

I B M	PART NUMBER	2597221
	DATE	CHANGE NUMBER
PUBLICATION DRAWING	01 AUG 86	842375
BASE FORM NUMBER <u>SY31-9037</u>		
TITLE. 6157 TAPE ATTACHMENT MAINTENANCE INFORMATION MANUAL		

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

CHANGE NUMBER	FORM / TNL	DESCRIPTION / COMMENTS
*****	*****	*****
842375	SY31-9037-0	RELEASE 5, FIRST CUSTOMER SHIP



**IBM System/36**  
**6157 Tape Adapter**  
**Maintenance Information Manual**

**First Edition (October 1986)**

The drawings and specifications contained herein shall not be reproduced in whole or in part without written permission.

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

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

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

The numbers at the bottom right of illustrations are publishing control numbers and are not part of the technical content of this manual.

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

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

## PREFACE

This manual contains the maintenance information necessary to service the System/36 6157 Tape Adapter. This manual includes maintenance procedures, FRU descriptions, and interface descriptions to aid in diagnosing machine failures not found by the MAPs.

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

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

### ***About This Manual***

The service procedures in this manual are numbered.

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

### ***Related Publications***

#### **System/36 Hardware Publications**

- *General Maintenance Information Manual*, SY31-8999
- *Processing Unit and Channel Maintenance Information Manual*, SY31-9000
- *Data Storage Attachment Maintenance Information Manual*, SY31-9001
- *Processing Unit and Channel Maintenance Information Manual (Stage 2)*, SY31-9015
- *Processing Unit and Channel Maintenance Information Manual (Stage 3)*, SY31-9035

#### **Other Hardware Publications**

- *6157 Streaming Tape Drive Setup and Operating Instructions*, SA23-1045

This page is intentionally left blank.

## **SAFETY**

### ***Danger and Caution Notices***

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

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

### ***Danger Notices***

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

### ***Caution Notices***

There are no caution notices in this manual.

### Rules for Safety

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

Do not fear electricity, but respect it.

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

#### Work Environment

- Do not work alone in hazardous conditions or near equipment that has dangerous voltage. Always inform your manager if the conditions or voltages are a possible problem.
- Always look for possible hazards in your work environment. Examples of hazards are: moist floors, nongrounded extension cables, power surges, and missing grounds.
- Do not perform any action that makes the product unsafe or that causes hazards for customer personnel.
- Before you start the equipment, ensure that other personnel are not in a hazardous position.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that the sleeves of your clothing are fastened or are rolled above the elbow.
- Insert your necktie into your clothing or fasten it with a clip (preferably nonconductive) at approximately 8 centimeters (3 inches) from its end.
- Lift the equipment or parts by standing or pushing up with your stronger leg muscles; this action removes the strain from the muscles in your back. Do not lift any equipment or parts that are too heavy for you.

- Put removed machine covers in a safe place while you are servicing the machine. Reinstall the covers before returning the machine to the customer.
- Always keep your tool kit away from walk areas so that other persons cannot trip over it. For example, keep the kit under a desk or table.
- Observe good housekeeping practices in the area of the machines while you are performing maintenance and after completing it.
- After maintenance, reinstall all safety devices, such as guards, shields, labels, and grounding devices. Exchange safety devices that are worn or defective. Remember, the safety devices protect you from a hazard. You destroy their purpose if you do not reinstall them when you have completed the service call.

#### Electrical Safety

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

**Note:** *A non-IBM attachment to an IBM machine may be powered from another source and may be controlled by a different switch or circuit breaker.*
- Switch off all power before:
  - Removing or assembling the main units of the equipment
  - Working near power supplies
  - Inspecting power supplies
  - Installing changes in machine circuits

- If you really need to work on equipment that has exposed live electrical circuits, observe the following precautions:
  - Ensure that another person who understands the power off controls, is near you. Another person must be there to switch off the power, if necessary.
  - Do not wear jewelry, chains, metal-frame eyeglasses, or other personal metal objects. Remember, if the metal touches the machine, the flow of current increases because the metal is a conductor.
  - Use only insulated probe tips or extenders. Remember, worn or cracked insulation is unsafe.
  - Use only one hand while you are working on live equipment. Keep the other hand in your pocket or behind your back. Remember, there must be a complete circuit for an electrical shock to occur. This precaution prevents your body from completing the circuit.
  - When you use a tester, set its controls correctly and use insulated probes that have the correct electrical specification.
  - Do not touch objects that are grounded, such as metal floor strips, machine frames, or other conductors. Use suitable rubber mats obtained locally, if necessary.
- When you are working with machines having voltages more than 30 Vac or 42 Vdc, observe the special safety instructions given in customer engineering memorandums (CEMs).
- Never assume that power has been removed from a circuit. First, ensure that power has been removed.
- Do not touch live circuits with the surface of a plastic dental mirror. Remember, the surface of the dental mirror is conductive and can cause damage or personal injury.

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

#### Mechanical Safety

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

#### Safety Glasses

Wear safety glasses when:

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

**Tools, Testers, and Field-Use Materials**

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

**Summary**

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

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

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

- The power receptacles could be wrongly wired.
- Safety devices or features could be missing or defective.
- The maintenance or machine level change history could be wrong or not complete.
- The design could have a problem.
- The machine could have been damaged when it was shipped.
- The machine could have an unsafe change or attachment.

- An engineering change or a sales change could be wrongly installed.
- The machine could be deteriorated because it is old, or because it operates in an extreme environment.
- A part could be defective, therefore causing a hazard.
- A part could be wrongly assembled.

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

**Electrical Accidents—First Aid**

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

- *Use Caution:* If the victim is touching the electrical-current source, remove the power. To do this, you may need to operate the room emergency power-off switch or the disconnecting switch. If you cannot find the switch, use a dry wooden rod or other nonconductive object to pull or push the victim away so he or she is not touching the electrical-current source.
- *Work Quickly:* If the victim is unconscious, he or she may need mouth-to-mouth rescue breathing and possibly external cardiac compression if the heart is not beating.
- *Get Medical Aid:* Instruct another person to dial the rescue service (such as the ambulance or the hospital).

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

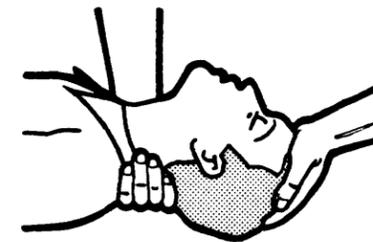
**DANGER**

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

.....  
 .....  
 .....  
 .....

1. Prepare for rescue breathing:

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

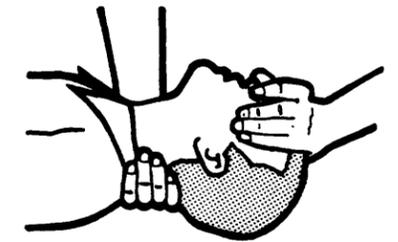


2. Look, listen, and feel to determine if the victim is breathing freely.

- Put your cheek near the victim's mouth and nose.
- Listen and feel for the breathing out of air. At the same time, look at the victim's chest and upper abdomen to see if they move up and down.

3. If the victim is not breathing correctly:

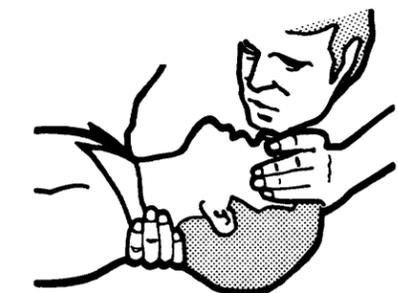
- Keep the victim's head tilted backward. Continue to press on the forehead with your hand; at the same time, position the same hand so that you can pinch together the victim's nostrils with your thumb and finger.



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



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



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

<sup>1</sup> Trademark of the Gardner-Denver Co.

**Reporting Accidents**

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

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

# Contents

## OVERVIEW

6157 Tape Adapter ..... 98-110

## LOCATIONS

Adapter Card ..... 98-200

Top Card Connector ..... 98-205

Cable Tower ..... 98-210

## DIAGNOSTIC INFORMATION

IPL Good Machine Path ..... 98-455

6157 Diagnostics ..... 98-460

## HOW TO INTERPRET ERAP REPORTS

Error History Table ..... 98-500

System Reference Code ..... 98-502

Volume ID ..... 98-504

Error Counter Table ..... 98-506

I/O Counter Table ..... 98-508

## FRU DESCRIPTIONS

Tape Adapter Card ..... 98-600

## INTERFACE DESCRIPTIONS

Tape Adapter Cable Diagram ..... 98-700

INDEX ..... X-1

This page is intentionally left blank.

## OVERVIEW

### 98-110

#### 6157 Tape Adapter

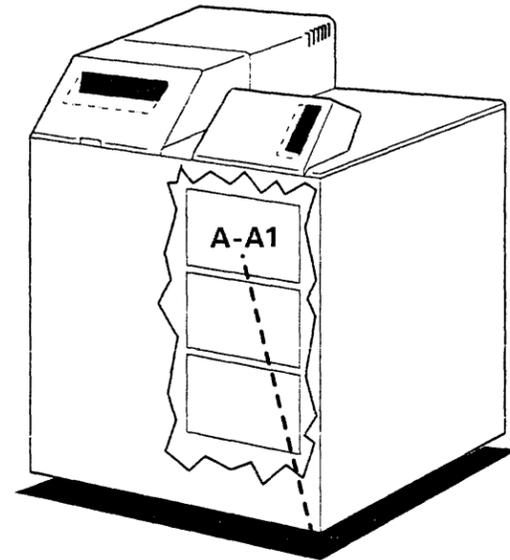
The 6157 tape adapter can attach one 6157 tape drive to the system channel through the data storage attachment (DSA). For DSA maintenance information, see Section 90.

The 6157 tape drive is a nine-track, serpentine, 1/4-inch streaming tape drive formatter which uses the 8000 bits-per-inch NRZI mode.

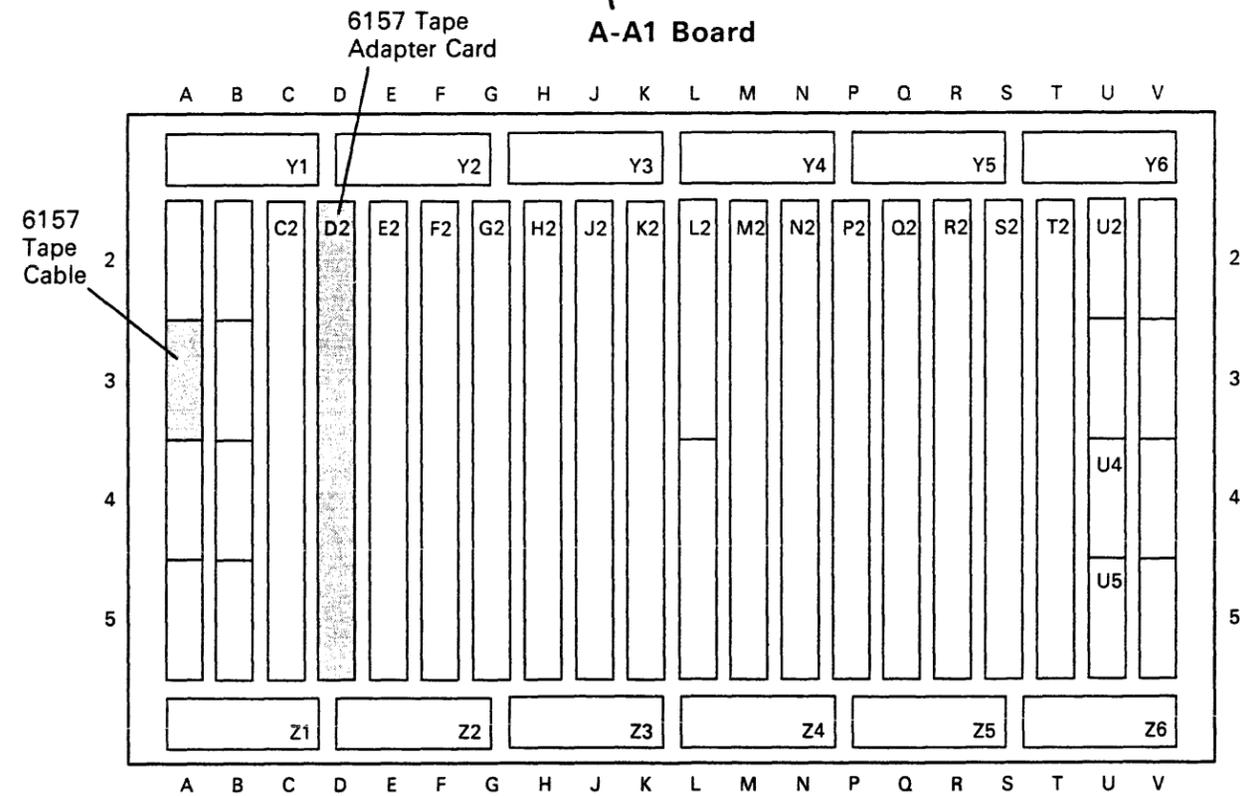
For 6157 maintenance information, see the manual *6157 Streaming Tape Drive Setup and Operating Instructions*.

LOCATIONS

98-200  
Adapter Card

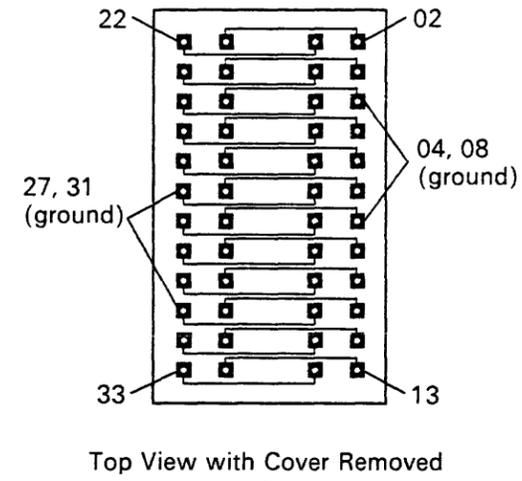


A-A1 Board

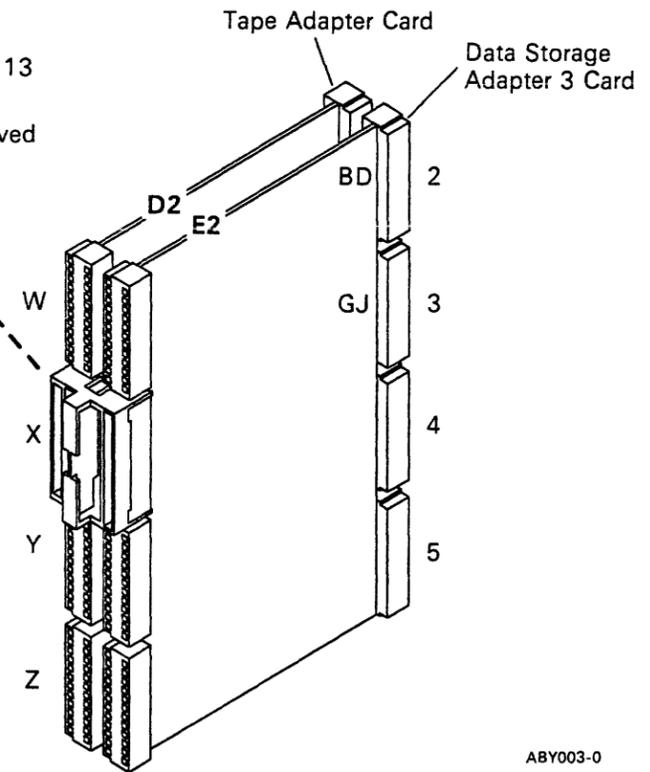


ABY002-0

98-205  
Top Card Connector

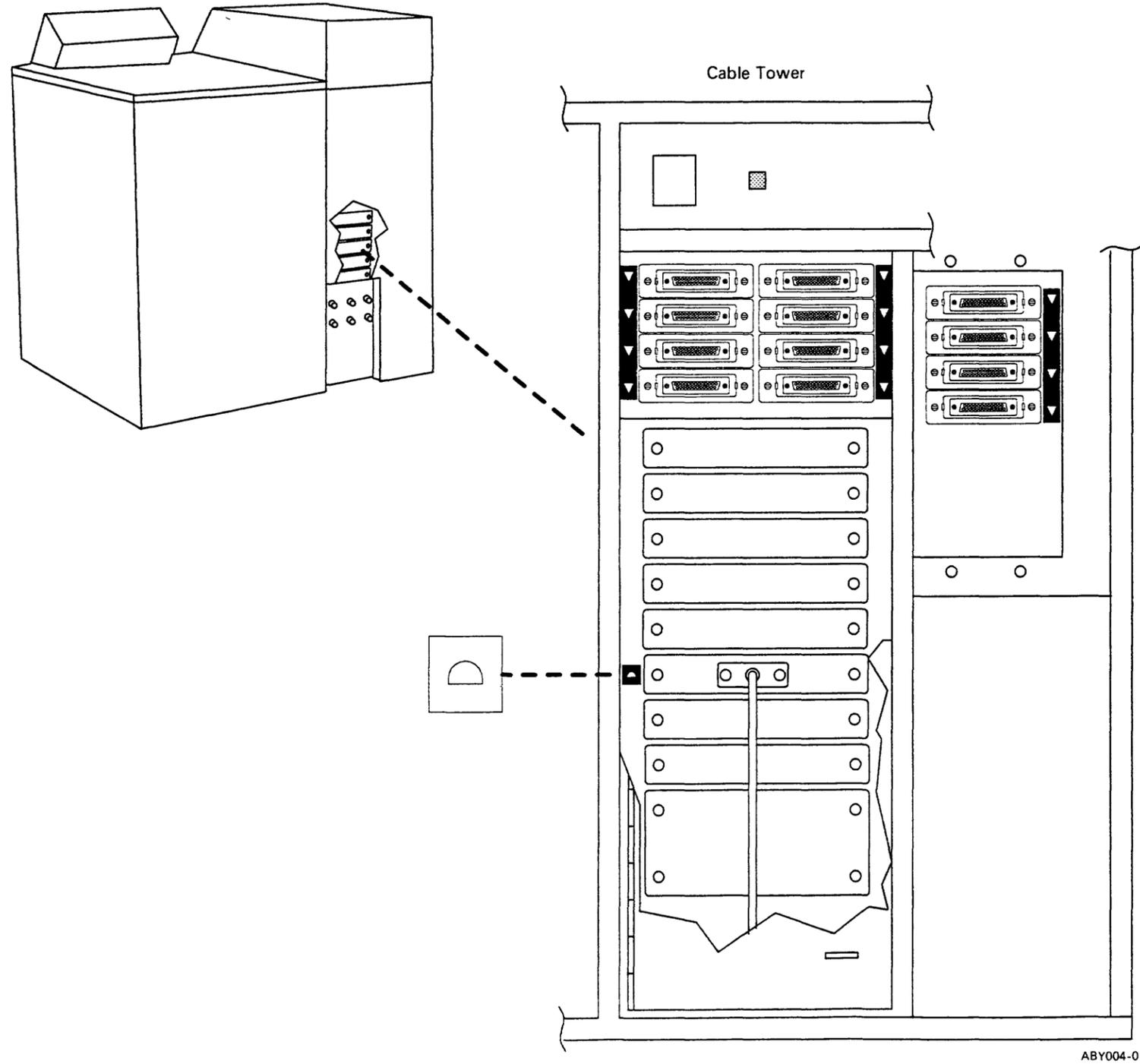


Top View with Cover Removed



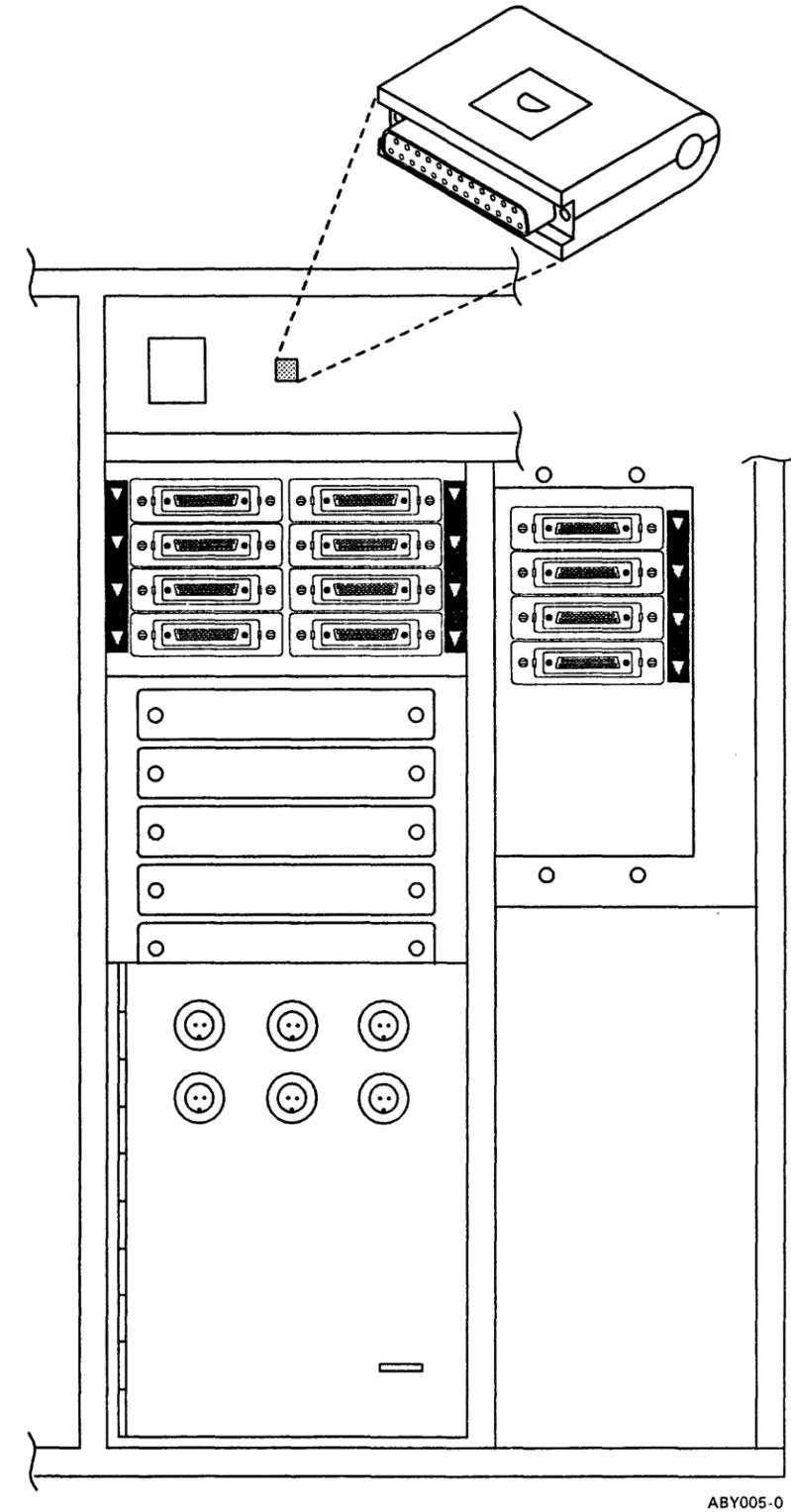
ABY003-0

**98-210  
Cable Tower**



ABY004-0

**Tape Wrap Connector  
(See 98-700 for wiring details.)**



ABY005-0

## DIAGNOSTIC INFORMATION

### 98-455

#### IPL Good Machine Path

Diagnostic wrap tests are run on the 6157 adapter card during initial program load (IPL). If an error occurs in the tape adapter circuits, a system reference code is displayed on the system console. For information on a specific system reference code, see MAP 0116.

### 98-460

#### 6157 Diagnostics

#### Online Problem Determination

Online problem determination (OLPD) runs under SSP and will help you to determine the failing FRU.

#### To Run the 6157 OLPD Procedure

1. Key in `PROBLEM` and press the Enter key.
2. Select the tape option and follow the displayed instructions.

#### Customer Setup Checkout Procedure

The customer setup checkout procedure should be used if SSP is not installed on the system or cannot be loaded.

#### To Run the Customer Setup Checkout Procedure

Perform the customer setup checkout procedure in the manual *Setting Up Your Computer*, SA21-9430.

## HOW TO INTERPRET ERAP REPORTS

See 01-360 for information on how to run the error recording analysis procedure (ERAP).

### 98-500

#### Error History Table

The error history table includes a series of fixed-length entries, with each entry representing an error on the 6157 tape drive or adapter. The entries are made in a table so that the latest error is first in the table. The following is an example of a 6157 error history table.

ERROR HISTORY TABLE FOR 6157 TAPE				W1
PRESS ENTER TO VIEW NEXT DISPLAY.		CMD7-RESTART	CMD3-BACK UP	
FROM: XX/XX/XX XX:XX:XX		TO: XX/XX/XX	XX:XX:XX	
DATE	TIME	SRC	VOLUME	
YYMMDD	HHMMSS	HEX	ID	
801209	083527	1B50	XXXXXX	
801111	133527	1B01	XXXXXX	
801016	223308	1BFF	XXXXXX	
800912	010339	1B26	XXXXXX	

**98-502**

**98-504**

### 98-502

#### System Reference Code

The system reference code (SRC) is a hexadecimal number generated by the 6157 error recovery procedures and passed to the system. For information on a specific system reference code, see MAP 0113.

### 98-504

#### Volume ID

The volume ID is a number or name that identifies the tape cartridge that was on the 6157 when the error occurred.

## 98-506

### Error Counter Table

The error counter table includes a series of counters, with each counter assigned to collect a specific type of error on the 6157 tape drive or adapter.

The following chart lists the errors as they appear in the error counter table.

Error
Permanent write errors
Permanent read errors
Write parity errors
Read parity errors
Write parity retries
Read parity retries
Underruns
Data errors

## 98-508

### I/O Counter Table

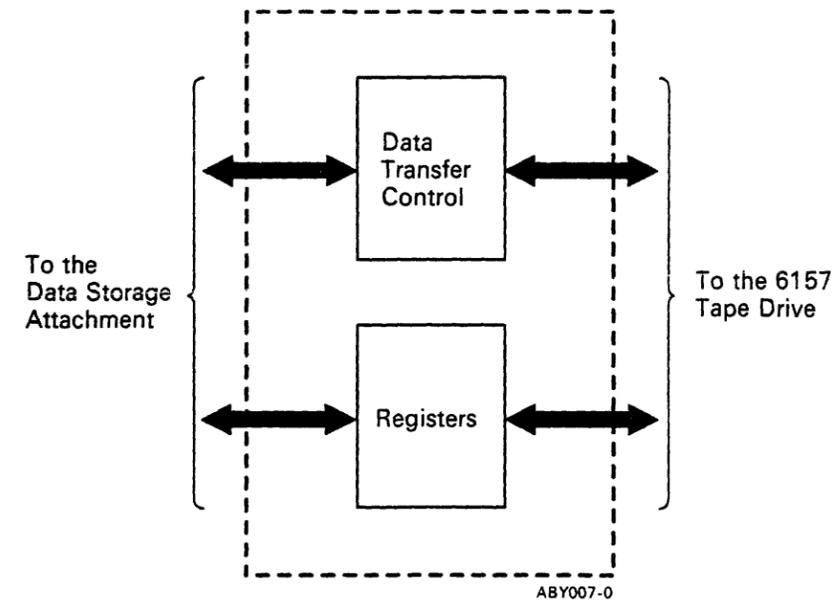
The I/O counter table includes two counters, which collect the following statistics about the 6157 tape drive:

- The number of K bytes written
- The number of K bytes read

**FRU DESCRIPTIONS****98-600  
Tape Adapter Card**

The tape adapter card:

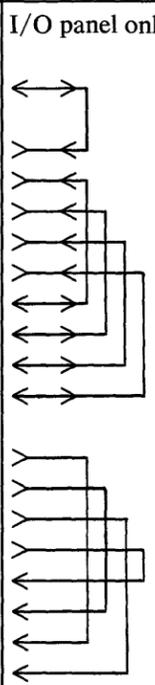
- Controls the lines in the cable to the tape drive
- Controls the data transfer between the tape drive and the data storage attachment
- Tests for bad parity on data transfers
- Contains circuits for diagnostics



## INTERFACE DESCRIPTIONS

98-700

### Tape Adapter Cable Diagram

Signal Name	Signal Pins		Signals Wrapped
	Tape Adapter Connector	Tape Unit Cable	
Signal ground	1-14	1-14	I/O panel only 
Wrap line	15	15	
Signal ground	16-19	16-19	
Host bus parity	20	20	
Host bus bit 7 (MSB)	21	21	
Host bus bit 6	22	22	
Host bus bit 5	23	23	
Host bus bit 4	24	24	
Host bus bit 3	25	25	
Host bus bit 2	26	26	
Host bus bit 1	27	27	
Host bus bit 0	28	28	
Online	29	29	
Request	30	30	
Reset	31	31	
Transfer	32	32	
Acknowledge	33	33	
Ready	34	34	
Exception	35	35	
Direction	36	36	

**Note:** The wrap tests wrap the bidirectional lines in both directions.

## INDEX

### A

adapter card  
description 98-600  
location 98-200

### C

cable tower 98-210

### D

diagnostics 98-460

### E

error counter table 98-506  
error history table 98-500  
system reference code 98-502  
volume ID 98-504

### F

FRU descriptions 98-600

### I

interface descriptions 98-700  
I/O counter table 98-508

### L

locations  
adapter card 98-200  
cable tower 98-210  
top card connector 98-205

### O

overview 98-110

### R

routines, diagnostic 98-460

### S

SRC 98-502  
system reference code 98-502

### T

tape adapter card (see adapter card)  
top card connector 98-205

### V

volume ID 98-504

### W

wrap and connectors  
location 98-210  
wiring diagram 98-700

### 6157

6157 diagnostics 98-460  
6157 tape adapter (overview) 98-110  
6157 tape drive 98-110



### READER'S COMMENT FORM

Please use this form only to identify publication errors or to request changes in publications. Direct any requests for additional publications, technical questions about IBM systems, changes in IBM programming support, and so on, to your IBM representative or to your IBM-approved remarketer. You may use this form to communicate your comments about this publication, its organization, or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Possible topics for comment are:

	Page No(s).		Page No(s).
Accuracy	_____	Figure/Diagram	_____
Adjustments/Procedures	_____	Index/Table of Contents	_____
Completeness	_____	Organization	_____
Cross-references	_____	Other _____	_____

Comments:

Please provide the information requested below; we will contact you. Thank you for your cooperation.

Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Job Title: \_\_\_\_\_  
(IBM Tie Line) (Extension)

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
(Area Code) (Local Number)

\_\_\_\_\_ Zip Code

No postage necessary if mailed in the U.S.A.

### READER'S COMMENT FORM

Please use this form only to identify publication errors or to request changes in publications. Direct any requests for additional publications, technical questions about IBM systems, changes in IBM programming support, and so on, to your IBM representative or to your IBM-approved remarketer. You may use this form to communicate your comments about this publication, its organization, or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Possible topics for comment are:

	Page No(s).		Page No(s).
Accuracy	_____	Figure/Diagram	_____
Adjustments/Procedures	_____	Index/Table of Contents	_____
Completeness	_____	Organization	_____
Cross-references	_____	Other _____	_____

Comments:

Please provide the information requested below; we will contact you. Thank you for your cooperation.

Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Job Title: \_\_\_\_\_  
(IBM Tie Line) (Extension)

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
(Area Code) (Local Number)

\_\_\_\_\_ Zip Code

No postage necessary if mailed in the U.S.A.

Fold and tape. **Please do not staple.**

Fold and tape. **Please do not staple.**

**BUSINESS REPLY MAIL**

FIRST CLASS / PERMIT NO. 40 / ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

**International Business Machines Corporation**  
Information Development  
Department 245  
Rochester, Minnesota, U.S.A. 55901



NO POSTAGE  
NECESSARY  
IF MAILED IN THE  
UNITED STATES



**BUSINESS REPLY MAIL**

FIRST CLASS / PERMIT NO. 40 / ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

**International Business Machines Corporation**  
Information Development  
Department 245  
Rochester, Minnesota, U.S.A. 55901



NO POSTAGE  
NECESSARY  
IF MAILED IN THE  
UNITED STATES



Fold and tape. **Please do not staple.**

Fold and tape. **Please do not staple.**



Cut Along Line

Cut Along Line

Cut Along Line



International Business Machines Corporation

**IBM System/36  
6157 Tape Adapter  
Maintenance Information Manual**

Order Number  
SY31-9037-0

Printed in U.S.A

SY31-9037-00

