



DISPLAYWRITER SYSTEM

Communications Link Analysis Guide

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S241-6270-2

IBM 6360 Diskette Unit
IBM 6580 Display Station

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SAFETY PRECAUTIONS

All IBM Customer Service Representatives are expected to take every safety precaution possible and observe the following safety practices when servicing IBM equipment.

Mechanical Safety:

1. Safety glasses must be worn.
2. All safety devices, such as guards, shields, signs, ground wires, etc., must be restored after maintenance. When a guard or shield is removed to observe or make an adjustment, that shield must be replaced when work in the area is completed.
3. Watches, rings, necklaces, ID bracelets, etc., must be removed when servicing the machine.
4. Care must be used when working near moving parts. Keep hair away from moving parts. Avoid wearing loose clothing that might be caught in the machine. Shirt sleeves must be kept buttoned or rolled above the elbows. Ties must be tucked in the shirt or have a tie clasp approximately three inches from the end. Tie chains are not recommended.

Electrical Safety:

1. The equipment referenced in this manual may use high voltages. Check voltage labels!
2. Safety glasses must be worn when checking energized circuits.
3. If a circuit is disconnected for servicing or parts replacement, it must be reconnected and tested before allowing the use of the machine.
4. Power should be removed from the machine for servicing whenever possible. Remember, when checking voltages, avoid contacting ground potential, such as metal floor strips, machine frame, etc.
5. Meter continuity checks should be used instead of voltage checks whenever possible.
6. Do not apply power to any part, component, or subassembly when it is not physically mounted in the machine, or in its approved service position.

General Safety:

1. Each Customer Service Representative is responsible to be certain no action on his/her part makes the product unsafe or exposes customer personnel to hazards.
2. Store the removed machine covers in a safe, out of the way place where no one can trip over them.
3. If you must leave the machine in a down condition, always install the covers and disconnect the power before leaving the customer's office.
4. Always place CSR tool kit away from walk areas where no one can trip over it.
5. Maintain safe conditions in the area of the machine while performing and after completing maintenance.
6. Before starting the equipment, make sure fellow CSRs and customer personnel are not in a hazardous position.
7. All the machine covers must be in place before the machine is returned to the customer.

Note: Refer to the Safety CEMs relating to this product(s) for further safety precautions.

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INTRODUCTION

This guide is for use by support level service personnel performing link analysis for an IBM Displaywriter using IBM Licensed Program Products. Current escalation procedures are to be followed as necessary.

The diagnosis of problems on the customer's communication link is not an IBM responsibility. Diagnosis of a communication link should only be done at the request of the customer. Tools are supplied, however, to support the IBM equipment which is a part of the user's communication system.

It is assumed that host/business machine personnel understand the problem determination tools available with their system; therefore, the information included here does not attempt to be machine specific.

This guide is divided into sections; "Preliminary Checks" on page 2-1 should be used first. It takes into account the most common communication problems.

CUSTOMER RESOURCES

The Displaywriter customer has several resources for performing link analysis. These resources include:

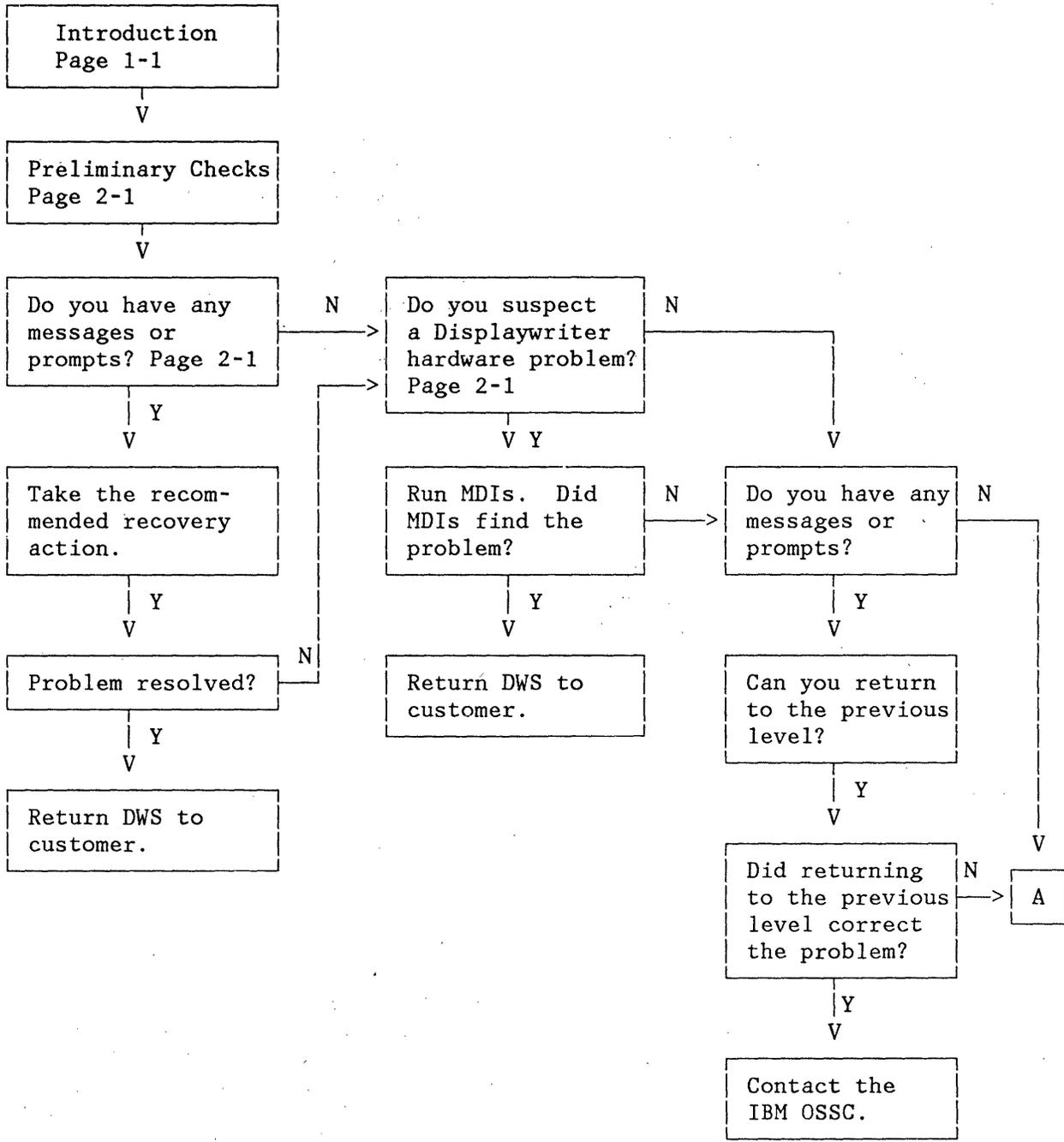
1. The communication coordinator.
2. Communication worksheets.
3. Displaywriter messages and prompts, which often isolate procedural problems for the operator.

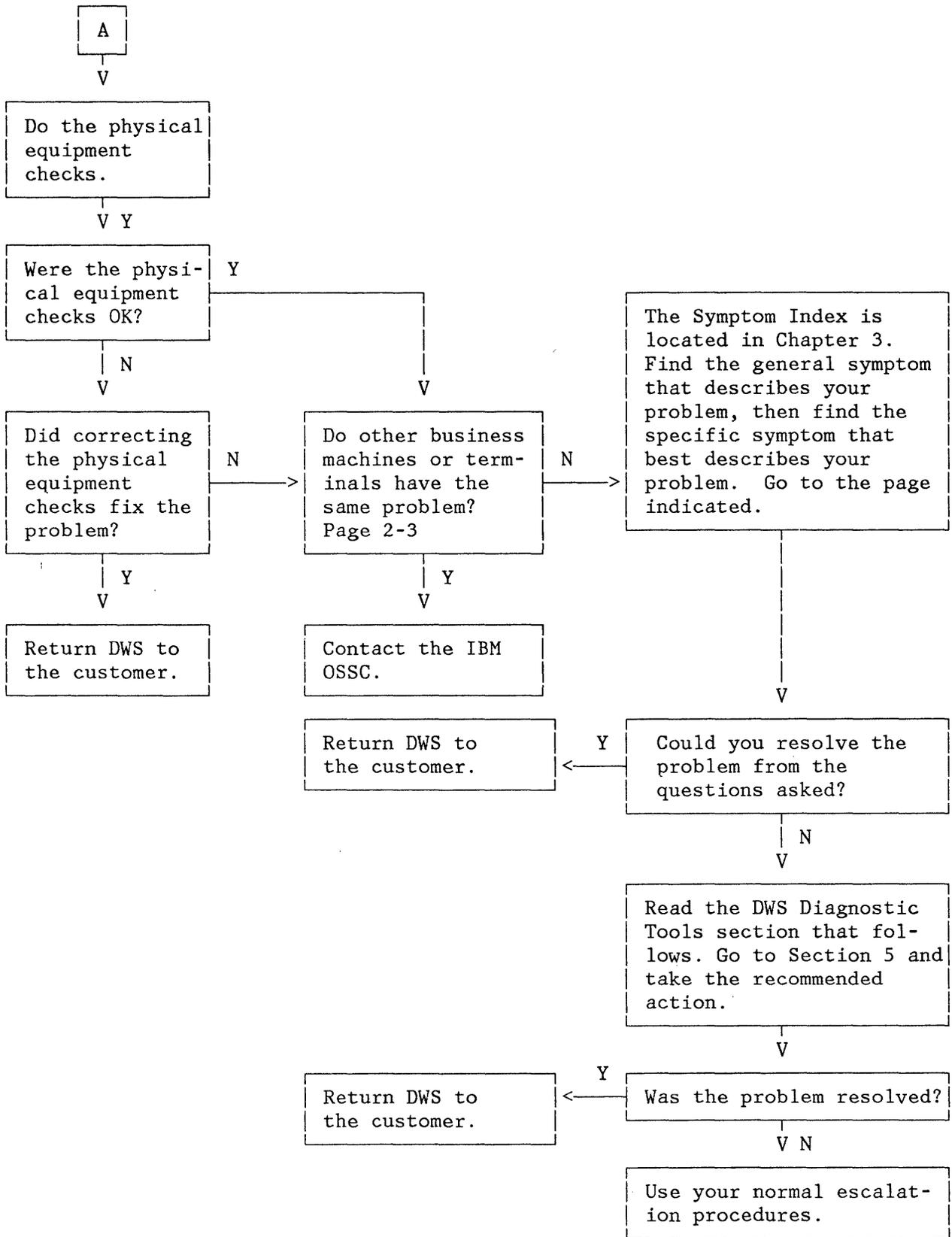
Note: Messages and prompts are located in the Displaywriter Communication Features Operator Guides.

4. Displaywriter Problem Determination Guide, which shows the operator how to run several internal diagnostic tests (including a test of the Displaywriter EIA cable).
5. Memory Record diskette.
6. Modem Self-Test if supported.
7. Communication Link Problem Determination Guide if available.
8. Displaywriter Communication Programmer's Guides if available.
9. The IBM OSSC personnel who can be contacted when the operator needs additional outside help.
10. Utilities available on the Communication Link Analysis diskette.

HOW TO USE THIS DOCUMENT

This flow chart is provided to direct service personnel in the proper procedure for using the Displaywriter Link Analysis Guide. This flow chart provides the sequence of steps to obtain the best use of this document. If the problem is not isolated or if you become lost return to the flow chart for direction.





PRELIMINARY CHECKS

WARNING: MOST COMMON COMMUNICATION PROBLEMS CAN BE IDENTIFIED BY CAREFULLY PERFORMING ONE OR MORE OF THE FOLLOWING PRELIMINARY CHECKS.

When a communication problem occurs, several preliminary checks can be made which may isolate the cause of the problem and lead to its resolution. These preliminary checks are included in this section.

PROMPTS AND MESSAGES

Remote Location Messages

Have any messages been received at the remote location?

If so, have the remote location personnel refer to the appropriate documentation for the meaning of the message, its cause, and the recommended recovery procedures. When the cause of the message is identified, correct it (if possible), and continue the session.

Displaywriter Messages and Prompts

If the Displaywriter operator reports any messages or prompts by the Displaywriter, ensure the operator takes the action recommended in the Operator's Reference Guide or Training Manual. Base machine prompts and messages may be displayed during communication. Make sure that you are not working on a base machine problem.

Once the cause of the message or prompt is identified, and the Displaywriter operator corrects it continue the session, if possible.

SUSPECTED HARDWARE PROBLEM

If a problem with Displaywriter hardware or other link hardware is suspected, the operator should follow the problem determination procedures in the Displaywriter Problem Determination Guide.

If the operator is directed to call for service, the service personnel may want to use Displaywriter Link Analysis Guide (this document) before responding to the call.

SYSTEM CONFIGURATION

Is there a new or changed resource?

1. Has a new communication feature or program diskette been issued for the Displaywriter?
2. Is the communications feature diskette personalized to be compatible with the types of communication lines and equipment with which the operator is communicating?
3. Have there been any personnel changes at the local or remote location that could affect communication procedures?
4. Have any ECs been installed that could effect the operation of the Displaywriter while communicating?
5. Have recent hardware changes been made? For example, has a new modem been installed at either location, or have configuration changes been made to the communication system?

6. Is the operator trying to communicate to a new remote location?
7. Has the existing software system been modified? For example, has a new release of a program product been installed or has program maintenance been performed?
8. Has the application program accessed by the Displaywriter been modified?

If any resources have been changed, try to determine if returning to the previous level corrects the problem.

If returning to the previous level corrects the problem, verify the changes were made correctly.

If the changes were made properly, refer the problem to IBM OSSC. If they were previously involved with this problem, continue the physical equipment checks.

If returning to the previous level does not correct the problem, or you can not return to the previous level, continue with the physical equipment checks.

PHYSICAL EQUIPMENT CHECKS

1. Ask the operator if the correct communication setup has been selected, and is the setup compatible with the protocol and operating procedures being used at the remote location?
2. Are the Displaywriter cables plugged in securely, and is the Displaywriter power on?
3. Is the Displaywriter electrical outlet ground common with the modem electrical outlet ground?

Common ground is required, and a dedicated electrical circuit is

recommended for Displaywriters with communication feature.

4. Is there power at the Displaywriter modem wall outlet, and is the modem power indicator on?
5. Are all cables properly connected at the Displaywriter modem?
6. Is the switch on the Displaywriter EIA cable in the operate (OPER) position and not in the (TEST) position?
7. Is the security keylock feature installed?
8. Ask the operator if the Displaywriter feature diskette is personalized correctly?
9. Are compatible Textpack and Communications feature diskettes being used?

The key must be inserted and turned on.

The Textpack diskettes and the Communications feature diskette must be compatible. In general, the third character from the left in the Textpack diskette name must be the same or higher than the third character in the Communications feature diskette name.

10. Are the modems at each end compatible?
11. (ASYNCR only) Is the operator trying to originate with an "answer only" modem or trying to answer with an "originate only" modem?

Generally, the sending and receiving systems have the same type of modem. Special care is required in setting up the modems if they are not the same type. Modem setup must be done by the customer or modem vendor.

12. Is the proper modem port, indicated in the setup for the modem, being used during this communication session?
13. Is the proper modem port being selected at both locations?
14. Is the modem ready to communicate? All test switches/buttons in the normal position. Refer to documentation supplied by the modem vendor, if necessary.
15. Are the keyboard control keys being used properly? Some of these control keys operate differently depending the protocol being used. Make sure the operator is using the correct communication keyboard template.
16. Is there someone at the remote station who can operate the equipment, and is the remote location setup, available, and ready to communicate?
17. Is there power at the remote modem wall outlet, and is the remote modem power indicator on?
18. Are all cables properly connected at the remote modem?
19. Did the calling party dial the correct number?
20. Does the local or remote modem have the auto answer function, and was the auto answer option strapped in the modems?

The modem will not auto answer unless DTR is active.

Some phone sets contain an AUTO button that must be pressed to activate the auto answer function.

If these physical equipment checks find a suspected cause of the communication problem, correct that cause and have the operator re-try the job.

If these physical equipment checks do not find a possible cause of failure or if the suspected cause did not correct the problem, continue with this section.

DO OTHER BUSINESS MACHINES OR TERMINALS IN THE NETWORK HAVE THE SAME PROBLEM?

If other business machines or terminals in the network have the same problem, the most likely cause of the problem is software or operational procedures. The IBM OSSC should be contacted, and the operator should notify the Communication Coordinator.

If other business machines or terminals in the system do not have the same problem, carefully check the hardware and software configuration and levels of the Displaywriter against those of a machine that operates correctly.

Make the necessary changes, and re-try the session.

If no differences have been found, service personnel may want to test the Displaywriter.

- Use the MDIs on the Displaywriter CED and ABC to verify the Displaywriter base machine, communication interface, and cable.
- Use the utilities to help isolate hardware problems. See "Service Aids" on page 4-1.
- Run OLTS:
 - If OLTS fails, check OLTS procedures, and attempt OLTS again.
 - If MDIs, Utilities and OLTS are acceptable, tell the remote location that more

checks are needed at that location.

If you suspect a problem with the modem, have the operator use the documentation supplied by the modem vendor.

If no problems are found with the configuration, continue with this section.

SYMPTOM ANALYSIS

If the failure has not been isolated at this time, service personnel should verify that MDIs have been run.

When the cause of a problem is not known after preliminary checks are completed, symptom analysis may aid in isolating and correcting the problem.

To aid in symptom analysis, the list of general symptoms is written to follow the order of a communication session, that is:

- The start of a communication line
- The connection of the data set to the line
- The bid sequence (BSC only)

- The transmission of data
- The disconnection a communication line

Read through the symptom index, "Displaywriter Symptom Analysis" on page 3-1. Note the failing symptom that is similar to the operator's problem. Each general symptom has several specific symptoms and questions that may isolate the cause of the problem.

Each list of specific symptoms and questions is followed by "Displaywriter Diagnostic Tools." This sub-section informs service personnel of Displaywriter diagnostic utilities for communication, which are supplied on the CED. These utilities aid in isolating the cause of the specific symptom. The utilities are described in detail in the Displaywriter Communication Service Manual. They can be used with many host/business machine system diagnostic tools and procedures, such as transmission tests. For more information on how to analyze the data obtained from the Utilities see "Service Aids" on page 4-1. Select the section that is proper for the problem being experienced.

DISPLAYWRITER SYMPTOM ANALYSIS

Remember, the general symptoms that follow, and the specific questions associated with them, are not meant to be host-specific. Their basic purposes are to help you logically search for the general causes of a problem, trigger other specific questions that can help isolate the exact cause, and to start a repair action from the appropriate service organization.

SYMPTOM INDEX

Find the symptom which best describes your problem. Go to the page indicated in this index. If doing the checks for your symptom does not resolve the the problem, go to the "Displaywriter Diagnostic Tool" sub-section. This section follows the list of specific symptoms and gives additional help in solving the problem. A Memory Record diskette, recorded at the time of the communications failure, is required to do communications link analysis.

General Symptoms:

1. "Cannont start communication line (local)" on page 3-2

Specific Symptoms

- "Line Busy (switched line)" on page 3-2
- "No answer from remote location (switched line)" on page 3-2
- "Displaywriter does not answer (leased line)" on page 3-3
- "Displaywriter does not answer (switched line)" on page 3-3

- "CONNECTED does not change to ON-LINE in the Communications Status Field" on page 3-3.

2. "Line Dropped (ON-LINE or CONNECTED goes away)" on page 3-4

Specific Symptoms

- "Communication started but line drops immediately" on page 3-4

- "Line started but drops during sending or receiving" on page 3-4

3. "Communication in a Wait State" on page 3-5

Specific Symptoms

- "Logon Rejected" on page 3-5
- "Cannot send data to the remote location" on page 3-5
- "Cannot receive from the remote location" on page 3-7

4. "Transmission Errors" on page 3-8

Specific Symptoms

- "Excessive time for the job transmission (BSC and SDLC)" on page 3-8
- "Data received at the remote location not complete" on page 3-8

5. "Output not Correct" on page 3-9

Specific Symptoms

- "Final output that is wrong or not complete" on page 3-9

- "Communication job prints incorrectly at Displaywriter" on page 3-10
- "Lost Data (Text appears to be missing)" on page 3-10
- "(BSC only) Data lines are truncated (Line endings chopped off)" on page 3-10
- "(BSC only) Transparent or Card Image lines are run together" on page 3-11
- "(BSC only) Printed text is erratically divided" on page 3-11

6. "Displaywriter Fails to DIscconnect" on page 3-11

Specific Symptoms

- "Fails to Logoff" on page 3-11
- "Data Terminal Ready (DTR) does not drop for Swtiched LIine" on page 3-11

CANNOT START COMMUNICATION LINE (LOCAL)

Line Busy (switched line)

1. The tone may be a normal busy signal. Wait and attempt the call again.

The following is for host attach communications only:

2. The host may not be disconnected from a previous communication session. Have the host operator verify the communication line status to ensure the communication line is available

No answer from remote location (switched line)

1. If the correct telephone number was dialed, this is not a local problem. Have the remote location check its communication setup and communications equipment.
2. Was the remote location ready to receive?
3. Was DTR indicated at the remote location?

The following are for host attach communications only:

4. Is a communications port available at the host?

Ask the host operator to check the communication line status to see if another word processing machine/terminal is using the communications port that you are dialing.

5. Was the communication line started or enabled at the host?

The host software that services the communication line must be started to enable Auto Answer at the host.

6. Was a communication line defined correctly at the host?

Usually, the host software requires a communication line definition to generate communications support. Have the host operator check the host's communication line definition for compatibility with your Displaywriter's line protocol, line speed, and modem characteristics. Request the host location do a modem self-test (if supported) to verify the modem operation.

Displaywriter does not answer (leased line)

1. Has the Displaywriter operator selected a communication setup and pressed the COMM START key? If so, READY displays in the Communication Status field (DTR active).

Displaywriter does not answer (switched line)

Note: This symptom is indicated when CONNECTED does not display in the Communication Status field.

1. The preliminary checks should be completed.
2. Has the Displaywriter operator selected a communication setup and pressed the COMM START key? If so, READY displays in the Communication Status field.
3. Can the call be answered manually? If the call can be answered, the problem is with your location.

CONNECTED does not change to ON-LINE in the Communications Status Field

1. The preliminary checks should be completed.
2. Has the communications equipment been checked at the remote location?

Request the remote location do a modem self-test (if supported) to verify their modem operation.

The following is only for BSC communications.

3. Does the Displaywriter have jobs in the send queue. The communications status field does not

change to ON-LINE until data is received.

The following are only for host attach communications.

4. Was a communication line defined correctly at the host?

Usually, the host software requires a communication line definition to generate communications support. Have the host operator check the host's communication line definition for compatibility with your Displaywriter's line protocol, line speed, code set and modem characteristics.

The following is for 3270 DSC only

5. Is the correct SDLC address being used at both the local and remote site?
6. Is the correct physical unit ID being used?

Displaywriter Diagnostic Tools

When the Displaywriter does not answer the remote site, first verify that the local operator has run the Displaywriter base machine diagnostics on the Problem Determination diskette. These tests should have been run by service personnel in the preliminary Displaywriter checks. To determine if the telephone can answer see "Telephone as a Tool" on page 4-18.

If the problem has not been isolated, access "Send Continuous Data" on page 4-11 or "Receive Continuous Data Utility" on page 4-12 of this manual.

Note: The operator should request the remote location to run link analysis procedures to verify the remote location is working properly, if not previously done.

LINE DROPPED (ON-LINE OR CONNECTED GOES AWAY)

This condition commonly occurs by ON-LINE or CONNECTED going away and the Status Field becoming blank or returning to READY.

Communication started but line drops immediately

1. The preliminary checks should have been completed.
2. Was power lost, or has the modem become unplugged at either location?
3. Did an inactivity timeout occur at the remote location?
4. Did the Displaywriter operator press DISC? If so, re-dial and attempt the job again.
5. Did an ID exchange fail? Check the Displaywriter modem and line description and the communication setup. Ensure the IDs are specified correctly. The remote location should also check that it has specified its IDs correctly.

The following is for BSC communications only:

6. Did the Displaywriter and the remote location each bid as the primary station? One location must be secondary (Primary No). Otherwise there will be a communication line contention problem.

The following is for BSC host attach communications only:

7. During host attach communications, most hosts bid as the primary machine; therefore the Displaywriter communication setup should show Primary No.

Line started but drops during sending or receiving

1. The preliminary checks should have been completed.
2. Was power lost, or has a modem become unplugged at either location?
3. Did an inactivity timeout occur at the remote location?
4. Did the Displaywriter operator press DISC? If so, re-dial and attempt the job again.
5. Did an ID exchange fail? Check the Displaywriter modem and line description and the communication setup. Ensure the IDs are specified correctly. The remote location should also ensure it has specified its IDs correctly.
6. Is the Displaywriter communication setup in use compatible with the remote location equipment's communication line definition, protocol, and operating procedures?
7. The telephone may be out of order, or excessive line "noise" may cause the communication line to drop.

Displaywriter Diagnostic Tools

When the line drops, the Displaywriter Display Error Log Utility may suggest why. A Memory Record diskette taken at the time of the failure is required to use this utility.

When the line drops immediately, access the Send Continuous Data or the Receive Continuous Data utilities on the CED. These utilities are used to verify the path from the local site to any point in the link at which the data can be wrapped or checked.

This trace information will allow you to verify line protocol, the actual format of the data sent to the remote site, and mandatory disconnects.

For more information see "Service Aids" on page 4-1.

COMMUNICATION IN A WAIT STATE

Logon Rejected

1. The preliminary checks should be completed.
2. Are compatible keyboard IDs being used at both locations?

The following are for host attach communications only.

3. Is a compatible keyboard ID being used to communicate to the host? In general, keyboards 100, 101, 102, and 103 are used in the United States as DP keyboards.
4. Was the logon valid, complete, and typed properly (for example all uppercase, proper line ending, syntax correct)?

Some hosts require that the logon be entered in uppercase and that the host system syntax requirements are followed. In addition, many hosts require periodic updates for the logon used. Make sure you are using the most current logon.

5. Did the logon document sent by the Displaywriter use the Card Image send format and non-transparent data (BSC communications only)?

Check the Displaywriter communication setup. Most hosts require the logon command to be in uppercase without word processing codes. Specify Card Image send

format in the communication setup. This will convert Displaywriter line ending codes to IRS codes (recognized at the host) during the communication session.

6. Was the Displaywriter previously signed on to the host, and is this signon still active?

Have the host operator check the Displaywriter's terminal status at the host.

If the Displaywriter is still signed on, send a signoff document from the Displaywriter, or ask the host operator to cancel and restart the communication line at the host.

7. Was the ID or password received by the host from the Displaywriter valid?

Have the host operator check the software definition for your Displaywriter at the host. Verify that the host software and your communication setup have properly specified the ID, password, and/or terminal status for the Displaywriter.

8. If this communication session uses a leased line, is the communication line active at the host? Have the host operator start the communication

Cannot send data to the remote location

1. The preliminary checks should be completed.
2. Is the Displaywriter in a send mode (ON-LINE displays in Communication Status field)?
3. Does the Communication Status field suggest operator action is

needed (HOLDING, BUSY, for example)?

4. Did the Displaywriter operator follow the proper procedures for sending a document?
5. Are the jobs queued at the Displaywriter?
6. Was the job correctly added to the send queue?

Specifying a document name incorrectly can cause a problem. For example, if the document was named Service Agreement, but you typed Service agreement, the document will not be communicated, because the document name was specified incorrectly.

7. If used, was the ID exchange successful? Check any messages received from the remote location, and have the remote location operator check the ID status of the Displaywriter at their location also.
8. Are compatible keyboard IDs being used at both locations?

(Asynchronous communications only). Each IBM CMC supports only one keyboard ID. A teletypewriter-like device generally supports keyboard ID 103.

(BSC only). Each IBM Mag Card II and IBM 6240 supports only one keyboard ID for communications.

9. Is the remote location busy or not ready to communicate, or is any operator intervention required first at the remote location?
10. Does the remote location product support the OCL being sent (BSC only). If so, verify that the proper OCL is being used.

The following is for host attach communications only:

11. Was the Displaywriter logged on successfully? Check any messages received from the host after the logon, and correct the logon if required. If necessary, have the host operator check the Displaywriter's status at the host. If not logged on correctly, see "Logon Rejected" on page 3-5.
12. Was the application program at the host (CMS or TSO for example) started? Ask the host operator to check to see if the proper application program was loaded.
13. Was the host enabled (set up) to receive the job?
14. Are compatible keyboard IDs being used at both locations?

In general, keyboards 100, 101, 102, and 103 are used in the United States as DP keyboards.

The following items are for BSC host attach communications only:

15. Is a card reader definition included in the host's remote terminal software definition?

If not, a card reader definition is necessary in order for Displaywriter communications to be recognized by the host.

16. Does a check of the terminal status by the host operator show an active card reader?

If not, have the host operator start the card reader, or vary the reader status on-line.

17. Were incorrect operator commands or JCL documents sent to the host?

If the command syntax is incorrect, sometimes the host will

"flush the data" without notification. This means the host may drop the communication line without notification or error message. Verify that the JCL documents and ID exchanges were typed correctly at the Displaywriter.

18. Were the operator commands or JCL documents sent using Card Image format and non-transparent data? Check the communication setup. It should specify the Card Image send format, or Select on Job Basis.

Most hosts require that commands be in uppercase and without word processing codes. Using the Card Image send format will convert the line ending codes to IRS sequences.

Cannot receive from the remote location

1. The preliminary checks should be completed.
2. Is the Displaywriter in a receive mode? (ON-LINE RECEIVE displays in the Communication Status field).
3. Does the Displaywriter Communications Status field suggest operator action is needed? (HOLDING, BUSY, etc).
4. Did the Displaywriter operator follow the proper procedures for receiving a document?

The following are for host attach communications only:

5. Was the Displaywriter logged on successfully? Check any messages received from the host after logon, and correct the logon if required. If necessary, have the host operator check the Displaywriter's status at the host. If the Displaywriter is not

signed on correctly, see "Logon Rejected" on page 3-5.

6. Is the job in a hold status?

Ask the host operator if the job is in hold status. If so, have the host operator release the job from hold status.

7. Is the host busy or not ready to send data to the Displaywriter?

If necessary, verify the host activity with the host operator.

The following items are for BSC host attach communications only:

8. Were the printer and card punch at the host specified correctly? Ask the host operator to verify that the printer and punch definition are included as part of the host's remote terminal software definition. This is required for Displaywriter communications.
9. Does a check of the terminal status by the host operator show an active printer and punch. If not, have the host operator start the device(s), or change its status at the host.
10. Was the printer started with the correct output forms and job classes.

When output requests a special form (paper requirement) or class, it may not start communicating until the device has been restarted with the correct form or class specified. If there are no problems with output forms or job class, have the host operator check:

- The print backlog to see if jobs are waiting to print.
- To see if the application started or ended

- To see if the location is specified by the JCL.

Displaywriter Diagnostic Tools

When problems with data transmission occur, the Display Error Log utility can be used to suggest why a job ended or a disconnect occurred.

Incompatibilities in keyboards, for example, may be indicated by a review of the trace data.

For more information see "Service Aids" on page 4-1.

TRANSMISSION ERRORS

Excessive time for the job transmission (BSC and SDLC)

If transmission time is excessive, it may be applications and format sensitive.

1. Does the Displaywriter Status Field suggest operator action is needed (HOLDING, BUSY, etc.)?
2. Does the Display Error Log utility, or the session summary, suggest that blocks were re-transmitted because of CRC/FCS errors?

Normally re-transmissions are caused by line noise during the communication session. This is usually a modem or communication line problem. Run MDIs to verify the local Displaywriter, and have the operator call the correct vendor and verify their equipment.

3. Protocol Loops

These problems can be seen with the Display Trace Utility. The problems show as correct protocol

which repeats until a timeout occurs.

These loops include, but are not limited to:

- BSC - ENQ and ACKO Loop
- BSC - TTD AND NAK Loop
- SDLC - RR Loop
- SDLC - FRMR Loop.

The trace data received before the loop must be checked to determine which location did not recover. Then the correct service organization should be called.

Note: Loops are not link failures! If the problem continues, it should be corrected by the operator and the IBM OSSC.

Data received at the remote location not complete

1. The preliminary checks should be completed.
2. Did the Displaywriter cancel the job because of an operator error or system failure?

Operator errors can vary from misspelling the document name when adding it to the send queue to ending the job incorrectly.

3. Did the Displaywriter cancel the job because of remote location intervention?
4. (BSC only). Was it a RVI (Reverse Interrupt) that caused the Displaywriter to end the job?

If an RVI is transmitted, and the Displaywriter has more than two blocks of data left to send, the Displaywriter cancels the job. A review of the Display Trace Utili-

ty will show an RVI as a two-byte X'107C'.

Displaywriter Diagnostic Tools

When problems with data transmission occur, the Display Error Log utility can be used to suggest why a job ended or a disconnect occurred.

Incompatibilities in keyboards, for example, may be indicated by a review of the trace data.

For more information see "Service Aids" on page 4-1.

OUTPUT NOT CORRECT

Final output that is wrong or not complete

Do not rule out base machine Displaywriter problems causing unintelligible or wrong characters.

For example, text may print incorrectly because the wrong printer element or print-wheel is being used (does not match keyboard ID being prompted for).

(Asynchronous Communications only)--Excessive line noise can cause unintelligible or wrong characters to be received and printed. Disconnect the communications line, dial the remote location again, and retransmit the document.

Note: The character normally used to suggest a character that is wrong or not supported by the keyboard ID is an underscore.

(BSC and SDLC only)--Because of the error checking method (CRC/FCS), and the protocol used, lost data is normally an operator or applications problem. Document compatibility procedures should be reviewed. Further

consultation may be required with your IBM OSSC

1. Are compatible keyboard IDs being used at both locations. This might suggest an application problem or an operator error.
2. Is only a certain character not printing? If so, verify the code for the character is defined in the Keyboard ID being used for the communication session.

The following items are for host attach communications only:

3. Is there the possibility of a remote location programming problem? Ask the host operator to verify the application software program.
4. Are compatible coded graphic character sets (Keyboard IDs) in use at both locations?

The following items are for BSC host attach communications only:

5. Do the host translate tables change EBCDIC/WP codes to blanks? A special signon card parameter (TEXT, for example) may be required at the host to print lower case characters at the Displaywriter.
6. Are compatible keyboards in use at both locations? This might suggest an application program or operator error.
7. Is only a certain transmission code not printing? If so, verify that the code is defined in the active keyboard.
8. Are compatible coded graphic character sets in use at both locations?
9. There is the possibility of a remote location programming prob-

lem. Have the operator request the host site to check its program.

Communication job prints incorrectly at Displaywriter

1. The preliminary checks should be completed.
2. Are the Receive Format Defaults for the active communication setup compatible with the received document?
3. Does the document contain keyboard or format changes received as Stop codes, or which cannot be communicated? The Stop codes must be translated to the correct keyboard, or format change instructions, before printing the document.
4. Is the proper level Textpack diskette being used to print the document?

The following are for BSC communications only:

5. Does the Displaywriter support the OCL or Mag Card II Format Lines being received?
6. Were OCL commands or Mag Card II Format Lines preceding the text entered correctly?

The following are for host attach communication only:

7. Did the host application format the data for a terminal type other than the one emulated by the Displaywriter?
8. Did the host application end abnormally? Ask the host operator

to check for any host output error messages.

9. Is there a possibility of a host programming problem? If necessary, have the host operator check the host application program.

Lost Data (Text appears to be missing)

1. The preliminary checks should have been completed.
2. Verify that the remote location is sending the data that is being lost.

Note: (BSC and SDLC) Because of the error checking method (CRC/FCS), and the protocol used, lost data is normally an applications problem. Have the operator's Communication Coordinator and the IBM OSSC correct the problem.

(BSC only) Data lines are truncated (line endings chopped off)

The following are for BSC host attach only.

1. Is the host record length large enough to process the complete record? For example, is the host specifying an 80-character record length but really sending 128-character records?

Have the host operator verify the specification for printer or card punch width at the host.

2. Is the proper block size specified in the Displaywriter communication setup?

(BSC only) Transparent or Card Image lines are run together

The following is for host attach communications only:

1. If Card Image data is to be received, the Displaywriter communication setup must specify Insert New Line Codes Yes.

(BSC only) Printed text is erratically divided

The following is for host attach communications only:

1. If receiving document text or data with carriage controls (for example, carrier returns or index returns), the Insert New Line Codes menu item should specify No in the Displaywriter communication setup.

Displaywriter Diagnostic Tools

When received data is unintelligible, the Displaywriter Send Continuous Data and Receive Continuous Data utility can be used to test the integrity of the communication line.

"Display Error Log Utility" on page 4-10 may show what caused the error.

For more information see "Service Aids" on page 4-1 of this manual.

DISPLAYWRITER FAILS TO DISCONNECT

Fails to Logoff

1. Was the logoff complete and typed correctly?
2. Was an attempt made to send logoff after DISC was pressed?

Data Terminal Ready (DTR) does not drop for Switched Line

1. The preliminary checks should be completed.
2. Is Attended Yes specified (BSC only)? Remember, if Attended Yes is specified, the operator must press DISC to disconnect the communication line. This allows DTR to drop.

After pressing DISC, if DTR does not drop at the Displaywriter, run base machine and communications problem determination procedures.

If DTR drops at the Displaywriter, and the modem does not disconnect, call your modem supplier to verify the modem equipment.

Displaywriter Diagnostic Tools

When DTR does not drop refer to "Communication Status Field" on page 4-1 of this manual.

SERVICE AIDS

The information contained in this section is intended to aid in analyzing data provided by the utilities. Details of how to access and run the utilities are included in the Displaywriter Communication Service Manual.

Additional tests and general communication information are included in this section to aid in link analysis.

The information in this section assumes ALL PRELIMINARY CHECKS HAVE BEEN COMPLETED. See "Preliminary Checks" on page 2-1of this manual.

COMMUNICATION STATUS FIELD

The Communication Status field is located on line 2 of the display. This field shows the status of the Displaywriter during the communication session.

Frequently the cause of the communications link problem can be found by reviewing the status term indicator which is displaying at the time of the communications failure.

The descriptions which follow provide a definition of what action to take based on the indicator that displays.

There is a separate section for ASYNC, BSC, and SDLC (3270 DSC and EDD).

Directions:

1. Find the section for the type of communications you are doing.
2. Find the text for the Communication Status term that is displaying at the time of the communications failure.
3. Read the description, and take the recommended, action or do the steps as directed.

ASYNC Displaywriter Status Field

Some modems have status lights which show specific EIA signals. Refer to the modem operator's manual for identification of these signals. Use the Displaywriter status shown below to help isolate the failure.

When an Asynchronous Communications session is first established, the Communication Status field indicators should display in the following sequence:

- READY
- CONNECTED
- ON-LINE

1. blank

A blank status field shows that DTR (Data Terminal Ready) is not active.

If the Communication Status field does not change from blank to READY at the time the setup is selected, re-check the menu item choices in the MODEM AND LINE DESCRIPTION and COMMUNICATION SETUP menus. If there are no problems with the menu item choices, this is not

a communication link problem. Do Displaywriter base machine and communications link problem determination

2. READY

READY appears in the Communication Status field to show the Displaywriter is ready to communicate. DTR is active.

If the Communication Status field does not change from READY to CONNECTED, then ON-LINE, this could be caused by the following:

DTR is not sensed by the modem.

DTR is sensed by the modem, but the modem is not connected to the line. The operator is unable to go to DATA on the modem.

DSR is not activated by the modem or DSR is not sensed by the Displaywriter.

(Switched line only)--The Auto Answer feature on the modem is not active. For more information, refer to "Telephone as a Tool" on page 4-18 in this manual.

Verify the operator performed Displaywriter base machine and communications link problem determination procedures. Have the operator run a modem self-test (if available) by referring to the modem supplier's documentation. If the problem is still not resolved, have the operator call the modem supplier to verify the modem equipment.

3. CONNECTED

CONNECTED shows the Displaywriter received DSR from the modem.

If CONNECTED does not change to ON-LINE, the most probable cause is a communication line or modem problem. Verify the operator performed base machine and communications link problem determination procedures. If the problem is still not resolved have the operator call the modem supplier to verify the modem equipment.

4. ON-LINE

ON-LINE shows the Displaywriter has sensed RLSD and CTS from the local modem. This is the normal operating condition for ASYNC.

5. ON-LINE BREAK

ON-LINE BREAK appears when using TTY protocol when the remote location has pressed the BREAK key. The remote location will send BREAK when the need to interrupt the session occurs. (for example, for a machine adjustment) When the break condition is received by your Displaywriter, your keyboard is locked, preventing you from sending any information. You will, however, still be able to receive information from the remote location. The remote operator will usually send you a message when they are ready to continue the session.

Press the BREAK key to release the break condition at your Displaywriter and continue the session.

6. ON-LINE RECEIVE

ON-LINE RECEIVE appears when using IBM CMC or 2741 protocol to show your Displaywriter is the receiving location.

7. ON-LINE SEND

ON-LINE SEND appears when using either IBM CMC or 2741 protocol to show that your Displaywriter is the sending location. The Displaywriter is sending from the keyboard or diskette when ON-LINE SEND displays.

8. ON-LINE STANDBY

ON-LINE STANDBY appears when using IBM CMC protocol when the sender presses the RESET key during the communication session.

ON-LINE STANDBY appears when using either IBM CMC or 2741 protocol to show that neither location is in a SEND or RECEIVE mode. ON-LINE STANDBY usually is replaced by ON-LINE SEND or ON-LINE RECEIVE.

BSC Displaywriter Status Field

The Communication Status field indicators should display in the following sequence:

- READY (Switched line only)
- CONNECTED or CONNECTED BID
- ON-LINE.

Use the Displaywriter status shown below to isolate failures. Some modems have status lights which show specific EIA signals; refer to the modem operators manual for identification of these signals.

1. blank

A blank Communication Status field is normal when in the communications frame, and the COMM START key has not been pressed. If the status field does not change from blank to READY, verify that the operator pressed the COMM START key, and have the operator recheck the menu item choices in the COMMUNICATION SETUP and LINE DESCRIPTION menus. If there are no problems with the setup, run the MDIs. This is not a link failure.

2. READY

READY displays in the Communication Status field to show the Displaywriter is ready to communicate. DTR is active.

- READY changes to CONNECTED when the Displaywriter receives DSR from the modem. This means the Displaywriter is in a receive mode and has no documents in the send queue to send to the remote location.
- READY changes to CONNECTED BID when the Displaywriter is in the send mode and has documents in the send queue. The Displaywriter starts sending ENQs at this time.

If READY does not change to CONNECTED or CONNECTED BID:

- DTR is not sensed by the local modem.
- DTR is sensed by the modem, but the modem is not connected to the communication line.
- The Displaywriter does not sense DSR from the modem

- (Switched line only)--The Auto Answer feature on the modem is not active. See "Telephone as a Tool" on page 4-18 of this manual.

Verify that the operator performed base machine and communications link problem determination procedures.

If the problem is still not resolved, have the operator call the modem supplier to verify the modem equipment.

3. CONNECTED

CONNECTED shows the Displaywriter received DSR from the modem. This is a normal status for a Displaywriter in receive mode with no documents in the send queue.

If the Displaywriter is to be receiving only, and CONNECTED does not change to ON-LINE RECEIVE, one or more of the following may be the problem:

- RTS is not being sensed by the local modem.
- RTS is sensed, but the modem does not activate CTS.
- The remote location equipment is not ready.
- The remote location equipment is not bidding (no jobs to send).
- The remote location equipment uses a different code set from the one you have specified in your communication setup.
- The Displaywriter is not receiving data over the communication line.

The problem could be in the Displaywriter, the communication

setup, the communications link, the modems, or the remote location equipment.

- During communications problem determination, you are directed to run the Display Error Log utility.

Carefully check the "Session Description" section of the Display Error Log to verify that the proper code-set is being used (EBCDIC or 7-bit) with this communication setup.

- If the Displaywriter is unable to receive data, or if unintelligible data shows in the trace information (Section 3 of the Display Error Log Utility), refer to "Data Path Tests" on page 4-15 of this manual.

If none of the above resolves the problem, the most probable cause of the problem is the remote location. Have the remote location check its communication setup, modem, and equipment.

4. CONNECTED BID

CONNECTED BID shows the Displaywriter sensed DSR and is in the send mode with documents in the send queue, or the Displaywriter is trying to initiate a session ID exchange. The Displaywriter is bidding for the communication line and begins sending ENQs at this time.

If CONNECTED BID does not change to ON-LINE SEND or ON-LINE RECEIVE, this means the Displaywriter has bid but did not receive a valid response (ENQ, ACK, etc). One or more of the following could be the problem:

- RTS is not being sensed by the local modem.
- RTS is sensed, but the modem does not activate CTS.

Note: A duplex, or 4-wire leased line modem may require RTS and RLSD (Receive Line Signal Detect) become active before activating CTS. Once CTS becomes active, it remains active until the communication line disconnects.

- The remote location equipment is not ready.
- There is a line contention problem. Both locations may have specified that each is primary. Determine who should be Primary and who should be secondary (Primary No for a Displaywriter.) Revise the communication setup accordingly.
- The remote location equipment uses a different code set from the one you have specified for the communication setup.
- The Displaywriter is not receiving any acknowledgement from the remote location to show that the remote location is receiving data.

The problem could be in the Displaywriter, the communication setup, the communications link, the modems, or the remote location equipment.

- During communications problem determination, you are directed to run the Display Error Log utility.

Carefully check the "Session Description" section of the Display Error Log to verify that the proper code-set is

being used (EBCDIC or 7-bit) with this communication setup.

- If the Displaywriter is not receiving any acknowledgement from the remote location, or if the acknowledgement appears as unintelligible data in the trace information (Section 3 of the Display Error Log utility), refer to the "Data Path Tests" on page 4-15 of this manual.

If none of the above resolves the problem, the most probable cause of the problem is the remote location. Have the remote location check its communication setup, modem, and equipment.

5. ON-LINE

ON-LINE displays in the Communication Status field to show the remote location is active and, the communication session may proceed. During the actual session, ON-LINE is normally followed by a blank (nothing) if there is no communications activity, or by another status term such as BID, SEND, OR RECEIVE.

6. BUSY.

BUSY shows your Displaywriter is causing the delay. Either 10 WACKs or 10 TTDs have been sent in sequence.

BUSY should automatically be replaced by ON-LINE when communications activity resumes.

7. HOLDING

HOLDING displays in the Communication Status field to show the Displaywriter is in a hold status. Usually, this is because of operator action at the Displaywriter.

This is not a communications link problem.

8. INACTIVE

INACTIVE displays in the Communication Status field when the Displaywriter is in receive mode. This shows no communications activity has taken place for 20 seconds. Communications activity should resume or a disconnect should occur.

9. REJECT

REJECT displays in the Communication Status field to show a block of received data or a bid was rejected by the Displaywriter, or a block of sent data was rejected by the remote location. Fifteen NAKs were sent or received in sequence.

10. WAITING

WAITING displays in the Communication Status field because of remote location equipment activity. The Displaywriter receives either 10 WACKs or 10 TTDs in sequence. The remote location will release this condition when it is ready to resume communications activity.

SDLC (3270 DSC and EDD) Displaywriter Status Field

The Communication Status field indicators should display in the following sequence:

- READY (Switched line only)
- CONNECTED
- ON-LINE
- SESSION.

Some modems have status lights which show specific EIA signals; refer to modem operators manual for identification of these signals.

1. blank

A blank Communication Status Field shows DTR is not active. If the Communication Status Field does not change from blank to READY, run MDIs. This is not a link failure.

2. READY

READY displays in the Communication Status field to show the Displaywriter is ready to communicate. DTR is active.

- READY changes to CONNECTED when the Displaywriter receives DSR from the modem.

If READY does not change to CONNECTED:

- DTR is not sensed by the local modem.
- DTR is sensed by the modem, but the modem is not connected to the communication line.
- The Displaywriter does not sense DSR from the modem.
- (Switched line only)--The Auto Answer feature on the modem is not active. See "Telephone as a Tool" on page 4-18 of this manual.
- RTS is not being sensed by the local modem.
- RTS is sensed, but the modem does not activate CTS.

Verify that the operator performed base machine and communications link problem determination procedures.

If the problem is still not resolved, have the operator

call the modem supplier to verify the modem equipment.

3. CONNECTED

CONNECTED not changing to ON LINE shows the SDLC link is not active, and the Displaywriter is not in the normal response mode.

If CONNECTED does not change to ON-LINE:

- The Displaywriter is not receiving data from the link.
- RTS was not sensed by the modem, or RTS was sensed but the modem did not activate CTS.

Note: A duplex, or 4-wire private line modem requires RTS and RLSD become active before activating CTS. Once CTS becomes active, it remains active until the line disconnects.

- The remote site is not ready.

The problem could be in the link, the modem, or the remote site. Have the operator verify the remote site. If no problems are found at the remote site the operator should be requested to call the modem vendor to verify his equipment.

If unable to receive, see "Data Path Tests" on page 4-15 of this manual.

If no Memory Record diskette was available have the operator re-try the job to get a Memory Record Diskette. Then return to "Display Trace Utilities" on page 4-11 of this manual.

4. ON-LINE

ON-LINE not changing to SESSION shows that a successful BIND exchange has not occurred. If ON-LINE does not change to SESSION, the most probable cause is a setup problem. The customer should contact the IBM OSSC. This is not a link problem.

5. SESSION

SESSION being displayed in the Communications Status Field shows a successful BIND has taken place, and the SNA session is active. This is the normal condition for 3270 DSC and EDD.

The following is for EDD only.

6. HOLDING

HOLDING shows that a HOLD state has been entered. If HOLDING is displayed the most probable cause is operator action. This is not a link problem.

LINK VERIFICATION PROCEDURE

This procedure provides a method of verifying the data path from the local site to the remote site. To assure yourself you are working on a link problem, and not a Displaywriter hardware problem, you should verify the customer's problem determination procedures and the MDIs have been run before doing link analysis.

1. Use the Error Log Session Description to verify the parameters selected are correct, and the parameters are compatible with the remote site.
2. Do the Modem Self-Test, if possible.

Note: This test can be done by the operator and does not require any service personnel.

This test verifies most of the circuitry in the modem and should be done at both the local and remote site. See the modem documentation to execute the Modem Self-Test.

If the Modem Self-Test fails, the operator should call the modem vendor.

3. Do the Modem End-to-End test if possible.

Note: This test can be done by the operator and does not require any service personnel.

The Modem End-to-End Test requires support from both the local and remote modems. In most cases operator action is required at both sites.

The Modem End-to-End Test verifies most of the circuitry in both the local and remote modem, and it also verifies the line. See the modem documentation to execute the Modem End-to-End Test.

If a failure occurs, the problem can be in either modem or the line. If the modems have passed the Modem Self-Test the most probable cause is the line.

4. Do the EIA cable wrap.

Note: These utilities do NOT verify DSR or RLSD. To verify these signals, they must be observed on the display.

This test verifies the local Displaywriter hardware. To do this test:

- Disconnect the EIA cable from the modem.

Note: The EIA cable must be disconnected and business machine clock used to assure that the local modem does not control any signal lines.

- Place the switch in TEST.
- Execute the Send Continuous Data Utility with Verify Receive Data ON.

If a failure occurs, the problem is with the Displaywriter hardware.

5. Do a modem wrap (AL).

This test verifies the data path through most of the modem circuitry.

The modem must support modem wrap (AL) in order to do this test.

- Reconnect the EIA cable to the modem. Move the cable switch to OPER.
- Condition the modem for modem wrap.
- Execute the Send Continuous Data Utility with Verify Receive Data on.

Note: These utilities do NOT verify DSR or RLSD. To verify these signals, they must be observed on the display.

If a failure occurs, and the cable wrap passed, the most probable cause of the problem is the modem.

6. Do a remote modem wrap (DL) if possible.

The remote site modem must support Digital Loopback, and the line

must be duplex to execute this test.

- Condition the remote modem for DL.
- Execute the Send Continuous Data Utility with Verify Receive Data ON.

Note: These utilities do NOT verify DSR or RLSD. To verify these signals, they must be observed on the display.

If a failure occurs, and the modem wrap has passed, the most probable cause of the failure is either the line or the remote modem. The remote site can do a modem wrap to verify their modem.

7. Do a DTE End-to-End test if possible.

These tests verify the complete data path from the local to remote site.

- DTE End-to-End Test, duplex

The remote site must support the wrap data function. Execute the Send Continuous Data Utility with Verify Receive Data ON.

Note: These utilities do NOT verify DSR or RLSD. To verify these signals, they must be observed on the display.

The remote site must wrap the data back to the local site. If failures occur, and the remote modem wrap passed, the most probable cause is the remote site DTE.

- DTE End-to-End Test half-duplex

The remote site must support sending and receiving continuous data.

The local Displaywriter should send continuous data to the remote site while the remote site receives continuous data to verify the transmit path from the Displaywriter to the remote site.

Note: These utilities do NOT verify DSR or RLSD. To verify these signals, they must be observed on the display.

The local Displaywriter should receive continuous data while the remote site sends continuous data to verify the receive path from the remote site to the Displaywriter. If a failure occurs, the local and remote sites can use their EIA cable and modem wraps to verify their equipment.

- DTE End-To-End Test SDLC

The remote site must support SDLC test command and response for this test.

Execute the SDLC exerciser utility to perform this test.

If failures occur, and the remote modem wrap passed, the most probable cause is the remote site DTE.

8. (HALF-DUPLEX lines only) -- measure the RTS/CTS delay.

Because the Displaywriter utilities and the modem tests do not use line turnarounds, on it is it necessary to compare the RTS/CTS delay to the echo clamp setting of the modem

Normally, the echo clamp should be 60% of the RTS/CTS delay time.

This ensures that receive lines are conditioned to accept data. Should the echo clamp exceed the RTS/CTS delay, data will be lost. Usually the communication session will not continue past the line bid sequence. This failure is hard to diagnose, because the Displaywriter utilities and modem tests will not show the failure. The utilities and modem tests do not use turnaround sequences.

The RTS/CTS Delay utility may be used to verify the RTS/CTS delay. However, it will not show the echo clamp duration. If an echo clamp problem is suspected, have the operator check the modem vendor's documentation for the echo clamp duration, or request the operator contact the modem vendor.

If a communications failure occurs, and the preceding steps show no failures, the problem is most likely an operational or software problem.

ON-LINE DIAGNOSTICS

On-line diagnostic tools are divided into three parts:

1. Error Logs

These logs are used to detect problems in the local communicating Displaywriter, and to detect errors associated with links.

A Memory Record diskette should be recorded by the operator when a communications problem occurs.

2. Trace

Trace provides a visual display of the data stream as it appears on the link. The trace can be used to detect procedural errors and incompatibilities in the data stream. Trace information can be used with error logs to solve

problems relating to modems, protocol and line bid.

3. OLTS

OLTS can be used to verify the ability of any Displaywriter to communicate.

DISPLAYWRITER UTILITIES

The following is a general description of the Displaywriter utilities.

Note: Refer to the Displaywriter Communication Service Manual for a description of how to access these Utilities.

Display Error Log Utility

This utility is used to display the Error Log from a Memory Record diskette recorded at the time of the error.

This utility is divided into sections:

- Session Description.

The information in this frame can be used to diagnose operational incompatibilities or setup errors (for example: clocking, machine type, and character set).

Note: When the Session Description Utility is accessed, the link description is updated in memory.

- Error History Log.

This is a log of the types of errors accumulated during a transmission.

- Last Adaptor Status.

This shows the condition of the hardware registers the last time

they were input by the applications code.

- Operational and Error Counters.

For BSC these counters include:

- Good text blocks transmitted and received
- Invalid blocks received
- Forward aborts received
- Parity error
- Overrun error
- NAK
- Receive timeout
- Underrun error
- Unexpected CTS dropout
- CRC Errors

For SDLC these counters include:

- I-Frame sent and received
- Invalid frames received
- Test frames received
- FCS errors
- Protocol errors
- Adaptor errors
- Inactivity timeouts
- I-Frames resent
- Transmit failures
- DSR dropouts
- CTS dropouts
- Invalid interrupts

- Adaptor Errors.

This information can be used to diagnose line noise, hardware problems, and protocol errors.

Display Trace Utilities

These utilities are used with BSC, SDLC, and SNA to display trace data. A Memory Record Diskette recorded at the time of the error is required to use this function.

- BSC Display Trace

This utility formats and displays the BSC trace.

- Display SDLC Trace

This utility can be used to diagnose SDLC problems such as incompatibilities, modem interface problems, adaptor errors, and timeout problems.

- SNA Display PIU Trace Utility

This utility provides an exact picture of the SNA protocol and data stream. This utility is used to diagnose problems such as procedural errors and incompatibilities. SNA protocol problems are not link problems.

Send Continuous Data

This utility can be used to do the following:

- Send a character pattern.

This allows a selected pattern to be transmitted continuously, either through the EIA cable, to the local modem, to the remote modem, or to the remote business machine. The remote site must be able to receive continuous data to aid in the use of this utility.

- Verify received data.

This option provides the capability of comparing any returned data with the pattern sent and wrapped through any point in the link capable of wrapping the data.

This utility may be used to find problems like broken leads in EIA cables, modem interface problems, link problems and remote site problems. See "Data Path Tests" on page 4-15 of this manual.

Receive Continuous Data Utility

This utility is used to verify a pattern being sent from a remote site. This pattern can be wrapped to the remote site if desired. A count of any errors detected will be accumulated.

This utility may be used to find problems like broken leads in EIA cables, modem interface problems, link problems and remote site problems. See "Data Path Tests" on page 4-15 of this manual.

Modem Wrap

This utility can be used to send a block of data one time or continuously, either through the EIA cable, the local modem, to the remote modem, or to the remote business machine. The remote site must be able to wrap data to the sender to aid in the use of this utility.

This utility may be used to find problems like broken leads in EIA cables, modem interface problems, link problems and remote site problems. See "Data Path Tests" on page 4-15 of this manual.

SDLC Exerciser Utility

This utility allows DTE End-To-End testing by transmitting or responding to a SDLC test command.

The remote location must be able to support this function to verify the data path.

This test verifies the complete data path from the local to the remote location.

Control Modem Interface

This utility controls EIA signal levels and gives visual feedback on the display. This utility should be used any time there are doubts about the EIA interface signals. The utility uses the circuits in the communication adaptor card that normally drive the EIA interface signals. If the voltage is from +3 vdc to +25 vdc, the signal is on. If the voltage is from -3 vdc to -25 vdc, the signal is off. These voltages must go to greater than +3 vdc, or to less than -3 vdc, to cause a signal to change state. Voltage transitions between +3 vdc and -3 vdc will give unexpected results.

Note: If the Control Modem Interface utility is accessed with the EIA cable disconnected from the modem and the test switch in the OPER position, or if the connections between the modem and the cable are open, the utility may show the signals in the ON state when they should have been in the OFF state (floating).

For example, the display may show CTS in an ON state while RTS is OFF. This condition could be checked by selecting RTS-CTS active then inactive. The signals should transition ON and OFF.

The main use of this utility is to show modem and line service personnel that the Displaywriter is driving signals.

If necessary, this utility can be used with the EIA interface tester to verify these signals.

Change Link Description Utility

This utility is used to change the link description recorded on the diagnostics diskette. This change can be made for temporary use, or stored on the diagnostics diskette permanently.

Note: When the Session Description Utility is accessed, the link description is updated in memory.

(BSC and SDLC) Measure RTS/CTS Delay Utility

This utility is used to measure the delay between RTS and CTS. This can be helpful when data is being lost on line turnarounds, or when you can not establish communication between two machines.

Normally, the echo clamp should be 60% of the RTS/CTS delay time. This ensures that receive lines are conditioned to accept data. Should the echo clamp exceed the RTS/CTS delay, data will be lost. Usually the communication session will not continue past the line bid sequence. This

failure is hard to diagnose, because the Displaywriter utilities and modem tests will not show the failure. The utilities and modem tests do not use turnaround sequences.

The RTS/CTS Delay utility may be used to verify if the modem was strapped correctly. However, it will not show the echo clamp duration. If an echo clamp problem is suspected, request the operator contact the modem vendor.

Return Data to Sender (ASYNC only)

This utility stores received data until a turnaround code is received. This data is then returned to the sender. It is primarily used for remote locations with limited test capability.

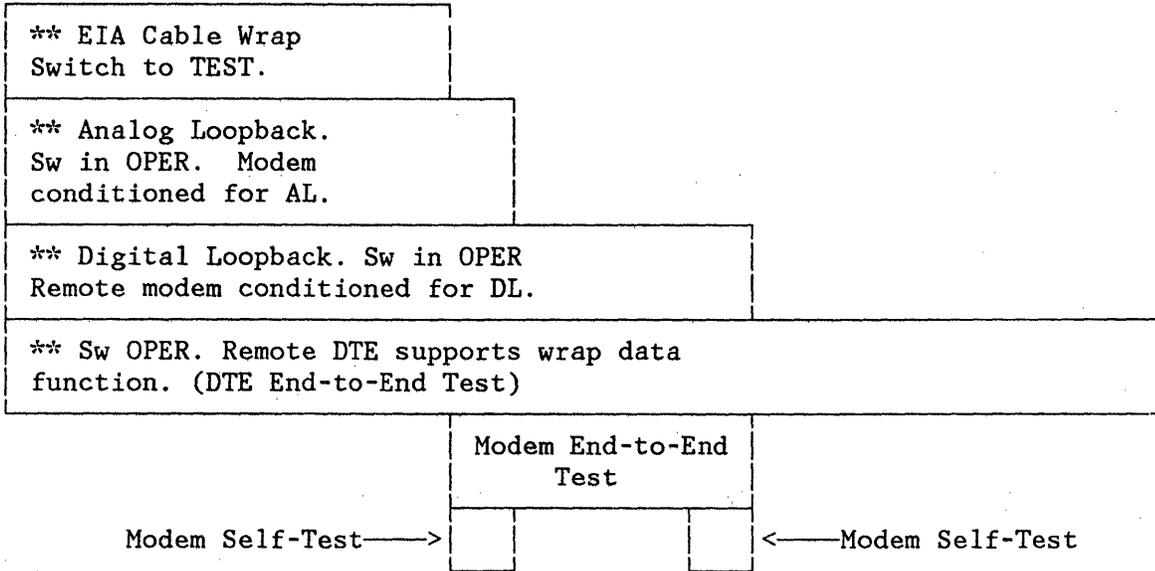
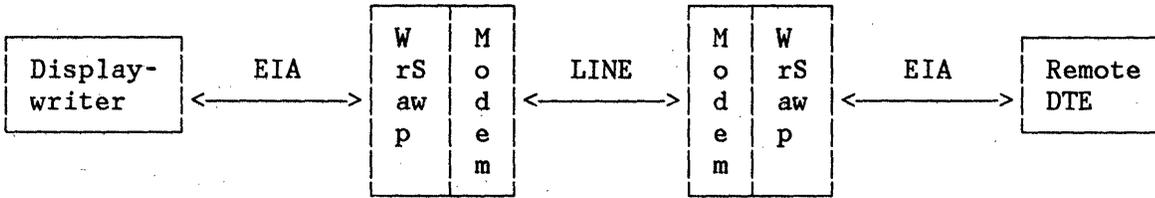
This utility provides a DCE END-TO-END Test with equipment that does not support sending and receiving continuous data.

Select Switched Network Backup Half-Speed Utility

This utility is used to select half-speed (DSRS) or SNBU (SS) operation before executing other utilities.

LOOP TEST CHART (Duplex)

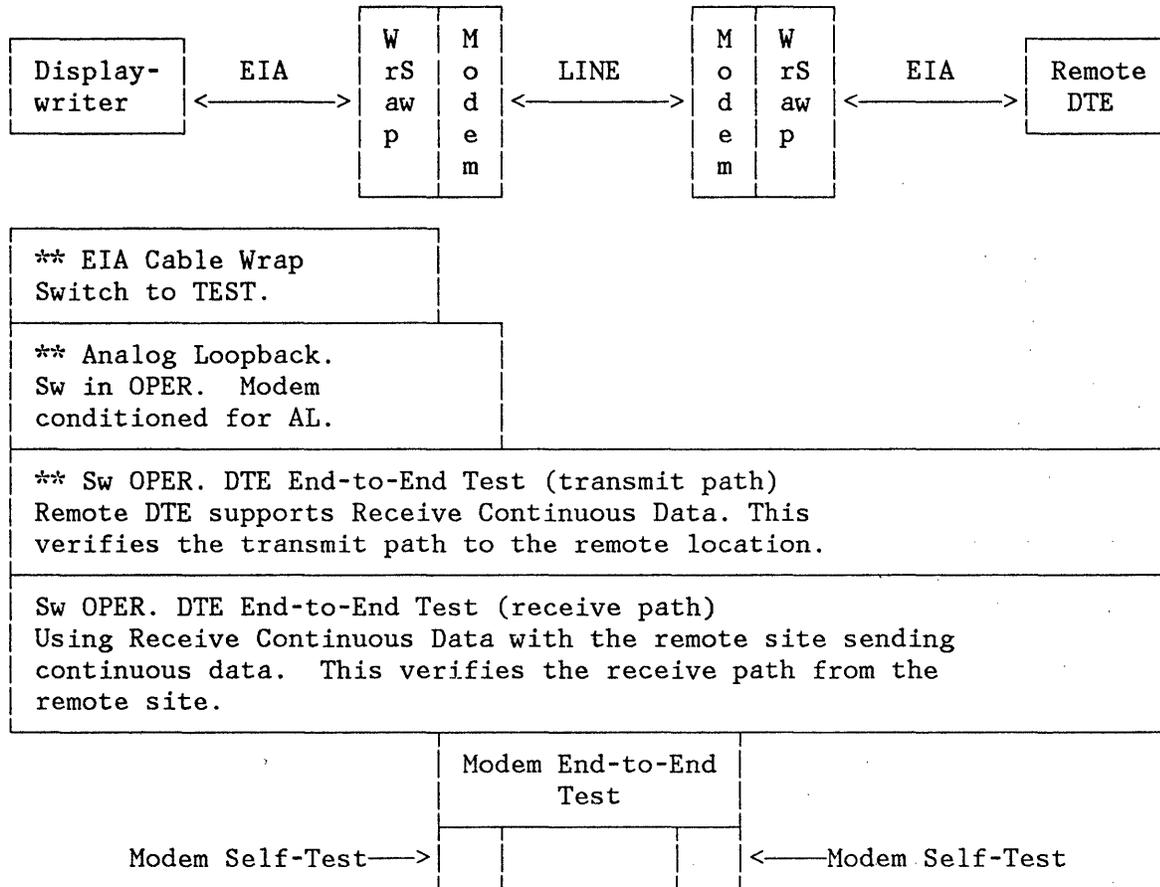
This chart is a representation of how far in the link each test will wrap data.



** Using Send Continuous Data with the Verify Receive Data Option on, or using Modem Wrap Utility

LOOP TEST CHART (HALF-DUPLEX)

This chart is a representation of how far in the link each test will wrap data.



DATA PATH TESTS

Each data path test checks a certain section of the communications link. These tests are designed to help you determine where the cause of the problem is in the link. When all tests are completed, you have tested the complete communication link. To do all of these tests, your modem must include modem diagnostic testing capabilities.

If you are not able to do all the tests, you may still be able to determine which part of the link is failing

by doing those tests that are available, and referring to the preceding chart to determine which parts of the link you have verified.

1. Displaywriter EIA Cable Wrap Test

This test verifies the Displaywriter hardware to the end of the Displaywriter EIA modem cable.

Note: The EIA cable must be disconnected from the modem to ensure that the local modem does not control any signal lines.

To do this test:

- a. Select Change Link Description utility.

Select Business Machine clock.

- b. Select the Send Continuous Data utility from the ABC diskette.

- c. Place the EIA cable switch in the TEST position.

- d. Disconnect the EIA cable from the modem.

- e. Run the Send Continuous Data utility.

2. Modem Self-Test

This test helps to verify only modem internal circuits. This test is performed by the modem to test the modem internal circuitry. Refer to the modem supplier's documentation regarding how to do the test.

3. Modem End-to-End Test

This test helps to verify most of the circuits in both the local and the remote modem and verifies the communication line. Operators should do this test before calling any supplier.

To do this test, refer to the modem supplier's documentation.

4. Local Analog Loopback

This test helps to verify the data from the local Displaywriter through most of the local modem.

To do this test:

- a. Condition the modem for Analog Loopback (AL button or switch on some modems). The EIA

cable must be attached to the modem.

- b. Place the EIA cable switch in the OPER position.

- c. Execute the Send Continuous Data or Modem Wrap utility from the ABC diskette.

The Displaywriter will send data to be wrapped through the modem and returned to the Displaywriter for checking.

5. Remote Digital Loopback Test

This test helps to verify the data path from the local Displaywriter through most of the remote modem. This test is similar to the Analog Loopback Test.

To do this test:

- a. Condition the remote modem for Digital Loopback (DL button or switch on some modems).

On some newer modems, the remote modem can be conditioned for this test by the local modem.

- b. Place your EIA cable switch in the OPER position.

- c. Execute the Send Continuous Data utility from the ABC diskette.

6. Data Terminal End-to-End Test

This test helps to verify the complete data path from the local to the remote location. To do this test, both locations must support sending and receiving continuous data. One location must send continuous data, and the other location must receive continuous data.

If the receiving location does not have a utility that will wrap data back to the sender, the receiving location must become the sending location, and the sending location must become the receiving location to test both send and receive paths.

To do the Data Terminal End-to-End Test for a duplex line that supports the wrap data function, run the Send Continuous Data utility with the Receive Data option ON. The remote location must wrap the data back to the sending location. If failures occur, and the remote location modem passed the modem self-test, the most probable cause is the remote location data terminal equipment.

To do the Data Terminal End-to-End Test for a half-duplex line or a duplex line that does not support wrap data function, the remote location must support sending and receiving continuous data. The local Displaywriter should use the Send Continuous Data utility to send data to the remote location, while the remote location receives the continuous data to verify the transmit path from the remote location to the Displaywriter.

Then, the local Displaywriter should choose the Receive Continuous Data utility, while the remote location sends continuous data to verify the receive path from the remote location to the Displaywriter. If a failure occurs, the local and remote locations can use their EIA cable and modem wraps to verify their equipment.

7. Measure the RTS/CTS Delay Test (Half-Duplex lines only)

Because the Displaywriter utilities and the modem tests do not

use line turnarounds, it is necessary to compare the RTS/CTS delays to the echo clamp setting of the modem.

Normally, the echo clamp should be 60% of the RTS/CTS delay time to insure that receive lines are conditioned to accept data.

Should the echo clamp exceed the RTS/CTS delay, data will be lost. Usually the communication session will not continue past the line bid sequence. This failure is hard to diagnose because the Displaywriter utilities and the modem tests will not show the failure, since the utilities and modem tests do not use the turnaround sequences.

Run the RTS/CTS utility to verify the RTS/CTS delay. Running this utility, however, will not show the echo clamp duration. If an echo clamp problem is suspected, check the modem supplier's documentation for the echo clamp duration or contact the modem supplier.

When a communications failure, occurs and the above tests do not show a communications problem in the link, the most probable cause of the problem is an operational or software problem.

OLTS

If OLTS is successful using the present Displaywriter configuration, the most probable cause of the problem is operator procedure at either location. Have the operator request the remote location check their equipment. If OLTS is not successful, check the Displaywriter using MDIs. Look at your OLTS failure as if it were an operator failure. Go to the proper section of this document which describes that failure.

GENERAL COMMUNICATION DEVICE INFORMATION

Telephone as a Tool

These tests can be used to determine whether the Displaywriter and the modem can answer the telephone and put the data on the line.

Do these tests with the help of the operator before going to the location, if possible.

Test No. 1

1. Have the operator prepare the Displaywriter for a communications session by choosing the desired communications setup.
2. Press the COMM START key (BSC only).
3. Prepare to send a document.
4. With the Displaywriter in a READY state, and a document queued for sending, call the local Displaywriter from another telephone.
 - If the local modem does not have Auto Answer, or if it is not activated, another person will have to answer the Displaywriter telephone, and go to DATA manually to do this test.
 - If the local modem has the Auto Answer feature, place the modem in Auto Answer. When you dial the Displaywriter modem from another telephone, you will hear the modem answer tone in your handset. The Displaywriter should start to send ENQs, and you should hear them in the handset as a high-pitched beep.

You have now checked the EIA interface between the Displaywriter and the modem, except for the received data. You have also shown that the modem was able to connect to the communication line and send data over it. If you can have the remote location also do this test, it is helpful.

Note: This test is not as useful in Asynchronous communications, because the Displaywriter does not bid (does not put data on the line). Instead, the Communication Status field should go from READY to CONNECTED, and you will hear the modem answer tone only.

Note: Using this test with a duplex modem checks only DTR from the Displaywriter to the modem, and ensuring the modem can answer. Some duplex modems will not bring CTS up until RLSD becomes active. This prevents the Displaywriter from sending ENQs.

Test No. 2

The following procedure will allow any data on the link to be heard. This can aid in isolating noise or determining if a signal is on the link. A telephone capable of setting up a conference call is needed.

1. Set up the Displaywriter to send a document to the remote location.
2. The remote location equipment should be set up to receive data.
3. Call a third location and have the third party dial the remote location.
4. When the remote location answers, go to DATA on the Displaywriter modem. The third location should be able to hear the data being communicated over the communication line.

If one signal sounds weak, use Test 1 at each location to deter-

mine which location has the weak signal.

5. The location with the weak signal should do communications problem determination procedures. When the equipment with the weak signal is a Displaywriter, do base machine and communications link problem determination procedures.

EIA Interface Tester

There are times when service personnel need to control an EIA signal, such as RTS, no matter how the controlling device conditions it. This can be done with the aid of the EIA tester. Any EIA signal used in the interface can be held ON or OFF to monitor the responses. The EIA tester can also be used to display the state of a signal on the cable, if necessary. The EIA tester can be used with "Control Modem Interface" on page 4-12 of this manual.

Acoustic Couplers

These devices can be used to bypass the customer's data communication equipment, and they may be used to bypass non-switched lines when a problem is suspected with the line.

Refer to the documentation provided with the acoustic coupler.

- Some acoustic couplers may be of the "originate only" or "answer only" type.
- Some acoustic couplers can communicate in both half-duplex and duplex. Use duplex in ASYNC communication. Use half-duplex in BSC and SDLC communication.
- Acoustic couplers are susceptible to outside noise interference. The phone handset should be prop-

erly placed and securely inserted into the acoustic coupler.

- These devices appear to be the same as a EIA RS232C modem to the Displaywriter.

Note: Some customers may elect to use these devices instead of modems. You will have to refer to their documentation for proper use.

Multi-Function Modems

There are modems available that can be used for either ASYNC or BSC depending on the strapping options selected. These modems usually have speed strapping options of 300 bps, 600 bps, and 1200 bps. They should be used as follows:

- ASYNC 100 to 300 bps. Strap the modem for 300 bps.
- ASYNC 300 to 600 bps. Strap the modem for 600 bps.
- BSC for Displaywriter. Strap the modem for 1200 bps.

In the ASYNC mode, these modems may have a character length option. They should be used as follows:

- Use the 10 bit option for Displaywriters in the TTY mode.
- Use the 9 bit option for Displaywriter in the CMC/2741 mode.

Note: Strapping the modem is the responsibility of either the customer or the modem vendor.

Data Encryption Devices

When performing Communication Link Analysis on a link using an encryption device similar to the IBM 3845 Encryption Device, do all link analy-

sis procedures with the encryption device in the bypass (clear) mode. Ask the operator to place the unit in the bypass mode, or see the device documentation. On the IBM 3845, there is a clear/operate switch for both ports, behind the front cover, the front cover has to be unlocked by the operator.

When these devices are bypassed, they are logically removed from the communication circuit, and their power can be turned on or off without affecting the normal data on the link.

All link tests and utilities can be run with the encryption device in

either mode, to help isolate the problem.

When performing End-to-End tests, the local and remote encryption devices should be in the same mode.

If the problem remains when the encryption devices are in the clear mode, the encryption device should be removed from the link to verify it is not causing the problem.

Note: The encryption device must be connected and in the operate mode before leaving the customer's location.

COMMONLY USED ABBREVIATIONS

The terms in this glossary are associated with the Displaywriter communications facility and are defined as used in this publication. Some terms may have different meanings in other contexts.

ABC	Asynchronous Binary synchronous Communication	DAA	Data Access Arrangement
ACK0	Positive acknowledgement of initial line bid or an even block count	DCE	Data Communication Equipment
ACK1	Positive acknowledgement of an odd block count	DL	Digital Loopback
AL	Analog Loopback	DP	Data Processing
ASCII	American Standard Code for Information Interchange	DSC	Data Stream Compatibility
ASYNC	Asynchronous Communication	DSR	Data Set Ready (CCITT 107)
BCC	Block Check Characters	DSRS	Data Signal Rate Select (CCITT 111)
BM	Business Machine	DTE	Data Terminal Equipment
BMC	Business Machine Clock	DTR	Data Terminal Ready (CCITT 108)
BSC	Binary Synchronous Communication	EBCDIC	Extended Binary Coded Decimal Interchange Code
CD	Carrier Detect (CCITT 109)	EC	Engineering Change
CDSTL	Connect Data Set To Line	EDD	Electronic Document Distribution
CED	Customer Engineering diskette	EIA	Electronics Industry Association
CMC	Communicating Mag Card	ENQ	Enquiry
CMS	Conversational Monitor System	FSC	Frame check sequence
CTS	Clear To Send (CCITT 106)	ID	Identification
CRC	Cyclic Redundancy Check	IRS	Inter-Record Separator
		JCL	Job Control Language
		LDC	Local Device Controller
		LL	Leased Line
		MDI	MAPS and Diagnostic Integration

MLC	Machine Level Control	SE	Systems Engineer
NAK	Negative Acknowledgement	SNA	Systems Network Architecture
OCL	Operator Control Language	SNBU	Switched Network Backup (CCITT 116)
OLTS	On-Line Test Support	SS	Select Standby (CCITT 116)
OSSC	IBM Office System Support Center	SW	Switched Line
PIU	Path Information Unit	TD	Transmit Data (CCITT 103)
RD	Receive Data (CCITT 104)	TSO	Time Sharing Option
RI	Ring Indicate (CCITT 125)	TTD	Temporary Text Delay
RLSD	Receive Line Signal Detect (CCITT 109)	X	Hexadecimal notation
RTS	Request To Send (CCITT 105)	WACK	Wait-Positive Acknowledgement
RVI	Reverse Interrupt	WP	Word Processing
SDLC	Synchronous Data Link Control		



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