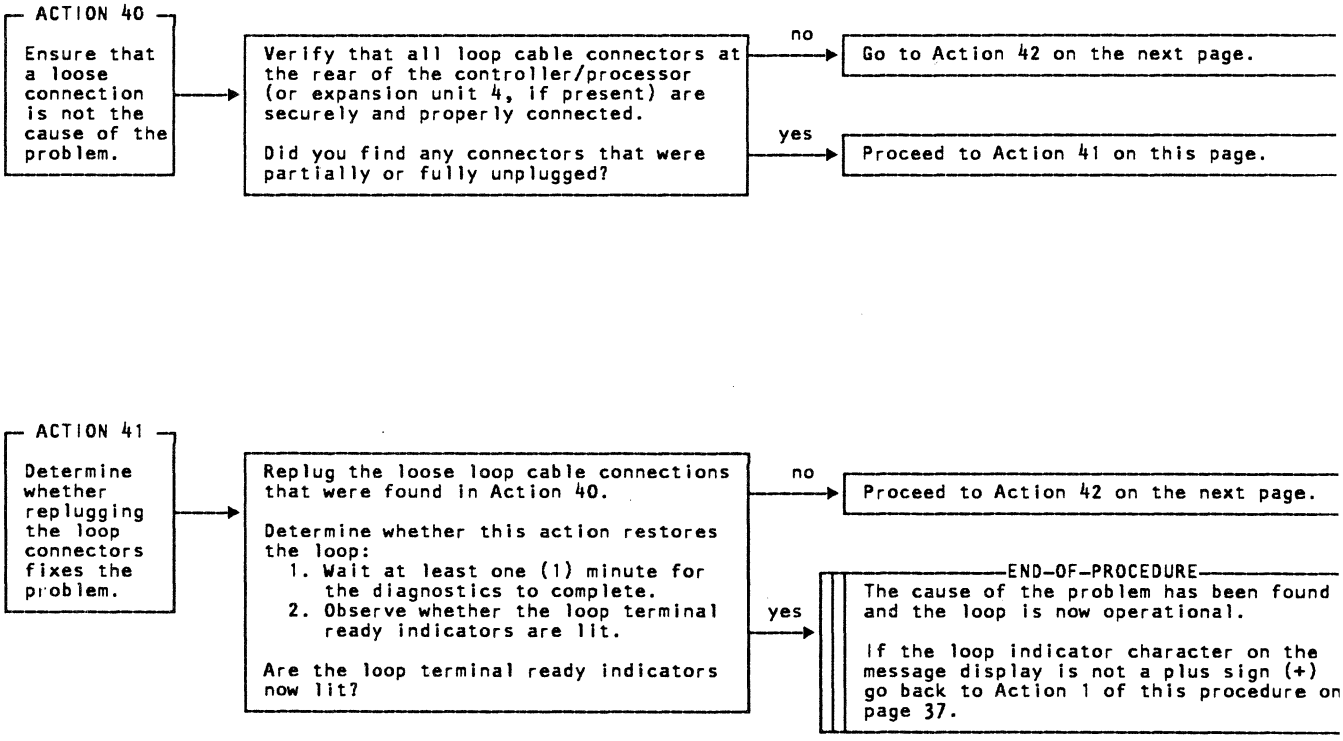


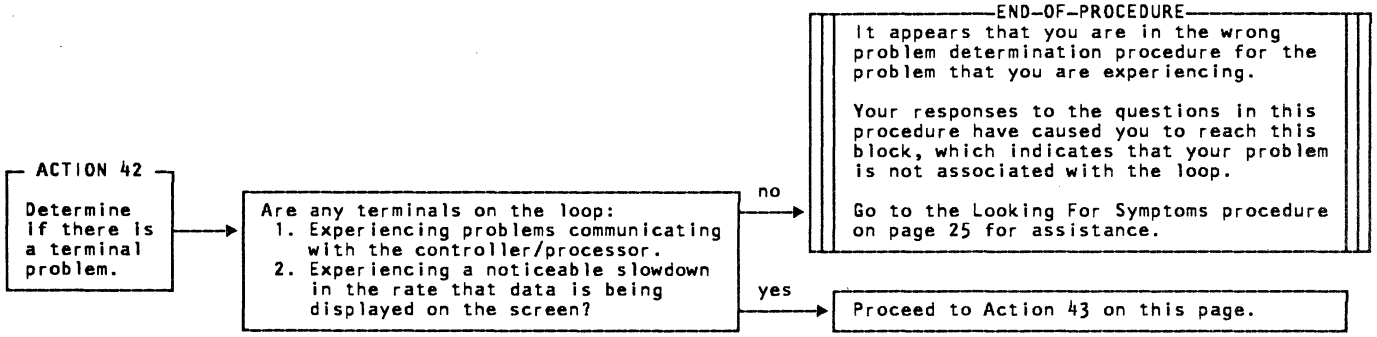
Figure 19. Example of a Remote Loop Configuration with All Ready Indicators Flashing

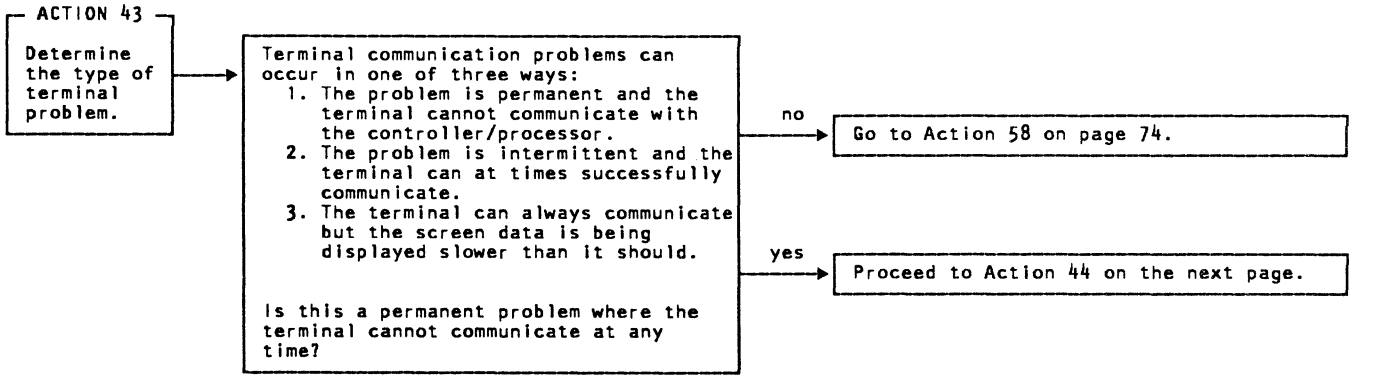
Action	Method of Analysis	Recommendations



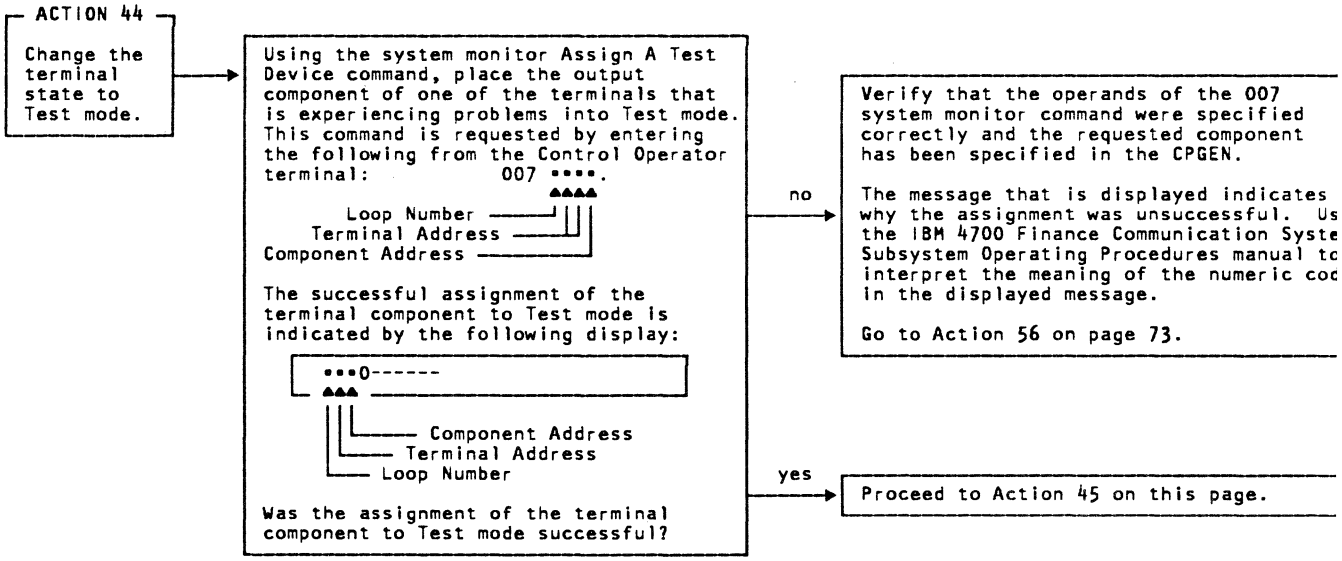
Action	Method of Analysis	Recommendations

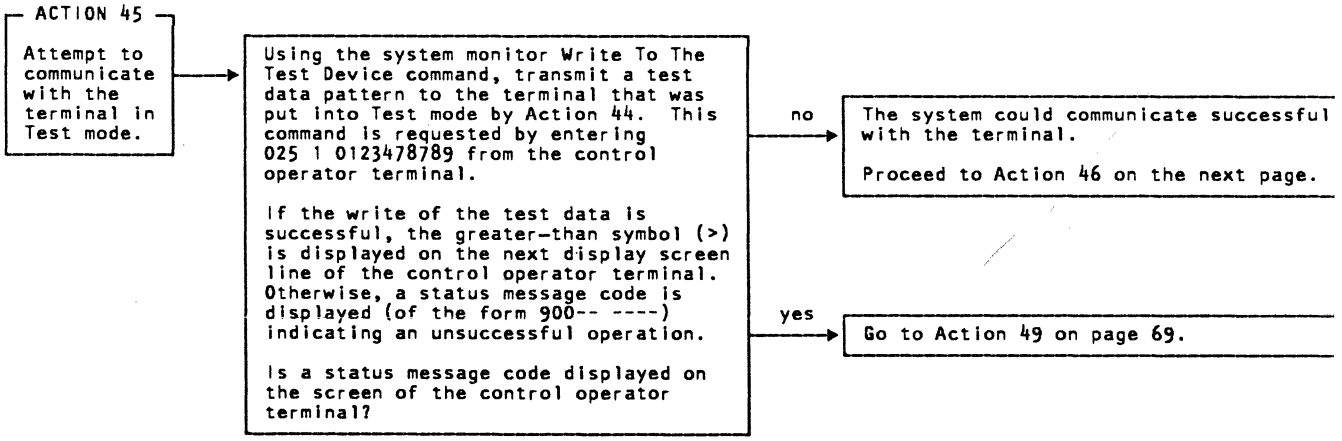
This portion of the procedure deals with those loop problems that do not cause the loop to become inoperable but cause a terminal(s) to be unable to communicate with the controller/processor.



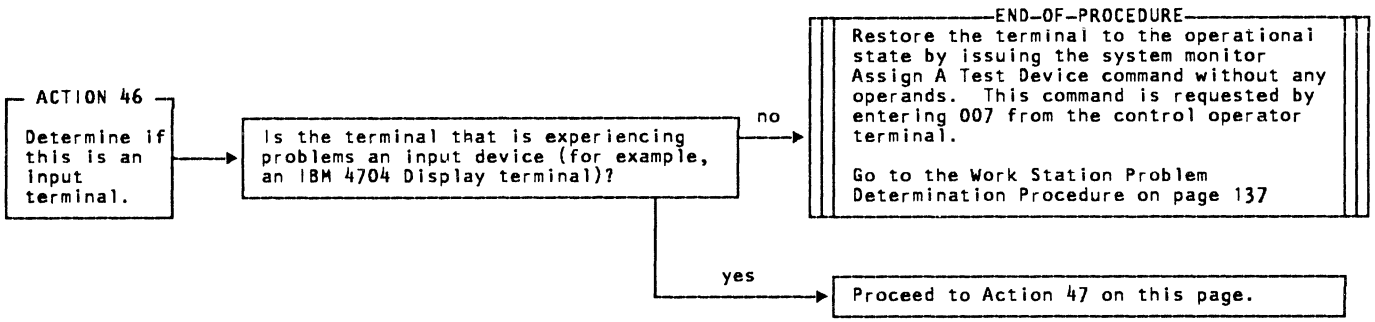


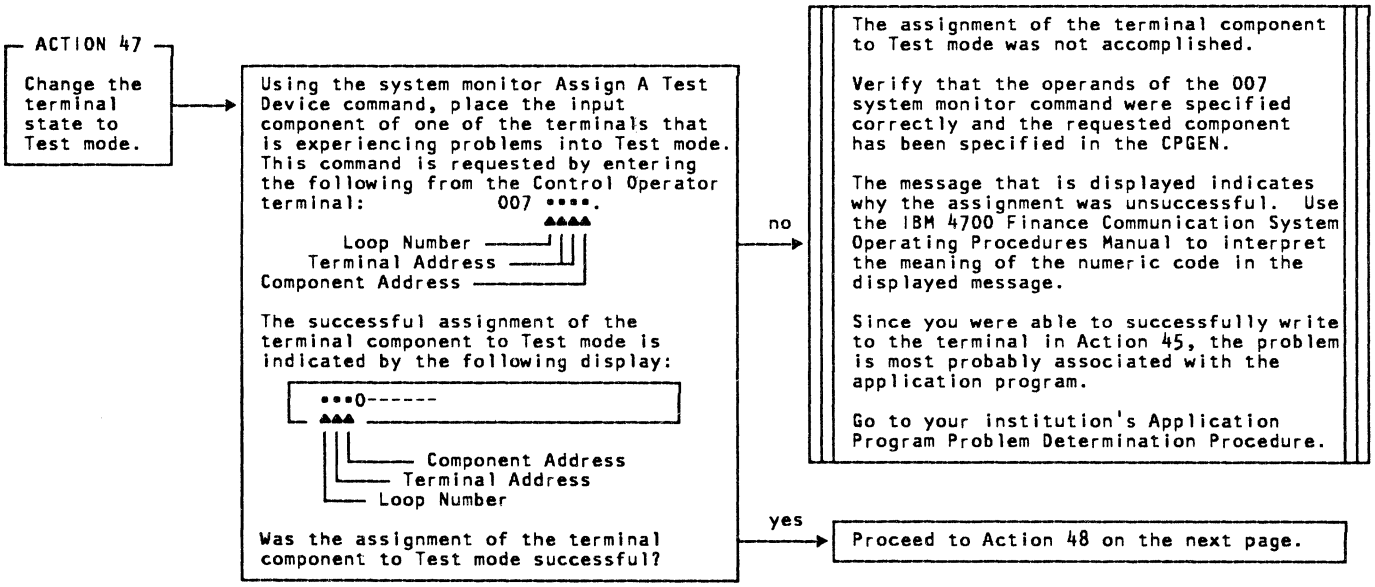
Action	Method of Analysis	Recommendations



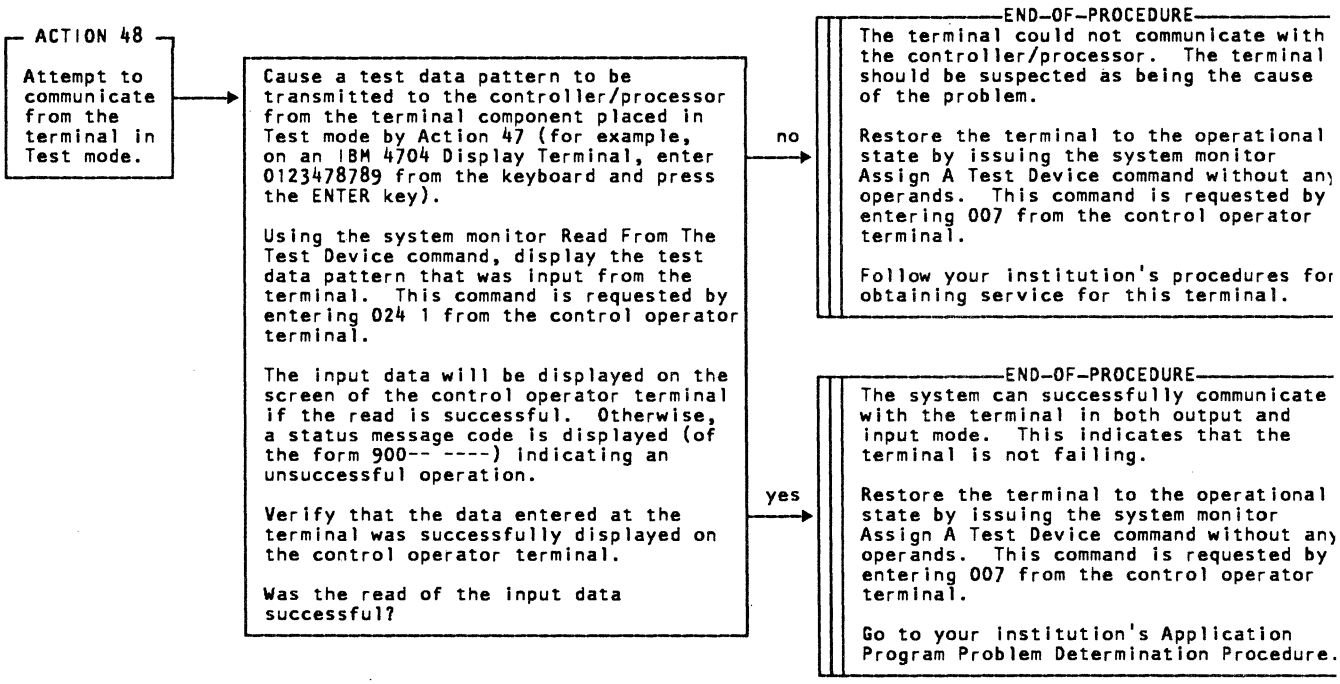


Action	Method of Analysis	Recommendations





Action	Method of Analysis	Recommendations



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 66.

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.

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/processor 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 page 72.

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?

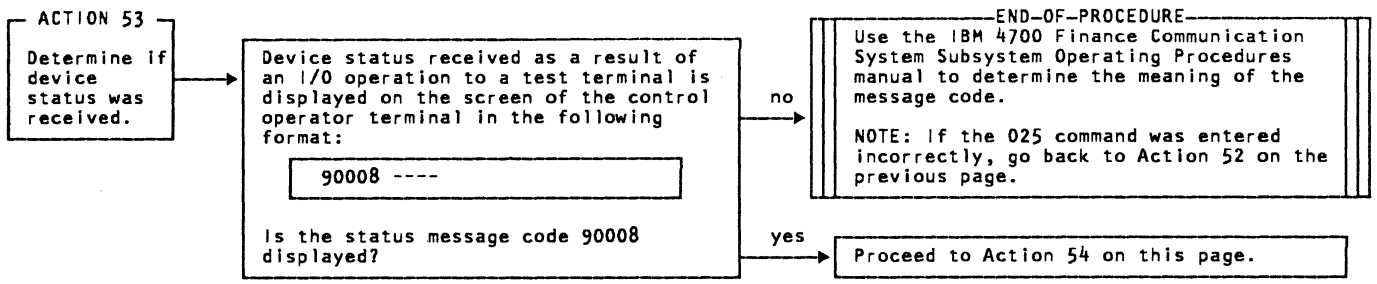
no → END-OF-PROCEDURE

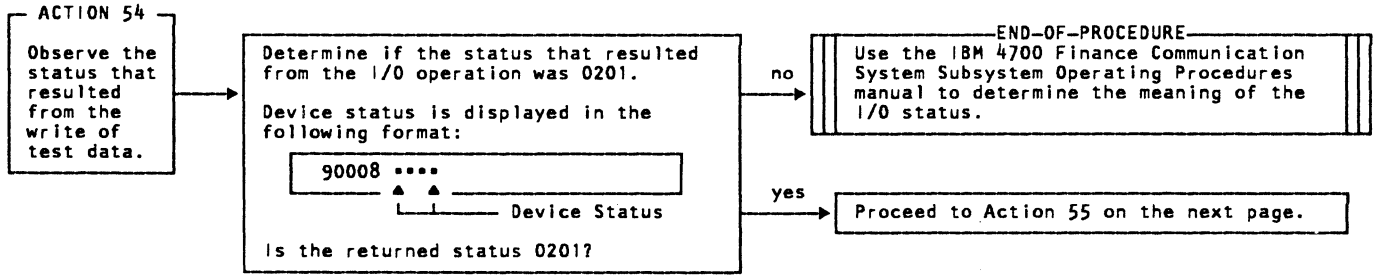
The system can successfully communicate with the terminal. The switch change appears to have corrected the problem.

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.

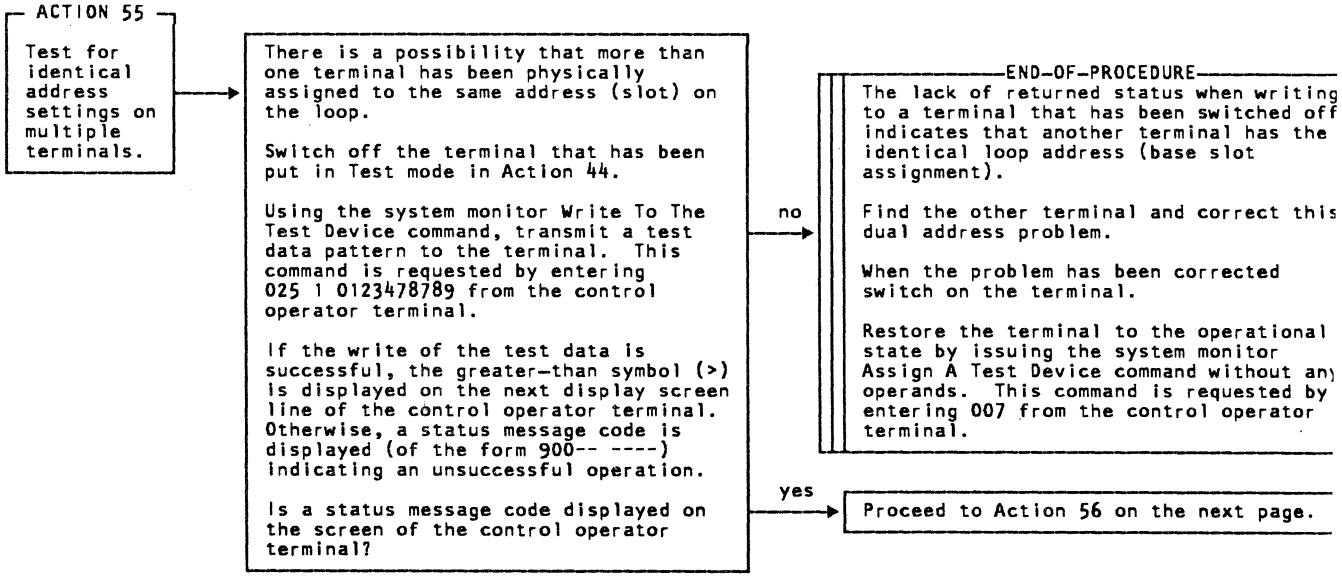
Action	Method of Analysis	Recommendations



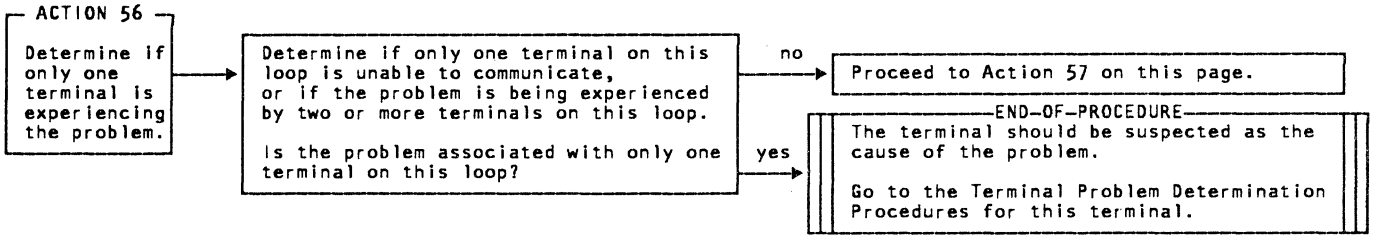


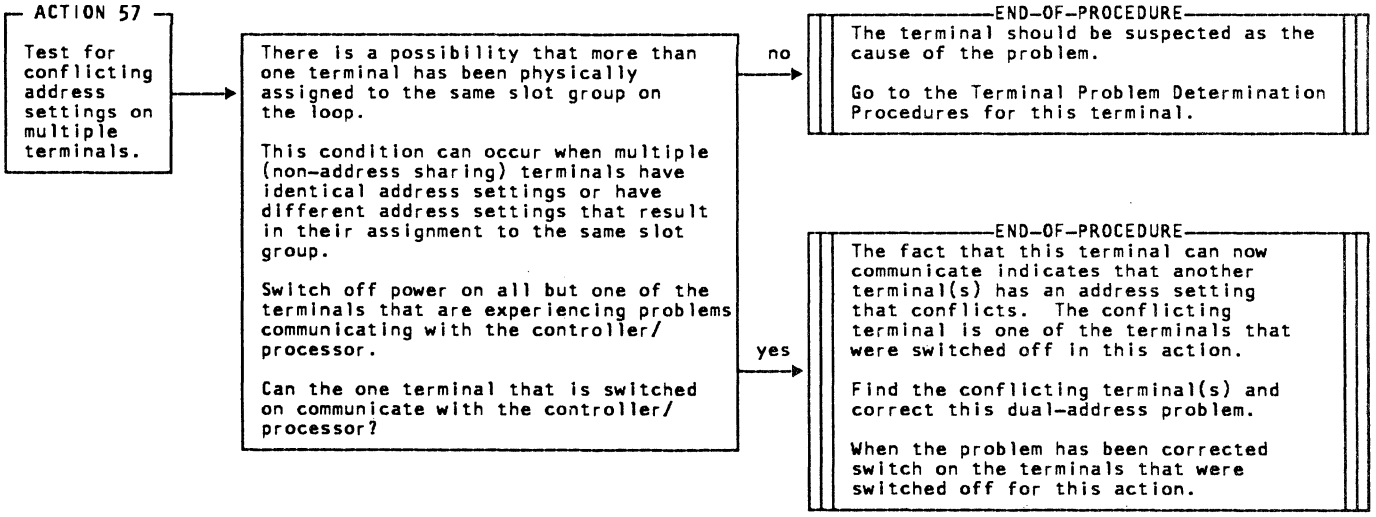
Action	Method of Analysis	Recommendations

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	Method of Analysis	Recommendations

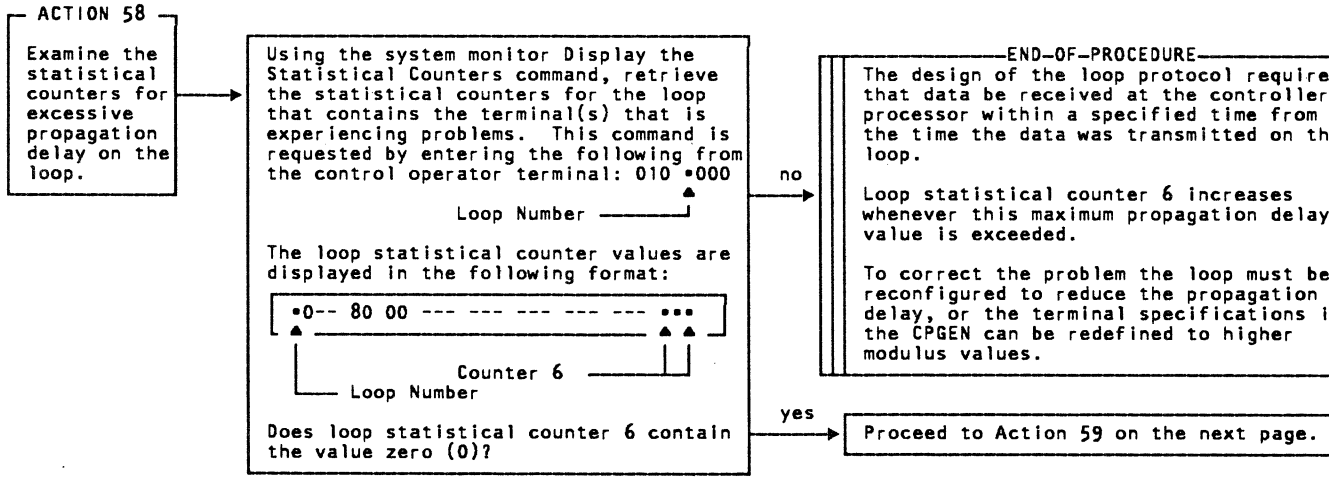




Action	Method of Analysis	Recommendations

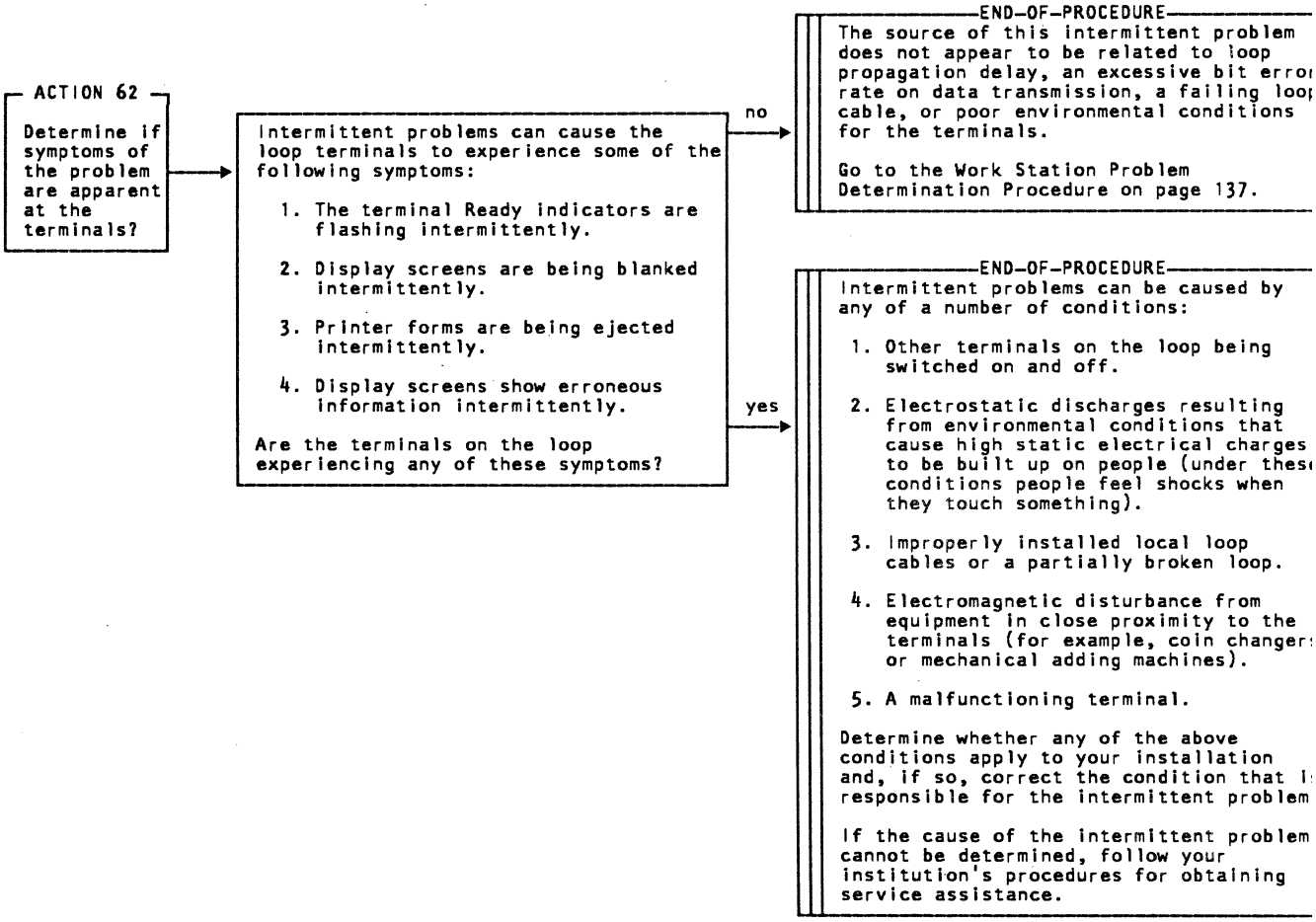
This portion of the procedure deals with intermittent loop problems.

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

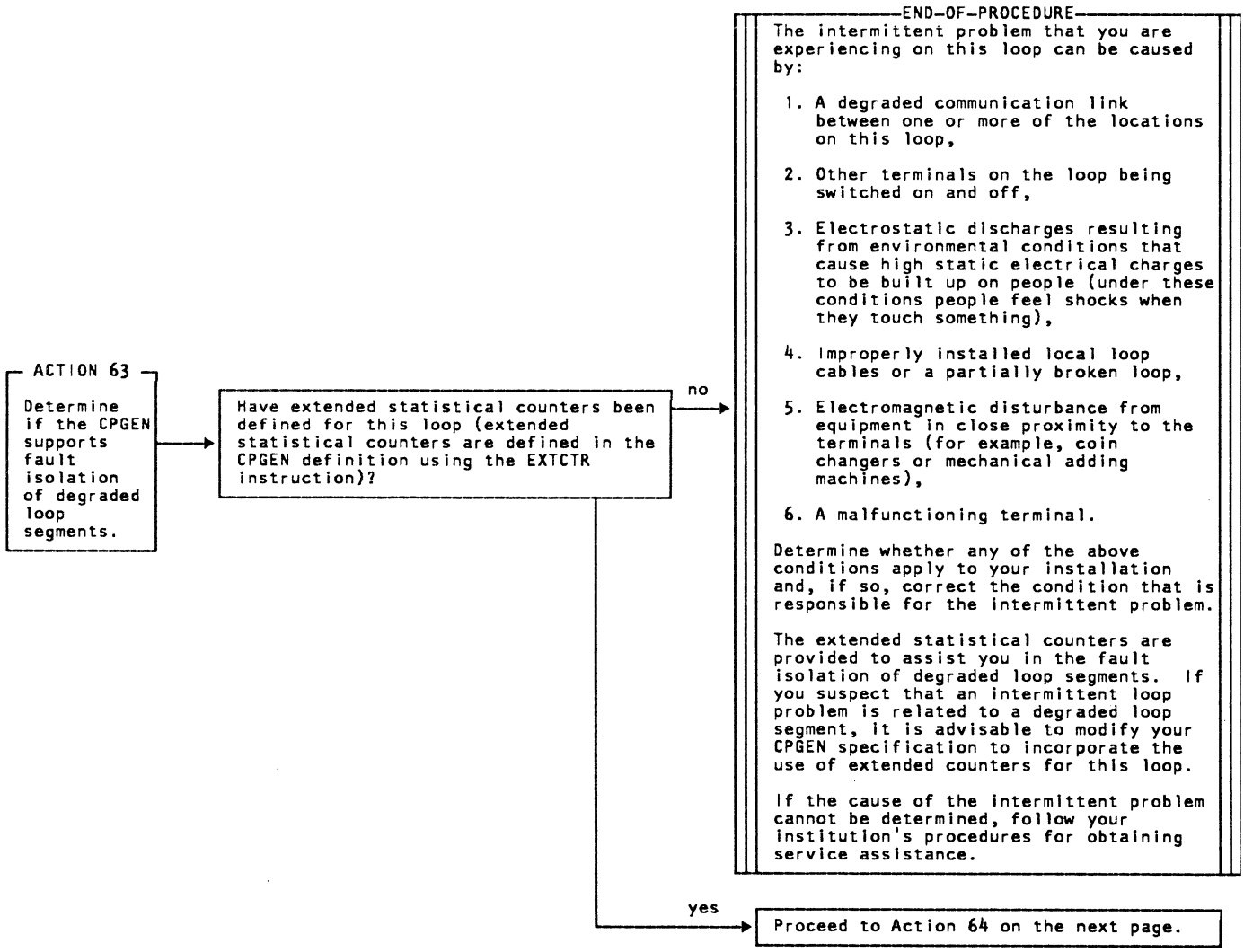


Action	Method of Analysis	Recommendations
ACTION 59 Determine if the loop contains any remote segments.	Use the loop layout diagram for this loop to determine whether there are any remote loop segments on the loop. Does the failing loop contain any remote segments?	no → Go to Action 62 on the next page. yes → Proceed to Action 60 on this page.
ACTION 60 Determine if the loop contains only one remote segment.	Use the loop layout diagram for this loop to determine whether there is only one remote loop segment on the loop. Does the failing loop contain only one remote segment.	no → Go to Action 63 on page 77. yes → Proceed to Action 61 on this page.
ACTION 61 Examine the statistical counters for an excessive bit error rate on the loop.	Use the loop statistical counter values displayed in Action 58. The loop statistical counter values are displayed in the following format: •0-- 80 00 --- ••• --- --- --- --- Counter 2 Loop Number Does loop statistical counter 2 contain the value zero (0)?	no → END-OF-PROCEDURE Loop statistical counter 2 records the occurrence of an excessive bit error rate on the loop. The fact that this counter is nonzero indicates that the bit error rate that was measured on this loop exceeded one error in 80 000 bits. Follow your institution's procedures for obtaining service from the common carrier to correct the poor quality communication link to the remote site. yes → Proceed to Action 62 on the next page.

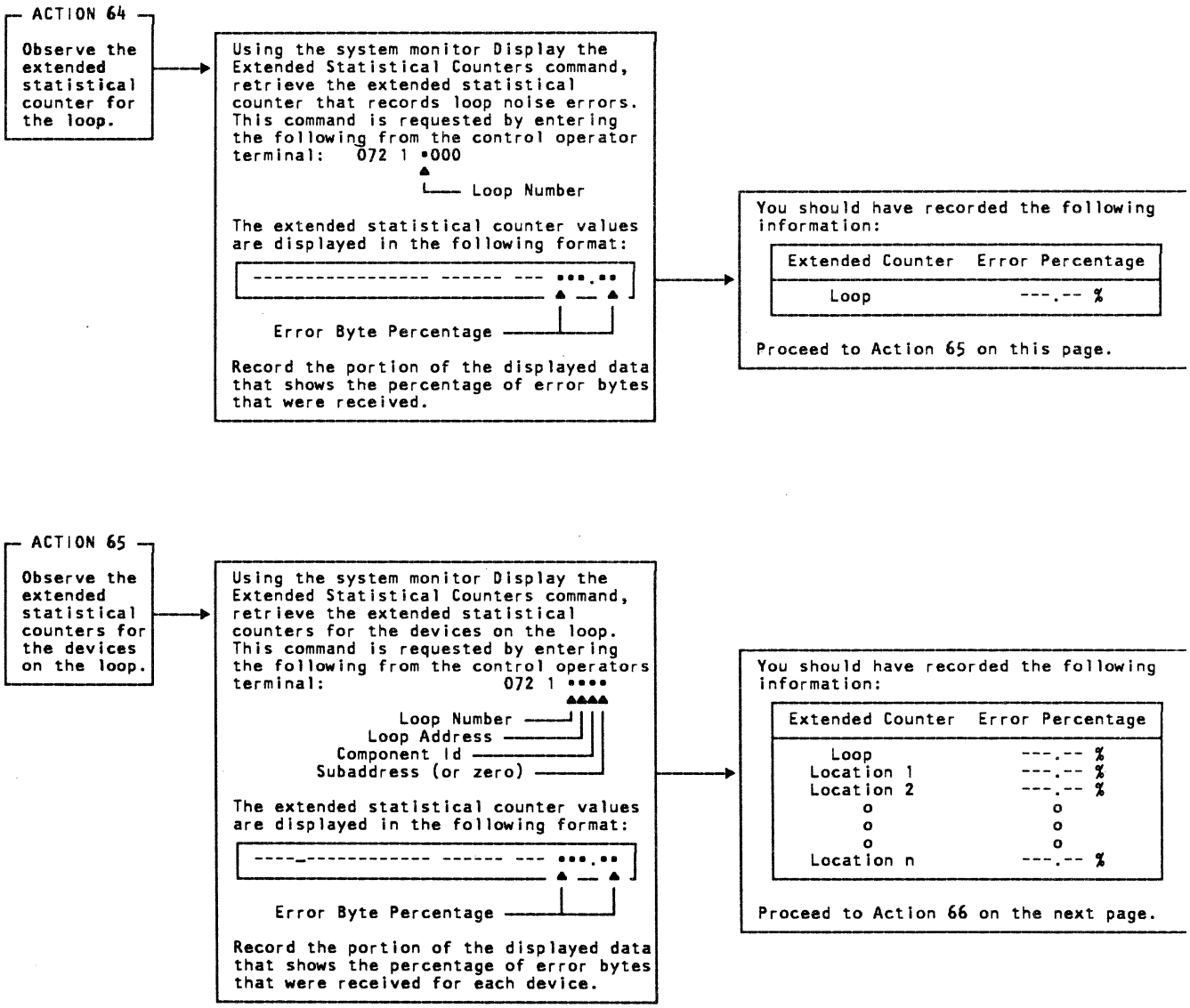
Action	Method of Analysis	Recommendations



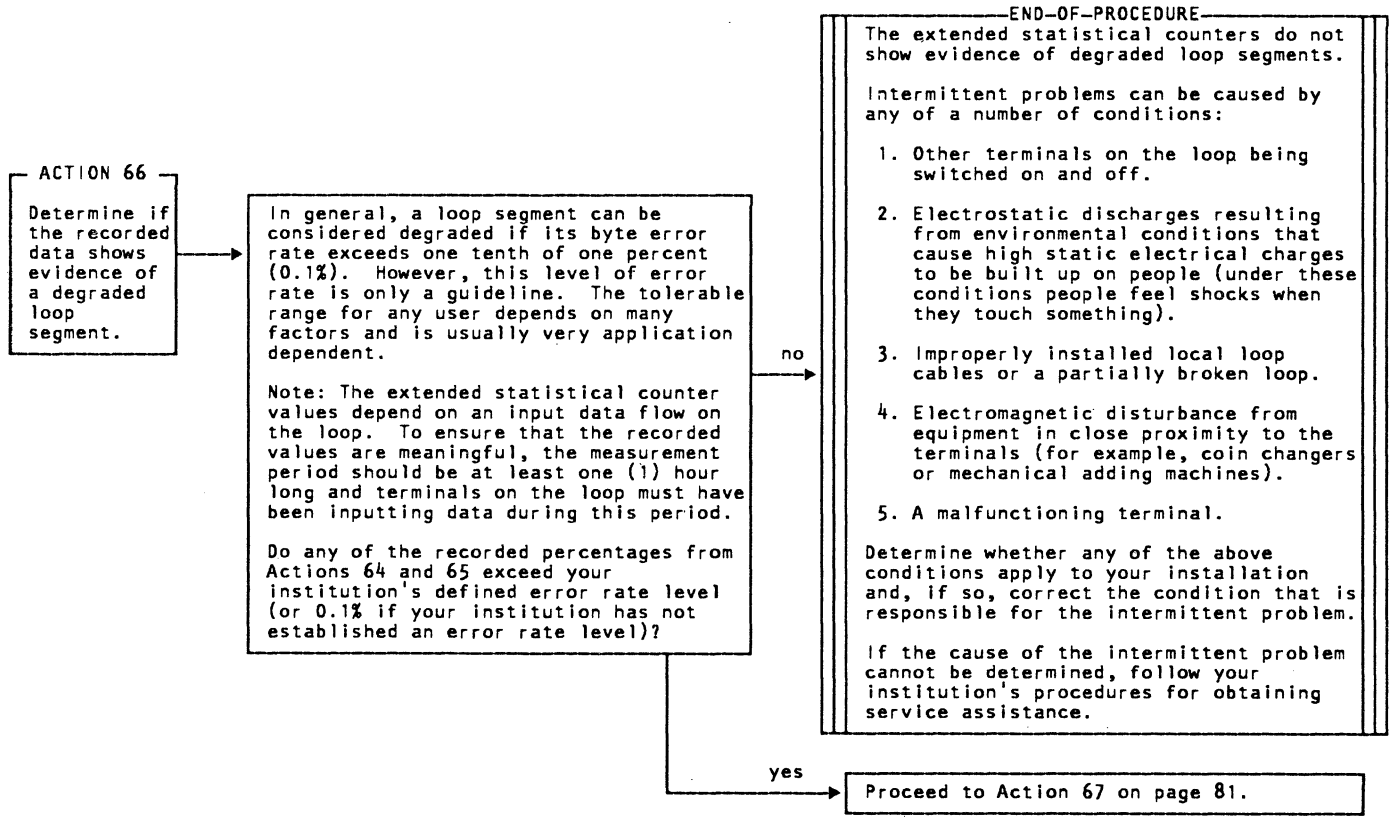
Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations



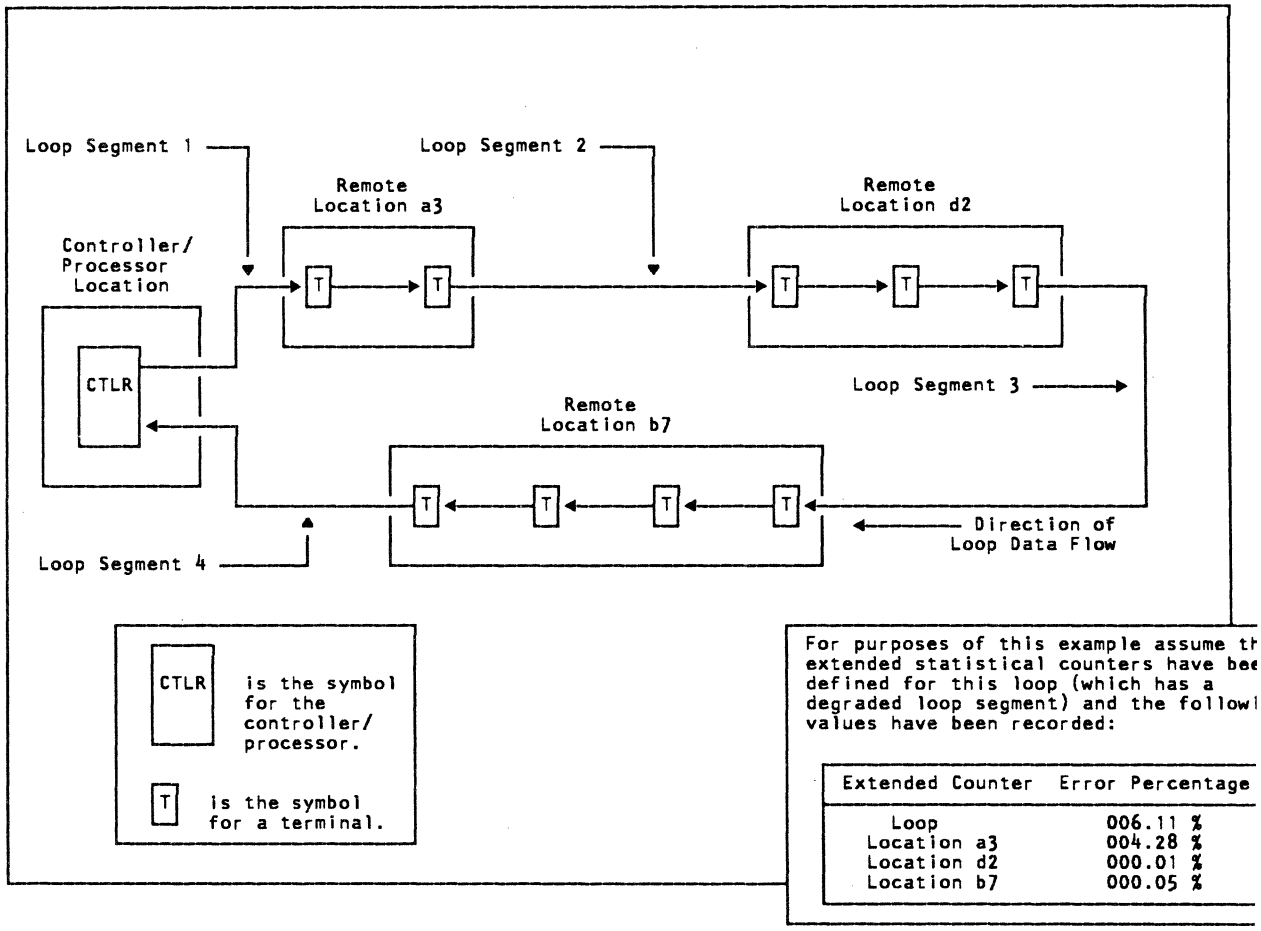
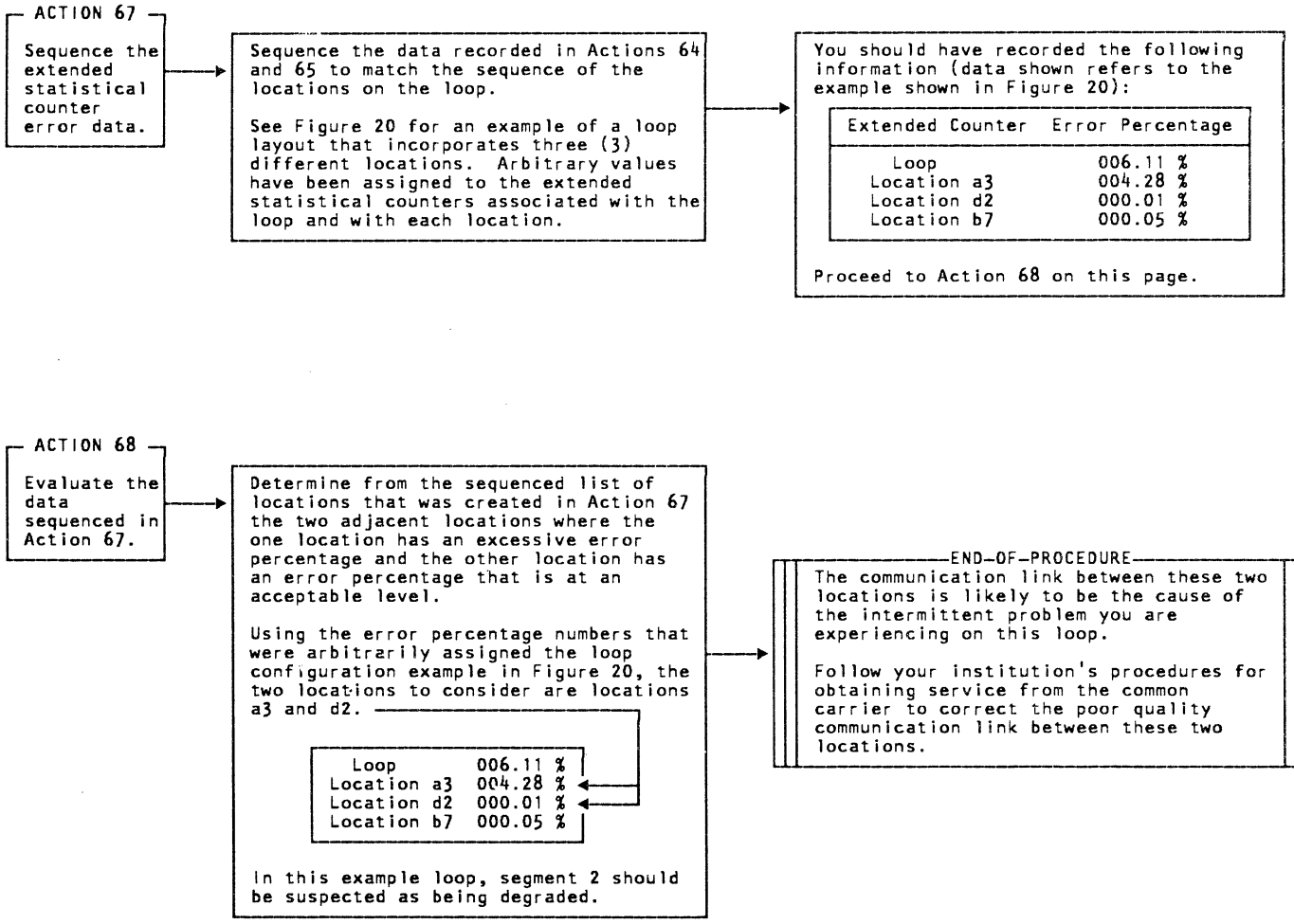


Figure 20. Example of a Multi–location Loop Configuration with a Degraded Loop Segment (loop segment 2)

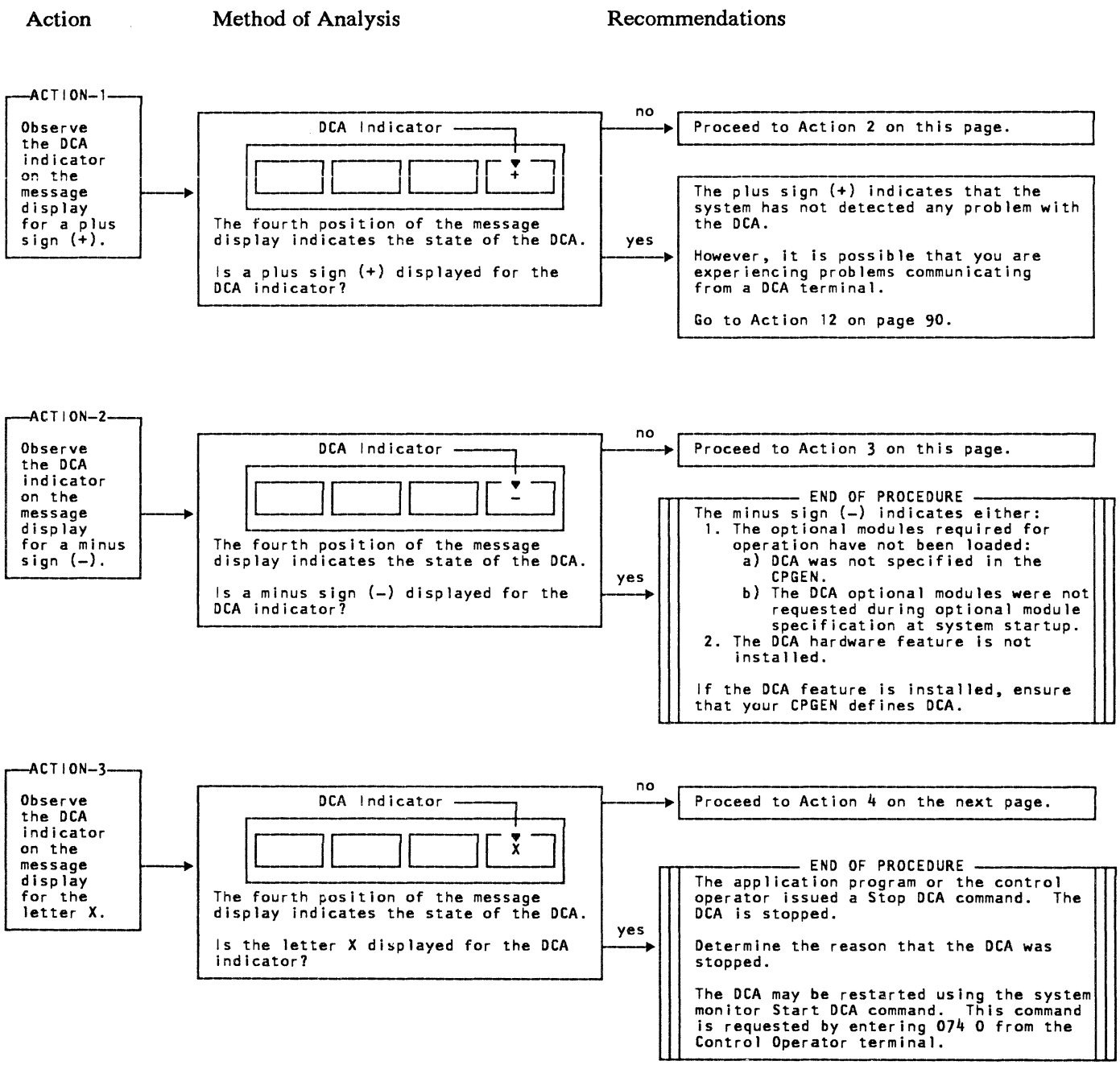
Action	Method of Analysis	Recommendations

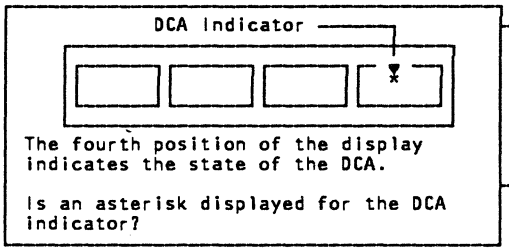
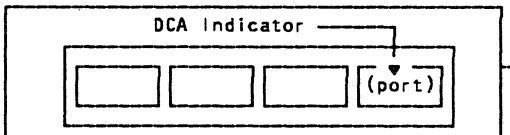
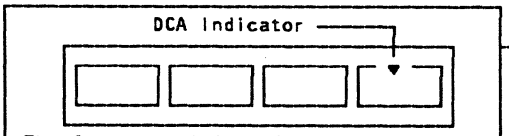


Chapter Four
Device Cluster Adapter Problem Determination Procedure

Chapter Four
Device Cluster Adapter Problem Determination Procedure

PDP02 - DCA Problem Determination Procedure



Action	Method of Analysis	Recommendations
ACTION-4 Observe the DCA indicator on the display for an asterisk.	 The fourth position of the 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/processor should still be operational. Follow your institution's procedures for obtaining service for the DCA.
ACTION-5 Observe the DCA indicator on the message display for a port number.	 The fourth position of the 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, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, or V?	no → Proceed to Action 6 on this page. yes → The character 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 message display is valid.	 The fourth position of the 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, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, or V?	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 by contacting IBM 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 85.

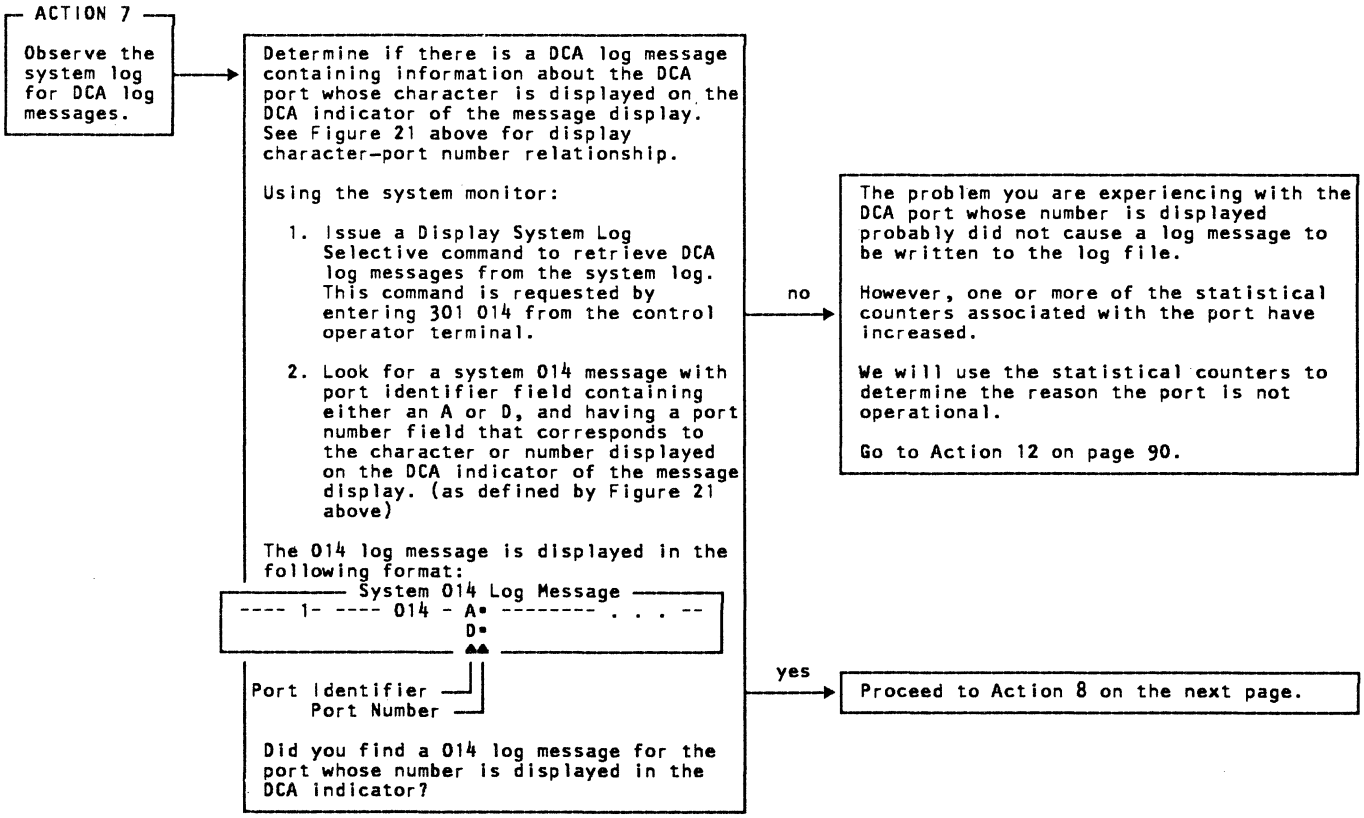
Action	Method of Analysis	Recommendations

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

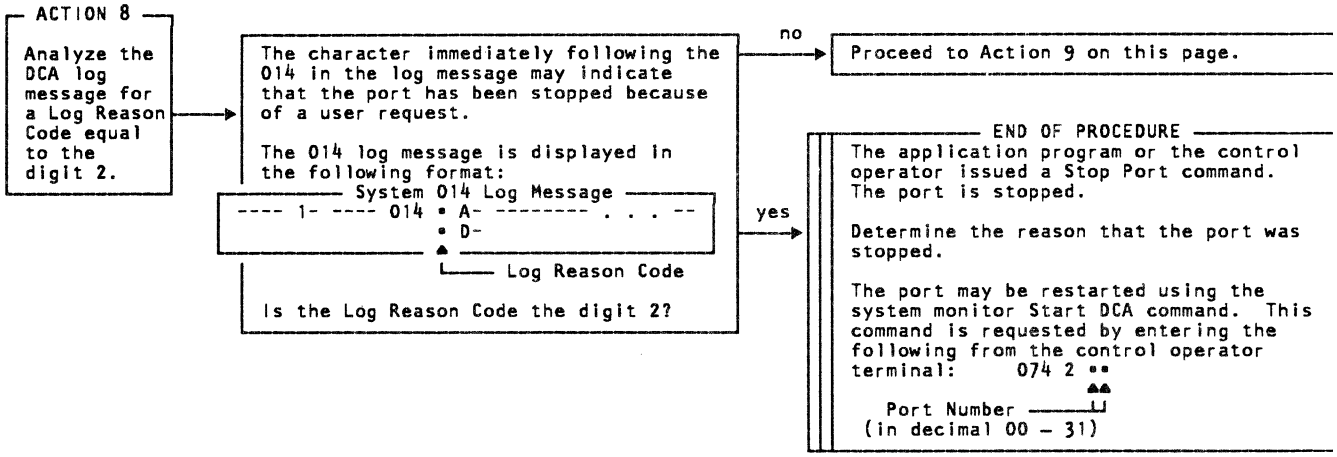
To reach this point in the procedure you will be experiencing problems with a DCA terminal. These problems may or may not cause the associated DCA port to be stopped.

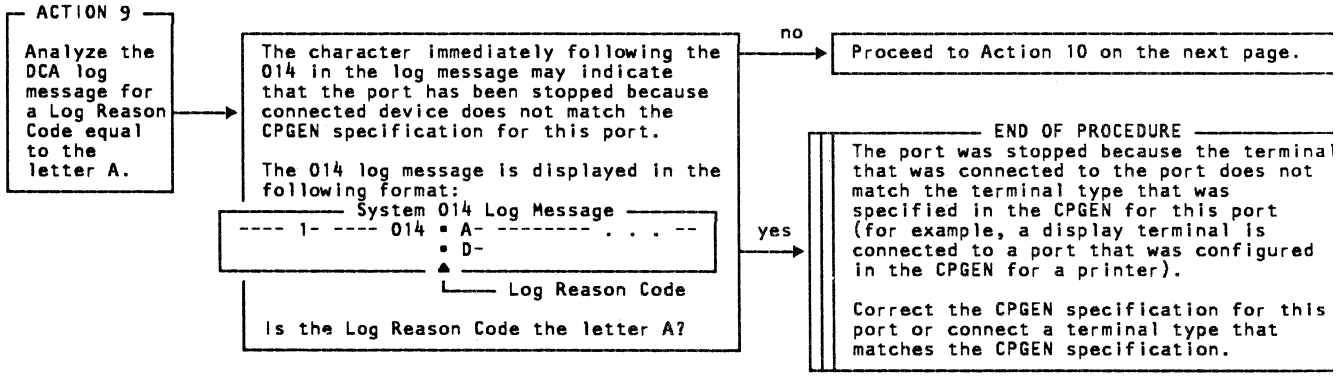
	Message Character Displayed	Port ID in System Log	Port Number in System Log	Port Number to be Used with System Monitor Commands: 010	074
DCA Ports 0 thru 15	0 thru F	A	0 thru F	A 00 - 15	00 - 15
DCA Ports 16 thru 31	G thru V	D	0 thru F	D 00 - 15	16 - 31

Figure 21. Example of DCA Port Assignment

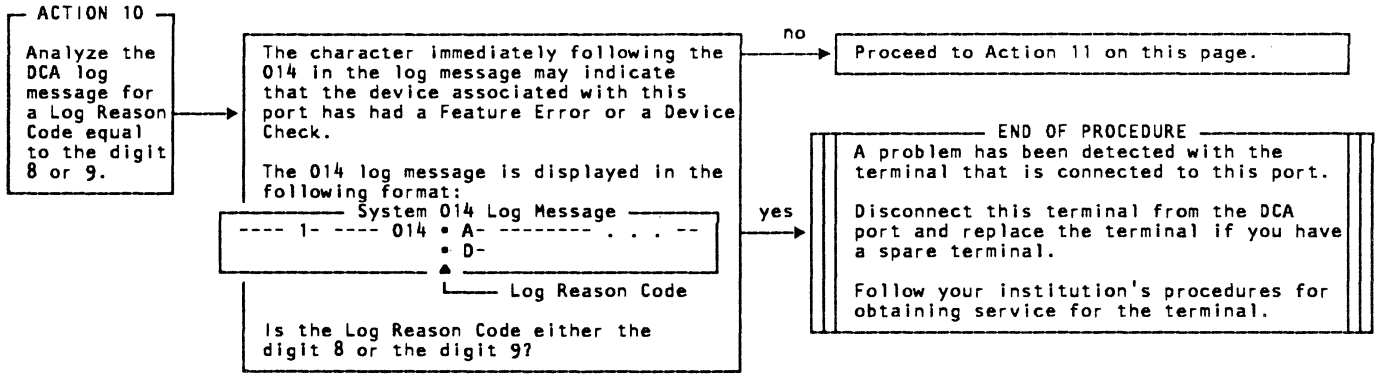


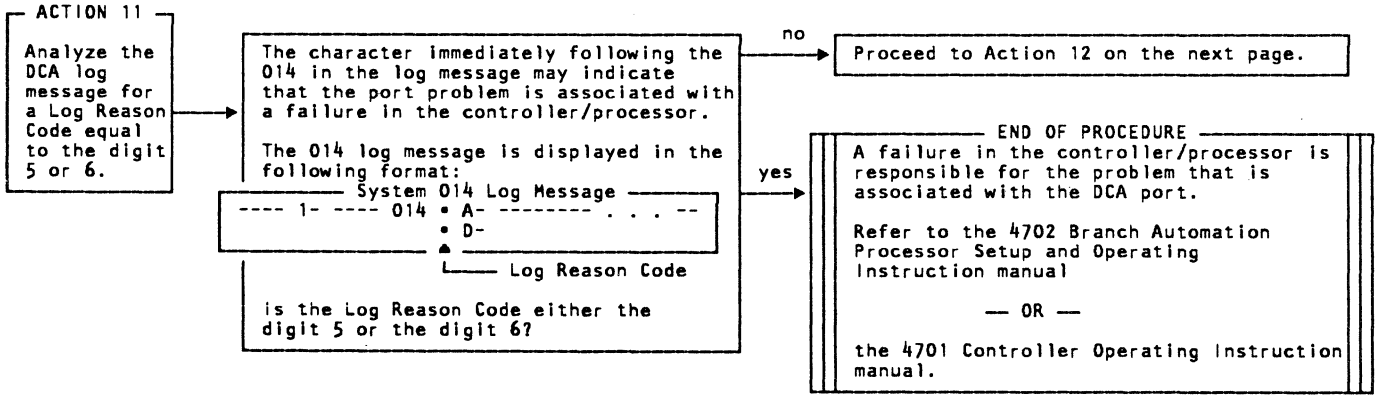
Action	Method of Analysis	Recommendations





Action	Method of Analysis	Recommendations





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.

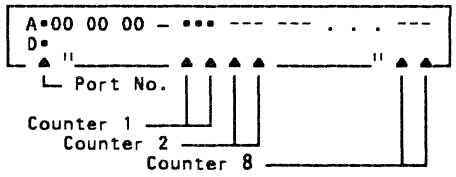
Determine whether statistical counter 1, for the port having the problem, has increased.

Use the system monitor Display Statistical Counters command to display the counters associated with the port having problems. This command is requested by entering one of the following commands from the control operators terminal. Refer to Figure 21 for which command to use.

010 A••0 (–or–) 010 D••0

Port Number (in decimal 00 – 15)

The statistical counter values are displayed in the following format:



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

no → Proceed to Action 13 on the next page.

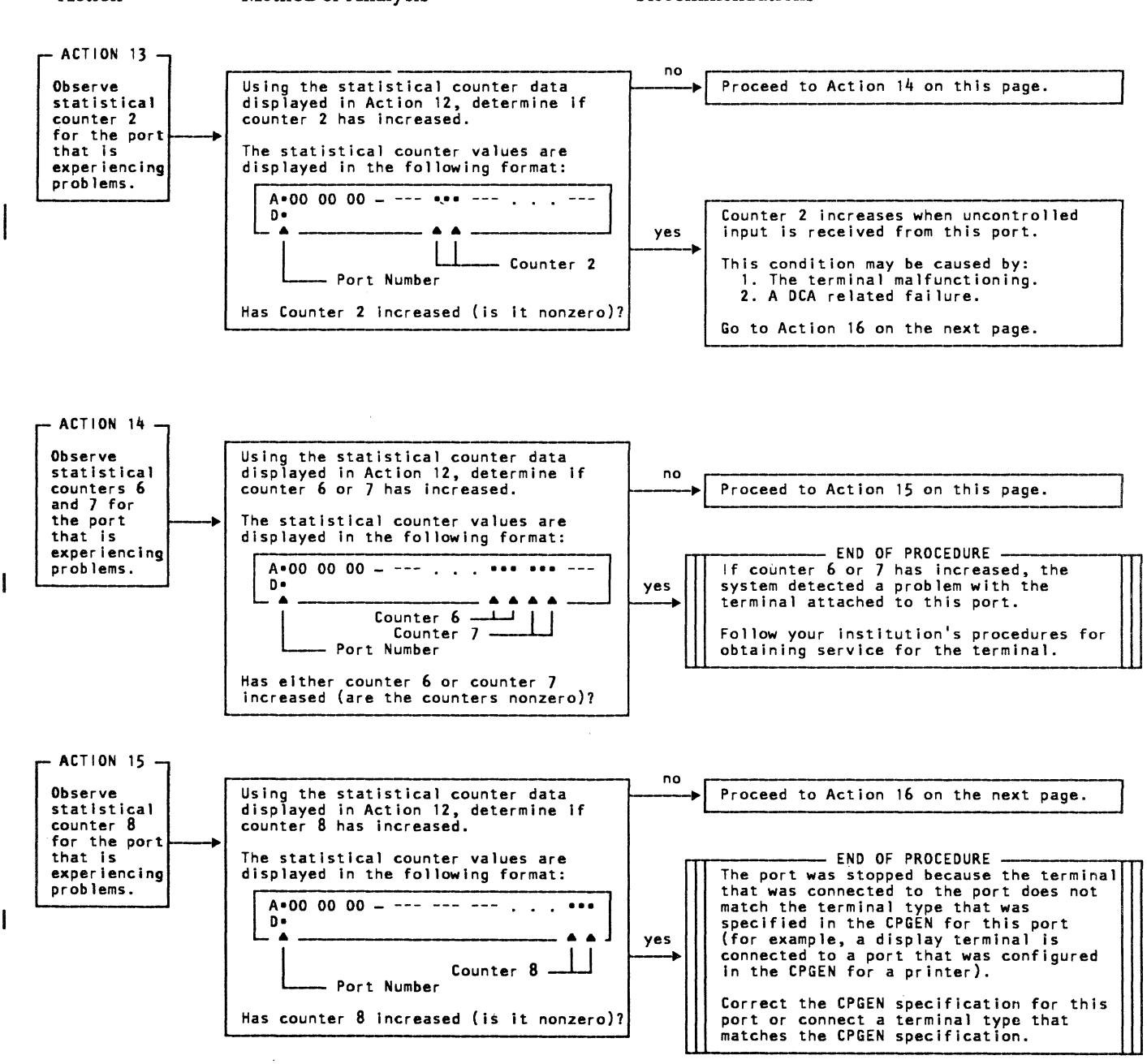
yes →

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

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

This condition may be caused by:
1. The terminal being switched off.
2. The terminal being disconnected.
3. The terminal malfunctioning.
4. A DCA related failure.

Go to Action 16 on page 92.


Action
Method of Analysis
Recommendations
ACTION 13
Observe statistical counter 2 for the port that is experiencing problems.
Using the statistical counter data displayed in Action 12, determine if counter 2 has increased.
The statistical counter values are displayed in the following format:
A•00 00 00 – --- •,•• --- . . . ---
D•
Counter 2
Port Number
Has Counter 2 increased (is it nonzero)?
no
Proceed to Action 14 on this page.
yes
Counter 2 increases when uncontrolled input is received from this port.
This condition may be caused by:
1. The terminal malfunctioning.
2. A DCA related failure.
Go to Action 16 on the next page.
ACTION 14
Observe statistical counters 6 and 7 for the port that is experiencing problems.
Using the statistical counter data displayed in Action 12, determine if counter 6 or 7 has increased.
The statistical counter values are displayed in the following format:
A•00 00 00 – --- . . . ••• ••• ---
D•
Counter 6
Counter 7
Port Number
Has either counter 6 or counter 7 increased (are the counters nonzero)?
no
Proceed to Action 15 on this page.
yes
END OF PROCEDURE
If counter 6 or 7 has increased, the system detected a problem with the terminal attached to this port.
Follow your institution's procedures for obtaining service for the terminal.
ACTION 15
Observe statistical counter 8 for the port that is experiencing problems.
Using the statistical counter data displayed in Action 12, determine if counter 8 has increased.
The statistical counter values are displayed in the following format:
A•00 00 00 – --- --- --- . . . •••
D•
Counter 8
Port Number
Has counter 8 increased (is it nonzero)?
no
Proceed to Action 16 on the next page.
yes
END OF PROCEDURE
The port was stopped because the terminal that was connected to the port does not match the terminal type that was specified in the CPGEN for this port (for example, a display terminal is connected to a port that was configured in the CPGEN for a printer).
Correct the CPGEN specification for this port or connect a terminal type that matches the CPGEN specification.

Action	Method of Analysis	Recommendations

Verify that the problem with the DCA port is not caused by a loose or open coaxial cable connection.

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/processor.
2. At the terminal.

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

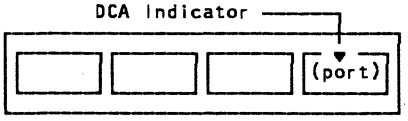
- no → Go to Action 18 on the next page.
- yes → Proceed to Action 17 on this page.

ACTION 17

Determine whether replugging the DCA connectors fixes the problem.

Replug the loose DCA cable connections that were found in Action 16.

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



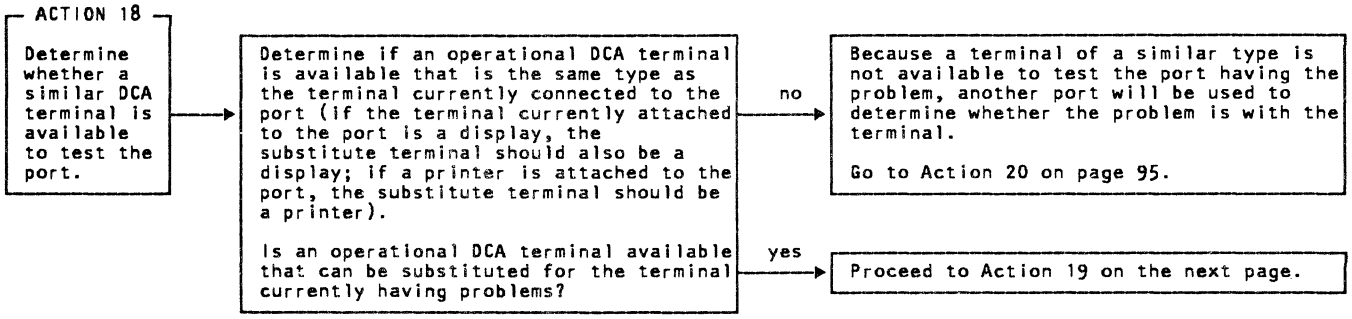
Is the number of the port that was not operational still being displayed?

- 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 85.
- yes → Proceed to Action 18 on the next page.

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	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) is failing. If the terminal does not become operational, the DCA port is failing and the controller/processor requires service.

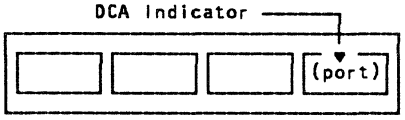
ACTION 19

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

To determine if the problem is associated with the controller/processor, 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 by disconnecting the controller/processor end of the coaxial cable.
2. Attach the substitute terminal using a different coaxial cable.
3. Switch the substitute terminal off and on.
4. Observe the DCA indicator on the 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 message display indicates that the currently attached terminal is operational.

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

Verify that the coaxial cable associate 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 experiencin the same problem as the originally connected terminal.

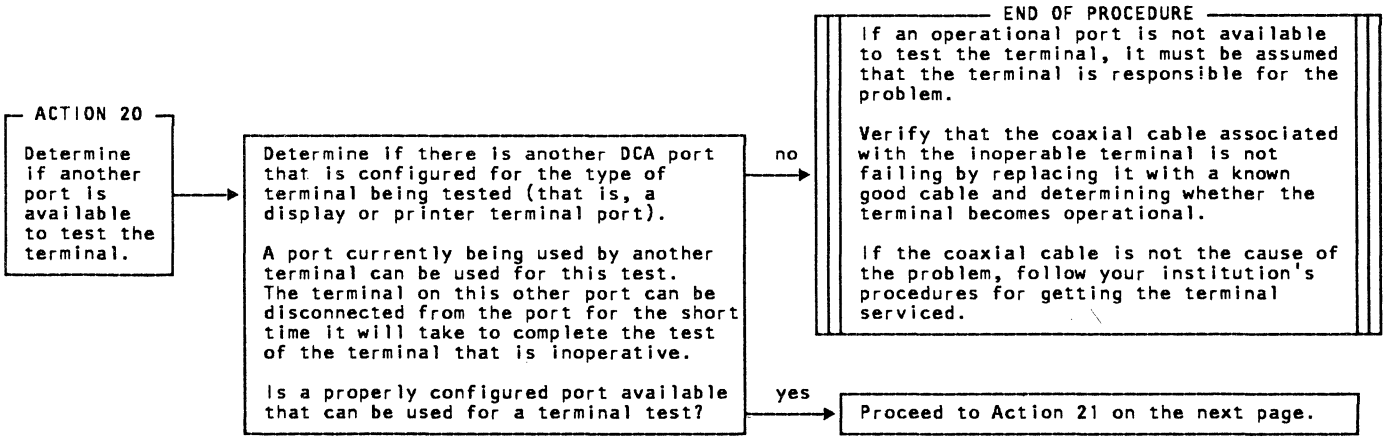
The controller/processor is malfunctioning.

Follow your institution's procedures fo obtaining service.

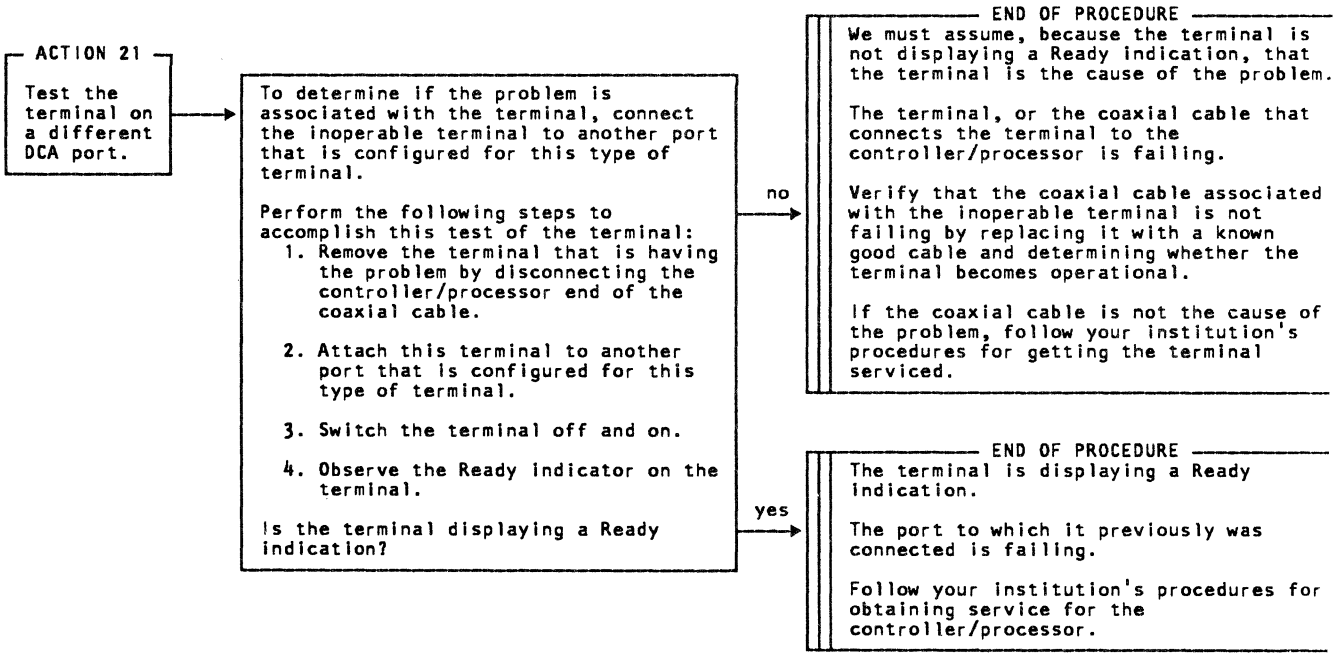
Action	Method of Analysis	Recommendations

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 becomes operational, the port that it was previously connected to is failing and the controller/processor requires service. If the terminal does not become operational, the problem is with the terminal.



Action	Method of Analysis	Recommendations

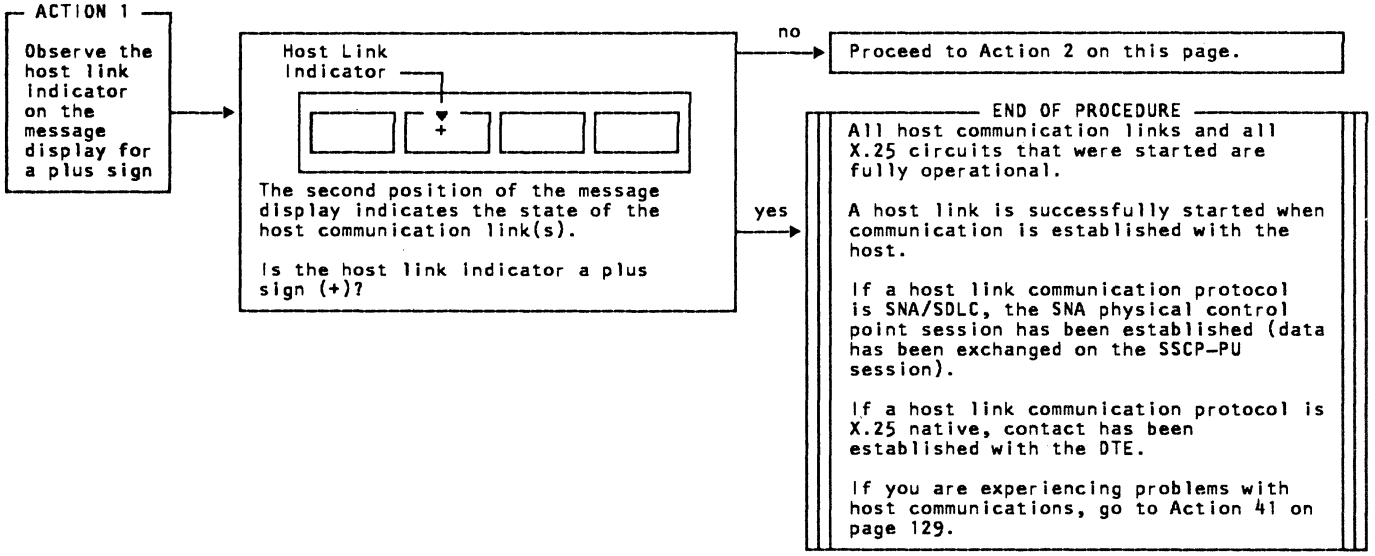


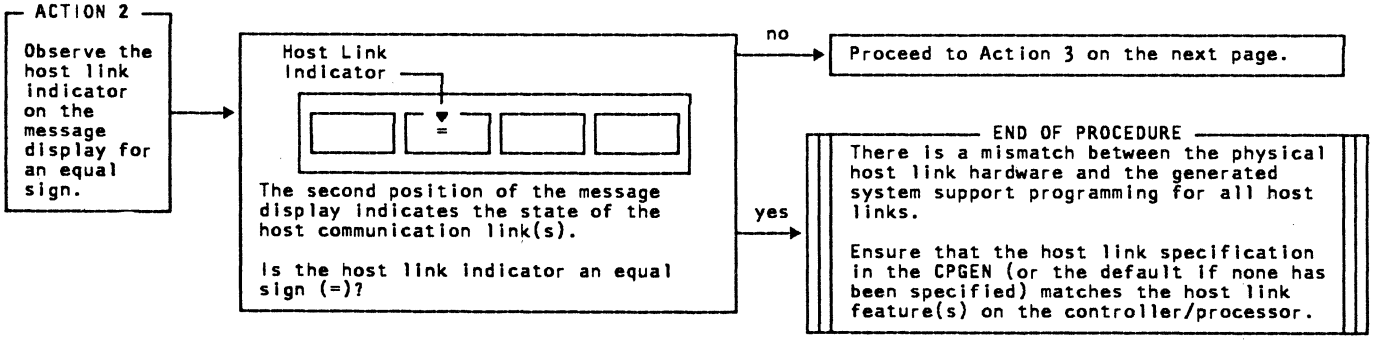
Chapter Five
Host Link Problem Determination Procedure

Chapter Five
Host Link Problem Determination Procedure

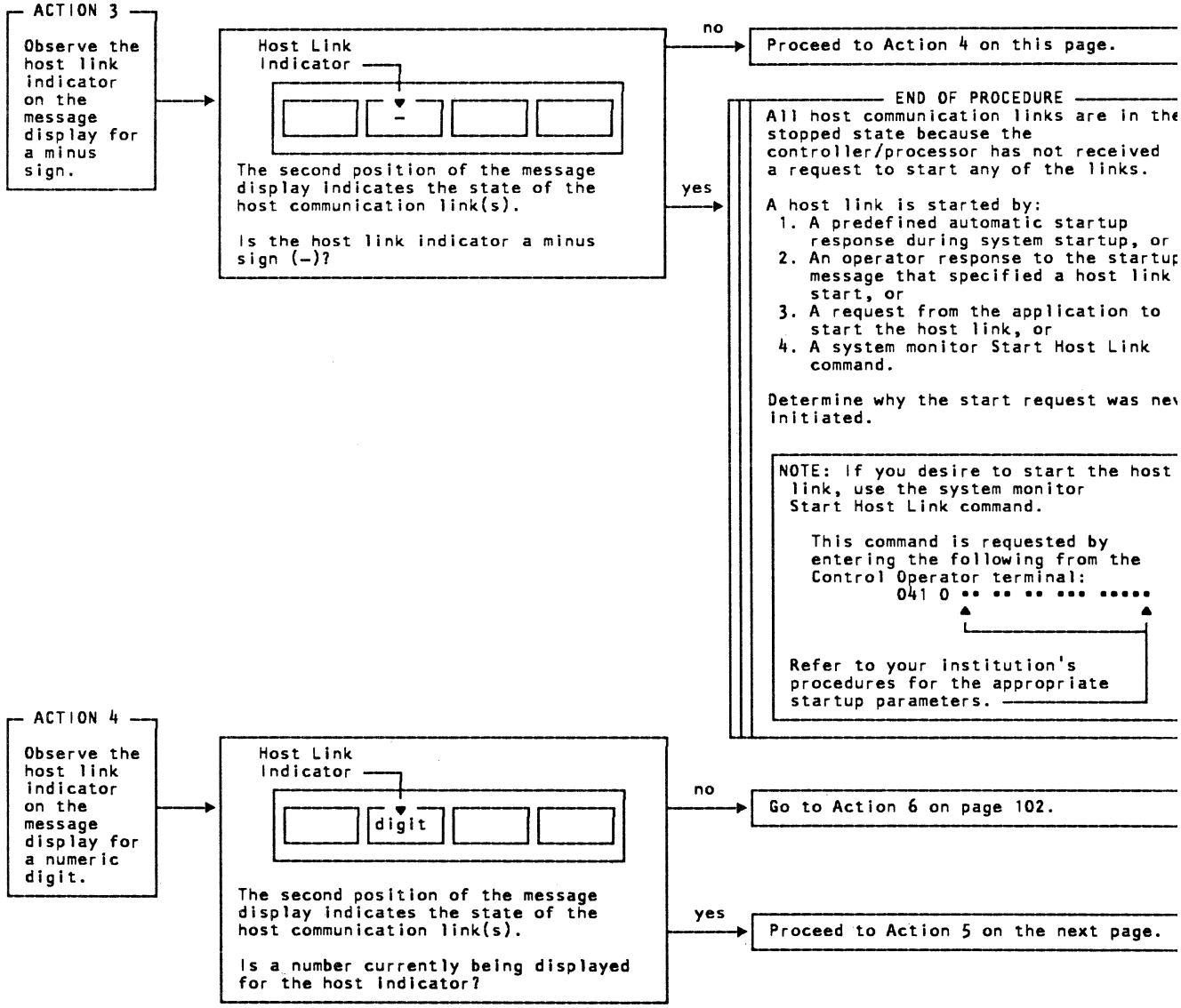
PDP03 - Host Link Problem Determination Procedure

Action	Method of Analysis	Recommendations





Action | Method of Analysis | Recommendations



Action	Method of Analysis	Recommendations

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

Because only one position on the 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 other link(s) is not displayed until the first link becomes 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.

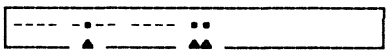
This state symbol will be referenced in the remainder of this procedure.

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 message display and the host link state symbols are displayed in the following format:



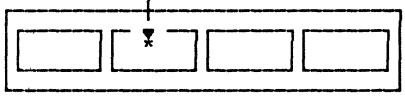
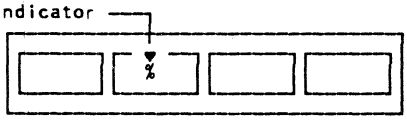
Host Link Indicator

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

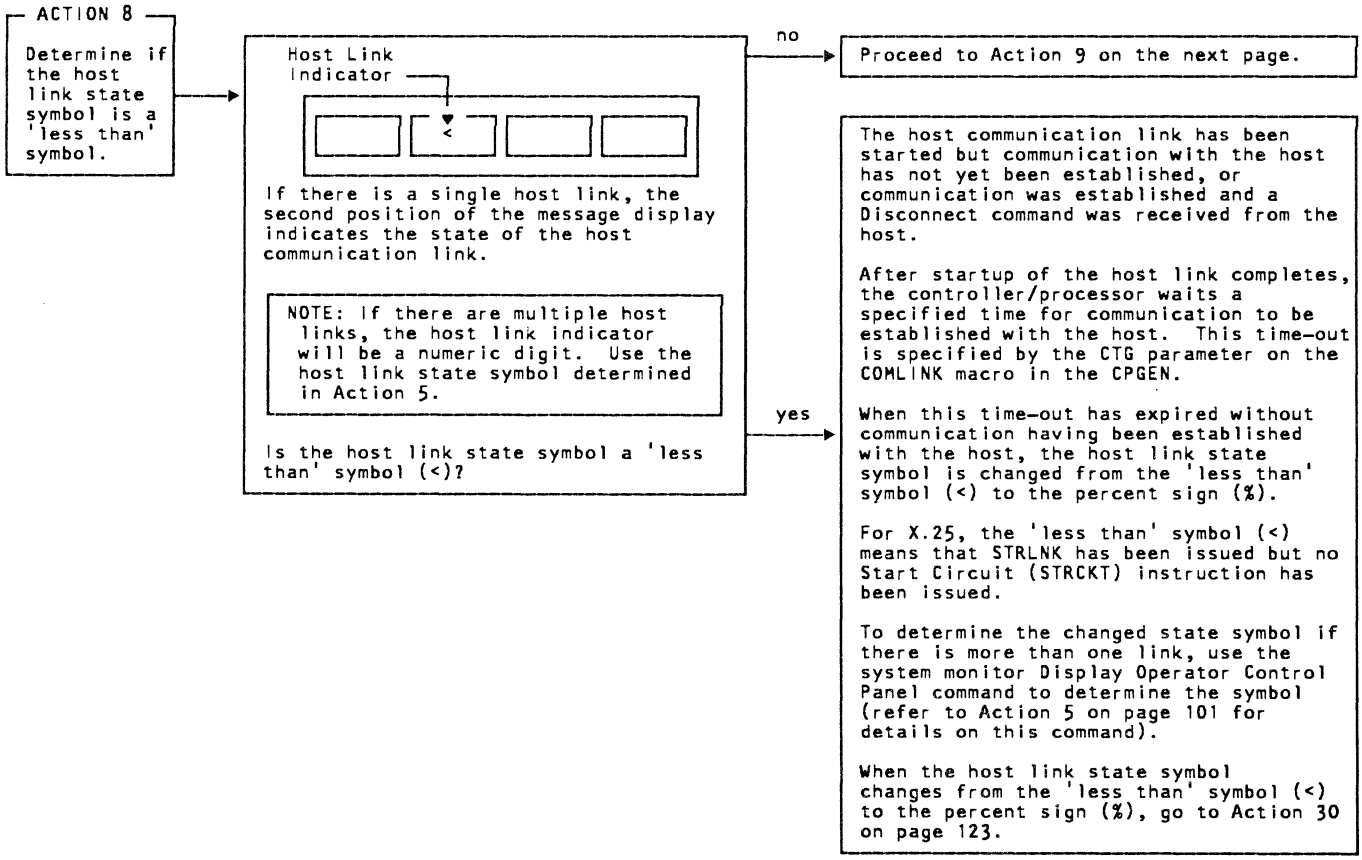
Determine the state symbol that is associated with the host link number displayed in the host link indicator position of the message display.

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

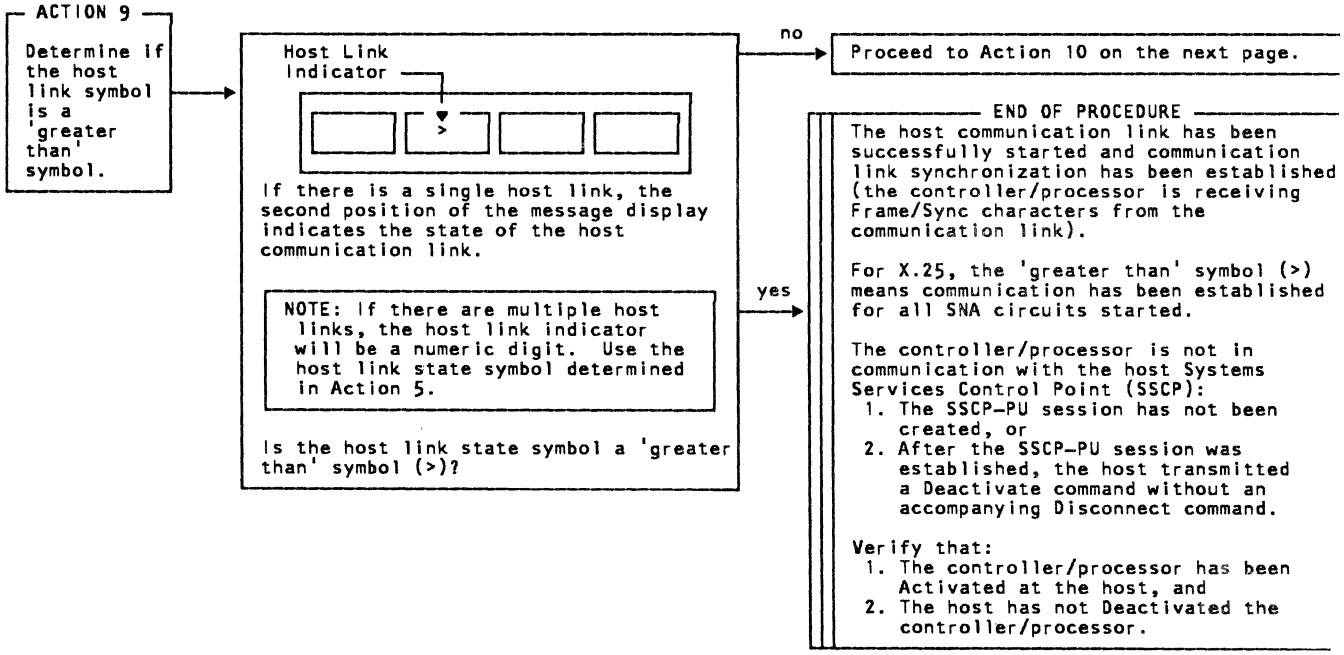
Proceed to Action 6 on the next page.

Action	Method of Analysis	Recommendations
ACTION 6 Determine if the host link state symbol is an asterisk.	Host Link Indicator  If there is a single host link, the second position of the message display indicates the state of the host communication link. NOTE: If there are 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 asterisk (*)?	no → Proceed to Action 7 on this page. yes → The host communication link is not operational. Internal diagnostics have run and the results have been detailed in a system log message. The controller/processor will continual attempt to start the host communication link. Go to Action 14 on page 111.
ACTION 7 Determine if the host link state symbol is a percent sign.	Host Link Indicator  If there is a single host link, the second position of the message display indicates the state of the host communication link. NOTE: If there are 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 percent sign (%)?	no → Proceed to Action 8 on the next page. yes → The host communication link is not operational. One or more of the host statistical counters have increased. These counters identify the condition that caused the link to be nonoperational. The controller/processor will continual attempt to start the host communicatior link. NOTE: Additional diagnostic testing occurs after this symbol is displayed. It is possible that this additional testing will discover a problem tha will cause a message to be written to the log. If this should occur, the host link state symbol will change to the asterisk (*). If the state symbol is an asterisk go to Action 14 on page 111. Go to Action 30 on page 123 if the hos link symbol is the percent sign (%).

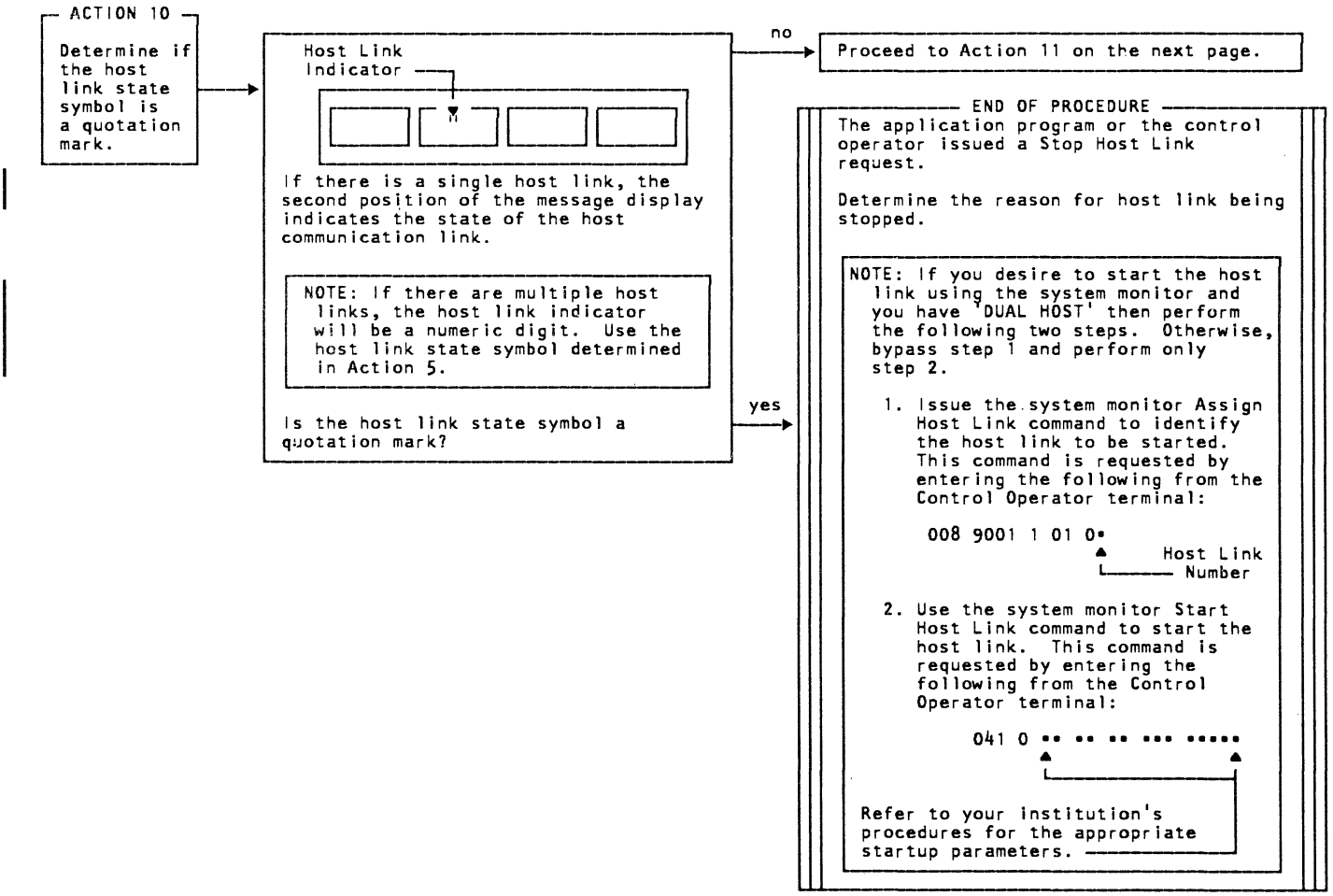
Action	Method of Analysis	Recommendations



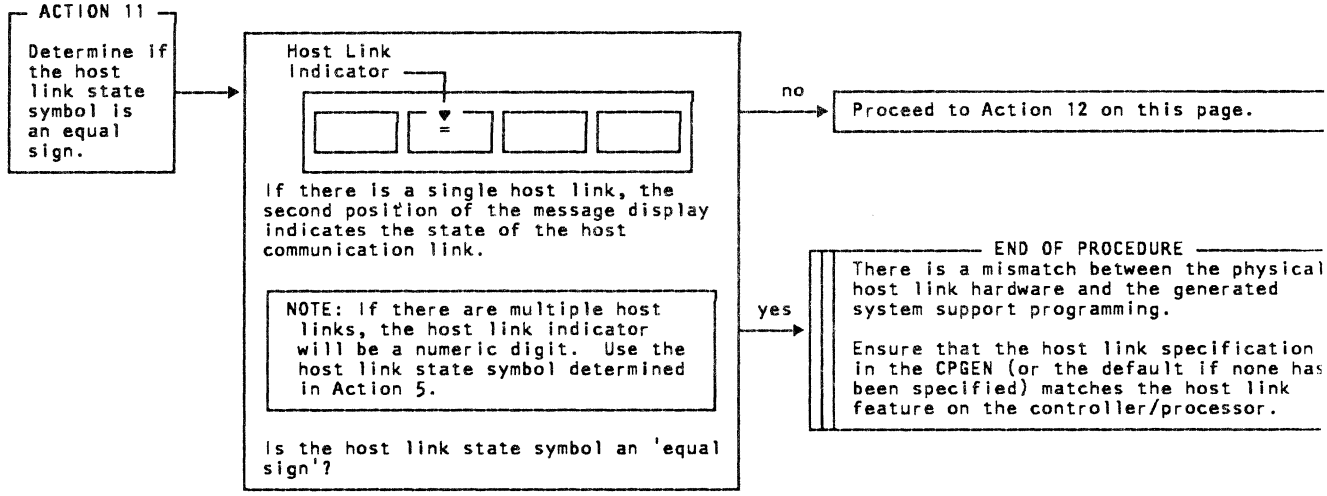
Action	Method of Analysis	Recommendations

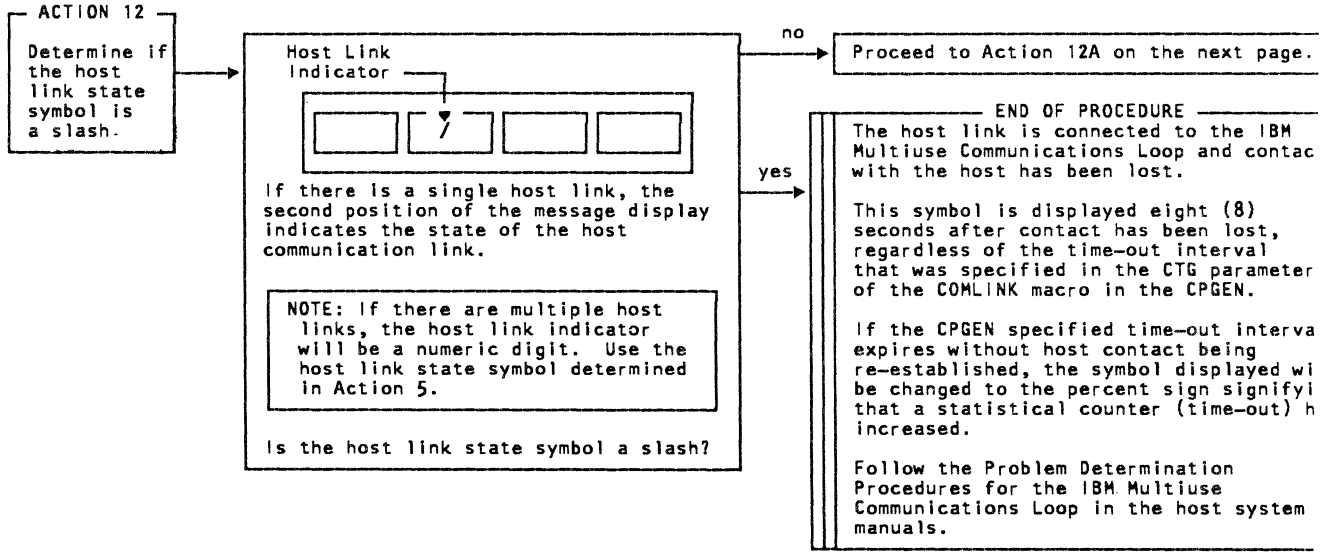


Action	Method of Analysis	Recommendations

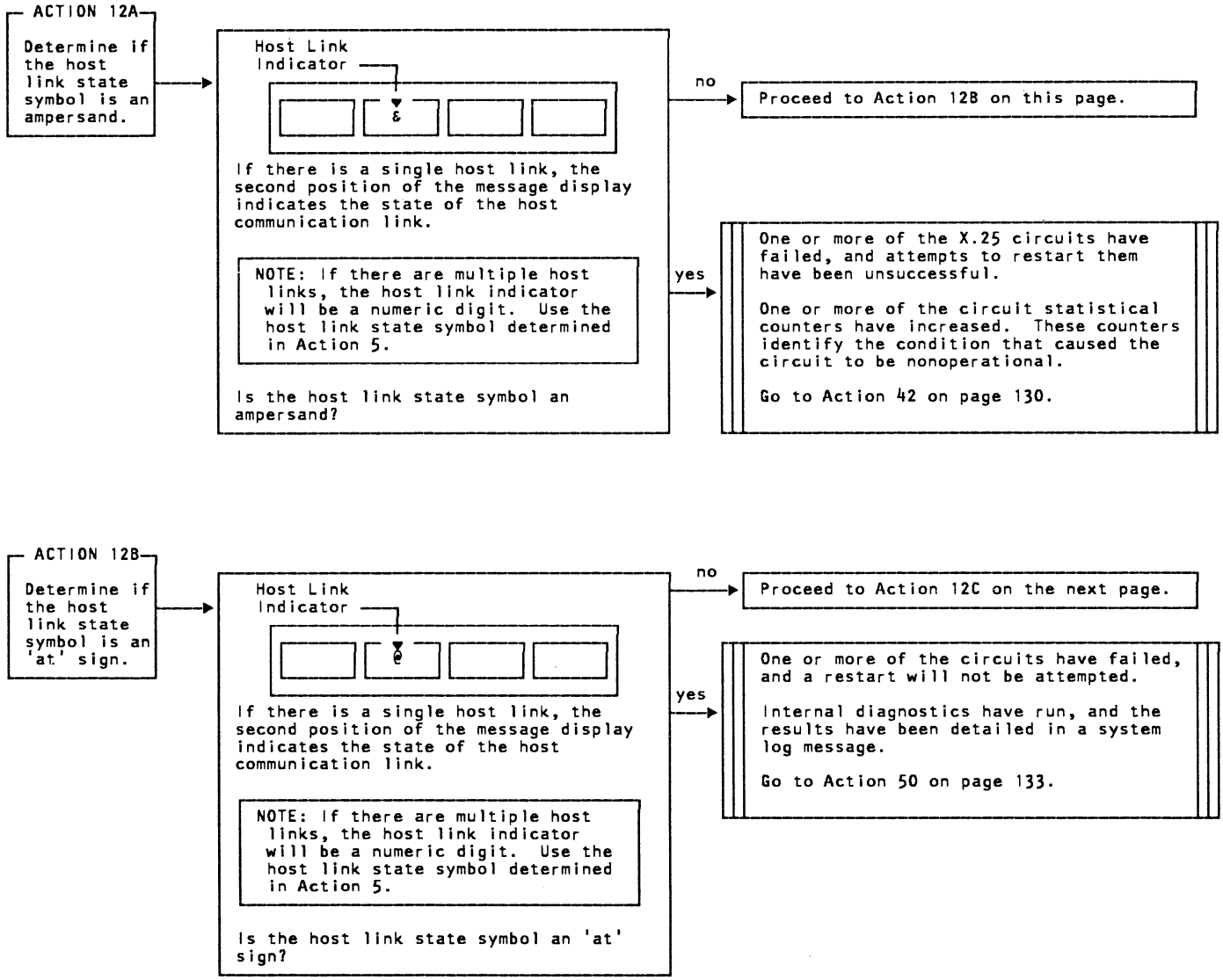


Action | Method of Analysis | Recommendations

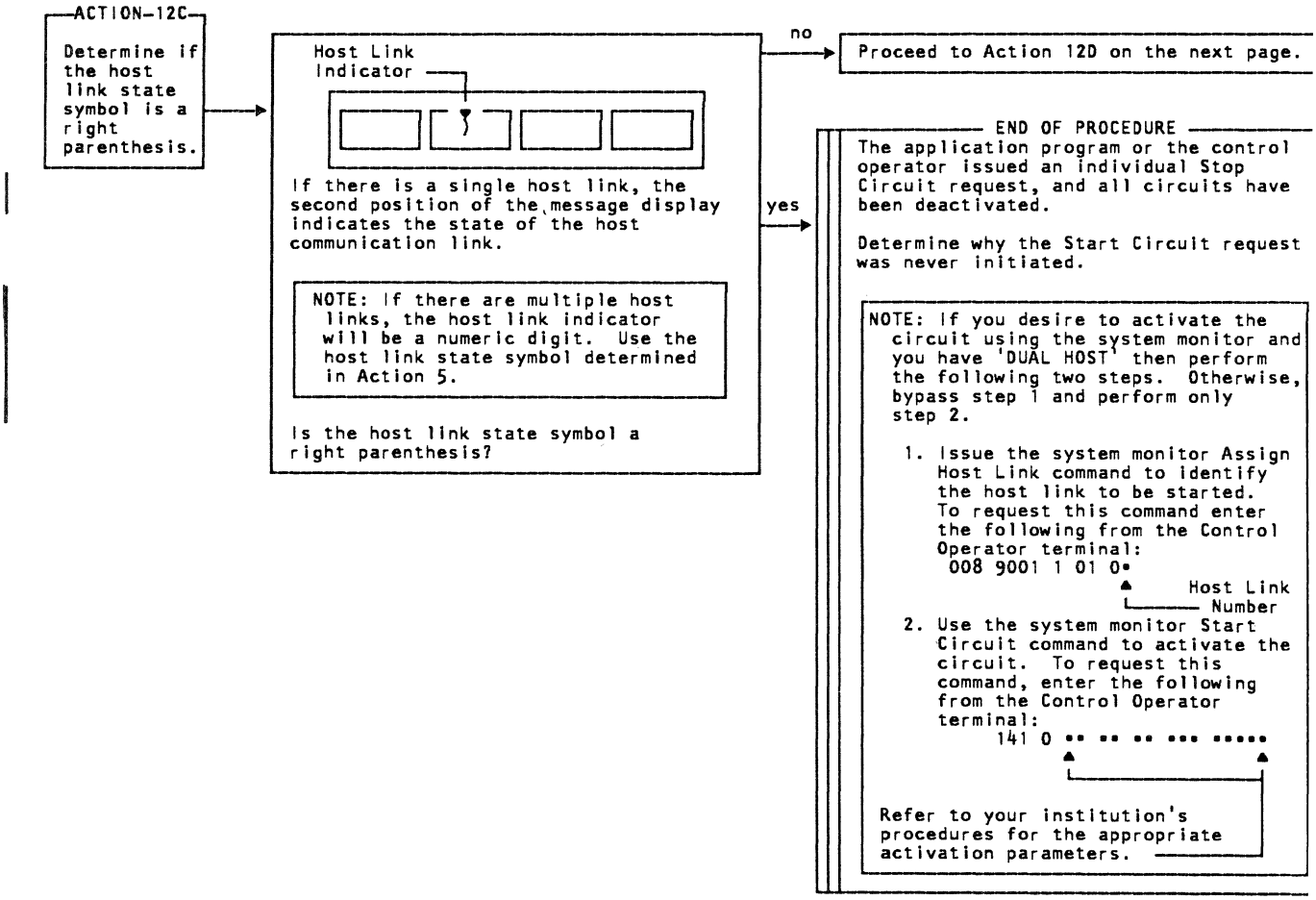




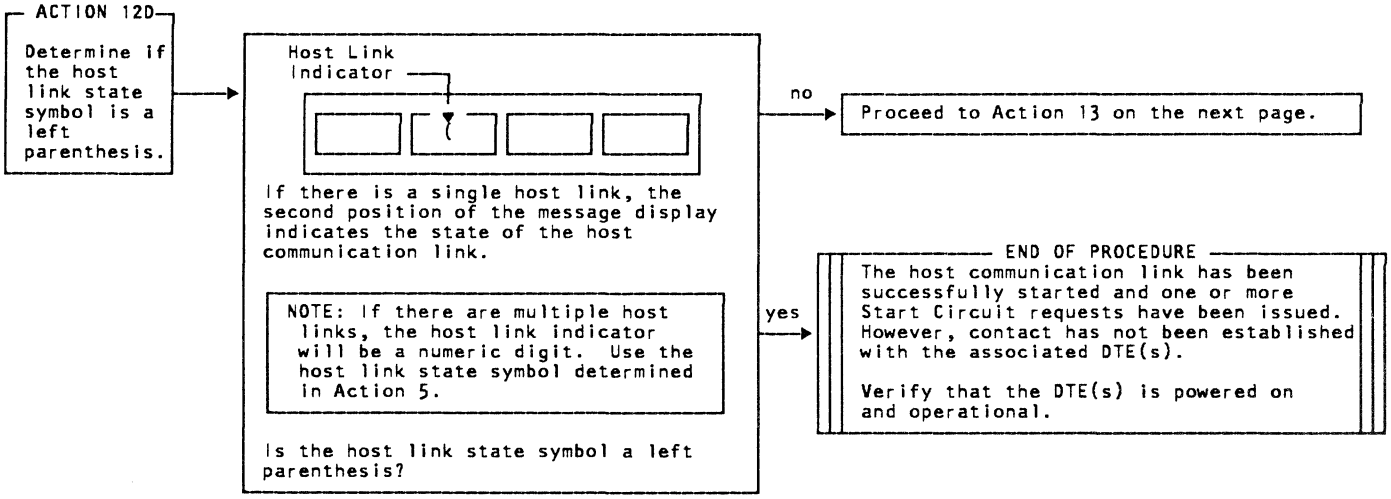
Action | Method of Analysis | Recommendations



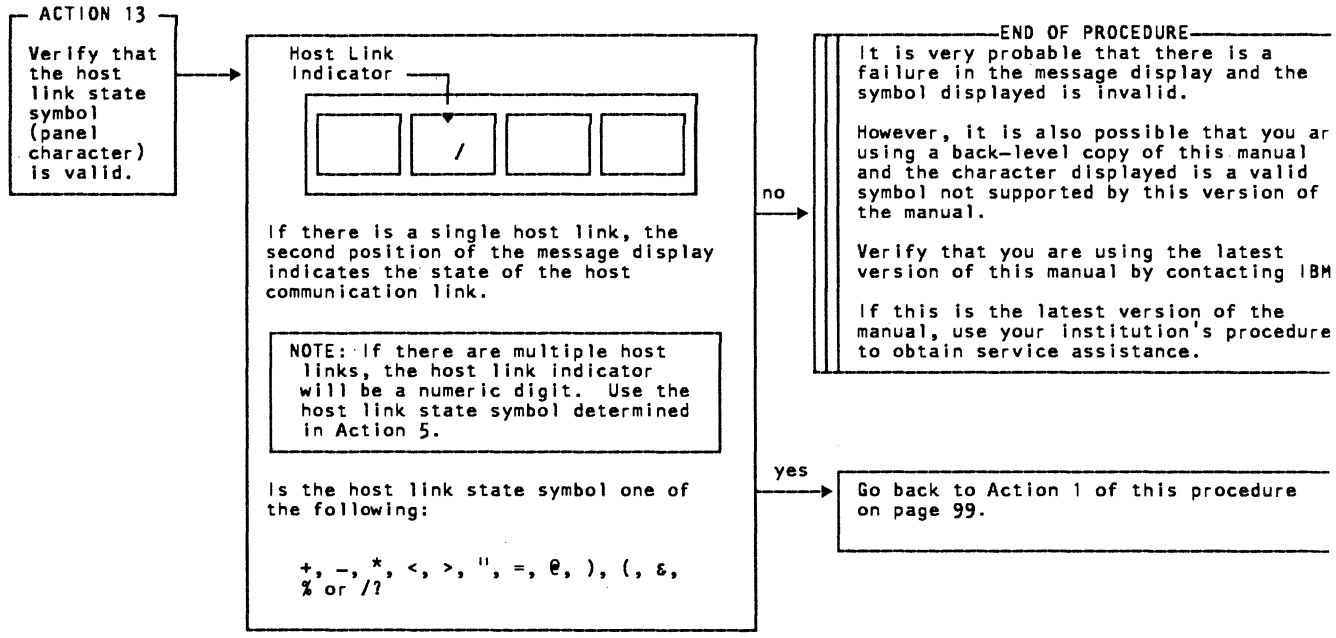
Action | Method of Analysis | Recommendations



Action | Method of Analysis | Recommendations



Action	Method of Analysis	Recommendations



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 →

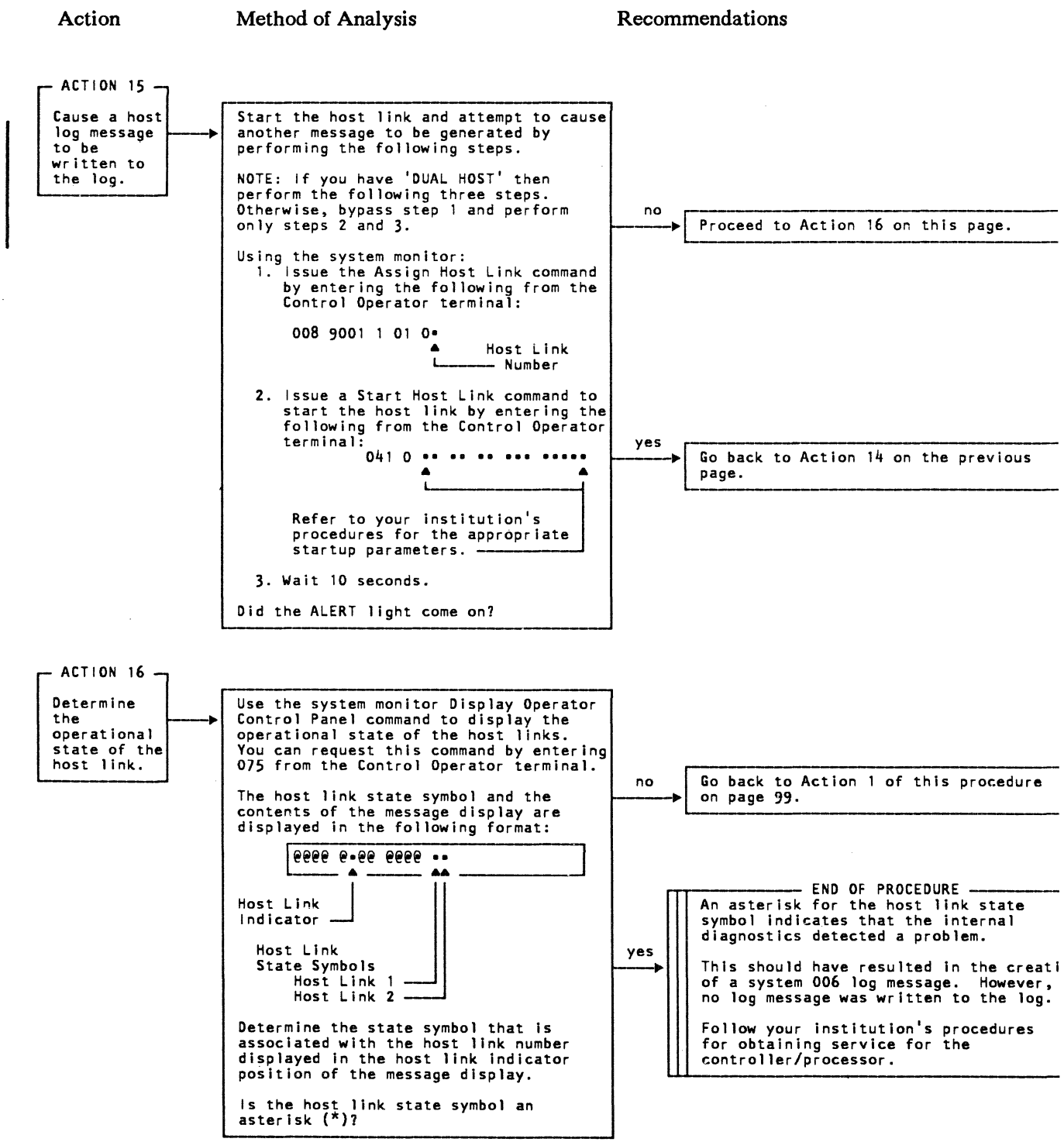
If you did not find a system 006 log message for the failing link it was probably because the log area on the diskette is full.

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

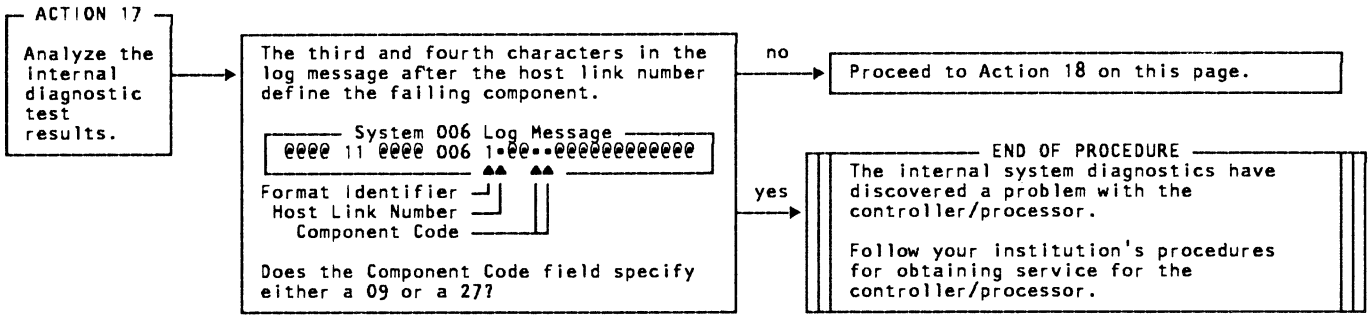
Proceed to Action 15 on the next page.

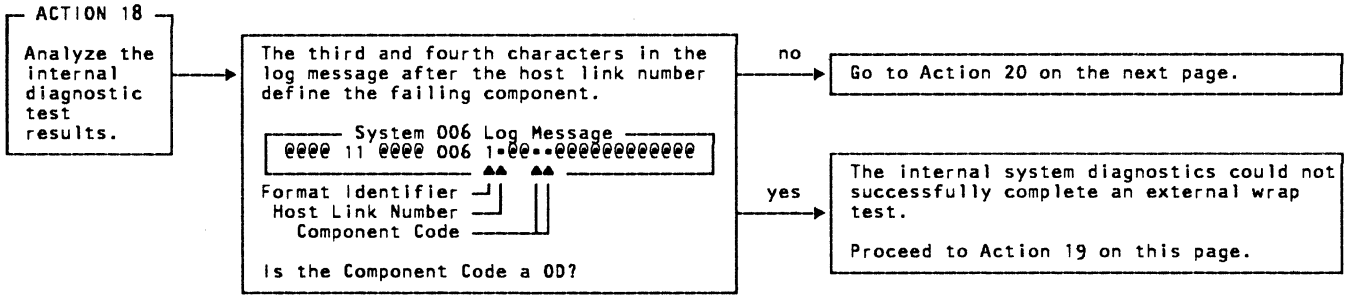
yes →

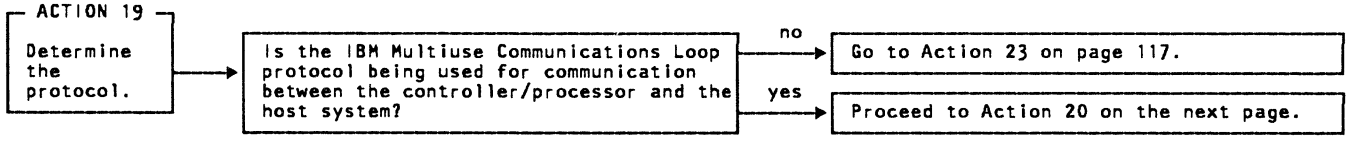
Go to Action 17 on page 113.


Action
Method of Analysis
Recommendations
ACTION 15
Cause a host log message to be written to the log.
Start the host link and attempt to cause another message to be generated by performing the following steps.
NOTE: If you have 'DUAL HOST' then perform the following three steps. Otherwise, bypass step 1 and perform only steps 2 and 3.
Using the system monitor:
1. Issue the Assign Host Link command by entering the following from the Control Operator terminal:
008 9001 1 01 0•
Host Link Number
2. Issue a Start Host Link command to start the host link by entering the following from the Control Operator terminal:
041 0 •• •• •• ••• •••••
Refer to your institution's procedures for the appropriate startup parameters.
3. Wait 10 seconds.
Did the ALERT light come on?
no
Proceed to Action 16 on this page.
yes
Go back to Action 14 on the previous page.
ACTION 16
Determine the operational state of the host link.
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 state symbol and the contents of the message display 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.
Is the host link state symbol an asterisk (*)?
no
Go back to Action 1 of this procedure on page 99.
yes
END OF PROCEDURE
An asterisk for the host link state symbol indicates that the internal diagnostics detected a problem.
This should have resulted in the creati of a system 006 log message. However, no log message was written to the log.
Follow your institution's procedures for obtaining service for the controller/processor.

Action	Method of Analysis	Recommendations



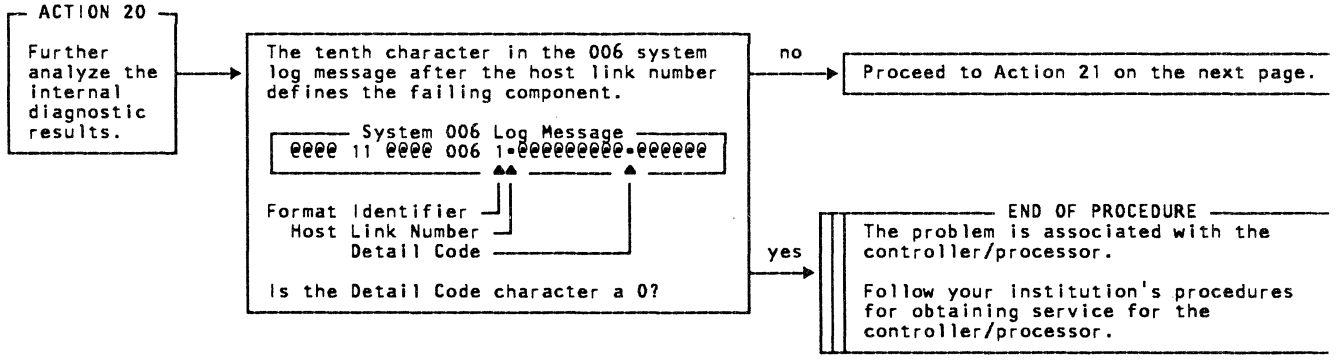




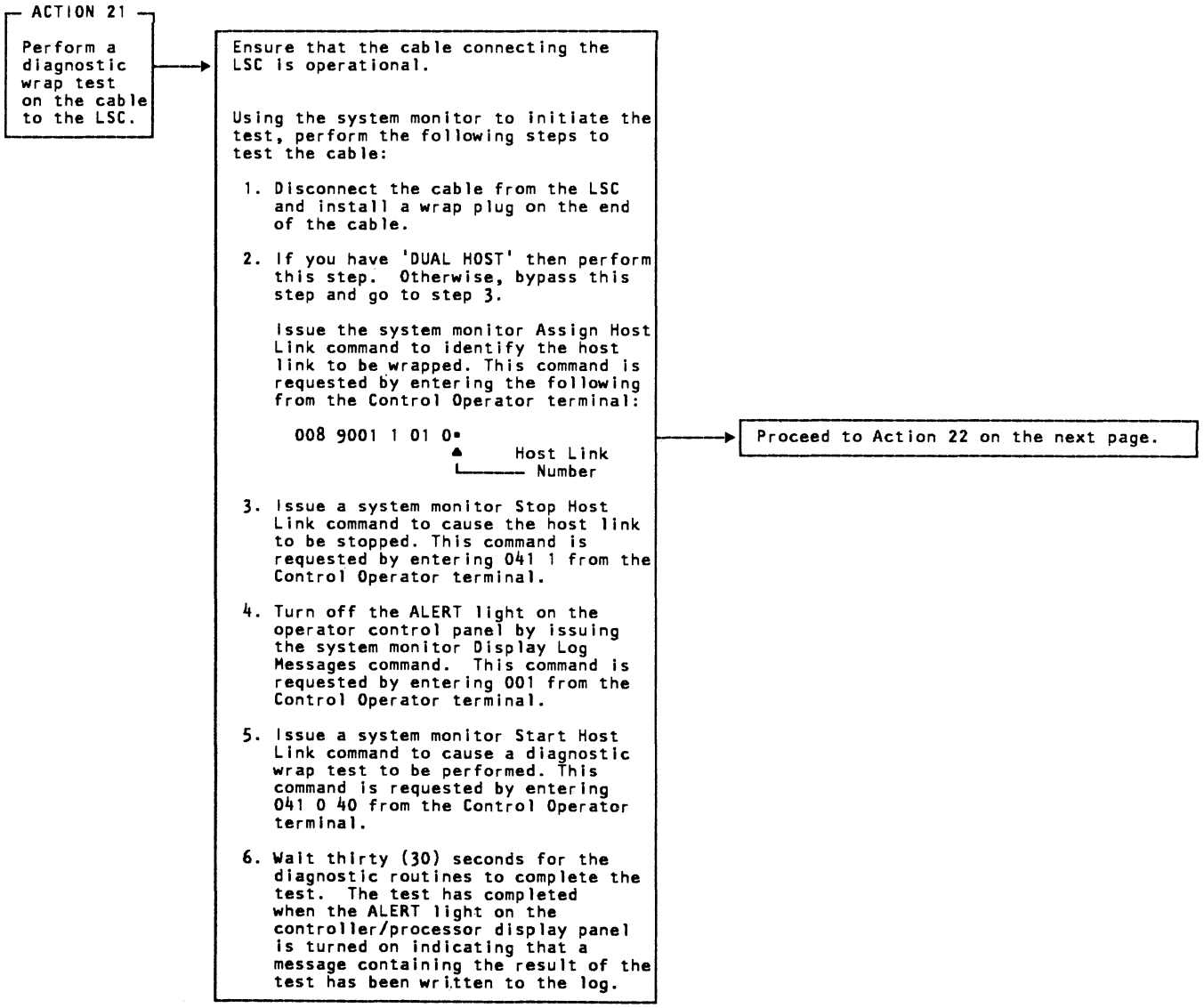
Action	Method of Analysis	Recommendations

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

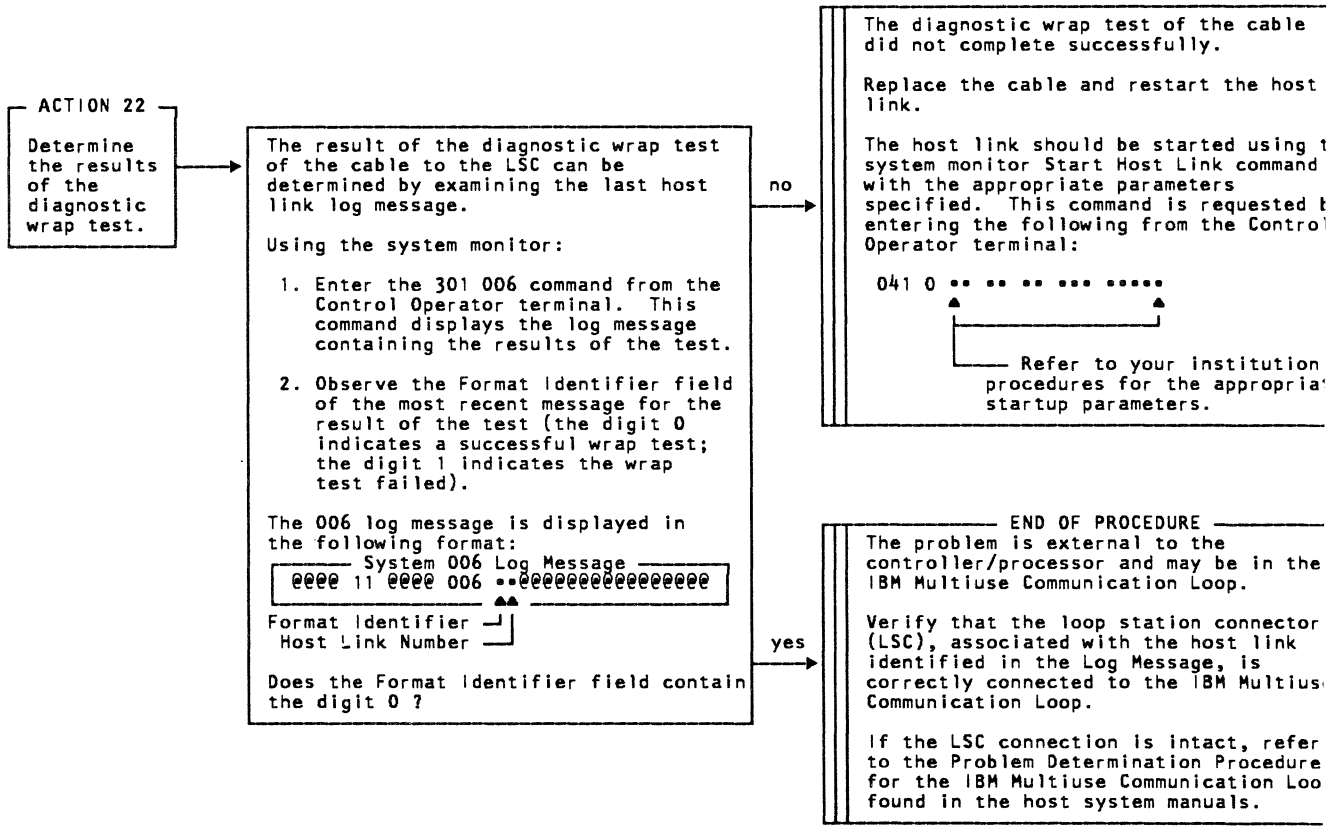
The following action (Action 20) further analyzes the 006 log message.



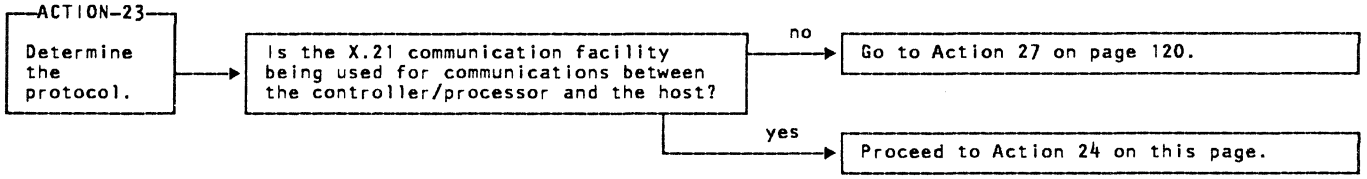
Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations

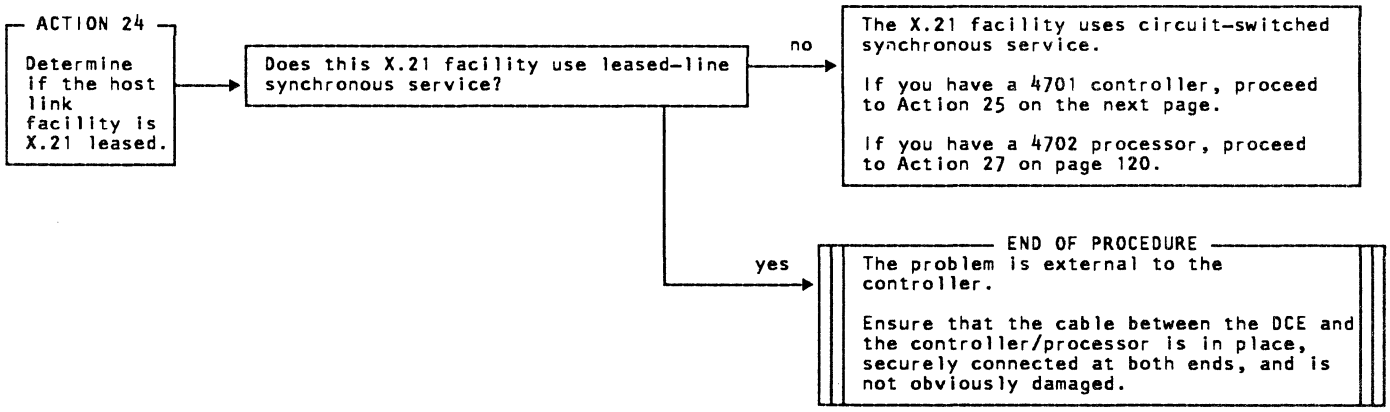


Action	Method of Analysis	Recommendations

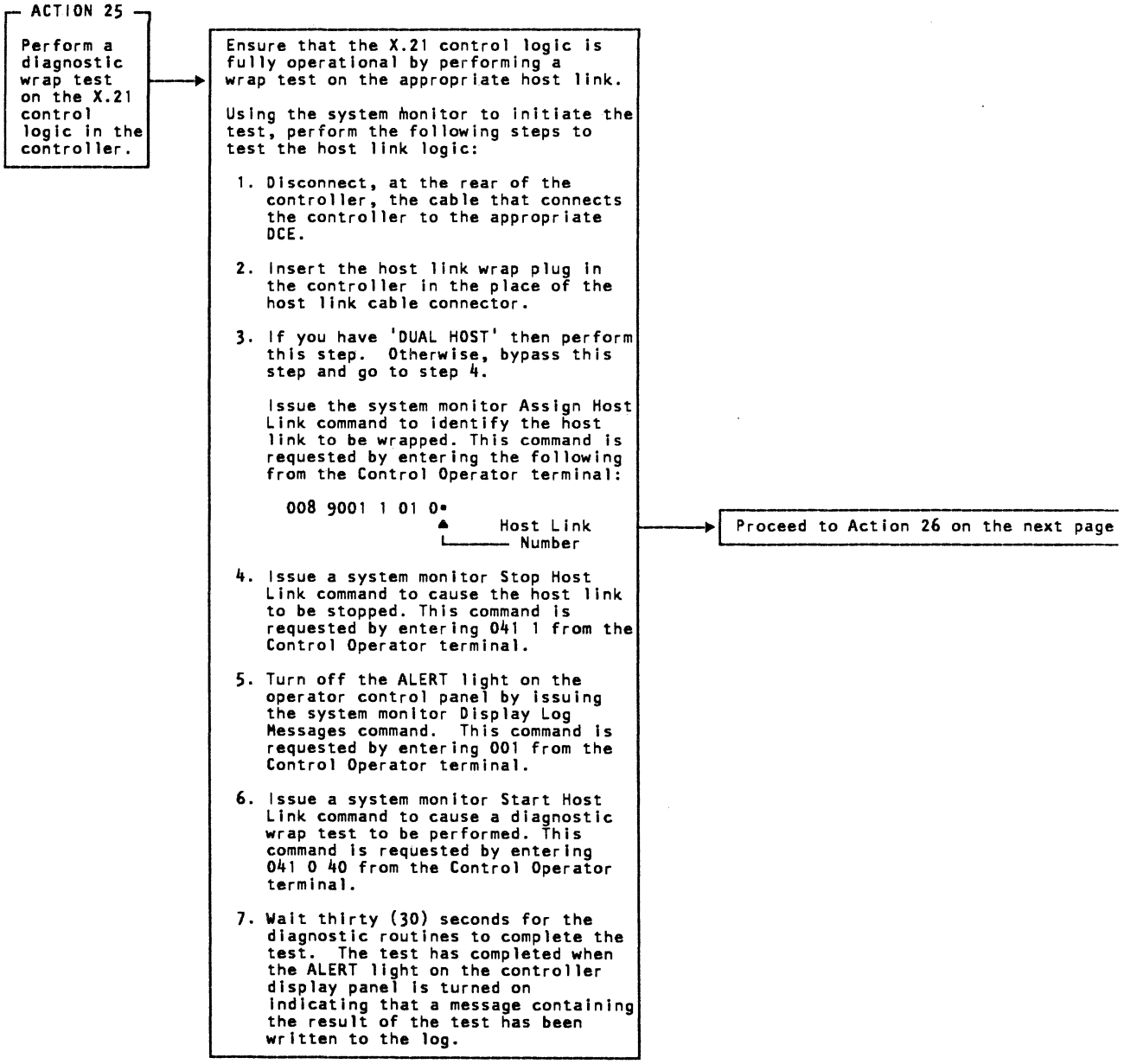


It was determined in Action 23 that the X.21 Communication facility is used for the link between the controller/processor and the host.

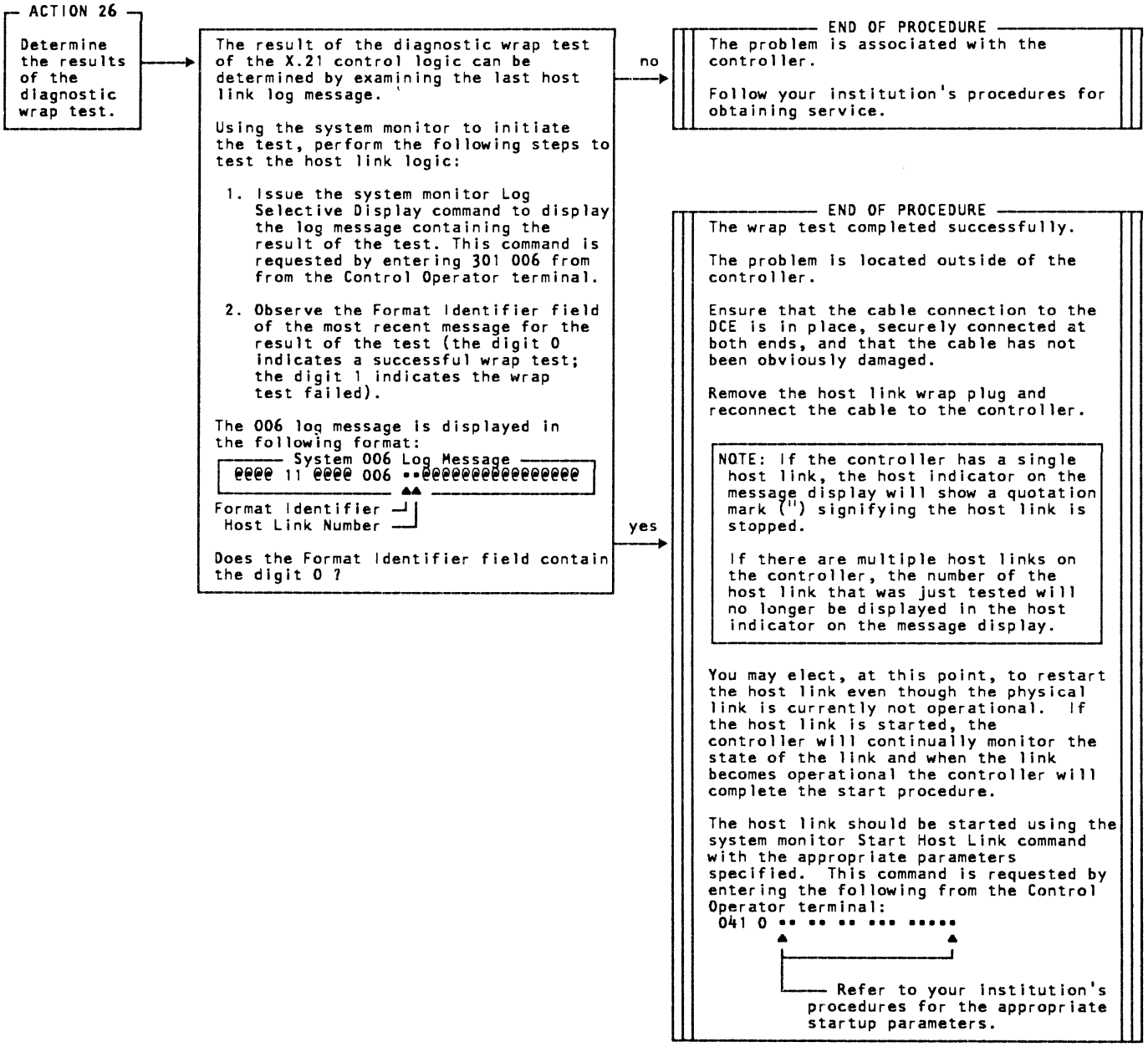
The next three actions pertain to this facility.

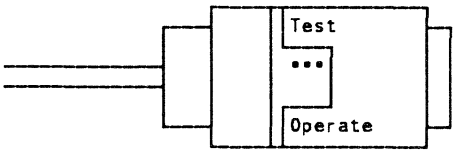


Action	Method of Analysis	Recommendations



Action | Method of Analysis | Recommendations



Action	Method of Analysis	Recommendations
ACTION 27 Perform a diagnostic wrap test on the cable to the modem.	Ensure that the cable on the appropriate host link is operational. Using the system monitor to initiate the test, perform the following steps to test the cable: 1. Place the TEST/OPERATE switch located on the modem end of the appropriate cable (the cable that connects the modem to the controller/processor) into the TEST position. Switch  Modem End of Cable 2. If you have 'DUAL HOST' then perform this step. Otherwise, bypass this step and go to step 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 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/processor 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.

Action | Method of Analysis | Recommendations

ACTION 28

Determine the results of the diagnostic wrap test.

The result of the diagnostic wrap test of the cable 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 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 →

The diagnostic wrap test of the cable did not complete successfully.

Replace the cable with a similar cable that is known to be operational.

Proceed to Action 29 on the next page.

yes →

END OF PROCEDURE

The cable tested successfully.
The problem is associated with the modem.

Ensure that the modem is fully operational and that the modem, if not wrappable, has not been incorrectly specified as wrappable in the CPGEN.

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

NOTE: If there is 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, 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/processor will continually monitor the state of the link and when the link becomes operational, the start procedure will complete.

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.
```

Action | Method of Analysis | Recommendations

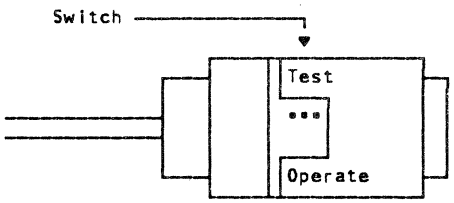
ACTION 29

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

Test the replacement cable to ensure the cable is operational.

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

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



2. Issue a system monitor Start Host Link command to cause a diagnostic wrap test to be performed on the 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:

System 006 Log Message

```
eeee 11 eeee 006 ••eeeeeeeeeeeeeeee
```

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/processor.

Follow your institution's procedures for obtaining service.

yes →

END OF PROCEDURE

The internal diagnostics have successfully tested the replacement cable.

The host link should now be operational.

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

The host link should be started using th 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 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 99.

Action	Method of Analysis	Recommendations

The host link state symbol, for the host link being analyzed, 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 99.

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/processor 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/processor could not establish a connection with the modem.
4. The controller/processor 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 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:

```
90@@ 01 00 @@@ @@@ @@@ ... @@@
  ▲▲       ▲ ▲ ▲ ▲
  ||       | | |_|__ Counter 2
  ||       |_|______ Counter 1
  ||________________ Link Type (2-SNA/SDLC,
  |                       5-BSC, 6-Multiuse)
  |_________________ Host Link ID (1 or 4)
```

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 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.

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 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:

```
90@@ 01 00 @@@ @@@ @@@ ... @@@
     ▲▲    ▲ ▲ ▲ ▲
     ||    | | | |
     ||    | | | └── Counter 2
     ||    | | └──── Counter 1
     ||    | └────── Link Type (2-SNA/SDLC,
     ||    |                    5-BSC, 6-Multiuse)
     ||    └──────── Host Link ID (1 or 4)
```

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.

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

Is there a difference in the two recorded values?

Has host link statistical counter 4 increased?

no → Go to Action 35 on page 126.

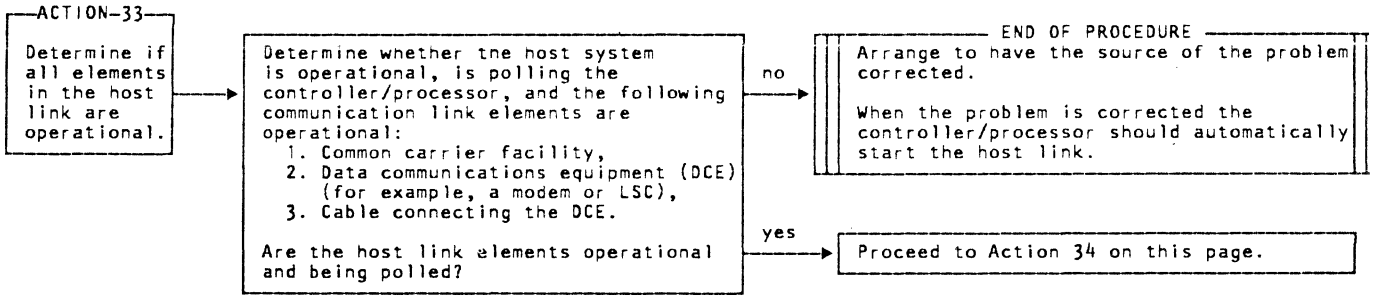
yes →

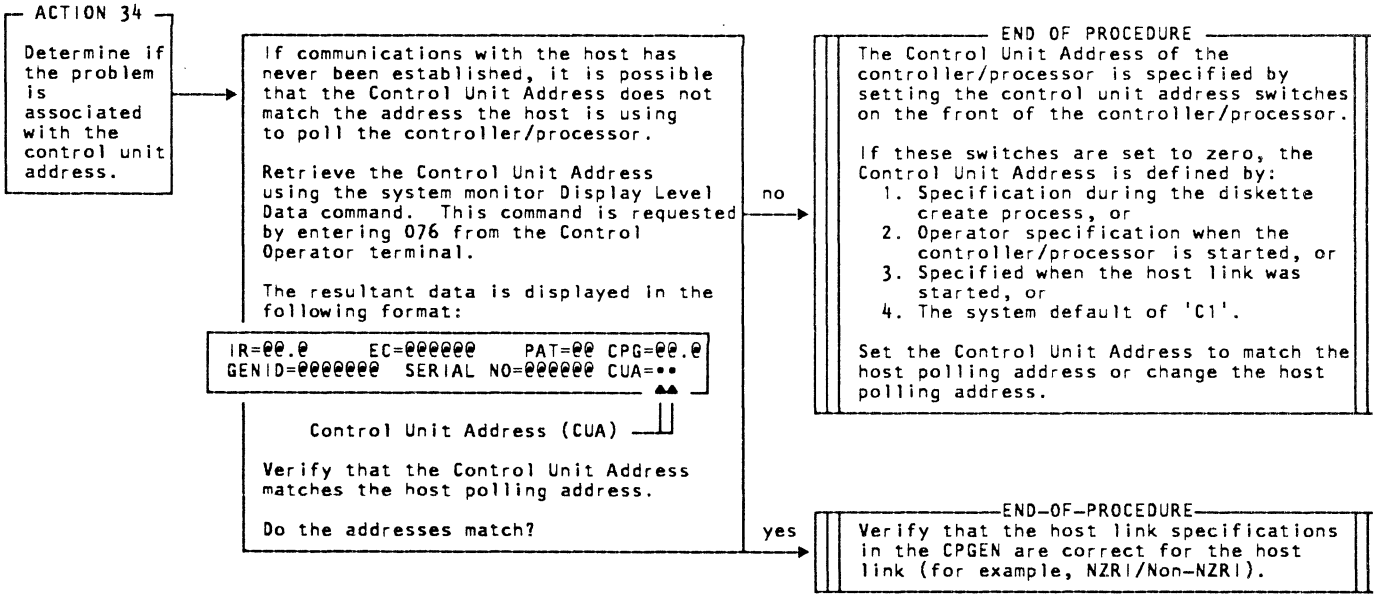
The host communication link is not operational because either:

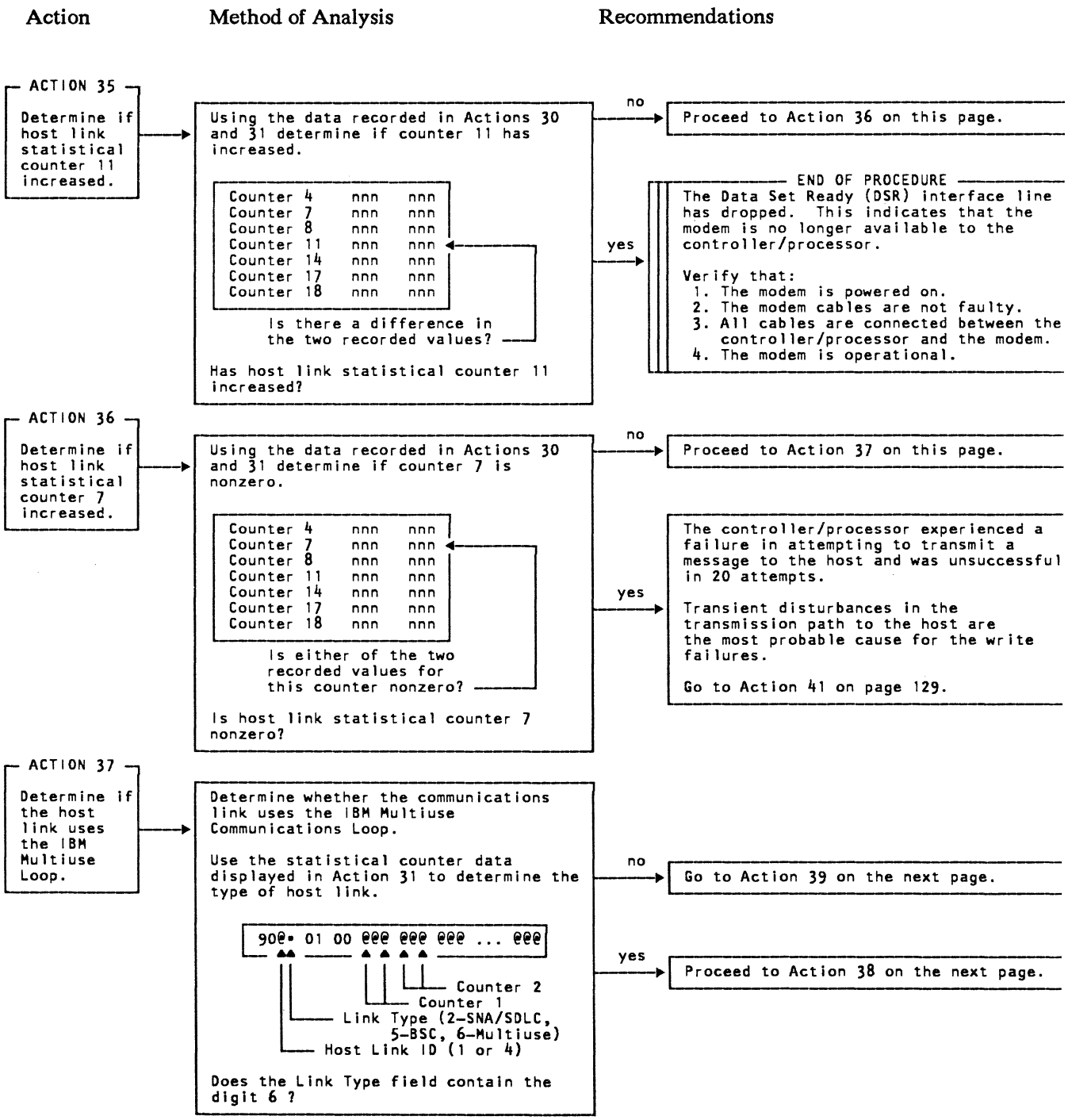
1. Communication with the host has bee lost after it had been establishec or
2. The controller/processor attempted to establish communication with the host and the host failed to respon within the time-out in the CPGEN.

Proceed to Action 33 on the next page.

Action	Method of Analysis	Recommendations






Action
Method of Analysis
Recommendations
ACTION 35
Determine if host link statistical counter 11 increased.
Using the data recorded in Actions 30 and 31 determine if counter 11 has increased.
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
Is there a difference in the two recorded values?
Has host link statistical counter 11 increased?
no
Proceed to Action 36 on this page.
yes
END OF PROCEDURE
The Data Set Ready (DSR) interface line has dropped. This indicates that the modem is no longer available to the controller/processor.
Verify that:
1. The modem is powered on.
2. The modem cables are not faulty.
3. All cables are connected between the controller/processor and the modem.
4. The modem is operational.
ACTION 36
Determine if host link statistical counter 7 increased.
Using the data recorded in Actions 30 and 31 determine if counter 7 is nonzero.
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
Is either of the two recorded values for this counter nonzero?
Is host link statistical counter 7 nonzero?
no
Proceed to Action 37 on this page.
yes
The controller/processor experienced a failure in attempting to transmit a message to the host and was unsuccessful in 20 attempts.
Transient disturbances in the transmission path to the host are the most probable cause for the write failures.
Go to Action 41 on page 129.
ACTION 37
Determine if the host link uses the IBM Multiuse Loop.
Determine whether the communications link uses the IBM Multiuse Communications Loop.
Use the statistical counter data displayed in Action 31 to determine the type of host link.
90@• 01 00 @@@ @@@ @@@ ... @@@
Counter 2
Counter 1
Link Type (2-SNA/SDLC, 5-BSC, 6-Multiuse)
Host Link ID (1 or 4)
Does the Link Type field contain the digit 6 ?
no
Go to Action 39 on the next page.
yes
Proceed to Action 38 on the next page.

Action	Method of Analysis	Recommendations

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

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

ACTION 38

Determine if link statistical counter 17 or 18 has increased.

Using the data recorded in Actions 30 and 31 determine if counter 17 or 18 has increased.

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

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

Has host link statistical counter 17 or 18 increased?

no → Proceed to Action 39 on this page.

yes → END OF PROCEDURE

The controller/processor has detected a loss of signal from the IBM Multiuse Loop.

Refer to the Problem Determination Procedures for the IBM Multiuse Communication Loop in the manuals for the host system.

ACTION 39

Determine if link statistical counter 8 or 14 has increased.

Using the data recorded in Actions 30 and 31 determine if counter 8 or 14 has increased?

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

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

Has host link statistical counter 8 or 14 increased?

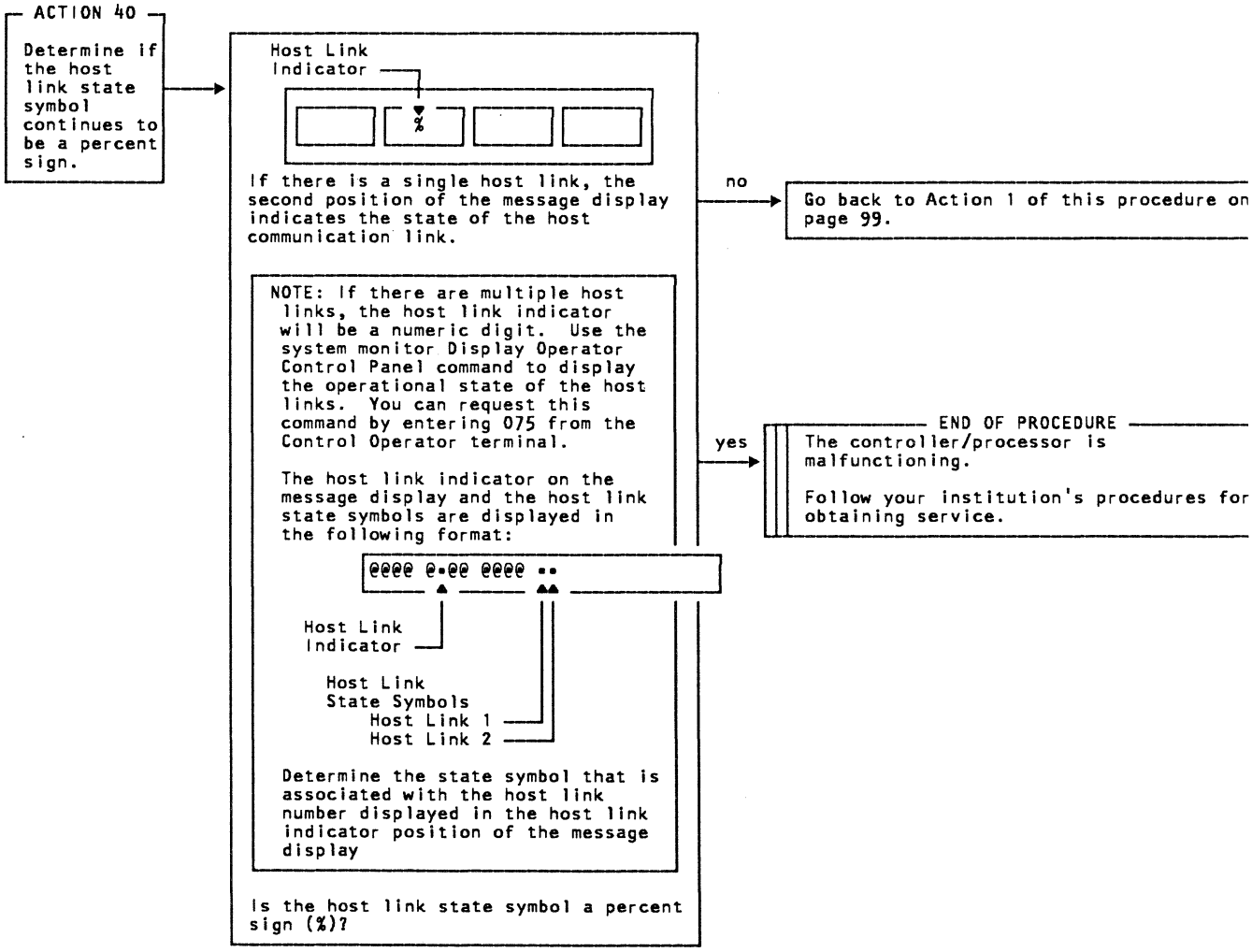
no → Proceed to Action 40 on the next page.

yes → END OF PROCEDURE

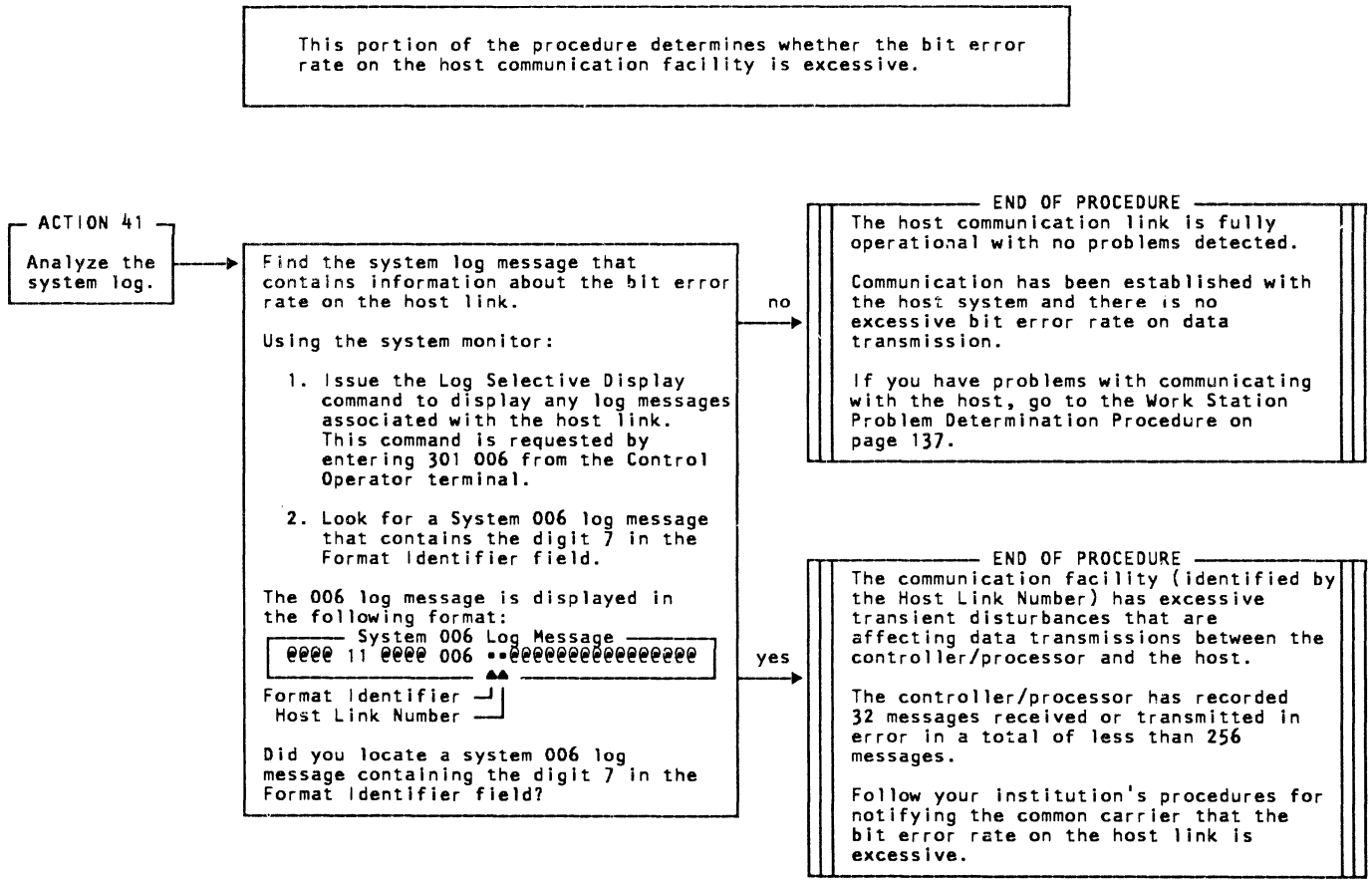
The controller/processor is malfunctioning.

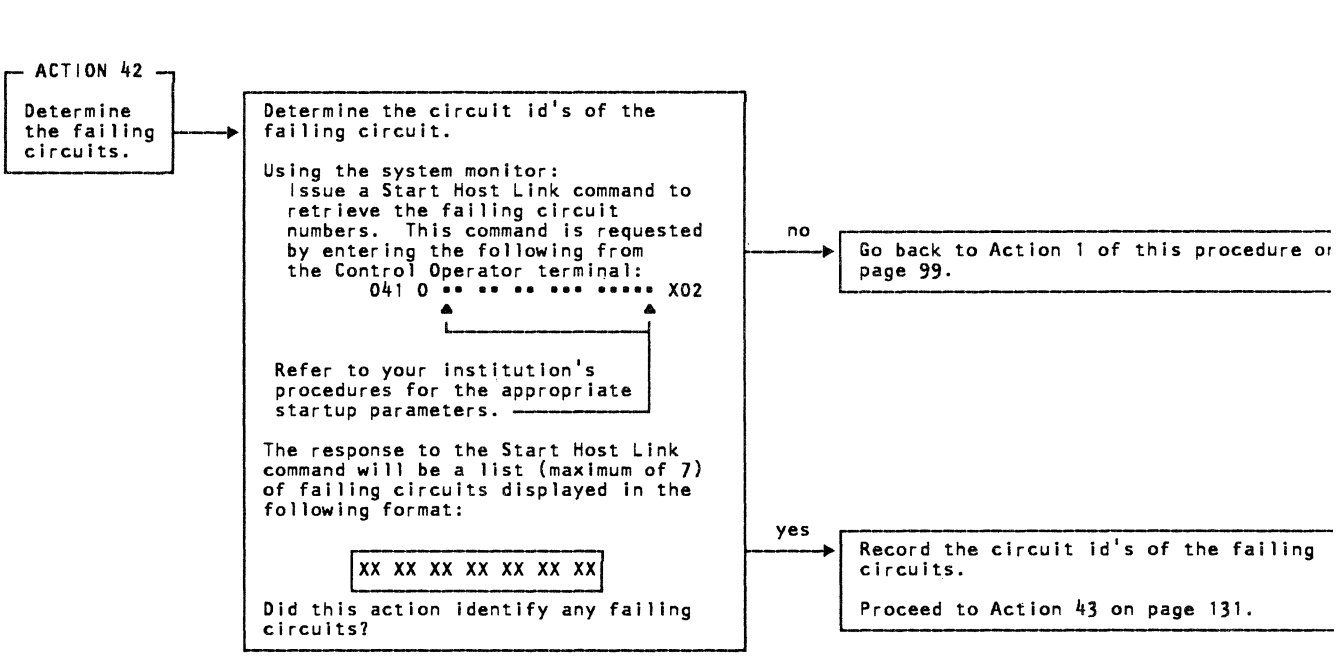
Follow your institution's procedures for obtaining service.

Action	Method of Analysis	Recommendations

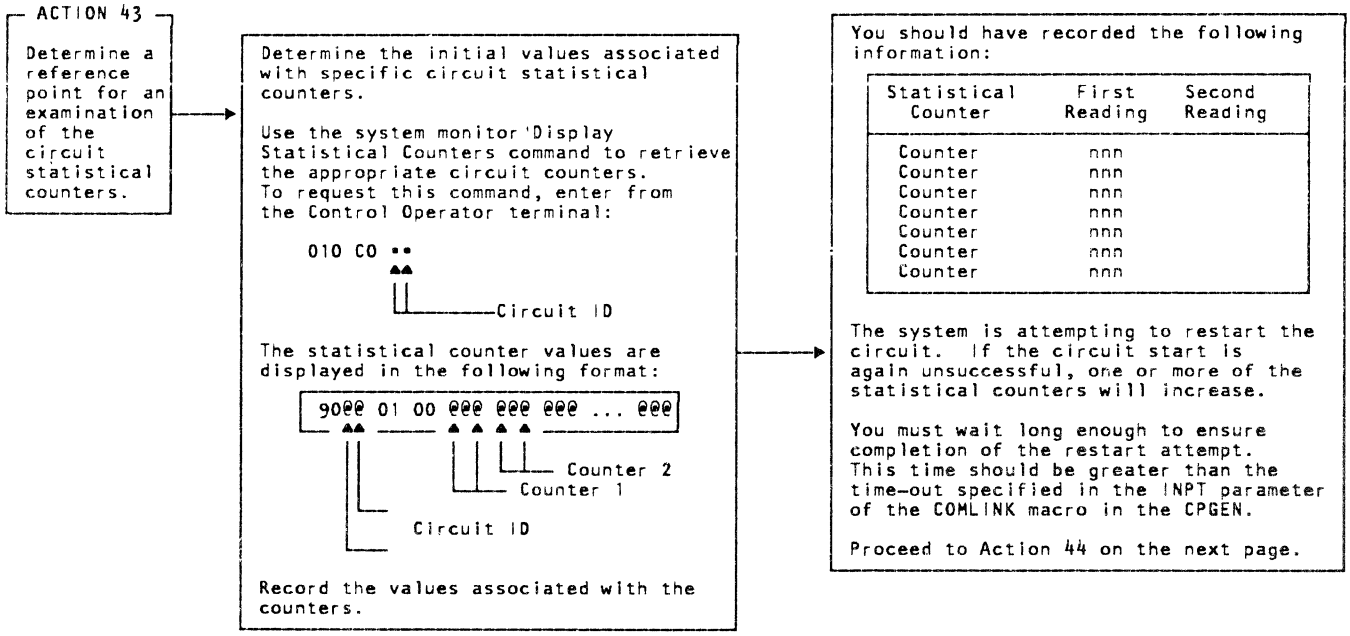


Action	Method of Analysis	Recommendations

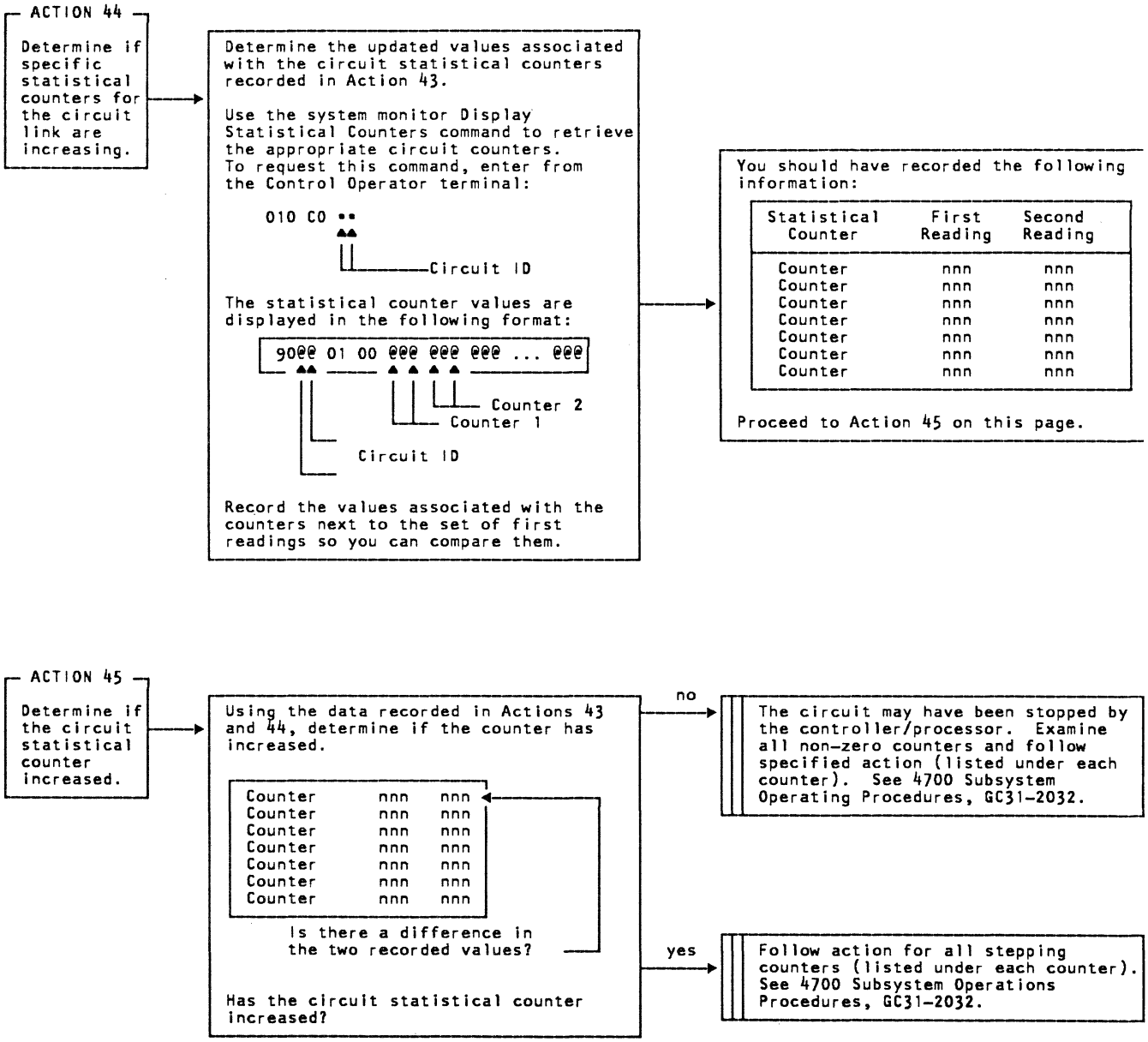


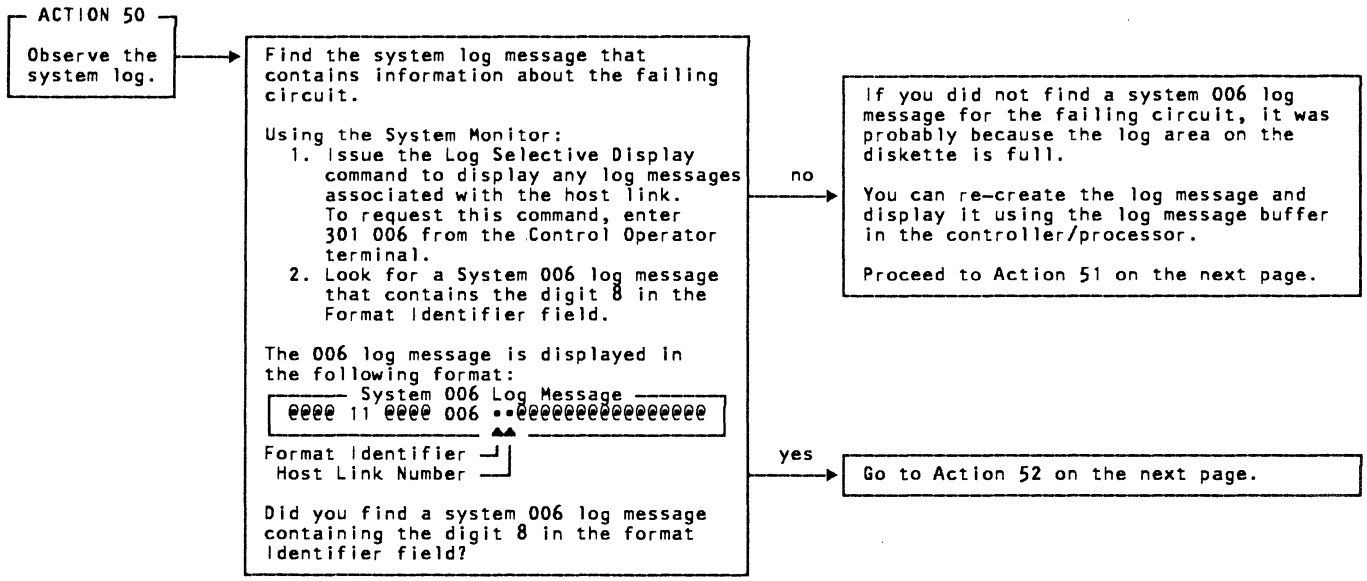

Action
Method of Analysis
Recommendations
ACTION 42
Determine the failing circuits.
Determine the circuit id's of the failing circuit.
Using the system monitor:
Issue a Start Host Link command to retrieve the failing circuit numbers. This command is requested by entering the following from the Control Operator terminal:
041 0 •• •• •• ••• ••••• X02
Refer to your institution's procedures for the appropriate startup parameters.
The response to the Start Host Link command will be a list (maximum of 7) of failing circuits displayed in the following format:
XX XX XX XX XX XX XX
Did this action identify any failing circuits?
no
Go back to Action 1 of this procedure or page 99.
yes
Record the circuit id's of the failing circuits.
Proceed to Action 43 on page 131.

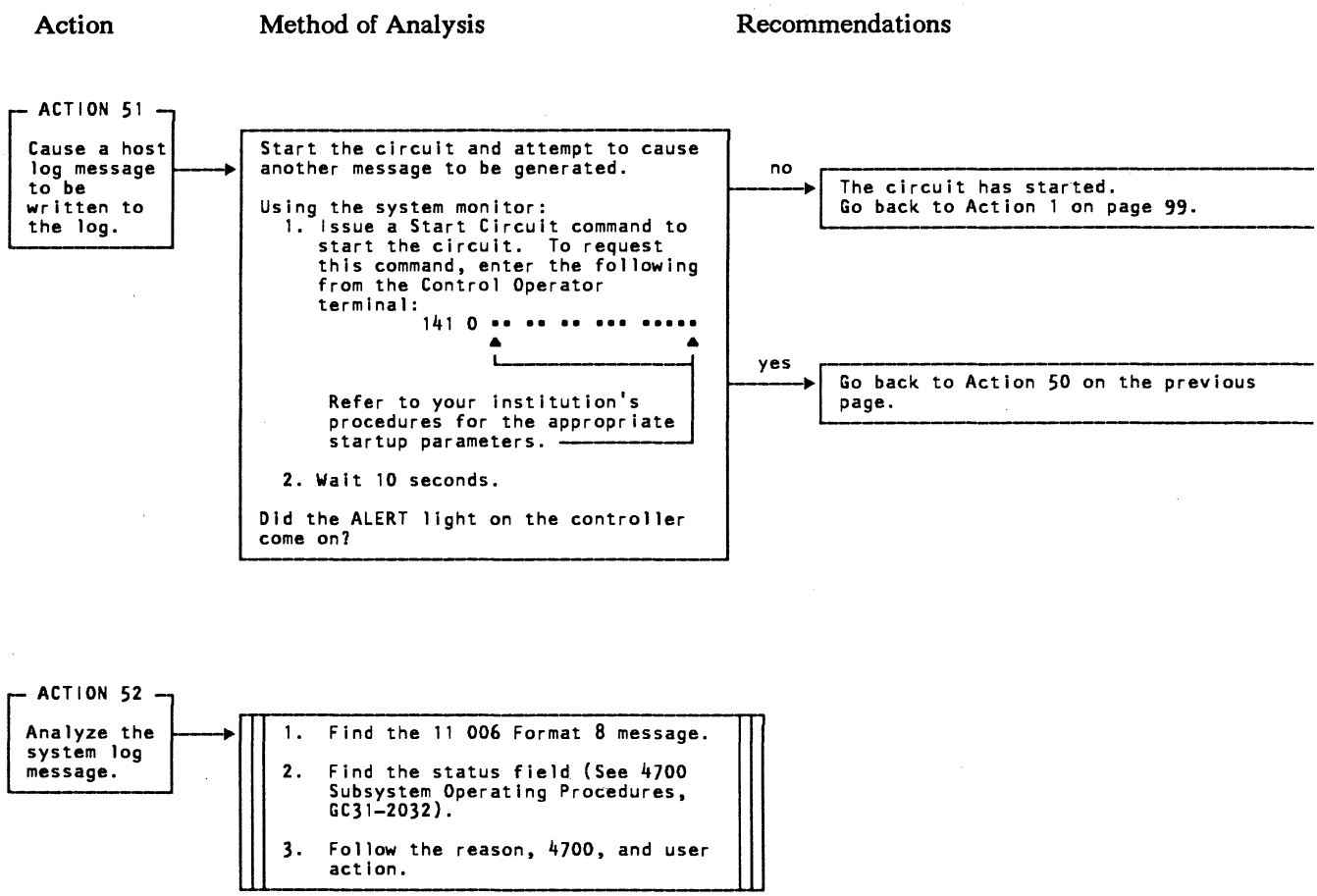
Action | Method of Analysis | Recommendations



Action | Method of Analysis | Recommendations




Action
Method of Analysis
Recommendations
ACTION 50
Observe the system log.
Find the system log message that contains information about the failing circuit.
Using the System Monitor:
1. Issue the Log Selective Display command to display any log messages associated with the host link. To request this command, enter 301 006 from the Control Operator terminal.
2. Look for a System 006 log message that contains the digit 8 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 8 in the format Identifier field?
no
If you did not find a system 006 log message for the failing circuit, 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/processor.
Proceed to Action 51 on the next page.
yes
Go to Action 52 on the next page.

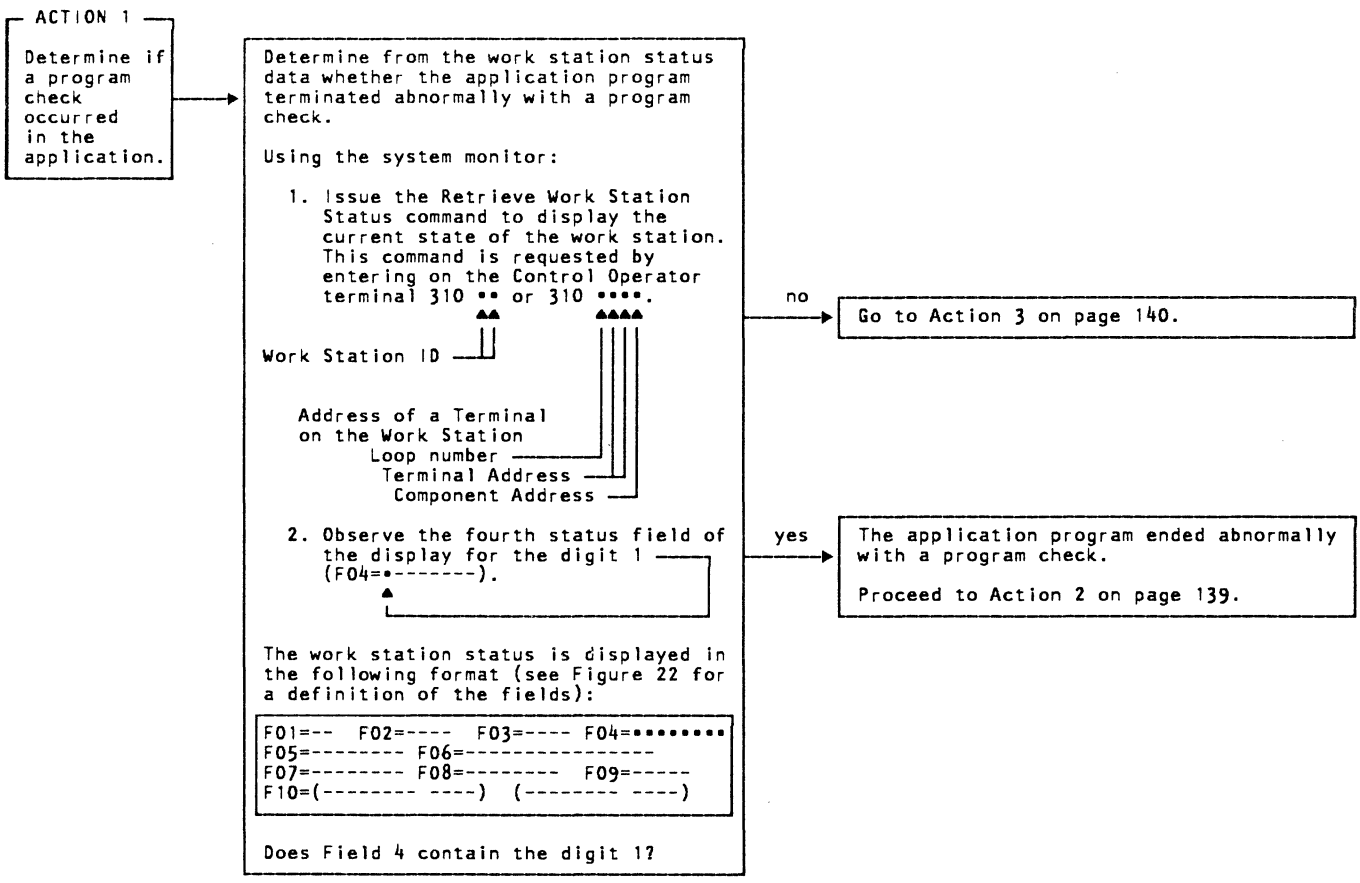

Action
Method of Analysis
Recommendations
ACTION 51
Cause a host log message to be written to the log.
Start the circuit and attempt to cause another message to be generated.
Using the system monitor:
1. Issue a Start Circuit command to start the circuit. To request this command, enter the following from the Control Operator terminal:
141 0 •• •• •• ••• •••••
Refer to your institution's procedures for the appropriate startup parameters.
2. Wait 10 seconds.
Did the ALERT light on the controller come on?
no
The circuit has started.
Go back to Action 1 on page 99.
yes
Go back to Action 50 on the previous page.
ACTION 52
Analyze the system log message.
1. Find the 11 006 Format 8 message.
2. Find the status field (See 4700 Subsystem Operating Procedures, GC31-2032).
3. Follow the reason, 4700, and user action.

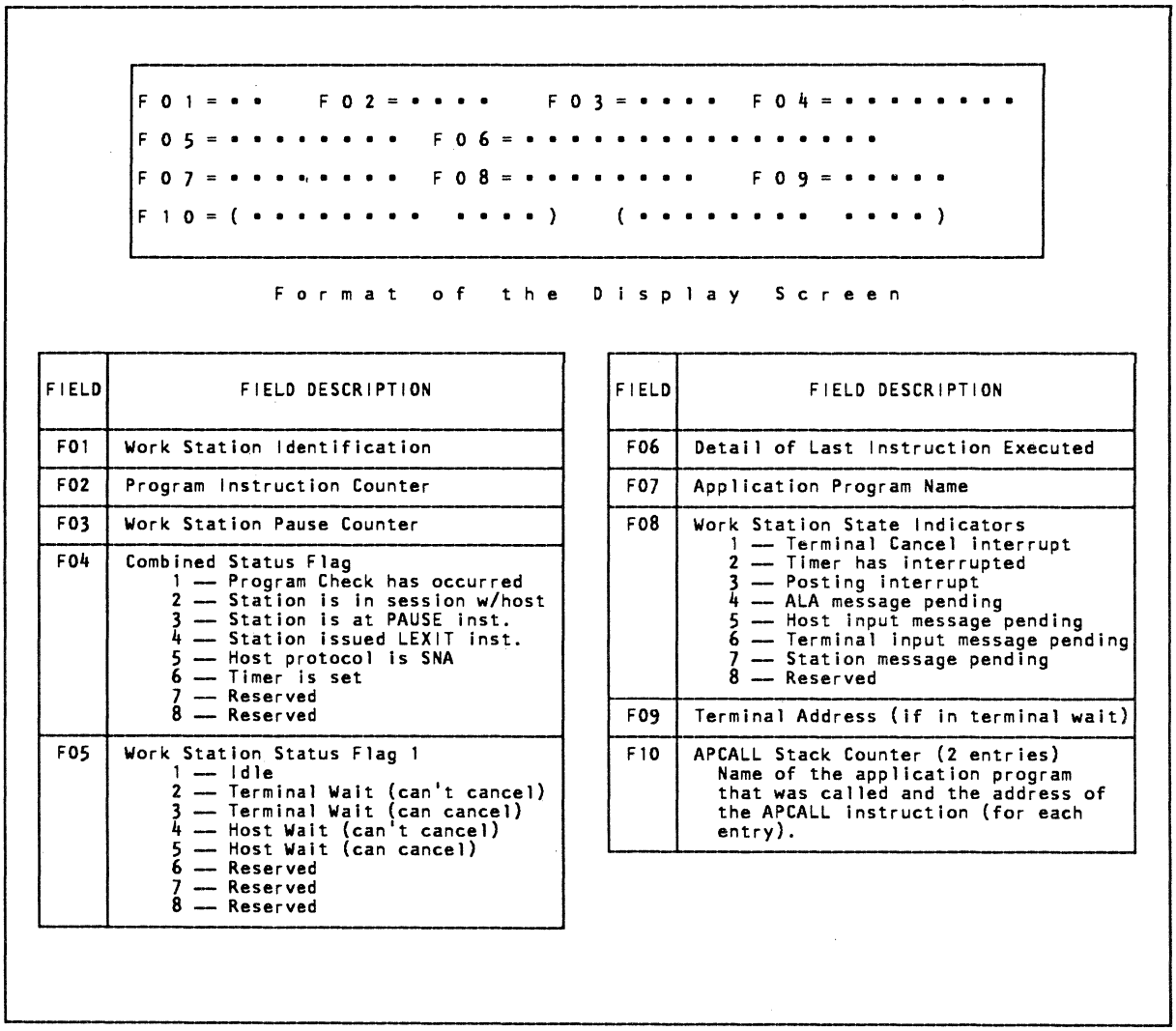
Chapter Six
Work Station Problem Determination Procedure

Chapter Six
Work Station Problem Determination Procedure

PDP04 - Work Station Problem Determination Procedure

Action	Method of Analysis	Recommendations





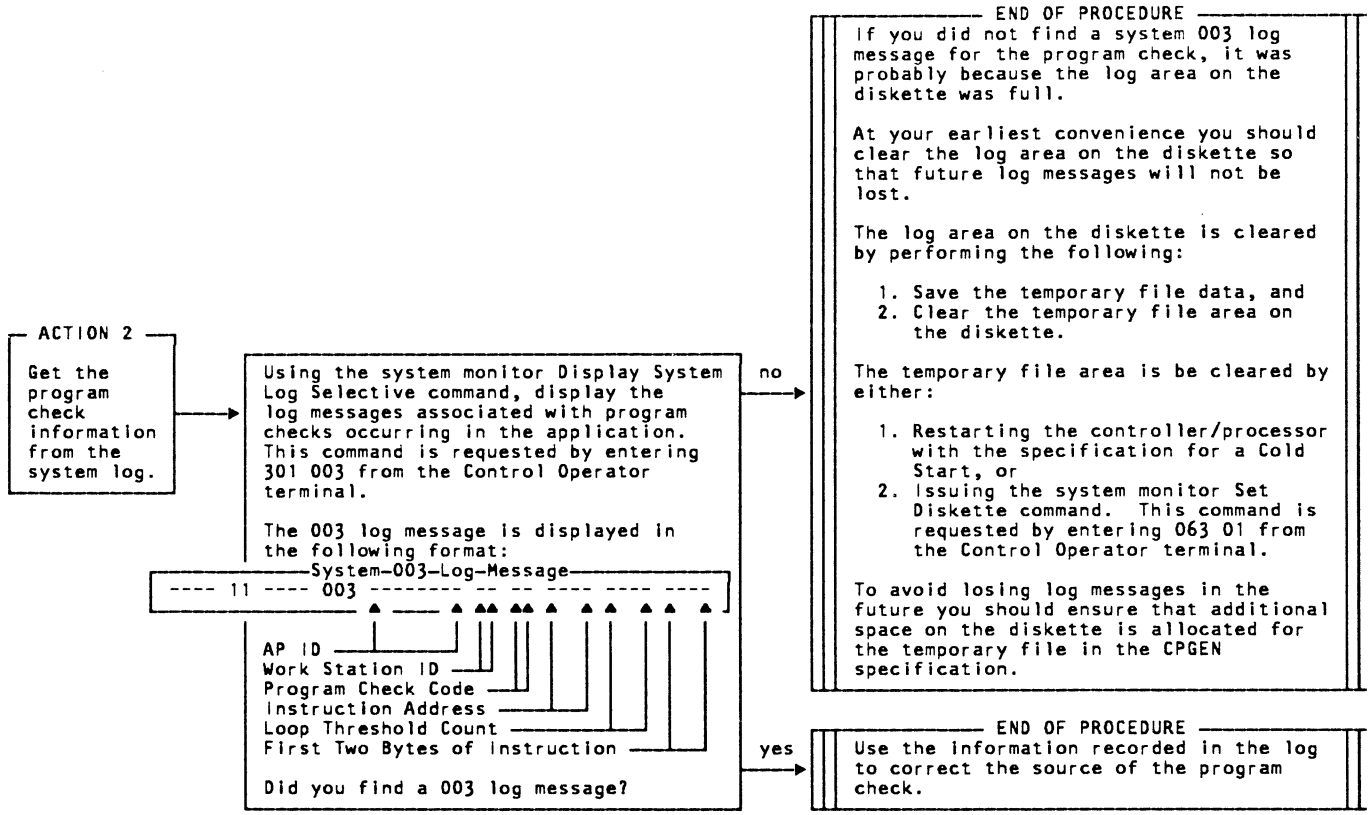
Format of the Display Screen

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

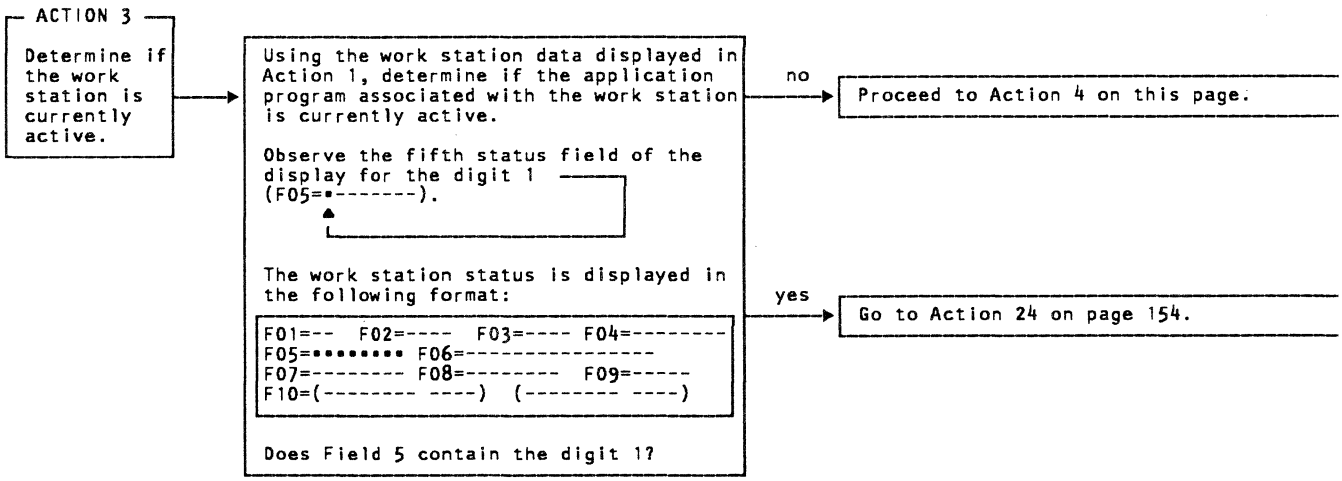
FIELD	FIELD DESCRIPTION
F06	Detail of Last Instruction Executed
F07	Application Program Name
F08	Work Station State Indicators 1 — Terminal Cancel interrupt 2 — Timer has interrupted 3 — Posting interrupt 4 — ALA message pending 5 — Host input message pending 6 — Terminal input message pending 7 — Station 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).

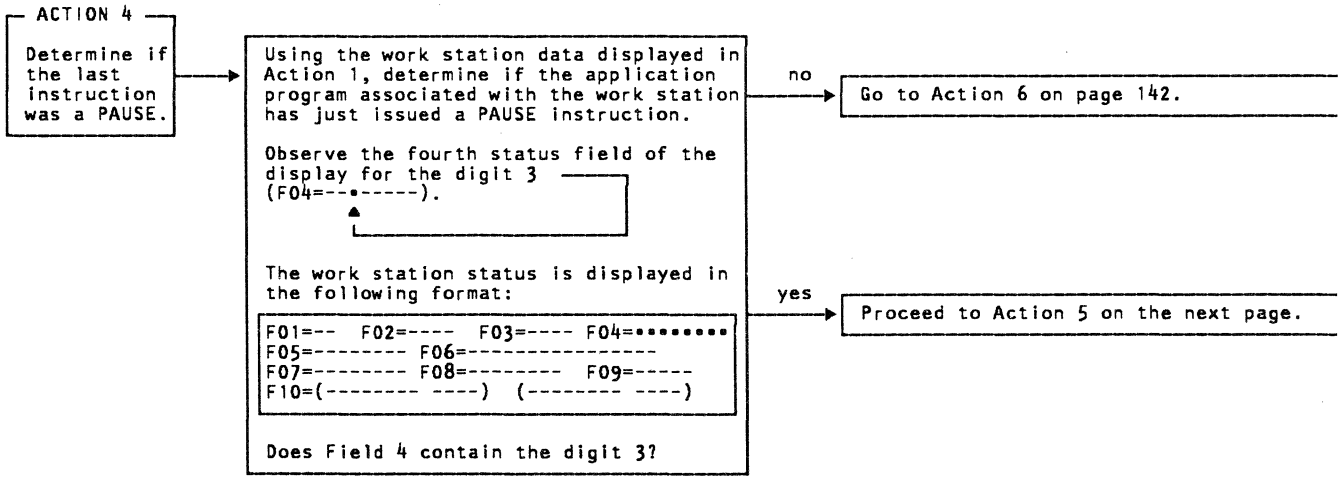
Figure 22. The Display Associated with the System Monitor Display Work Station Status Command

Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations





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.

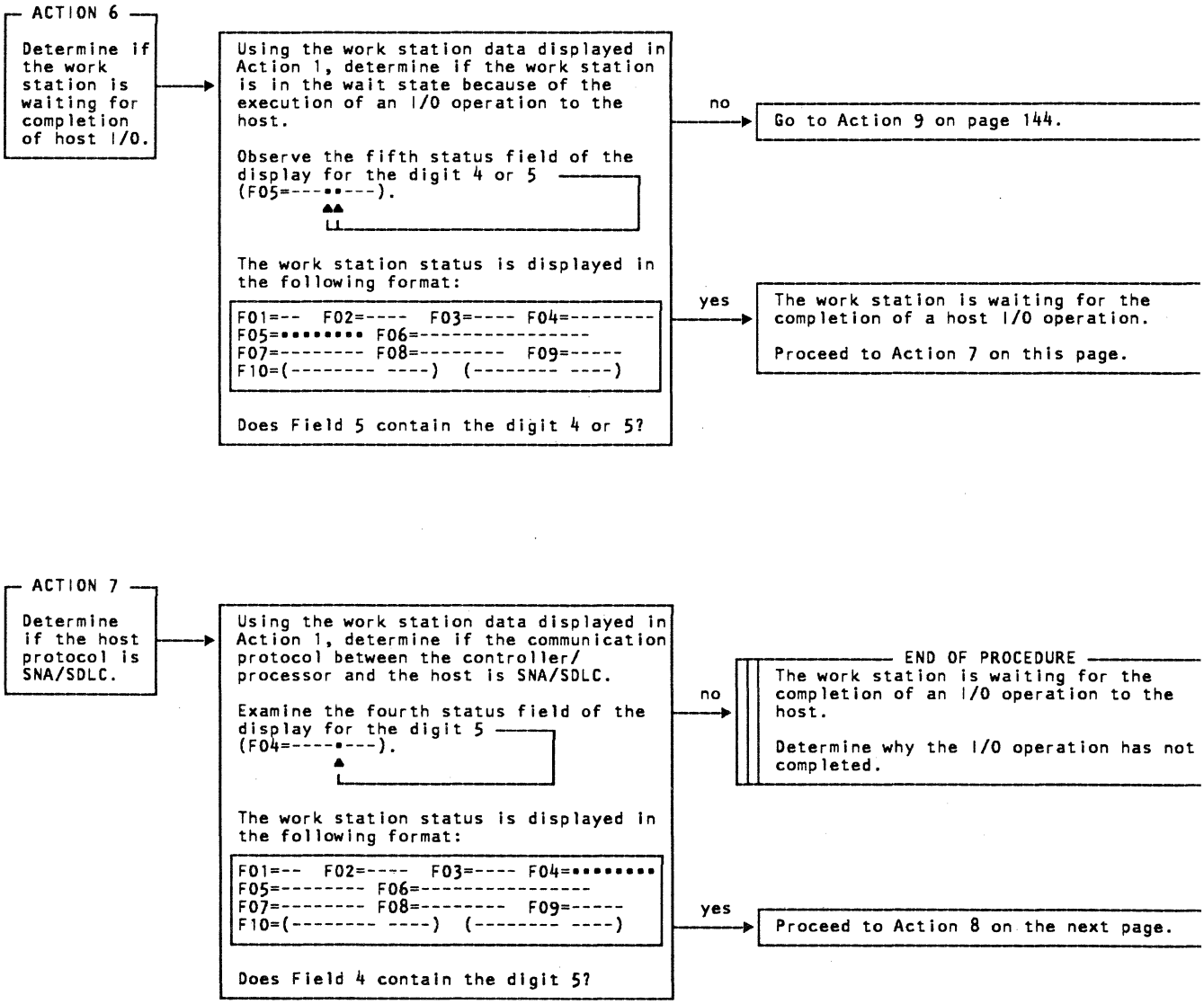
yes →

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.

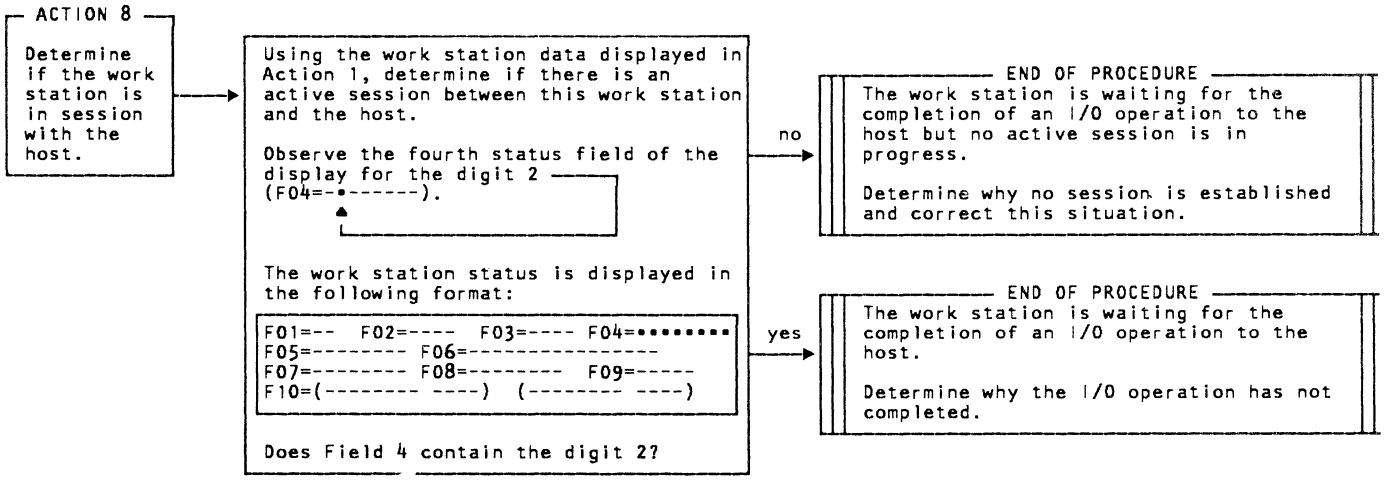
Action | Method of Analysis | Recommendations



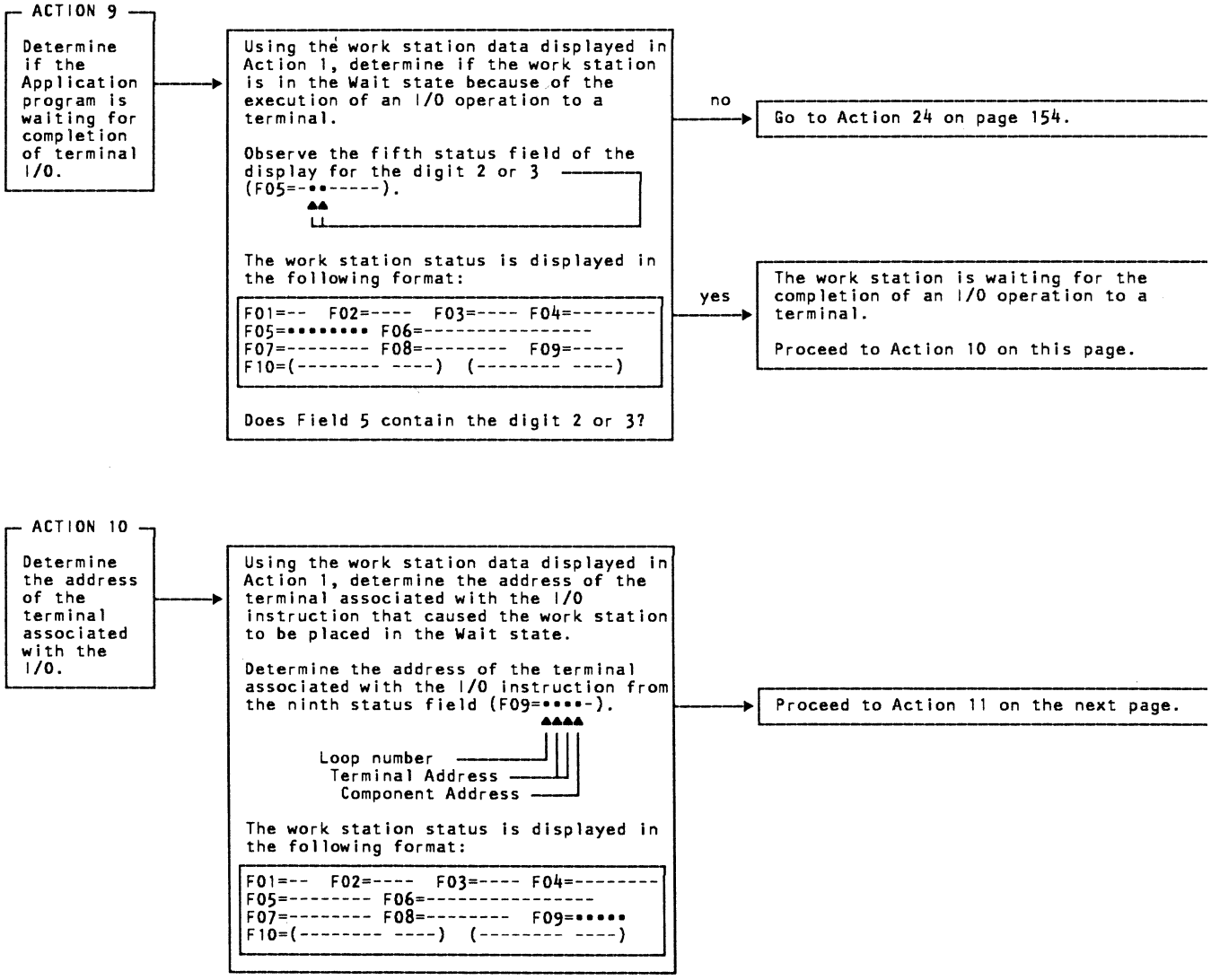
Action	Method of Analysis	Recommendations

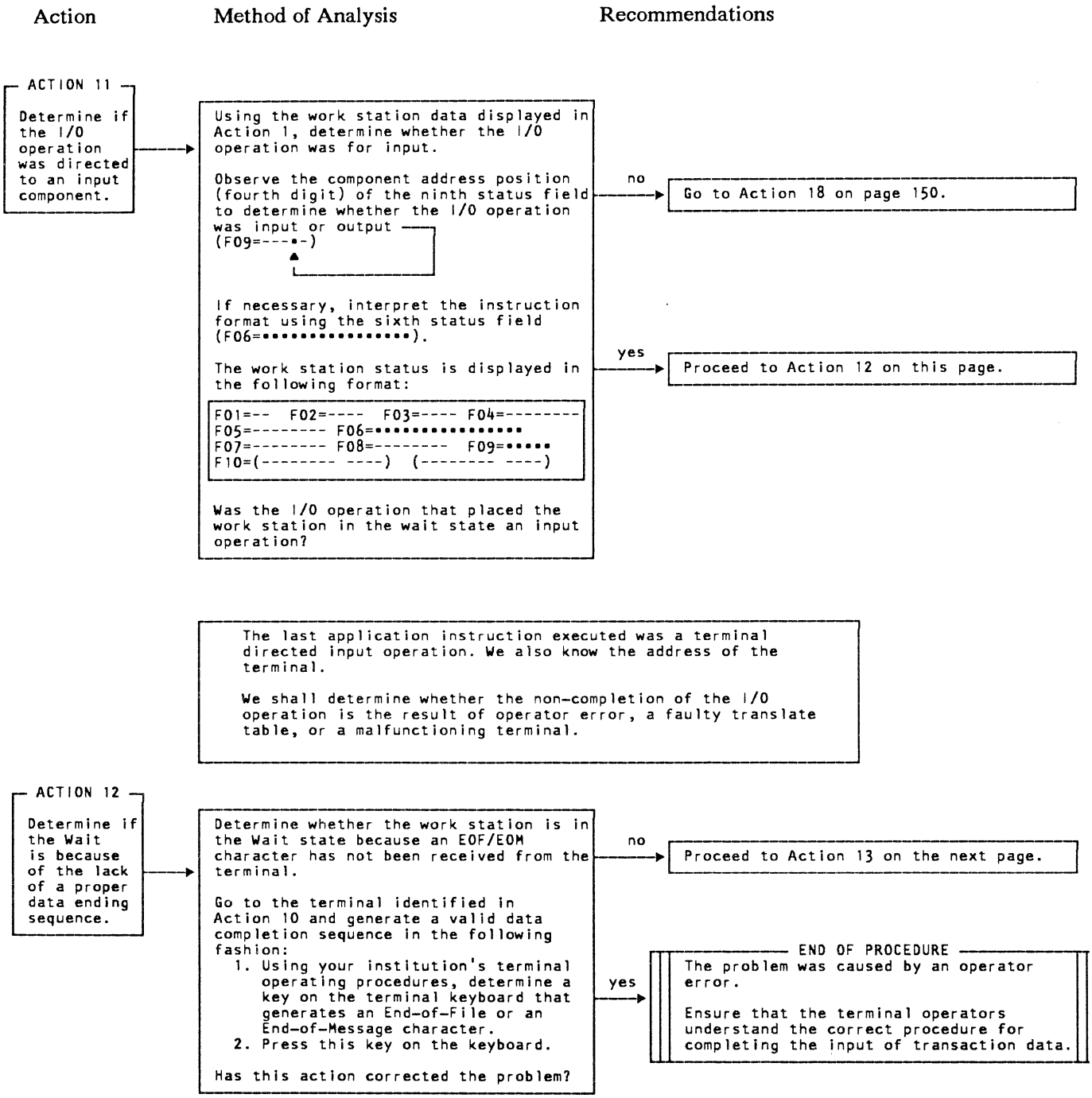
The work station is waiting for the completion of a host directed I/O operation and the host communication protocol is SNA/SDLC.

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

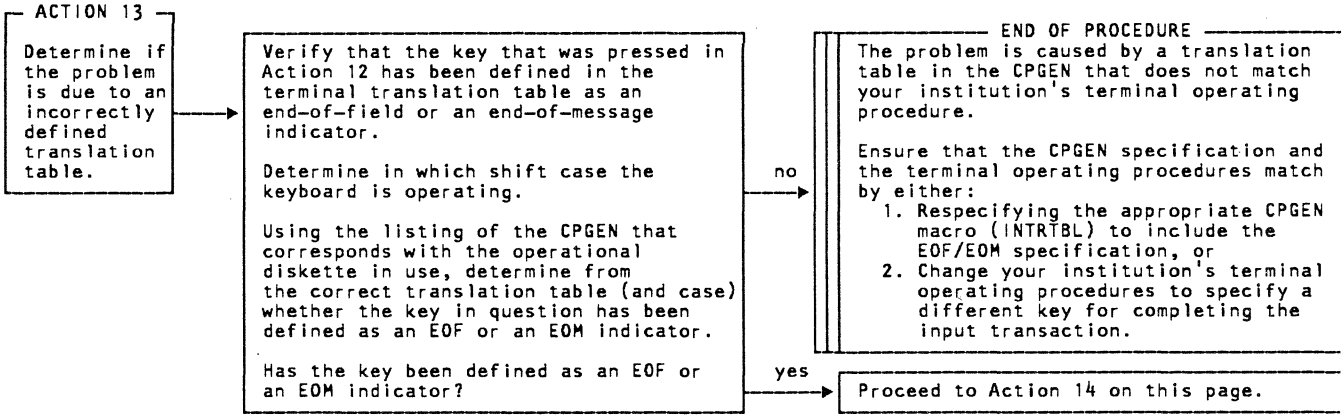


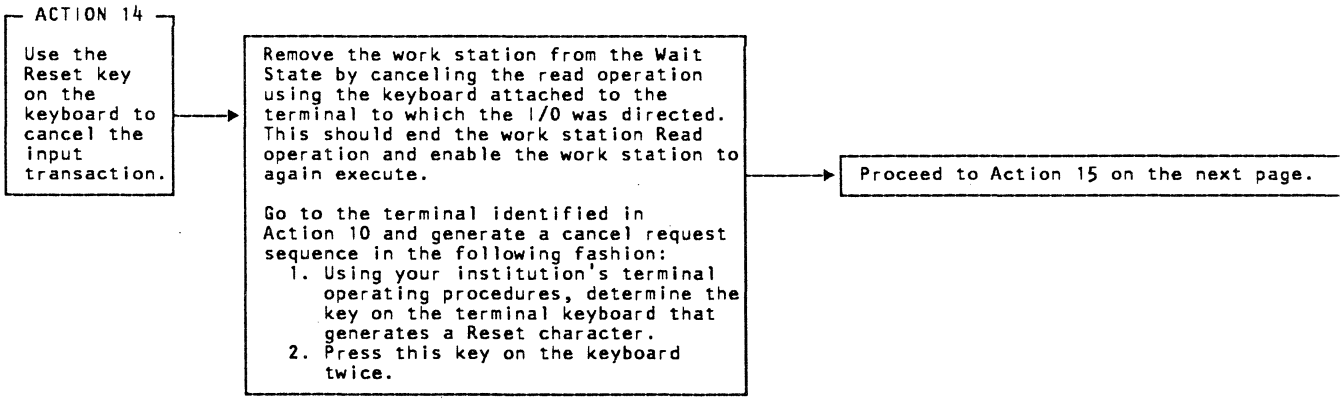
Action	Method of Analysis	Recommendations



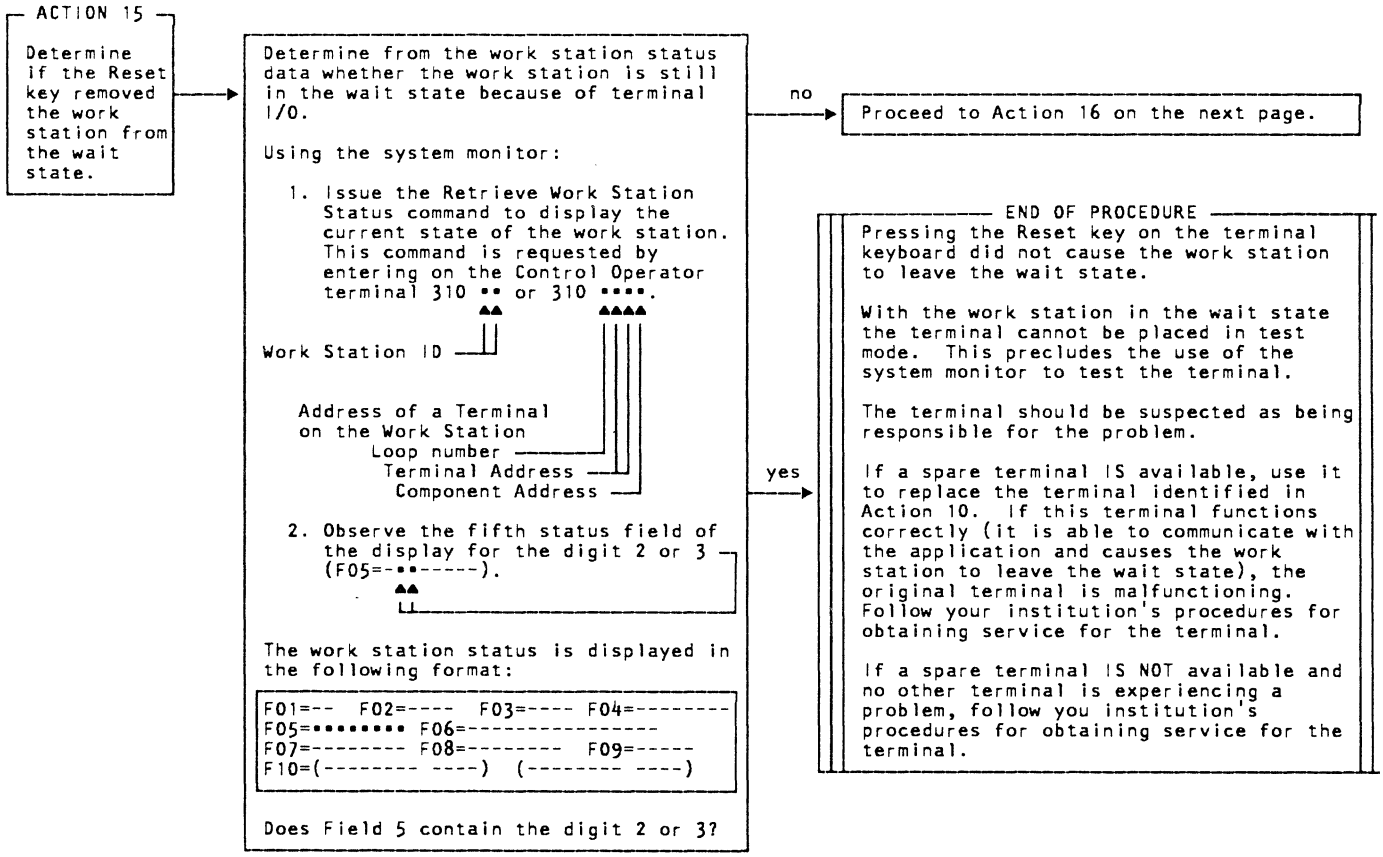

Action
Method of Analysis
Recommendations
ACTION 11
Determine if the I/O operation was directed to an input component.
Using the work station data displayed in Action 1, determine whether the I/O operation was for input.
Observe the component address position (fourth digit) of the ninth status field to determine whether the I/O operation was input or output
(F09=---•-)
If necessary, interpret the instruction format using the sixth status field (F06=••••••••••••••••).
The work station status is displayed in the following format:
F01=-- F02=---- F03=---- F04=--------
F05=-------- F06=••••••••••••••••
F07=-------- F08=-------- F09=•••••
F10=(-------- ----) (-------- ----)
Was the I/O operation that placed the work station in the wait state an input operation?
no
Go to Action 18 on page 150.
yes
Proceed to Action 12 on this page.
The last application instruction executed was a terminal directed input 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, a faulty translate table, or a malfunctioning terminal.
ACTION 12
Determine if the Wait is because of the lack of a proper data ending sequence.
Determine whether the work station is in the Wait state because an EOF/EOM character has not been received from the terminal.
Go to the terminal identified in Action 10 and generate a valid data completion sequence in the following fashion:
1. Using your institution's terminal operating procedures, determine a key on the terminal keyboard that generates an End-of-File or an End-of-Message character.
2. Press this key on the keyboard.
Has this action corrected the problem?
no
Proceed to Action 13 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 completing the input of transaction data.

Action	Method of Analysis	Recommendations

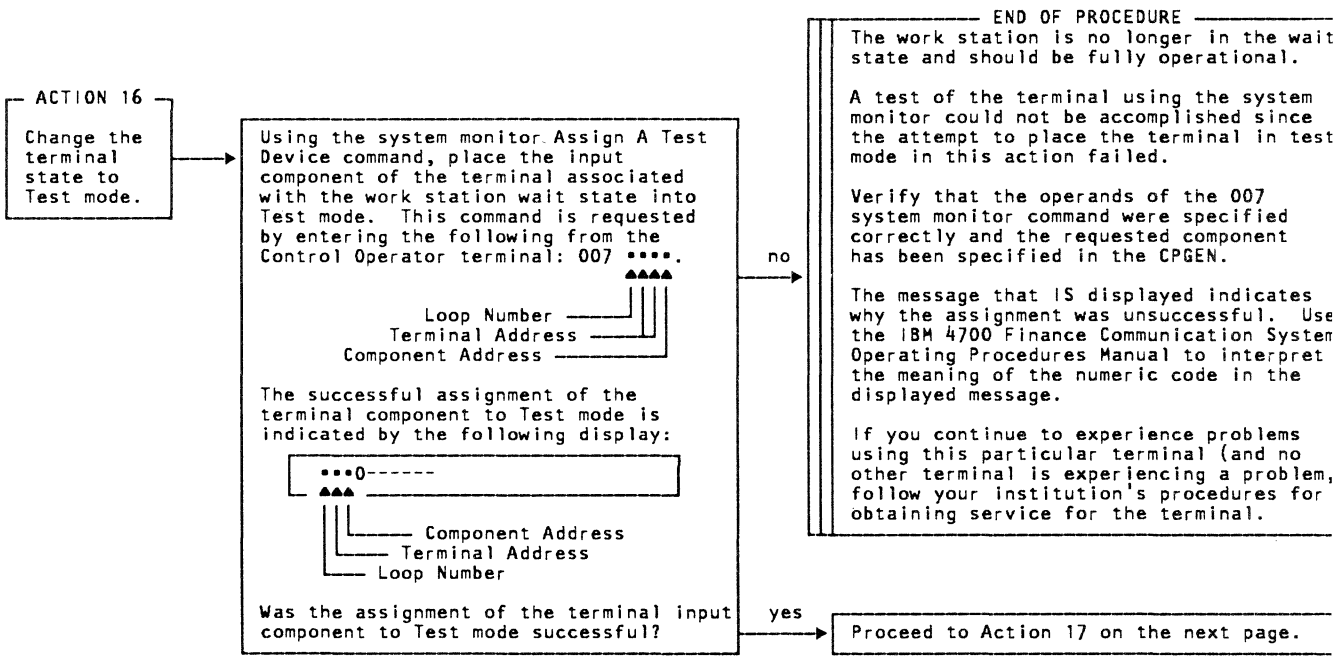




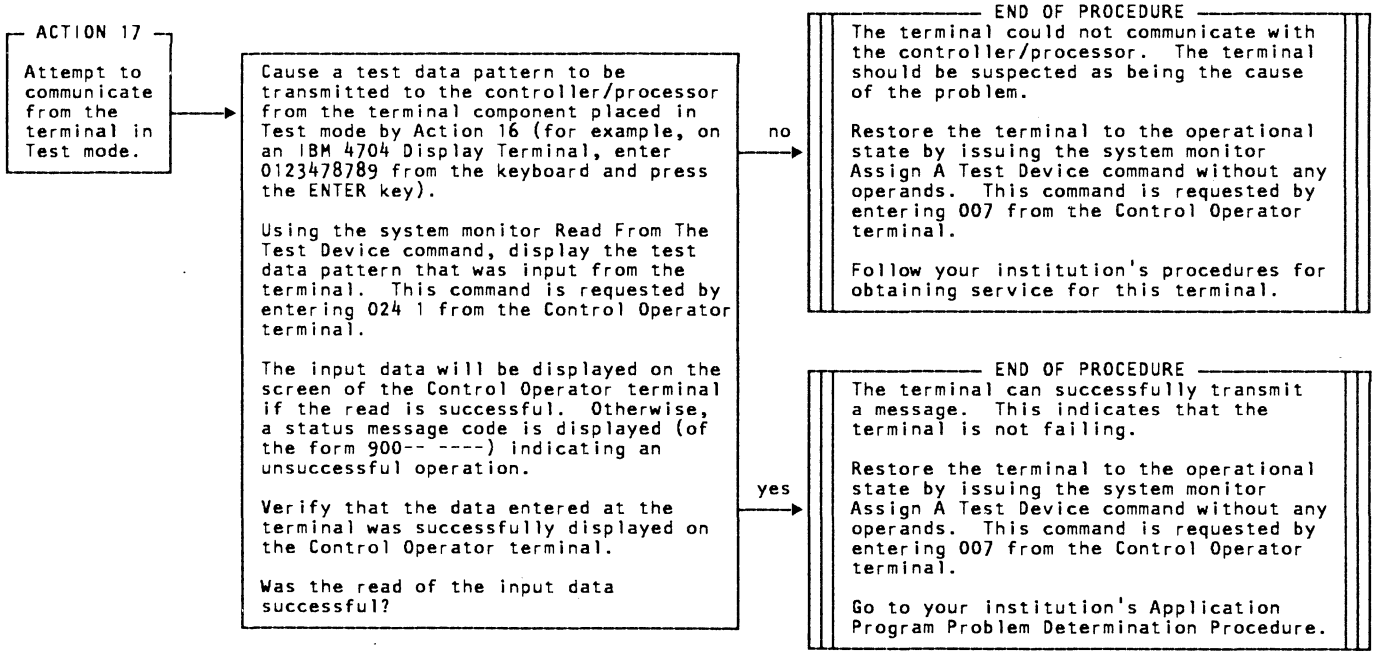
Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations



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.

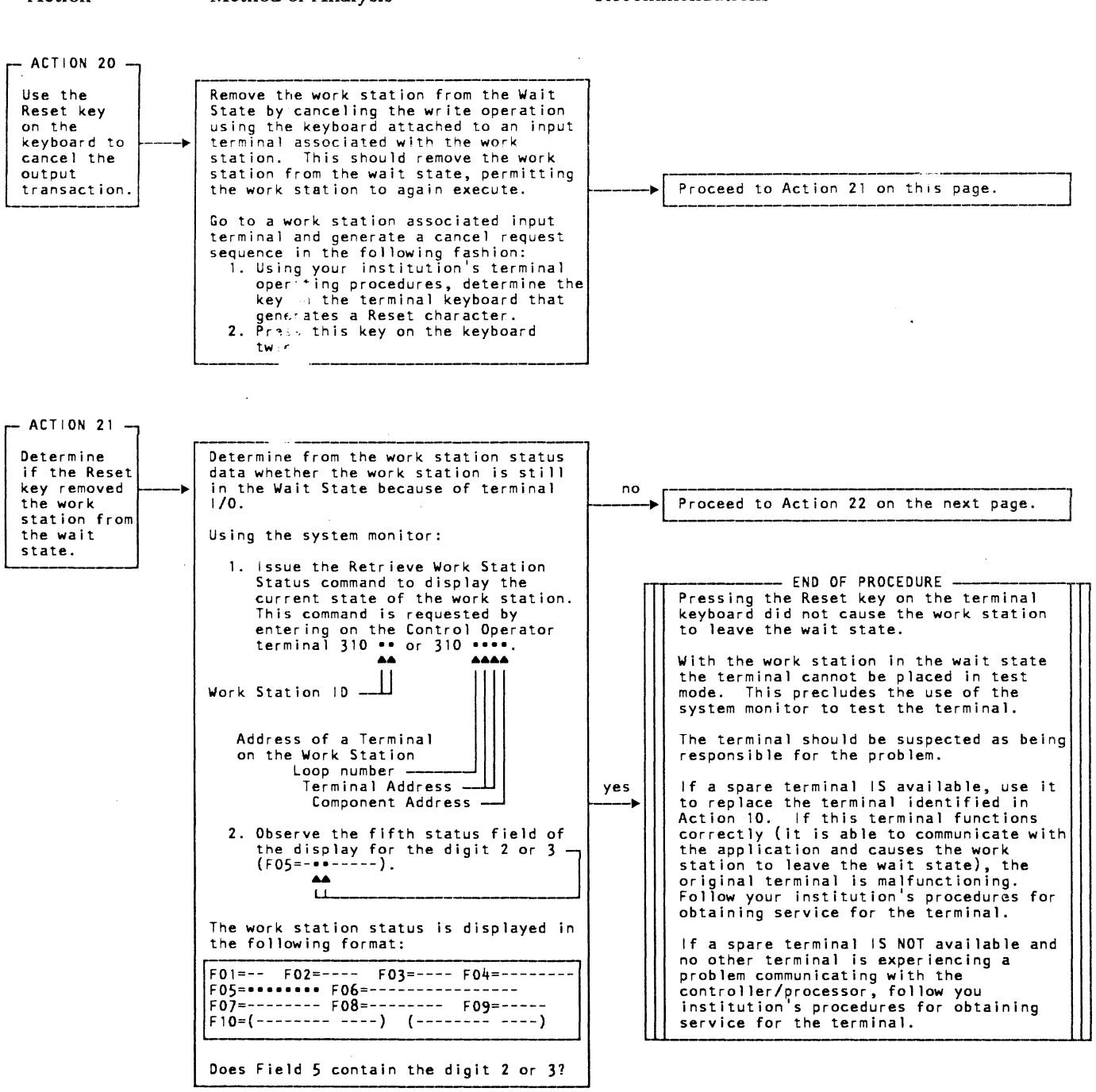
Go to the terminal identified in Action 10 and generate a start indication (for example, the IBM 4710 printer requires a form to be inserted in the printer before printing occurs; other printers require you to press the Start button to initiate printing).

Has this action corrected the problem?

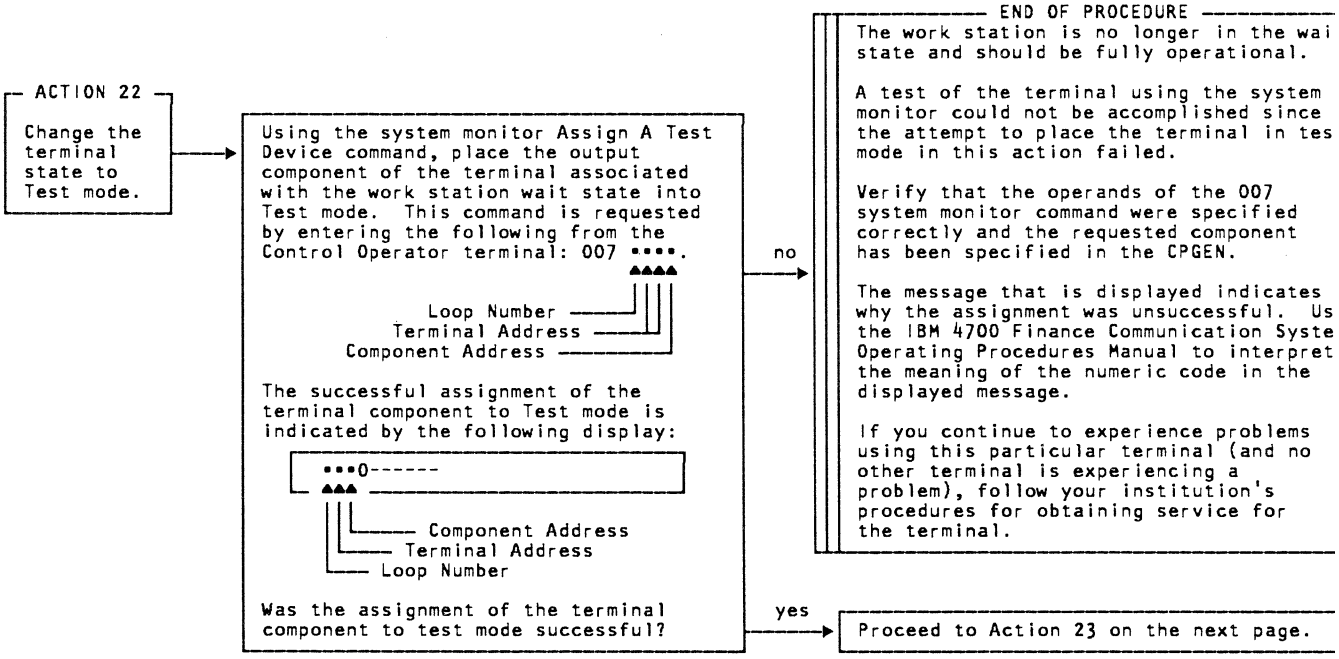
- no → Proceed to Action 20 on the next page.
- yes → END OF PROCEDURE

The problem was caused by an operator error.

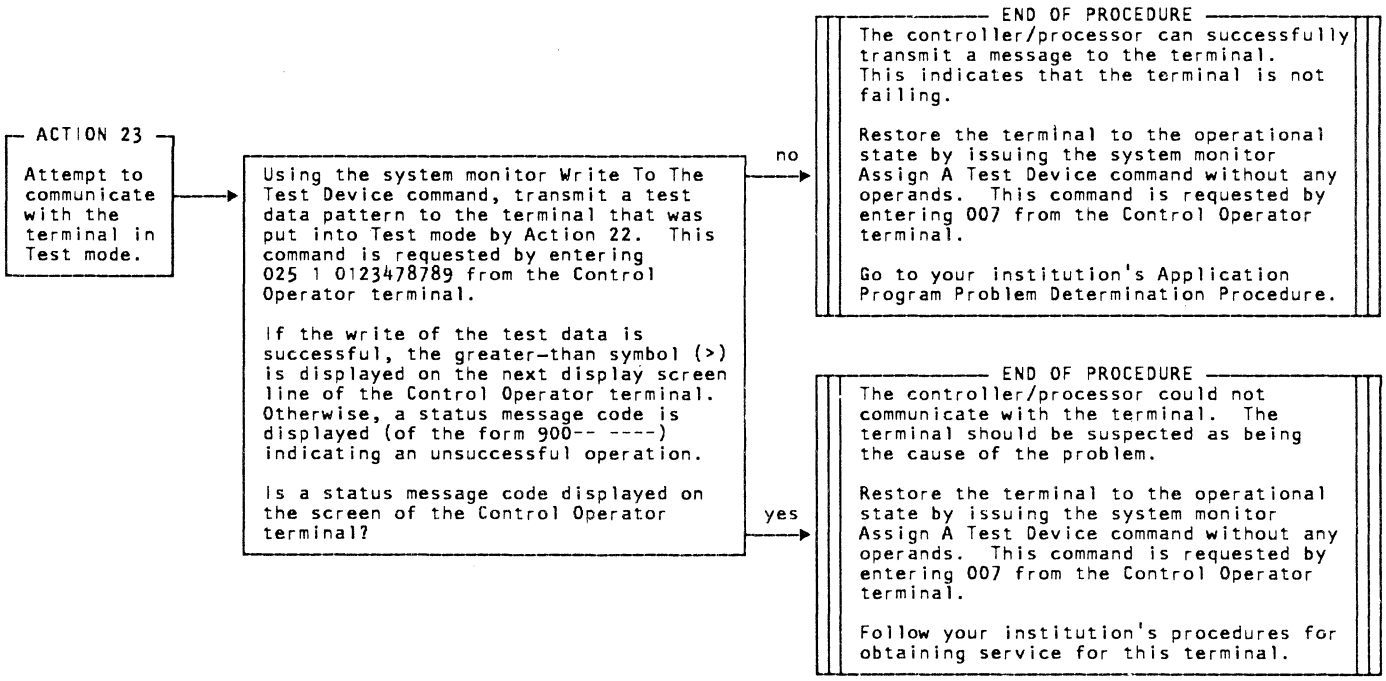
Ensure that the terminal operators understand the correct procedure for obtaining output data.


Action
Method of Analysis
Recommendations
ACTION 20
Use the Reset key on the keyboard to cancel the output transaction.
Remove the work station from the Wait State by canceling the write operation using the keyboard attached to an input terminal associated with the work station. This should remove the work station from the wait state, permitting the work station to again execute.
Go to a work station associated input terminal and generate a cancel request sequence in the following fashion:
1. Using your institution's terminal operating procedures, determine the key on the terminal keyboard that generates a Reset character.
2. Press this key on the keyboard twice
Proceed to Action 21 on this page.
ACTION 21
Determine if the Reset key removed the work station from the wait state.
Determine from the work station status data whether the work station is still in the Wait State because of terminal I/O.
Using the system monitor:
1. Issue the Retrieve Work Station Status command to display the current state of the work station. This command is requested by entering on the Control Operator terminal 310 •• or 310 ••••.
Work Station ID
Address of a Terminal on the Work Station
Loop number
Terminal Address
Component Address
2. 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
Proceed to Action 22 on the next page.
yes
END OF PROCEDURE
Pressing the Reset key on the terminal keyboard did not cause the work station to leave the wait state.
With the work station in the wait state the terminal cannot be placed in test mode. This precludes the use of the system monitor to test the terminal.
The terminal should be suspected as being responsible for the problem.
If a spare terminal IS available, use it to replace the terminal identified in Action 10. If this terminal functions correctly (it is able to communicate with the application and causes the work station to leave the wait state), the original terminal is malfunctioning. Follow your institution's procedures for obtaining service for the terminal.
If a spare terminal IS NOT available and no other terminal is experiencing a problem communicating with the controller/processor, follow you institution's procedures for obtaining service for the terminal.

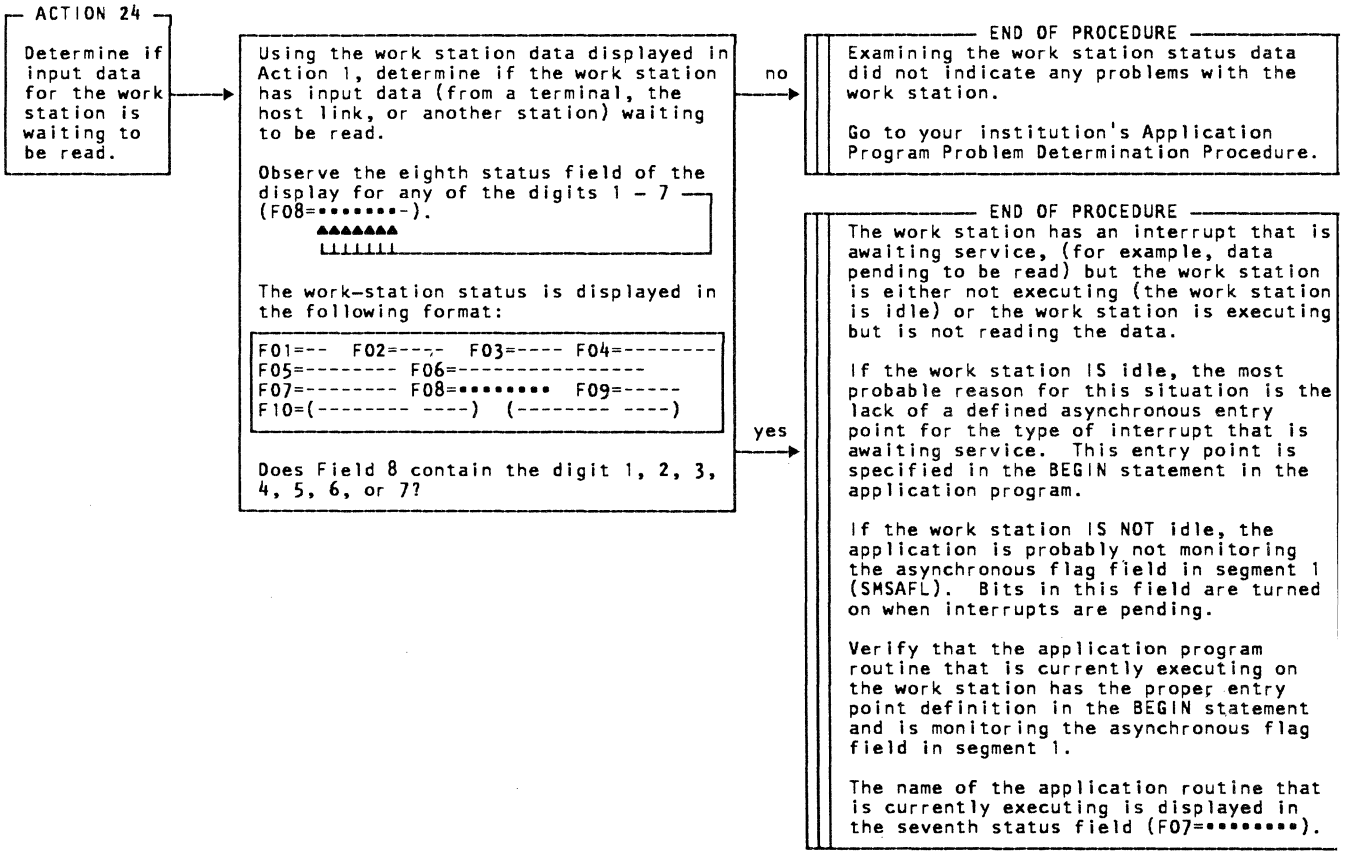
Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations



Action | Method of Analysis | Recommendations

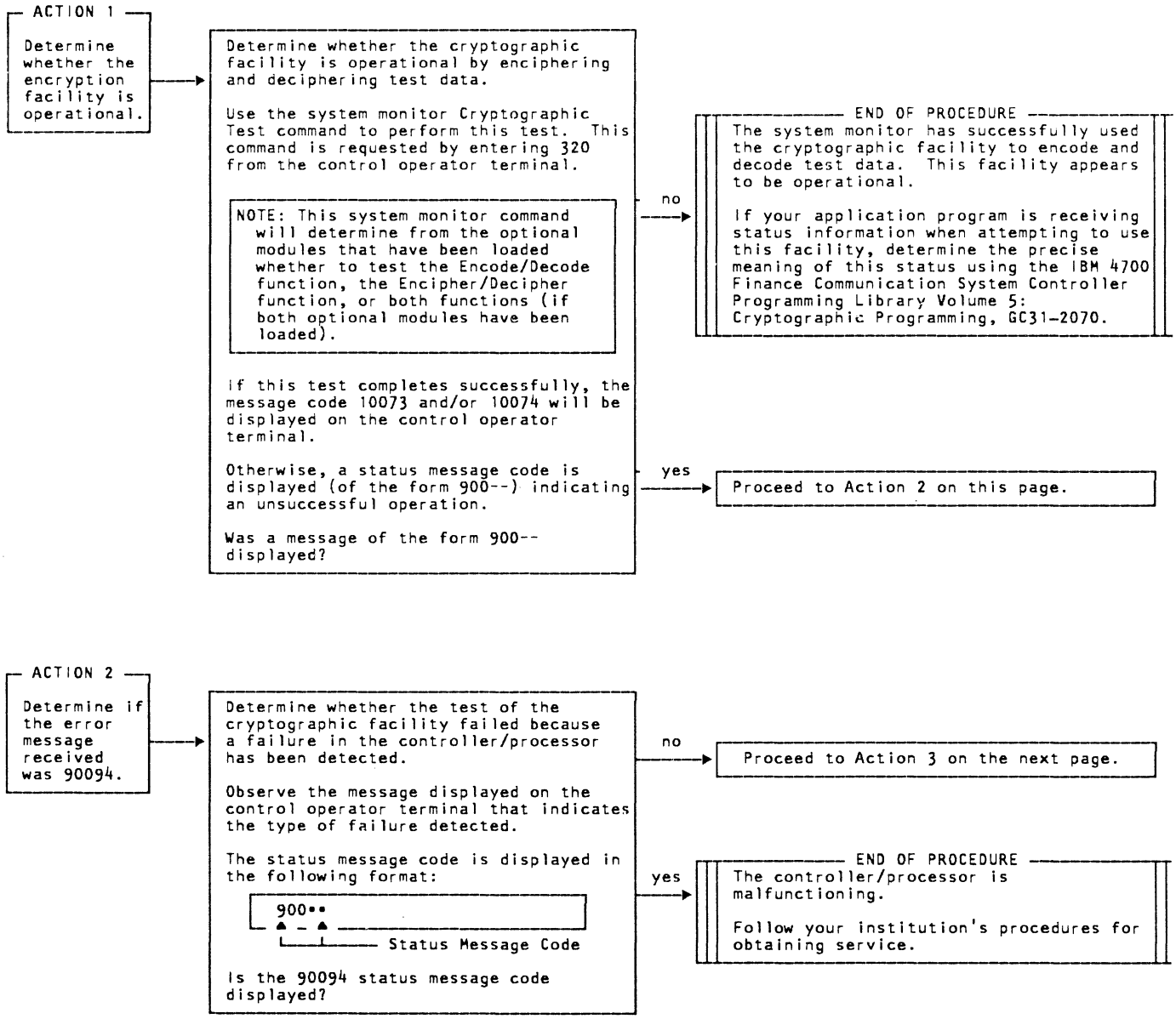


Chapter Seven
Cryptographic Facility Problem Determination Procedure

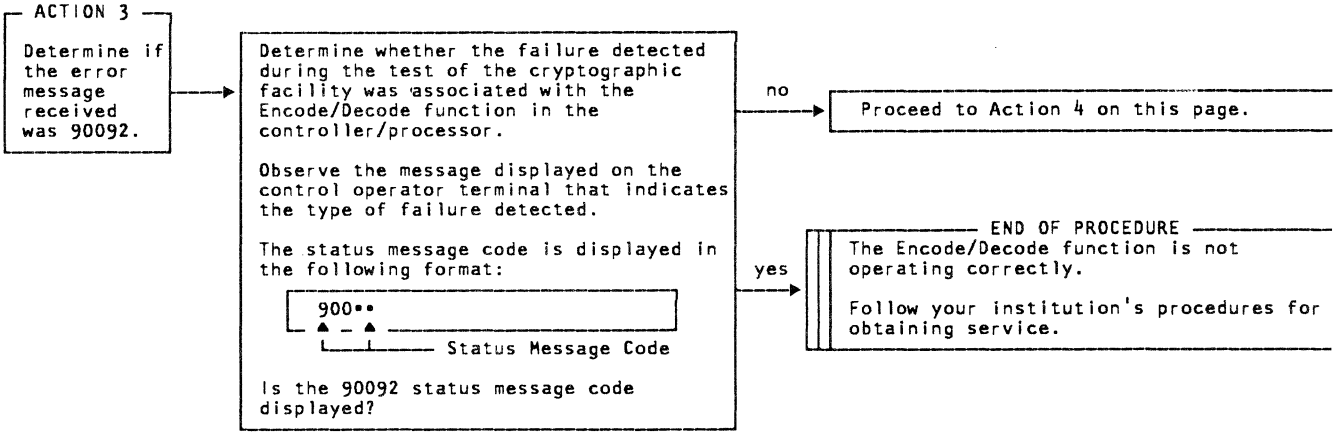
Chapter Seven
Cryptographic Facility Problem Determination Procedure

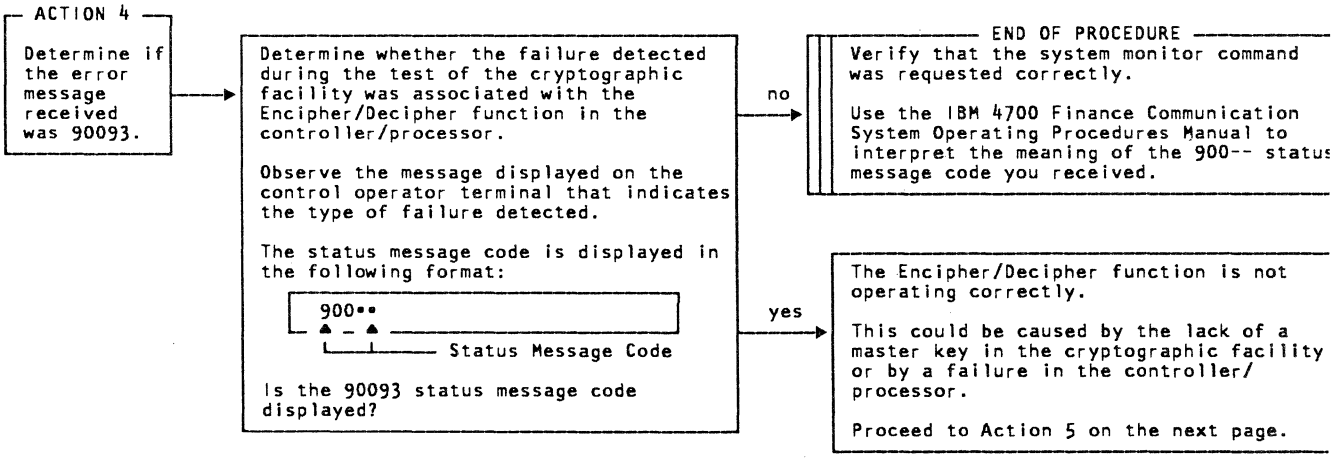
PDP06 - Cryptographic Facility Problem Determination Procedure

Action | Method of Analysis | Recommendations

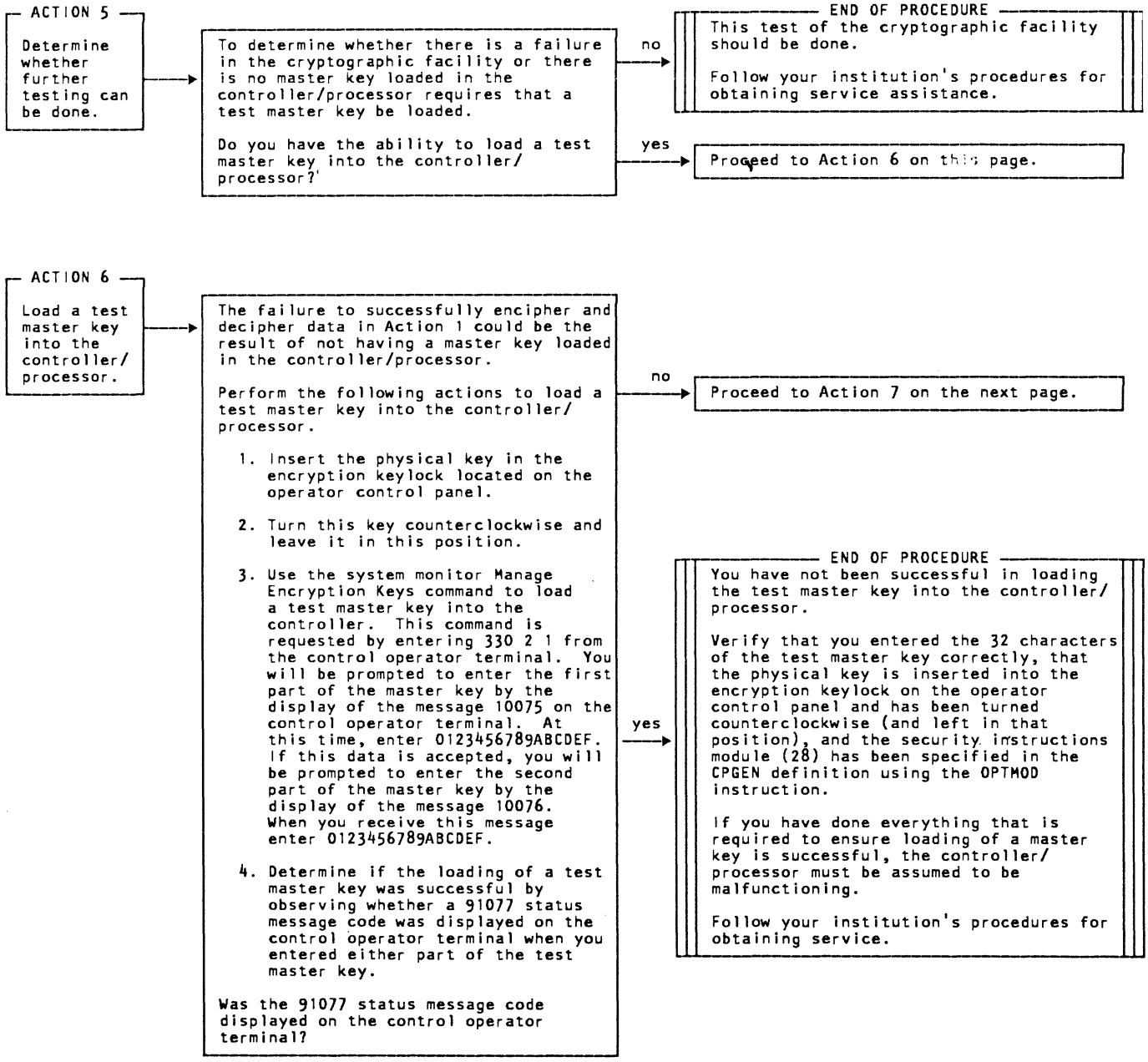


Action	Method of Analysis	Recommendations

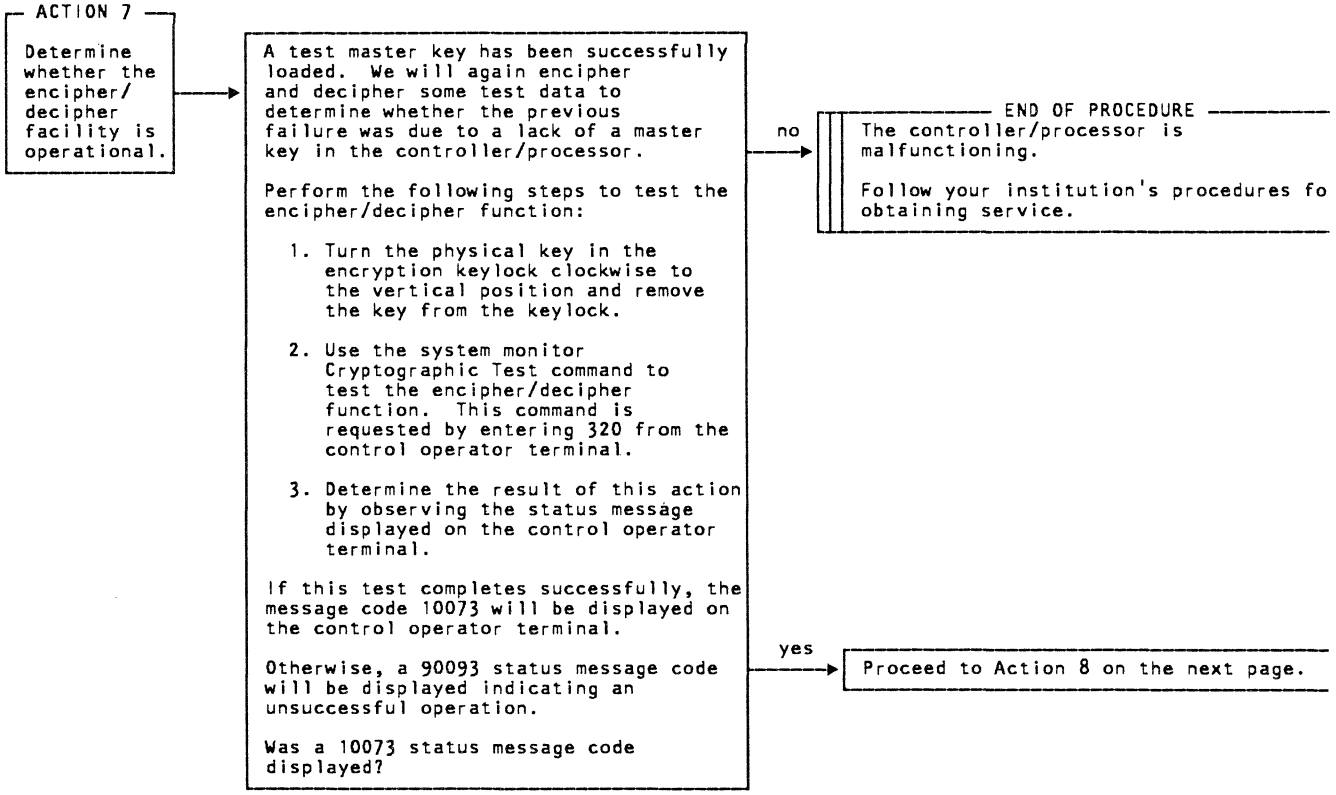




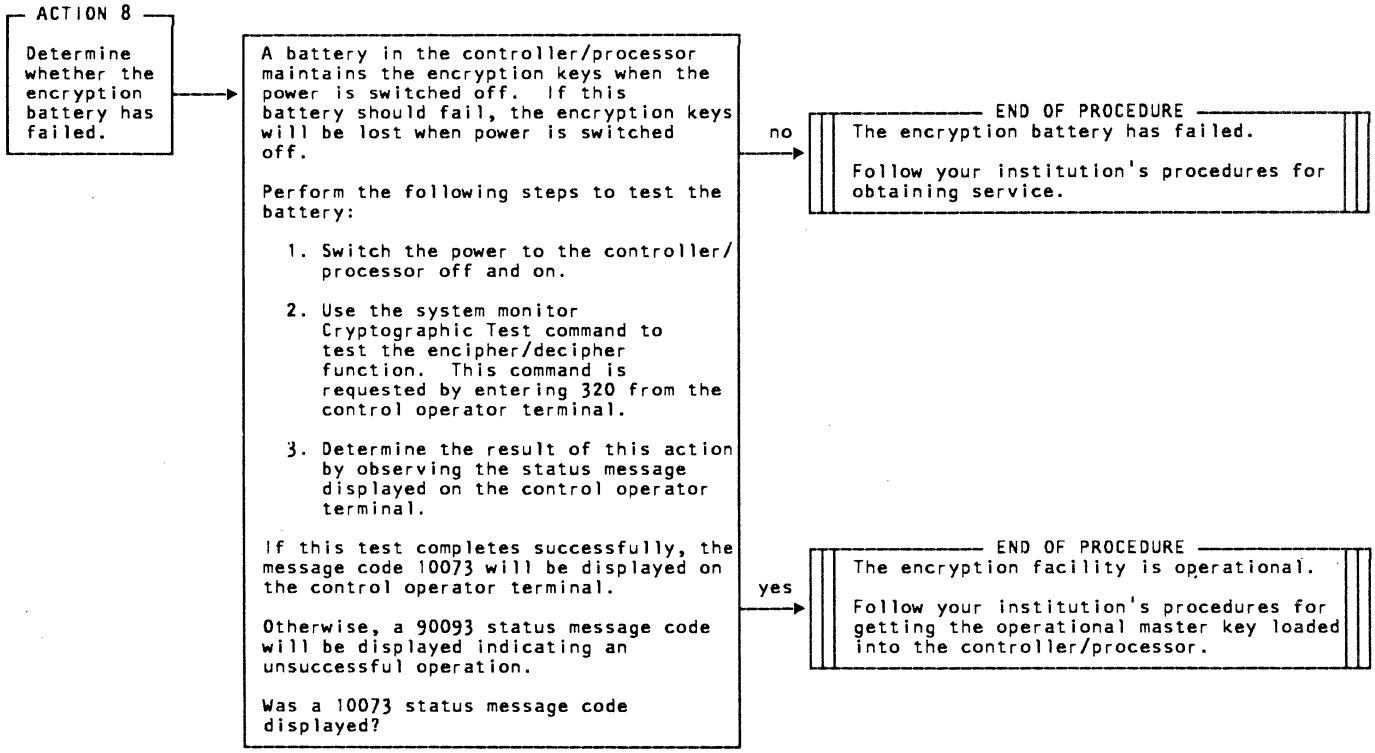
Action | Method of Analysis | Recommendations



Action	Method of Analysis	Recommendations



Action	Method of Analysis	Recommendations

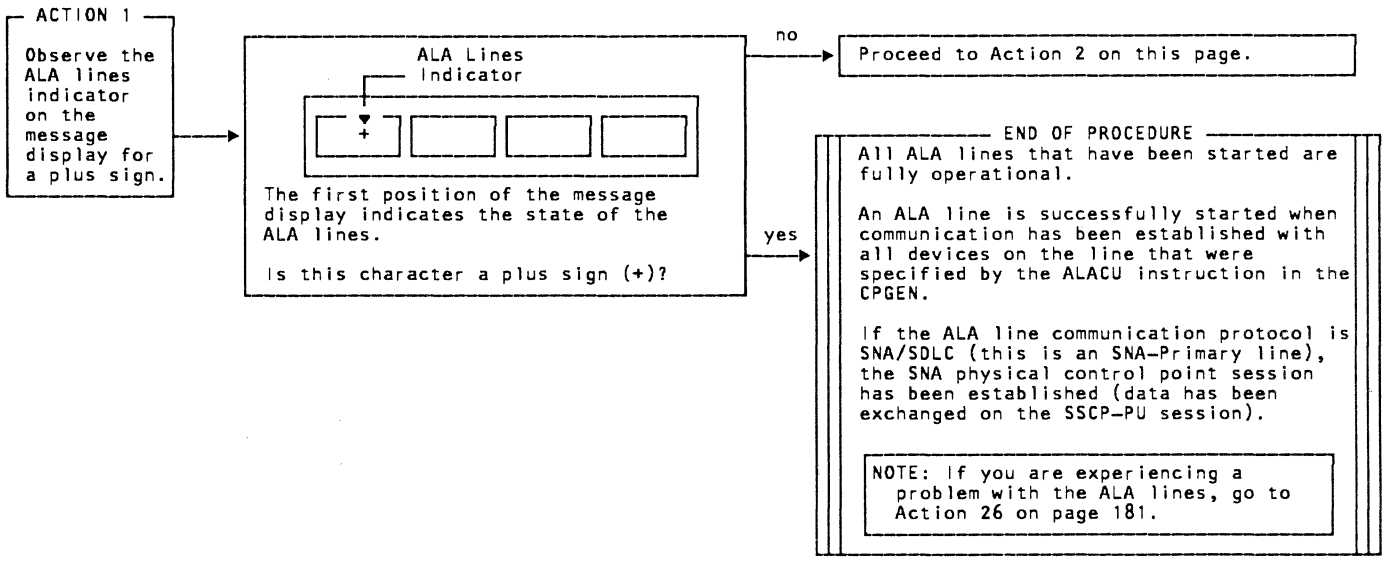


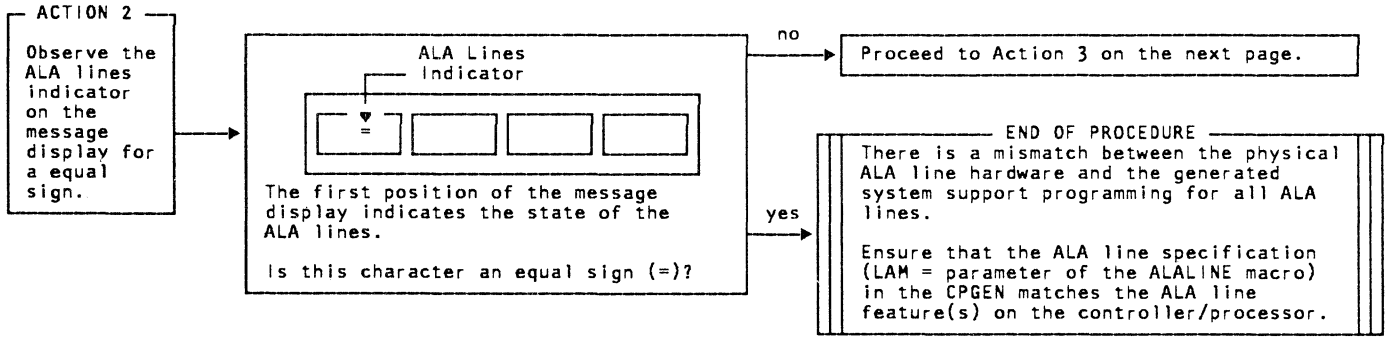
apter Eight
ı Line Problem Determination Procedure

Chapter Eight
ALA Line Problem Determination Procedure

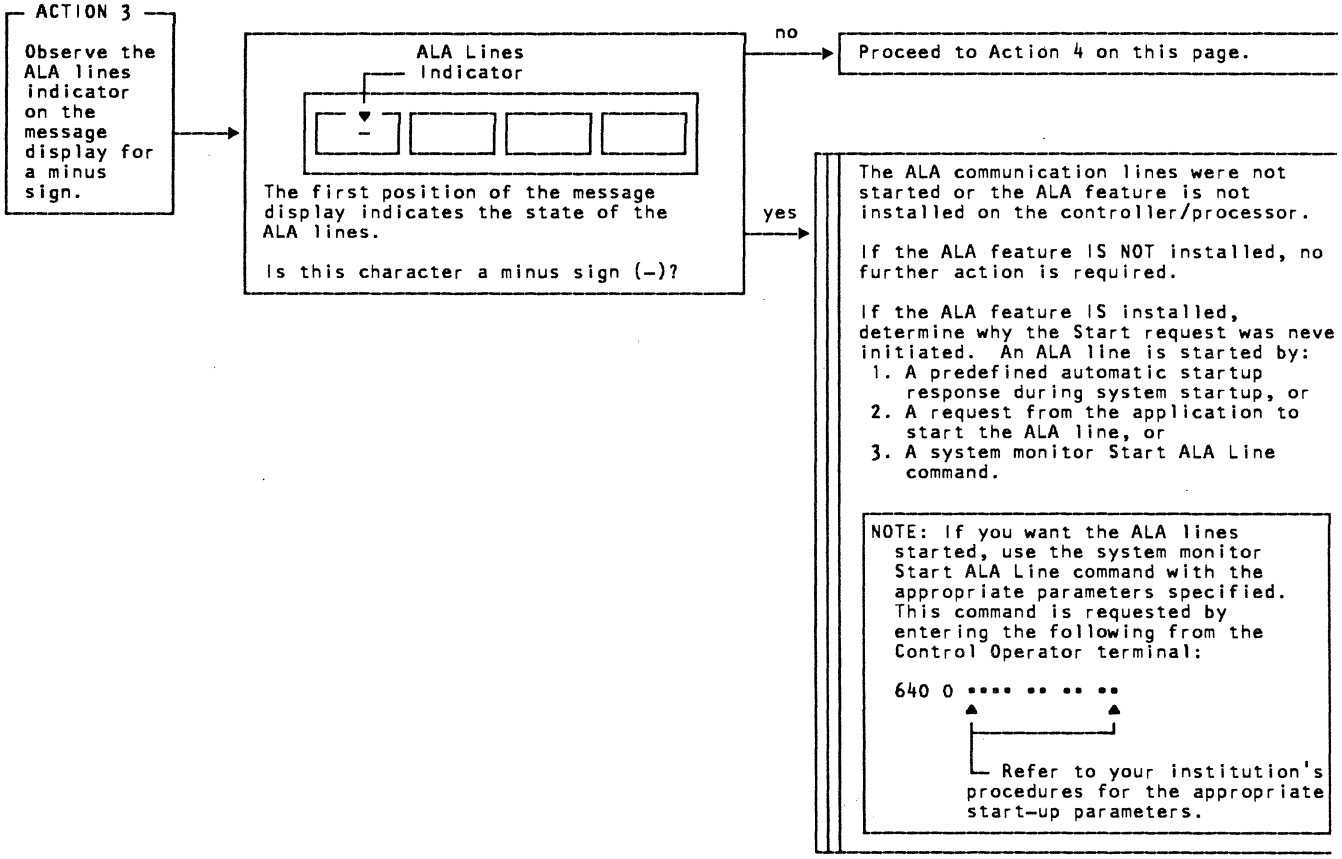
PDP07 - ALA Line Problem Determination Procedure

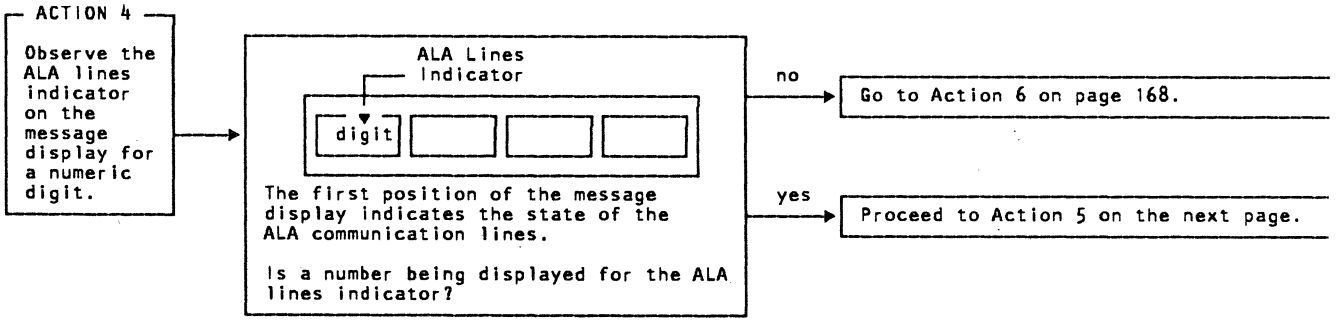
Action	Method of Analysis	Recommendations





Action	Method of Analysis	Recommendations





Action	Method of Analysis	Recommendations

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

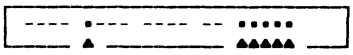
Action 5 will determine the operational state of the line by displaying the associated state symbol. This symbol will be referenced in the remainder of the procedure.

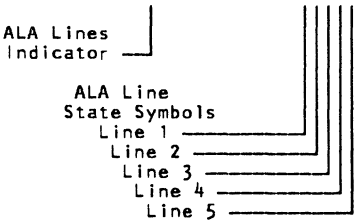
ACTION 5

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.

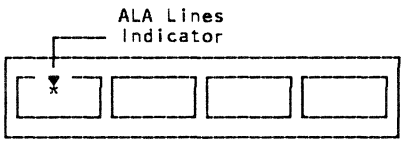
Use this state symbol for the following actions.

Proceed to Action 6 on the next page.

Action	Method of Analysis	Recommendations

ACTION 6

Determine if the ALA lines state symbol is an asterisk.



If there is a single ALA line, the first position of the message display indicates the state of the ALA line.

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

Is the state symbol an asterisk (*)?

no → Proceed to Action 7 on this page.

yes → The ALA line is not operational.

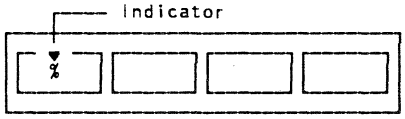
Internal diagnostics have run and the results have been recorded in a system log message.

The controller/processor will continuall attempt to start the ALA Communication line.

Go to Action 17 on page 174.

ACTION 7

Determine if the ALA lines state symbol is a percent sign.



If there is a single ALA line, the first position of the message display indicates the state of the ALA line.

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

Is the state symbol a percent sign (%)?

no → Proceed to Action 8 on the next page.

yes → The ALA line is not operational.

One or more of the ALA lines statistical counters have increased. These counters identify the condition that caused the line to be non-operational.

The controller/processor will continuall attempt to start the ALA Communication line.

NOTE: Additional diagnostic testing occurs after this symbol is displayed.

It is possible that this additional testing will discover a problem that will cause a message to be written to the log.

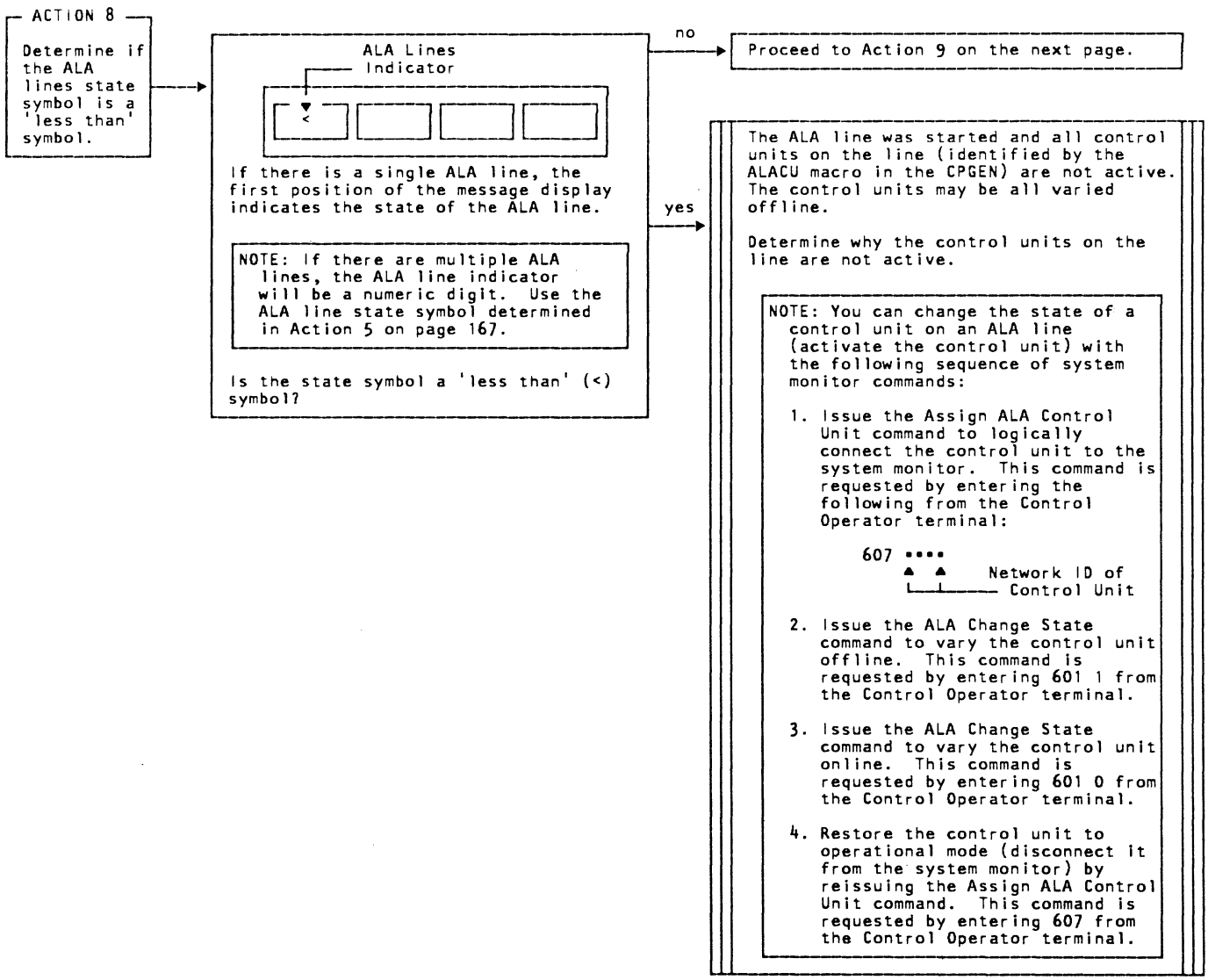
If this should occur, the ALA state symbol will change to an asterisk (*).

If the state symbol changes to an asterisk, go to Action 17 on page 174.

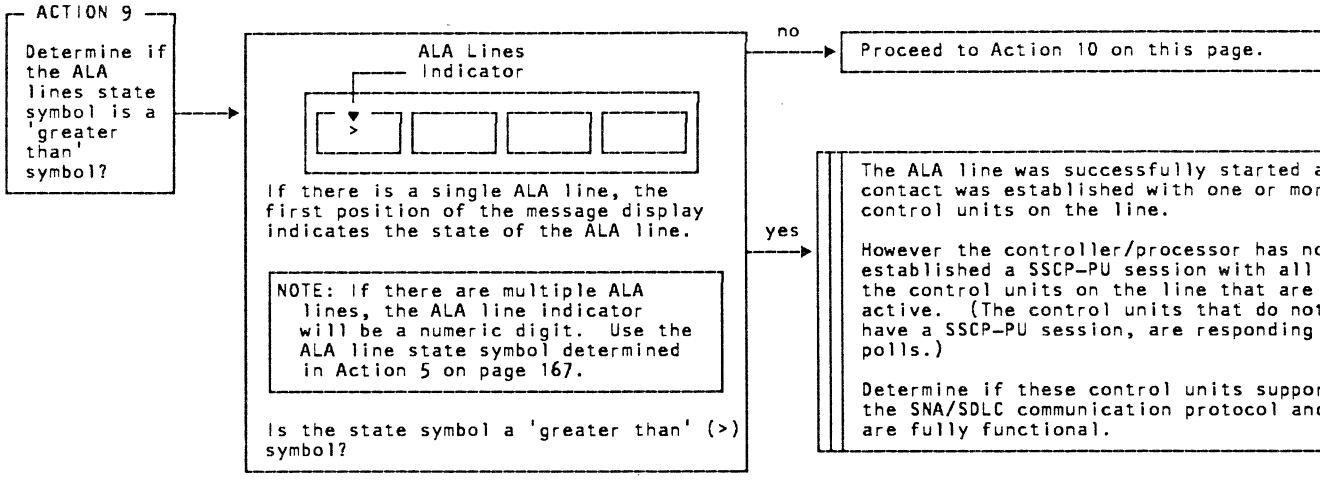
If the state symbol is the percent sign go to Action 26 on page 181.

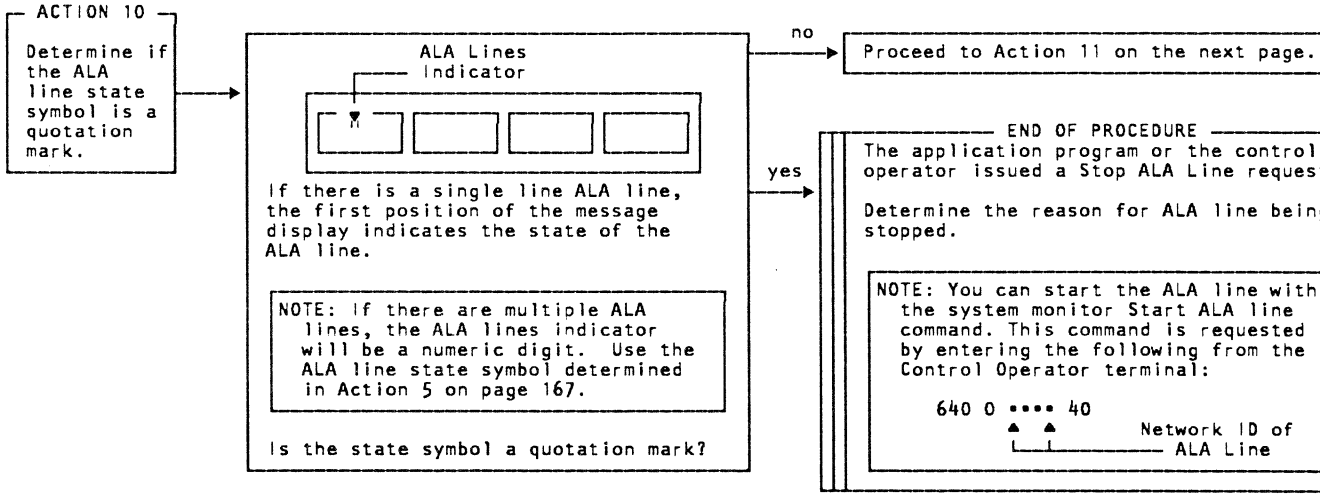
PDP07 - ALA Line Problem Determination Procedure

Action	Method of Analysis	Recommendations



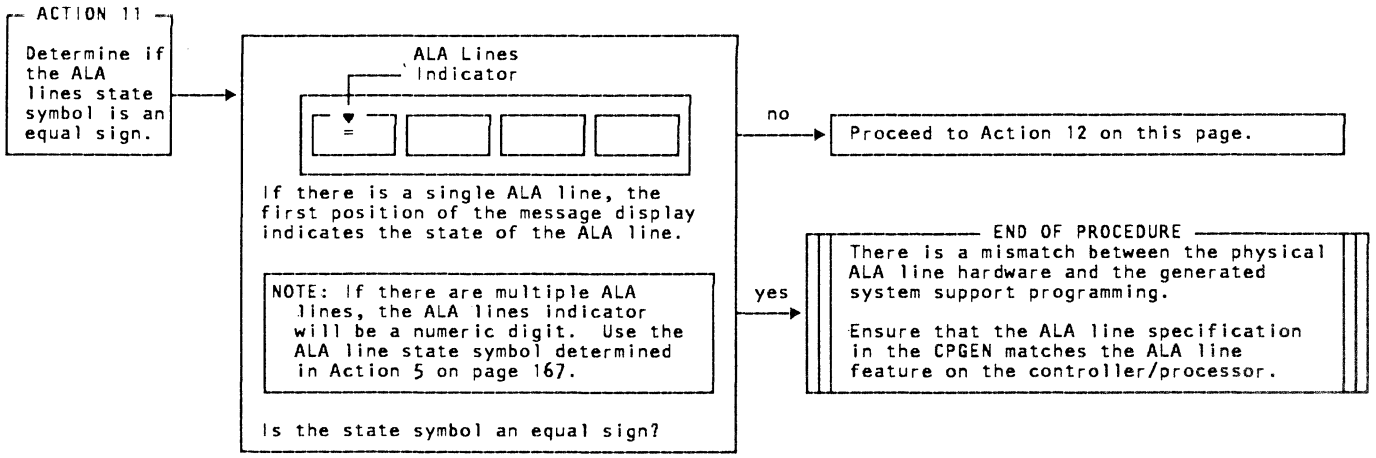
Action	Method of Analysis	Recommendations

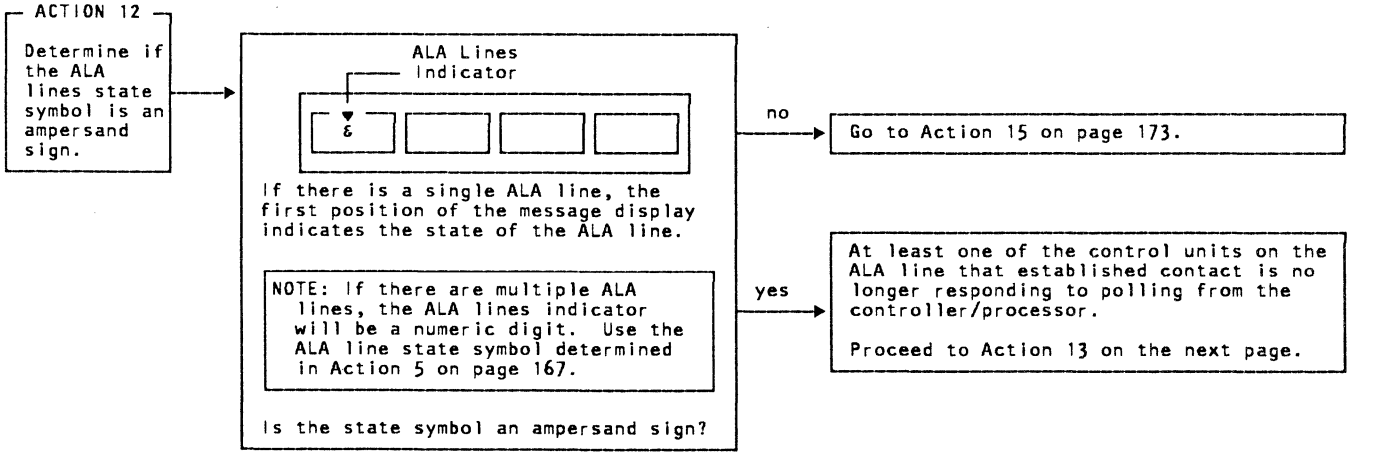




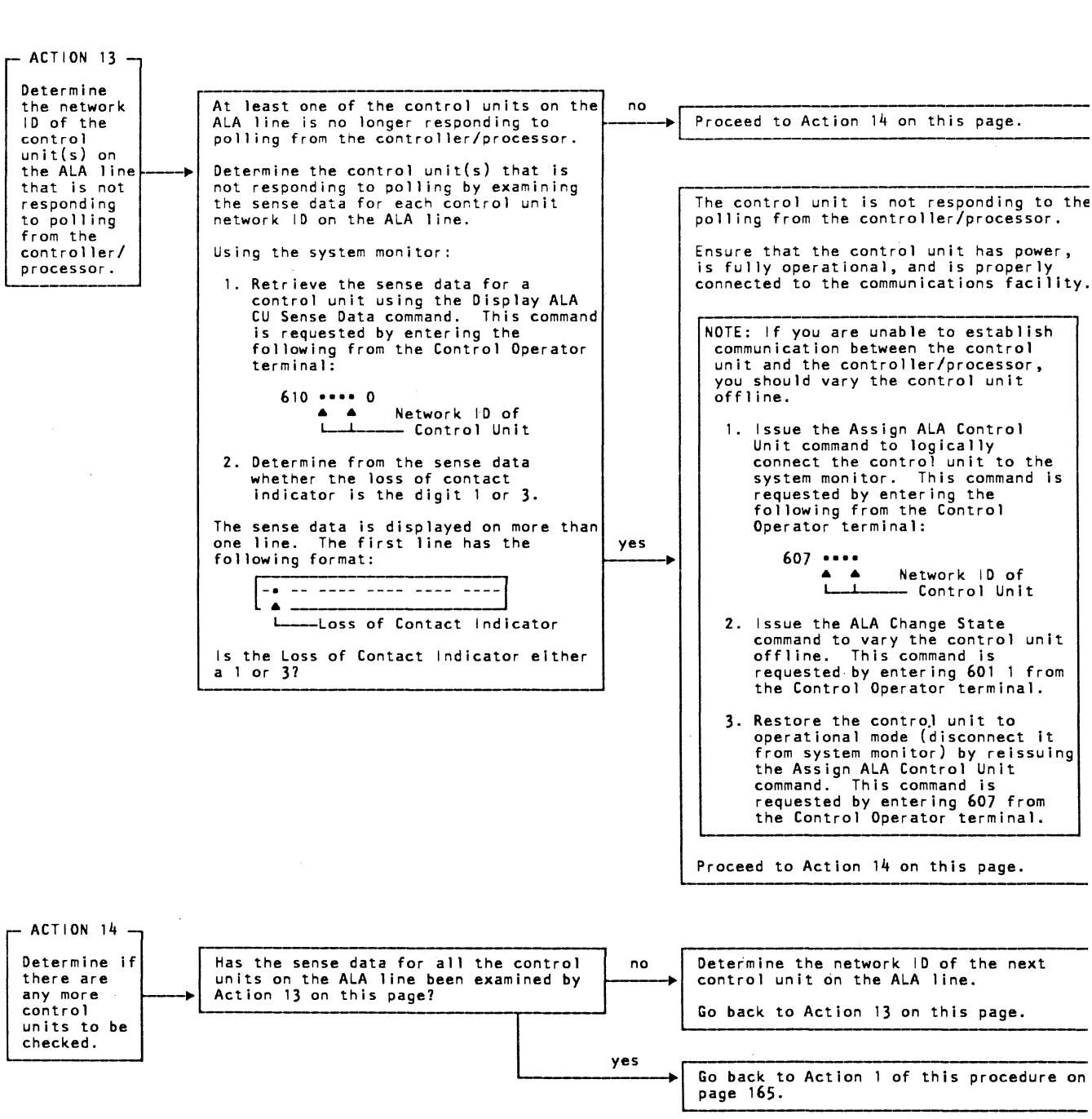
PDP07 - ALA Line Problem Determination Procedure

Action | Method of Analysis | Recommendations

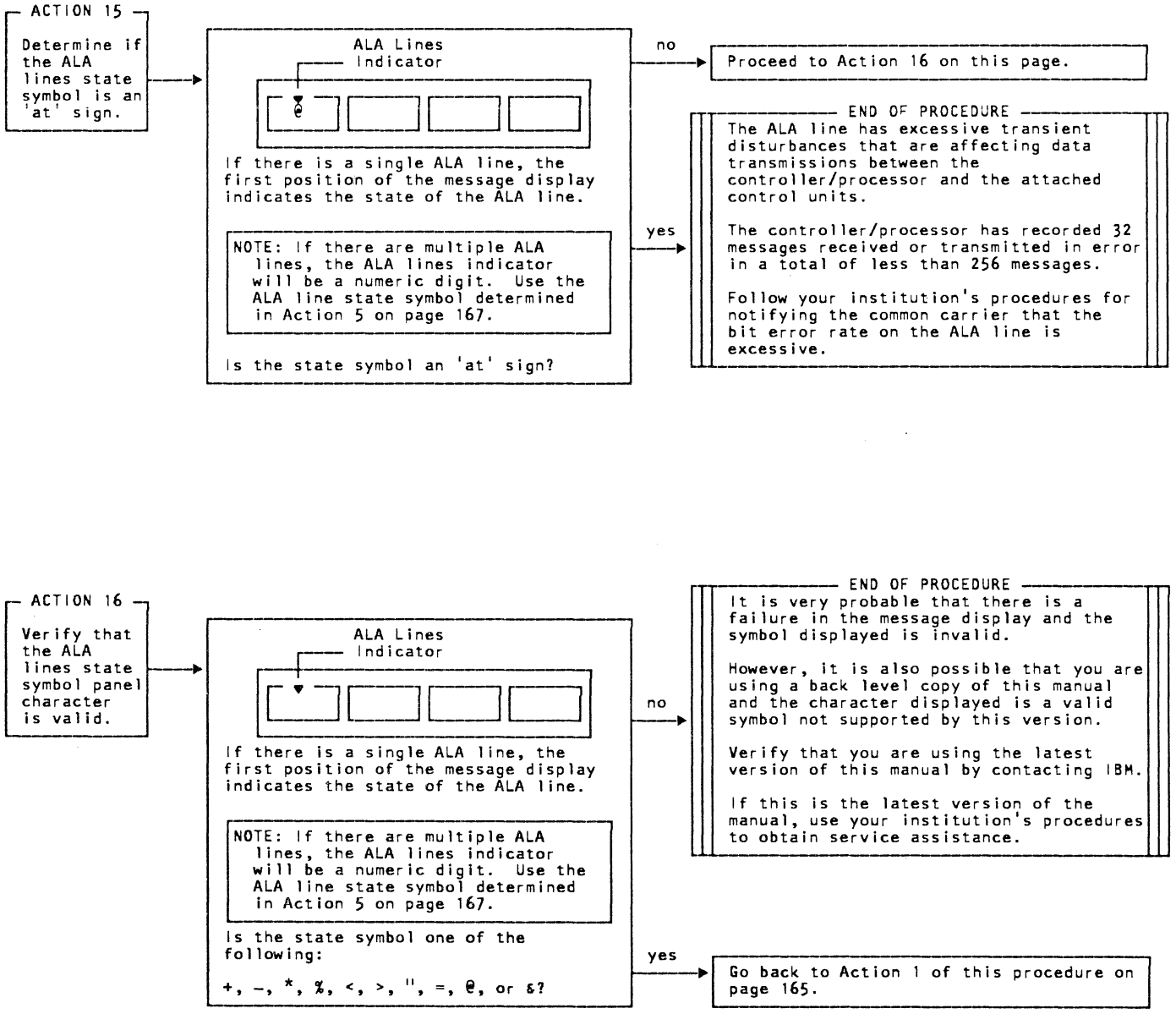




PDP07 - ALA Line Problem Determination Procedure



Action | Method of Analysis | Recommendations



PDP07 - ALA Line Problem Determination Procedure

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

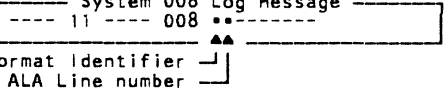
Observe the system log for an ALA log message.

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/processor.

Proceed to Action 18 on this page.

yes → Go to Action 20 on the next page.

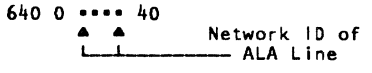
ACTION 18

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.

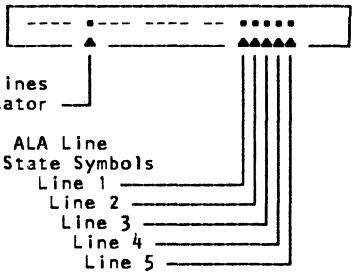
Action	Method of Analysis	Recommendations

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 165.

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.

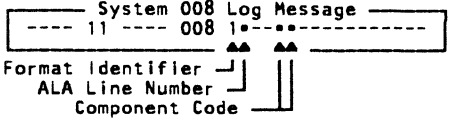
Follow your institution's procedures for obtaining service for the controller/processor.

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.

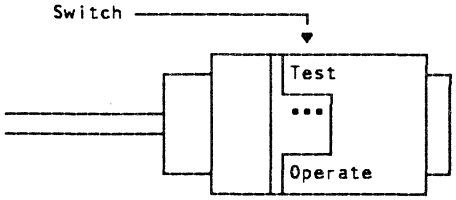
yes →

END OF PROCEDURE

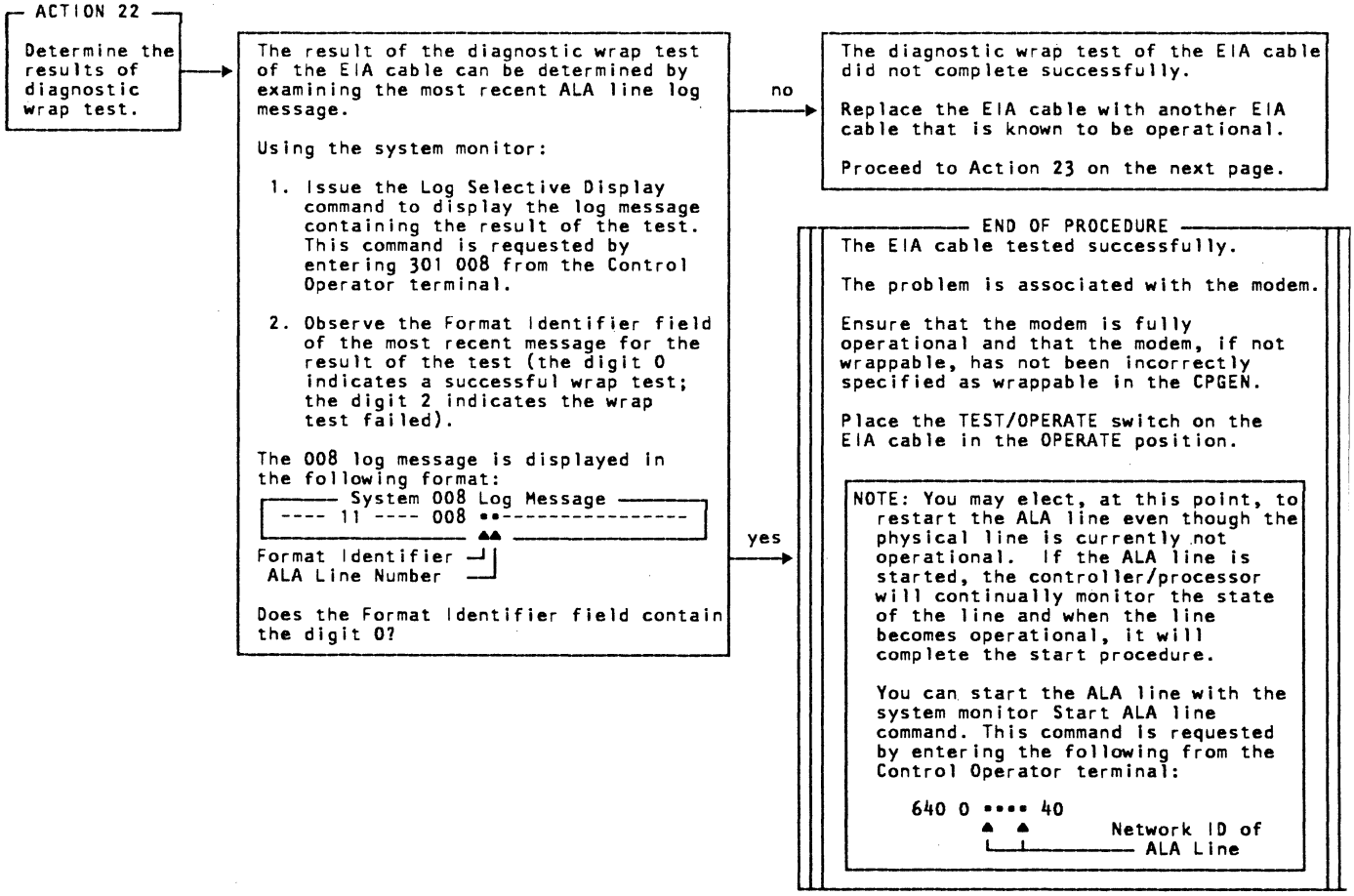
The internal system diagnostics have discovered a problem with the controller/processor.

Follow your institution's procedures for obtaining service.

PDP07 - ALA Line Problem Determination Procedure

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/processor 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/processor 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.

Action	Method of Analysis	Recommendations



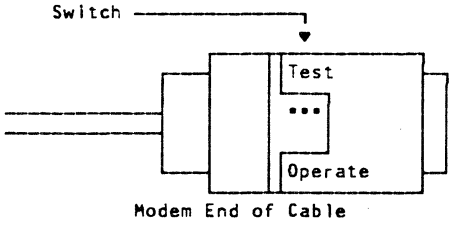
PDP07 - ALA Line Problem Determination Procedure

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.



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/processor.

Follow your institution's procedures for obtaining service.

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 165.

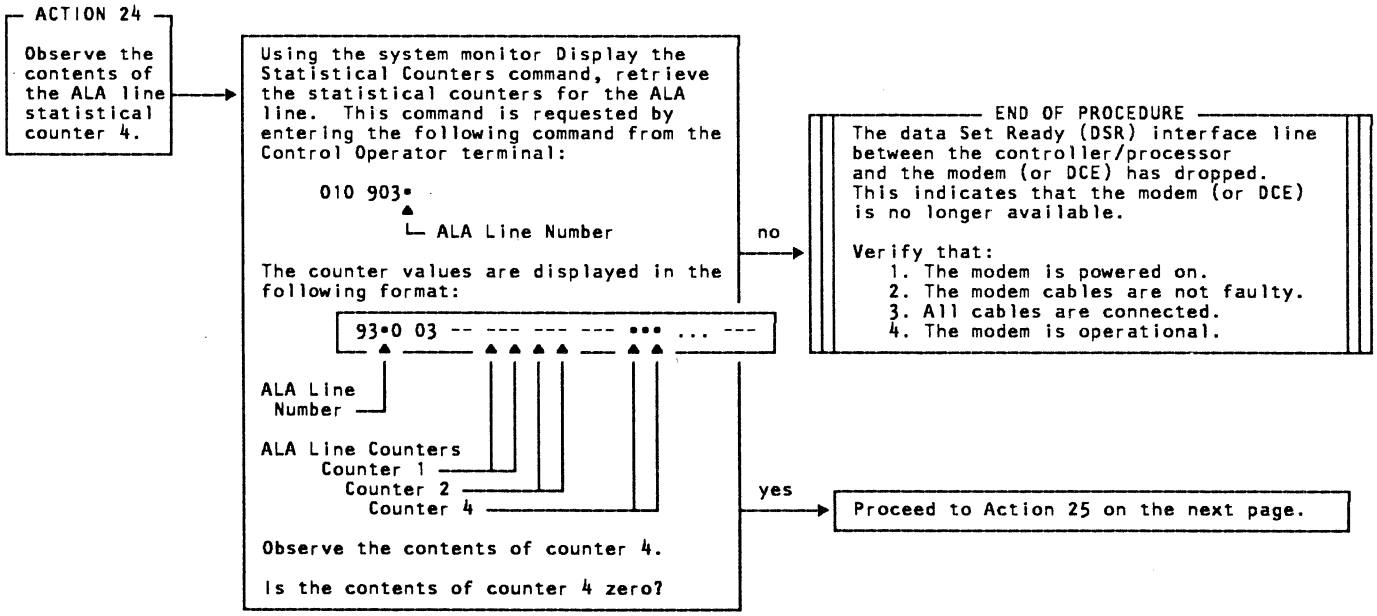
Action	Method of Analysis	Recommendations

The ALA line state symbol should be a percent sign (%). If it IS NOT, go back to Action 1 of this procedure on page 165.

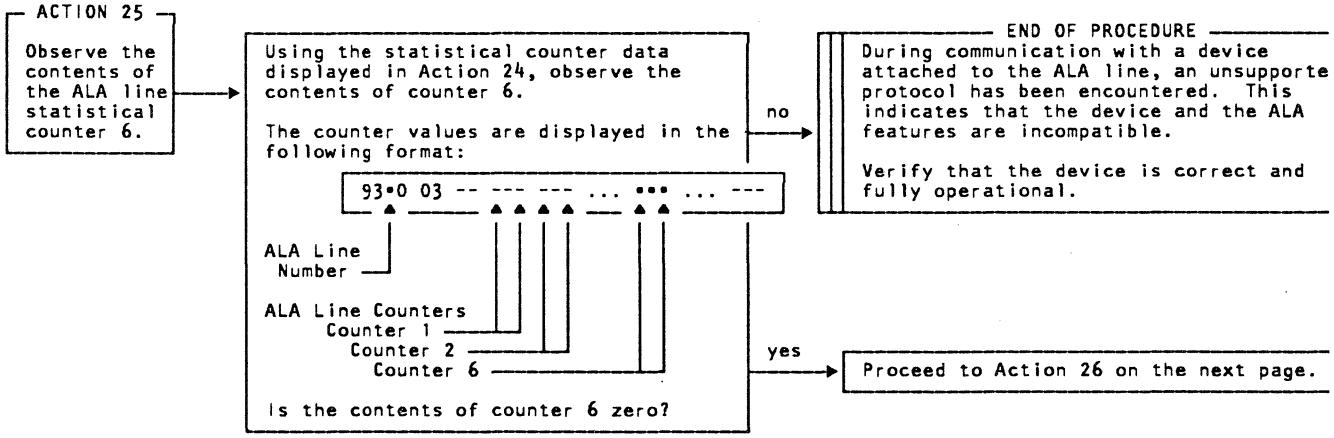
The percent sign indicates that the ALA line is not operational, or experiencing problems, because of one of the following:

1. An interface line between the controller/processor 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	Method of Analysis	Recommendations



PDP07 - ALA Line Problem Determination Procedure

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 than the ALA line.

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

1. The controller/processor 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.

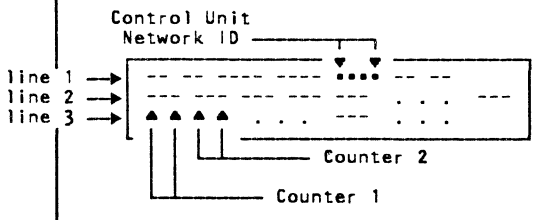
Determine the initial values associated with specific ALA control unit line statistical counters.

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.

Action | Method of Analysis | Recommendations

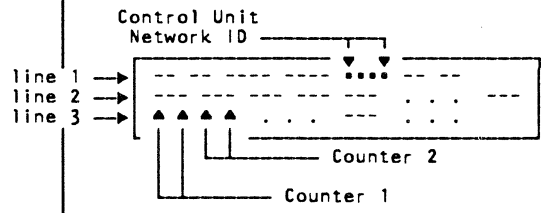
ACTION 27

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 →

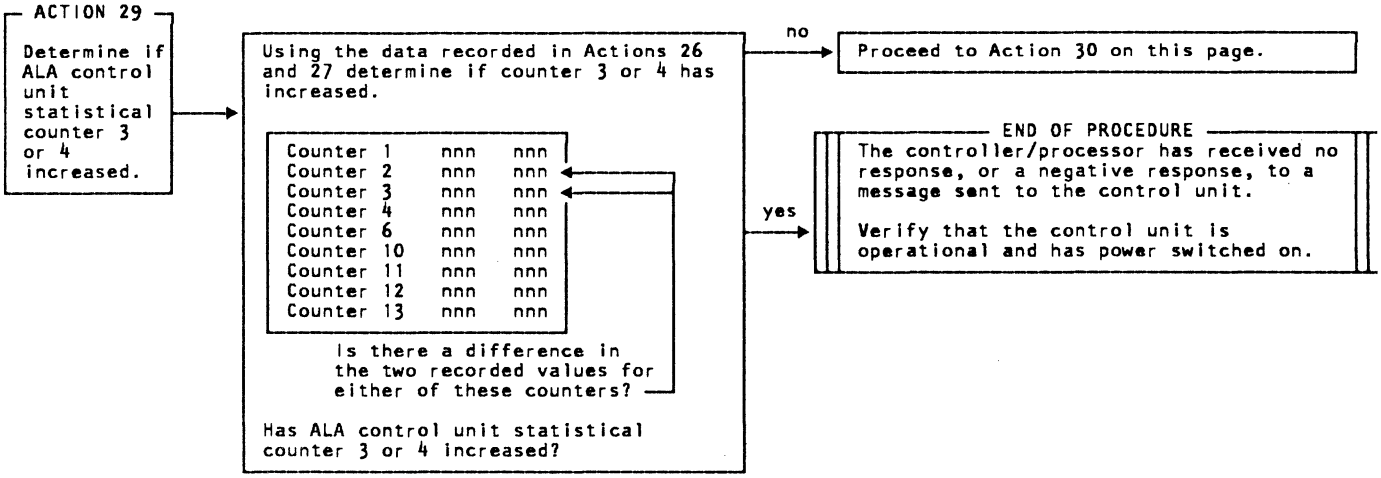
END OF PROCEDURE

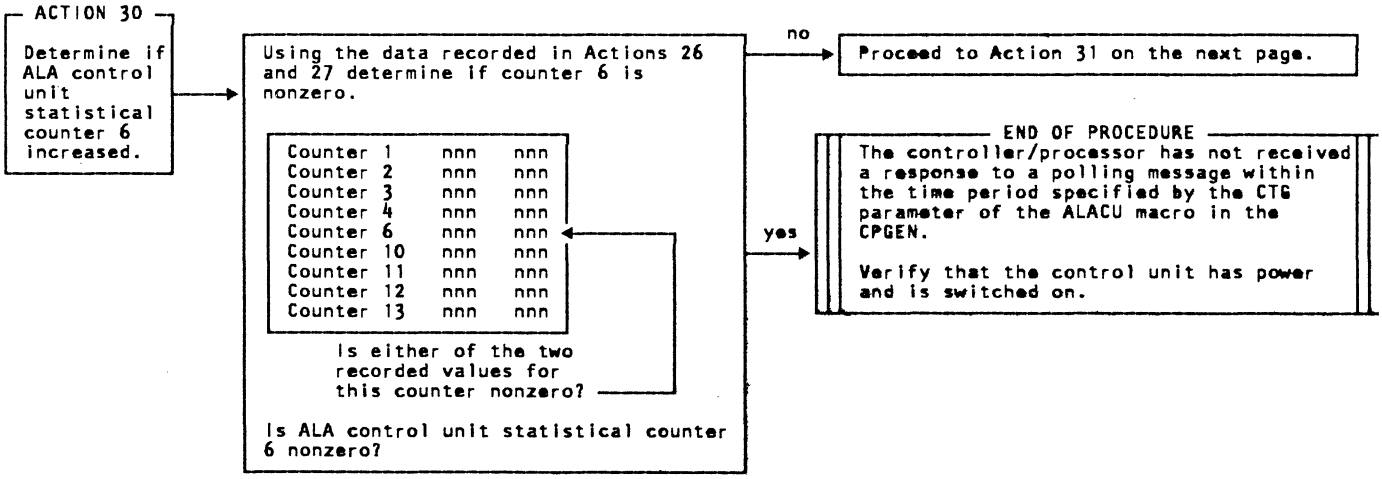
Communication with the control unit has not been established because there has been no response, or a negative response to a selection sequence transmitted from the controller/processor.

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

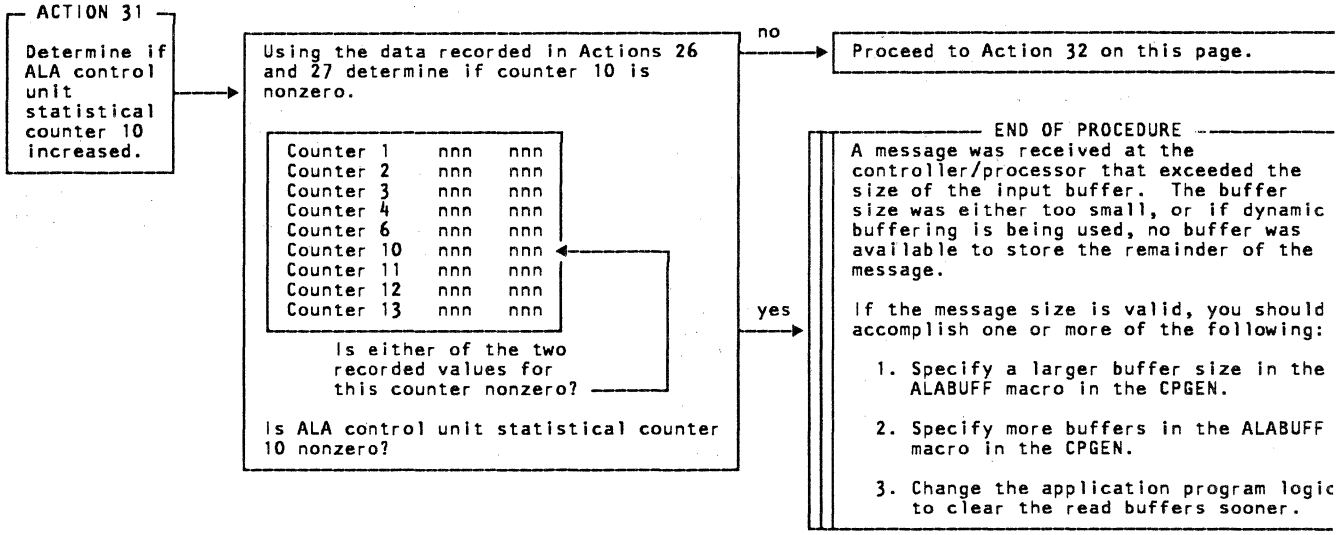
Verify that the control unit is operational and has power switched on.

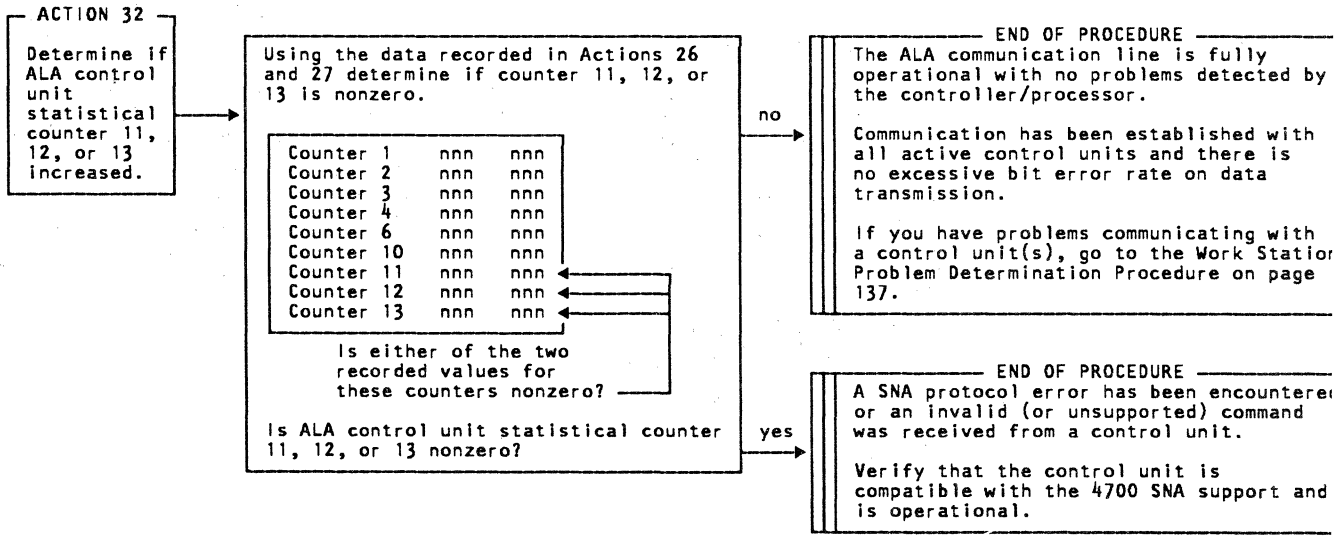
Action | Method of Analysis | Recommendations





Action | Method of Analysis | Recommendations





Appendixes

Appendixes

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/processor and its associated terminals. The associated terminals are arranged on one or more loops (local and remote).

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

The finance loop interface is the logical and physical connection between a controller/processor or terminal and the physical loop. If the loop is remote, external modems connect it 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 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/processor 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/processor 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/processor. 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/processor. 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 23).

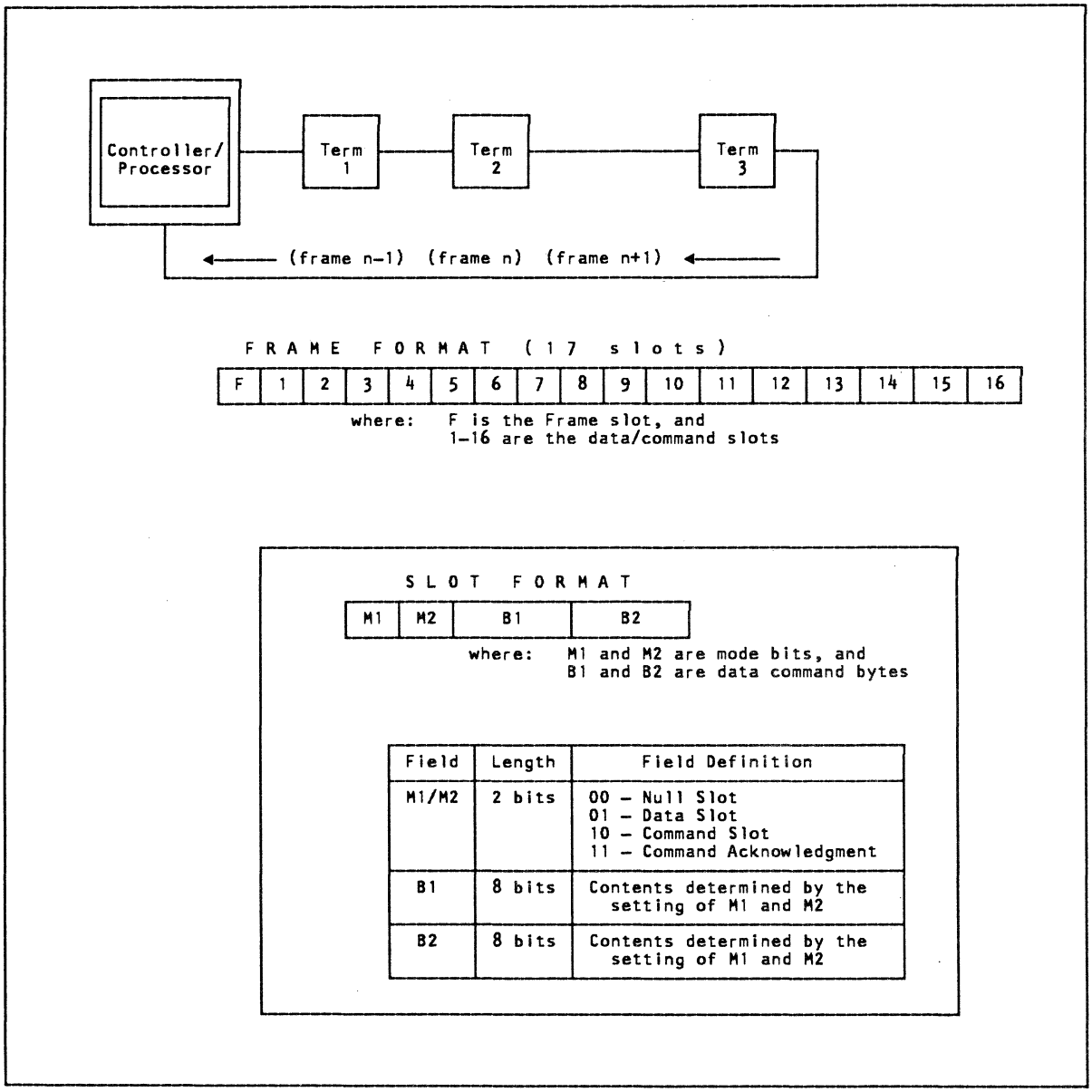
The first slot of a frame is the synchronization bit pattern, and is called the framing slot. The other slots of the frame are identified by their relative position to the framing slot. Each terminal has at least one slot assigned to it. The assigned slot is determined by the terminal's base address (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 1111111101111111 10. 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.

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 23. 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 24.

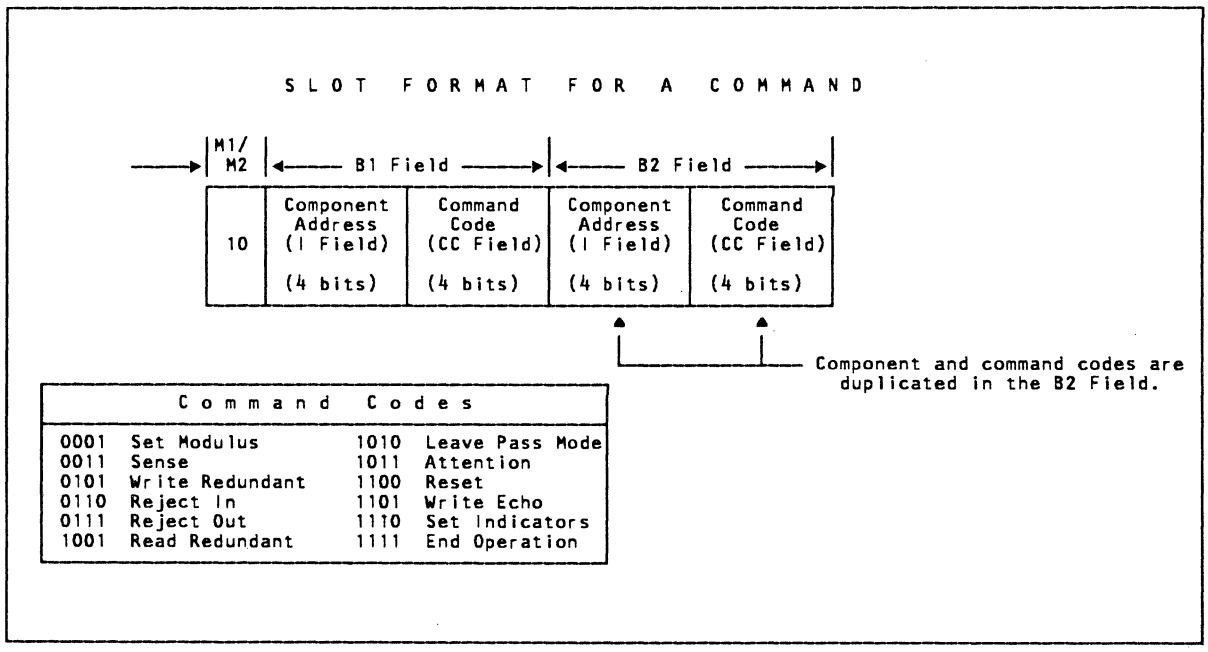


Figure 24. Format of a Command on the Loop

Command Issue

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

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

The command pattern is serially presented 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, 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.

3. Fields B1 and B2 compare equally.

To issue a command, 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/processor 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/processor function that occurs: (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 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/processor, 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/processor 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 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, consecutive slots cannot be allocated to the terminal.

Controller/Processor-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 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. This command is always executed (even in Pass Mode state).

Read Redundant

This command initiates data transfers from the terminals. 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/processor 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), a Reject command initiates resending of the byte from the terminal. The data transfer continues until 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/processor determines whether the B2 byte was inverted (signifying that the terminal accepted the slot). If the B2 byte was not inverted, the slot contents to the terminal are transmitted.

If the B2 byte was inverted, the controller/processor 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/processor sends a Reject command and then retransmits the slot contents to the terminal. The data transfer continues until 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/processor.

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, an End Operation command is sent.

Reject Out

This command is issued by the controller/processor 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/processor.

Reject In

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

This command is associated with the Write Redundant command.

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/processor 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/processor. Asynchronous polling of attached terminals for inputs or errors is performed by the adapter.

To support multiple terminals, the DCA uses the cycle steal facility to transfer data to and from the controller/processor 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 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).

Appendix Three
Description of Alternative Line Attachment

Appendix Three
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/processor (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/processor. This communications protocol uses the SDLC line discipline.

SNA support is provided 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 Four
Loop Layout Diagram

Appendix Four
Loop Layout Diagram

LOOP LAYOUT DIAGRAM

Prepared by: _____ Date: _____

Controller/Processor ID: _____

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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Publication Number
GC31-2033-3

File Number
S370/4300/8100/S34/S36/S38-00

Printed in
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GC31-2033-03