

**WANG**

**VS**

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**System Operation Guide**

# VS System Operation Guide

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This manual replaces and obsoletes the fifth edition of the *VS System Operation Guide* (800-1102SO-05). For a list of changes made to this manual since the previous edition, see the "Summary of Changes."



## PREFACE

This manual covers a variety of topics of interest to system administrators and console operators. These topics include:

- . System operation functions performed at the Operator's Console
- . System power-up/power-down and Initial Program Loading (IPL) procedures
- . What to do when the system enters Control Mode
- . The operational characteristics of all system peripheral devices

Part I deals with the Operator's Console and Control Mode. Part II deals with system power-up/power-down procedures, IPL, and system peripheral devices.

For further information on related topics, consult the following manuals:

VS Operating System Services	800-1107OS
VS Principles of Operation	800-1100PO
VS Program Development Tools	800-1307PT
VS Programmer's Introduction	800-1101PI
VS System Management Guide	800-1104SM
VS Utilities Reference Manual	800-1303UT



**SUMMARY OF CHANGES  
FOR THE SIXTH EDITION OF THE VS SYSTEM OPERATION GUIDE**

TOPIC	DESCRIPTION	PAGES
<b>OPERATOR'S CONSOLE</b>		
Device Management	All devices are now displayed and controlled through separate Program Function keys (PF 9 through PF 13), replacing limited access through the Control DEVICE STATUS Menu.	Chapter 6
I/O Error Log	Print I/O Error Log command, formerly activated by PF 8 is now included in PF 14 (SYSTEM Options).	7-4
System Options	SYSTEM Options (PF 14) now allows the user to set eight workstations as dual Operator/User mode workstations; the former limit was four workstations.	7-3
Procedure Queue	PROCEDURE Queue Operations (PF 3) now replace former Job Queue operations.	Chapter 3
<b>PERIPHERALS</b>		
Workstations	A chapter has been added on the workstation, and its functions. The Archiving Workstation is also discussed.	Chapter 11, Appendix A
Screen Messages Displayed at Operator's Console	Expanded descriptions of the causes of, and response to, some screen messages	Chapter 8
Model 2270V Diskette Drive	Now available in four models: 2270V-0, -1, -2, and -3	12-1, Appendix B
Model 2260V Disk Drive	No longer offered	
Model 2280V Disk Drive	Now available in three models: 2280V-1, -2, and -3	14-1, Appendix D

TOPIC	DESCRIPTION	PAGES
Model 2209V	Model 2209V-3 is now dual density	15-1
Model 2273V-1 Band Printer	No longer offered	
Printer Character Sets	Models 5521 and 5531-2 were added to chart in Appendix L; miscellaneous changes were also made.	L-1
Power Cabling and Operating Environment Requirements	Miscellaneous changes	13-1; Appendices A,B,C,D,E,G, H,I,J,K
Control Mode Dump	Procedure for VS-100	9-3 through 9-5
Power-Up/Down and IPL	Expanded description with VS-100 notes added	10-1 through 10-4
General	Miscellaneous editorial changes	

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**PART I**

**THE OPERATOR'S CONSOLE**

## CHAPTER 1 INTRODUCTION

### 1.1 GENERAL INFORMATION

The Operator's Console is designed to give operators access to the following system operations:

- . Display and management of print file entries in the Print Queue
- . Display and management of background job entries in the Procedure Queue
- . Printer(s) control
- . Display and control of interactive and non-interactive tasks
- . Display and management of all devices -- printers, workstations, tapes, disks, and telecommunications
- . Display and control of system options, including the setting of system parameters, and additional operator's consoles, and the printing of the I/O Error Log

The Operator's Console is always located at Workstation #0 which is adjacent to the CPU, disk and tape drives, and printers. The Operator's Console allows the operator to both control system operations and enter User mode. In User mode the operator has access to the Logon display and all Command Processor functions. The Logon display and Command Processor functions are discussed in the VS Programmer's Introduction.

### 1.2 SUMMARY OF OPERATOR'S CONSOLE FUNCTIONS

This section presents a summary of the operator functions in the Operator's Console Menu. (A detailed discussion of operator functions is presented in Chapters 2 through 7.) The Operator's Console Menu is the first screen that appears at Workstation #0 after the system is IPLed. Figure 1-1 shows a typical Operator's Console Menu. In addition to a full menu of operator functions, the screen displays up to eight system messages requiring operator attention. (Chapter 8 has a complete discussion of Operator's Console messages.)

\*\*\* Wang VS Operator's Console \*\*\*  
6:16 PM Monday February 2, 1981

Position to (\*) and Press (ENTER) to Provide Immediate Operator Service:  
Mount Volume FLOPPY on Disk 11, . . . . . 17:40  
\*Assistance Required For Printer 3 . . . . . 18:02  
\*Dismount Volume VD0128 From Tape 28 . . . . . 18:15  
\*I/O Error Log Queued For Printing . . . . . 17:43

Press (1) to Return to User Mode  
- or -

Use the Function Keys to Manage:

(2) PRINT Queue	(9) PRINTERS
(3) PROCEDURE Queue	(10) DISKS
	(11) TAPES
(6) INTERACTIVE Tasks	(12) TELECOMMUNICATIONS
(7) NON-INTERACTIVE Tasks	(13) WORKSTATIONS
	(14) SYSTEM Options

Press (HELP) at Any Time to Return to the Operator Console Menu

FIGURE 1-1. Operator's Console Menu

### 1.2.1 Return to User Mode (PF 1)

The Return to User Mode function appears on the Operator's Console Menu. If the operator is not logged on, pressing PF 1 displays the Logon Screen. If the operator is logged on, pressing PF 1 displays the Command Processor Menu.

Press PF 11 from the Logon Screen or the Command Processor Menu to return to the Operator's Console Menu.

### 1.2.2 PRINT Queue (PF 2)

This function allows the operator to control the printing of spooled print files. Spooled print files are generated either through the normal print output operations of programs or utilities run at the workstations, or through specific print options available in many of the system utilities. Print files are listed on the Print Queue. The following operations can be performed on print files:

- . Release (to the printer) files currently on HOLD
- . Hold active files currently displayed on the Print Queue
- . Scratch a print file

- . Change the attributes of a print file (such as queue entry position, print class, form #, and copy count)
- . Remove a file from the Print Queue
- . Change the post-printing disposition of a print file

These operations are discussed in Chapter 2.

### 1.2.3 PROCEDURE Queue (PF 3)

This function allows the operator to control the execution of jobs submitted for background processing. (Users submit jobs to be run in background mode either through SUBMIT Procedure (PF 12) from the Command Processor Menu or through Submit SVC via Assembler Language.) Job files are listed in the Procedure Queue. The following operations can be performed on job files:

- . Release to the CPU jobs that are currently on HOLD.
- . Hold jobs in the Procedure Queue that are not yet executing.
- . Change the attributes of a job. This includes the job's position in the queue, the class, the CPU time limit and what to do if it is exceeded, and whether or not a dump is to be supplied if the job is cancelled.
- . Remove a job that is not currently running from the Procedure Queue.
- . Define the "after execution" disposition of a job.

These operations are discussed in Chapter 3.

### 1.2.4 INTERACTIVE Tasks (PF 6)

This function allows the operator to monitor and control the interactive tasks of the system. At system generation each workstation is assigned to an interactive task. These interactive tasks and their attributes are displayed in a table screen that can be examined by the operator. The screen shows the status of activities at each workstation. Some workstations may be LOGGED OFF, while at other workstations where users are LOGGED ON, the names of programs being executed interactively are displayed. As each program is executing, the screen displays information concerning the date and time the task was activated, the elapsed running time, and the CPU time used by the task. When required, the operator can display the program statistics of a particular task to assess the total resource requirements of the program.

Several important features in the Interactive Tasks display include the ability of the operator to force users to logoff in situations where partial or total system shutdown is required. Also, the operator can force a user's program to enter into the HELP processor (for debugging assistance) or even cancel the program, if required. Dual mode operator privileges may be assigned

to a workstation that previously had user privilege only. Likewise, Dual mode operator privileges can be removed from a workstation that previously had them. In addition, the Control Non-Interactive Tasks Menu can be directly accessed without forcing the user to go back to the Operator's Console.

The following operations can be performed on Interactive tasks:

- . Display paging and I/O statistics of all interactive tasks
- . Cause the users program to enter into the HELP processor
- . Assign or remove dual mode operator privileges depending upon previously assigned privileges
- . Cancel a program while it is being executed
- . Control logon/logoff of interactive users
- . Force an interactive user into immediate logoff, or logoff at the completion of a currently running job
- . Display statistics on a particular job by User ID
- . Allow access to debugging of current program

These operations are discussed in Chapter 4.

#### 1.2.5 NON-INTERACTIVE Tasks (PF 7)

This function permits the operator to control or monitor the background tasks of the system. Background tasks on the Wang VS include the Initiator task which runs background jobs submitted by users, and those tasks that perform certain system operations. The latter tasks are called dedicated tasks because they are automatically running as a result of the IPL process. Dedicated tasks are not controlled by the operator, but their use of system resources can be monitored.

The Initiator task is directly responsible for allocating time on the CPU and running a job. When a job is running, the system provides information to the Operator's Console Screen concerning the CPU time being used, the CPU time allocated to the job, and the disposition of the job if the CPU time is exceeded. This information can be used by the operator to determine if the job should be interrupted, cancelled, or run to completion with additional CPU time. In addition, the operator can control the status of the Initiator by making it available or unavailable for jobs submitted in the future.

The operator can control the following background job operations:

- . Access the Control Interactive Tasks Menu without returning to the Operator's Console
- . Display paging and other I/O statistics for all jobs being run in background

- . Display information on a user submitted job currently running
- . Interrupt a job that is running
- . Continue or cancel execution of a job that has exceeded the specified CPU time limit
- . Control job initiation by making the Initiator task "inactive" or "available" for future use
- . Cancel a job that is currently executing or paused (interrupted)
- . Control the scheduling of future jobs by setting the priorities for Job Class
- . Display information on dedicated tasks

These operations are discussed in Chapter 5.

#### 1.2.6 Device Management (PF 9-13)

These functions allow the operator to control the status of the devices attached to the system including PRINTERS (PF 9) DISKS (PF 10) TAPES (PF 11) TELECOMMUNICATIONS (PF 12) and WORKSTATIONS (PF 13). These operations include:

- . Display status of each device on system
- . Change scheduling of print files
- . Change status of each device on system
- . Attach and detach devices on the system
- . Mount and dismount disk and tape volumes
- . Change disk restrictions
- . Display information on owner of device
- . Activate and deactivate Telecommunications operations
- . Access the Control Interactive Menu from Workstation operations

Further discussion of Device Management is provided in Chapter 6.

### 1.2.7 SYSTEM Options (PF 14)

This function allows the operator to display and control system options including the setting of system parameters, and additional operator's consoles, and the printing of the I/O Error Log. The following operations can be performed as system options:

- . Set system parameters to a new default line-count (lines per page) for program use
- . Display system status to review system-wide status
- . Set additional operator console list to establish additional dual mode workstations
- . Print I/O Error Log to list I/O error conditions encountered by the system. The operator also has the option to purge the file after printing

Further discussion of System Options is provided in Chapter 7.

## CHAPTER 2 MANAGING PRINT QUEUE OPERATIONS

### 2.1 INTRODUCTION

As explained in Chapter 1, the Print Queue is a list of print files. Print files displayed on the Print Queue are of two types: Active (print files created with Print Mode "S", also referred to as "spooled" print files) and inactive (print files created with Print Mode "H", also referred to as "hold" files). Note that print files created with print modes "O" (online) or "K" (keep) are not carried on the Print Queue. Active, or "S" mode, print files are printed automatically by the system in a predetermined order as a printer becomes available, unless an error condition occurs or the operator manually intervenes to prevent them from being printed. Inactive, or "H" mode print files are never printed automatically; they remain on the queue unless the operator manually releases them for printing.

This chapter explains how to perform a variety of operations on print queue entries; these include the following:

- . Locating an entry in the Print Queue by NEXT, FIRST, etc. (See Section 2.2.)
- . Changing a print file's status from active to inactive, or from inactive to active. (See Section 2.4.)
- . Changing a print file's position in the Print Queue. (See Section 2.5.)
- . Changing the specified form number or number of copies for a print file. (See Section 2.6.)
- . Removing a print file's entry from the queue and, optionally, scratching the file itself. (See Section 2.7.)
- . Specifying what is to be done with a print file (its disposition) after it is printed. (See Section 2.8.)

To perform any of these operations, press PF 2 from the Operator's Console Menu. The Print Queue Screen is displayed (see Figure 2-1).

\*\*\* Print Queue Display \*\*\*  
 10:14 am Tuesday February 3, 1981

19 Entries in Print Queue

	File	Library	Volume	User	Class	Form	Copies	Lines	Disposition	Status
1	LOG00006	#ADKPRT	VOL001	ADK	A	000	1	36		Printer 3
2	LOG00000	#EGCPRT	VOL001	EGC	A	000	11	36	SAVE	
3	LOG00002	#PRT	SYSTEM		A	000	1	38		
4	CENALPHA	#LDBPRT	VOL001	LDB	A	000	1	112		Hold
5	DISP0003	#MJSVRT	SYSTEM	MJS	A	000	1	38	REQUEUE	Hold
6	DISP0004	#MJSVRT	SYSTEM	MJS	A	000	1	38		Hold
7	DISP0005	#MJSVRT	SYSTEM	MJS	A	000	1	38		Hold
8	DISP0002	#MJSVRT	SYSTEM	MJS	A	000	1	38		Hold
9	DISP0002	#MJSVRT	SYSTEM	MJS	A	000	1	38	REQUEUE	Printed
10	DISP0001	#MJSVRT	SYSTEM	MJS	B	000	1	38	SAVE	Hold

Position Cursor to Indicate File(s) and Press PF Key to Perform Action:

(5) Next    (7) Hold/Release    (10) Change    (13) Change Disposition  
 (3) Last    (8) Scratch    (12) Remove

Figure 2-1. Print Queue Screen (Typical)

## 2.2 CONTENTS OF THE PRINT QUEUE

The Print Queue contains not print files but entries that identify print files. Thus, manipulation of Print Queue entries involves no physical movement of print files themselves until a file is actually sent to a printer for printing. The Print Queue Screen displays the following information for each entry in the queue:

- ENTRY #    -- The position of the entry in the Print Queue.
- FILE        -- The name of the print file.
- LIBRARY    -- The library containing this print file.
- VOLUME     -- The volume containing the user Print Library.
- USER        -- The ID of the user who placed the print file in the queue.
- CLASS      -- The Print Class (A through Z) to which the print file is assigned. (See Section 2.3 for an explanation of Print Classes.)
- FORM        -- The Form # on which the print file is to be printed. (See Section 2.6 for a discussion of Form Codes.)
- COPIES     -- The number of copies of the print file to be printed. (See Section 2.6.)

- LINES** -- The total number of lines in the print file.
- DISPOSITION** -- The disposition of the file after it is printed. (See Section 2.8.)
- STATUS** -- The status of the print file (inactive, active, or being printed). (See Section 2.4.)

The Print Queue capacity is 1,920 entries; 1,920 is the maximum number of combined Print and Procedure Queue entries. The entries in the queue are displayed in alphabetic Print Class order. All active entries are displayed before the inactive entries. The complete queue can be examined, 10 entries at a time, with PF keys PF 2 (FIRST), PF 3 (LAST), PF 4 (PREVIOUS), and PF 5 (NEXT).

Modifications to the attributes of a Print Queue entry can be made by positioning the cursor next to the entry number and pressing the appropriate PF key. The modifications that can be performed are described in Sections 2.4 through 2.8.

### 2.3 ORDER OF PRINTING PRINT FILES

Active print files on the queue are automatically printed by the system in an order determined by:

1. Printer availability
2. Print Class
3. Their position within the Print Class.

Each print file is assigned to a Print Class either when it is created (the Print Class is specified via the SET USAGE CONSTANTS command) or when a user submits a print request. Print classes are identified with a one-letter code from A-Z. Since each printer on the system is assigned a list of print classes (in its Print Class priority list - see Section 6.2), the Print Class determines the printer on which a print file will be printed. (In addition a Print Class is associated with various header page, trailer page, and paper eject options when the file is printed, see Section 6.2.)

Each printer's Print Class priority list is set by the operator in a sequence determined by the DP manager. The alphabetical arrangement of the letter codes in the priority list is arbitrary; however, the codes normally start at A and end at Z. Thus, Print Class A has the highest priority, Print Class Z the lowest. All files in a Print Class are printed before any files in the next lower class. Thus, all files in Class A are printed before any files in Class B; all those in Class B before any in Class C; etc. (See Section 6.2 for a discussion of Printer Print Classes.)

Within a Print Class, files are printed in the order in which they were submitted. When the currently printing file is completed, the system automatically scans the Print Queue and selects the next active file in the highest priority Print Class for printing.

Inactive print files are listed in the Print Queue by their Print Class, but, since they are not printed, their class and their position within the class are irrelevant. An inactive print file's Print Class becomes important only when that file is released for printing (that is, when its status is changed from inactive to active).

Although the relative priorities of the Print Classes are not subject to change, the operator does have the ability to change both a particular print file's Print Class and its position within that class. The operator can therefore manually change the order in which files are printed, giving a file a lower or a higher priority.

#### 2.4 CHANGING A PRINT FILE'S STATUS

To change the status of a print file from active to inactive or vice versa, the Hold/Release function (PF 7) is used. Position the cursor on the line of the entry whose status is to be changed, and press PF 7. Depending on the current status of the entry, PF 7 will either hold or release it.

##### 2.4.1 Releasing an Inactive Print File for Printing (RELEASE)

If the current status of the print file is inactive (HOLD), PF 7 will change its status to active (a blank entry under status), in effect releasing the file for printing. This does not mean that the file is immediately printed; however, a released print file is placed on the queue following the last active print file in its print class. (That is, it is treated exactly as if it were a new active print file being placed on the queue.) Figure 2-2 shows how a released print file is handled in the queue.

\* \* \* \* \* Print Queue Display \* \* \* \* \*  
 11:09 am Tuesday February 3, 1981

17 Entries in Print Queue

	File	Library	Volume	User	Class	Form	Copies	Lines	Disposition	Status
1	SECU0002	#TDPRT	SYSTEM	TDP	A	000	1	36	SAVE	Printer 3
2	SECU0004	#TDPRT	SYSTEM	TDP	A	000	1	36		
3	SECU0003	#TDPRT	SYSTEM	TDP	T	200	1	36		Printer 19
4	RENUMBER	#LDBPRT	SYSTEM	LDB	A	000	1	62		Hold
5	STRALPHA	#ADKPRT	VOL001	ADK	A	000	1	65		Hold
6	RESIDENT	#ADKPRT	VOL001	ADK	A	000	1	80		Hold
7	JURORLST	#LDBPRT	VOL001	LDB	A	000	1	20		Hold
8	FSTOTALS	#ADKPRT	VOL001	ADK	A	000	1	15		Hold
9	STRAUDIT	#ADKPRT	VOL002	ADK	A	000	1	71		Not Mounted
10	ELOG0000	#PRT	SYSTEM		B	000	1	1120		Hold

Position Cursor to Indicate File(s) and Press PF Key to Perform Action:

- |          |                  |             |                         |
|----------|------------------|-------------|-------------------------|
| (5) Next | (7) Hold/Release | (10) Change | (13) Change Disposition |
| (3) Last | (8) Scratch      | (12) Remove |                         |

Figure 2-2. Print Queue Showing Released Files

NOTE

A print file located on a volume that is not mounted on the system cannot be printed. Such a file is retained in the Print Queue with status NOT MOUNTED when an attempt is made to print it (see Entry 9 in Figure 2-2).

Print files created by the system (e.g., ERROR Log File, Dumps, etc.) are assigned to the system library #PRT. These files normally have no entry for User in the Print Queue (see Entry 10 in Figure 2-2).

#### 2.4.2 Changing an Active Print File to Inactive (HOLD)

If the current status of the print file is active (a blank entry under status), pressing PF 7 will change its status to inactive (or HOLD). However, a print file currently being printed cannot be cancelled or halted with the Hold/Release function. A file is identified as printing when its status displays the printer on which it is printing (e.g., Printer 3). It is not possible to change the status of an active file while it is being printed, although a current print operation can be halted by selecting PF 5 (STOP Printing and HOLD File) from the Change Status Option (PF 6) of the Control Printer Menu. (Control Printer functions are discussed in further detail in Chapter 6.) If a print file's status is changed to inactive, it is not automatically printed; it simply remains in the Print Queue until it is manually removed or released to active status.

#### 2.5 CHANGING A PRINT FILE'S POSITION IN THE PRINT QUEUE

Although print files are normally printed in the predetermined order described in Section 2.3, it is possible to change a file's position in the Print Queue. The operator can move individual files up or down in the queue in order to meet specific printing requirements. A file's position in the queue is determined by two factors: its Print Class and its position within the Print Class. Either or both can be changed by the operator with the Change function (PF 10).

##### 2.5.1 Changing a File's Print Class

To change a file's Print Class, position the cursor next to its entry and press PF 10. Press TAB to position the cursor to the Class column, enter the new class code, and press ENTER. If the file is active, it is placed in the new class following all other active print files in that class (i.e., it becomes the last active print file in that class). Likewise if a file is inactive, it becomes the last file in the new class.

The Change function permits modification of the entry number, form type, and number of copies, in addition to Print Class. The entry number is discussed in the following subsection. Form type and number of copies are explained in Section 2.6.

##### 2.5.2 Changing a File's Position within a Print Class

The Change function also permits modification of a print file's entry number. The entry number determines a file's position relative to other print files of the same class in the Print Queue. A print file cannot be assigned an entry number that would place that file outside its Print Class in the queue. Note that moving an active print file to the first position in its class will not interfere with any other files that may already be printing. The file is not printed until a printer becomes available. In order to print a file immediately, a currently printing file must be cancelled (see Section 6.2).

## 2.6 CHANGING A FILE'S FORM NUMBER AND NUMBER OF COPIES

The Change function (PF 10) can also be used to modify both the Form Number and number of copies for a particular print file. Position the cursor to the appropriate entry and press PF 10.

### 2.6.1 Changing the Form Number

A Form number may be changed if the output of the print file is to be printed on a form different from that specified when the file was created. Press TAB to position the cursor under the Form column, type in the new form number, and press ENTER. Allowable Form Type numbers are 000 through 254.

### 2.6.2 Changing the Number of Copies

The default value for Copies is 1, but up to 32,767 copies of a file can be specified. Press TAB to position the cursor under the Copies column, enter the number, and press ENTER. The copy count is normally changed before a file is printed but may be changed during the printing of a file. All copies of a file are printed before another print file can be printed, unless the printing of a file is cancelled (see Section 6.2). It should also be noted that the quantity shown for Copies is not incrementally reduced as each copy is printed.

## 2.7 REMOVING A PRINT FILE FROM THE PRINT QUEUE

It often happens that the Print Queue becomes cluttered with many print files that were submitted by users who really did not care to have them printed. The operator has two options: remove a file from the Print Queue and scratch the file in the user's Print library, or simply remove the entry from the queue without scratching the file.

### 2.7.1 Removing and Scratching a Print File

The Scratch function (PF 8) is used to remove a print file entry from the queue and scratch the file. Position the cursor next to the desired entry and press PF 8. Then press ENTER to perform the Scratch operation.

Note that only unprotected print files (that is, those with a blank File Class) can be scratched with the Scratch function by the operator. Print files with any other File Protection Class code must be scratched by a user with appropriate access rights by means of the Scratch function in User mode. (See the VS Programmer's Introduction.)

### 2.7.2 Removing a Print File Entry from the Queue without Scratching the File

The Remove function (PF 12) is used to remove a print file from the Print Queue. The file itself is not scratched and remains in the user's Print Library where it can be submitted to the Print Queue at a future time. Position the cursor next to the desired entry, and press PF 12. Then press ENTER to perform the Remove operation.

### 2.8 CHANGING A PRINT FILE'S POST-PRINTING DISPOSITION

After a print file has been printed, the entry is normally removed from the Print Queue and scratched from the user Print library. The operator can also change the file's disposition so that the entry is removed from the queue but not scratched, or the entry is reentered onto the queue after printing.

The Change Disposition function (PF 13) is used to change a print file's post-printing disposition. The disposition of a print file is normally changed before the file is released to the printer, but it can also be specified while the file is printing. Position the cursor to the appropriate entry and press PF 13. Depending on the current disposition of the entry the options are as follows:

- SAVE -- After the file is printed, the entry is removed from the Print Queue and the file itself is saved. In order to print this file again, the user must request printing via the Command Processor. Press PF 4 to perform this action.
  
- REQUEUE -- After the file is printed, the entry is retained in the queue in an inactive status and is labelled PRINTED. Press PF 5 to perform this action.
  
- SCRATCH -- After the file is printed, the entry is removed from the queue and the file itself is scratched. This is the default condition, shown as a blank entry. Press PF 8 to perform this action.

CHAPTER 3  
MANAGING THE PROCEDURE QUEUE

3.1 INTRODUCTION

As explained in Chapter 1, the Procedure Queue is a list of all background jobs submitted for execution. Jobs in the Procedure Queue are of two types: active (procedure status RUN) and inactive (procedure status HOLD). Active jobs are automatically run by the system, one job at a time, in a predetermined order (this order can be changed by the operator). Inactive jobs are not automatically run; they remain in the queue until manually released or removed by the operator.

This chapter explains how to perform a variety of operations on Procedure Queue entries, including the following:

- . Changing a job's status from active to inactive, or from inactive to active. (See Section 3.4.)
- . Changing a job's position in the Procedure Queue. (See Section 3.5.)
- . Setting a CPU time limit for the job, and specifying what action is to be taken if that time limit is exceeded. (See Section 3.6.)
- . Specifying the type of dump to be performed upon job termination or cancellation. (See Section 3.6.)
- . Removing a job from the queue before it is run. (See Section 3.7.)
- . Determining how the job is to be handled after it is executed (retained on the Procedure Queue for re-execution or removed). (See Section 3.8.)

To perform any of these operations, press PF 3 from the Operator's Console Menu. The Procedure Queue Screen is displayed (see Figure 3-1).

This chapter deals only with the manipulation of jobs in the Procedure Queue; it does not explain how to monitor or interrupt a background job once its procedure has begun execution. That topic is covered in Chapter 5.

\*\*\* Procedure Queue Display \*\*\*  
 9:55 am Tuesday February 3, 1981

14 Procedures in Queue

User	Proc-Id	Procedure	Library	Volume	Class	Limit	Dump	Disposition	Status
1	TDP	INVEN3	TDPPROC7	TDPTORY	SYSTEM	A	C 0:00:40	P HOLD	RUNNING
2	TDP	PAYDAY	TDPPROC8	TDPTORY	SYSTEM	A	P 0:00:10	P HOLD	
3	TDP	GRADES	TDPPRDC5	TDPTORY	SYSTEM	A	P 0:00:10	P HOLD	
4	TDP	WATSON2	TDPPRLOP	TDPTORY	SYSTEM	A	W 0:00:21	N	COMPLETED
5	TDP	ACCOUNTS	TDPPROC2	TDPTORY	SYSTEM	A	P 0:00:10	P	HOLD
6	SFF	LOOP	LOOPJOB	SFKPROC	SYSTEM	C	P		HOLD
7	TDP	WATSDN3	TDPPRLOP	TDPTORY	SYSTEM	U	C 0:00:31	N HOLD	HOLD
8	TDP	INVEN4	TDPPROC4	TDPTORY	SYSTEM	W	P 0:00:30	Y HOLD	HOLD
9	TDP	INVEN5	TDPPRLOP	TDPTORY	SYSTEM	W	P 0:00:50	N	COMPLETED
10	APL	COSMO	APLCOSMO	APLPROC	VOL222	W	W 0:02:00	N	HOLD

Position Cursor to Indicate Procedure and Press PF Key to Perform Action:

	(5) Next	IMMEDIATELY:	(10) Change	AFTER EXECUTION:
(3) Last	(7) Hold/Release	(12) Remove	(13) Hold/Remove	

Figure 3-1. Procedure Queue Display (Typical)

### 3.2 CONTENTS OF THE PROCEDURE QUEUE

The Procedure Queue contains entries that identify procedure files that are to be run on a non-interactive basis as background jobs, it does not contain the procedure files themselves. Thus, manipulation of entries in the Procedure Queue causes no actual movement or modification of procedure files.

To examine the contents of the Procedure Queue, press PF 3 from the Operator's Console Menu. The resulting Procedure Queue display contains the following information for each Procedure Queue entry:

ENTRY NUMBER	-- The position of the job in the Procedure Queue.
USER	-- The ID of the user who submitted the job.
PROC--ID	-- An optional name that identifies this job. The job name is used only for purposes of identifying a particular job; it does not identify the procedure file which is to be run (the procedure file name is specified in the following field).
PROCEDURE	-- The name of the controlling procedure for this job. The controlling procedure runs and sets parameters for one or more nested procedures and/or programs, which collectively constitute this job.
LIBRARY	-- The name of the library containing the controlling procedure. (Procedures and programs run by this procedure as part of the job may be located in other libraries.)
VOLUME	-- The name of the volume on which the procedure library is located.
CLASS	-- The Job Class to which the job is assigned (identified by a letter from A to Z). (See Section 3.5 for a discussion of Job Class.)
ACTION (no heading)	-- The Action code (C, W, or P) assigned to the job to determine what action is to be taken if the job's CPU time limit is exceeded. (See Section 3.6.)
LIMIT	-- The CPU time limit specified for execution of this job (optional). (See Section 3.6.)
DUMP	-- The Dump code (Y, N, or P) assigned to the job to determine the type of dump to be produced if the job is terminated abnormally. (See Section 3.6.)
DISPOSITION	-- The disposition of the job after it is executed (return to queue for re-execution or not). (See Section 3.8.)
STATUS	-- The current status of the job (held, running, completed).

Up to 1,920 jobs may be submitted for background execution; this is the maximum number of combined Print and Procedure Queue entries. Entries in the Procedure Queue are displayed in alphabetical order by Job Class. All active jobs are displayed before any inactive jobs.

The complete queue of job entries can be examined, 10 entries at a time, with PF keys PF 2 (FIRST), PF 3 (LAST), PF 4 (PREVIOUS), and PF 5 (NEXT). Attributes of a job entry can be modified by positioning the cursor to the desired entry number and pressing the appropriate PF key. The modifications that can be made are explained in Sections 3.4 through 3.8.

### 3.3 ORDER OF EXECUTING BACKGROUND JOBS

Background jobs are, by definition, jobs that require no user interaction. Active background jobs are run automatically in sequence by the system; in the normal case, the operator is called upon to intervene only when a mount or dismount operation is requested by a job. The order in which background jobs are executed is determined by:

1. Their Job Class
2. Their position within the Job Class

Each background job is assigned to a Job Class when it is submitted for execution by the user. Job Classes, like Print Classes, are identified with a one-letter code from A-Z.

Just as Print Classes are used in a printer's Print Class priority list, Job Classes are assigned to the system Job Class priority list (see Section 5.10). The list gives the classes of the jobs that the CPU will execute in their order of priority. Job Classes for the CPU are assigned priorities through the Control Job Processing Tasks function (see Section 5.10). Typically, Job Class codes are assigned priorities in alphabetical sequence, with Job Class A having the highest priority, and Job Class Z the lowest. All active jobs in a Job Class are run before any jobs in the next lower class are run. Thus, all active jobs in Class A would be run before any jobs in Class B, all those in Class B before any in Class C; etc. (See Section 5.10 for a discussion of CPU Job Classes.)

Within a Job Class, jobs are run in the order in which they were submitted. When the currently executing job terminates, the system automatically scans the Procedure Queue and selects the next active job in the highest priority Job Class for execution.

Inactive (or HOLD) jobs are listed by Job Class, but, since such jobs are not executed, their Job Class and position are irrelevant. An inactive job's Job Class becomes significant only when that job is released for execution by the operator (i.e., when its status is changed from inactive to active; see Section 3.4).

The operator can assign a new Job Class to any job on the Procedure Queue and change its position within a Job Class. In this way, the order in which jobs are executed can be modified by the operator. See Section 3.5 for an explanation of this procedure.

### 3.4 CHANGING A JOB FILE'S STATUS

To change the status of a background job from active to inactive or vice versa, position the cursor at the job entry and press PF 7 (Hold/Release). The result of this action depends upon the current status of the job.

#### 3.4.1 Releasing an Inactive Job for Execution (RELEASE)

If the job is currently inactive (status is HOLD), PF 7 changes its status to active or RUN (a blank under Status), in effect releasing the job for execution. This does not mean that the job is immediately run, however. The job entry is considered active and is inserted in the queue following the last active job in its Job Class. (Effectively, the job is treated as if it were a new active job being submitted for execution.) It is then run in sequence according to the standard order of execution described in Section 3.3. A job is currently executing when RUNNING is shown under its Status (See Figure 3-1).

NOTE

Actual job execution is determined by the status of the Initiator. (See Sections 5.1 and 5.8.)

#### 3.4.2 Changing an Active Job to Inactive (HOLD)

If the job is currently active (status is blank), PF 7 changes its status to inactive (or HOLD), unless the job is currently in execution. The status of a currently executing job cannot be changed with PF 7 (see the following note). An inactive job is never automatically run by the system; it simply remains in the Procedure Queue until the operator manually removes it or releases it for execution.

NOTE

PF 7 cannot be used to halt or interrupt execution of a job. A running job can be interrupted or cancelled only by means of PF 9 from the Control Non-Interactive Tasks Menu. (See Sections 5.6 and 5.9.)

### 3.5 CHANGING A JOB'S POSITION IN THE PROCEDURE QUEUE

A job's position in the Procedure Queue is a function of its Job Class and its position within that Job Class. Both of these attributes can be modified by using the Change function. To invoke the the Change function, position the cursor at the desired job entry and press PF 10.

The Change function also permits changes to a job's CPU time limit, its Time Limit Action code, and its Dump code, as well as the entry number and Job Class. The Time Limit, Action code, and Dump code are discussed in Section 3.6.

#### 3.5.1 Changing the Job Class

The Change function allows the current Job Class for a job to be changed to any legal Job Class code (A-Z). Press TAB to position the cursor to the Class column, enter the new code, and press ENTER. When an active job is assigned to a new class, it is automatically placed at the bottom of the class, following all other active jobs in that class. Likewise if a job is inactive, it becomes the last job in the new class.

#### 3.5.2 Changing a Job's Position within a Job Class

Change also allows the entry number of a job to be modified. The entry number of a job determines its position in the queue relative to other jobs of the same class. Key in the new entry number and press ENTER. Note that a job cannot be assigned an entry number that would place that job outside its Job Class in the queue. If at any point while a job is awaiting execution another job is submitted in a higher Job Class, the new job is run before the current job, even though the current job is at the top of its Job Class.

### 3.6 CHANGING A JOB'S CPU TIME LIMIT, TIME LIMIT ACTION CODE, AND DUMP CODE

When a job is submitted, the user may specify a CPU time limit for the job. This time limit is a safety measure; it ensures that the job does not completely tie up the system's background job resources (if it should, for example, enter an infinite loop). The action to be taken in the event a job exceeds its prescribed time limit is determined by the job's Action code. PF 10 (Change) is used to modify the CPU time limit and Action code for a job. The Action or Time Limit Disposition code is used to signal a particular action to be performed by the system (see Subsection 3.6.2). Position the cursor to the desired job entry and press PF 10.

#### 3.6.1 Changing the CPU Time Limit

It may be necessary in some cases to extend a job's CPU time limit to allow completion of a job that otherwise would terminate prematurely. Press TAB to position the cursor under the Limit column. Enter the new time limit in the specified field and press ENTER.

### 3.6.2 Changing the Time Limit Action Code

To specify a new Time Limit Action code, press TAB to position the cursor under the blank column next to Class. Enter the new code and press ENTER. The codes are:

- C - CANCEL: Automatically cancels the job when the job's CPU Time Limit is exceeded.
- W - WARN: Issues a message on the screen informing the operator that the job has exceeded its time limit; however, the job continues execution.
- P - PAUSE: Stops job execution and issues a message on the screen informing the operator that the job has exceeded its time limit.

### 3.6.3 Changing a Job's Dump Code

The Dump code specifies what type of dump will be provided upon abnormal job termination. To change the code, first press TAB to position the cursor under the Dump column. Then enter the new code and press ENTER. The codes are:

- (Y) YES -- A complete dump is printed.
- (N) NO -- No dump is printed. (Only a 1-page indicative dump.)
- (P) PROGRAM -- A complete dump is printed only if a dump was DEFAULT specified in the procedure.

### 3.7 REMOVING A JOB FROM THE PROCEDURE QUEUE

The Remove function (PF 12) is used to remove a job entry from the Procedure Queue. Position the cursor next to the desired entry, press PF 12, and press ENTER to perform the Remove operation. Note that Remove does not scratch the job procedure file from the user's library.

### 3.8 CHANGING A JOB'S AFTER-EXECUTION DISPOSITION

After a job has been executed, the entry is normally removed from the Procedure Queue and the job procedure file is saved in the user's library. However, the operator can change the job's disposition so that the entry is not removed (or so that it is removed if the entry is presently held).

The Hold/Remove function (PF 13) is used to change the job's disposition. Position the cursor to the appropriate entry and press PF 13. The options are as follows:

HOLD -- After the job is run, its entry is retained in the Procedure Queue with status COMPLETED

REMOVE -- After the job is run, its entry is removed from the Procedure Queue. This is the default condition (shown as a blank entry).

CHAPTER 4  
CONTROL INTERACTIVE PROCESSING TASKS

4.1 INTRODUCTION

The Control Interactive Tasks Menu is selected by pressing PF 6 from the Operator's Console Menu (see Figures 4-1 and 4-2). This screen displays information about the interactive tasks of the system. As explained in Chapter 1, an interactive task is associated with every workstation on the system.

*** Control Interactive Tasks (Status and Time) ***						
8:00 am Tuesday February 3, 1981						
WS	User	Status	Program Executed/Current	Starting Date / Time	Elapsed Time	CPU Time
17		LOGGED OFF				
16		LOGGED OFF				
15		LOGGED OFF				
14		LOGGED OFF				
13		LOGGED OFF				
12		LOGGED OFF				
2		LOGGED OFF				
1		LOGGED OFF				
0		LOGGED OFF				

Position Cursor to Indicate Task and Press Pfkkey to Perform Action:

(4) Previous	(7) Paging & I/O	(11) Change Status
(2) First	(8) Program Status	(12) Cancel Program
(6) Non-Interactive Tasks		(13) Logon/Logoff Control

Figure 4-1. Control Interactive Tasks Menu (All Users Logged Off)

This chapter explains how to perform a variety of operations from the Control Interactive Tasks Menu including the following:

- . Examining the status and time statistics of the interactive tasks. (See Section 4.2.)
- . Examining the paging and I/O statistics of the interactive tasks. (See Section 4.3.)
- . Accessing the Non-Interactive Tasks Display from this menu. (See Section 4.4.)
- . Monitoring the program status of an interactive task. (See Section 4.5.)
- . Changing the status of an active interactive task. (See Section 4.6.)
- . Cancelling a user's interactive task. (See Section 4.7.)
- . Controlling user logon or logoff at a workstation. (See Section 4.8.)
- . Controlling user logon or logoff for all workstations. (See Section 4.9.)

*** Control Interactive Tasks (Status and Time) ***							
8:00 am Tuesday February 3, 1981							
WS	User	Status	Program Executed/Current	Starting Date / Time	Elapsed Time	CPU Time	
17		LOGGED OFF					
16	LXR	LOGON INHIBITED					
15	RR1		BACKUP	2/03 11:07	0:09	0:02:03	
14	KER	IDLE					
13	REK	DEBUG	REPORT4	2/03 11:00	0:16	0:00:05	
12	PJG		EDITOR COBOL	2/03 11:16	0:00	0:00:02	
2	PG	IDLE					
1	BLB	HELP PROCESSOR LP		2/03 11:13	0:03	0:00:01	
0		LOGGED OFF					

Position Cursor to Indicate Task and Press PFkey to Perform Action:

(4) Previous	(7) Paging & I/O	(11) Change Status
(2) First	(8) Program Status	(12) Cancel Program
(6) Non-Interactive Tasks		(13) Logon/Logoff Control

Figure 4-2. Control Interactive Tasks Menu (Typical)

#### 4.2 CONTENTS OF THE INTERACTIVE TASK TABLE (STATUS AND TIME)

When PF 6 is pressed from the Operator's Console Menu, the first screen displayed is the Control Interactive Tasks Menu (Status and Time). For each workstation task the following information is presented:

WS	--	The workstation number assigned to this task.
USER	--	The ID of the user <u>logged on</u> at this workstation.
STATUS	--	The status of user activity at this workstation. Status can be LOGGED OFF, LOGGED ON, OPERATOR, IDLE, DEBUG, etc.
PROGRAM EXECUTED/CURRENT	--	The name of the program or procedure run by the user.
STARTING DATE/TIME	--	The date and time of day that the program or procedure was run by the user at that workstation.
ELAPSED TIME	--	The time that has elapsed since the user ran the program or procedure.
CPU TIME	--	The CPU time used in executing a program or procedure.

The functions shown at the bottom of the screen may be used to examine and control certain task operations. PF 6 (NON-INTERACTIVE TASKS) and PF 7 (PAGING & I/O) are discussed in Sections 4.3 and 4.4 respectively. PF 8 (PROGRAM STATUS) and PF 12 (CANCEL PROGRAM) apply to an interactive task where a user has run a program (see Sections 4.5 and 4.7). PF 11 (CHANGE STATUS) can be applied to an interactive task where a user has logged on. PF 13 (LOGON/LOGOFF CONTROL) can be applied at any time. Lastly, if the system has more than nine interactive tasks, the remaining tasks are displayed on subsequent screens. The contents of each screen can be examined, nine tasks at a time, with PF keys: PF 2 (FIRST), PF 3 (LAST), PF 4 (PREVIOUS), and PF 5 (NEXT).

#### 4.3 CONTENTS OF THE INTERACTIVE TASK TABLE (PAGING AND I/O STATISTICS)

When PF 7 - PAGING & I/O is selected from the Control Interactive Tasks Menu described in Section 4.2, the Paging and I/O statistics for each workstation are displayed. The following information is displayed for each workstation:

WS I/O	--	The number of workstation I/O operations
DISK I/O	--	The number of disk I/O operations
TAPE I/O	--	The number of tape I/O operations

PRINT I/O -- The number of print I/O operations  
 OTHER I/O -- The number of other I/O operations (including TC)  
 PAGE-INS -- Total page-ins used by the system  
 SYSTEM  
 PAGE-INS -- Total page-ins used by the program  
 PROGRAM  
 PAGE-OUTS -- Total page-outs used by the system  
 SYSTEM  
 PAGE-OUTS -- Total page-outs used by the program  
 PROGRAM

This information can be useful for assessing the total resource requirements of a program and how efficiently it uses memory.

The functions at the bottom of the screen are the same as those described in Section 4.2, except that PF 7 (STATUS/TIME), can be used to return to the Control Interactive Tasks Menu (Status and Time).

#### 4.4 EXAMINING BACKGROUND TASKS FROM THE INTERACTIVE TASK MENU

To examine the background tasks of the system, press PF 6 (NON-INTERACTIVE TASKS). This operation conveniently displays the Control Non-Interactive Tasks Menu without returning to the main Operator's Console Menu. (The Control Non-Interactive Tasks Menu is discussed in Chapter 5.)

#### 4.5 MONITORING THE PROGRAM STATUS OF AN INTERACTIVE TASK

The program status information associated with a program being run at a particular workstation can be displayed by positioning the cursor next to the particular task number and pressing PF 8 (PROGRAM STATUS). The display shows the names and locations (library and volume) of programs currently running, the number of open files for each program, and the following for each open file:

- . Volume location by device unit number and model description (disk, tape, etc.)
- . Open mode (INPUT, OUTPUT, I/O, EXTEND, SHARED)
- . XIO Count--the number of I/O block transfers
- . File, library, and volume name
- . Number of file extents

#### 4.6 CHANGING THE STATUS OF AN INTERACTIVE TASK

The status of an interactive task, where a user is logged on, may be changed as required by the operator. To activate this operation, move the cursor to a particular task and press PF 11 (CHANGE STATUS). The Change Status Menu is displayed. Depending on the present status of the task, the options are:

- . Cause the task to enter the HELP Processor
- . Enable Operator Privileges
- . Disable Operator Privileges

##### 4.6.1 Causing a Workstation to Enter HELP Processing

This operation forces a workstation into the HELP processor, thereby providing the user (at that workstation) access to the ENTER DEBUG PROCESSING function (PF 10). To activate this operation, press PF 2 from the Change Status Menu.

##### 4.6.2 Assigning Dual Mode Privileges to a User (Enable Operator Privileges)

This operation assigns dual mode privileges to a workstation, thus allowing complete access to both the Command Processor Menu and the Operator's Console Menu at that workstation. From the Change Status Menu, press PF 5 to assign operator privileges to the workstation. The Command Processor Screen at the user's workstation will show PF 11 as ENTER OPERATOR MODE. Note that operator privileges can be assigned to a workstation only where there is a user logged on at that workstation. Once assigned, operator privileges remain with the workstation until they are removed (as indicated in the following subsection), or when the system is IPLed.

#### NOTE

The assignment of operator privileges via CHANGE STATUS does not alter the dual mode consoles on the Operator's Console list (see Section 7.4). Also, operator privileges assigned by this method will not be retained when a subsequent IPL is performed.

##### 4.6.3 Removing Dual Mode Privileges from a User (Disable Operator Privileges)

This operation removes operator privileges from a workstation previously assigned by means of the Change Status function. From the Change Status Menu, press PF 5 to remove operator privileges from a workstation; PF 11 - ENTER OPERATOR MODE will be removed from the Command Processor Screen at the user's workstation.

NOTE

Operator privileges can never be removed from Workstation #0.

#### 4.7 CANCELLING AN INTERACTIVE PROGRAM

The Cancel Program function (PF 12) can be used to cancel a program run at a workstation. Position the cursor next to the task number associated with the desired workstation and press PF 12. This action produces the Cancel Program submenu. Press ENTER to begin the cancel processing. The program running at the specified workstation is terminated and the workstation screen reverts to the Command Processor display.

Note that PF 1 can be pressed to return to the Control Interactive Tasks Menu without cancelling the program.

#### 4.8 CONTROLLING USER LOGON OR LOGOFF AT A WORKSTATION

To control user Logon/Logoff at a particular workstation, position the cursor next to the task number associated with that workstation and press PF 13. The Control Logon/Logoff Menu is displayed. Depending upon whether a user is logged off or logged on, at the specified workstation, the options available are as follows:

- . Allow subsequent Logons at this workstation
- . Reject subsequent Logons at this workstation
- . Force User Logoff at program (or procedure) completion
- . Force User logoff immediately

##### 4.8.1 Allow Subsequent Logons at this Workstation

The operator can allow subsequent logons at a workstation with a present status of LOGON INHIBITED. Press PF 5 and ENTER to initiate this action. The status of the task on the Control Interactive Tasks Menu immediately becomes LOGGED OFF, and the workstation displays the Logon Menu.

##### 4.8.2 Reject Subsequent Logons at this Workstation

Subsequent logons at a workstation can be inhibited by the operator when, for instance, the system requires maintenance. Press PF 2 and ENTER to initiate this action. This function can be applied to a workstation that is either active or logged off. For an active workstation, the LOGON INHIBITED action takes place after the user has completed current activities and has

logged off. For a workstation with a LOGGED OFF status, the action takes place immediately. In both cases, the status of the task on the Control Interactive Tasks Menu becomes LOGON INHIBITED, and the workstation screen displays this message:

SORRY  
Logon from this Workstation  
has been Temporarily Inhibited  
by the System Operator

#### 4.8.3 Force User Logoff at Program (or Procedure) Completion

While a user is active at the workstation the operator can force the user to automatically logoff when the program (or procedure) currently running is completed. Press PF 3 and ENTER to initiate this action. At the completion of the program (or procedure), the user is automatically logged off and the workstation screen reverts to the Logon message. Unlike the operation in Subsection 4.8.2, subsequent logons are allowed from this workstation.

#### 4.8.4 Force User Logoff Immediately

To force the user to logoff immediately, press PF 4, a warning screen is displayed giving the operator the option of keying ENTER to complete the user Logoff request, or PF 1 to return the display to the Control Interactive Tasks Menu without performing the user Logoff operation. With the completion of the Logoff request, the program (or procedure) at the user's workstation is cancelled, the user is automatically logged off, and the user's workstation screen reverts to the Logon message. (Although subsequent logons are allowed from the workstation, this action should signal the user that the operator is anticipating a possible system shutdown.)

### 4.9 CONTROLLING LOGON OR LOGOFF FOR ALL WORKSTATIONS

To control Logon or Logoff for all workstations on the system, position the cursor next to any task number and press PF 13. The options available are:

- . Allow subsequent logons
- . Reject subsequent logons
- . Force user logoff at program (or procedure) completion
- . Force user logoff immediately

#### 4.9.1 Allow Subsequent Logons

When all workstations have been forced to logoff and remain logged off by the operations described in the following sections, the operator can allow subsequent logons at these workstations by pressing PF 5 and ENTER. Immediately, the status of all workstations on the Control Interactive Tasks Menu becomes LOGGED OFF and all workstations display the Logon message. This procedure may be used to reactivate all workstations after system maintenance has been performed.

#### 4.9.2 Reject Subsequent Logons

This operation can be used after all workstations have been forced to logoff for a system IPL. This action ensures that all workstations remain inactive after the IPL process. Press PF 6 and ENTER. The status of all workstations on the Control Interactive Tasks Menu become LOGON INHIBITED, and all workstations display this message:

SORRY  
Logon from this Workstation  
has been Temporarily Inhibited  
by the System Operator.

#### 4.9.3 Force User Logoff at Program (or Procedure) Completion

To force all users to logoff at the completion of a currently executing program or procedure, press PF 7 and ENTER. As each user completes his current activities, the workstation screen reverts to the Logon Menu. This action can be used before an anticipated IPL, system maintenance, or as the first step in an orderly system shutdown procedure at the end of the day.

#### 4.9.4 Force User Logoff Immediately

To force all users to logoff immediately, press PF 8, a warning screen is displayed giving the operator the option of keying ENTER to complete the All-user Logoff request, or PF 1 to return the display to the Control Interactive Tasks Menu without performing the All-user Logoff operation. If the All-user Logoff request is completed, programs at each workstation are immediately terminated and each screen reverts to the Logon Menu. This operation should be used only under extraordinary circumstances preceding a system shutdown.

CHAPTER 5  
CONTROL NON-INTERACTIVE TASKS

5.1 INTRODUCTION

The Control Non-Interactive Tasks Menu is selected by pressing PF 7 from the Operator's Console Menu (see Figure 5-1). The Control Non-Interactive Tasks Menu Screen displays information about the background tasks of the system. The background tasks are the Initiator and the dedicated system tasks.

5.1.1 The Initiator

Unless a word processing task is scheduled, the first background task is an Initiator task. Word processing tasks are always listed first with the Initiator tasks immediately following. The Initiator, as its name implies, initiates the execution of an active background job. The Initiator can be pictured as a switch that tells the system when to execute a background job from the Procedure Queue. If the Initiator is ON (or ACTIVE), a background job can be run. If the Initiator is OFF (or INACTIVE), no background jobs can be run.

When the Initiator is ACTIVE and there are no active jobs in the Procedure Queue, the status of the Initiator is shown as AVAILABLE (See Figure 5-1). An active job is immediately executed by the CPU when the Initiator is AVAILABLE. While a job is running, the job name and its attributes appear in the task slot occupied by the Initiator (see Figure 5-2). Note that the Time Limit Action code (C,P,W (blank)) is displayed to the right of the CPU Time.

The control of the Initiator is discussed in Section 5.8.

*** Control Non-Interactive Tasks (Status and Time) ***							
9:53 am Tuesday February 3, 1981							
Procedure Identifier	Status	User	Procedure	Elapsed Time	CPU Time	CPU Limit	Starting Date / Time
AVAILABLE							
[SHARER]			@SHARER@	1:03	0:00:00	2/03	8:49
[SYSTSK]			@SYSTSK@	1:03	0:00:06	2/03	8:49
[PRTTSK]			@PRTTSK@	1:03	0:00:05	2/03	8:49
<u>Position Cursor to Indicate Task and Press PF Key to Perform Action:</u>							
(7) Paging & I/O (11) Control Proc Initiation							
(8) Program Status (12) Cancel Proc							
(6) Interactive Tasks (9) Pause/Continue (13) Control Proc Scheduling							

Figure 5-1. Control Non-Interactive Tasks Menu

### 5.1.2 Dedicated System Tasks

The dedicated system tasks normally displayed are the tasks associated with sharing files, system control operations, and printing functions. These tasks are shown as @SHARER@, @SYSTSK@, and @PRTTSK@ in Figure 5-1. While each task is running, the system provides information to the operator, including the date and time the task was activated, the elapsed running time, and the CPU time (if any) used by the task. Note: This information is not of normal concern to the user or operator.

```
*** Control Non-Interactive Tasks Menu (Status and Time) ***
          9:55 AM Tuesday February 3, 1981
```

Procedure Identifier	Status	User	Procedure	Elapsed Time	CPU Time	CPU Limit	Starting Date / Time
INVEN3		TDP	TDPPROC7	0:00	0:00:02	C 0:00:4	2/03 9:55
[SHARER]			@SHARER@	1:03	0:00:00		2/03 8:49
[SYSTSK]			@SYSTSK@	1:03	0:00:06		2/03 8:49
[PRTTSK]			@PRTTSK@	1:03	0:00:05		2/03 8:49

Position Cursor to Indicate Task and Press PF Key to Perform Action:

(7) Paging & I/O	(11) Control Proc Initiation	
(8) Program Status	(12) Cancel Proc	
(6) Interactive Tasks	(9) Pause/Continue	(13) Control Proc Scheduling

Figure 5-2. Control Non-Interactive Tasks Menu (with Job Running)

This chapter explains how to perform a variety of operations from the Control Non-Interactive Tasks Menu:

- . Examining the status and time statistics of the background tasks. (See Section 5.2.)
- . Examining the paging and I/O statistics of the background tasks. (See Section 5.3.)
- . Examining the Control Interactive Tasks Display from this menu. (See Section 5.4.)
- . Examining the program status of a background task. (See Section 5.5.)
- . Interrupting job execution. (See Section 5.6.)

- . Resuming job execution that has been interrupted. (See Section 5.7.)
- . Cancelling job execution. (See Section 5.9.)
- . Controlling the status of the Initiator. (See Section 5.8.)
- . Assigning the job classes for job execution. (See Section 5.10.)
- . Selecting the dump options for a Job Class. (See Section 5.10.)

## 5.2 BACKGROUND TASK INFORMATION (STATUS AND TIME)

When PF 5 is selected from the Operator's Console Menu, the first screen displayed is the Job Task Control Display (Status and Time). For each background task the following information is presented:

PROCEDURE IDENTIFIER	-- The name that identifies an active background job (optional).
STATUS	-- The status of the Initiator task (AVAILABLE or INACTIVE) and the status of a job that is executing.
USER	-- The ID of the user whose job is currently running.
PROCEDURE	-- The controlling procedure file for the background job currently running.
ELAPSED TIME	-- The time that has elapsed (hours and minutes) since the background job or dedicated system task was activated by the system.
CPU TIME	-- The CPU time used by the background job or dedicated system task.
CPU LIMIT	-- For a background job, the CPU time limit for job execution (optional). Normally specified when the job is submitted to the Procedure Queue.
STARTING DATE/TIME	-- The date and time that the background job or dedicated system task was activated by the system.

Any of the functions shown at the bottom of the screen may be used to examine and control certain task operations. PF 7 (PAGING & I/O) and PF 6 (INTERACTIVE TASKS) are discussed in Sections 5.3 and 5.4 respectively. PF 13 (CONTROL PROC SCHEDULING) is used to assign CPU job classes and dump options for job execution (see Section 5.10). PF 8 (PROGRAM STATUS) applies to both the background job currently running and the dedicated system tasks (see Section 5.5). PF 9 (PAUSE/CONTINUE) (see Sections 5.6 and 5.7), and PF 12 (CANCEL PROC) (see Section 5.9) can only be selected for the background job. PF 11 (CONTROL PROC INITIATION) controls the status of the Initiator and is discussed in Section 5.8.

### 5.3 BACKGROUND TASK INFORMATION (PAGING and I/O STATISTICS)

When PF 7 (PAGING and I/O) is selected from the Control Non-Interactive Tasks Menu (described in Section 5.2), the Paging and I/O statistics for each task are displayed. The following information is displayed for the background job currently executing and for each dedicated system task:

DISK I/O	--	The number of disk I/O operations
TAPE I/O	--	The number of tape I/O operations
PRINT I/O	--	The number of print I/O operations
OTHER I/O	--	The number of other I/O operations (including TC)
PAGE-INS SYSTEM	--	Total page-ins used by the system
PAGE-INS PROGRAM	--	Total page-ins used by the program
PAGE-OUTS SYSTEM	--	Total page-outs used by the system
PAGE-OUTS PROGRAM	--	Total page-outs used by the program

This information can be useful for assessing the total resource requirements of a program and for determining how efficiently it uses memory.

The functions at the bottom of the screen are the same as those described in Section 5.2, except that PF 7 (STATUS/TIME) can be used to return to the Control Non-Interactive Tasks (Status and Time) Screen.

### 5.4 EXAMINING INTERACTIVE TASKS FROM THE BACKGROUND TASK MENU

To examine the interactive tasks of the system press PF 6 (INTERACTIVE TASKS). This operation conveniently displays the Control Interactive Tasks Menu, it is not necessary to return to the main Operator's Console Menu. (The Control Interactive Tasks Menu is discussed in Chapter 4.)

## 5.5 MONITORING THE PROGRAM STATUS OF A BACKGROUND TASK

The program status information associated with a particular active job or dedicated background task can be displayed by positioning the cursor next to the particular task number and pressing PF 8. The display shows the names and locations (library and volume) of programs currently running, the number of data files opened by each program, and the following for each open file:

- . Volume location by device unit number and model description (disk, tape, etc.)
- . Open mode (INPUT, OUTPUT, I/O, EXTEND, SHARED)
- . XIO count--the number of I/O block transfers
- . File, library, and volume name
- . Number of file extents

## 5.6 SUSPENDING JOB EXECUTION VIA THE PAUSE FUNCTION

To suspend execution of a background job while the job is running, position the cursor next to the Initiator Procedure Identifier and press PF 9 (PAUSE/CONTINUE). The job is immediately suspended and PAUSE appears under the Status entry (see Figure 5-3). While the job is in a Pause condition no other jobs can be run from the Procedure Queue using that Initiator. Once a job is suspended, execution can be subsequently resumed (see Section 5.7) or cancelled (see Section 5.9).

```
*** Control Non-Interactive Tasks (Status and Time) ***
          9:55 am Tuesday February 3, 1981
```

Procedure Identifier	Status	User	Procedure	Elapsed Time	CPU Time	CPU Limit	Starting Date / Time
INVEN3	PAUSE	TDP	TDPPROC7	0:00	0:00:20	C 0:00:40	2/03 9:55
[SHARER]			@SHARER@	1:03	0:00:00		2/03 8:49
[SYSTSK]			@SYSTSK@	1:03	0:00:06		2/03 8:49
[PRTTSK]			@PRTTSK@	1:03	0:00:05		2/03 8:49

Position Cursor to Indicate Task and Press PF Key to Perform Action:

(7) Paging & I/O	(11) Control Proc Initiation	
(8) Program Status	(12) Cancel Proc	
(6) Interactive Tasks	(9) Pause/Continue	(13) Control Proc Scheduling

Figure 5-3. Control Non-Interactive Tasks Menu (Pause Condition)

## 5.7 RESUMING JOB EXECUTION VIA THE CONTINUE FUNCTION

To resume job execution that was suspended by means of the PAUSE function, position the cursor next to the Initiator task number and press PF 9 (PAUSE/CONTINUE). In addition, when a job is suspended because its CPU time has been exceeded, CONTINUE can be used to invoke options that allow the operator to conclude job execution. When CPU time is exceeded, the following screen message is displayed:

ⓂCPU TIME LIMIT EXCEEDED BY JOB XXXXXXXXX SUBMITTED BY USER YYY

To invoke the Continue Proc submenu associated with this message position the cursor next to the Procedure Identifier of the Initiator and press PF 9. The following options are presented in the submenu:

PF 1 -- RETURN to the Control Non-Interactive Tasks Menu leaving the job paused

Press PF 1 to return to the Control Non-Interactive Tasks Menu.

PF 5 -- CONTINUE Running with NO TIME LIMIT

Press PF 5 to run the job to completion.

PF 9 -- CONTINUE Running and:

ADDITIONAL CPU TIME = **##:##:##** (HH:MM:SS)

If CPU Limit exceeded again,  
ACTION= P (C-Cancel/W-Warn/P-Pause)

Assign the amount of additional CPU Time estimated to complete the job in the designated fields. Specify a new Time Limit Action code, if desired. After the entries are made, press PF 9 to continue running the job.

PF 12 -- CANCEL PROC Immediately

To initiate job cancellation, press PF 12. This action displays the Cancel Proc submenu (see Section 5.9).

### NOTE

The submenu associated with the message CPU TIME LIMIT EXCEEDED, etc., can also be displayed by positioning the cursor at the tab stop of the message and pressing ENTER.

## 5.8 CONTROLLING THE INITIATION OF JOB EXECUTION

To control the status of the Initiator press PF 11 (CONTROL PROC INITIATION). Depending on the current status of the Initiator, the options are:

- . Finish running the currently executing background job and make Initiator not available for subsequent job execution
- . Make the Initiator not available (no job currently running)
- . Make the Initiator available

### 5.8.1 Finish Running the Job and Make Initiator Not Available

While a background job is running, the Initiator can be made not available for future use if PF 5 is pressed. This action will allow the current job to run to completion before the Initiator assumes a status of INACTIVE. (All other active jobs will remain in the Procedure Queue.)

### 5.8.2 Make the Initiator Not Available

When the Initiator is AVAILABLE but no job is currently running, press PF 5 to make the Initiator not available for future use. The Initiator assumes a status of INACTIVE, and no active jobs from the Procedure Queue are allowed to execute. (All active jobs remain in the Procedure Queue.)

### 5.8.3 Make the Initiator Available

When the Initiator is INACTIVE, press PF 5 to make the Initiator available for future use. This action will immediately execute the first active job from the Procedure Queue. If there are no active jobs in the Procedure Queue, the Initiator simply assumes the status of AVAILABLE.

## 5.9 CANCELLING A BACKGROUND JOB

To cancel the job that is currently executing or is in Pause status, use the Cancel Proc function (PF 12). Position the cursor next to the Initiator task number and press PF 12. This action produces the Cancel Proc submenu. An option to provide a memory dump can be specified from this menu. (This dump overrides the Dump selection made by the user in SUBMIT Procedure (PF 12) from the Command Processor.) After the Dump option is selected press ENTER to begin the cancel processing. Note that a PF 1 option can be used to return to the Control Non-Interactive Tasks Menu without cancelling the job.

### NOTE

Whether or not the Dump option is exercised, a 1-page indicative dump is automatically created when the job is cancelled. This 1-page dump displays debug information similar to that on the Debug Processor Screen. (See VS Program Development Tools.)

## 5.10 CONTROLLING THE SCHEDULING OF BACKGROUND JOBS

The scheduling of background job execution on the CPU can be controlled by the operator. Job scheduling involves the creation of a Job Class priority list for the CPU. In addition, a Dump option must be specified for each Job Class. To display the Control Proc Scheduling Screen, press PF 13 from the Control Non-Interactive Tasks Menu.

### 5.10.1 Assigning the Job Classes for Job Execution

The Job Class priority list gives the classes of jobs that the CPU will execute (see Figure 5-4). The letters A through Z are valid Job Class codes and can be assigned in any order in the priority list. A given Class code however, cannot appear more than once in the priority list. Any active job with a Class code that appears in the priority list will be executed by the CPU. Priority refers to the order in which jobs are executed when more than one active job is awaiting execution from the Procedure Queue. As an example, suppose Job 1 with Class code B and Job 2 with Class code Q are both active jobs in the Procedure Queue. When the currently running job is completed, Job 2 is run before Job 1 because its class is higher on the priority list.

#### NOTE

An active job with a Class code that is not on the priority list can not be executed. Such a job will normally remain in the Procedure Queue until its code is added to the priority list or until its Class code is changed to one that is already in the priority list. The procedure for changing a job's Class code is discussed in Section 3.5.

```

*** Control Job Scheduling ***
2:46 pm Tuesday February 3, 1981

TASK 25

Highest ---- PRIORITY ----> Lowest

JOB CLASS . . . . . AQUCIKBWO*****
DUMP OPTION . . . . . PYNPPPPPP*****

DUMP OPTIONS:      'Y' - Force a DUMP on Program Abnormal Termination
                   'N' - Force NO DUMP on Program Abnormal Termination
                   'P' - Dump Option is to be under Program Control

NOTE: Dump Option will be used only if "P" used when Job is Submitted

Press (ENTER) to Make Modifications or Press (PF 1) to Return to Display
```

Figure 5-4. Job Class Priority List (Typical)

### 5.10.2 Selecting the Dump Options for a Job Class

A Dump Option code must be specified for each Job Class code in the priority list. The allowable Dump Option codes are:

Y -- Force a DUMP on program abnormal termination

N -- Produce NO DUMP on program abnormal termination

P -- Dump Option to be under program control. This option will be used only if PAUSE was selected when the job was submitted (via SUBMIT PROCEDURE).

Press ENTER after all modifications have been made to the Job Class priority list.

CHAPTER 6  
MANAGING DEVICES

6.1 INTRODUCTION

PF keys 9 through 13 form the Manage Devices section of the Operator's Console Menu (see Figure 6-1).

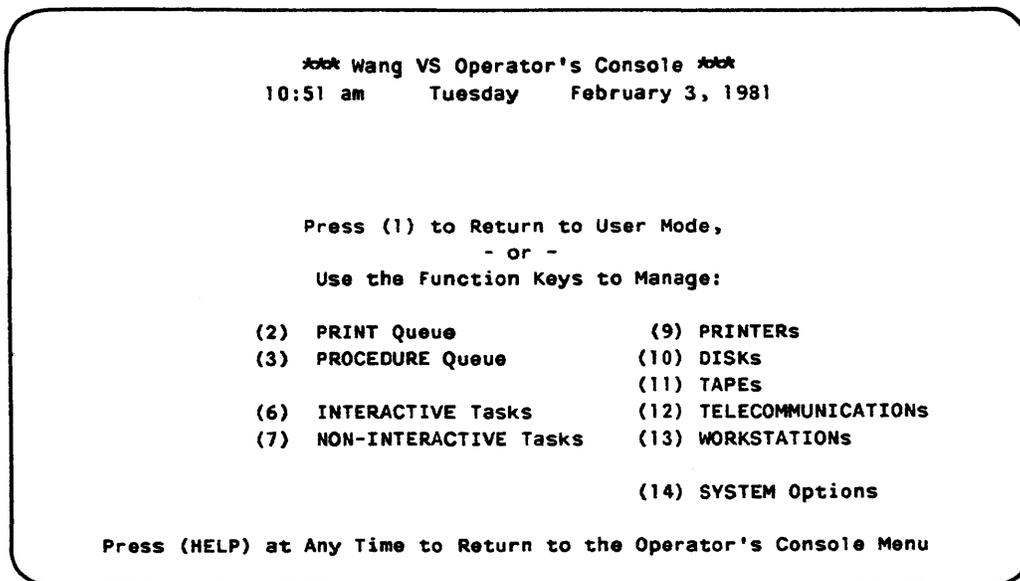


Figure 6-1. Operator's Console Menu

The Manage Devices PF keys allow the operator to control all devices. By positioning the cursor next to the appropriate device on the Display Devices Screen and pressing a PF key, the operator can mount and dismount disks and tapes, attach and detach disks, tapes, printers, and telecommunication devices; and control logons and logoffs for all workstations. Information about each device type can be displayed by pressing the appropriate PF key (9 through 13).

Most device management functions can be executed from both the user's Command Processor Menu and the Operator's Console Menu. However, the Attach and Detach commands and the telecommunications functions (Activate, Deactivate and Change) appear only on the Operator's Console Menu.

## 6.2 CONTROLLING PRINTERS

The Control Printers Display (Figure 6-2) is selected by pressing PF 9 (PRINTERS) from the Operator's Console Menu. This screen displays information on each printer under the control of the Operator's Console. Each printer is identified by its unit number, device number, a form type number, and its present status (active or inactive). An active printer is available to print a file from the Print Queue. An inactive printer is not available to print a file from the Print Queue.

*** Control Printers ***				
10:14 AM Tuesday February 3, 1981				
<u>Unit</u>	<u>Device</u>	<u>Form</u>	<u>Type</u>	<u>Status</u>
3	5572	000		Printing LOG00006 in #ADKPRT on VOL001
19	5571	200		Waiting For Print File
44	5574	100		Waiting For Print File
46	5573	000		Idle

Position Cursor to Indicate Device and Select:

(6) Change Status	(8) Attach
(7) Change Scheduling	(9) Detach

Figure 6-2. Control Printers Menu (Typical)

This section explains how to perform a variety of operations from the Printer Control Display including the following:

- . Setting the status of a printer. (See Subsection 6.2.1.)
- . Changing the Form number for a printer. (See Subsection 6.2.2.)
- . Interrupting and controlling a currently printing file. (See Subsection 6.2.3.)
- . Assigning the Print Classes to a printer. (See Subsection 6.2.4.)
- . Selecting the header page, trailer page, and forced eject options for a Print Class. (See Subsection 6.2.5.)

### 6.2.1 Changing the Status of a Printer

The status of a printer can only be changed when the printer is not printing. A printer is printing when its Status is "PRINTING file name IN library name ON volume."

A printer is not printing when its STATUS is one of the following:

- . WAITING FOR PRINT FILE
- . IDLE
- . RELEASED
- . RELEASED (TASK #, USER yyy)

To change the status of a printer, position the cursor next to the unit number of the printer and press PF 6. Depending on the current status of the printer, the options are:

- . IDLE Printer
- . RELEASE Printer
- . ACQUIRE

In addition, the current Form number of the printer can be changed from this menu (See Section 6.2.2).

#### IDLE a Printer

When a printer is set to IDLE it becomes unavailable for printing even though it is physically ON and SELECTED. It is an inactive printer.

A print file released to an IDLE printer will remain in the Print Queue as active until the printer status is no longer IDLE.

To set a printer to IDLE, press PF 7 (IDLE Printer).

#### RELEASE a Printer

When a printer is set to RELEASE, it is no longer under the control of the Operator's Console. It is an inactive printer and will not print any print files from the Print Queue. (A RELEASED printer may accept printing requests from a workstation in the Online print mode). A print file released to a RELEASED printer will remain in the Print Queue as active until the printer status is no longer RELEASED.

To set a printer to RELEASE, press PF 9 (RELEASE Printer).

#### ACQUIRE a Printer

An inactive printer (IDLE or RELEASE) can be made active through the ACQUIRE function. Press PF 10 to ACQUIRE the printer. The status of the printer becomes WAITING FOR PRINT FILE.

### 6.2.2 Changing the Form Number for a Printer

The Form number represents the form type to be used with the printer. The Form numbers are assigned by installation policy to identify the different types of forms that can be used with the printer. Forms can be defined by using the FORMCNTL utility documented in the VS Utilities Reference. Form numbers 000 thru 254 are allowed. To initiate a change in the Form number, first position the cursor next to the unit number of the printer and press PF 6 (CHANGE STATUS) from the Control Printers Menu. Enter the new Form number in the designated field and press PF 11.

### 6.2.3 Interrupting and Controlling a Currently Printing File

When a print file is printing, the PF 5 function in the Control Printers Menu is shown as "STOP Printing and HOLD File." This function is used to interrupt printing of a print file at a particular printer. To initiate this action, position the cursor to the unit number of the printer and press PF 6. Printing operations at the printer are immediately suspended, and the Control Printer submenu with the following information is presented on the screen:

- . The name of the current print file, library, and volume location
- . The number of lines contained in the print file
- . The number of lines already printed (the point of interruption)
- . Total number of copies requested (and the number printed so far)

In addition, the operator is asked to select one of the following options for concluding print operations:

- PF 1 -- RETURN TO PRINTER DISPLAY AND CONTINUE PRINTING.  
Press PF 1 to resume printing of the print file at the point of interruption.
- PF 2 -- BACK UP (#### PAGES OR #### LINES).  
Assign numbers in the appropriate field for Pages or Lines. These numbers represent the number of pages (or lines) that the page (or line) pointer will backup in the print file before printing can resume. Press PF 2 to resume printing, starting from the new location in the print file. If no entries are made in the Page or Line fields, pressing PF 2 causes the print file to be printed to completion from the point of interruption.
- PF 3 -- SKIP (#### PAGES OR #### LINES).  
Assign numbers in the appropriate field for Pages or Lines. These numbers represent the number of pages (or lines) that the page (or line) pointer will skip in the print file before printing can resume. Press PF 3 to resume printing, starting from the new location in the print file. If no entries are made in the Page or Line fields, pressing PF 3 causes the print file to be printed to completion from the point of interruption.
- PF 4 -- START PRINTING AT PAGE #### OR LINE ####.  
Assign the number of the page (or line) that the printer must position to in the print file. Press PF 4 to resume printing starting from the new location. If no page (or line) entry is made, pressing PF 4 causes the print file to be printed to completion from the point of interruption.
- PF 5 -- STOP PRINTING AND HOLD FILE.  
Press PF 5 to make the printer available for another print file. The present print file entry is held in the Print Queue, and the print file is saved in the user's print library.

- PF 6 -- STOP PRINTING AND SCRATCH FILE.  
Press PF 6 to make the printer available for another print file. The present print file entry is removed from the Print Queue and the print file is scratched.
- PF 7 -- FINISH PRINTING AND IDLE PRINTER.  
Press PF 7 to resume printing from the point of interruption. After the file is printed, the printer is set to an Idle status.
- PF 8 -- SCRATCH FILE AFTER PRINTING.  
Press PF 8 to resume printing from the point of interruption. After the file is printed, its entry is removed from the Print Queue and scratched from the user's library.
- PF 9 -- FINISH PRINTING AND RELEASE PRINTER.  
Press PF 9 to resume printing from the point of interruption. After the file is printed, the printer is set to a Release status.
- PF 10 -- RELOAD FORMS CONTROL FOR FORM # XXX (only for printers supporting the Forms Control Option).  
Assign a valid Form number from the Forms Control Definition file for this printer. Press PF 10 to load the specified Forms Control Definition.
- PF 11 -- CHANGE NUMBER OF COPIES FROM 1 TO **XXXX**.  
Enter a number (up to 32767) in the Copies field and press PF 11. This action allows the operator to change the number of copies to be printed without returning to the Print Queue.

#### 6.2.4 Assigning the Print Classes to a Printer

The scheduling of printing on a printer can be controlled by the operator. Print scheduling involves the creation of a Print Class priority list for each printer on the system. The list gives the classes of print files that a printer will print in an assigned order of priority. In addition, Header Page, Trailer Page, and Forced Eject options are assigned for each class on the list (see Subsection 6.2.5). To display the Print Class priority list for a printer, move the cursor next to the unit number of the printer and press PF 7.

A typical Print Class priority list is shown in Figure 6-3. The letters A - Z are valid Print Class codes and can be assigned in any order in the priority list. A given Class code, however, cannot appear more than once in the priority list. Any active print file with a Class code that appears in the priority list will be printed by the printer. Priority refers to the order in which print files are printed when more than one active file is awaiting printing from the Print Queue. As an example, assume File 1 with Print Class E and File 2 with Print Class T are both active files in the Print Queue. When the currently printing file is completed, File 2 is printed before File 1 because its class is higher on the priority list.

\*\*\* Control Scheduling for Print Files \*\*\*  
10:08 am Tuesday February 3, 1981

Printer 3

Highest ---- PRIORITY ----> Lowest

PRINT CLASS . . . . . THEQUIKCBROWDNAY\*  
HEADER PAGE . . . . . YNNHHNNNNNCNNNN\*  
FORCED EJECT . . . . . YYYYYYYYYYYYYYYN\*

- HEADER PAGE Options: 'Y' - Full Descriptive Header and Trailer Pages  
'H' - Full Header Page, No Trailer Page  
'C' - Condensed Header Page  
'N' - No Header/Trailer Pages
- FORCED EJECT Options: 'Y' - A New Page is Forced at the Beginning of Each Print File  
'N' - File is Printed Exactly as Specified by Program (Should be used with HEADER PAGE Option 'N')

Press (ENTER) to make Modifications or Press (1) to Return to Display

Figure 6-3. Print Class Priority List (Typical)

NOTE

Any active print file with a Class code that is not on a printer's priority list can not be printed on that printer. Such a file will normally remain in the Print Queue until its code is added to the printer's priority list, or the file is assigned a Class code that is already in the priority list. (Of course, if another printer is available with the required Print Class, the print file is printed on that printer.)

### 6.2.5 Selecting the Header Page and Forced Eject Options for a Print Class

For each Print Class entry on a printer's Print Class priority list, a Header Page and Forced Eject code must be specified. To display the Print Class priority list for a printer, move the cursor next to the unit number of the printer and press PF 7.

#### Header Page

The Header Page function is used to specify the extent to which normal header and trailer page information is to be printed for a file with a particular Print Class. The options available are:

- Y -- Full descriptive header and trailer page
- H -- Full header page; no trailer page
- C -- Condensed header page; no trailer page
- N -- No header or trailer page

The condensed header page (see Figure 6-4) is designed especially for use with low-speed printers and for narrow forms (i.e., 8 1/2 x 11 inch paper). The condensed header is 12 lines by 80 columns and is printed on the top half of the page.

```
*****
*****
CPPF5
FILE CPPF5 IN LIBRARY SMDPRT ON VOLUME FLOPPY
9:43:55 AM JANUARY 21, 1981 36 LINES 1 COPY
BY USER SMD (AT WORKSTATION 0)
PRINT CLASS X FORM# 000 PRINTER 46
*****
*****
```

Figure 6-4. Sample Condensed Header

#### Forced Eject

The Forced Eject function is used to specify whether a print file with a particular Print Class is to be forced to a new page. The options are:

- Y -- A new page is forced at the beginning of print files that do not explicitly issue a page eject as their first operation.
- N -- File is printed exactly as specified by the program (should be used with Header option N).

### 6.2.6 Activating Remote Printers

To activate a remote printer, you must first activate a remote workstation:

- . From an Operator's Console, press PF 12 (TELECOMMUNICATIONS) to manage telecommunications devices. Position the cursor to the desired unit number and press PF 10 (Change). The system will ask for the Type, Line Name, and Routing Address. The type of device must be 2246R for a remote workstation. The line name serves as a label and may be named anything the user desires. Once the values are entered, press ENTER.
- . Press PF 6 (Activate). Press ENTER. This will activate the remote workstation, and the system will assign a task to run at the workstation. The Logon display should appear on the remote workstation.
- . Once the remote workstation is activated, the operator can use PF 2 to activate the remote printer. Any valid printer type may be activated. These include the 2221V, 2273V-1, 2281WR, and 2281WCR printers.
- . Once the remote workstation and printer are activated, the operator must assign a particular print type to be printed on the remote printer. For example, using PF 9 (PRINTERS) on the Operator's Console, and PF 7 (Change Scheduling), the operator may assign Print Classes A through C to the local printer and Classes D through Z to the remote printer. By setting the remote printer defaults to D through Z, the remote printer will only print the remote user's files. All local print files (A through C) will print on the local printer. For an explanation of assigning Print Classes to different printers, see Subsection 6.2.4.

### 6.3 CONTROLLING DISKS

To reach the Control Disks Screen, press PF 10 (DISKS) from the Operator's Console Menu. The Control Disks Screen provides information about all the disk units configured for the system. The current user's ID appears on the Owner Information Screen (refer to the following explanation).

The information is listed in the order of the unit number (device address). The following information is provided for all disk devices:

- . Unit number
- . Device model number
- . Capacity in megabytes or kilobytes
- . Platter type--removable, fixed, or diskette

If a volume is mounted on the unit, the following additional information appears:

- . Volume name
- . Restrictions--removal, write protection, or exclusive use
- . Number of open files
- . Any status other than Ready

Figure 6-5 is an example of a Control Disks Screen. Note that the bottom of the screen contains a list of the commands available to control disks and the PF keys associated with them. These are described in the following paragraphs.

*** Control Disks ***							
2:56 pm		Tuesday		February 3, 1981			
Unit	Device	Capacity	Type	Volume	Restrictions	Open Files	Status
16	2265V-1	75 Mb	Rem	A40259		0	
17	2265V-1	75 Mb	Rem	VOL444		63	
18	2265V-2	288 Mb	Rem	SYSTEM		18	
19	2265V-2	288 Mb	Rem	WORK		5	
23	2270V	315 Kb	Dsket				

Position Cursor To Indicate Device and Select:

(6) Mount	(8) Attach	(10) Change Restrictions
(7) Dismount	(9) Detach	(11) Owner Information

Figure 6-5. Control Disks Screen

### Mount

To logically mount a volume on a disk unit, move the cursor to the line describing the unit, and press PF 6. Fixed/removable disk combinations are described on two lines; move the cursor to either line of the description.

Next, the Mount Disk Screen, illustrated in Figure 6-6, appears. Supply the following parameters:

- . Volume name
- . Label type. No Label is valid only for diskettes; Standard Label is the default
- . Mode--shared is the default
- . Allow work files? Choose yes or no; no is the default.
- . Allow spool files? Choose yes or no; no is the default.

```
          **** Mount Disk ****
          2:57 pm   Tuesday   February 3, 1981

Device 23
Removable Platter

          VOLUME = ****

          LABEL = SL   (SL = Standard,  NL = No Label)

          MODE  = SH   (SH = Shared,    RR = Restricted Removal)
                   (PR = Protected,  EX = Exclusive)

          Allow Work Files?   WORK = NO*

          Allow Spool Files?  SPOOL = NO*

          Press (ENTER) to Mount, or Press (1) to Return to Display
```

Figure 6-6. Mount Disk Screen

Press ENTER to initiate a logical mount; the system will prompt you to physically mount the disk. Press PF 1 to cancel the mount and return to the Control Disks Screen.

### Dismount

When logically dismounting a volume, you no longer receive a GETPARM prompt. Simply move the cursor to the line that describes the volume and press PF 7. The volume name will blink so you can verify that this is the volume you wish to dismount. Press ENTER to initiate a logical dismount; the system will prompt you to physically dismount the volume. Press PF 1 to cancel the dismount and return the screen to its normal state.

### Change Restrictions

This command modifies the mount restrictions. To change these restrictions for a specific volume, move the cursor to the entry for that volume and press PF 10. The system highlights the Restriction column and lets you type over the entry. Type one of the following restrictions:

- . Shared
- . Removal (restricted removal)
- . Protected
- . Exclusive

These choices are listed at the bottom of the screen. The command accepts any unique, leading substring, and a blank restriction is equivalent to Shared.

Press ENTER to effect the change, or press PF 1 to cancel the command and return the screen to its original state.

### Owner Information

To receive information about the volume owners, press PF 11. A volume owner is the user who mounted the volume.

The following data on owner information appears in the right-hand columns of the display screen, as illustrated in Figure 6-7:

- . Owner's User ID and/or job name; this information is supplied unless the volume is mounted for initialization or is a No Label (NL) volume.
- . Proc-ID is specified only if a background job mounts a volume. The name in this column is the name of the job that was submitted; it is not the Procedure name.
- . Volume's eligibility for work file and/or spool file allocations.

The Owner Information screen also makes two additional commands available. A description of these commands, Change and Status Information, follows.

* * * * * Control Disks * * * * *							
2:58 pm		Tuesday		February 3, 1981			
<u>Unit</u>	<u>Device</u>	<u>Capacity</u>	<u>Type</u>	<u>Volume</u>	<u>User</u>	<u>Proc-ID</u>	<u>Spool Work</u>
16	2265V-1	75 Mb	Rem	A40259			NO NO
17	2265V-1	75 Mb	Rem	VOL444	SYSTEM		YES YES
18	2265V-2	288 Mb	Rem	SYSTEM			NO NO
19	2265V-2	288 Mb	Rem	WORK			NO NO
23	2270V	315 Kb	Dsket				

Position Cursor To Indicate Device and Select:

(6) Mount	(8) Attach	(10) Change
(7) Dismount	(9) Detach	(11) Status Information

Figure 6-7. Owner Information Screen Format (Disk)

## Change

This command modifies work and spool file eligibility. To change these restrictions for a specific volume, position the cursor next to that volume's entry, and press PF 10. The system highlights the Work and Spool columns and lets you change the entries. Type yes or no in the column you wish to change. Then, press ENTER to effect the change, or press PF 1 to cancel the command and return the screen to its original state.

## Status Information

Owner data replaces the mount restrictions, number of open files, and status information that appears on the Control Disks Screen. To return to the Control Disks Screen and that information, press PF 11 from the Owner Information screen format.

## Attach and Detach

The operator can attach any device to, or detach any device from the system. The workstation is the only device not included. By pressing the appropriate PF key (PF 9 through 12) and lining up the cursor next to the device to be attached or detached, the operator may press PF 8 to attach a device or PF 9 to detach the same device. The system will then display the device in flashing characters and ask the operator to press ENTER. The device will then be attached or detached. Note that a device may not be detached while it is in use. A detached device cannot be accessed until the operator re-attaches the device or the system is re-IPLed.

## 6.4 CONTROLLING TAPES

To reach the Control Tapes Screen, press PF 11 (TAPES) from the Operator's Console Menu. The Control Tapes Screen provides information about all the tape units configured for the system. The current user's ID now appears on the Owner Information screen (see following explanation).

The information is listed in the order of the unit number (device address). The following information is provided for all tape devices:

- . Unit number (device address)
- . Device model number
- . Device type (9- or 7-track dual (DD) or single density)

If a volume is mounted on the unit, this additional information appears:

- . Volume name
- . Tape label (AL = ANSI Label, NL = No Label, IL = IBM Label)
- . Tape density
- . Any status other than READY

Figure 6-8 is an example of a Control Tapes Screen. Note that the bottom of the screen contains a list of the commands available to control tapes and the PF keys associated with them. These are described in the following paragraphs.

```

                **** Control Tapes ****
                2:58 pm   Tuesday   February 3, 1981

Unit Device      Type      Volume Label      Density      Status
-----
28 2209V-2      9-Track-DD
29 2209V-3      7-Track

                Position Cursor To Indicate Device and Select:

                (6) Mount      (8) Attach      (11) Owner Information
                (7) Dismount   (9) Detach

```

Figure 6-8. Control Tapes Screen

Mount

To logically mount a volume on a tape unit, move the cursor to the line describing the unit and press PF 6. The Mount Tape Screen, illustrated in Figure 6-9, appears. Supply the following parameters:

- . Volume name
- . Label type AL (ANSI) is the default
- . Mode Exclusive is the default

```

                **** Mount Tape ****
                2:58 pm   Tuesday   February 3, 1981

Device 28

VOLUME = ****

LABEL = AL      (AL = ANSI,  NL = No Label,  IL = IBM)

MODE   = EX     (EX = Exclusive,  SH = Shared)

                Press (ENTER) to Mount, or Press (1) to Return to Display

```

Figure 6-9. Mount Tape Screen

Press ENTER to initiate a logical mount; the system will prompt you to physically mount the tape. Press PF 1 to cancel the mount and return to the Control Tapes Screen.

### Dismount

When logically dismounting a volume, you no longer receive a GETPARM screen. Simply move the cursor to the line that describes the volume and press PF 7. The volume name will blink. Then, press ENTER to initiate a dismount; the system will prompt you to physically dismount the tape. Press PF 1 to cancel the dismount and return the screen to its normal state.

### Owner Information

To receive information about the volume owners, press PF 11. The Owner Information screen presents the following information in the screen's right-hand columns, as illustrated in Figure 6-10.

- . Restrictions -- Exclusive or Shared
- . Owner's user ID -- if applicable
- . Proc-ID -- specified only if a background job mounts a volume. The name in this column is the name of the job that was submitted; it is not the Procedure name.

The Owner Information screen also makes two additional commands available. These commands, Change Restrictions and Status Information, are described in the following paragraphs.

*** Control Tapes ***						
2:58 pm		Tuesday		February 3, 1981		
Unit	Device	Type	Volume	Restrictions	User	Proc-ID
28	2209V-2	9-Track-DD				
29	2209V-3	7-Track				

Position Cursor To Indicate Device and Select:

(6) Mount	(8) Attach	(10) Change Restrictions
(7) Dismount	(9) Detach	(11) Status Information

Figure 6-10. Owner Information Screen Format (Tape)

## Change Restrictions

This command modifies the mount restrictions. To change these restrictions, press PF 16 from the Owner Information screen. Type one of the following restrictions in the Restrictions column on the appropriate line:

- . Shared
- . Exclusive

The command accepts any unique, leading substring, and the default is Shared.

Press ENTER to effect the change, or press PF 1 to cancel the command and return the screen to its original state.

## Status Information

Owner data replaces the label, density, and status information presented on the Control Tapes Screen. To return to the Control Tapes Screen and that information, press PF 11 from the Owner Information screen.

## Attach and Detach

The operator can attach any device to, or detach any device from, the system. The workstation is the only device not included. By pressing the appropriate PF key (PF 9 through 12) and lining up the cursor next to the device to be attached or detached, the operator may press PF 8 to attach a device or PF 9 to detach the same device. The system will then display the device in flashing characters and ask the operator to press ENTER. The device will then be attached or detached. Note that a device may not be detached while in use. A detached device cannot be accessed until the operator re-attaches the device or the system is re-IPLed.

## 6.5 CONTROLLING TELECOMMUNICATIONS

To reach the Control Telecommunications Screen, press PF 12 (TELECOMMUNICATIONS) from the Operator Console Menu. The Control Telecommunications (TC) Screen provides information about all TC units configured for the system including all remote devices connected by telecommunication lines. Figure 6-11 shows a sample Control Telecommunications Screen.

The information is listed in order by unit number (device address). The following information is provided for all TC devices:

- . Unit number (device address)
- . Device model number
- . Line name
- . Routing address
- . Status

If the unit currently has no device associated with it, the Type column lists it as Available. If the device is a remote workstation, the Status column contains the associated task's User ID. Valid devices include the 2246R Remote Workstation, the 2221V printer, and the 2231V-1 and 2231V-2 printers. For additional information regarding setting up Remote Printers see Section 6.2.6 of this chapter.

\*\*\* Control Telecommunications \*\*\*  
4:58 pm Tuesday February 3, 1981

Unit	Type	Line	Routing Address	Status
64	2246R	UNDER	0	Activated Workstation
65	2221V	UNDER	0	
66	Available			
67	Available			
68	Available			
69	Available			
70	Available			
71	Available			
72	Available			
128	Available			
129	2246R	LINE2	1	Activated Workstation
130	2231V-2			

Position Cursor to Indicate Device and Select:

(6) Activate (8) Attach (10) Change  
(3) Last (5) Next (7) Deactivate (9) Detach

Figure 6-11. Control Telecommunications Screen

The line name is a label and can be set at any value the operator desires (i.e., xxxx or yyyy or any alphanumeric not exceeding 8 characters). Under the Status heading, a device may be indicated as Activated, Detached, Logged on, Reserved, or In Use, depending on the actual status of the device involved. The Routing Address may be any number from 0 to 31 and reflects the position of the device on the line dropped from the modem.

Unit numbers are set up in the configuration file and the starting addresses are specified in multiples of 64 (i.e., 64, 128, and so forth).

## 6.6 CONTROLLING WORKSTATIONS

To reach the Display Workstation Screen, press PF 13 (WORKSTATIONS) from the Operator Console Menu. The Display Workstation Screen provides information about all local workstations that are configured for the system and all remote workstations that are currently connected (see Figure 6-12). This information is listed in order by unit number (device address).

The unit number and device model number appear for all workstations; additional information appears in the following specific cases:

Status information -- appears for any unit that is not READY

User ID -- appears if the user is logged on

User name -- appears if the user is logged on

Operator -- appears in the Status column if the workstation is an Operator's Console

Unit	Device	User	Name	Status
0	2246C	ABC	tech writing	
1	2246C	TM	Tom	
2	2246C	SHR	SHARER	
4	2246C	SAL	Sally	
5	2246C	RWL	Rick	
6	2246C			Disconnected
7	2246C			
8	2246C			Disconnected
9	2246C	SKH	Susan	
10	2246C	LPK	Leonard	

Position Cursor To Indicate Device and Select:

(6) Control Interactive Tasks

(3) Last      (5) Next

Figure 6-12. Display Workstations Screen

**CHAPTER 7**  
**SYSTEM OPTIONS**

**7.1 INTRODUCTION**

The user can modify and display system parameters by pressing PF 14 (SYSTEM Options) on the Operator's Console Menu.

- . The operator can set default lines per page for file printout by pressing PF 4 (Set SYSTEM PARAMETERS), as described in Section 7.2.
- . The operator can review system status by pressing PF 5 (Display SYSTEM STATUS), as explained in Section 7.3.
- . The operator can set up as many as eight workstations as dual Operator/User Mode workstations by pressing PF 8 (Set ADDITIONAL OPERATOR Console List), as explained in Section 7.4.
- . The operator can print the I/O Error Log by pressing PF 10 (Print I/O ERROR LOG), as described in Section 7.5.

Figure 7-1 shows the System Options Menu.

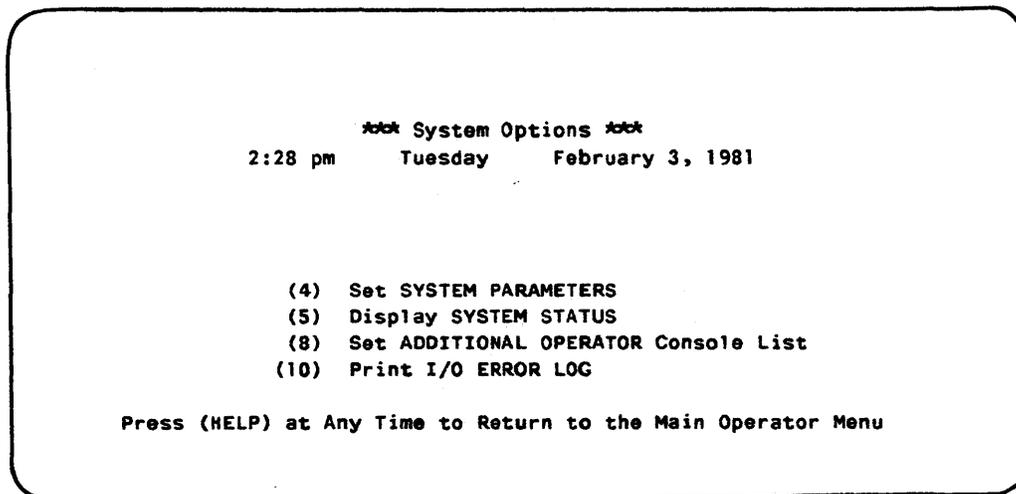


Figure 7-1. System Options Menu

## 7.2 SET SYSTEM PARAMETERS (PF 4)

The Set SYSTEM PARAMETERS option allows the operator to select a value for default lines per page for printouts. The maximum value allowed is 255 lines per page; the minimum value allowed is 10 lines per page, and the default value is 55 lines per page. To modify the lines per page value, enter the new value in the modifiable field provided and press ENTER. Pressing HELP will return the operator to the Operator's Console Menu.

## 7.3 DISPLAY SYSTEM STATUS (PF 5)

To display the system status information, press PF 5 (Display SYSTEM STATUS). This displayed information is not modifiable. The display includes the current time and date, the version number of the CP microcode, information on the assembly date and version of the current operating system, and the disk volume on which the operating system resides. In addition, data is displayed concerning the size and number of page frames, the number of permanently resident and temporarily fixed page frames, and system buffer space and usage. See Figure 7-2 for a sample System Status display.

```
*** System Status ***
2:57 pm    Tuesday    February 3, 1981

Microcode Version is 3.03

Current Wang VS Operating System File, @SYS000@ In Library @SYSTEM@
On Volume NEWSYS, was Assembled on 01/19/81, Version 5.00.00

System Has 256 Page Frames of 2048 Bytes Each
0 Page Frames Are Removed From Use

12 Pages Are Permanently Resident
51 Pages Are Temporarily Fixed

System Buffer Space Available = 20584 Bytes

SHARER Bufpool Counts: Hit = 147098    Miss = 213276
                        #

SHARER Control Blocks are Fixed
```

Figure 7-2. System Status Display

#### 7.4 SET ADDITIONAL OPERATOR CONSOLE LIST (PF 8)

The operator may specify a maximum of eight workstations as dual mode operator console workstations by pressing PF 8 and entering the workstations' device number. Any workstation may be set as a dual mode workstation. The user may enter the device number (from 1 to 128, depending on the actual device numbers of the workstations) of the workstation(s) in the modifiable fields and press ENTER to set the workstations as dual mode operator consoles (see Figure 7-3). All workstations thus selected will function both as user console workstations (displaying the standard Command Processor Menu) and operator console workstations (displaying the Operator's Console Menu). All dual mode workstations will display the standard Logon Screen and will also display the message "Press PF 11 to Enter Operator Mode" at the bottom of the Logon Screen.

All workstations specified as dual mode workstations in this fashion will remain dual mode permanently. Workstations may also be specified as dual mode temporarily (i.e., until the next time the system is IPL'ed). The operator may do this by pressing PF 6 (INTERACTIVE Tasks) on the Operator's Console Menu as explained in Section 4.6.

```
          *** Set Operator List ***
        3:10 pm   Tuesday   February 3, 1981

      Workstation 0 is a Dual-Mode Operator Console

    Additonal Dual Mode Operator Console Workstations

                                *33
                                *36
                                *31
                                *32
                                *16
                                *15
                                *25
                                *41

    Press (ENTER) to Make Modifications, or Press (HELP) to Return to Menu
```

Figure 7-3. Set Operator List

## 7.5 PRINT I/O ERROR LOG (PF 10)

The operator prints the I/O Error Log by pressing PF 10. The I/O Error Log is the system's record of errors occurring during disk, tape, or printer read or write operations. The operator may set various print parameters for the Error Log (see Figure 7-4). The operator is permitted to set the Print Class (A through Z), the Form number (0 to 254), the lines per page (10 to 255); the operator can also delete or retain the Error Log file. The operator can select YES in response to the question, "Purge Current Log File?". The system deletes the current Error Log file after printing it and then begins to compile a new Error Log file. The default values for this option are Print Class A, Form number 0, 55 lines per page, and NO in response to the question of purging the Error Log file.

```
*** Print I/O Error Log ***
3:13 pm      Tuesday      February 3, 1981

Error Log Currently Contains  140 Lines

PRINT CLASS      =  A      (A-Z)
FORM #           =  *0     (0-254)
LINES PER PAGE   =  *55    (10-255)

Purge Current Log File?
PURGE            =  NO*
```

Press (ENTER) to Print, or Press (HELP) to Return to the Operator Console Menu

Figure 7-4. Print I/O Error Log Menu

### NOTE

If the Operator does not print the I/O Error Log for a long time, it will eventually overflow its assigned space. At this point it will print automatically and delete automatically after printing.

The operator should purge (i.e., delete after printing) the Error Log file after it reaches approximately 500 lines; this will make it easier to reference recent or current errors or error conditions. The I/O Error Log printout should be retained so that the Wang Customer Engineer can refer to it during service calls. Printing the Error Log periodically and purging it after printing minimizes the disk space occupied by the Error Log and decreases the chance of losing important error information.

The Print I/O Error Log Screen is displayed from the System Options Menu when PF 10 is pressed. This screen displays the number of I/O error conditions that have occurred during system operation. The I/O errors are accumulated in the I/O Error Log file; statistics on each error occupy one line in the file.

The menu allows the operator to obtain a printed copy of the I/O Error Log. The copy of the Error Log contains the following information for each error condition encountered:

- . Date and time
- . The ID of the user if anyone was logged on at the workstation involved
- . The device number of the workstation involved
- . The task being run from that workstation
- . File name and location
- . Disk block involved
- . I/O Command
- . I/O Command Word and I/O Status Word descriptions

## CHAPTER 8 SCREEN MESSAGES

### 8.1 INTRODUCTION

The Operator's Console Menu Screen can display up to eight one-line messages. Messages are displayed in the following order of priority:

1. Operator intervention is required.
2. For information only.
3. Nonremovable messages (e.g., Task Crash).

If more than eight messages are pending at one time, the eight messages with the highest priorities are displayed first, with an indication that more messages are pending. Each additional message is displayed when the higher priority messages are acted upon by the operator.

All screens activated by PF 2 through PF 9 from the Operator's Console Menu also display from three to eight messages for operator attention. The priorities of messages on the screen are the same as those described above for the Operator's Menu.

As mentioned in Subsection 7.4.3, all dual mode operator workstations can display messages only in Operator mode. Thus, a workstation in User mode will not be aware of an operator message until it enters Operator mode. For a dual mode console at Workstation #0 the situation is different. In this case, if the operator is in User mode and an error condition has occurred, the console may automatically enter Operator mode so that the message can be displayed.

Operator's Console error messages are described in Sections 8.3 through 8.10 of this chapter.

### 8.2 TYPES OF MESSAGES

There are two types of messages--those identified by a dim pseudoblink with stoptab and those without a dim pseudoblink and stoptab.

### 8.2.1 Dim Pseudoblank ( ■ )

This type of message requires operator action. It is serviced by positioning the cursor next to the stoptab of the message and pressing ENTER. Depending on the message, a transition is made to the screen that most directly services the indicated conditions; or if the message is purely informational, the message is cleared. Some messages may be cleared automatically by performing an action (for example, correcting a Paper Out condition for a printer).

### 8.2.2 No Dim Pseudoblank

The operator does not move the cursor to respond to this type of message but simply performs the stated action (i.e., MOUNT VOLUME, MOUNT TAPE, etc.). Except in the case of a Task Crash or similar message, the message is automatically cleared once the operator performs the required action.

## 8.3 PRINTER-RELATED MESSAGES

Message: ■ ASSISTANCE REQUIRED FOR PRINTER ###

Cause: Printer ### is in one of the following conditions:

- a. Powered off
- b. Deselected
- c. Out of paper
- d. Out of ribbon
- e. Jammed forms
- f. Malfunctioning

Action: 1. Manually correct the condition; or

2. Position the cursor at the message and press ENTER. The Control Printer Menu described in Section 3.4 will be displayed.

Message: ASSISTANCE REQUIRED FOR PRINTER ###

Cause: Printer ### is printing a Word Processing document, and is in one of the following conditions:

- a. Powered off
- b. Deselected
- c. Out of paper
- d. Out of ribbon
- e. Jammed forms
- f. Malfunctioning
- g. Daisy wheel needs changing
- h. Special form needs mounting

Action: Manually correct the condition.

**Message:** ■ CHANGE FORMS ON PRINTER ### TO FORM XXX, REPLACING FORM YYY  
**Cause:** Attempt is made to print a print file with required Form Type XXX on a printer that has Form Type YYY currently mounted.

**Action:** 1. Mount Forms Type XXX on Printer ### (optional); and  
2. Position the cursor at the message and press ENTER to display the Form Change Menu described at the end of this section.

**Message:** ■ CHANGE FORMS ON PRINTER ### TO FORM XXX  
**Cause:** Next printing to be performed on printer ### requires form XXX which is different from the form currently mounted.

**Action:** 1. Mount Form Type XXX on printer ### (optional); and  
2. Position the cursor at the message and press ENTER to display the Form Change Menu described at the end of this section.

**Message:** ■ VALIDATE FORMS LINEUP FOR PRINTER ###  
**Cause:** A forms lineup test requested in the Form Change Menu has been completed; the results of the test must be acknowledged.

**Action:** Position the cursor to the message and press ENTER to display the Lineup Forms submenu described at the end of this section.

**Message:** ■ WARNING - SYSTEM UNABLE TO LOAD MICROCODE TO PRINTER ###  
**Cause:** There is a problem in loading microcode for a serial printer, possibly because the printer is powered off.

**Action:** Cycle the printer ON, i.e., if the printer is OFF, turn it ON; if ON, turn it OFF and then ON. This may have to be done several times. If this process does not solve the problem and if any other Warning messages are displayed, the messages should be noted and Wang Field Service notified.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ WARNING - SYSTEM UNABLE TO FIND MICROCODE FOR PRINTER ###  
**Cause:** There is a problem with finding microcode and configuration tables for a serial printer. The most likely causes are that the microcode file was inadvertently scratched or renamed, or that the VIOC is bad. The next most likely explanation is a SYSGEN problem. Another possibility--a hardware problem.

**Action:** Notify Wang Field Service.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ PRINTER ERROR (POSSIBLE DATA FORMAT ERROR) ON PRINTER ###

**Cause:**

1. (Most likely) Printer was powered off during printing
2. Improperly formatted print file (program error)
3. Hardware problem.

**Action:** Position the cursor to the message and press ENTER to obtain the Control Printers Screen (see Section 3.4).

**Message:** ■ "XIO" ERROR, PRINTING xxxxxxxx IN yyyyyyy ON zzzzzzz, PRINTER ###  
  ↑                  ↑                  ↑  
  file              library          volume

**Cause:** Possible hardware problem. The indicated file was printing at the time, but now has been placed in a hold status. The indicated printer has been idled.

**Action:** Notify Wang Field Service.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

#### Form Change Menu

The Form Change Menu is displayed when the operator responds to either of the following messages:

- CHANGE FORMS ON PRINTER ### TO FORM XXX, REPLACING FORM YYY
- CHANGE FORMS ON PRINTER ### TO FORM XXX

PF 1 -- RETURN TO DISPLAY.

Press PF 1 to return to the Print Queue Display.

PF 4 -- ACKNOWLEDGE FORM CHANGE AND START PRINTING.

After the form is changed at the printer press PF 4 to resume printing.

PF 5 -- ACKNOWLEDGE FORM CHANGE AND PERFORM LINE-UP TEST FOR 10 LINES OF TEXT.

The operator may assign a value for LINES OF TEXT other than the default value of 10. After the forms have been changed at the printer, press PF 5 to allow the specified number of lines (including header lines) to be printed. (Total lines printed will never exceed the number of lines in the first block of the file.) When the printing is complete, the following message is displayed on the screen:

VALIDATE FORMS LINE UP FOR PRINTER ###

The response to this message produces the Line-up Forms submenu with the following options:

PF 1 -- RETURN TO DISPLAY.

Press PF 1 to return to the Print Queue Display.

PF 4 -- START PRINTING (FROM BEGINNING OF FILE).

This operation signifies that the forms alignment is satisfactory. The file is printed to completion starting from the beginning, on a new page of the printer. Press PF 4 to initiate printing.

PF 5 -- REPEAT LINE-UP TEXT FROM 10 LINES.

This operation is the same as that for PF 5.

PF 8 -- HOLD FILE.

File printing is suspended. The file entry is retained in the Print Queue with a status of HOLD and the file is saved in the user's print library. Press PF 8 to initiate this action.

PF 8 -- WITHOUT FORM CHANGE: HOLD FILE.

The form is not changed at the printer, and printing is suspended. The file entry is retained in the Print Queue with status HOLD; the file is saved in the user's print library. Press PF 8 to initiate this action.

PF 9 -- WITHOUT FORM CHANGE: START PRINTING.

Press PF 9 to print the file without a change of form.

#### 8.4 TAPE DRIVE-RELATED MESSAGES

**Message:** ASSISTANCE REQUIRED FOR TAPE UNIT ###

**Cause:** Tape drive is powered OFF or is off-line.

**Action:** Power ON the tape drive or set to on-line status. Message is removed from the screen when action is completed.

**Message:** MOUNT VOLUME vvvvvv ON TAPE ###, USER xxx

**Cause:** Volume (vvvvvv) is to be mounted on tape (###) for use by the user with ID (xxx).

**Action:** Mount the indicated volume. After the mount operation is completed, the message is automatically removed from the screen.

**Message:** MOUNT VOLUME vvvvvv ON TAPE ###, USER xxx, REPLACING yyyyyy, USER zzz

**Cause:** Volume (vvvvvv) is to be mounted on tape (###) for use by the user with ID (xxx).

**Action:** Remove Volume (yyyyyy) and replace with indicated volume. After the mount operation is completed, the message is automatically removed from the screen.

**Message:** ■ DISMOUNT VOLUME vvvvv FROM TAPE ###, USER xxx

**Cause:** User has requested that the indicated volume be removed from the indicated tape drive.

**Action:** Perform the dismount operation. Remove the message from the screen by positioning the cursor at the message and pressing ENTER.

**Note:** If the dismount operation is performed by an interactive user (and is acknowledged at the user's workstation), the operator message will automatically be removed.

#### 8.5 DISK DRIVE-RELATED MESSAGES

**Message:** ASSISTANCE REQUIRED FOR DISK UNIT ###

**Cause:** Disk drive is powered OFF.

**Action:** Power ON the disk drive. Message is removed from the screen when action is completed.

**Message:** MOUNT VOLUME vvvvvv ON DISK ###, USER xxx

**Cause:** Volume (vvvvvv) is to be mounted on Disk (###) for use by the user with ID (xxx).

**Action:** Mount the indicated volume. After the mount operation is completed, the message is automatically removed from the screen.

**Message:** MOUNT VOLUME vvvvvv ON DISK ###, USER xxx, REPLACING yyyyyy, USER zzz

**Cause:** Volume (vvvvvv) is to be mounted on Disk (###) for use by the user with ID (xxx).

**Action:** Remove Volume (yyyyyy) and replace with indicated volume. After the mount operation is completed, the message is automatically removed from the screen.

**Message:** ■ DISMOUNT VOLUME vvvvvv FROM DISK ###, USER xxx

**Cause:** User has requested that the indicated volume be removed from the indicated disk drive.

**Action:** Perform the dismount operation. Remove the message from the screen by positioning the cursor at the message and pressing ENTER.

**Note:** If the dismount operation is performed by an interactive user in Data Processing mode (and is acknowledged at the user's workstation), the operator message will automatically be removed. If a dismount is performed by a user in Word Processing mode or in response to a background job's requirement, the message must be cleared at the Operator's Console before the user (or background job) can continue.

## 8.6 BACKGROUND JOB MESSAGES

**Message:** ■ CPU TIME LIMIT EXCEEDED BY JOB xxxxxxxx SUBMITTED BY USER yyy

**Cause:** The indicated job, submitted with a CPU time limit, has exceeded the designated limit.

**Action:** Depending on the option requested by the submitter of the job, the following actions apply:

### PAUSE Option

Position the cursor at the message and press ENTER. This action provides the Continue Job Screen with options for job continuation or cancellation (see Section 5-7).

### AUTOMATICALLY CANCELLED Option

No message appears on the screen. When the job exceeds its CPU Time Limit, it is automatically cancelled.

### WARN Option

This message serves only as a warning and can be removed from the screen by positioning the cursor to the message and pressing ENTER. The job continues processing, and the CPU Time (on the Control Task Display) remains blinking, which indicates that the WARN has been acknowledged.

Message: ■ JOB xxxxxxxx SUBMITTED BY USER yyy WAS INCOMPLETE PRIOR TO IPL

Cause: The system was brought down while the indicated job was running. The subsequent IPL caused the message to appear on the screen.

Action: None. This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

Note: A job terminated in this manner is retained in the Procedure Queue with an INCOMPLETE status. The job may be subsequently released for execution or removed from the Procedure Queue.

Message: ■ ASSISTANCE REQUIRED FOR JOB xxxxxxxx SUBMITTED BY USER yyy

Cause: A special condition (usually a file possession conflict or a "volume not mounted" condition) requires operator assistance.

Action: Position the cursor at the message and press ENTER to obtain the screen detailing the problem and providing additional directions to the operator.

### 8.7 I/O ERROR LOG MESSAGES

Message: ■ I/O ERROR LOG QUEUED FOR PRINTING

Cause: Operator requested printing the error log from the Print I/O Error Log Screen.

Action: Depending on the Print Class assigned to the Error Log file, the error log is either released to an available printer or its file is retained in the Print Queue.

Note: This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ I/O ERROR LOGGING DISCONTINUED - UNABLE TO CREATE ERROR LOG FILE

**Cause:** File space problems or I/O errors on the system volume.

**Action:** Request that appropriate personnel make space available on system volume. Restarting I/O error logging requires a system IPL.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ PERMANENT ERROR ON I/O ERROR LOG - A NEW LOG WILL BE CREATED

**Cause:** File space problems or I/O errors on the system volume. (In the former case, this message will quickly be replaced by the I/O ERROR LOGGING DISCONTINUED message.)

**Action:** Request that appropriate personnel make space available on system volume.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ I/O ERROR LOG NOT PRINTED - UNABLE TO CREATE PRINT FILE

**Cause:** File space problems or I/O errors on the system volume.

**Action:** Request that appropriate personnel make space available on system volume. Try the printing operation again.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ I/O ERROR LOG NOT PRINTED - UNABLE TO OPEN LOG FILE

**Cause:** I/O errors on the system volume. Possible problems include VTOC errors and possession conflicts. The log file may have been scratched.

**Action:** Request that appropriate personnel make space available on system volume.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ I/O ERROR LOG HAS OVERFLOWED AND WILL BE PURGED AFTER PRINTING

**Cause:** Error log has exceeded approximately 1,700 entries and is released to the Print Queue. (A new log is automatically created, and logging continues.)

**Action:** The Error Log file will always be released to an available printer.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

## 8.8 MICROCODE WARNING MESSAGES

**Message:** ■ WARNING - SYSTEM UNABLE TO LOAD MICROCODE TO WORKSTATION ###

**Cause:** Problem in loading microcode for a serial workstation, possibly because the workstation is powered OFF.

**Action:** Cycle the workstation ON, i.e., if the workstation is OFF, turn it ON; if ON, turn it OFF and then ON. This may have to be done several times. If this process does not solve the problem and if any other Warning messages are displayed, the messages should be noted and Wang Field Service notified.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ WARNING - SYSTEM UNABLE TO FIND MICROCODE FOR WORKSTATION ###

**Cause:** Problem in finding microcode and configuration tables for serial workstation. Most likely cases: the microcode file was inadvertently scratched or renamed, or the VTOC is bad. Second most likely: SYSGEN problem. Also possible: hardware problem.

**Action:** Notify Wang Field Service.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ WARNING - SYSTEM UNABLE TO LOAD MICROCODE TO IOP OF DEVICE ###

**Cause:** Problem in loading microcode for a serial IOP. Possible hardware or SYSGEN problem.

**Action:** Notify Wang Field Service.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ WARNING - SYSTEM UNABLE TO FIND MICROCODE FOR IOP OF DEVICE ###

**Cause:** Problem in finding microcode and configuration tables for serial IOP. Most likely cases: the microcode file was inadvertently scratched or renamed, or the VTOC is bad. Second most likely: SYSGEN problem. Also possible: hardware problem.

**Action:** Notify Wang Field Service.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

**Message:** ■ WARNING - SYSTEM UNABLE TO LOAD CONFIGURATION FOR DEVICE ###

**Cause:** Problem in loading configuration tables for serial device.

**Action:** Notify Wang Field Service.

**Note:** This is an informational message that may be removed from the Operator's Console Screen by positioning the cursor to the message and pressing ENTER.

## 8.9 TASK-RELATED MESSAGES

**Message:** ■ TASK CRASH - TASK ### - USER xxx - WS nnn - STOP TASKS, DUMP, RE-IPL.

**Cause:** An unrecoverable error has been encountered by the indicated task. Error may be the result of hardware or operating system problems.

**Action:** Perform Control Mode Dump (see Chapter 9). Forward resultant diskette dump to Wang Field Service for analysis. Re-IPL system (see Chapter 10).

**Message:** ■ DEDICATED SYSTEM TASK COULD NOT RUN PROGRAM xxxxxxxx

**Cause:** A dedicated system task could not run its designated program. May be a SYSGEN problem.

**Action:** Notify Wang Field Service.

**Message:** ■ DEDICATED SYSTEM TASK RUNNING PROGRAM xxxxxxxx HAS BEEN CANCELLED.

**Cause:** A dedicated system task has encountered an abnormal termination condition, (e.g., program check, DMS cancel condition, etc.).

**Action:** Re-IPL system. Any dumps (DUMP0001, etc.) in #PRT library should be printed or copied to diskette and forwarded to Wang Field Service for analysis.

#### 8.10 PERMANENT QUEUE MESSAGES

Unless otherwise noted, the messages in this section should only appear immediately after system IPL.

**Message:** UNABLE TO CREATE PERMANENT QUEUE - UNDEFINED "OPEN" ERROR

**Cause:** Possible internal system error.

**Action:** This is an informational message that may be removed only by correcting the problem and IPLing the system. If the message appears repeatedly, contact a Wang Field Service representative.

**Message:** UNABLE TO CREATE PERMANENT QUEUE - NO ROOM IN VTOC ON SYSTEM VOLUME

**Action:** This is an informational message that may be removed only by correcting the problem and IPLing the system. To correct the problem and avoid its recurrence, it may be necessary to copy the system volume to a volume initialized with a larger VTOC.

**Message:** UNABLE TO CREATE PERMANENT QUEUE - NO ROOM FOR FILE ON SYSTEM VOLUME

**Action:** This is an informational message that may be removed only by correcting the problem and IPLing the system. To correct the problem and avoid its recurrence, it may be necessary to copy the system volume to a disk pack with larger capacity.

**Message:** UNABLE TO CREATE PERMANENT QUEUE - PERMANENT I/O ERROR ON DISK FILE

**Action:** This is an informational message that may be removed only by correcting the problem and IPLing the system. First, try simply IPLing; if this does not solve the problem, there is probably a disk drive hardware malfunction, or possibly a damaged disk pack.

**Message:** EXISTING PERMANENT QUEUE NOT IN USE - PROTECTION/POSSESSION PROBLEM

**Cause:** Protection problem: possible bad main memory board. Possession problem: a user program began execution immediately after IPL, and accessed the Queue.

**Action:** This is an informational message that may be removed only by correcting the problem and IPLing the system.

**Message:** EXISTING PERMANENT QUEUE NOT IN USE - QUEUE TOO BIG FOR ADDRESS SPACE

**Cause:** Bad VTOC information. Queue has been extended by other than system task(s); possibly, a user program has created a file with the System Queue name.

**Action:** This is an informational message that may be removed only by correcting the problem and IPLing the system. The Queue may have to be scratched or renamed.

**Message:** EXISTING PERMANENT QUEUE NOT IN USE - PERMANENT I/O ERROR ON DISK FILE

**Action:** This is an informational message that can occur at any time, and may be removed only by correcting the problem and IPLing the system.

**Message:** EXISTING PERMANENT QUEUE NOT IN USE - UNEXPECTED FILE "OPEN" ERROR

**Cause:** Defined in message.

**Action:** This is an informational message that may be removed only by correcting the problem and IPLing the system. If the message appears repeatedly, contact a Wang Field Service representative.

**Message:** EXISTING PERMANENT QUEUE CANNOT BE UPDATED - PERMANENT I/O ERROR ON DISK FILE

**Action:** This is an informational message that can occur at any time, and may be removed only by correcting the problem and IPLing the system.

### 8.11 MISCELLANEOUS MESSAGES

**Message:** INTERNAL SYSTEM ERROR INDICATED BY INCONSISTENT PRINTER TASK MESSAGE

**Cause:** Internal system software errors.

**Action:** This message should never appear, but if it does, contact Wang Field Service. It is an informational message that may be removed only by IPLing the system.

**Messages:** UNABLE TO INITIATE PRINTING - UNEXPECTED "READFDR" ERROR ENCOUNTERED

**Cause:** Internal system software errors.

**Action:** This message should never appear, but if it does, contact Wang Field Service. It is an informational message that may be removed only by IPLing the system.

CHAPTER 9  
CONTROL MODE

9.1 INTRODUCTION

This chapter describes the procedure for performing a Control Mode dump. In addition, various system errors that put the system into Control Mode are discussed at the end of the chapter. The system automatically goes into Control Mode when problems are encountered that prevent it from proceeding with normal operations. The system can also be forced into Control Mode as described in VS Principles of Operation. Control Mode should only be used for dumping as outlined in this chapter. In the Control Mode, system operations are halted, and the top line of Workstation #0 displays the words CONTROL MODE W and the current Program Control Word (PCW). Depending on whether the Control Mode line is blinking or not, the following actions should be taken:

- Blinking -- A hardware error is indicated. Call Wang Field Service; no Control Mode dump is required.
- Non-blinking -- A software error is indicated. Call DP manager or Wang Field Service. A Control Mode dump is required (see Section 9.2).

9.2 CONTROL MODE DUMP PROCEDURE

A Control Mode dump is performed by using the Control Mode dump program. This program allows the entire contents of main memory to be dumped to diskettes on a VS or to disk or tape on a VS-100. The dump should only be performed by an authorized DP staff person or by Wang Field Service personnel. There are separate Control Mode dump procedures for the VS (see Section 9.2.1) and for the VS-100 (see Section 9.2.2). All workstation operations required during these procedures must be done from Workstation #0. Throughout these procedures, zeroes must be keyed in where indicated. When keying in information defined in the procedure, begin keying at the current cursor position. Do not reposition the cursor. The character \* represents the value of a position and must not be changed during the process of preparing the dump. In any place in these procedures where there is an instruction like "key in 0000\*\*\*\* 0000," you must key in the zeroes and skip over the \*\*\*\* by using the space bar.

### 9.2.1 VS Control Mode Dump Procedure

Before beginning to take a VS Control Mode dump, you must have at least two dump diskettes. These dump diskettes, upon which the contents of memory will be copied, must have been initialized as NL and provided by Wang Field Service personnel. All system configurations must include a diskette. The procedure for performing a Control Mode dump on a VS is as follows.

1. The system must be in Control Mode or the Control Mode button on the front panel of the processor must be pressed.
- 2A. Record the displayed line. The line is the current PCW. A message may also be displayed.
- 2B. If a parallel printer (Model 2221V, 2231V-2, 2263V-1, 2263V-2, 2263V-3, or 2281V) is available as Device 3, dump the first hex 2000 bytes of memory to the printer by keying D 000000 002000 and then press (ENTER). If the printer is not available, proceed to Step 3.
3. Key in P 000070 and press (ENTER) to find the address of the Master Control Block (MCB). The display will show P000070 AAAA\*\*\*\* \*\*\*\*\*. AAAA is the address of the MCB.
4. Key in P 00AAAA and press (ENTER). AAAA is the value displayed in Step 3. The display will then show P 00AAAA \*\*\*\*\* \*\*\*\*ZZZZ where ZZZZ is the address of the desired Dump program.
5. Key in W and press (ENTER) to display the current PCW. Key in M 0000ZZZZ 00000000 and press (ENTER). ZZZZ is the address of the Dump program from Step 4.
6. Key in X and press (ENTER) to exit from Control Mode and begin execution of the Dump program.
7. The program is now waiting for the dump diskette to be mounted (no message is displayed on the workstation). Insert the diskette, or if it is already inserted, pop it out and push it back in again.

The rest of the dump procedure differs depending on whether or not microcode is loaded into Workstation #0. Lack of microcode will cause the program to enter Control Mode to communicate coded messages (see Section 9.3) rather than displaying direct messages at the workstation.

8. If the dump diskette cannot be read, the program will enter Control Mode and the W \*\*\*\*\* 400F\*\*\*\* will be displayed. If microcode is loaded at Workstation #0, the message BLOCK 0 I/O ERROR will also be displayed.

This message may be due to a media or a drive problem. In this case, repeat the procedure starting from Step 3 and try re-inserting the diskette into the drive or try another dump diskette. If, after a few attempts, the same message continues to appear, then the Control Mode dump attempt has been unsuccessful. Call your Wang Field Service representative.

9. If reading Block 0 of the dump diskette was successful, the program will respond in one of two ways depending on whether Workstation #0 has microcode loaded.
  - . The message DUMP IN PROGRESS may be displayed. Proceed to Step 10.
  - . If not, W \*\*\*\*\* 4001\*\*\*\*\* is displayed. Key in M \*\*\*\*\* 0000\*\*\*\*\* and press (ENTER) again. Then press X and (ENTER). This clears the Control Mode bit and the message code and starts the dump.
10. If an I/O error is detected during dumping, the program displays the message DISK I/O ERROR, W \*\*\*\*\* 40FF\*\*\*\*\*, or both. In this case, the dump is unsuccessfully terminated. As was the case with Step 8 above, try another dump diskette and start over.
11. When a diskette is full, you are prompted for another by the message MOUNT ANOTHER DISK or by W \*\*\*\*\* 4002\*\*\*\*\*, or both. Remove, label, and save the full diskette and insert another dump diskette. If only the PCW was displayed, change it as described in Step 9B.
12. When the dump is successfully finished, the program displays the message DUMP COMPLETED - PLEASE PRINT I/O ERROR LOG AFTER IPL, the PCW W \* 4000 \*, or both. Respond by removing and labelling the diskette.
13. Re-IPL the system, and print the I/O Error Log. Verify all disk (not diskette) VTOCs by running the LISTVTOC utility (see VS Utilities Reference). Mail to Wang Quality Assurance the dump diskettes, the printed dump from Step 2B (if available), the recorded line from Step 2A, a Software Problem Report Form (800-5104), and the I/O Error Log, along with an explanation of what was happening at the time the system malfunctioned and the present status of hardware and software. The mailing address is as follows.

WANG QUALITY ASSURANCE  
 (Software Support) MS 1363  
 WANG LABORATORIES, INC.  
 One Industrial Avenue  
 Lowell, Massachusetts 01851

### 9.2.2 VS-100 Control Mode Dump Procedure

Before beginning to take a VS-100 Control Mode dump, you should have a listing of your system configuration and a disk or tape. Use tape if possible. Any data on the disk or tape will be wiped out by the dump program. The procedure for performing a Control Mode dump on a VS-100 is as follows.

1. The system must be in Control Mode or you must press the Control Mode button on the front panel of the processor.

2. Record the displayed line. The line is made up of the current PCW and, possibly, a message.
3. Key in V 000070 and press (ENTER) to find the address of the Master Control Block (MCB) and the Dump program. The display will show V 000070 AAAA\*\*\*\* \*\*\*\*. AAAA is the address of the MCB.
4. Key in V 00AAAA and press (ENTER). AAAA is the value displayed in Step 3. The display will then show V 00AAAA \*\*\*\*Z where ZZZZ is the address of the desired Dump program.
5. Key in W and press (ENTER) to display the current PCW. Key in M 000ZZZZ 00000000 and press (ENTER). ZZZZ is the address of the Dump program from Step 4.
6. Subtract hex 02 from ZZZZ from Step 5 to get YYYY. Key in V 00YYYY and press (ENTER). The dump device address is displayed (QQQQ\*\*\*\* \*\*\*\*). If your configuration includes tape drives, the default dump device is the tape drive with the lowest numeric logical device number. Note that this may not be the lowest numeric physical device address. For example, if ZZZZ (from Step 4) had been 04DA, the dump device address must be specified at virtual address 04D8 (04DA-02).

QQQQ is in the format BBBI IIPP PPPP PPPP

where: BBB = Bus Adapter Number (001 = BA #1)  
(010 = BA #2)

III = IOP Number (000 = IOP slot 0)  
(001 = IOP slot 1)  
(010 = IOP slot 2)  
(011 = IOP slot 3)  
(100 = IOP slot 4)  
(101 = IOP slot 5)  
(110 = IOP slot 6)  
(111 = IOP slot 7)

PP PPPP PPPP = Port Number.

For example, if QQQQ = 2401, the drive is located on Bus Adapter #1, IOP slot #1, and Port #1

BA1	IOP1	Port1	
BBBI	IIPP	PPPP	PPPP
0010	0100	0000	0001
2	4	0	1

If your configuration does not include tape drives or you want to override the default device, you must calculate the address as shown above and then respecify by keying the calculated value (in this case M 2401) and pressing (ENTER). If the device specified is a disk, be cautioned that the dump procedure will destroy the disk's VTOC.

7. Key in X and press (ENTER) to exit from Control Mode and begin execution of the Dump program.
8. The program will reenter Control Mode to request that the first (or next) dump volume be mounted. W \*\*\*\*\*4001\*\*\*\*\* is displayed. Key in M \*\*\*\*\* 0000\*\*\*\*\* and press (ENTER). Then key in X followed by (ENTER). This clears the Control Mode bit and the message code and starts the dump. Physically mount the requested volume. Execution of the Dump program begins when it detects that the device is ready.
9. The Dump program will continue dumping for a short time. It may reenter Control Mode for one of three reasons:
  - A. The dump has successfully completed. This is indicated by the display W \*\*\*\*\* C000C000. Dismount the dump volume and proceed to Step 10.
  - B. An I/O error has occurred. This is indicated by the display W 00000004 C000\*\*\*\*\*. The dump cannot continue, but a partial dump has been completed. Dismount the dump volume and proceed to Step 10.
  - C. The mounted volume is full. Another dump volume is required. This is indicated by the display W \*\*\*\*\* 4\*\*\*\*\*. Dismount the full volume and proceed to Step 8 to mount another volume.
10. Re-IPL the system. Verify all disk (not diskette) VTOCs by running the LISTVTOC utility (see VS Utilities Reference). Print the I/O Error Log. If you dumped to a disk, contact your local Wang sales office to copy the disk to tape. Mail to Quality Assurance the tape, the I/O Error Log, a Software Problem Report Form (800-5104), the recorded line from Step 2, and the problem report describing the circumstances of the problem. The mailing address is as follows.

WANG QUALITY ASSURANCE  
 (Software Support) MS 1363  
 WANG LABORATORIES, INC.  
 One Industrial Avenue  
 Lowell, Massachusetts 01851

If Condition 9B occurred, also include a note explaining that the dump is partial.

### 9.3 SYSTEM CONTROL MODE ERROR MESSAGES

Messages such as KEY ENTER TO START DUMP or MOUNT ANOTHER DISKETTE will appear only if the microcode for workstation #0 is loaded. If microcode is not loaded, the program will use Control Mode stops with the message codes indicated below.

The operating system's initialization code has been updated to convert error messages to control mode stops. If any of the following error conditions occur, the PCWs indicated will be displayed. If microcode is loaded, one or more of the following messages may be displayed at Workstation #0.

<u>Message</u>	<u>Unique PCW (in Hex)</u>
<b>IPL Error Message</b>	
IPL I/O ERROR	00000001 FFFFFFF0
NO SYSTEM FILE ON VOLUME	00000002 FFFFFFF0
BAD VTOC ON IPL'D VOLUME	00000003 FFFFFFF0
NOT ENOUGH MEMORY FOR RESIDENT SYSTEM	00000012 FFFFFFF0
IPL PROGRAM CHECK	
No message is displayed (CP3 system on CP4, or CP4 system on CP3)	00FFFFFF FFFFFFFF
<b>Resident System Initialization Errors</b>	
SYSINIT I/O ERROR--OPERATING	00000011 FFFFFFF0
SYSINIT PROGRAM CHECK	00000013 FFFFFFF0
IPL DEVICE NOT INCLUDED IN SYSGEN	00000014 FFFFFFF0
<b>Machine Check Error Messages</b>	
MAIN MEMORY PARITY ERROR	00000021 FFFFFFF0
I/O PROCESSOR MALFUNCTION-DEVICE	00000022 FFFFFFF0
I/O PROCESSOR MALFUNCTION-TIME OUT	00000023 FFFFFFF0
<b>Non-Resident System Initialization Errors</b>	
OPERATING SYSTEM FILE (@SYSSVC@) NOT FOUND	00000031 FFFFFFF0
PAGING FILE FOR TASK 0 CANNOT BE CREATED/SCRATCHED (VCB has return code from CREATFDR/SCRATCH SVC)	00000032 FFFFFFF0
LINK TO SYSGEN MODULE FAILED (for dynamic sysgen only)	00000033 FFFFFFF0

**PART II**  
**SYSTEM PERIPHERAL DEVICES**

## CHAPTER 10 SYSTEM POWER-UP AND POWER-DOWN PROCEDURES

### 10.1 VS POWER-UP AND POWER-DOWN PROCEDURES

Different VS power-up and power-down procedures are recommended depending on the unique installation requirements. Check with your local Wang Field Service representative to find out which procedure is best for your installation. This chapter describes a standard power-up procedure, a start-up from Control Mode, a standard power-down procedure, and a special power-down procedure to be performed in the case of a power failure.

The following is the standard VS power-up procedure. To power-up a device, turn the power switch to the ON position. For ease in locating the device power switches, refer to the chapters on the particular devices in this manual.

#### Standard Procedure for Powering-Up a VS System

1. Power-up all workstations and printers.
2. Power-up the CPU. The switch is located on the lower left of the back panel of the VS processor and on the lower right front panel of a VS-100 processor.
3. Power-up the tape drives, if any.
4. Power-up the disk drives one at a time. On 2265Vs the AC Power switch should be turned on first, then the Power Supply switch.
5. Load the Read/Write heads on the disk drives by pressing the START button on the front panel. Wait at least 5 seconds before pressing the START button of the next drive.

If the processor is a VS-100 model, you must also load the system microcode. This is done by pushing the Bootstrap button, which is the left most button on the upper right of the front-processor panel.

- Bootstrap
- Initialize
- Load
- Control

The load is successful if the second light from the left on the indicator panel (lower right front of processor) is steadily lit. If that light is blinking, remove and reinsert the minidiskette that is located below the light indicator panel. (To get at this drive, you must remove the processor front cover.) If the light still blinks, call your local Wang Field Service representative.

6. Perform an Initial Program Load (IPL). To IPL, press the Control Mode button on the upper right front of the processor. Then press the Initialize button on the upper right front of the processor. Workstation #0 will display CONTROL MODE F 04. The code displayed after the words CONTROL MODE indicates which device will be used by the IPL as the system volume. The letter F or R indicates whether the volume is fixed or removable. The hexadecimal digits indicate the device number. F 04 is the provided default.
  - A. If the processor is a VS model, either accept the default F 04 and press ENTER or respecify the code. To respecify the code press the BACKSPACE (or NEWLINE) key to reposition the cursor, key over F 04, and press ENTER. The device number must be less than 32.
  - B. If the processor is a VS-100 model, you must indicate the Bus Adapter number, IOP number, and Port number of the device to be used. To calculate this, follow the format:

```

BIII  PPPP
where:  B = 0 for BA #1
         1 for BA #2
        III = 000 for IOP #0
           001 for IOP #1
           010 for IOP #2
           011 for IOP #3
           100 for IOP #4
           101 for IOP #5
           110 for IOP #6
           111 for IOP #7
        PPPP = 0000 - 1111 for device #0-15.

```

For example, device #4 on IOP #3 on BA #2 would be:

	BA2	IOP3	Port 4
	BIII	PPPP	
Binary:	1011	0100	
Hex:	B	4	

So, to indicate that the system volume to be used by IPL is the removable pack on BA #2, IOP #3, Device #4, enter R B4 and press ENTER.

7. The system will then prompt you to set the date and time. Enter this information.

8. The system will next prompt you for the name of the configuration file to be used. (When the system was generated by a Wang Field Service representative, multiple configuration files may have been created, if requested. This could be useful, for example, if for testing purposes you only needed a minimum configuration. You could, at IPL time, specify the minimum configuration filename, and thereby bring the system up with only the defined minimum configuration.) Enter the configuration file information and press ENTER. The system, after a temporary pause, is now up and running.

#### Standard Procedure for Powering-Down a VS System

To power-down a system, there are two basic options--a complete or a partial power-down. The complete power-down procedure for an active system follows.

- 1A. Inhibit further logons through PF 6 (INTERACTIVE Tasks) on the Operator's Console Menu. (Refer to Chapter 4 of this manual for an explanation of the inhibit logon process.) Notify all users to logoff the system. Use PF 6 of the Operator's Console Menu to verify that they have done so.
- 1B. Inhibit execution of any pending background procedures by pressing PF 3 (PROCEDURE Queue) of the Operator's Console Menu. Change the status of all procedures in the queue to HOLD. This will prevent any procedures from running once the currently executing procedure has completed. Once the in-progress procedure is completed, proceed to Step 2.
- 2A. Idle all printers by changing their status through the PRINTERS option (PF 9) of the Operator's Console.
- 2B. De-activate the background task through the Control Proc Initiation command of the Non-Interactive Tasks Control of the Command Processor.
3. Power down all workstations.
4. Press the Control Mode button on the upper right corner of the processor. Ensure that Workstation #0 displays XXXXXXXX 87XXXXXX. (The Xs are of no consequence for this procedure.)
5. Unload the tape drives, if any, by pressing the Online and then the Rewind button. After the tape has reached the load point, press the Rewind button again. Then, power-down each tape drive.
- 6A. Unload disk Read/Write heads by pressing the Start button on each drive.
- 6B. Power-down each disk drive.
7. Power-down the processor.

If you are performing a partial power-down, you can leave the system in Control Mode without powering down every device. For this procedure, perform Steps 1-4, and Step 6A.

To bring the system up from a complete power-down, follow the complete standard procedure for powering-up a system described above. To bring the system up from a partial power-down, follow Steps 6-8 of the standard power-up procedure.

#### Power Outage Procedure for the VS

In the event of a power failure, the following power-down procedure should be followed:

1. Press the START button on all disk drives that were in use, i.e., on which Read/Write heads were loaded. (Unless a hardware malfunction occurs or the processor loses power before the disk drive, the Read/Write heads will retract automatically whenever a power outage is sensed. Pressing the START button sets a latch so that the drives will not start automatically when power is restored.)

(Steps 2-6 should be performed for surge protection when power is restored.)

2. Power-down all disk drives. On/Off switches for the 2260V and 2280V disk drives are located at the base of the back panel. On 2265V drives, open the back panel and turn off both the Power Supply switch and the AC Power switch. Be careful not to disturb any system cables when walking in back of the equipment.
3. Press the Power button on any tape drives that were active to insure that they will be OFF when power is restored. Any tapes that were operational should be manually wound forward several feet on the lower reel to restore tension.
4. Power-down the processor by turning off the Power Supply switch located at the lower left of the rear panel on a VS-80 and at the lower right of the front panel on the VS-100.
5. Power-down all printers. The Power switch for matrix and daisy printers is located on the rear panel; on band printers the Power switch is at the base of the front cover on either the left or the right side (depending on the model); line/chain printer Power switches are located at either the base of the back panel or on the top panel.
6. Power-down all workstations by setting the toggle switch on the lower back panel to OFF (down).

When power is restored, follow the Standard VS power-up procedure.

#### 10.2 IMPORTANCE OF FOLLOWING THE CORRECT POWER PROCEDURES

Failure to power the system up and down correctly may result in media information destruction. In all of the above procedures it is essential that the processor be powered on before and off after the disk and tape drives and that the disk Read/Write heads be unloaded before powering off any part of the system.

The following is a summary of general rules that must be followed when powering a system up or down.

1. Always power the processor on before and off after the disk and tape drives.
2. Do not power the processor on or off while the disk Read/Write heads are loaded. Always unload the disk Read/Write heads before powering any part of the system off.
3. When loading disk Read/Write heads, wait at least 5 seconds before pressing the START button on the next drive.
4. Do not press the START button on a disk drive while a file on that drive is open.
5. Avoid electrical interference, such as use of 2-way radios in the computer room or plugging a power tool into the system power circuit.
6. Maintain computer room temperatures between 60 and 80 degrees Fahrenheit. Humidity should be 40% to 60% in the equipment area and 35% to 65% in the storage area.

A Volume Table of Contents (VTOC) resides on Cylinders 0 and 1 of each disk pack. When the Read/Write heads are loaded but not performing any I/O operations, they are positioned at rest above Cylinder 0. Because power fluctuations may occasionally cause spurious Write operations, VTOC integrity may be destroyed if any part of the system is powered up or down while the heads are thus positioned. The problem may be compounded on 2260V and 2280V drives, because the VTOCs on both the fixed and removable platters may be destroyed simultaneously.

Two symptoms of a damaged system VTOC are I/O errors upon IPL and a continually blank screen on Workstation #0 after IPL. Although many of the original files may remain intact, the VTOC will be inaccessible. If this condition occurs, contact your local Wang Service representative, who may recommend that you mount and run off of the backup pack.

In addition to this VTOC integrity problem, other conditions may cause the writing of random blocks of data to the disk. These conditions include:

- . Power failures, surges, or power fluctuations in the supply lines
- . A circuit breaker tripping on either the processor or a disk drive or on a workstation with a file open
- . A hardware malfunction

## CHAPTER 11 WORKSTATIONS

### 11.1 INTRODUCTION

The operator communicates with the VS system through the VS workstation. The VS workstation consists of a 12 inch Cathode Ray Tube (CRT) and a keyboard. The CRT is capable of displaying 24 rows of 80 characters each. The keyboard includes a standard typewriter keyboard, a compact numeric keypad, and 16 programmable function keys. Five models of the VS workstation are available: the 2246S Serial Workstation, the 2246P Parallel Workstation, the 2246R Remote Workstation, the 2246C Combined Workstation and the 2266 Archiving Workstation (AWS). All models of the VS workstation have the same CRT, and all have the same keyboard except for the 2246C Combined Workstation and the 2266C Combined Archiving Workstation which have special function keys and function as both data processing and word processing workstations. In addition, certain special applications workstations are available (see Section 11.4).

### 11.2 THE CATHODE RAY TUBE (CRT)

All VS workstations use a 12 inch CRT for data entry and display. The CRT screen can be adjusted for optimal visibility in different lighting conditions by means of the brightness and contrast controls which are located to the lower right of the workstation screen. The CRT is capable of displaying characters in either low intensity (dim), high intensity (bright), or blinking. These three display modes are used to indicate different conditions on the CRT.

Fields are divisions of the screen formatted under program control into discrete regions; they can be presented with any display characteristics. The system uses different display characteristics to indicate different conditions. Fields are usually indicated in the following manner:

- . Protected fields (not modifiable by the user). In all system menus and prompts, protected fields are displayed with low intensity. Protected fields are used to display information or instructions to the user.
- . Modifiable fields. Modifiable fields are displayed with high intensity. In addition, all blank characters are displayed as pseudoblanks (solid blocks). Modifiable fields are used to receive user data. As data is keyed into a modifiable field, the default values and/or pseudoblanks are replaced by the entered characters.

- . Blinking-Modifiable characters are blinked to indicate a field in error. Protected fields are sometimes blinked to call attention to error messages.

The cursor, a special symbol resembling a blinking underscore character, is displayed beneath a character position to indicate where the next character entered by the user will be displayed. If the cursor does not appear on the screen, the keyboard is locked and no data can be entered.

The VS workstation's ON/OFF toggle switch is located in the back of the workstation. The workstation is turned on by putting the ON/OFF switch in the up or ON position. The VS workstation also features an audio alarm that produces a short beep whenever an illegal keying operation is attempted or when an application program produces it. Illegal operations include attempts to enter data in a protected field, to move the cursor beyond the screen with a field-sensitive key, or to enter data while the keyboard is locked. The audio alarm's sound level can be adjusted by using the control marked TONE, which is located in the back of the workstation next to the ON/OFF switch. Next to the TONE control is a control knob marked CLICKER which controls the volume of the clicking that is produced by pressing any of the data entry keys.

### 11.3 THE KEYBOARD

The standard workstation keyboard is divided into a number of areas or zones, each containing a group of keys dedicated to certain types of operations. The largest area is the typewriter like character entry area, which is used to enter alphabetic, numeric, and special characters into the display. Immediately adjacent to the character entry keys is a block of character edit keys, which allow easy editing of the display. Across the top of the keyboard is a row of 16 user-programmable function keys, which can be used in upper- and lowercase to provide single-keystroke access to 32 user- or system-defined functions. A compact numeric keypad provides a convenient means of entering numeric data.

The workstation keyboard is the user's primary means of communicating information to the system. The keyboard keys are divided into the following functional groups:

- . Data entry keys
- . Cursor positioning keys
- . Special-purpose keys
- . System communication keys

#### 11.3.1 Data Entry Keys

The data entry keys provide the means for entering data at the current cursor position on the screen. The cursor must, however, be positioned within a modifiable field; otherwise, the keystroke is not honored and the alarm is sounded. The keys in this group include:

- Normal Character Keys -- Include letters, numbers, and special characters. In general, these keys function exactly as typewriter keys; SHIFT and LOCK can be used to obtain uppercase symbols. If the cursor is positioned in a numeric-only field and any key other than (0-9), (-), (+) or (.) is struck, the alarm sounds and the keystroke is rejected. When the cursor is in the last position of a field and one of the character keys is struck, the character is entered at that location and the cursor is automatically positioned at the next modifiable field (even if this involves skipping one or more lines or columns). If there are no more modifiable fields, the workstation alarm sounds and the cursor does not move.
- ERASE -- Sets to blanks the cursor location and all locations following it within the same field. Locations preceding the cursor are not changed. The cursor is not moved.
- INS (insert) CHAR -- Inserts a blank in the display at the current cursor position and automatically shifts all characters in the current field one location to the right, starting at the current cursor position. If the last character in the field is a blank or pseudobank, this character is lost. If the last character is not a blank or pseudobank, the keystroke is not honored and the alarm sounds.
- DEL (delete) CHAR -- Deletes the character at the current cursor position and shifts all characters in the field one location to the left after the current position. A blank is inserted in the last position in the field.

### 11.3.2 Cursor Positioning Keys

Cursor positioning keys are used to move the cursor to a desired location on the screen. They consist of two types: non-field-sensitive and field-sensitive.

#### Non-Field-Sensitive Cursor Positioning Keys

These keys position the cursor without regard for the presence of particular fields. They can be used to position the cursor at any location on the screen. There are four keys in this group; all provide the automatic repeat feature, which causes keystrokes to be entered continually while the key is pressed:

- Up arrow (↑) -- Moves the cursor up one row in the same column. If positioned in the top row, the cursor moves to the bottom row in the same column.

Down arrow (↓) -- Moves the cursor down one row in the same column. If positioned in the bottom row, the cursor moves to the top row in the same column.

Right arrow (→) -- Moves the cursor one location to the right in the same row. If positioned at the end of a row, the cursor moves to the beginning of the next row. If positioned at the end of the bottom row, it moves to the beginning of the top row.

Left arrow (←) -- Moves the cursor one location to the left in the same row. If positioned at the beginning of a row, the cursor moves to the end of the preceding row. If positioned at the beginning of the top row, it moves to the end of the bottom row.

### Field-Sensitive Cursor Positioning Keys

These keys normally move the cursor two or more positions with a single keystroke. They are used to position the cursor at a new field or new line; they are especially useful in data entry, since they always position the cursor at a modifiable location. There are four keys in this group:

TAB -- Positions the cursor at the next tabable position on the screen. A tabable position is either the first character of a modifiable field, a preset tab column within a modifiable field, or the first character of a protected numeric-only field. If the cursor is positioned at the last tabable location on the screen, the alarm sounds and the cursor does not move.

BACK TAB -- Positions the cursor at the closest first byte of a modifiable field preceding the current cursor location. If the cursor is in a modifiable field and in other than the first location, the cursor moves to the start of that field. If there is no preceding modifiable location, the alarm sounds and the cursor does not move.

NEW LINE -- Advances the cursor to the first position of the next line and positions it at the first modifiable position at or following the start of the line. The cursor may therefore be positioned several lines from the original position. If there is no modifiable location at or following the start of the next line, the alarm sounds and the cursor does not move.

HOME -- Positions the cursor at the first modifiable location on the screen. If there is no modifiable location on the screen, the alarm sounds and the cursor does not move.

### 11.3.3 Special-Purpose Keys

There are three keys used for special actions:

SHIFT -- Causes basically the same action as it does on a typewriter. For keys with uppercase and lowercase characters on the key face, SHIFT always determines which of two characters is entered. For keys with only a single character on the key face, SHIFT has no effect.

SHIFT also has no effect when letters are entered into a field designated as uppercase only. In this instance, uppercase letters are entered whether SHIFT is pressed or not. A small lamp immediately to the left of SHIFT is lighted whenever SHIFT is pressed. Pressing SHIFT when the keyboard is locked in uppercase turns the SHIFT lamp off and unshifts the keyboard.

SHIFT-LOCK -- Causes the keyboard to behave as if SHIFT were being continuously pressed. When pressed, LOCK causes the SHIFT lamp to be lighted. Pressing LOCK again does not unlock the SHIFT key; pressing SHIFT, however, turns off the SHIFT lamp and unshifts itself.

RESET -- Causes all Field Attribute Characters on the screen with a blink indication to be reset to high intensity, nonblinking. RESET is effective even when the keyboard is locked.

### 11.3.4 System Communication Keys

All the keys thus far discussed operate exclusively on the contents of the workstation screen; in no case do they affect the contents of memory or any external files. A special group of keys enables the user to communicate interactively with the system; they also indicate that the controlling program may not process the data entered, and can be used to request special assistance from the system. Each of these special keys presents an interrupt to the system, requesting the system to service the workstation at once. In addition, a special control character called Assistance ID (AID) is generated by each of the system communication keys. This character identifies the key used to initiate the interrupt. It can be examined under program control.

When a system communication key is pressed, all keys (except RESET and HELP) are locked and the cursor is removed from the screen. If any one of the locked keys is pressed, the alarm sounds. The system communication keys are:

ENTER -- The normal means of terminating user entry and requesting the program to process data. SHIFT does not affect the action of ENTER, and ENTER is not honored while the keyboard data entry keys are locked.

- PROGRAM FUNCTION (PF)** -- The 16 PF keys act the same as the ENTER key, except that each key generates a unique character. A controlling program can therefore examine the character to determine which PF key was struck. The values of the PF keys are affected by SHIFT: the lowercase values are PF 1 to PF 16 and the uppercase values are PF 17 to PF 32.
- HELP** -- Always invokes the Command Processor Menu on a user workstation. HELP remains active even when the data entry keys are locked, and it may be used at any time to interrupt a running program and obtain access to the Command Processor Menu. (HELP is not active if the user has been HELP-disabled by an operator or a system security administrator; see the VS System Management Guide.) HELP does not alter the status of the interrupted program, nor does it cause information that has been entered into the display to be released for processing. (The screen contents are saved in a work buffer and returned to the screen when normal processing is resumed.)

#### 11.4 WORKSTATION MODELS

The 2246P (Parallel) Workstation and 2246S (Serial) Workstation are functionally identical. However, the 2246P Parallel Workstation is supported on the VS-60/-80 only. No parallel devices are supported on the VS-100 or VS-50.

The 2246C (Combined) Workstation is supported by the same I/O Processors as the 2246S (Serial) Workstation. The difference between the S and C models is that the Combined Workstation is capable of operating in either a word processing or data processing mode. In addition to the normal workstation keyboard, the 2246 Combined Workstation has special operational keys for word processing functions. The 2246C Workstation also has 32K of Random Access Memory (RAM) instead of the 16K RAM that other workstations have. The 2256 Combined Workstation is identical to the 2246C, except that it has 64K of RAM instead of 32K.

The 2266 Serial and 2266 Combined Archiving Workstations (AWS) include a single diskette drive, connected to the workstation at a maximum cable distance of 25 feet (7.6 meters). The 2266 Serial AWS has a standard data processing keyboard and capabilities; the 2266 Combined AWS offers additional word processing capability with the same keyboard as the 2246 Combined Workstation. The diskette drive attached to the AWS may be a 2270V-1, which supports the standard VS 308KB hard-sectored diskette; a 2270V-2, which supports soft-sectored diskettes; or a 2270V-3 diskette drive, which uses both hard- and soft-sectored diskettes. Archiving workstations are available in five configurations. The 2266S-1, 2266S-2, and 2266S-3 consist of a serial AWS and a 2270V-1, -2 and -3 diskette drive, respectively. The 2266C-1 is a 2266C AWS and a 2270V-1 drive and the 2266C-3 is a 2266C AWS and a 2270V-3 diskette drive. For a description and operating instructions of these diskette drive models, see Chapter 12.

## 11.5 PREVENTIVE MAINTENANCE

Every 2 weeks, the following preventive maintenance routine should be carried out:

- . Check fan for proper operation by powering up the workstation
- . Dust keyboard
- . Clean case and face of the CRT with a soft cloth and a mild detergent, used sparingly. Be careful not to drip water into the keyboard.
- . Check workstation for proper operation

Do not leave the workstation powered-up when it is not in use. Do not use the high range of the Brightness control; the characters displayed will burn into the screen, leaving permanent faults in the CRT display. Be careful to leave the fan free of any covering or obstruction, and do not step on or crush the cables attached to the workstation. Never eat, drink, or smoke while using the workstation.

**CHAPTER 12**  
**MODEL 2270V DISKETTE DRIVES**

**12.1 INTRODUCTION**

This chapter provides instructions for operating the Model 2270V-0 Diskette Drive that is built into the CP cabinet of the VS. The information provided here also applies to the new Archiving Workstation Diskette Drives (2270V-1, -2, and -3).

The 2270V-1 drive reads and writes hard-sectored, single-sided, single-density diskettes. These diskettes, if purchased from Wang, have a white label and 32 sector holes and one index hole near the rim of the diskette. The 2270V-2 drive uses soft-sectored, single- or double-density, single- or double-sided diskettes. Wang soft-sectored diskettes have one hole near the rim and have red labels if double-sided and blue labels if single-sided. Single-sided, single-density diskettes have green labels. The 2270V-3 diskette drive can use either hard- or soft-sectored, single- or double-sided, single- or double-density diskettes. A single-sided, single-density diskette has a capacity of 308 kilobytes (Kb). A single-sided, double-density contains 616 Kb and a double-sided, double-density diskette has a capacity of 1232 Kb. Table 12-1 shows the different diskettes and the uses to which they can be put.

Table 12-1. Diskette Compatibility Table

Use	Diskette	
	Hard-Sector (single-sided single-density)	Soft-Sector (single- or double-density single- or double-sided)
WP Archiving	2270-0 2270V-1	
VP/MVP	2270V-0 2270V-1 2270V-3	
LVP		2270V-2 2270V-3
IBM		2270V-2 2270V-3
VS	2270V-0 2270V-1 2270V-2 2270V-3	2270V-2 2270V-3

## 12.2 LOADING DISKETTES

To load a diskette, complete the following steps:

1. Remove the diskette from its envelope, and check that the Write Protect hole in the diskette jacket is covered with a tab (Figure 12-1). If the Write Protect hole is uncovered, the diskette cannot be formatted. Refer to Section 12.4 for a discussion of the Write Protect feature.

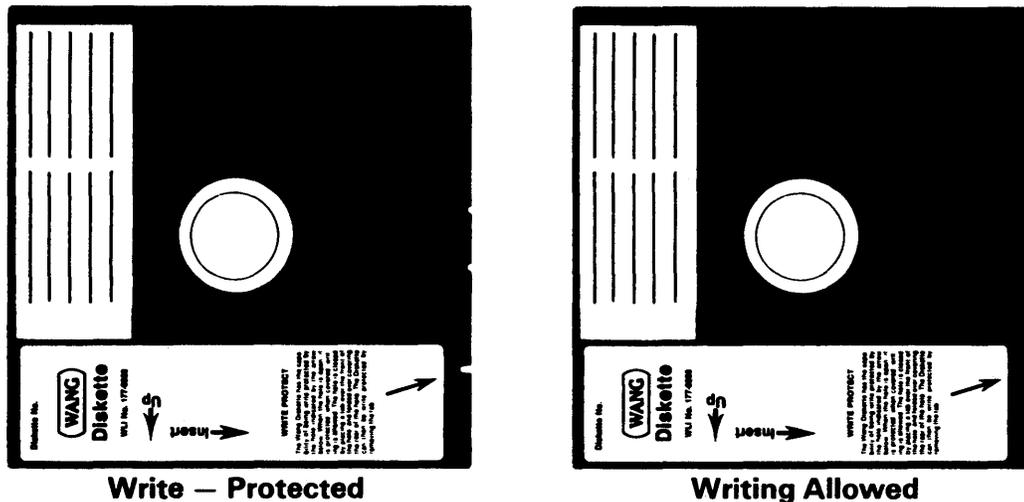


Figure 12-1. Model 2270V-0 Diskette, with Tab Covering the Write Protect Hole

2. Open the door of the diskette drive by pressing against the door latch located immediately to the left of the door (Figure 12-2). The door should slide open.
3. Insert the diskette into the open drive slot (Figure 12-2). Push the diskette into the drive slot until it catches and holds in the slot. The plastic jacket in which the diskette platter is sealed is labelled with arrows indicating the proper direction for mounting. Before mounting, be sure that the mylar recording disk moves freely within its jacket. Test for freedom of movement by pushing gently against the inner edge of the diskette; it should move and turn easily.
4. Close the drive door by sliding it to the left until it locks into place. Be sure the door is tightly closed.
5. To remove the diskette from the drive, press the door latch. The drive door automatically slides open, and a spring-loaded release mechanism ejects the diskette about halfway out of the drive slot.

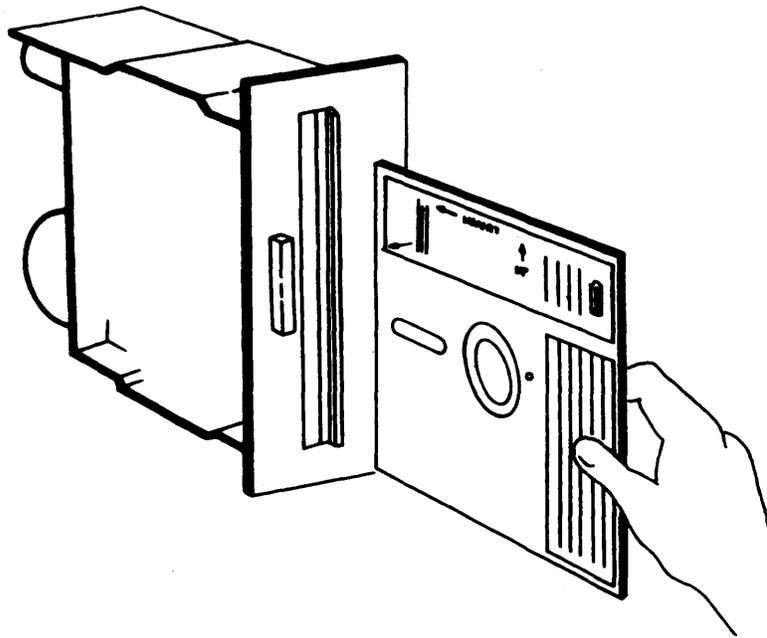


Figure 12-2. Mounting a Diskette

### 12.3 FORMATTING DISKETTES

To format a diskette for use in data processing, run the DISKINIT utility. (See VS Utilities Reference Manual.) Once formatted, the diskette is ready to record programs and data.

To format a diskette for word processing on the VS, run the DISKINIT utility, then select the option "Prepare Archive Diskette" from the Document Filing submenu of the Word Processing Menu.

### 12.4 THE WRITE PROTECT FEATURE

Important programs and data recorded on a diskette should be protected against accidental erasure caused by overwriting or reformatting. The Write Protect feature is provided for this purpose.

A small hole punched near the edge of the diskette's plastic jacket controls the Write Protect mechanism (see Figure 12-3). When this hole is uncovered, the diskette is write protected. No information can be recorded on a protected diskette, nor can the diskette be formatted. Information already stored on the diskette can, however, be read in the normal fashion. Any attempt to write on a protected diskette elicits a message saying the diskette is protected.

The Write Protect feature is inhibited by covering both openings of the Write Protect hole with a folded tab (tabs are provided with each diskette for this purpose). The diskette may then be protected again at any time simply by removing the tab.

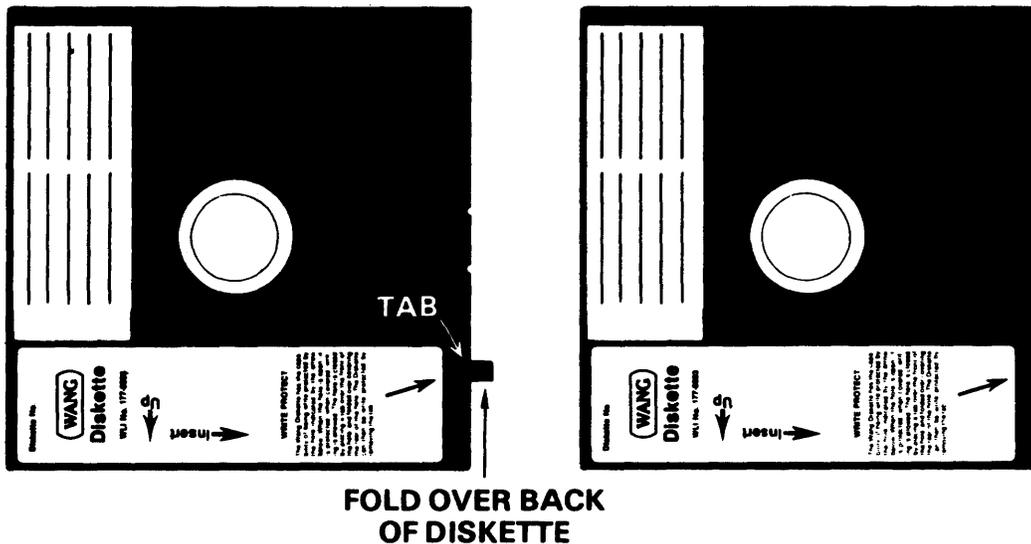


Figure 12-3. Model 2270V-0 Diskette Write Protect Feature

## 12.5 HANDLING AND STORAGE OF DISKETTES

Diskettes are light and compact, and may be easily stored in filing cabinets, on shelves, in boxes, etc., either lying flat or standing on edge. A diskette should always be stored in its envelope to inhibit the accumulation of dust on the recording surface.

The following suggestions apply to the handling and storage of diskettes:

1. Replace storage envelopes when they become worn, cracked, or distorted. Envelopes are designed to protect the diskette.
2. Keep diskettes away from magnetic fields and ferromagnetic materials that might become magnetized. Strong magnetic fields (greater than about 50 oersteds) may distort recorded data on a diskette.
3. Do not write on the plastic jacket with a ballpoint pen or lead pencil. Use a felt-tip pen.
4. Do not expose a diskette to high temperature or humidity, or to direct sunlight, for prolonged periods. The temperature range for storage of diskettes is 50°F to 125°F (10°C to 52°C), and the range of relative humidity is 8% to 80%.
5. Do not smoke when handling diskettes. The heat and contamination from a carelessly dropped ash can damage the diskette.

6. Do not touch or attempt to clean the diskette recording surface. Abrasion to the surface may cause a loss of stored data.
7. Replace diskettes by frequently copying to new diskettes or to the system disk. After continual use, a diskette may lose reliability.

**CHAPTER 13**  
**MODEL 2265V DISK DRIVES**

**13.1 INTRODUCTION**

This chapter provides information for operating the 2265V Disk Drive. There are two models of the 2265V: the 2265V-1, which stores 75 megabytes on 5 surfaces, and the 2265V-2, which stores 288 megabytes on 19 surfaces. Aside from capacity, the operating characteristics of the two models are identical.

**13.2 CONTROLS AND INDICATORS**

The drive has a control panel on the front of the machine and power switches and a running time meter at the rear. Figure 13-1 shows the controls, and Table 13-1 provides functional descriptions.

**13.3 OPERATING INSTRUCTIONS**

**13.3.1 Power-Up Instructions**

1. Set the AC POWER circuit breaker to ON. (If the pack is stored in the drive, the AC POWER breaker should be left ON to maintain cleanliness of shroud and pack.)
2. Set POWER SUPPLY circuit breaker to ON.
3. Install disk pack (refer to Section 13.3.3).
4. Press operator panel START switch.

The spindle motor energizes and the head loading sequence begins when the spindle is up to speed.

The head loading sequence is completed when the READY indicator stops blinking. The drive is now ready to receive a Read, Write, or Seek command from the control unit. The READY indicator is illuminated.

### 13.3.2 Disk Pack Handling

To ensure maximum disk pack life and reliability, observe the following precautions:

1. Store disk packs in machine-room atmosphere: 60°F to 80°F (15°C to 27°C), with 30% to 60% relative humidity.
2. If a disk pack must be stored in a different environment, allow 2 hours for adjustment to the computer environment before use.
3. Never store a disk pack in sunlight or a dirty environment.
4. Store disk packs flat, not on edge. They may be stacked with similar packs when stored.
5. Always be sure that the bottom plastic cover is on the disk pack whenever it is not actually installed in a drive.
6. When marking packs, use a pen or felt-tip marker that does not produce loose residue. Never use a lead pencil. Write on the label before it is applied to the disk pack.

### 13.3.3 Disk Pack Installation

The disk pack is installed in the following manner:

1. Raise the pack access cover. (AC POWER circuit breaker must be ON.)
2. Lift the disk pack by its plastic canister handle.
3. Disengage the bottom dust cover from the disk pack by turning the canister handle counterclockwise. Set the cover aside in an uncontaminated area.

— CAUTION —

Avoid abusive contact between the disk pack and the spindle. The Read/Write heads are sometimes manually positioned during maintenance procedures. Make certain the heads are fully retracted.

4. Place the disk pack onto the spindle.

NOTE

A spindle lock mechanism is activated when the disk pack canister cover is on the spindle. The mechanism holds the spindle stationary while a disk pack is loaded or unloaded.

5. Twist the canister handle clockwise to lock the disk pack in place. A click may be heard as the spindle lock mechanism engages.
6. Lift the canister clear of the disk pack, place the bottom dust cover on the canister, and set it aside in an uncontaminated area.
7. Close the front cover immediately to prevent entry of dust and contamination of surfaces.

#### 13.3.4 Disk Pack Removal

The disk pack is removed in the following manner:

1. Press the operator panel START switch to extinguish the START indicator.
2. Wait for the READY indicator to stop blinking.
3. Raise the front cover.

CAUTION

The read/write heads are sometimes manually positioned during maintenance procedures. Make certain that the heads are fully retracted.

4. Place the plastic canister over the mounted disk pack so that the post protruding from the center of the disk pack is received into the canister handle.

5. Twist the canister handle counterclockwise about 10 revolutions, until a clicking sound indicates that the disk pack is free of the spindle. Avoid abusive contact between the disk pack and the spindle assembly.
6. Lift the canister and disk pack clear of the spindle.
7. Close the front cover.
8. Place the bottom dust cover in position on the disk pack and lock it.

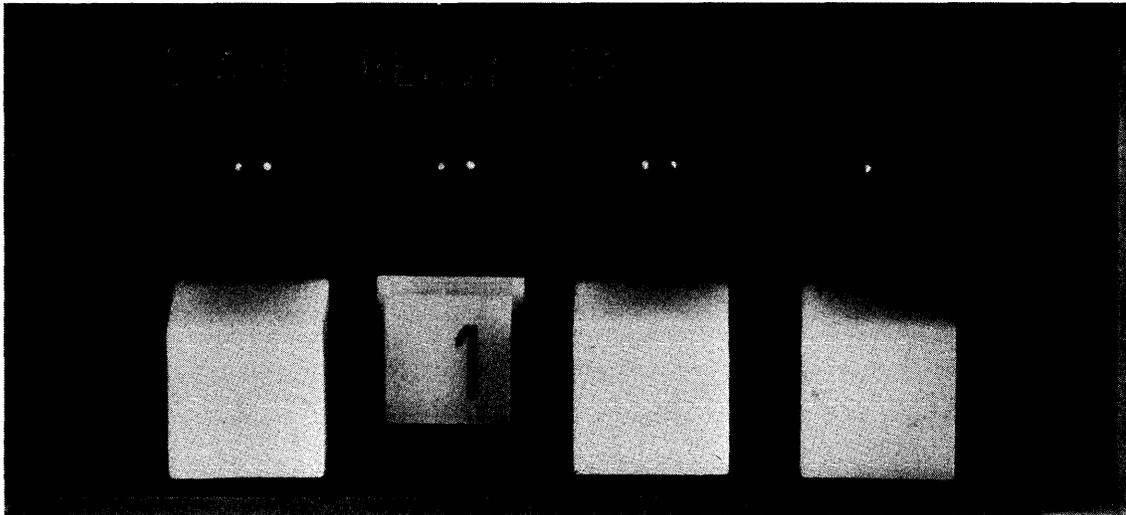


Figure 13-1. Model 2265V Disk Drive Control Panel

Table 13-1. Model 2265V Controls and Indicators

Control or Indicator	Function
<b>Operator Panel</b>	
<p><b>START Switch</b></p>	<p>Illuminates when pressed to start. Energizes the spindle drive motor and begins First Seek sequence, provided the following conditions are met:</p> <ol style="list-style-type: none"> <li>1. Disk pack is in place and canister removed.</li> <li>2. Pack cover is closed.</li> <li>3. Circuit breakers are ON.</li> </ol> <p>Causes a Power-off sequence when pressed a second time, to stop. Lamp is extinguished.</p>
<p><b>START Indicator</b></p>	<p>Illuminates when START switch is ON.</p>
<p><b>FAULT Switch</b></p>	<p>Clears the Fault circuitry and extinguishes the FAULT indicator. (Does not clear Maintenance Fault register.)</p>
<p><b>FAULT Indicator</b></p>	<p>Lights in response to one or more of the following conditions:</p> <ol style="list-style-type: none"> <li>1. Read and Write are selected at the same time.</li> <li>2. No AC Write current when Write Gate is present.</li> <li>3. More than one head is selected.</li> <li>4. Read or Write is selected while off cylinder.</li> <li>5. Low voltage condition sensed for <u>+5V</u>, <u>+20V</u>, and <u>+42V</u>.</li> <li>6. Loss of signal while heads loaded.</li> </ol>
<p><b>LOGIC Plug</b> (below READY indicator)</p>	<p>Completes circuitry to permit selection of the unit through a binary code.</p> <p style="text-align: center;"><b>CAUTION</b></p> <p>The LOGIC plug should not be changed or removed. It is used by service personnel only.</p>

Table 13-1. (continued)

Operator Panel (continued)	
Control or Indicator	Function
READY Indicator	Illuminates when the unit is up to speed, the heads are loaded, and no fault condition exists.
PROTECT Switch	Protects the disk pack from being written upon.
PROTECT Indicator	Illuminates when the PROTECT switch is ON.
Rear Panel	
AC POWER circuit breaker	Controls the application of AC power.
POWER SUPPLY circuit breaker	Controls the application of DC power to the logic chassis.
ELAPSED TIME Meter	Active when AC and DC power are applied by circuit breakers. Records accumulated AC power-on time.
Maintenance Panel (Back of Operator Panel)	
WRITE FAULT Indicator	Indicates a Write was attempted and no AC Write current and/or DC current was sensed.
HEAD SELECT FAULT Indicator	Indicates that more than one head was selected.
W.R. FAULT Indicator	Read and Write were selected at same time.
ON CYLINDER FAULT Indicator	Read or Write was selected while off cylinder.
VOLTAGE FAULT Indicator	Low voltage condition existed for <u>+5V</u> , <u>+20V</u> , <u>+42V</u> .

CHAPTER 14  
MODEL 2280V FIXED/REMOVABLE DISK DRIVES

14.1 INTRODUCTION

The 2280V Disk Drive is available in three models (the 2280V-1, -2, and -3), providing a total of 30, 60, and 90 megabytes of on-line storage, respectively. All three models have a 15-megabyte removable platter. In addition, the 2280V-1 has one 15-megabyte fixed platter; the 2280V-2 has one 15-megabyte and one 30-megabyte fixed platter; and the 2280V-3 has one 15-megabyte and two 30-megabyte fixed platters. The information in this section refers to all three drive models.

14.2 CONTROLS AND INDICATORS

The Power switch is located in the rear of the 2280V Disk Drive. Switches and indicators on the control panel (see Figure 14-1) are described in Table 14-1.

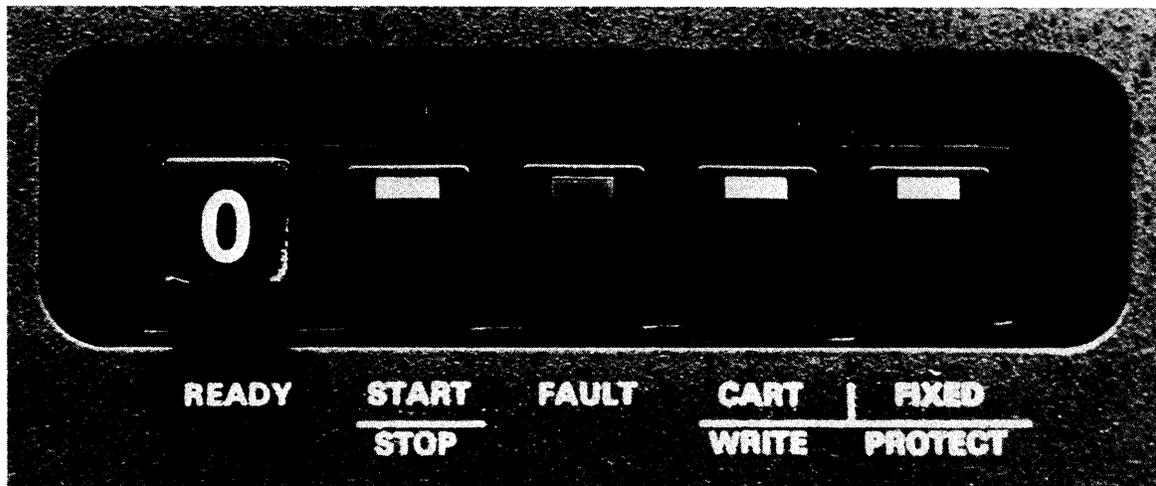


Figure 14-1. Model 2280V Disk Drive Control Panel

Table 14-1. Model 2280V Controls and Indicators

Control or Indicator	Function
START/STOP Switch	<p>When in START position, this dual-action switch energizes the spindle motor of the disk drive and puts the disk into operating mode, providing that the following conditions are met:</p> <ol style="list-style-type: none"> <li>1. The disk drive Power switch is ON.</li> <li>2. The disk cartridge loading door is closed and latched.</li> <li>3. The Fault indicator light is OFF.</li> </ol> <p>A Power-off sequence is initiated when the switch is in STOP position.</p>
START Indicator	This indicator illuminates when the START/STOP switch is in the START position and turns off when the switch is in the STOP position.
READY Indicator	This indicator is illuminated whenever the unit is up to speed, heads are loaded, and the FAULT indicator light is off (indicating there are no faults within the unit that require manual intervention). The READY light blinks throughout the spindle start and stop procedure.
FAULT Indicator	This indicator illuminates when a disk hardware error (fault) exists.
WRITE PROTECT CART Switch	This switch is inactive and is only used by Wang Service Personnel.
WRITE PROTECT FIXED Switch	This switch is inactive and is only used by Wang Service Personnel.

### 14.3 LOADING AND UNLOADING THE DISK CARTRIDGE

This section describes the procedure for changing the removable disk cartridge.

#### 14.3.1 Disk Cartridge Removal

1. If the Ready lamp is illuminated, press the START/STOP switch and wait about 30 seconds for the lamp to extinguish (indicating that the spindle motor has shut off). (When the Ready lamp is illuminated, the disk cartridge cannot be removed.)
2. After the Ready indicator ceases blinking and extinguishes entirely, open the disk cartridge access door by pulling back the door handle (Figure 14-2).

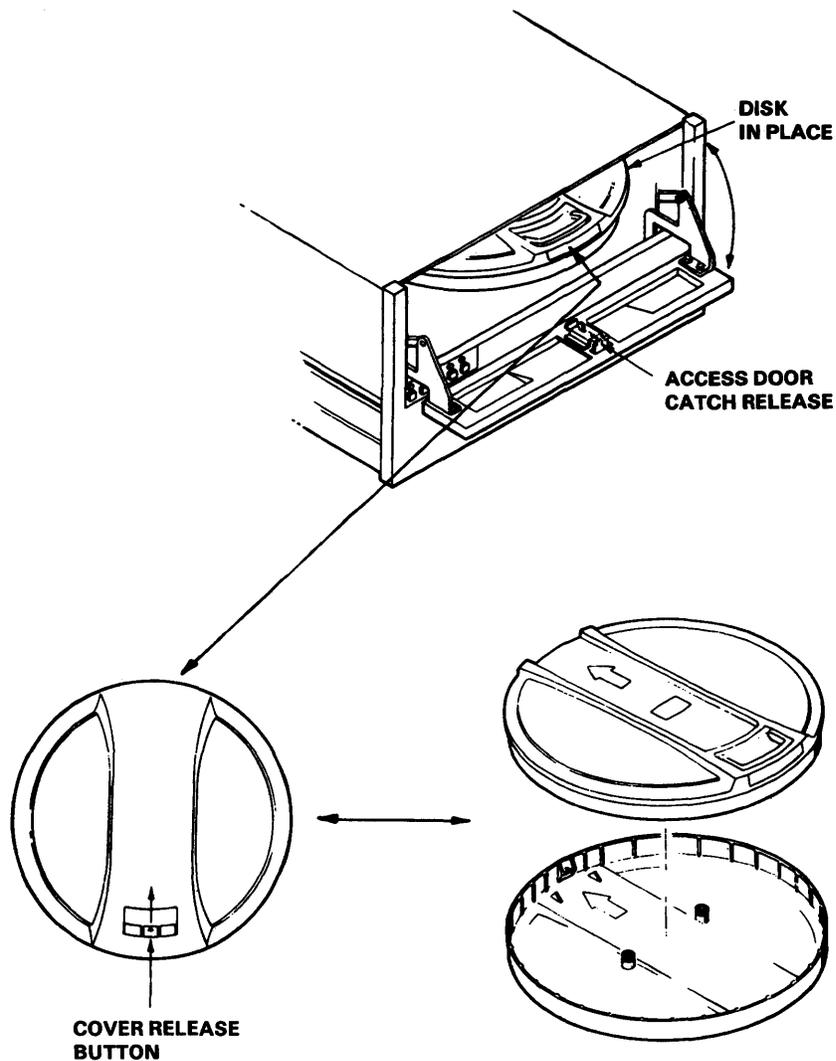


Figure 14-2. Disk Cartridge Installation and Removal

3. With a slight upward pressure on the cartridge handle, pull the cartridge out of the receiver.
4. Place the dust cover in position on the cartridge and fold it over the top handle. The handle may be swung out to carry the cartridge, but do not push the cover release button.

Turn the dust cover over and set the disk cartridge into it. (The arrow on the cartridge must be aligned with the arrow on the dust cover.) Apply pressure on the cartridge near the handle to lock the dust cover onto the disk cartridge. Cover and cartridge can now be carried as a unit by lifting the handle without touching the cover release button.

5. Close the access door if another cartridge is not to be installed.

6. Whenever a disk cartridge is removed from the disk unit, a replacement cartridge should be loaded in its place immediately. See Section 14.3.2.

#### 14.3.2 Loading a New Disk Cartridge

1. Make certain that the disk power is ON, and the START/STOP switch is set to STOP (Start lamp is extinguished). (A disk cartridge cannot be loaded when the disk is in the Start mode.)
2. Disengage the dust cover from the disk cartridge by simply pushing the cover release button toward the center of the cover. Set the cover aside.
3. Slide the disk cartridge into the receiver track with a slight upward pressure on the cartridge handle; be sure that the head opening is toward the rear of the unit.
4. Push the handle down and push the cartridge rearward until it stops.
5. Close the cartridge access door. The cartridge automatically slides into place on the spindle as the access door is closed.
6. Set the START/STOP switch to the START position to apply power to the spindle motor.

#### NOTE

If the spindle motor does not rotate, the disk cartridge access door may not be completely closed, the cartridge may not be properly seated on the spindle chuck, or the cartridge receiver/base may not be all the way down the lower chassis.

**CHAPTER 15  
TAPE DRIVES**

**15.1 INTRODUCTION**

This chapter describes the characteristics and operation of the 2209V Series Magnetic Tape Drives. The tape drives can be used for on-line storage of sequential files, file backup, and data transfer between non-VS computer systems and the VS. The functional characteristics of each model are shown in Table 15-1.

The drives of the 2209V Series accept tape reels up to 10.5 in. (26.9 cm) in diameter, containing up to 2400 ft (731.7 m) of 0.5-in. (1.27-cm) tape. Reading and writing occur in forward mode only. Reading speed is 75 inches/sec (192.3 cm/sec) and rewind speed is 200 inches/sec (512.8 cm/sec). The tape drive is vacuum-buffered to prevent tape breakage or distortion. Tapes can be processed with or without standard IBM or ANSI labels.

The 2209V Series drives (see Figure 15-1) contain dual-gap read-after-write heads that perform immediate write verification. Single-track read errors are corrected automatically through VRC parity reconstruction.

Table 15-1. 2209V Series Comparison

Model	Capacity	Recording Density	Data Transfer Rate
2209V-1 9-Track Magnetic Tape Drive	25 megabytes (with 2K blocks)	1600 bpi, phase encoded	120 kilobytes/sec
2209V-2 Dual- Density 9-Track Magnetic Tape Drive	25 megabytes @1600 bpi 12.5 megabytes @800 bpi	800 bpi NRZ1 or 1600 bpi, phase encoded	60 kilobytes/sec @800 bpi 120 kilobytes/sec @1600 bpi
2209V-3 Dual- Density 7-Track Magnetic Tape Drive	12.5 megabytes	556 or 800 bpi NRZ1	60 kilobytes/sec



Figure 15-1. Model 2209V Tape Drive

## 15.2 OPERATIONAL OVERVIEW

The Read/Write head on a 2209V Series drive is located between the vacuum columns, and is a stationary, one-section assembly (see Figure 15-2). The tape moves from the top (supply) reel through the top (supply) vacuum column, over the Read/Write head, through the lower (take-up) vacuum column to the machine (take-up) reel. The loop in each vacuum column acts as a buffer for the sudden start and stop motion of the tape. Switches in the vacuum columns control motors and brakes that permit the two reels to rotate independently.

Writing or reading of tape information occurs as the tape is moved across the Read/Write head (see Figure 15-3 and Table 15-2). Writing occurs at the write gap portion, and reading occurs at the read gap portion of the Read/Write head. Information is written on tape in blocks of one or more records. A tape block is defined or marked by an interblock gap before and after the block.

Minimum block lengths are 12 bytes for a Read operation, and 18 bytes for a Write operation. This minimum length was established to distinguish noise blocks from data blocks, but there is no machine check for compliance with minimum length. The maximum block size is 32K.

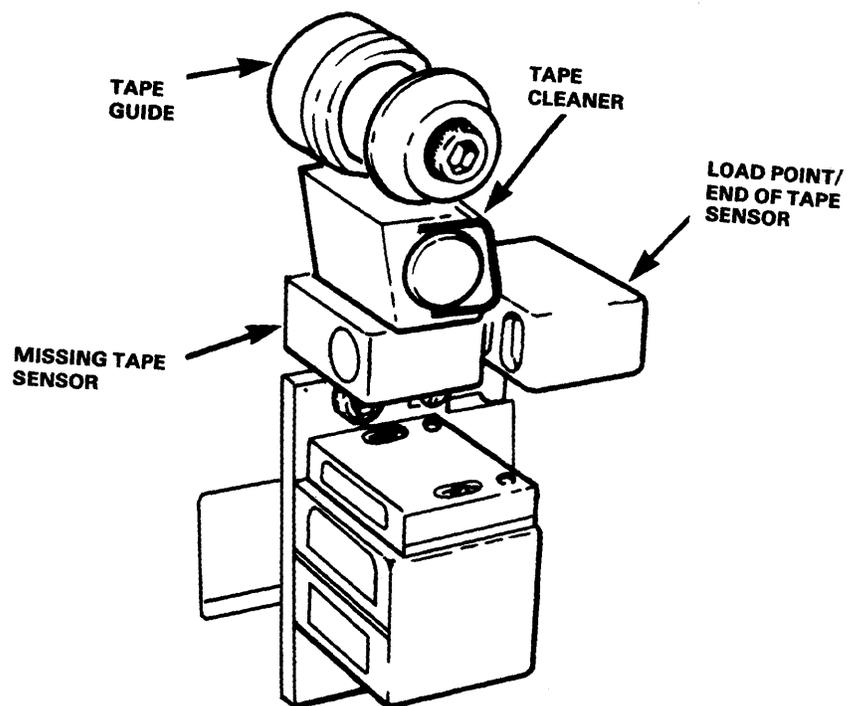


Figure 15-2. Head Assembly Detail

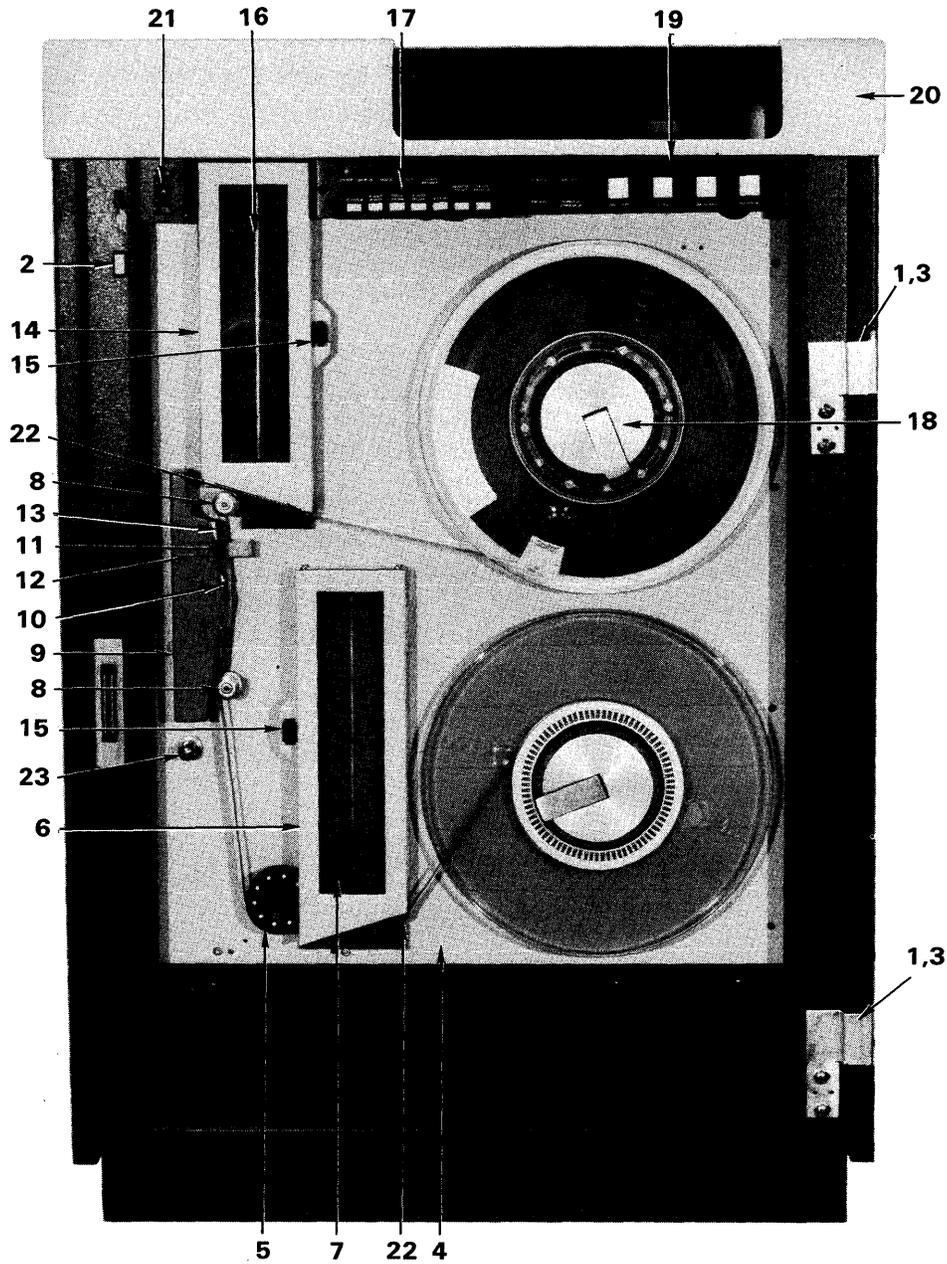


Figure 15-3. Model 2209V Tape Drive: Front View

Table 15-2. Parts List for Figure 15-3

Item	Description
1	Door Assembly (Removed)
2	Cover Latch/Release
3	Hinge Pin
4	Deck Assembly
5	Capstan
6	Take-up Column Cover
7	Take-up Vacuum Column Assembly
8	Split Tape Guide Assembly, Ceramic
9	Magnetic Head Cover
10	Head and Head Mount Assembly, 9 track
11	LP/EOT Photosensor Assembly
12	Broken Tape Photosensor Assembly
13	Tape Cleaner Assembly - Synthetic Sapphire Blade
14	Supply Vacuum Column Cover
15	Catch Vacuum Column Cover
16	Supply Vacuum Column Assembly
17	Test Panel Assembly
18	Reel Hub (part of deck assembly)
19	Pushbutton Control Panel Assembly
20	Control Panel Cover Assembly
21	Thumbwheel Switch for 1 to 4 parallel configurations (not presently offered)
22	Tape Guide
23	Adjustable Grip Latch

### 15.3 CONTROLS AND INDICATORS

To access the control panel and test panel (see Figures 15-4 and 15-5), push the cover latch release (2); the panel cover assembly (20) will rise, providing approximately 3-4 inches of clearance. The switches and indicators on the control panel are described in Table 15-3.

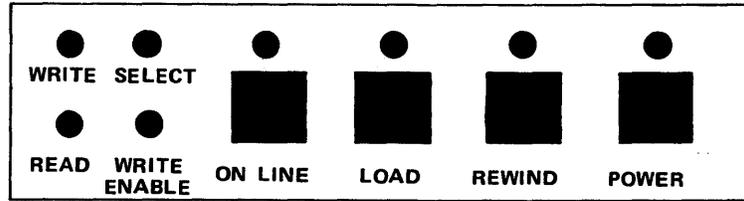


Figure 15-4. Model 2209V Tape Drive Control Panel

Table 15-3. Control Panel Switches and Indicators

Switch or Indicator	Function
WRITE Indicator	Illuminates when Write status is selected.
READ Indicator	Illuminates when Read status is selected.
SELECT Indicator	Illuminates when tape unit is on-line and selected.
WRITE ENABLE Indicator	Illuminates whenever a reel with a WRITE ENABLE ring is mounted on the supply hub.
ON LINE	A pushbutton that when first pressed, places the tape unit in an on-line condition. When the tape unit is on-line, it can be remotely selected. When this button is pressed a second time, it takes the tape unit off-line. The indicator illuminates when the tape is on-line.
LOAD	A pushbutton that activates the reel servos and starts the Load sequence. The indicator illuminates when the missing-tape sensor is satisfied that there is a tape to load.
REWIND	A pushbutton that activates the rewind operation only when the tape is taut and the unit is off-line. The indicator illuminates during either a local or a remote rewind operation. Pressing the REWIND pushbutton at load point initiates the Unload sequence.
POWER	The POWER switch supplies power to the tape drive when pressed once and removes the power when pressed again.

NOTE

The LOAD and REWIND pushbuttons are disabled when the tape unit is on-line.

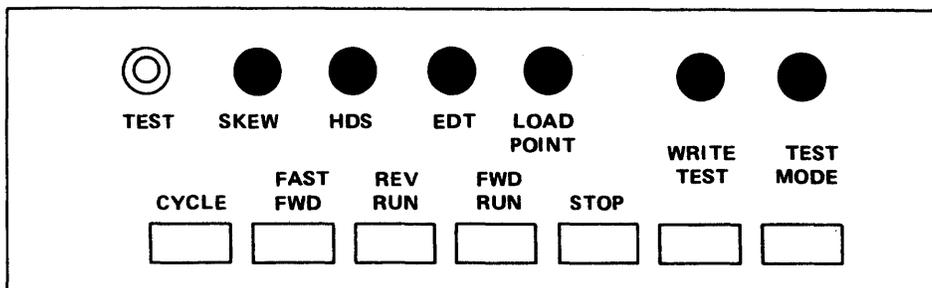


Figure 15-5. Model 2209V Tape Drive Test Panel

NOTE

The tape drive must be off-line and the STOP pushbutton pressed before the test panel can become functional.

Table 15-4. Test Panel Switches and Indicators

Switch or Indicator	Function
TEST point and SKEW Indicator	Illuminates if the tape skew exceeds the appropriate skew (Read or Write) gate setting.
HDS Indicator	Indicates that high-density mode (1600 BPI) has been selected, on a 2209V-2 drive only. On a 2209V-3, it indicates that 800 BPI has been selected.
EOT Indicator	Indicates when tape has reached or passed end-of-tape.
LOAD POINT Indicator	Indicates when tape is at load point.
CYCLE Pushbutton	An interlocked pushbutton that runs tape in alternating forward and reverse modes. This is useful for making ramp or vacuum sensor adjustments. Pressing the STOP pushbutton terminates this operation.
FAST FORWARD Pushbutton	An interlocked pushbutton switch that allows the tape unit to run forward at fast speed. Pressing the STOP pushbutton or the EOT indicator terminates this operation.

Table 15-4. Test Panel Switches and Indicators (continued)

Switch or Indicator	Function
REVERSE RUN Pushbutton	An interlocked pushbutton switch that allows tape unit to run in reverse at normal speed. Pressing the STOP pushbutton or the LOAD POINT indicator terminates this operation.
FORWARD RUN Pushbutton	An interlocked pushbutton that allows the tape unit to proceed forward at normal speed. Pressing the STOP pushbutton or the EOT indicator terminates this operation.
STOP Pushbutton	An interlocked pushbutton that terminates any test mode function currently in progress.
WRITE TEST Pushbutton and Indicator	A pushbutton that causes 1s to be written on all channels to facilitate write skew adjustment. WRITE TEST remains active in FORWARD RUN mode only. (STOP pushbutton must be pressed and TEST MODE selected to actuate this feature.) The indicator illuminates while the unit is in this mode.
TEST MODE Pushbutton and Indicator	A pushbutton that selects the Test mode and activates the test panel. Tape unit must be off-line and STOP pushbutton pressed before test panel will function. To exit from Test mode either press ON LINE or press STOP and then TEST MODE.

#### 15.4 MOUNTING AND DISMOUNTING TAPE REELS

##### 15.4.1 Mounting a Tape Reel

To mount a tape reel, make sure the unit is OFF LINE and proceed as follows (see Figures 15-3 and 15-6):

1. Remove the reel of tape from its canister or ring. Hold the reel by its rigid central hub.
2. Open the cover of the tape unit (finger grip at left center of cover) and unlock the tape hub latch (Item 18 in Figure 15-3) for the supply reel by pulling the latch in the center. It remains open.
3. Place the tape reel (with or without a WRITE ENABLE ring) over the supply reel hub, so that it touches the reel hub only. To write on a tape, be sure to insert a WRITE ENABLE ring in the back of the reel. Be sure that the side of the tape with the WRITE ENABLE ring in it is facing away from you when mounting the tape.

4. Press the protruding end of the Latch knob back into position to hold the tape onto the hub. The snap action of the latch is felt as it locks.
5. Pull out about 4 feet of tape leader and thread the leader over the upper guide (8) and past the read/write head (10).
6. Pass the leader beneath the capstan (5) to the right of the capstan guide (22) and over the take-up reel guide. Wrap the tape leader clockwise around the take-up reel.
7. Hold the end of the tape against the hub of the take-up reel and turn the reel until the tape end is overlapped and secured by the next tape winding. You must wind up enough slack for the unit to rewind slightly when the tape becomes taut during a Load sequence.
8. Close the cover of the tape unit and push POWER. When the Power lamp is illuminated, AC power is available to the unit.

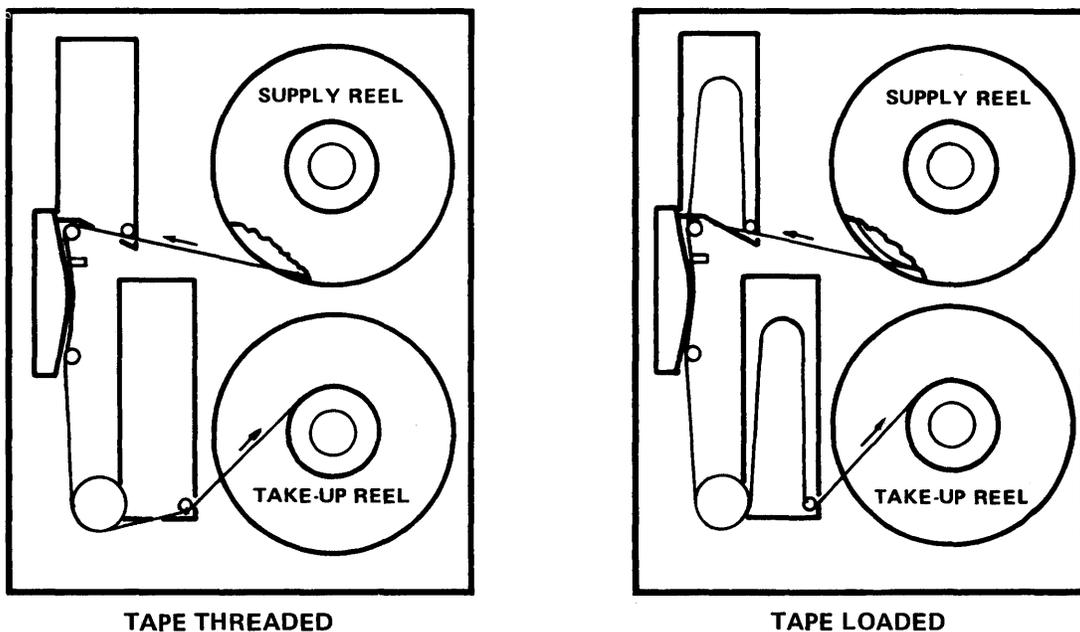


Figure 15-6. Tape Threading Diagram

#### 15.4.2 Tape Loading Procedure

Pressing the LOAD pushbutton energizes the reel servos and initiates the Load sequence. The tape advances to the load point marker and stops.

If for some reason the load point marker is already past the sensor (as, for example, in restoring power after a shutdown), the tape continues to move forward for approximately 6 seconds and then automatically rewinds to the load point. Once pressed, the LOAD switch illuminates. It is deactivated when power has been turned off or the tape has been unloaded (rewound beyond the load point).

#### 15.4.3 Placing Tape Unit On-Line

After the tape is properly threaded and brought to the load point, press the ON LINE pushbutton and check that the ON LINE indicator illuminates. (The Rewind pushbutton is disabled when the tape unit is on-line.) The LOAD button is disabled as well. On-line status enables the tape unit to be remotely selected and to perform all normal operations under remote control.

#### 15.4.4 Tape Unloading and Rewinding

Provision is made in the 2209V Series Tape Drives for rewinding a tape to the load point under remote control. However, this operation may also be performed manually. Proceed as follows:

1. Press the ON LINE pushbutton. Check that the indicator extinguishes when pressure is removed. Before a tape can be removed (unloaded) it must be logically dismounted. When this is done, the ON LINE indicator goes out. If the ON LINE indicator remains illuminated then either the tape is still mounted, the tape was not mounted properly in the first place, or the system crashed.
2. Press the REWIND pushbutton. The tape will now rewind to the load point marker.
3. After the tape has been positioned at the load point via remote or local control, press the REWIND pushbutton to unload the tape past the load point to the physical beginning of the tape.

#### NOTE

The rewind sequence cannot be stopped until the tape has rewound either to the load point or onto the supply reel after an Unload sequence.

#### 15.4.5 Power Shutdown Procedure

A tape drive should not be turned off when the tape is loaded. Wang 2209V Series drives are designed to prevent physical damage to the tape in the event of power failure and to minimize operator errors that could destroy recorded data. In the event of a power failure during a tape unit operation, manually wind the tape forward several feet before restoring power. When power has been restored, press the LOAD pushbutton. When the load point is reached, press the ONLINE button. If the load point is not reached within 36 feet, the tape will rewind, searching for the load point. The tape can then be advanced to the data block nearest the point at which the power failure occurred, by initiating the appropriate control commands.

Although it is possible to develop procedures that would allow power shutdown between files or record blocks on a tape, this is not recommended. Where data files are short, it is preferable to use smaller tape reels.

NOTE

If a power failure occurs during a write operation, erroneous data will have been recorded. The data should therefore be rewritten.

#### 15.5 ON-LINE OPERATION OF THE TAPE DRIVE

Physical tape movement and on-line drive operations are handled by the system. (See the VS Operating System Services and VS Principles of Operation for appropriate instructions.)

#### 15.6 TAPE CHARACTERISTICS

Magnetic tape is similar to the tape used in home tape recorders. To produce this magnetic tape, microscopically small particles of iron oxide are mixed with a binding agent and uniformly applied to the surface of flexible mylar plastic. The tape is approximately 1.5 mil (0.04 mm) thick. The plastic base is about as thick as cigarette paper; the magnetic coating is about one-third the thickness of the plastic base. Recording occurs on this ferromagnetic coating.

Reel-to-reel magnetic tape units read and write data on 0.5-in. (1.27-cm) wide magnetic tape wound on plastic reels up to 10.5 inches (26.7 cm) in diameter. A full reel contains approximately 2,400 feet (731.7 m) of usable tape, weighs about four pounds (1.82 kg), and can contain more than 35 megabytes of data. At 4K bytes per block, this is equivalent to almost 450,000 cards punched in all 80 columns. A miniature reel, 8.5 inches (21.6 cm) in diameter, is available; it holds 1,200 feet (365.8 m) of tape, but lengths as short as 50 feet (15.2 m) can be used.

#### 15.7 TAPE PROTECTION DEVICE

Writing operations automatically erase any previous information on the tape. Therefore, a tape protection device is provided to prevent accidental erasure. A plastic WRITE ENABLE ring (Figure 15-7) fits into a circular groove molded in the back (machine side) of the tape reel. This ring must be in place to enable the machine to write on the tape in the reel. When the ring is removed, only reading can take place; the tape is protected from accidental writing, which could erase valuable information. When a tape is enabled (with ring), the WRITE ENABLE indicator on the control panel is illuminated.



Figure 15-7. Magnetic Tape Reel Showing WRITE ENABLE Ring

#### 15.8 CARE AND HANDLING OF TAPES

Because of the high density at which data is written and read on the 2209V Series drives, extremely small particles of dust or oxide from the tape can cause data errors. Careful attention to the cleaning procedures described in Section 15.9 and quarterly servicing will help ensure trouble-free operation.

NOTE

Cleaning should be done after every 8 hours of use, or prior to any extensive tape operations.

Never use the top of the tape unit as a working area, because materials placed there may interfere with the tape unit's cooling system.

Foreign particles, a crease, or any condition that causes the tape to be lifted as little as 0.001 inch (0.025 mm) from the Read/Write head might cause the signal to fall below the effective sensitivity of the Read/Write unit. (Recorded information comes within 0.007 inch (0.175 mm) of the edge of 9-track tape.)

A tape will normally wind on the reel with some of its edges slightly protruding. This protrusion usually results from high speed rewinding, which causes air to be trapped between adjacent layers of tape. In itself, this condition will not interfere with the proper operation of the tape, but it requires that proper care in handling the tape be exercised by all operating personnel. The exposed tape edges can be badly damaged by squeezing them through the reel openings, or by pinching the edges of the reel. Handle reels near the hub whenever possible. In picking up reels, grip the reel by the center hole.

To label a reel of tape for identification other than by means of the provided card holder, use a material that can be removed without leaving a residue. Adhesive stickers that can be applied and removed easily are satisfactory. Never use an eraser to alter the identification on a label. Always date the reel; use of tapes over 2 years old is not recommended.

Reels must be properly supported when not in use. The plastic reel container is designed to fully support a reel; a reel supported in any other manner may become warped. While a reel of tape is on the machine, its container should be closed and placed where it is not exposed to dust and dirt. When removed from a tape unit, the reel should immediately be placed in a dust-proof container. Always place tape-end retainers on the reels when they are stored to prevent the free end from unwinding in the container. Store tapes in a cabinet elevated from the floor and away from sources of paper or card dust. This should minimize the transfer of dust from the outside of the container to the reel during loading or unloading operations.

Tapes that contain useful information must not be exposed to extreme temperatures, magnetic fields with an intensity greater than 50 oersteds, or direct sunlight for prolonged periods. Smoking should not be permitted in the computer room; ashes can contaminate the tape and live ashes can produce permanent damage when they touch the surface of the tape.

If the tape reel is improperly mounted, the edge of the tape receives undue wear and becomes burred, causing one edge of the tape to be slightly thicker than the other. When wound on a reel, the tape edge with the burr will wind to a larger diameter than the undamaged edge. In time, the edge of the tape with the burr will be permanently stretched. A tape in such condition proves unpredictable and generally unsatisfactory. Read errors, usually random and nonrepetitive, are increased.

If a reel wobbles or appears to be warped during use, the reel may not be seated properly on the tape drive hub. The same effect is produced if the File Protect ring is not inserted completely and the reel is prevented from being properly seated. In either case, the tape can be damaged.

Dropping a reel of tape can easily damage both the reel and the tape. Never throw or mishandle reels, even while they are protected in their containers. If a reel of tape is dropped, the reel may be broken or bent (bending is less likely, as a strain sufficient to bend a reel usually breaks it), the edge of the tape may be crimped, and the tape may be soiled. Inspect the tape reel immediately. A broken or bent reel can usually be found by visual inspection. In addition, the reel can be checked for bending by mounting it on the hub of a tape unit. If the reel has been bent or broken,

it must not be used again. The tape may be serviceable, however. If there is no evidence of crimping or other tape damage, and the reel is undamaged, thoroughly clean the reel and the exposed or unwound tape. A damaged reel without evidence of tape damage should be discarded after the exposed or unwound tape is thoroughly cleaned (see Subsection 15.9.5) and rewound on a good reel. If possible, test the tape for proper functioning before using it on subsequent runs. If crimped tape contains essential information, thoroughly clean the tape and attempt to reconstruct this information through a tape-to-printer or other machine operation. If reconstruction fails, the tape records in question must be rewritten from cards or other source material. Discard the crimped footage.

## 15.9 INSPECTION AND CLEANING INSTRUCTIONS

Wang tape drives are highly reliable precision instruments that will provide years of trouble-free performance when properly maintained. A planned program of routine inspection and maintenance is essential for optimum performance and reliability. On the other hand, the units require very few adjustments, and these should be performed only when there is strong reason to believe they are required.

In addition to daily inspection and frequent cleaning as described below, it is advisable to have a Wang Service Representative make a thorough check of tape drive operating parameters every 2 to 3 months, to ensure that no problem goes unnoticed. The need for maintenance will vary somewhat with the environment and degree of use of the drive. The maintenance schedules indicated here apply to units that are in constant operation in ordinary environments; they should be modified as experience dictates.

### 15.9.1 Daily Cleaning of Machine Room

The entire room in which the tape drive is kept should be vacuumed every 24 hours. For vacuuming under the various machine components, it is recommended that a nozzle made of a nonconducting material be used, to minimize any possibility of an electrical accident. The entire floor should also be thoroughly cleaned every day with a damp mop. Under no circumstances should sweeping or the use of dust cloths or dry mops be substituted, since these techniques spread dust in the air.

### 15.9.2 Daily Check of the Drive

Visually check the machine for cleanliness and obvious misadjustment. If items in the tape path show evidence of dirt or oxide accumulation, clean them thoroughly.

All items in the tape path must be kept scrupulously clean. This is particularly true of the head and guides. The inside of the dust cover must not be allowed to accumulate dirt since transfer of dirt to the tape will cause malfunction.

### 15.9.3 Head Cleaning

Oxide or dirt accumulations on the head surfaces are removed using a mild organic solvent and a swab. Q-tips are convenient for this use but must be used with caution: be sure the wooden portion does not contact head surfaces. An ideal solvent is the trichloroethane contained in the Wang maintenance kit. However, other solvents such as pure isopropyl alcohol are acceptable.

DO NOT USE - acetone or lacquer thinner  
- aerosol spray cans  
- rubbing alcohol

Do not use an excess of any solvent, and be extremely careful not to allow solvent to penetrate ball bearings of tension rollers, capstan motor, etc., since it will destroy their lubrication.

1. Remove tape from the tape unit.
2. Remove the Read/Write/Erase head covers (Item 4 in Figure 15-8) by pulling directly away from the front of the machine. The covers come off with a gentle, steady pull.
3. Moisten a soft, lint-free cloth or cotton-tipped applicator with cleaner, hold back the head gate (see Figure 15-8), and swab the head surfaces. Be sure to swab the erase head. After the head surfaces have been carefully swabbed, dry them with a separate clean, lint-free cloth.
4. Replace the head cover by aligning the holes in each cover with the mounting pins on the drive and pressing it firmly into place.

### 15.9.4 Tape Path Cleaning

Other items in the tape path should be cleaned at the same time as the magnetic head:

- . Clean the face of the ceramic tape cleaner as in Step 3 above. The tape cleaner is above the Read/Write/Erase heads.
- . Clean the head gate.
- . Clean the roller guides (Figure 15-8), rotating them to be sure all surfaces are cleaned. Dry with a clean, lint-free cloth.
- . Moisten a cloth with water; it should be damp, not wet. Rotate the capstan slowly with one hand; without touching the rubber surface, clean the surface of the capstan with the damp cloth. Check the capstan surface for abrasion or polish; if defects are observed, contact your Wang Service Representative.

**CAUTION**

Tape drive cleaner should never be permitted to come into direct contact with magnetic tape.

**15.9.5 Tape, Reel, and Guide Cleaning**

To clean magnetic mylar tape, wipe it gently with a clean lint-free cloth moistened with a recommended tape cleaner. Never use carbon tetrachloride and vythene for cleaning magnetic tape units.

Reel containers should be periodically inspected. Remove any accumulation of dust by washing containers with a household detergent.

Guide wear occurs principally at the point of contact with the front guide surface. Although guides are ceramic, in time grooves will appear. Since guides are symmetrical, it is only necessary to loosen the guide mounting screw, rotate the guide, and tighten to present an unworn surface to the tape.

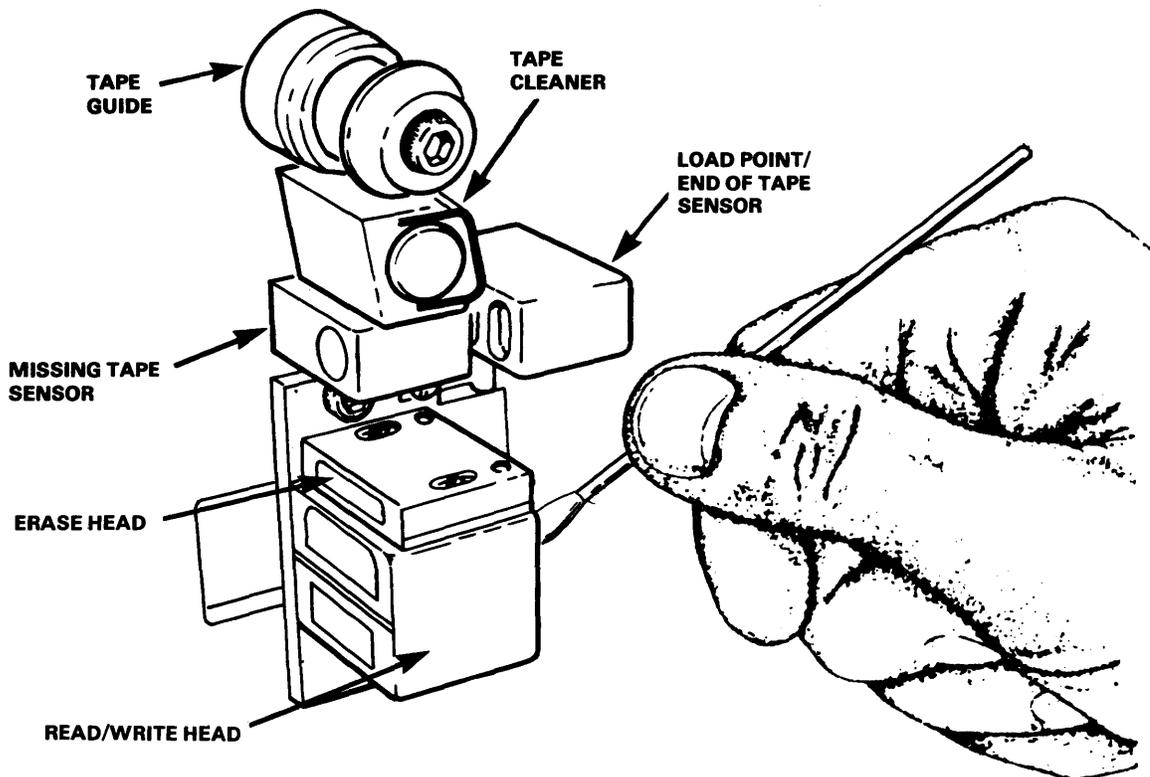


Figure 15-8. Cleaning a Model 2209V Tape Drive

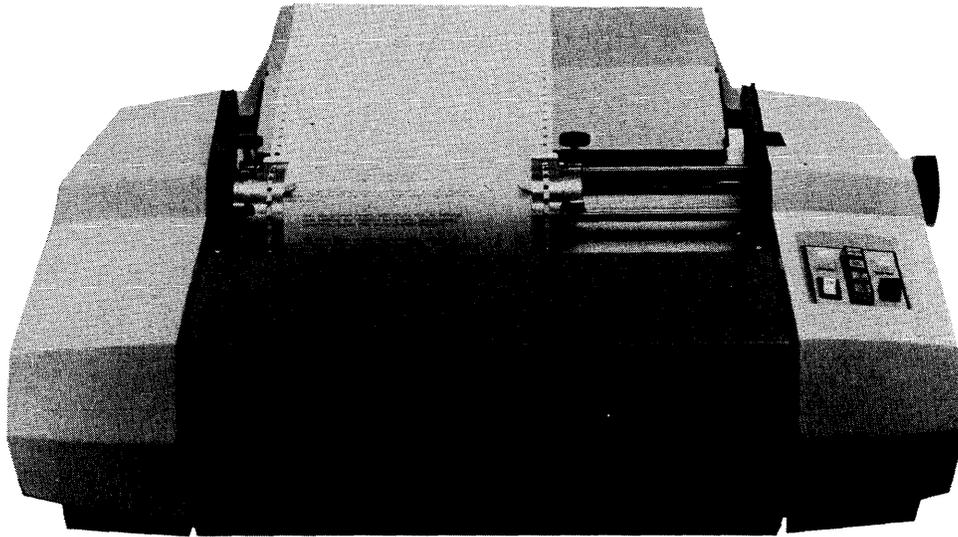
**CHAPTER 16**  
**MODELS 2221V AND 5521 MATRIX CHARACTER PRINTERS**

**16.1 INTRODUCTION**

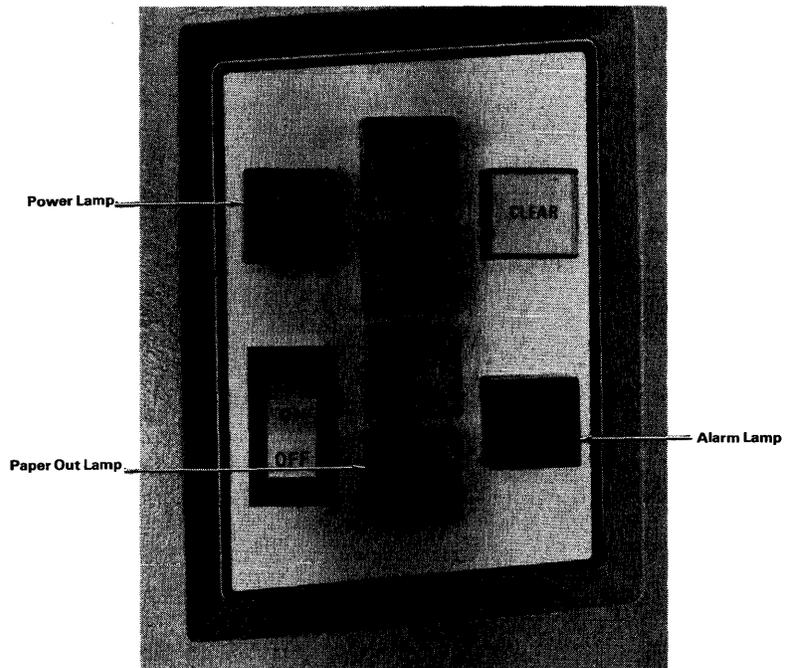
The Model 2221V Parallel Matrix Character Printer and the Model 5521 Serial Matrix Character Printer provide quality hard-copy output at a rate of 200 characters per second. Sharp, readable characters are formed by using a 9 x 9 dot matrix on the Model 2221V and a 9 x 11 dot matrix on the Model 5521. Each line contains a maximum of 132 characters; and the 200 character-per-second rate generates 65 to 300 lines per minute (depending upon the line lengths used).

The Model 2221V and Model 5521 are functionally very similar; however, the 5521 provides a greater number of characters, and its use allows multiple printers to be connected at greater distances to the central processor. The Model 2221V, used for data processing only, provides a set of 96 characters, including upper- and lowercase letters, numbers, punctuation marks, and special symbols. The Model 5521 provides a standard set of 96 or 112 characters, for data processing or word processing, respectively. The 112-character set includes letters and punctuation marks applicable to several languages, currency symbols, and other special characters not available with the 2221V. Expanded print is available with both models. A full-line buffer receives a complete line of data transmitted from memory to the printer. A Vertical Format Tape provides control for vertical spacing on forms. Continuous-form paper of widths from 3.5 to 14.9 in. (8.9 to 37.8 cm) can be used with the printer.

The Model 2221V Matrix printer and Matrix printer control panel are displayed in Figures 16-1 and 16-2.



**Figure 16-1. Model 2221V Matrix Printer**



**Figure 16-2. Model 2221V Matrix Printer Control Panel**

## 16.2 PAPER INSERTION

Paper is inserted in the Model 2221V or the Model 5521 using the following procedure:

1. Push continuous-form pin-feed paper into the slot in the bottom of the printer until it comes out between the pin-feed mechanisms (see Figure 16-3).
2. Open the pin-feed gates, insert the paper holes evenly over the pins, and close the gates. If the distance between the pin-feed mechanisms must be adjusted, unscrew the right-hand Lock knob and slide the mechanism to the proper position.
3. A fine horizontal adjustment of forms can be made using the Vernier knob at the top right of the printer. When the Vernier knob is turned, both pin-feed units move simultaneously. The knob allows fine adjustment of the paper, up to one-half inch, in the horizontal direction.
4. Press the ON/OFF rocker switch on the control panel (see Figure 16-2). When the printer is ON, the Power lamp (upper left of control panel) is illuminated.
5. (Model 2221V only.) Press the LINE FEED switch to advance paper in the printer.
6. (Model 2221V only.) Press the TOP OF FORM switch; this advances the paper until the Vertical Format unit senses a top-of-form hole in the Vertical Format Tape.
- 7a. (Model 2221V only.) For proper adjustment of forms (particularly to bring the physical top of form and the top-of-form hole in the Vertical Format Tape into coincidence), align the paper in the printer using the Platen knob, and then push in and hold the Platen knob while pressing the TOP OF FORM switch. This advances the Vertical Format Tape in the Vertical Format unit to the top-of-form hole.
- 7b. (Model 5521 only.) Select the desired top-of-page position on the paper by manually rolling the platen with the Platen knob held in. The top-of-page position is set by holding in the Platen knob while pressing the TOP OF PAGE switch once. When the platen drive motor ceases to move, the top-of-page position has been set.

WARNING

NEVER OPERATE THE PRINTER WITHOUT PAPER.

- 8a. (Model 2221V only.) If paper runs out while the printer is being used, it ceases operation, an audible 2-second tone is sounded, and the Paper Out lamp (behind the FORM OVERRIDE switch) is illuminated. To complete printing the page, press FORM OVERRIDE to print one line at a time until the paper (and Vertical Format Tape) advances to top-of-form. The paper may now be changed. Press the FORM OVERRIDE button to continue printing after inserting fresh paper in the printer.
- 8b. (Model 5521 only.) If paper runs out while the printer is in use, the printer ceases operation, an audible tone is sounded, and the Change Paper lamp is illuminated. Press SELECT to print one line at a time until the paper runs out or change the paper. Press SELECT to continue printing after inserting fresh paper.

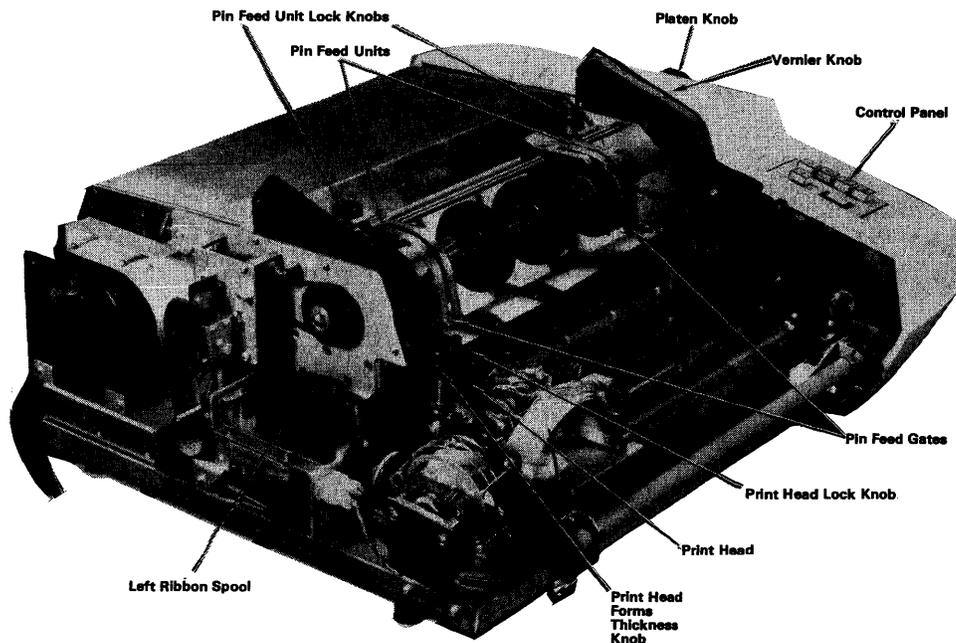


Figure 16-3. Printer Components

NOTE TO 2221V USERS

Do not press CLEAR when changing paper; doing so erases the current line in the printer buffer.

WARNING

Whenever the front cover of the printer is opened and any adjustments are made to the print head (adjusting print head gap or disengaging paper at the print head), the circuit breaker at the back of the printer must be turned off.

The print head must be at the extreme left of the carrier before the front cover is closed to resume operation.

Once the front cover is closed, the circuit breaker may be turned on. Under no circumstances should the print head be moved manually with the circuit breaker on.

### 16.3 PRINT ADJUSTMENT

To adjust the print blackness for different form thicknesses, follow the procedure detailed below:

1. Check that the printer has paper in it and is turned off.
2. Open the front cover of the printer and find the print head (see Figure 16-3).
3. Locate the Forms Thickness knob and the Lock knob on the print head. The Forms Thickness knob is to the left of the print head, the Lock knob to the right.
4. Unlock the Lock knob on the print head.
5. Turn the Forms Thickness knob to move the head in or out; turn it in to provide a blacker imprint and out to move the head back to accommodate thicker forms.
6. Lock the adjustment by turning the Lock knob until it stops.
7. When the head has been properly adjusted, close the front cover of the printer. The printer does not operate unless all covers are closed.
8. During printer operation, if the paper does not feed smoothly but catches on the front surface of the print head, check that the print head is properly adjusted and locked in place.

## 16.4 RIBBON REPLACEMENT

The ribbon spools can be replaced using the following procedure:

1. Turn power OFF.
2. Open the front cover of the printer, find the Print Head Lock knob, and loosen it.
3. Turn the Forms Thickness knob until the print head is away from the ribbon.
4. Remove the Platen knob and push off the left- and right-hand covers; they cannot be moved unless the front cover is open. The Platen knob must be pulled off to move the right-hand cover.
5. Compare the ribbon mechanism with that in Figure 16-4 to find the parts involved and follow the path of the ribbon in the mechanism.
6. Remove caps from the ribbon-reversing guides and lift old spools from axles.
7. Place the full new spool on the right-hand axle and thread the ribbon through the guides, idlers, and rollers. The ribbon must feed from the inner side of the spool.
8. Place the empty spool on the left-hand axle.

### CAUTION

Be absolutely sure that the ribbon rivets are wound onto the left-hand spool so they cannot come into contact with the Print Head during printer operation.

9. Replace the caps on the ribbon-reversing guides and close the side covers of the printer. Replace the Platen knob.
10. Readjust the Forms Thickness knob (see Section 16.3) and tighten the Lock knob.
11. Close the front cover of the printer and turn power ON to resume operation.

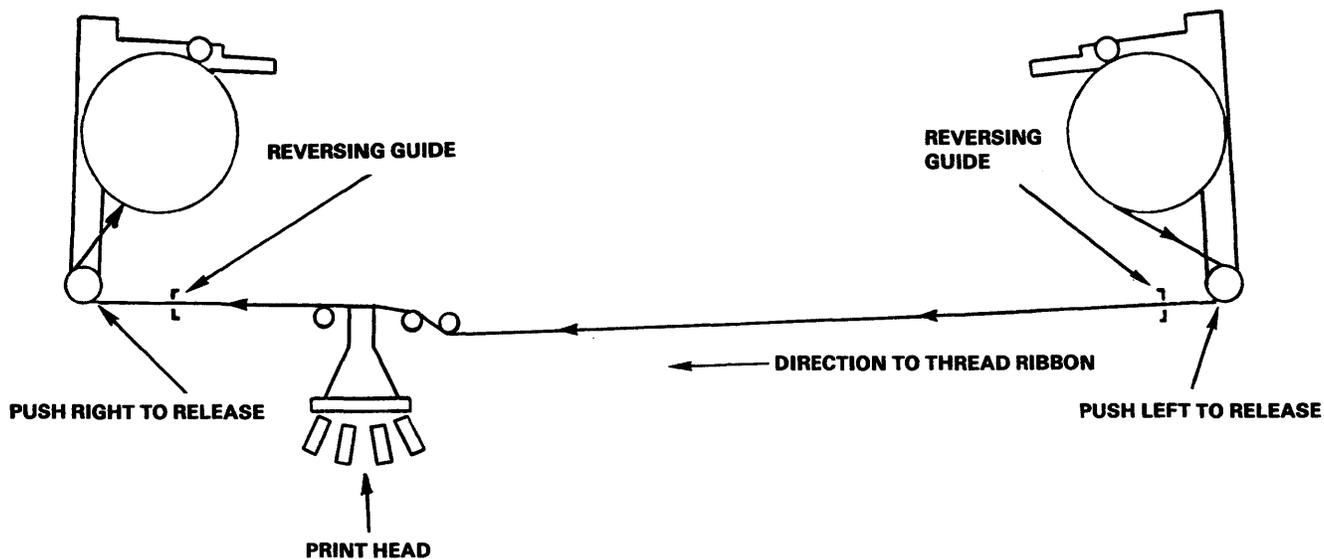


Figure 16-4. Ribbon Replacement Mechanism

### 16.5 FUSE REPLACEMENT

The fuse (see Figure 16-5), located at the rear panel of the printer, can be changed by twisting the bad fuse out of the socket and replacing it with a new fuse. This fuse is the main fuse. The circuit breaker to its left governs the print head servo. The printer should be turned off while the fuse is being changed.

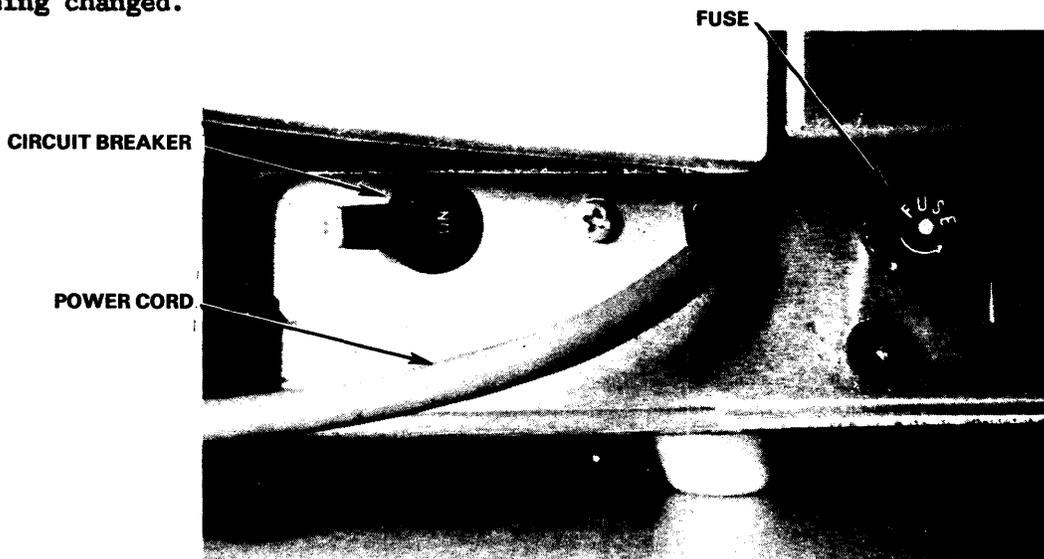


Figure 16-5. Back of Printer

## 16.6 VERTICAL FORMAT CONTROL

The mechanism that guides and controls paper movement in the printer is located under its left-hand cover. The Vertical Format unit (Figure 16-6) contains a tape reader that provides vertical tab and top-of-form spacing control via punched tape with holes punched in Channels 5 and 7, respectively. The user also obtains an automatic page ejection (end-of-document) with holes punched in Channel 2. With such a tape, paper automatically advances to the next top-of-form hole when the end of a document is reached. End-of-document is normally set at the 66th line of 11-inch forms. Automatic page ejection passes the perforation in fan-fold paper when forms have been properly aligned. Before operating the printer, verify that the paper tape is properly seated in the Vertical Format Unit. To position the tape at the top-of-form holes, push in and hold the Platen knob and press the TOP OF FORM switch.

The standard 1-inch-wide, 8-channel mylar tape has sprocket holes located between Channels 3 and 4, holes for vertical tab in Channel 5, for top-of-form in Channel 7, and for end-of-document in Channel 2. The sprocket holes are spaced at 0.1-in. (0.25 cm). The tape reader and paper-feed mechanisms are mechanically linked so that each line feed advances the paper one line and the tape one sprocket hole. When the printer receives a vertical tab code, the tape is advanced to the next hole in Channel 5 and the paper is advanced correspondingly. When the printer receives a form feed code, or the TOP OF FORM switch is pressed, the punched tape is advanced to the next hole in Channel 7 and the paper advances correspondingly.

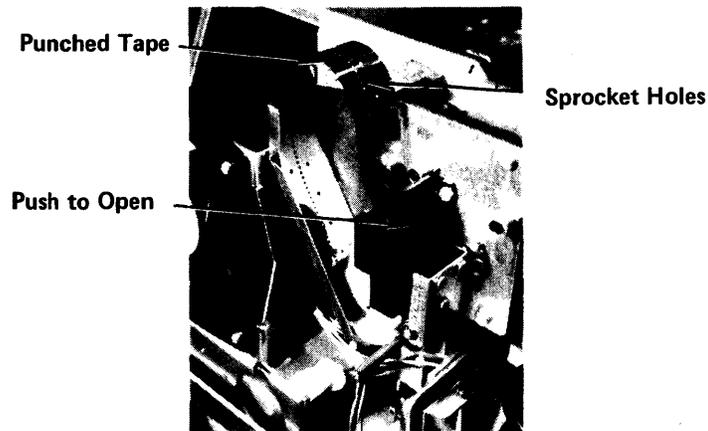


Figure 16-6. Vertical Format Unit

On the standard tape, vertical tab holes are spaced six sprocket holes apart -- corresponding to a 1.0-in. (2.54-cm) tab, or six lines. Form feed holes are spaced 66 sprocket holes apart; this corresponds to an 11.0-in. (27.9-cm) form. The tape provided with the printer should last the life of the printer. Special tapes to produce unique printline spacing can be used with the printer; they must be prepared either with a Teletype tape punch or with manual punching equipment.

To replace Vertical Format Tape, open the front cover of the printer and push off the left-hand cover to gain access to the tape reader (see Figure 16-6). Open the reader cover and install tape in the tray provided, ensuring that the sprocket teeth protrude through the paper tape. Close reader cover.

Appendix M indicates how to splice a prepared tape. Problems with Vertical Format Tapes are best resolved by your Wang Service Representative.

## 16.7 PRINTER CONTROLS

The control panel on the right-hand side of the printer contains a number of switches, buttons, and indicators (lamps) for controlling the manual operations of the printer (see Figure 16-2). These are discussed in the following paragraphs.

### ON/OFF

To turn the printer ON, turn the switch to the ON position. The Power lamp is illuminated. To turn OFF the printer, turn the switch to the OFF position; the Power lamp is turned OFF.

### SELECT

After turning on the printer, press the SELECT switch; the Select lamp is illuminated. SELECT readies the printer to receive data from the system. When the SELECT switch is pressed again, the Select lamp is extinguished. The SELECT switch can be used to halt printing temporarily (as when aligning forms) without causing loss of data in the print buffer: press SELECT to extinguish the Select lamp, then align the forms and press SELECT again.

### LINE FEED (2221V)

Paper is advanced one line when this switch is pressed briefly; if the switch is held down, paper advances continuously. This switch operates only when the printer is in deSELECT mode (has not been Selected).

### TOP OF FORM (2221V)

With the printer ON (but not SELECTed), paper is manually advanced to top of form by pressing this switch. Paper advance is controlled by the Vertical Format unit.

### TOP OF PAGE (5521)

This switch is used to position continuous-form paper to the top of the next page; it can be utilized whether or not the printer is SELECTed.

### FORM OVERRIDE (2221V)

When paper runs out, the printer ceases operation, an audible tone is sounded, the Paper Out lamp is illuminated, and the printer stops. Press and hold down the FORM OVERRIDE button to complete printing the line or the page. Be sure to insert paper in the printer before continuing operation.

### CHANGE PAPER (5521)

When the printer nears the end of continuous-form paper, this lamp illuminates, an audible tone is sounded, and the printer is automatically deSELECTed. If you wish to print more lines on the existing page, press SELECT once for each line. When paper runs out, insert more paper and press SELECT to continue printing.

### CLEAR (2221V)

Pressing this switch clears the printer line buffer if the printer is not in SELECT mode (has not been SELECTed).

### ALARM LAMP (2221V)

The Alarm lamp (lower right of control panel) indicates mechanical or electronic malfunctioning, generally a paper or ribbon jam; when a malfunction occurs, an audible alarm tone sounds for two seconds and the Alarm lamp illuminates. To recover from this condition, shut off power (press OFF switch), fix jammed paper or ribbon, reset the circuit breaker on the back panel of the printer, and turn the power on again. If neither paper nor ribbon jam has caused the problem, contact your Wang Service Representative.

### MALFUNCTION (5521)

Anytime a printer malfunction occurs, the Malfunction lamp illuminates, an audible tone is sounded, and the printer is automatically deSELECTed. When this occurs, power-off the printer and correct the problem (insert new paper, fix jammed paper, etc.). Reset the circuit breaker if necessary, and turn the power on again. If pressing SELECT does not cause printing to resume, investigate the printer's status from an Operator's Console (see Section 6.2). If the malfunction cannot be easily corrected, notify your Wang Service Representative.

## 16.8 POINTS TO BE CHECKED

1. The printer must be connected to the appropriate IOP or remote workstation.
2. The tape in the Vertical Format unit must be correctly seated.

3. Paper must be inserted in the printer (see Section 16.2).
4. The forms thickness must be set for good print quality. It can be adjusted as described in Section 16.3.
5. Make sure the printer is turned on.
6. Press SELECT to enable printer to receive data.
7. Make sure you have specified the correct printer number under Set Usage Constants (PF 2 from the Command Processor Menu).

## CHAPTER 17

### MODELS 2231V-2 AND 5531-2 MATRIX CHARACTER PRINTERS

#### 17.1 INTRODUCTION

The Model 2231V-2 Parallel Matrix Character Printer and the Model 5531-2 Serial Matrix Character Printer provide quality hardcopy output at a rate of 120 characters per second. Sharp, readable characters are formed by using a 7 x 9 dot matrix. Each line contains a maximum of 132 characters, and the 120 character-per-second rate generates 45 to 250 lines per minute, depending upon the line lengths used.

The Model 2231V-2 and Model 5531-2 printers are functionally very similar; however, the 5531-2 provides a greater number of characters, and its use allows multiple printers to be connected at greater distances to the central processor. The 2231V-2, used for data processing only, provides a set of 96 characters, including upper- and lowercase letters, numbers, punctuation marks, and special symbols. The 5531-2 provides the 96-character set for data processing and for word processing (the 112-character set includes letters and punctuation marks applicable to several languages, currency symbols, and other special characters). Expanded print is available with both models. A full-line buffer receives a complete line of data transmitted from memory to the printer. A Vertical Format Tape provides control for vertical spacing on forms. Continuous-form paper of widths from 3.5 to 13.5 inches (8.9 to 34.3 cm) can be used with the printer.

The Model 2231V-2 Matrix printer and Matrix printer control panel are displayed in Figures 17-1 and 17-2.

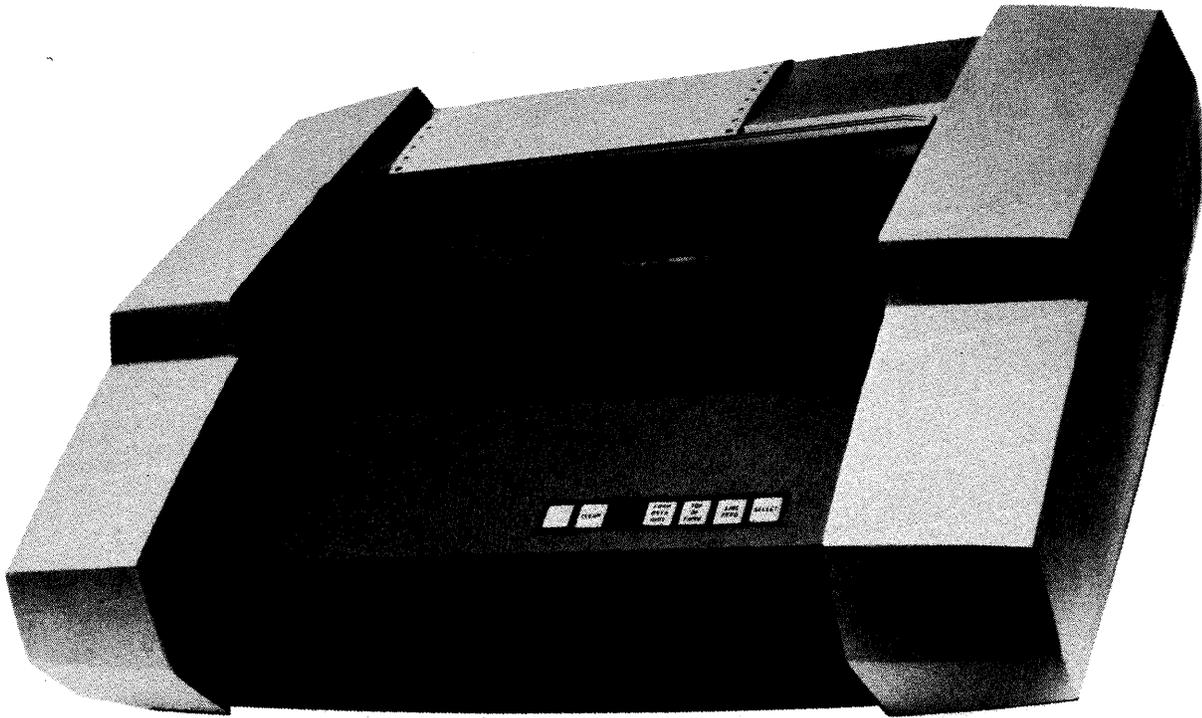


Figure 17-1. Model 2231V-2 Matrix Printer

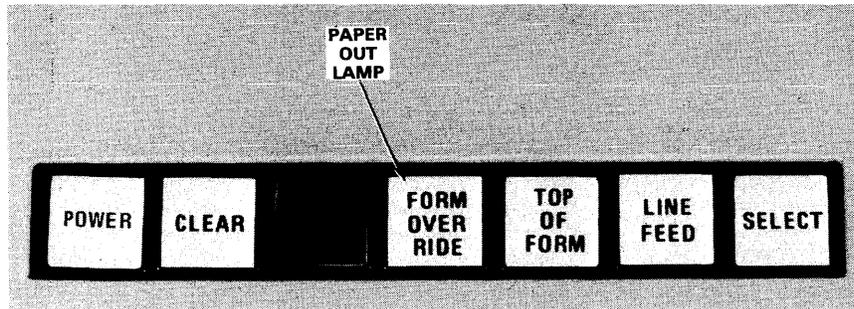
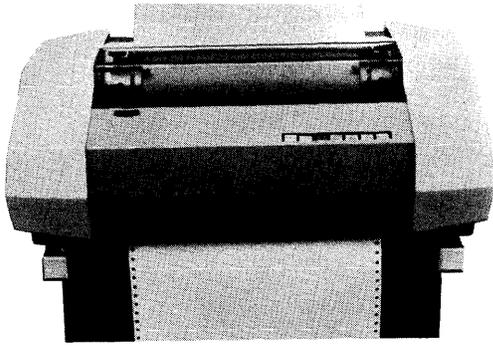


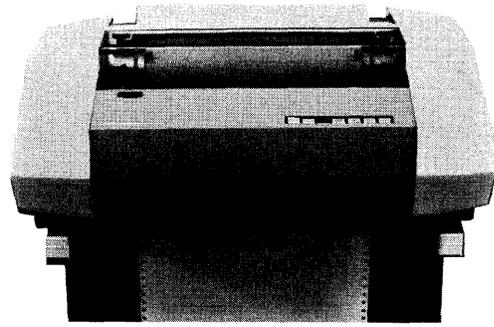
Figure 17-2. Model 2231V-2 Matrix Printer Control Panel

## 17.2 PAPER INSERTION

1. Raise the cover of the printer. Secure the cover in the raised position with the cover rod located on the right side of the printer.
2. Push continuous-form pin-feed paper into the slot at the bottom front of the printer until it comes out between the pin-feed mechanisms (see Figures 17-3 and 17-4).
3. Open the pin-feed gates, move the paper holes down evenly over the pins, and close the gates. If the distance between the pin-feed mechanisms must be adjusted, unscrew the right-hand Lock knob and slide the mechanism to the proper position. After the paper is in proper position, close the cover of the printer.
4. Press the ON/OFF rocker switch at the rear of the printer (see Figure 17-5). When the printer is ON, the Power lamp (left indicator of control panel) is illuminated.
- 5a. (Model 2231V-2 only.) Press the LINE FEED switch to advance paper in the printer.
- 5b. (Model 5531-2 only.) Press the TOP OF PAGE switch to advance paper.



(a) Front Loading Slot



(b) Bottom Loading Slot

Figure 17-3. Paper in the Loading Slots

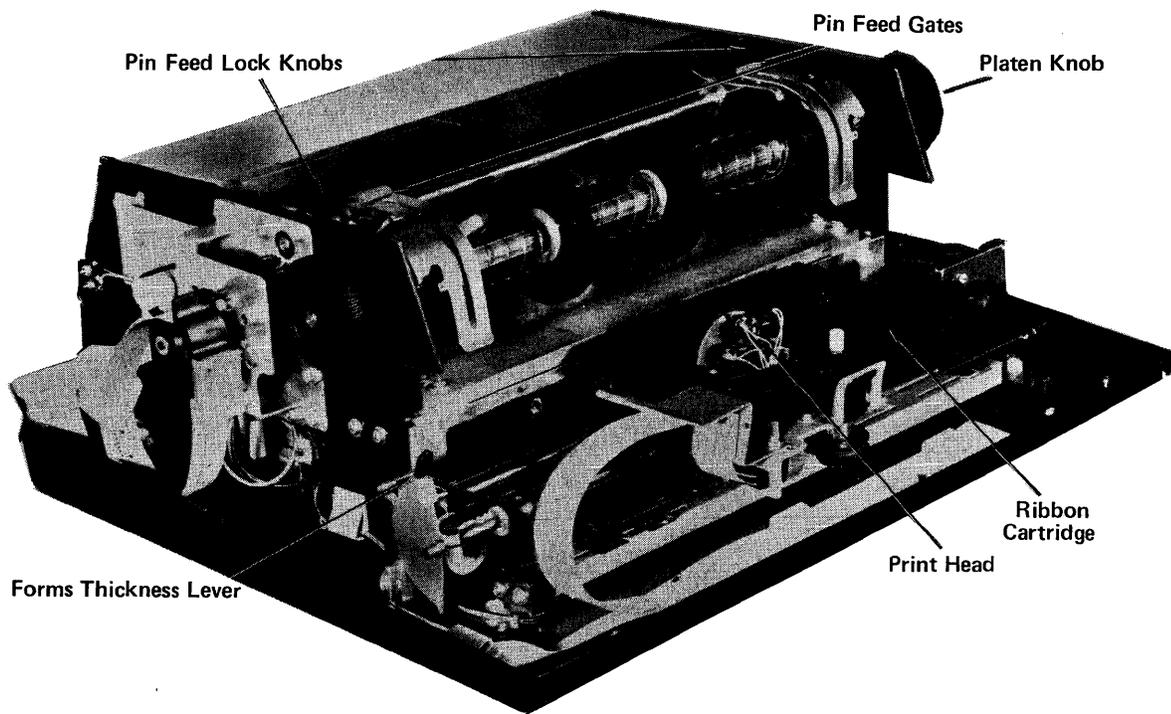


Figure 17-4. Printer Components

- 6a. (Model 2231V-2 only.) For proper adjustment of forms, particularly to bring the physical top of form and the top-of-form hole in the Vertical Format Tape into coincidence, align paper in the printer using the Platen knob, and then push in and hold the Platen knob while pressing the TOP OF FORM switch. This advances the Vertical Format Tape in the Vertical Format Unit to the top-of-form hole. Manual adjustments of forms in the vertical direction can be made with the Platen knob by pushing in and rotating the knob.
- 6b. (Model 5531-2 only.) Select the desired top-of-page position on the paper by manually rolling the platen with the Platen knob held in. The top-of-page position is set by holding in the Platen knob while pressing the TOP OF PAGE switch once. When the platen drive motor ceases to move, the top-of-page position has been set.

CAUTION

NEVER OPERATE THE PRINTER WITHOUT PAPER.

- 7a. (Model 2231V-2 only.) If paper runs out while the printer is being used, the printer ceases operation, an audible 1-second tone is sounded, and the Paper Out lamp (behind the FORM OVERRIDE switch) is illuminated. To complete printing the page, press FORM OVERRIDE to print one line at a time until the paper (and Vertical Format Tape) advances to top of form. The paper may now be changed. Press the FORM OVERRIDE button to continue printing after inserting fresh paper in the printer.
- 7b. (Model 5531-2 only.) If paper runs out while the printer is in use, the printer ceases operation, an audible tone is sounded, and the Change Paper lamp is illuminated. Press SELECT to print one line at a time until the paper runs out or change the paper. Press SELECT to continue printing after inserting fresh paper.

NOTE

Do not press CLEAR when changing paper; doing so erases the current line in the printer buffer.

The cover of the printer can be opened for making adjustments to the print head (adjusting print head gap or disengaging paper at the print head).

When the cover is open, power to the carriage motor is turned off; the print head can now be moved manually.

Once the cover is closed, the printer is ready for normal operation.

### **17.3 PRINT ADJUSTMENT**

To adjust the print blackness for different form thicknesses, follow the procedure detailed below:

1. The printer must have paper in it and must be turned off.
2. Raise the cover of the printer and find the print head and the Forms Thickness lever (see Figure 17-4).
3. Notice that the Forms Thickness lever has position notches numbered from 1 to 9 for different print adjustments. The lower numbers are for single forms; the higher numbers are for multiple forms.
4. Unlock the Forms Thickness lever.
5. Turn the Forms Thickness lever to move the head in or out: turn it in to provide a blacker imprint and out to move the head back to accommodate thicker forms.
6. Lock the lever to the proper adjustment position.
7. When the head has been properly adjusted, close the cover of the printer. The printer does not operate unless the cover is on.
8. During printer operation, if the paper does not feed smoothly but catches on the front surface of the print head, check that the print head is properly adjusted and locked in place.

### **17.4 RIBBON CARTRIDGE REPLACEMENT**

The ribbon cartridge can be replaced using the following procedure:

1. Turn power OFF.
2. Raise the cover of the printer and find the Forms Thickness lever. Pull the lever completely backward to the L position so that the print head is removed from the paper.
3. Remove the exposed ribbon from the print head; rotate the cartridge spindle as required.
4. Remove the cartridge by grasping the sides and pulling it up from the print head carriage.
5. Place the new cartridge in printer; guide its exposed ribbon over the print head while rotating the cartridge spindle as required and snap cartridge in place.
6. Readjust Forms Thickness lever to proper print adjustment position.
7. Replace the cover of the printer and turn power ON to resume operation.

## 17.5 FUSE REPLACEMENT

Two fuses (see Figure 17-5) are located at the rear panel of the printer. One monitors main line current and the other fuse controls current to the carriage motor. A fuse can be changed by twisting it out of the socket and replacing it with a new fuse. The printer should be turned off when a fuse is being changed.

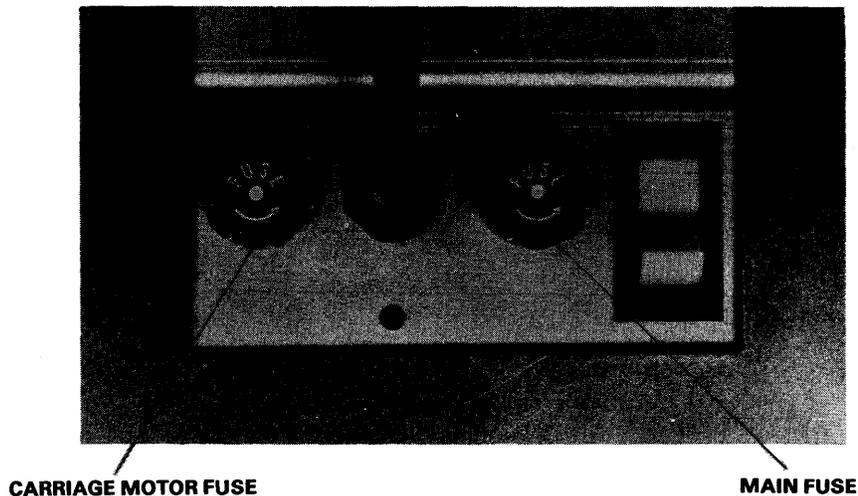


Figure 17-5. Back of Printer

## 17.6 VERTICAL FORMAT CONTROL

The mechanism that guides and controls paper movement in the printer is located on the left side under the cover. The Vertical Format unit contains a tape reader (Figure 17-6) that provides vertical tab and top-of-form spacing control by means of punched tape with holes punched in Channels 5 and 7, respectively. Before operating the printer, verify that the mylar tape is properly seated in the Vertical Format unit. To position the tape at the top-of-form holes, push in and hold the Platen knob and press the TOP OF FORM switch.

The standard 1-inch-wide, 8-channel mylar tape has sprocket holes located between Channels 3 and 4, holes for vertical tab in Channel 5, and holes for top of form in Channel 7. The sprocket holes are spaced at 0.1-in. (0.25-cm.) intervals. The tape reader and paper-feed mechanisms are mechanically linked so that each line feed advances the paper one line and the tape one sprocket hole. When the printer receives a vertical tab code, the tape is advanced to the next hole in Channel 5 and the paper is advanced correspondingly. When the printer receives a form feed code or the TOP OF FORM switch is pressed, the punched tape is advanced to the next hole in Channel 7 and the paper advances correspondingly.

On the standard tape, vertical tab holes are spaced six sprocket holes apart -- corresponding to a 1.0-in. (2.54-cm) tab, or six lines. Form feed holes are spaced 66 sprocket holes apart (this corresponds to an 11.0-in. (27.9-cm) form). The tape provided with the printer should last the life of the printer. Special tapes to produce unique printline spacing can be used with the printer; they must be prepared either with a Teletype tape punch or with manual punching equipment.

To replace Vertical Format Tape, raise the cover of the printer to gain access to the tape reader on the left side of the printer (see Figure 17-6). Push open the upper reader bracket and install tape, ensuring that the sprocket teeth protrude through the mylar tape. Close upper reader bracket.

Appendix M indicates how to splice a prepared tape. Problems with Vertical Format Tapes are best resolved by your Wang Service Representative.

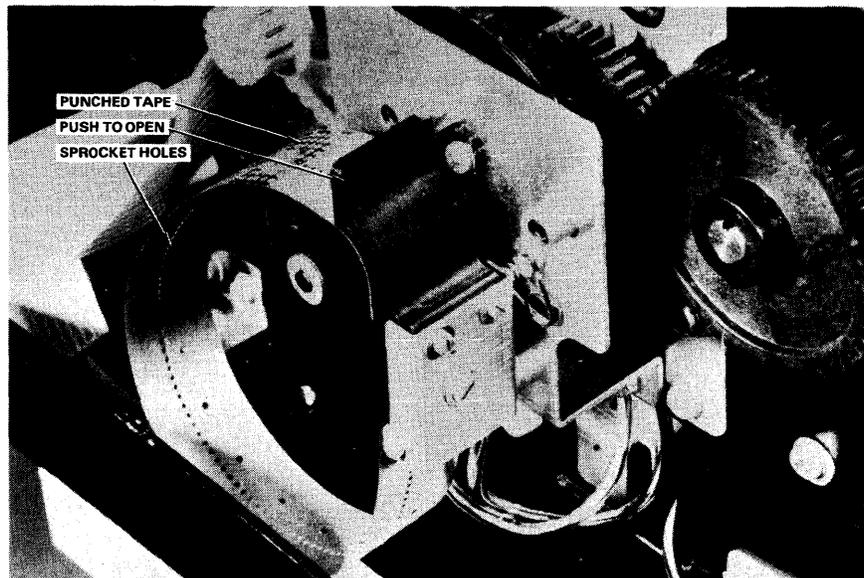


Figure 17-6. Tape Reader

## 17.7 PRINTER CONTROLS

The control panel on the front side of the printer contains a number of switches, buttons, and light indicators for controlling the manual operations of the printer (see Figure 17-2). These are discussed in the following paragraphs.

### ON/OFF

The ON/OFF switch is located in the rear of the printer. To turn the printer on, turn the switch to the ON position. The Power lamp at the control panel is illuminated. To turn off the printer, turn the switch to the OFF position; the Power lamp is extinguished.

## SELECT

After turning on the printer, press the SELECT switch; the Select lamp is illuminated. SELECT readies the printer to receive data from the CP. When the SELECT switch is pressed again, the Select lamp is extinguished. The SELECT switch can be used to halt printing temporarily (as when aligning forms) without causing loss of data in the print buffer: press SELECT to turn off the Select lamp, align the forms, and press SELECT again.

## LINE FEED (2231V-2)

Paper is advanced one line when this switch is pressed briefly; if the switch is held down, paper advances continuously. This switch operates only when the printer is in deSELECT mode (has not been SELECTed).

## TOP OF FORM (2231V-2)

With the printer on (but not SELECTed), paper is manually advanced to top of form by pressing this switch. Paper advance is controlled by the Vertical Format unit.

## TOP OF PAGE (5531-2)

This switch is used to position continuous-form paper to the top of the next page. The printer must be deSELECTed before this switch will function.

## FORM OVERRIDE (2231V-2)

When paper runs out, the printer ceases operation, an audible tone is sounded, the Paper Out lamp is illuminated, and the printer stops. Press and hold down the FORM OVERRIDE button to complete printing the line or the page. Be sure to insert paper in the printer before continuing operation.

## CHANGE PAPER (5531-2)

When the printer nears the end of continuous-form paper, this lamp illuminates, an audible tone is sounded, and the printer is automatically deSELECTed. If you wish to print more lines on the existing page, press SELECT once for each line. When paper runs out, insert more paper and press SELECT to continue printing.

## CLEAR (2231V-2)

Pressing this switch clears the printer line buffer if the printer is not in Select mode (has not been SELECTed).

## ALARM LAMP (2231V-2)

This lamp (between the CLEAR and FORM OVERRIDE switches) indicates that the fuse of the carriage motor has been burned open. It is generally caused by a paper or ribbon jam. To recover from this condition, shut off power (press OFF switch), fix jammed paper or ribbon, replace the burned fuse, and turn the power on again. If the new fuse burns out again, contact your Wang Service Representative.

## MALFUNCTION (5531-2)

Anytime a printer malfunction occurs, the Malfunction lamp illuminates, an audible tone is sounded, and the printer is automatically deSELECTed. Correct the malfunction and attempt to print again by pressing SELECT. It may be necessary to investigate the printer's status from an Operator's Console (see Section 6.2). If the malfunction cannot be easily corrected, notify your Wang Service Representative.

### 17.8 POINTS TO BE CHECKED

1. The printer must be connected to the appropriate IOP.
2. The tape in the Vertical Format unit must be correctly seated.
3. Paper must be inserted in the printer (see Section 17.2).
4. The forms thickness must be set for good print quality. It can be adjusted as described in Section 17.3.
5. Turn on the printer and press SELECT to enable printer to receive data.
6. Make sure you have specified the correct printer number under SET Usage Constants (PF 2 from the Command Processor Menu).

**CHAPTER 18**  
**MODELS 5570 AND 5571 LINE PRINTERS**

**18.1 INTRODUCTION**

This chapter describes the characteristics and operation of the Model 5570 and Model 5571 Line Printers. Both models are impact printers featuring a laterally revolving chain-type carrier. Typically, the print chain is composed of 384 fully formed character typefaces arranged in multiple identical sets on 48 eight-character links that are mounted end-to-end in a loop. A full line produced by the printer contains 132 print positions. See Table 18-1 for a comparison of the Models 5570 and 5571 Line Printers.

Printing is accomplished by an electromagnetically activated print hammer in each print position, pushing a small area of the form against the ribbon as the appropriate character type of the chain appears in front of the form. Vertical pitch is selectable at 6 or 8\* lines/inch (2.34 or 3.12 lines/cm), and horizontal pitch is 10 columns/inch (3.9 columns/cm). Hard-copy printout is produced a line at a time from stored digital data that is transferred to the printer in the form of print character and paper advance instruction codes from the system. A 132-character buffer receives a complete line of data transmitted from system memory to the printer. A Vertical Format Tape provides control for vertical spacing on forms. Continuous-form paper with widths from 3.5 to 19.5 inches (8.9 to 49.5 cm) can be used with the Model 5570; maximum forms width for the Model 5571 is 13.2 inches (33.8 cm).

Table 18-1. Printer Characteristics

Model	Speed	Font	Character Set
5570	600 lpm	Gothic	64 (uppercase only)
5571	425 lpm	Courier	96 (upper- and lowercase)

\* Vertical pitch of 8 lines/inch is a hardware option.

The printer system consists of two major subassemblies: a stationary frame and a yoke that pivots away from the frame to provide access to the print area. The paper feed components and the print hammers are mounted on the stationary frame at the back of the paper path. The ribbon feed components and the print chain are mounted on the yoke at the front of the paper path. A hinged, balanced canopy at the top of the printer manually opens for access to the yoke and mechanism controls. The yoke manually opens and swings forward and down, providing full access to the print area for forms loading and ribbon changing. Forms enter the printer at the front from an enclosed space directly below the yoke and exit the printer at the rear onto a detachable shelf.

Figure 18-1 displays a Line printer control panel.

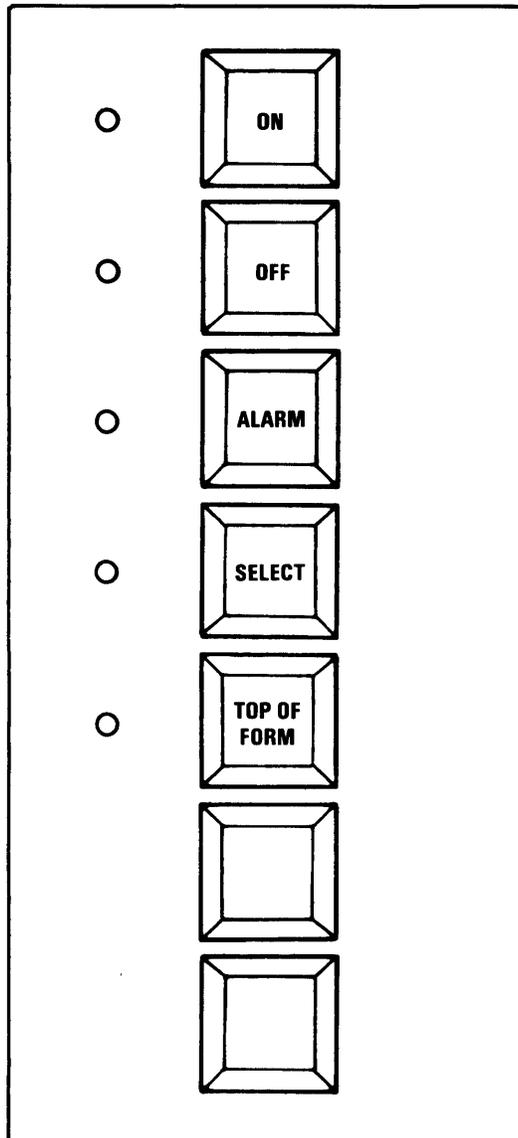


Figure 18-1. Line Printer Control Panel

## 18.2 PAPER INSERTION

Paper is inserted in the printer using the following procedure:

1. Raise the canopy to gain access to the printer yoke and open the front doors to gain access to the paper supply area (see Figure 18-2).
2. Release and pivot the yoke by pulling the yoke lever forward and then pulling the yoke forward by its handle.

### NOTE

The yoke should be opened only when the printer is deSELECTed, or when the printer power is OFF.

3. Unlock and set the paper tractors to approximate their final position. Normally, the left-hand tractors should be positioned slightly to the left of the first printing position.
4. Open the upper tractor hold-down plates (covers) by pushing the hold-down latches upward until the spring loaded plates snap open. Open the spring-loaded lower tractor hold-down plates by gently pulling the hold-down plates up and out.
5. Thread the forms, printing side up, up through the opening between the open yoke and the lower paper platen, and place the forms on the paper tractors with the margin feed holes engaged on the tractor feed pins. (When loading multiple-part forms, fold the first page over before threading so that the parts will not shift while threading.) With the feed holes properly engaged on the feed pins, close the paper hold-down plates.
6. Swing the form-scale into place over the form at the printline by pushing the form-scale from the yoke toward the form until it is in place.
7. Referring to the form-scale, horizontally position the paper tractors and forms to the desired print location on the form. Lock the left-hand paper tractors in their final position.
8. Tighten the cross-tension on the form by carefully positioning the right-hand yoke paper tractors. The form should be taut but without distortion of the margin feed holds (such distortion might interfere with proper feeding). With the form at the desired cross-tension, lock the right-hand paper tractors in their final position.

9. Open the sliding panel at the upper left side of the printer to gain access to the Vertical Format Unit (VFU) and the Infinite Forms Position control. Check that the format tape loop is installed in the VFU.
10. Turn the printer power ON and press the TOP OF FORM button to advance the paper tractors to the next top-of-form position.
11. With the printer deSELECTed, adjust the vertical position of the forms by means of the Infinite Forms Position control.

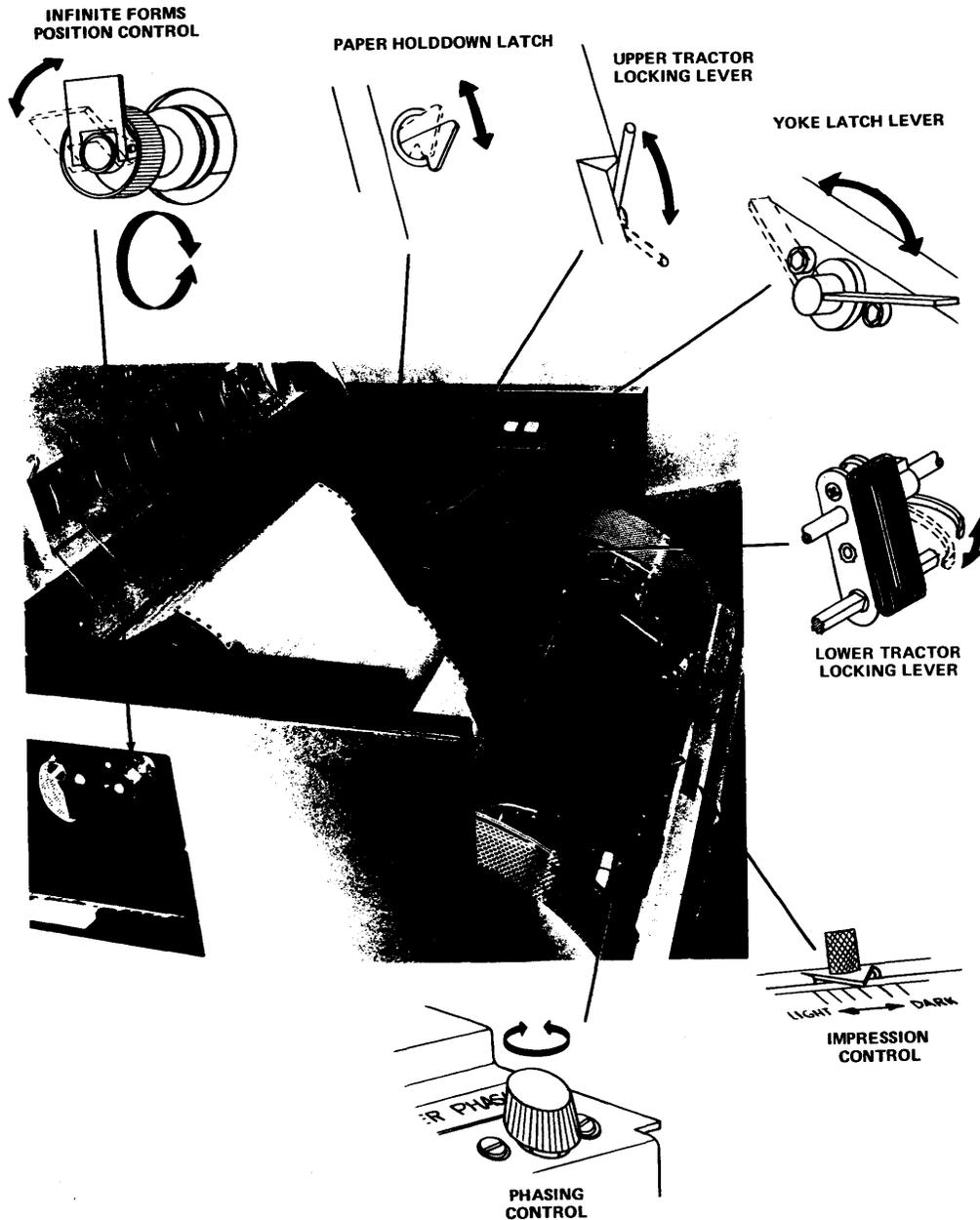


Figure 18-2. Line Printer, Definition of Terms

**WARNING**

Do not attempt to position forms while the printer is operating. This control is directly coupled to the paperfeed drive system and turns as paper is being advanced through the printer.

Decouple the forms control by raising the clutch release lever, and adjust the vertical position of the forms by turning the Control knob until the line on which the first line of print is to appear is just visible above the top edge of the form-scale. Reengage the paperfeed drive by pressing the clutch release lever back into position against the Control knob. Close the upper left side panel.

12. Close and latch the printer yoke. With the yoke lever in the forward (release) position, pivot the yoke to the closed position by pulling upward and then pushing inward on the yoke handle until the yoke is fully closed. Push the yoke lever back as far as it will go to secure the yoke.
13. Check for proper initial setting of the Impression and Phasing controls, particularly if the thickness or number of parts of the new form is significantly different from that of the previous form (see Section 18.3 for details). Close the canopy.
14. Arrange the forms supply directly under the printer yoke so that the forms will feed straight into the printer. If the forms are fed from a carton, be sure the flaps or any ragged edges on the carton do not snag the forms. Close the paper cabinet doors.
15. Position the paper tray in the mounting holes at the lower rear of the printer. Check that the paper shelf grounding cord is plugged in.
16. Press the RUN (SELECT) button. When printing begins, check for proper printing and forms handling. The first forms fed out of the printer should be guided onto the paper shelf so that they fold properly and lay flat. During operation, the printout should be occasionally dressed down by jostling the stack to make it lie flat and by pressing down on the paper to squeeze out trapped air.

### 18.3 PRINT QUALITY ADJUSTMENTS

The Impression and Phasing controls on the printer yoke permit the operator to adjust the print density (darkness of impression) and the horizontal alignment of the printed characters while the printer is in operation. To achieve the best possible results, these controls should be adjusted to each application. To ensure satisfactory print quality, the operator should check these adjustments each time a new form and/or a new ribbon is installed. Certain precautions should also be observed:

1. Use the ribbon and form(s) recommended for the application (see Appendix I).

2. Monitor and adjust the print density as required during operation.
3. Replace the ribbon as required.
4. Clean the print chain as required.

When making print quality adjustments, the Impression control should be adjusted first; then the Phasing control may be adjusted. These adjustments are interdependent.

### 18.3.1 Print Density

Adjustments to print density are made with the Impression control mechanism (see Figure 18-2). The Impression control moves the chain closer to or farther away from the print hammers; this permits the adjustment of print impression (darkness) to accommodate forms and ribbons of different thicknesses and characteristics. Print impression is adjusted by sliding the Impression control to the left or right. Print impression darkens as the control is moved to the right and becomes lighter as the control is moved to the left.

Generally, the Impression control should be initially set to "Light" for:

1. Thick forms, in order to avoid smudging
2. Very thin forms, in order to avoid embossing
3. Fresh ribbons, in order to avoid extraneous inking

The Impression control should be set to a position between "Light" and "Dark" for average form thicknesses and used ribbons, as experience dictates. Because fresh ribbons contain more ink than used ribbons, the initial print density will be relatively heavy for a given setting of the Impression control. The more a ribbon is used, the less ink it contains and the lighter the print density becomes. Therefore, the operator should check the print density at the beginning of, and at intervals during, a print operation, and should adjust the Impression control as required.

### 18.3.2 Character Phasing

The Phasing control permits adjustment of the lateral alignment of character imprints to correct any left or right side cutoff. After the Impression control is adjusted, the Phasing control should be adjusted to horizontally align the printout in all print positions to correct for any left or right-side cutoff while printing a full width character, such as an "M" or "W" (see Table 18-2). When printing on multiple-part forms, the last (bottom) part should be checked for proper Phasing adjustment, because any cutoff will be more pronounced on the bottom part than on the top part. The Phasing control can be continuously rotated in either direction to adjust alignment.

### 18.3.3 Chain Cleaning

The print chain should be cleaned periodically to ensure consistent print quality. During printing, small particles of paper and ink may accumulate in the counters (open spaces) between the lands (raised portion) of the type faces on the print chain. When this accumulation fills the open spaces, the distinctness of the printed characters might be affected. Therefore, the chain should be cleaned (with the ribbon removed), first with a vacuum cleaner, then with a soft wire brush and a vacuum cleaner, on a routine basis. A piece of paper should be placed between the open yoke and the print and paperfeed mechanisms to catch any material that is brushed off the chain while it is being cleaned.

Table 18-2. Operator-Correctable Printed Character Conditions

Printout	Condition	Adjustment
	Dark Print, Smudging Extraneous Inking	Decrease Impression adjustment
	Light Print, Voids	Increase Impression adjustment
	Left Cutoff	Increase Phasing adjustment for full- character imprint in all positions
	Right Cutoff	Decrease Phasing adjustment for full- character imprint positions
	Filled Characters	Clean print chain.

### 18.4 RIBBON REPLACEMENT

The ribbon can be replaced using the following procedure:

1. Raise the canopy, and release and pull out the printer yoke to gain access to the ribbon and ribbon-feed mechanism (see Figure 18-3).
2. Swing the form-scale away from the yoke by pushing the form-scale backward, and open the hinged ribbon cover at the top center of the yoke by swinging it toward the front to gain full access to the ribbon and ribbon mandrels.

3. Using the disposable plastic gloves supplied with the new ribbon, push the upper ribbon mandrel to the right, lift out the left end, and remove the mandrel from the mechanism. Temporarily place it on top of the form-scale.

NOTE

To ensure proper operation of the printer, it is recommended that ribbon #725-0162 should be used. It is available from your Wang Service Representative.

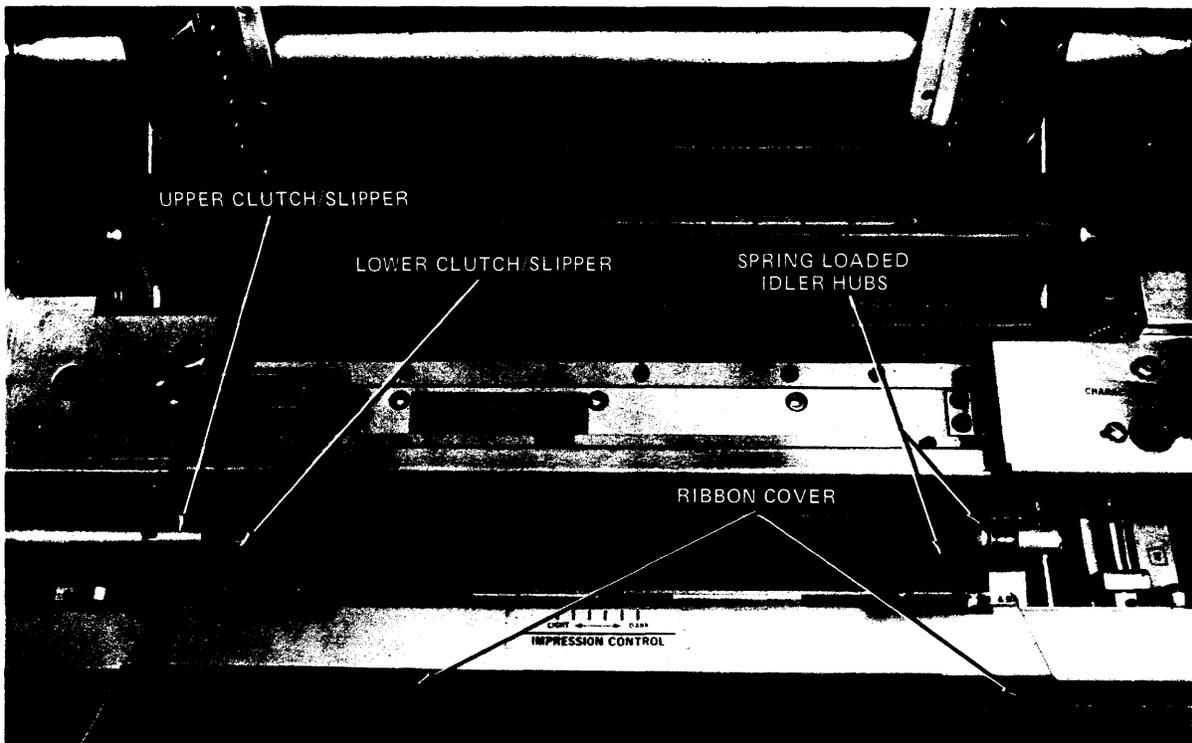


Figure 18-3. Ribbon Feed Mechanism

4. Push the lower ribbon mandrel to the right, lift out the left end, and remove the mandrel from the mechanism. Grasping both mandrels, slide the ribbon slightly to the right to clear the upper and lower ribbon sensors at the left side of the ribbon path (see Figure 18-4), and remove the ribbon from the printer.
5. When installing a new ribbon, load the full mandrel onto the lower ribbon drive first. With the full mandrel positioned so that ribbon winds from the underside (see Figure 18-4), place the right-hand end of the mandrel onto the lower right spring-loaded idler hub, push the mandrel to the right, and place the left end of the mandrel onto the lower left drive hub. One of the notches in the end of the mandrel must be engaged with the pin on the rim of the drive hub (see Figure 18-5).

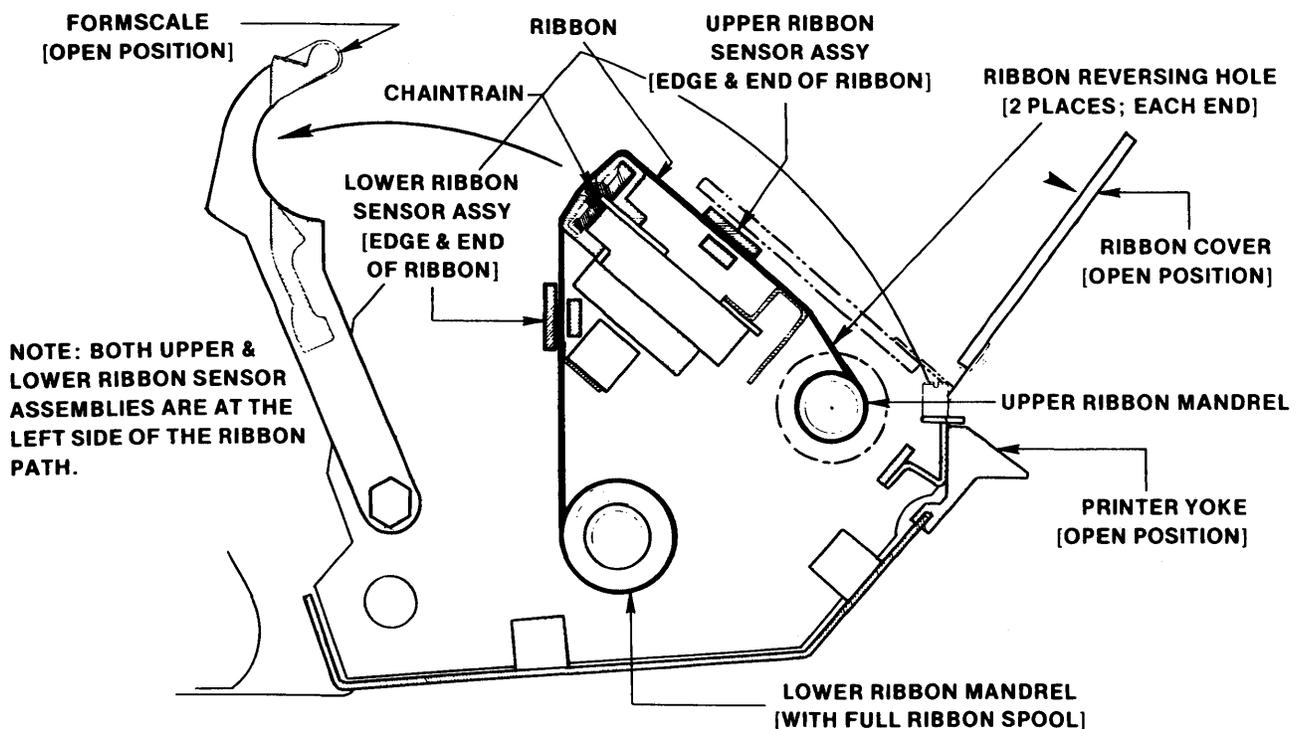


Figure 18-4. Ribbon Path

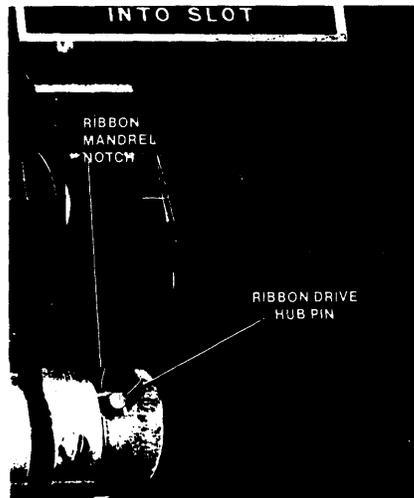


Figure 18-5. Ribbon Drive Hub and Mandrel Notch

6. Wind the ribbon over the chain as shown in Figure 18-4. Be sure the left edge of the ribbon is threaded into the slots of both the lower and upper ribbon sensors.
7. Place the right-hand end of the "empty" mandrel onto the upper right spring-loaded idler hub and push the mandrel to the right. Place the left end of the mandrel onto the upper left drive hub with one of the notches in the end of the mandrel engaged with the pin on the rim of the drive hub. (Ribbon should wind onto the top side of the upper mandrel.)
8. Manually turn the upper ribbon mandrel to take up any slack in the ribbon from in front of the print chain, and ensure that the Ribbon End holes are located behind the ribbon sensors. Close the ribbon cover.

9. Close and secure the printer yoke. Check for proper settings of the Impression and Phasing controls. Generally, when a fresh ribbon is installed, the Impression control should be initially set for light print density (refer to Section 8.3). Close the canopy.
10. When printing begins, check that the ribbon is feeding properly.

NOTE

The upper and lower ribbon sensors should be cleaned on a routine basis, preferably with each ribbon change, while the ribbon is removed.

### 18.5 VERTICAL FORMAT CONTROL

The mechanism that guides and controls paper movement in the printer is located on the left side of the printer. The Vertical Format unit contains a tape reader that provides top-of-form and vertical tab spacing control via punched tape with holes punched in Channels 1 and 5, respectively. Also, Channel 8 provides an automatic page eject. With this feature, paper automatically advances to the next top-of-form hole when the end of a document is reached. End of document is normally set at the 66th line of 11-in. (27.9-cm) forms. Automatic page ejection passes over the perforation in fanfold paper when forms have been properly aligned. Before operating the printer, verify that the paper tape is properly seated in the Vertical Format unit. To position the tape at the top-of-form holes, press the TOP OF FORM switch.

The standard 1-inch-wide, 8-channel paper tape has sprocket holes located between Channels 3 and 4, holes for top-of-form in Channel 1, and holes for vertical tab in Channel 5. The sprocket holes are spaced at 0.1-in. (0.25 cm) intervals. The tape reader and paper-feed mechanisms are mechanically linked so that each line feed advances both the paper one line, and the tape one sprocket hole. When the printer receives a vertical tab code, the tape is advanced to the next hole in Channel 5 and the paper is advanced correspondingly. When the printer receives a form feed code or the TOP OF FORM switch is pressed, the punched tape is advanced to the next hole in Channel 1 and the paper advances correspondingly.

On the standard tape, vertical tab holes are spaced six sprocket holes apart -- corresponding to a 1.0-in. (2.54-cm) tab, or six lines. Form feed holes are spaced 66 sprocket holes apart -- corresponding to an 11.0-in. (27.9-cm) form. The tape provided with the printer should last the life of the printer. Special tapes to produce unique lineprint spacing can be used with the printer; they must be prepared either with a Teletype tape punch or with manual punching equipment.

Follow these instructions to mount a new Vertical Format Tape:

1. DeSELECT the printer and open the sliding panel at the upper left side of the printer to gain access to the Vertical Format unit.

2. Raise the spring-loaded tape hold-down and carefully remove the old tape by lifting it up to clear the feed pins.
3. Orient the new tape loop so that the narrow, 3-channel side of the tape is on the left side of the loop, as viewed from the front of the printer.
4. Insert the tape loop into the narrow gap between the tape guides and place the top of the loop over the tape drive sprocket so that the feed pins engage the feed holes in the tape.
5. Lightly holding the tape loop taut, lower the tape hold-down.
6. Press the HOME (TOP OF FORM) switch to position the tractors, and close the sliding panel. Realign paper if necessary.

Appendix M indicates how to splice a prepared printer tape. Problems with Vertical Format Tapes are best resolved by your Wang Service Representative.

## 18.6 PRINTER CONTROLS

The control panel on the right-hand side of the printer contains a number of switches, buttons and light indicators for controlling the manual operations of the printer. They are discussed in the following paragraphs.

### ON

To turn the printer on, press the ON button. The button is illuminated when the power is ON.

### OFF

To turn the printer off, press the OFF button. When the power is OFF, the OFF button is illuminated. The OFF button is also illuminated whenever a malfunction turns on the Alarm lamp.

### RUN (SELECT)

After turning on the printer, press the RUN (SELECT) button; the button is illuminated. RUN (SELECT) readies the printer to receive data from main memory.

In the ready position, the printer remains in a stand by state with the power to the chain and ribbon feed drive motors turned off until the transfer of the first print command from main memory. Similarly, the printer automatically switches to the stand by state to conserve power if a print command is not transferred within approximately one minute of the last print operation.

## HOME (TOP OF FORM)

With the printer ON and deSELECTed, paper is advanced to the top-of-form position by pressing this switch. Paper advance is specified by the top-of-form position as designated by a punched hole in Channel 1 of the Vertical Format Tape. If no tape is mounted, a 1-line advance is made.

## ALARM LAMP

The Alarm indicator is illuminated when a mechanical or electronic malfunction occurs. The lamp is illuminated for any of the following conditions:

1. Yoke is open
2. Yoke latch is open
3. Paper runaway condition is detected
4. Printer is out of paper, or less than 5.5-in. (14 cm) of paper remain below the linetype
5. Paper or ribbon is jammed
6. Hammer driver is not positioned properly. When this condition exists, RUN (SELECT) is inhibited and the printer does not operate.

(The Alarm lamp is also illuminated momentarily at power turn-on and turn-off, to provide a lamp check.)

If the corrective action indicated in the following list does not alleviate a malfunction, shut the printer off. If the problem cannot be resolved, contact your Wang Service Representative.

<u>Condition</u>	<u>Corrective Action</u>
Yoke open	Close yoke
Yoke latch open	Close yoke latch
Runaway paper	Press HOME (TOP OF FORM). Check if format tape is damaged.
Out of paper	Replace paper
Paper or ribbon jam	Replace paper or ribbon

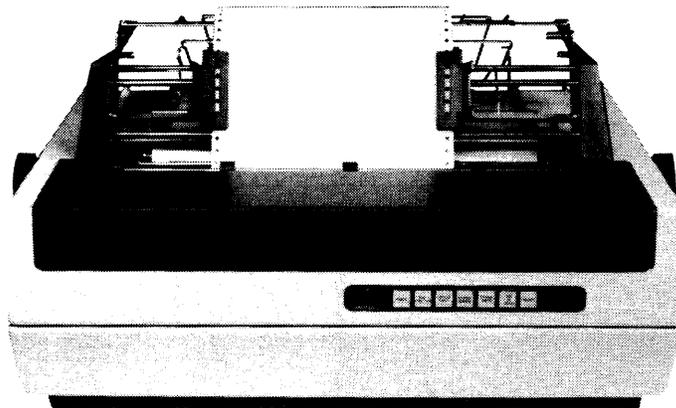
## 18.7 POINTS TO BE CHECKED

1. The printer must be connected to the appropriate CP-installed Input/Output Processor (IOP).
2. The tape in the Vertical Format unit must be correctly seated.
3. Paper must be inserted into the printer.
4. The Impression and Phasing controls must be set for good print quality.
5. The printer must be turned on.
6. RUN (SELECT) must be pressed to enable the printer to receive data.
7. The correct printer number must be specified under SET Usage Constants (PF 2 from the Command Processor Menu).

**CHAPTER 19**  
**MODELS 6581W AND 6581WC DAISY PRINTERS**

**19.1 INTRODUCTION**

The Models 6581W and 6581WC Daisy Printers (Figures 19-1 and 19-2) use daisy character wheels to form typewriter-quality upper- and lowercase characters and special symbols. The Model 6581W can print in either a 10-pitch (up to 132 character-per-line) or a 12-pitch (up to 158 character-per-line) format at an average rate of 30 characters per second. The Model 6581WC has a wide carriage and prints in either a 10-pitch (up to 180 character-per-line) or a 12-pitch (up to 216 character-per-line) format, at an average rate of 30 characters per second. Both models print bidirectionally across the page. Interchangeable daisy wheels containing 86 characters allow for various type styles.\* Both printers can print up to six copies using single sheets or continuous-form paper. Paper widths are from 3.5 to 15 inches (8.9 to 38.1 cm) on the 6581W and from 3.5 to 20.5 inches (8.9 to 52 cm) on the 6581WC.



**Figure 19-1. Model 6581W Printer**

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\* Only Wang daisy wheels should be used (see Appendix J).

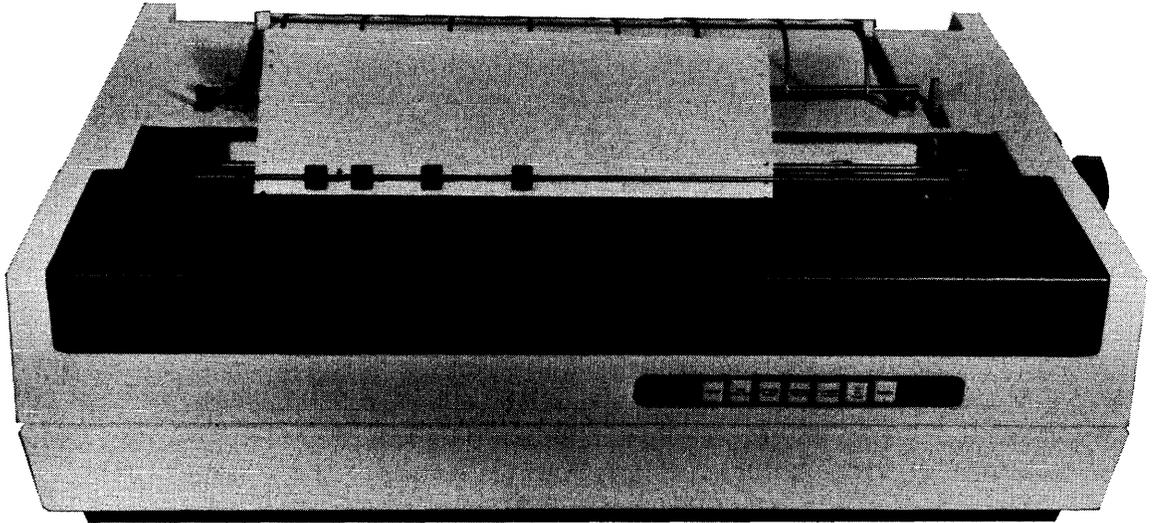


Figure 19-2. Model 6581WC Printer

## 19.2 PAPER INSERTION

Paper is inserted in the printer in a manner similar to loading paper in a standard typewriter. The steps for insertion are as follows:

1. Pull the Paper Release lever, located on the right-hand side, to its full forward position.
2. Pull the paper bail forward to properly align the paper.
3. Insert the paper behind the platen and turn the Platen handle until the paper comes around and up in front of the platen.
4. After the paper is properly positioned, return the paper bail and the Paper Release lever to their operating positions.
5. Adjust the Copy Control lever, on the left, for paper or form thickness adjustments. For single-sheet paper, the lever should be in its full forward position. As paper thickness increases, move the lever toward the rear.
6. Manual vertical fine adjustments of paper can be made by pushing in and rotating the left Platen knob.

### 19.3 CONTINUOUS-FORM PAPER INSERTION WITH FORMS FEEDER

1. To install the forms feeder for use with continuous-form paper, pull the paper bail forward (away from the platen), and then pull the Paper Release lever to its full forward position.
2. Center the forms feeder over the printer with the white Latch Release buttons (see Figures 19-3 and 19-4) facing the top of the printer.
3. Press in both Latch Release buttons to open the jaws of the forms feeder assembly latches (see Figures 19-3 and 19-4) and lower the feeder onto the platen shaft. At the same time, position the Paper Release lever extension (see Figure 19-3) over the Paper Release lever. Notice how the latches fit easily over the platen shaft to the right and left of the platen. Release the Latch Release buttons to lock the forms feeder into place.
4. Push the Paper Release lever to the rear. This can be done by gently pulling up on the upper paper rack. Insert continuous-form paper between the upper and lower paper racks and down behind the platen. Turn the Platen knob until the paper comes around and up in front of the platen.
5. Position the Paper Release lever forward and align the paper.
6. Open the pin-feed gates (see Figures 19-3 and 19-4) on the forms feeder by gently pulling forward on the front of the gates. Align the holes in the paper with the pins on the feeder. To change paper width or margins, pull the side(s) of the pin-feed gate(s) forward, adjust the gate(s), align the holes on the paper with the pins on the feeder, and push the side(s) of the gate(s) back into operating position. Close the pin-feed gates by gently pushing them back.
7. Turn the Platen knob to position the paper to where the first line of printing is to begin at the top of the page. When printing occurs, the paper should exit over the top of the upper paper rack towards the back of the printer.

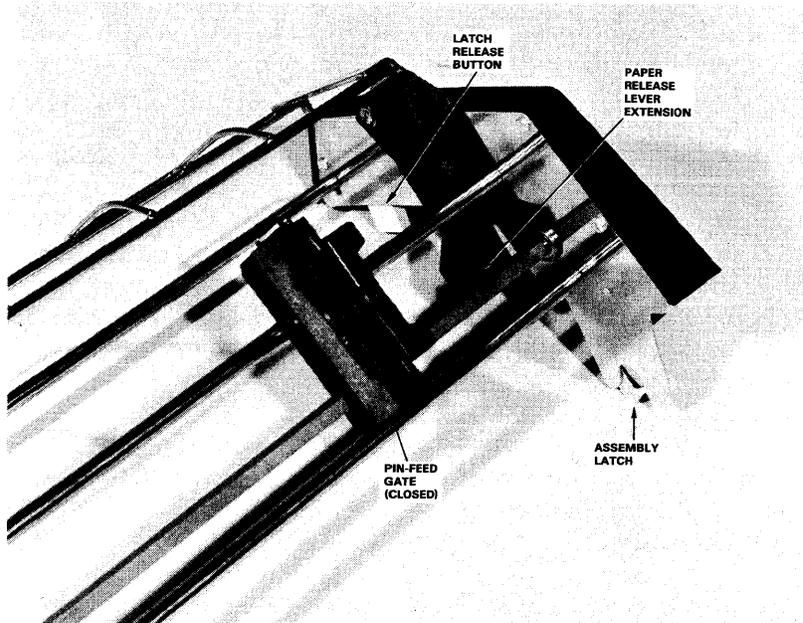


Figure 19-3. Forms Feeder (Right Angle)

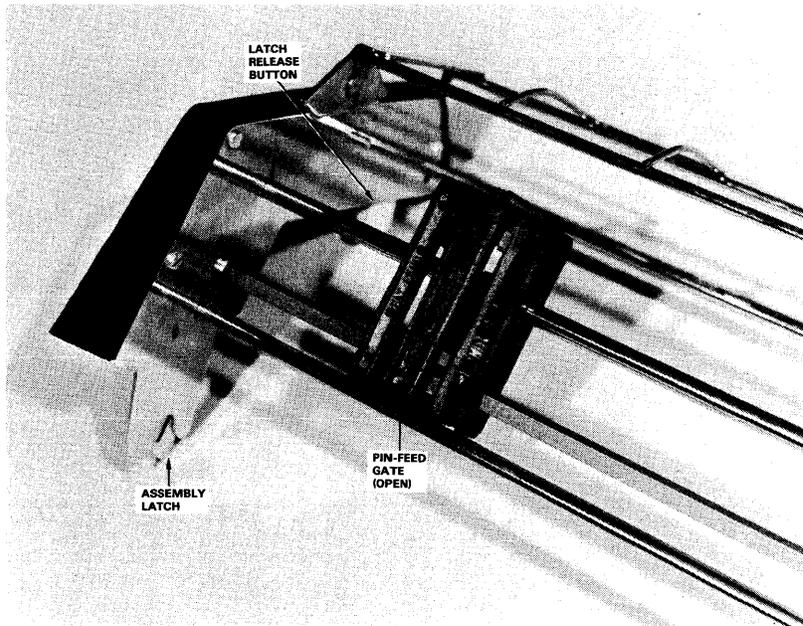


Figure 19-4. Forms Feeder (Left Angle)

#### 19.4 RIBBON CARTRIDGE REPLACEMENT

1. Open the front cover by gently pulling up on the front edge of the printer cover.
2. Use the cartridge side latches to loosen the ribbon cartridge.
3. Remove the cartridge by gently pulling it up.
4. To install a new cartridge, slide the exposed portion of the ribbon behind the two ribbon guide posts located in front of the print wheel. Align the right pin of the ribbon cartridge (see Figure 19-5) to the right clip on the carriage (see Figure 19-6) and push down on the cartridge until it snaps into place.

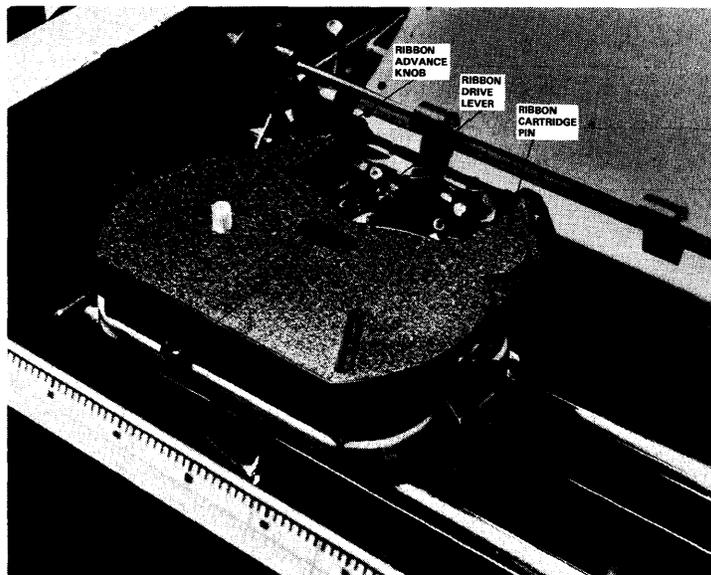


Figure 19-5. Ribbon Cartridge Removal

5. Push down on the center of the ribbon cartridge to release the ribbon drive lever.
6. Turn the Ribbon Advance knob on the cartridge clockwise until the ribbon is taut.
7. Close the cover.

## 19.5 PRINT WHEEL REPLACEMENT

1. Open the front cover by gently pulling up on the front edge of the printer cover.
2. Remove the ribbon cartridge as previously described.
3. To remove the wheel, tilt the inner carriage assembly away from the platen. Expose the print wheel by gently squeezing and pulling the release lever (see Figures 19-6 and 19-7).
4. Grasp the rubber hub (Figure 19-7) and gently pull away the print wheel.
5. To install the print wheel, push it firmly onto the end of the print wheel motor shaft. Be sure the alignment slot on the print wheel (see Figure 19-8) fits into the tab protruding from the shaft hub (see Figure 19-7).
6. Tilt and latch the inner carriage assembly back into operating position (see Figure 19-8). Replace the ribbon cartridge as previously described.
7. Close the front cover.

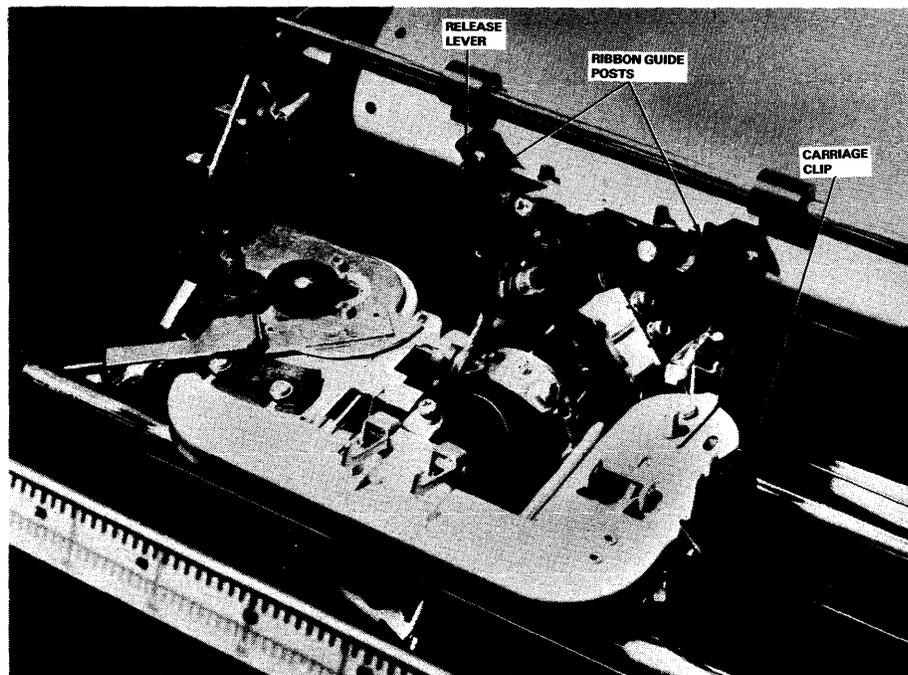


Figure 19-6. Ribbon Cartridge Replacement

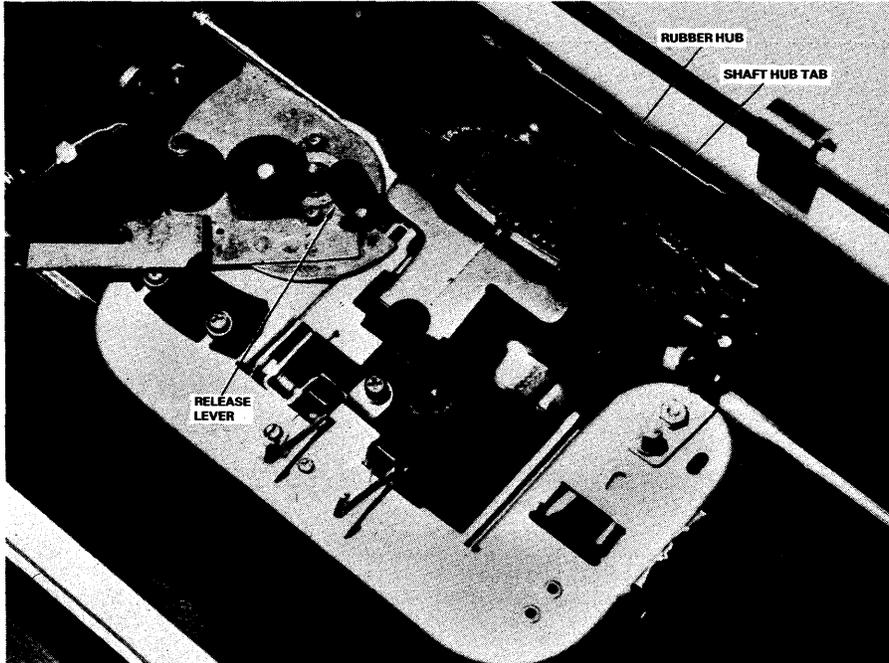


Figure 19-7. Print Wheel Replacement

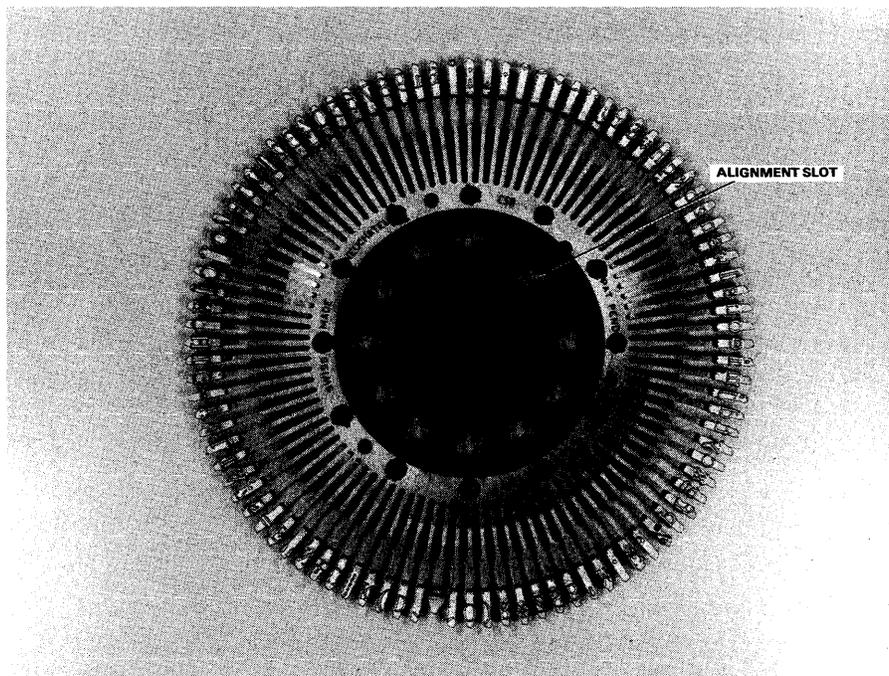


Figure 19-8. Print Wheel

## 19.6 PRINT INTENSITY ADJUSTMENT

Print intensity is adjusted by means of the Impression Control switch, which is located to the right on the outside of the printer (see Figure 19-9), adjusts the print intensity. Three levels of print intensity are provided to accommodate print wheel font variations as well as multiple copy printing. Print intensity levels shown on the switch are as follows:

- H -- high, used for printing multiple forms.
- M -- medium, used for most normal typing work, printing on single sheets.
- L -- low, used for light printing.

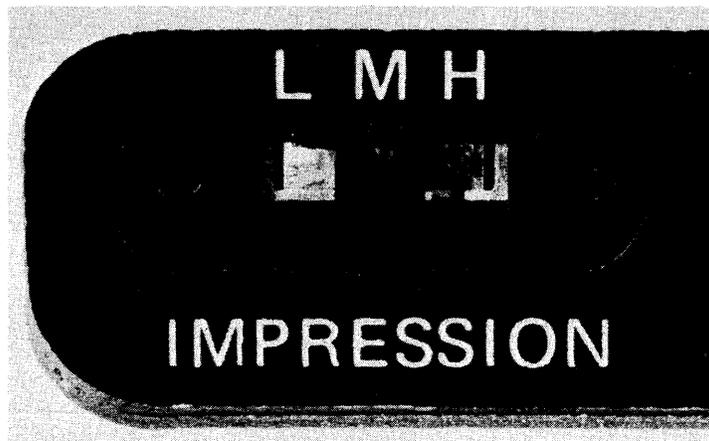


Figure 19-9. Impression Control Switch

## 19.7 COPY CONTROL LEVER

The Copy Control lever, located on the top left-hand side of the printer, is used for variations in paper thickness. For single sheet paper, the lever should be in its full forward position. For multiple forms, move the lever toward the back; it should be placed all the way to the rear when 6-part forms are used. This lever should be used in conjunction with the Impression Control switch.

## 19.8 FUSE REPLACEMENT

The main line fuse is located at the rear of the printer. The printer should be turned off when the fuse is being changed. The fuse is changed by rotating the bad fuse counterclockwise until it can be removed and replacing it with a new fuse.

## 19.9 PRINTER CONTROLS

The control panel on the front of the printer (see Figure 19-10) contains switches, buttons, alarms, and light indicators for controlling printer operations. Whenever the printer needs attention (because of a malfunction or the need to change a daisy wheel, ribbon, or paper), an audible tone is sounded. The appropriate light is illuminated, and the printer is automatically deSELECTed, causing the light under SELECT to turn off. After the appropriate action has been taken, the printer must be reSELECTed (press SELECT to illuminate the lamp).



Figure 19-10. Control Panel

### NOTE

The ON/OFF rocker switch is located at the rear of the printer. When the printer is ON, the Power lamp is illuminated. When the printer is OFF, the lamp is extinguished.

### POWER

When this light is ON, it indicates that printer power is ON; when the light is extinguished, printer power is OFF.

## MALFUNCTION

When a printer malfunction occurs, the printer is automatically deSELECTed, the Malfunction lamp is illuminated, and an audible tone is sounded. The problem may be simple, e.g., a foreign object in the carriage, in which case the operator may simply remove it and press the TOP OF PAGE button and then the SELECT button to continue printing. If the malfunction occurs repeatedly notify your Wang Service Representative.

### NOTE

The Malfunction lamp also goes ON and OFF during the Power ON procedure.

## CHANGE DAISY

When a Stop instruction is encountered in the word processing text being printed, the Change Daisy lamp illuminates, an audible tone is sounded, and the printer is automatically deSELECTed. When this occurs, change the print wheel and then press SELECT to proceed with the printing operation. The Change Daisy lamp also illuminates if the pitch of the current printout is different from the pitch used for the last printout.

## CHANGE RIBBON

The Change Ribbon lamp illuminates to indicate that the ribbon should be changed. The printer is automatically deSELECTed, the tone is sounded, and the lamp is illuminated. The printer immediately stops. To print more characters, press the SELECT button once for each character to be printed. The Change Ribbon light also illuminates if the cover is not properly closed. After changing the ribbon or properly closing the cover, press SELECT to continue printing.

## CHANGE PAPER

When the printer nears the end of the last sheet of paper, the Change Paper lamp illuminates, a tone is sounded, and the printer is automatically deSELECTed. Insert more paper and press SELECT to continue printing. To print more lines on the existing page, press SELECT once for each line. The Change Paper lamp also illuminates if the paper for the current word processing printout is different from that used for the last printout.

## TOP OF PAGE

The TOP OF PAGE button positions the paper to the top of the page. A major advantage of this button is the ability to easily reprint an entire word processing page if an error or problem is noticed during the printing of a page. To reprint a page, deSELECT the printer and press the TOP OF PAGE button; the printer ejects to the next top of page. SELECT the printer and the entire page is reprinted from the beginning. This technique may be utilized no matter how many lines were printed on the previous page, but it cannot be used to reprint a page unless the printer was first deSELECTed by the operator. (For example, it will not work if the printer was automatically deSELECTed by a malfunction.)

## SELECT

This button should be pressed to initially activate the printer or to restart the printer after it has been manually or automatically deSELECTed.

### 19.10 POINTS TO BE CHECKED

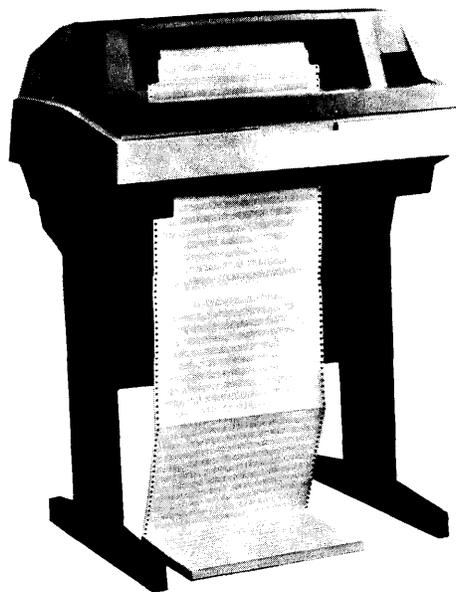
1. The printer must be connected to the appropriate IOP.
2. Paper must be inserted in the printer.
3. The Impression Control switch must be set for good print quality. It can be adjusted as described in Section 19.6. Also, the Copy Control lever must be set for the proper paper thickness.
4. Turn on the printer and press SELECT to enable printer to receive data.
5. Make sure you have specified the correct printer number under SET Usage Constants (PF 2 from the Command Processor Menu).

**CHAPTER 20**  
**MODELS 5573 and 5574 BAND PRINTERS**

**20.1 INTRODUCTION**

This chapter describes the characteristics and operations of the Models 5573 and 5574 Band Printers (see Figure 20-1). The Model 5573 prints 250 lines per minute in 10 or 15 pitch; the Model 5574 prints 600 lines per minute in 10 pitch. Each printed line can contain up to 132 print columns at 10 pitch (or 200 columns at 15 pitch with the Model 5573); six or eight lines may be printed per inch. Character bands offer a choice of two different character sets (one with 64 characters and one with 96); a wide variety of type styles is also available. Every band must be accompanied by its own Programmable Read-Only Memory (PROM) chip, which controls the character sequence for the particular band. PROM chips are installed by Wang Field Service Representatives.

A buffer receives a complete line of data transmitted from the system CP to the printer. A digital readout status indicator helps the user to locate printer problems by displaying error codes, which can be referenced in Section 20.9 or on a table located inside the printer's hood. The Copies control allows printing on single- or multipart forms. The printer can use continuous-form paper with widths from 3 to 16 inches (7.62 to 40.6 cm).



**Figure 20-1. Band Printer**

## 20.2 PRINTER CONTROLS

The control panel on the right-hand side of the printer contains switches, buttons, lamps, and a digital readout status indicator for controlling manual operations. Figure 20-2 is a labelled illustration of the control panel. Note that certain controls are externally accessible while others can only be accessed by opening the printer cover.

### POWER ON

The Power ON lamp illuminates when power is ON.

### ON/OFF LINE Switch/Indicator

This switch alternately places the printer on and off-line. When the printer is on-line, the lamp is illuminated.

### ALARM/CLEAR Indicator/Switch

The Alarm indicator is illuminated during power-up and whenever fault conditions occur. These conditions are also indicated by the Status indicator display. Pressing the ALARM/CLEAR switch clears the printer's buffer.

### PAPER STEP

The PAPER STEP switch causes the paper to advance one print line. Before the switch will function, the printer must be taken off-line. The switch is disabled during on-line operation.

### TOP OF FORM

Pressing this switch advances the paper to the first print position of the next form. Like the PAPER STEP switch, the TOP OF FORM switch only operates when the printer is off-line. An on-line condition disables the switch.

### PHASE CONTROL

This control is used to maintain equal printing density on the left and right sides of the characters. Proper phasing can be achieved by running the test for print registration (see Section 20.8).

### LINES PER INCH

This switch is no longer functional, as printing density is now software-selectable.

## TEST

This 3-position switch activates the printer's self-testing capabilities. The center or OFF position disables the self-test function. Moving the switch to the right and pressing the ON/OFF Line switch causes the printing of a 132-column sliding pattern; moving the switch to the left and pressing the ON/OFF LINE switch cause the printing of a fixed vertical pattern. (See also Section 20.8.)

## STATUS

The Status indicator is an alphanumeric display showing printer status. Fault conditions can be referenced in a table on the inside of the printer hood and in Section 20.9.

## COPIES CONTROL

By controlling the pressure of the impact hammers, this control makes it possible to allow print on single- or multipart forms. As the Copies control is moved from left to right, the hammer pressure decreases. (See also Section 20.8.)

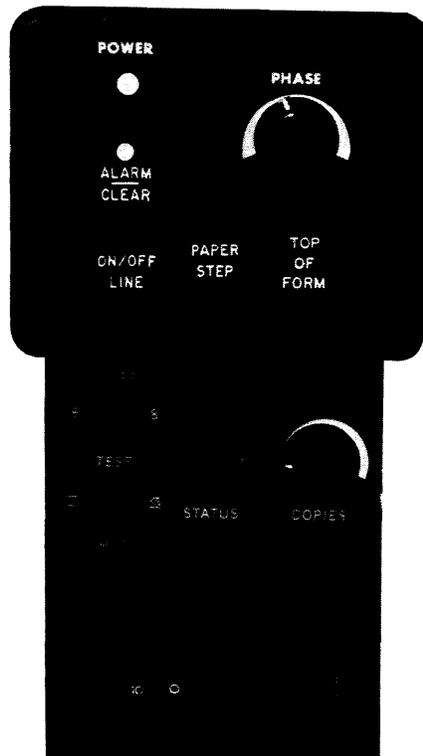


Figure 20-2. Band Printer Control Panel

## 20.3 PAPER CONTROLS AND PRINTER SENSORS

### 20.3.1 Paper Controls

The following paper controls are used when loading the printer.

#### SPROCKET COVERS

The sprocket covers (right and left) can be opened to reveal the pin-feed mechanisms, upon which the forms are secured.

#### PAPER FEED RELEASE LEVER

This lever controls the paper feed motor, which determines how paper is fed through the sprockets. Paper is fed automatically when the lever is in the run position, with the numeral 1 visible. When the lever is adjusted so that the numeral 0 is visible, the motor is disengaged, allowing the manual operation of the Vertical Paper Adjust knob.

#### VERTICAL PAPER ADJUST KNOB

This knob rotates the drive shaft upon which the right and left sprockets are mounted. When the paper feed motor is disengaged, the Vertical Paper Adjust knob can be operated manually.

#### SPROCKET LOCKS

Sprocket locks control the horizontal movement of the sprockets along the drive shaft. Squeezing the locks moves the sprockets to accommodate a particular form width.

### 20.3.2 Printer Sensors

Printer sensors detect the existence of certain conditions that impede the operation of the printer. When any of these conditions arise, an error message is displayed on the Status Indicator (see Section 20.9).

#### PAPER OUT SENSOR

This sensor detects the end of the last form and causes Error Code 01 to be displayed.

#### PAPER MOTION SENSOR

The paper motion sensor senses when paper is moving through the sprockets. If there is a loss of motion for a maximum of nine lines, an error code of 02 is displayed.

#### BAND COVER

This sensor senses when the character band cover is closed. If the cover has not been properly closed, Error Code 03 is displayed.

## HAMMER BANK

This sensor detects when the hammer bank is unlatched and causes Error Code 04 to be displayed.

### 20.4 POWER-ON AND POWER-OFF PROCEDURES

Before the printer is powered up, it should be properly loaded with paper, ribbon, band, and corresponding PROM. The Test switch should be in the OFF position, and all covers and latches closed. Sections 20.5, 20.6, and 20.7 describe in detail how to load the ribbon, character band, and paper.

#### 20.4.1 Printer Power-Up

To power up the printer, perform the following:

1. Move the Power switch to the ON position. The Power ON indicator should illuminate at this time.
2. Allow three seconds for the Alarm/Clear lamp to extinguish. If it remains illuminated, check the Status Indicator for the error code and, if possible, correct the condition.
3. Press the TOP OF FORM switch.
4. Press the ON/OFF LINE switch, verifying that its lamp is illuminated.

#### 20.4.2 Printer Shutdown

To power-down the printer, perform the following:

1. Check the status of the ON/OFF LINE switch. If the lamp stays on after the ON/OFF LINE switch is pressed, the print buffer contains unprinted data.
2. Place the printer's Power switch in the OFF position, ensuring that the Power lamp is extinguished. At the end of this procedure, the printer is no longer operational.

### 20.5 RIBBON REPLACEMENT

The following instructions pertain to ribbon cartridge removal and insertion (a diagram illustrating these instructions can be found inside the printer hood):

1. Make sure the printer is off-line.
2. Raise the printer cover. Open the hammer bank by lifting the plastic-covered hammer bank handle, located beside the left-hand sprocket cover. Lifting the handle releases the hammer bank latch and moves the hammer bank away from the ribbon cartridge.

### 20.5.1 Ribbon Removal

To remove a ribbon cartridge, perform the following:

1. Swing open the ribbon drive roller pivot arm.
2. Grasp the ribbon cartridge, sliding it approximately 1.5 inches to the right, and then remove it from the printer.

### 20.5.2 Ribbon Installation

To install a new ribbon, perform the following:

1. Remove the new ribbon cartridge from its packaging, setting aside the towelette for cleaning up after the ribbon is installed.
2. To insert the ribbon cartridge, first make sure that the two semicircular grooves (indentations for the pivot arm and ribbon drive roller) are on the left. Then place the cartridge over the two locating buttons.
3. Open the pivot arm, threading the ribbon between the pivot arm roller and the ribbon drive roller and then around the first ribbon guide. Close the pivot arm.
4. Increase the tension in the ribbon slightly, leaving extra slack on the right side of the cartridge. Slide the cartridge to the left until it locks into place, and then close the ribbon drive roller pivot arm.
5. Thread the ribbon through the second, third, and fourth ribbon guides and between the two plastic flaps that appear behind the ribbon cartridge. The ribbon should be positioned over the band.
6. Spin one of the pulleys by hand in a counterclockwise direction until the ribbon is taut.
7. Lower the Hammer Bank handle, thereby locking the hammer bank into place. Close the printer cover.

## 20.6 BAND REPLACEMENT

The character set of the band printer is contained on an easily removable steel band, controlled by its own PROM (Programmable Read-Only Memory) chip. PROMs must be installed by an authorized Wang Field Service Representative. A printer may have two different PROMs, corresponding to character sets offered on the following bands:

- . Utility Band. The Utility Band has a 64-character set (including uppercase letters, numbers, and special symbols) and is standard for band printers.

- . 96-Character Band. This band contains a 96-character set, including upper and lowercase letters, numbers, and special symbols.

The following procedures pertain to the removal and insertion of character bands. Note that a band will not be accepted unless its corresponding PROM is already resident in the printer. Before performing band removal or insertion, place the printer off-line, raise its cover, and disengage the Hammer Bank latch by lifting up the Hammer Bank handle.

#### 20.6.1 Band Removal

Before removing the band, it may be convenient to remove the ribbon cartridge (see Section 20.5). To remove the band, perform the following:

1. Open the band cover. Decrease band tension by moving the band release handle that extends from the right-hand pulley.
2. Holding the band with your left hand, use your right hand to carefully lift the band from the right pulley. Be careful not to bend the band to a curve smaller than that of the pulleys.
3. Squeeze the sides of the band together at the center so that a figure 8 is formed. Lift the band off the left pulley and remove it from the printer.

#### 20.6.2 Band Insertion

To insert a new band, perform the following:

1. With print characters facing outward, place the band in position by first resting its right end on top of the right pulley.
2. Place the left end of the band around the left pulley and carefully insert it between the ribbon mask and the forms alignment scale.
3. Holding the band in position, slide its right end over the right pulley, and carefully position it between the band sensor and the pulley.
4. Slide the band down the right pulley until the bottom edge of the band rests on the edge guide bearing -- a grooved, rotating disk located beneath the pulley.
5. Move the band release handle forward until it is in the locked position.
6. Spin either pulley by hand in a counterclockwise direction until the band is properly secured in the groove of the edge guide bearings.
7. Insert the ribbon cartridge, following the instructions given in Section 20.5.

8. Close the band cover and lower the Hammer Bank handle to the locked position. Close the printer cover and return the printer to on-line status.

## 20.7 PAPER INSERTION

Before loading paper, be sure that the ribbon cartridge and character band are properly installed. After the printer is powered up (but is still off-line), raise the printer cover and perform the following operations:

1. Press the TOP OF FORM switch.
2. Grasp the Paper Feed Release lever attached to the Paper Adjust knob, located next to the right-hand sprocket cover. Pull the lever out so that it is no longer flush against the Paper Adjust knob.
3. Open the hammer bank by lifting the plastic-covered Hammer Bank handle which is located beside the left-hand sprocket cover. Lifting the handle releases the Hammer Bank latch and moves the hammer bank away from the band.
4. Position the sprockets to the approximate width of the form by squeezing the sprocket locks and sliding the sprockets along the drive shaft.
5. Move the paper support guides on the sprocket drive shaft an equal distance between the sprockets.
6. Spring open both sprocket covers, uncovering the sprocket pins.
7. Slide continuous-form pin-feed paper through the paper throat between the hammer bank and the band, pulling the paper over the sprocket pins and up into the paper exit chute. If the forms are fed from a carton, be sure the flaps or ragged edges on the carton do not snag the forms.
8. Align the form feed holes in the right margin over the right-side sprocket pins and close the right-side sprocket cover.
9. Squeezing the right sprocket lock, slide the right sprocket along the drive shaft until the left-margin form feed holes are aligned with the left sprocket pins.
10. Close the left sprocket cover, ensuring that the form is not skewed on the sprockets.
11. To determine horizontal positioning of text on paper, simultaneously squeeze both sprocket locks, and then slide the form to the left or right until the first print column is reached. Do not create too much tension in the form. Too much tension is indicated by elongation of the form feed holes.

12. To determine vertical positioning, refer to the top-of-form index, a scale that indicates the vertical position where the first line of print will appear. Rotate the Paper Adjust knob to line up the paper perforation with a particular number on the top-of-form index. For example, if 6 is chosen, the first printed line will then appear six vertical spaces down from the top-of-form perforation.
13. Lower the Hammer Bank handle, moving the hammer bank forward. Make sure that the handle is in the locked position, as far down as possible.
14. Swing the Paper Feed Release lever up to the Run position, so that the green numeral 0 is visible.
15. Close the printer cover.
16. Press the ALARM/CLEAR switch, causing the ALARM/CLEAR indicator lamp to extinguish.

## 20.8 PRINT ADJUSTMENT

The printer is equipped with a number of controls for achieving proper print registration. The Test, Phase, and Copies controls allow the user to test and control proper phasing, and to control hammer pressure when multi-part forms are being used.

The following print registration problems often occur but are simple to correct.

- . Left or right portions of all characters missing. This condition indicates that the Phase and Copies controls need to be readjusted.
- . Smearred characters. When this condition occurs, the band may be dirty, the ribbon too "wet," or the paper quality poor.
- . Carbon copies too light or too dark. This condition may be caused by an improper Copies control adjustment, poor quality ribbon, too many copies, or paper that is too stiff.

The Test switch, located on the control panel, enables the user to perform diagnostic tests for print quality. Before attempting print testing and adjustment, the user should make sure that the band cover is closed; the hammer bank latched; and the printer is properly loaded with paper, ribbon, and character band. Carry out the following procedures to obtain a test printout.

1. Press the TOP OF FORM switch, causing the paper to move to the top position of the next form.
2. Select the sliding (diagonal line) test pattern by positioning the Test switch to the right.
3. Press the ON/OFF LINE switch, taking the printer off-line. The test printout will begin. It should be allowed to continue until enough lines have been printed to determine vertical and horizontal registration.
4. To halt printing, press the ON/OFF LINE switch. Check the printout, ensuring that all characters are legible and all columns contain a printed character.
5. Move the Test switch to the left, selecting the fixed character (vertical line) pattern. Ideally, each character should be of equal print density on its right and left sides. The fixed character pattern enables the user to judge letter clarity and adjust character uniformity by using the Phase control dial.
6. Press ON/OFF LINE to begin the next print cycle. While printing is in progress, adjust the Phase control dial for proper registration. Clockwise movement will cause increased density to the right side of the character. The letter H is well suited for this type of test; it should have both sides of equal density, with the center bar touching both sides.

The ability to regulate the printing force of the hammers allows the band printer to print evenly through multiple forms. Continuous-form purchase orders and other multiple-copy documents can be handled with ease through use of the Copies control. To adjust the Copies control, perform the following operations:

1. Start the test print cycle, selecting the fixed character pattern.
2. Set the Copies control to the lowest setting that allows the best print quality for the number of forms being printed. To increase hammer pressure, adjust the control by moving it slightly to the right.
3. Momentarily press the ON/OFF LINE switch to stop the print cycle.
4. Set the Test switch to the center (or OFF) position and close the printer cover.

## 20.9 STATUS INDICATOR

The band printer has a diagnostic status indicator on the control panel. When the printer is forced off-line, an alphanumeric error code is displayed, informing the user of the problem at hand.

Table 20-1 defines the possible error codes displayed by the Status Indicator and lists the actions necessary to correct the various errors. Actions 1, 2, and 3, defined immediately below, are suggested methods for clearing the Status Indicator display.

1. Perform corrective action and press ALARM/CLEAR switch.
2. Perform corrective action.
3. Shut printer down and power it up again. If fault persists, call service personnel.

Table 20-1. Status Indicator Codes

Status Display	Definition	Corrective Action	Cleared By
01	Paper supply low	Reload paper	1
02	Paper motion fault	Ensure paper movement	1
03	Band cover open	Close band cover	1
04	Hammer bank not closed	Close and latch hammer bank	2
05	Undefined character band loaded	Band must be changed to be PROM-compatible	1
08	Undefined form length selected	Reselect forms length	2
10	Memory not loaded	Press ALARM/CLEAR switch	1
14	Channel not found	Press ALARM/CLEAR switch	1
20	No comparison, data unprintable	Data error*	1
21	Off line - print inhibit	Call service personnel	3
22	Interlock cable error	Call service personnel	3
23	Parity error	Data error*	1
24	Nine consecutive carriage returns	Data error*	1

\* Data error corresponds to a user system malfunction. If pressing the ALARM/CLEAR switch does not correct the problem, consult service personnel.

Table 20-1. Status Indicator Codes (continued)

Status Display	Definition	Corrective Action	Cleared By
25	Format code error	Data error*	1
26	DAVFU stop code error	Data error*	1
27	DAVFU data greater than 143 lines	Data error*	1
28	VFU check sum error	Data error*	1
29	I/O parity error DAVFU load	Data error*	1
30	VFU memory check error	Data error*	1
40	Band system fault	Call service personnel	3
41	Paper system current fault	Call service personnel	3
42	Hammer system fault	Call service personnel	3
44	12 volt fault	Call service personnel	3
45	-9 volt fault	Call service personnel	3
46	VCL fault	Call service personnel	3
47	+38 volt fault	Call service personnel	3
48	Transducer fault	Call service personnel	3
60	Failure Mode - start motor	Call service personnel	3
61	Failure Mode - idle	Call service personnel	3
62	Failure Mode - load	Call service personnel	3
63	Failure Mode - edit	Call service personnel	3
64	Failure Mode - print	Call service personnel	3
65	Failure Mode - format	Call service personnel	3

\* Data error corresponds to a user system malfunction. If pressing the ALARM/CLEAR switch does not correct the problem, consult service personnel.

Table 20-1. Status Indicator Codes (continued)

Status Display	Definition	Corrective Action	Cleared By
66	Self Test - print inhibit	Call service personnel	3
67	Self Test	Set Test switch to OFF	1
68	DAVFU load routine	Normal indication	
76	ON Line - print inhibit	Call service personnel	3
77	ON Line	Normal indication	
88	OFF Line - ready	Press ON/OFF Line switch	
P	Power fault	Call service personnel	3
H	HOT condition	Call service personnel	3
C	Clock fault	Call service personnel	3

\* Data error corresponds to a user system malfunction. If pressing the ALARM/CLEAR switch does not correct the problem, consult service personnel.

#### 20.10 VERTICAL FORMAT CONTROL

Vertical formatting determines the number of lines to be printed and the amount of space to be left blank between lines of a page of output. Most applications require a form that is 11 inches (27.9 cm) long, with output single- or double-spaced. However, the band printer is equipped to handle a wide variety of printed output (anything up to 126 lines long, including multipart forms).

Vertical formatting for the band printer is controlled by the Vertical Format Unit (VFU). When the printer is selected, the Vertical Format Unit is automatically loaded into the main memory. The VFU contains 12 channels, with top of form indicated by a tab in Channel 1 of Line 1 and bottom of form indicated by tabs in Channels 1 and 2 of Line 66. When the VFU is loaded, a default forms length of 66 is set, with tab stops at every sixth line of Channel 5.

**PART III**  
**APPENDICES**

**APPENDIX A  
MODELS 2246 AND 2266 WORKSTATION SPECIFICATIONS**

	<u>2246 Models</u>	<u>2266 Models</u>
<b>Workstation Dimensions</b>		
Height	13.0 in. (33.0 cm)	13.5 in. (34.3 cm)
Width	19.5 in. (49.5 cm)	19.8 in. (50.8 cm)
Depth	20.5 in. (52.1 cm)	20.5 in. (52.1 cm)
Net Weight	40 lb (18.1 kg)	37.5 lb (17.1 kg)
<b>Power Requirements</b>		
Volts	115 V/60 Hz or 230 V/50 Hz	115 V/60 Hz or 230 V/50 Hz
Amps	0.75 @ 115 V 0.37 @ 230 V	0.6 @ 115 V 0.3 @ 230 V
Watts	125	72
Heat Dissipation	427 Btu/hr (107.6 kcal/hr)	102 Btu/hr (25.5 kcal/hr)
<b>Cables</b>		
Power	7 ft (2.1 m)	7 ft (2.1 m)
Data	500 ft (152.5 m) for 2246P	25 ft (7.6 m)
	2,000 ft (609.6 m) for other 2246s	
<b>Operating Environment</b>		
	60°F to 80°F (15°C to 27°C) 30% to 60% relative humidity	

**APPENDIX B  
MODEL 2270V DISKETTE DRIVE SPECIFICATIONS**

	<u>2270V-0</u>	<u>2270V-1,-2,-3</u>
<b><u>PERFORMANCE</u></b>		
Rotational Speed (rpm)	360	360
Average Access Time (ms)	424	200.3
Average Latency Time (ms)	83	83
Track-to-Track Head Positioning Time (ms)	3	3
Rotational Period (ms)	167	167
Data Transfer Rate (kb/sec)	31	31
<b><u>GENERAL SPECIFICATIONS</u></b>		
<b>Physical Dimensions</b>		
Height	(Built into	13.3 in. (33.7 cm)
Width	VS CP cabi-	16.5 in. (41.9 cm)
Depth	net)	22.0 in. (55.9 cm)
<b>Weight</b>		65 lb (29.5 kg)
<b>Power Requirements</b>		
Volts	115 V/60 Hz or 230 V/50 Hz	115 V/60 Hz or 230 V/50 Hz
Amps	0.35 @ 115 V 0.35 @ 230 V	2.0 @ 115 V 1.0 @ 230 V
Watts		250
<b>Heat Dissipation</b>		710 Btu/hr (177.5 kcal/hr)
<b>Cabling</b>		
To Power Source		6 ft (1.8 m)
To Archiving Workstation		25 ft (7.6 m)
To CP		2,000 ft (609.6 m)

Operating Environment

60°F to 80°F (15°C to 27°C)  
30% to 60% relative humidity

DISKETTE CHARACTERISTICS

	<u>2270V-0</u>	<u>2270V-1</u>	<u>2270V-2</u>	<u>2270V-3</u>
Sectoring	Hard	Hard	Soft	Hard or Soft
Sidedness	Single	Single	Single	Double
Density	Single	Single	Dual	Dual
Storage Capacity	308 kb	308 kb	616 kb	1.2 Mb

**APPENDIX C  
MODEL 2265V DISK PACK DISK DRIVE SPECIFICATIONS**

	<u>2265V-1</u>	<u>2265V-2</u>
<b><u>STORAGE CAPACITY</u></b>		
Surfaces	5	19
Cylinders (Tracks per Surface)	823	823
Sector Size (Bytes)	2048	2048
Sectors per Track	9	9
Total Storage (Megabytes)	75.85	288.22
<b><u>GENERAL SPECIFICATIONS</u></b>		
<b>Physical Dimensions</b>		
Height	41 in. (104.1 cm)	41 in. (104.1 cm)
Width	24 in. (61 cm)	24 in. (61 cm)
Depth	36 in. (91.4 cm)	36 in. (91.4 cm)
Weight	500 lb (227 kg)	550 lb (247.5 kg)
<b>Power Requirements</b>		
Volts	110 V/60Hz or 230 V/50 Hz	110 V/60 Hz or 230 V/50 Hz
Amps Start-up	20 @ 115 V, 10 @ 230 V	40 @ 115 V, 20 @ 230 V
Amps Running	8.2 @ 115 V, 4.1 @ 230 V	8.2 @ 115 V, 4.1 @ 230 V
Amps Standby	1.5 @ 115 V, 0.75 @ 230 V	2.0 @ 115 V, 1.0 @ 230 V
Watts	943	1200
Heat Dissipation	2,580 Btu/hr (650.2 kcal/hr)	4,200 Btu/hr (1,058 kcal/hr)

The following specifications are valid for both drive models.

## Cabling

Power	6 ft (1.8 m)
Data	15 ft (4.6 m) to CP 10 ft (3.1 m) to previous 2265V 24 ft (7.3 m) to last drive

## Operating Environment

60° F to 80° F (15° C to 27° C)  
30% to 60% relative humidity

## PERFORMANCE

Rotational Speed (rpm)	3,600
Seek Time (ms)	
Average	30
Maximum	55
Minimum	6
Rotational Period (ms)	16.66
Data Transfer Rate (Mb/sec)	1.2

**APPENDIX D  
MODEL 2280V DISK DRIVE SPECIFICATIONS**

	<u>2280V-1</u>	<u>2280V-2</u>	<u>2280V-3</u>
<b><u>STORAGE CAPACITY</u></b>			
Cylinders (Tracks per Surface)	823	823	823
Sector Size (Bytes)	256	256	256
Sectors per Track	64	64	64
Number of Fixed Platters	1	2	3
Megabytes of Fixed Storage	15	45	75
Number of Removable Platters	1	1	1
Megabytes of Removable Storage	15	15	15
Total Storage (Megabytes)	30	60	90

The following specifications are valid for all three models.

**GENERAL SPECIFICATIONS**

**Physical Dimensions**

Height	36 in. (91 cm)
Width	21 in. (53 cm)
Depth	33 in. (83 cm)

**Weight** 170 lb (77.1 kg)

**Data Transfer Rate (Mb/sec)** 1.2

**Power Requirements**

Volts	115 V/60 Hz or 230 V/50 Hz
Amps	8 @ 115 V, 4 @ 230 V
Watts Start-up	1,900
Watts Running	950
Watts Standby	250

**Heat Dissipation** 1,050 Btu (264.6 kcal)/hr Standby  
2,150 Btu (541.8 kcal)/hr Running

## Cabling

Power  
Data

8 ft (2.5 m)

5 ft (1.15 m) to disk IOP  
15 ft (4.6 m) to previous 2280V  
24 ft (7.3 m) to last drive

Operating Environment

60° F to 80°F (15° C to 27° C)  
30% to 60% relative humidity

## PERFORMANCE

Rotational Speed (rpm)	3,600
Average Access Time (ms)	30
Average Latency Time (ms)	8
Track-to-Track Head Positioning Time (ms)	6
Rotational Period (ms)	16.66

**APPENDIX E  
MODEL 2209V SERIES TAPE DRIVE SPECIFICATIONS**

	<u>2209V-1</u>	<u>2209V-2</u>	<u>2209V-3</u>
<b><u>RECORDING CHARACTERISTICS</u></b>			
Tracks	9	9	7
Density	1,600 bpi phase encoded	800 bpi NRZ1 or 1600 bpi phase encoded	556 or 800 bpi NRZ1
Interblock Gap	0.60 in. (1.52 cm)	0.60 in. (1.52 cm)	0.60 in. (1.52 cm)
Character Code	ASCII	ASCII	BCD
Data Transfer Rate (kb/sec)	120	60 @ 800 bpi 120 @ 1,600 bpi	60

The following specifications are valid for all three models.

**GENERAL SPECIFICATIONS**

**Tape and Reel Characteristics**

Tape Width	0.5 in. (1.3 cm)
Tape Thickness	1.5 mil (0.04 mm)
Tape Tension	8.0 oz (227 g)
Reel Diameter	10.5 in. (26.6 cm)
Hub Diameter	3.69 in. (9.37 cm)
Reel Capacity	2400 ft (731 m)
Tape Speed	75 ips (190 cm/sec) read/write 200 ips (508 cm/sec) nominal during rewind

## Transport Characteristics

Drive Type	Single Capstan Reel to Reel
Transport Buffer	Vacuum Columns
Start/Stop Displacement	0.19 in. (0.476 cm)
Start/Stop Time @75 ips	5.0 msec
Instantaneous/ Long Term Speed Variation	+1%
Braking	Dynamic
Tape Heads	
Write then Read	Dual Gap 0.15 in (0.38 cm)
Erase	Side-mounted, full width

## Drive Dimensions

Height*	34 in. (86 cm)
Width	24 in. (61 cm)
Depth	26 in. (66.0 cm)

## Site Dimensions

Height**	36.5 in. (92.7 cm)
Width	26.0 in. (66.0 cm)
Depth	73 in. (185.4 cm) to accommodate front and rear access doors

## Approximate Weight

Installed	170 lb (77.4 kg)
Shipping	222 lb (100.6 kg)

## Cables

Power	8 ft (2.4 m)
Data	12 ft (3.7 m)

## Fuses

15 amp @ 115 VAC
3 amp @ 115 VAC
8 amp @ 115 VAC

## Operating Environment

60°F to 80°F (15°C to 27°C)
30% to 60% relative humidity (non-condensing)

\* Available with integral storage cabinet in heights up to 64 in. (162.6 cm).

\*\* Dependent on storage cabinet.

### Power Requirements

Volts	115 V/60 Hz or 230 V/50 Hz
Amps Start-up	15 @ 115 V, 8 @ 230 V
Amps Running	8 @ 115 V, 4 @ 230 V
Amps Standby	3 @ 115 V, 1.5 @ 230 V
Watts	472

Heat Output	1,623 Btu (409 kcal)/hr
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**APPENDIX F**  
**PROPER CARE AND HANDLING OF DISKS AND TAPES: A SUMMARY**

Contamination and improper handling of disks and tapes may result in loss of data and irreparable damage to recording media. Dust, smoke, magnetic fields, and heat are primary offenders in disk and tape damage. See Chapters 12 through 15 for details concerning care of disks and tapes. The following list summarizes the most important points.

1. Properly store disks and tapes in a cabinet elevated from the floor away from sources of dust. Diskettes and tapes should be stored in closed containers.
2. Always return diskettes and tapes to their containers to ensure proper support, prevent warping, and maintain cleanliness.
3. Be sure to place a tape end retainer on stored tape to prevent the free end from unwinding in the container.
4. Be sure that people do not smoke while handling disks and tapes.
5. Disks and tapes should be stored away from heat and direct sunlight.
6. Disks and tapes should not be exposed to a magnetic field with an intensity greater than 50 oersteds.
7. Handle tape reels close to the hub. Do not touch edges of wound tape.
8. Be sure disks and tapes are mounted correctly.
9. For tapes, be sure that the WRITE ENABLE Ring is inserted correctly.
10. Label tape using the holder provided. If this is not possible, use a labeling material that will not leave a residue when removed. Do not use an eraser to alter the label.
11. If a dropped tape reel is damaged (either cracked or bent) as revealed by visual inspection, it must be discarded; however, the tape itself can usually be salvaged.
12. Disks and tapes should be cleaned at least once a year. Cleaning services are available from vendors on a contractual, on-site basis.

**APPENDIX G  
MODELS 2221V AND 5521 PRINTER AND PAPER SPECIFICATIONS**

**PRINTER SPECIFICATIONS**

	<u>2221V</u>	<u>5521</u>
Printout Speed (cps)	200	200
Character Configuration (Dot matrix dimensions)	9 x 9 normal 18 x 11 expanded	9 x 11 normal 18 x 11 expanded
Vertical Pitch (lines/inch)	6	6
Horizontal Pitch (columns/inch)	10	10
Line Width (Columns)	132	132
Number of Characters in Set	96 (data processing)	96 (data processing) 112 (word processing)
Multiple Copies	5	5

**Cable**

Power	6 ft (1.8 m)	6 ft (1.8 m)
Data	50 ft (15.25 m)	2000 ft (609.6 m)

Unless otherwise indicated, the following specifications apply to both printer models.

**Dimensions (Printer and Stand)**

Height	39 in. (99 cm)
Width	29 in. (74 cm)
Depth*	27 in. (69 cm)

**Printer Weight** 85 lb (38.2 kg)

**Site Width** 50 in. (1.3 m)

**Power Requirements**

Volts	115 V/60 Hz or 230 V/50 Hz
Amps	4.0 (SB) @ 115V 2.0 (SB) @ 230 V
Watts	300

\* Plus 15 in. (39 cm) rear clearance for paper rack.

<b>Fuses (Printer)</b>	<b>2.5 amp (SB) for 115 VAC</b> <b>1.5 amp (SB) for 230 VAC</b>
<b>Fuses (Interface Box, 5521 Only)</b>	<b>1.5 amp (SB) for 115 VAC</b> <b>0.8 amp (SB) for 230 VAC</b>
<b>Heat Dissipation</b>	<b>1,200 Btu/hr</b> <b>(302.4 kcal/hr)</b>
<b>Operating Environment</b>	<b>60°to 80°F (15°C to 27°C)</b> <b>30% to 60% relative humidity</b> <b>(noncondensing)</b>

**PAPER SPECIFICATIONS (for both printer models)**

If paper does not conform to these specifications, problems may occur with forms handling. No specifications are given for card stock; try a sample before purchasing.

1. Use margin-perforated fanfold paper or card stock; perforations are used for guiding by pin-feed units.
2. Maximum form length is 11 in. (27.9 cm).
3. Paper Stock:
  - a. For single part forms use 15 to 20 lb bond (20 lb for better forms handling).
  - b. For multipart forms use:
    - 2 ply: 15/15-lb bond, 7-lb carbon
    - 3 ply: 15/12/15-lb bond, 7-lb carbon
    - 4 ply: 12/12/12/15-lb bond, 7-lb carbon
    - 5 ply: 12/12/12/12/15-lb bond, 5-lb carbon  
(Up to four copies in addition to the original can be used.)
  - c. Form width must be:
    - 3.5 in. (8.9 cm) minimum
    - 14.9 in. (37.8 cm) maximum

4. Fastening of multipart forms:
  - a. Improved multipart paper handling can be achieved with glued margins.
  - b. Multipart forms must otherwise be fastened with crimps every 2 inches (5.1 cm) along both edges of the forms.
  - c. Crimps must not come closer to the fanfold than 0.50 inch (1.27 cm).
  - d. Each crimp must have four prongs, two to enter both form and carbon and two to enter forms only.
5. Forms thickness:
  - a. Maximum in the print area: 0.018 inch (0.046 cm) (allows for four 12-lb, one 15-lb, and four 7-lb carbon parts).
  - b. Over crimps in the pin-feed margin: 0.030 in. (0.076 cm).
6. Sprocket holes:
  - a. Must run along both margins  $0.25 \pm 0.03$  in. ( $0.635 \pm 0.076$  cm) from paper edge to the hole center lines.
  - b. Distance between hole centers along the margins must be  $0.5 \pm 0.005$  in. ( $1.27 \pm 0.013$  cm) nonaccumulative in any 5-in. (12.7 cm) length.
  - c. Hole diameters must be  $0.156 \pm 0.005$  in. ( $0.396 \pm 0.013$  cm) (the two top and bottom drive holes on each sheet (four per sheet) can be up to 0.200 in. (0.508 cm) in diameter to permit post or ring binding of output).
  - d. Distance between hole centers across the sheet must be uniform without 0.015 in. (0.038 cm) to a maximum of 14.5-in. (36.83 cm).
7. When using forms with wide and narrow copies in the same set, the top copy should always be fullest width.
8. For preprinted forms:
  - a. Pin-hole center to left side of left-most character not less than  $3/8 \pm 1/16$  in. ( $1.0 \pm 0.2$  cm).
  - b. Pin-hole center to right side of last character not less than  $3/8 \pm 1/16$  in. ( $1.0 \pm 0.2$  cm).

APPENDIX H  
 MODELS 2231V-2 AND 5531-2 PRINTER AND PAPER SPECIFICATIONS

PRINTER SPECIFICATIONS

	<u>2231V-2</u>	<u>5531-2</u>
Printout Speed (cps)	120	120
Character Configuration (Dot Matrix Dimensions)	7 x 9 normal 14 x 9 expanded	7 x 9 normal 14 x 9 expanded
Vertical Pitch (Lines/Inch)	6	6
Horizontal Pitch (Columns/Inch)	12	12
Line Width (Columns)	132	132
Number of Characters in Set	96 (data processing)	96 (data processing) 112 (word processing)
Multiple Copies	5	5
Cable		
Power	6 ft (1.8 m)	6 ft (1.8 m)
Data	50 ft (15.3 m)	2000 ft (609.6 m)
Dimensions, Interface Box (5531-2 Only)		
Height		7.8 in. (20 cm)
Width		9.2 in. (23 cm)
Depth		19.2 in. (49 cm)

Unless otherwise indicated, the following specifications apply to both printer models.

Printer Dimensions

Height	10 in. (25.4 cm)
Width	24 in. (61.0 cm)
Depth	18 in. (45.7 cm)
Weight	68 lb (30.6 kg)
Weight (Optional Stand)	40 lb (18 kg)

Site Width 40 in. (1 m)

**Power Requirements**

Volts 115 V/60 Hz or 230 V/50 Hz  
Amps 1.5 (SB) @ 115 V, 0.8 (SB) @ 230 V  
Watts 150

**Fuses (Printer)**

1.5 amp (SB) for 115 V  
0.8 amp (SB) for 230 VAC  
2.5 amp (SB) for DC carriage motor

**Fuses (Interface Box,  
5531-2 Only)**

1.5 amp (SB) for 115 V  
0.8 amp (SB) for 230 V

**Operating Environment**

60°F to 80°F (15°C to 27°C)  
30% to 60% relative humidity  
(noncondensing)

**Heat Dissipation**

600 Btu/hr (151.2 kcal/hr)

**PAPER SPECIFICATIONS**

If paper does not conform to the specifications listed here, problems with forms handling can occur.

1. Use margin-perforated fanfold paper or card stock; perforations are used for guiding by pin-feed units.
2. Maximum form length is 11-in. (27.9 cm).
3. Paper Stock:
  - a. For single-part forms, use 15- to 20-lb bond (20-lb for better forms handling).
  - b. For multipart forms use:
    - 2 ply: 15/15-lb bond, 7-lb carbon
    - 3 ply: 15/12/15-lb bond, 7-lb carbon
    - 4 ply: 12/12/12/15-lb bond, 7-lb carbon
    - 5 ply: 12/12/12/12/15-lb bond, 5-lb carbon(Up to four copies in addition to the original can be used.)

c. Form width must be:

- 3.5 in. (8.9 cm) minimum.
- 13.5 in. (34.3 cm) maximum (edge-to-edge).

4. Fastening of multipart forms:

- a. Improved multipart paper handling can be achieved with glued margins.
- b. Multipart forms must otherwise be fastened with crimps every 2 inches (5.1 cm) along both edges of the forms. NCR or other specialty paper can be fastened up to four parts of the form length.
- c. Crimp must not come closer to the fanfold than 0.50 in. (1.27 cm).
- d. Each crimp must have four prongs, two to enter both form and carbon and two to enter forms only. Card stock should be tested first.

5. Forms thickness:

- a. Maximum in the print area: 0.018 in. (0.046 cm) (allows for four 12-lb, one 15-lb, and four 7-lb carbon parts).
- b. Over crimps in the pin-feed margin: 0.030 in. (0.076 cm).

6. Sprocket holes:

- a. Must run along both margins 0.25 - 0.03 in. (0.635 - 0.076 cm) from paper edge to the hole center lines.
- b. Distance between hole centers along the margins must be  $0.5 + 0.005$  in. ( $1.27 \pm 0.013$  cm) nonaccumulative in any 5.0-in. (12.7 cm) length.
- c. Hole diameters must be  $0.156 + 0.005$  in. ( $0.396 + 0.013$  cm) (the two top and bottom drive holes on each sheet (four per sheet) can be up to 0.200 in. (0.508 cm) in diameter to permit post or ring binding of output).
- d. Distance between hole centers across the sheet must be uniform within 0.015 in. (0.038 cm) to a maximum of 12-5/16 in. (31.27 cm).

7. When using forms with wide and narrow copies in the same set, the top copy should always be the fullest width.
8. For pre-printed forms:
  - a. Pin-hole center to left side of left-most character cannot be less than  $3/8 \pm 1/16$  in. ( $1.0 \pm 0.2$  cm).
  - b. Pin-hole center to right side of last character cannot be less than  $3/8 \pm 1/16$  in. ( $1.0 \pm 0.2$  cm).

**APPENDIX I  
MODELS 5570 AND 5571 PRINTER AND PAPER SPECIFICATIONS**

**PRINTER SPECIFICATIONS**

	<u>5570</u>	<u>5571</u>
Printout Speed (lpm)	600	425
Character Configuration	Gothic font (Uppercase only)	Courier font (Upper-/lowercase)
Vertical Pitch (Lines/inch)	6 or 8*	6 or 8*
Horizontal Pitch (Columns/inch)	10	10
Line Width (Columns)	132	132
Number of characters in Set	64	96
Multiple Copies	6	6

The following specifications apply to both printer models.

**Printer Dimensions**

Height	42 in. (106.7 cm)
Width	36.5 in. (92.7 cm)
Depth	32 in. (81.3 cm)

**Weight** 570 lb (256.5 kg)

**Fuses** A circuit breaker (behind the lower right side)

**Power Requirements**

Volts	115 V/60 Hz or 230 V/50 Hz
Amps	5.5 @ 115 V, 3.0 @ 230 V
Watts	790

**Heat Dissipation** 2,700 Btu/hr (680.4 kcal/hr)

**Cable**

Power	7 ft (2.1 m)
Data	2,000 ft (609.6 m)

\* Vertical pitch of 8 lines/inch is a hardware option.

**Operating Environment**

60°F to 80°F (15°C to 27°C)  
30 to 60% relative humidity,  
non-condensing

**PAPER SPECIFICATIONS**

If paper does not conform to the specifications listed here, problems with forms handling can occur. No specifications are given for card stock; try a sample before purchasing.

1. Use margin-perforated fanfold paper; perforations are used for guiding by pin-feed units.
2. Maximum form length is 11-in. (27.9 cm).
3. Paper Stock:
  - a. For single part forms use 15- to 20-lb bond (20-lb for better forms handling).
  - b. For multipart forms use:
    - 2 ply: 15/15-lb bond, 7-lb carbon
    - 3 ply: 15/12/15-lb bond, 7-lb carbon
    - 4 ply: 12/12/12/15-lb bond, 7-lb carbon
    - 5 ply: 12/12/12/12/15-lb bond, 5-lb carbon(Up to five copies in addition to the original can be used.)
  - c. Form width must be:
    - 3.5 in. (8.9 cm) minimum
    - 19.5 in. (49.5 cm) maximum
4. Fastening of multipart forms:
  - a. Improved multipart paper handling can be achieved with glued margins.
  - b. Multipart forms must otherwise be fastened with crimps every two inches (5.1 cm) along both edges of the forms.
  - c. Crimps must not come closer to the fanfold than 0.50 in. (1.27 cm).
  - d. Each crimp must have four prongs -- two to enter both form and carbon and two to enter forms only.
5. Forms thickness:
  - a. Maximum in the print area: 0.02 in. (0.05 cm) (allows for five 12-lb, one 15-lb, and four 7-lb carbon parts).
  - b. Over crimps in the pin-feed margin: 0.030 in. (0.076 cm).

6. Sprocket holes:

- a. Must run along both margins  $0.25 \pm 0.03$  in. ( $0.635 \pm 0.076$  cm) from paper edge to the hole center lines.
- b. Distance between hole centers along the margins must be  $0.5 \pm 0.005$  in. ( $1.27 \pm 0.013$  cm) nonaccumulative in any 5-in. (12.7 cm) length.
- c. Hole diameters must be  $0.156 \pm 0.005$  in. ( $0.396 \pm 0.013$  cm). (The two top and bottom drive holes on each sheet (four per sheet) can be up to 0.200 in. (0.508 cm) in diameter to permit post or ring binding of output.)
- d. Distance between hole centers across the sheet must be uniform within 0.015 in. (0.038 cm) to a maximum of 14.5-in. (36.83 cm).

7. When using forms with wide and narrow copies in the same set, the top copy should always be of the fullest width.

8. For pre-printed forms:

Pin-hole center to left side of left-most character not less than  $3/8 \pm 1/16$  in. ( $1.0 \pm 0.2$  cm).

Pin-hole center to right side of last character not less than  $3/8 \pm 1/16$  in. ( $1.0 \pm 0.2$  cm).

**APPENDIX J  
 MODELS 6581W AND 6581WC PRINTER AND PAPER SPECIFICATIONS**

**PRINTER SPECIFICATIONS**

	<u>6581W</u>	<u>6581WC</u>
Printout Speed (cps)	30	30
Vertical Pitch (Lines/Inch)	3, 4, 6, or 8	3, 4, 6, or 8
Horizontal Pitch (Columns/Inch)	10 or 12	10 or 12
Line Width (Columns)	132 @ 10 pitch 158 @ 12 pitch	180 @ 10 pitch 216 @ 12 pitch
Number of Characters in Set	86	86
Multiple Copies	6	6
<b>Printer Dimensions</b>		
Height	9 in. (22.9 cm)	9 in. (22.9 cm)
Height with Forms Feeder	12.5 in. (31.7 cm)	12.5 in. (31.7 cm)
Width	25 in. (63.5 cm)	28.75 in. (73 cm)
Depth	19.5 in. (49.5 cm)	19.5 in. (49.5 cm)
<b>Power Requirements</b>		
Volts	115 V/60 Hz or 230 V/50 Hz	115 V/60 Hz or 230 V/50 Hz
Amps	3.0 @ 115 V, 1.5 @ 230 V	3.0 (SB) @ 115 V, 2.0 @ 230 V
Watts	300	300

**The following specifications apply to both printer models.**

Approximate Net Weight	70 lb (31.5 kg)
Fuses	3.0 amp (SB) for 115 V 1.5 amp (SB) for 230 V
<b>Cable</b>	
Power	6 ft (1.8 m)
Data	2,000 ft (609.6 m)

**Operating Environment**

60°F to 80°F (15°C to 27°C)  
30% to 60% relative humidity,  
noncondensing

**Print Wheels**

The following Wang print wheels may be used:

720-6051 Letter Gothic  
720-7007 Bold P.S.  
720-6076 Courier 10  
720-6020 Prestige Elite  
720-6077 Courier 12  
720-8068 Symbol 10.

**PAPER SPECIFICATIONS**

**Minimum Paper Width**

3.5 in. (8.9 cm)

**Maximum Paper Width**

15 in. (38.1 cm) for 6581W,  
20.5 in. (52 cm) for 6581WC

**Paper Thickness**

0.027 in. (0.069 cm)

**Material**

Margin-perforated, continuous fan-fold or  
discrete paper stock

**Bond for single part forms**

15- to 20-lb bond (20-lb recommended)

**Bond for multipart forms**

2 ply: 15/15 bond, 8-lb carbon  
3 ply: 15/12/15-lb bond, 8-lb carbon  
4 ply: 12/12/12/15-lb bond, 6-lb carbon  
5 ply: 12/12/12/12/15-lb bond, 6-lb  
carbon  
6 ply: 12/12/12/12/12/15-lb bond, 6-lb  
carbon

**Ribbon**

Black carbon ribbon cartridge (multi-  
strike and singlestrike)

**APPENDIX K  
MODELS 5573 AND 5574 PRINTER AND PAPER SPECIFICATIONS**

**PRINTER SPECIFICATIONS**

	<u>5573</u>	<u>5574</u>
Printout Speed (lpm)	250	600
Vertical Pitch (Lines/Inch)	6 or 8	6 or 8
Horizontal Pitch (Columns/Inch)	10 or 15	10
Line Width (Columns)	132 @ 10 pitch 200 @ 15 pitch	132
Number of Characters in Set	64 or 96	64 or 96
Multiple Copies	6	6

**NOTE: The following specifications apply to both printer models.**

**Printer Dimensions**

Height with stand, cover closed	43.75 in. (111.1 cm)
Height without stand, cover closed	14.9 in. (37.8 cm)
Height without stand, cover open	29.5 in. (74.9 cm)
Width	30.3 in. (77 cm)
Depth	25.2 in. (64 cm)

**Stand Size**

Height	28.85 in. (73.7 cm)
Width	30.3 in. (77 cm)
Depth	25.2 in. (64 cm)

**Approximate Net Weight**

Printer	198 lb (89.1 kg)
Stand	32 lb (14.5 kg)

**Power Requirements**

Volts	115 V/60 Hz or 230 V/50 Hz
Amps	3.0 @ 115 V, 1.5 @ 230 Hz
Watts	350

**Fuses** 8-amp thermal circuit breaker

**Heat Dissipation** 1,200 Btu/hr (302.4 kcal/hr)

**Cable**

**Power  
Data**

**6 ft (1.8 m)  
2,000 ft (609.6 m)**

**Operating Environment**

**60°F to 80°F (15°C to 27°C)  
30% to 60% relative humidity**

## PAPER SPECIFICATIONS

### Punching

The forms should have sprocket feel holes in the left- and right-hand margins. Holes should be  $5/32 \pm 0.004$  inch ( $0.156 \pm 0.010$  cm) in diameter; the hole centers should be located  $1/4 \pm 1/32$  inch ( $0.64 \pm 0.08$  cm) from the top horizontal tearline perforation (applicable when the form length is evenly divisible by  $1/2$  inch (1.27 cm)). Hole centers should be  $1/4 \pm 1/64$  inch ( $0.64 \pm 0.04$  cm) from the edge of the forms. The horizontal center-to-center distance between holes should be within  $1/64$  inch (0.04 cm) of nominal, i.e.,  $8-1/2$  inch (21.59 cm) form; center-to-center hole spacing should be  $1/2 \pm 1/64$  inch ( $1.27 \pm 0.04$  cm). The forms used should enter and leave the sprocket pins without tearing.

Holes punched in carbons should not be less than the actual size of the holes punched in the forms and not greater than 7.32 inch (0.56 cm) in diameter. Holes in carbons and forms should be centered with corresponding holes in all parts. Holes should be punched cleanly so that no disks remain in either the forms or carbons.

### Perforations

The horizontal tear-line perforations should be accurately located at a 90-degree angle to a vertical line through the center of all marginal aligning holes. The perforations should be cut through both forms and carbons. The cut and uncut portions of the forms should have dimensions satisfactory for the intended use, but should not catch in normal handling or feeding through the printer.

### Fastening

Forms and carbons should be secured together by a method that prevents any sheet or carbon from shifting positions relative to the other sheets. Print quality is adversely affected by a loosely fastened form. Fastening on both margins is recommended. The fastening medium must not impair the printing alignment or feeding of forms. Metallic hard-finished fasteners or any fastening medium that can cause damage to the printer should not be used. If only one side of the form is fastened, it must be the right side.

Recommended types of fastening are: crimping, hook lock, stan lock, fugitive gluing, and flexible gluing. The fastening technique used must not cause wrinkling, creases, or tears that would restrict form feeding through the printer.

Paper Selection Guide

The chart below is a guide for selecting paper to be used in the Band Printer. Forms meeting the specifications should produce satisfactory printing results. However, it is ultimately the responsibility of the user to ensure that the forms provide satisfactory printing and do not degrade printer performance.

To verify proper paper handling and printout legibility, paper should be tested under normal operating conditions. Forms other than those listed below may be used for fulfilling the operating requirements, providing they do not increase the printer's maintenance requirements.

PAPER REQUIREMENTS

Item	Specification
Type	Standard fanfolded, edge punched
Dimensions	3 to 16 in. (7.63 to 40.64 cm) overall
Width	Normally, the machine can accomodate 11 or 12
Length	in. (27.94 or 30.48 cm) form lengths.
	When the forms length selector is being used,
	the printer may accommodate a minimum form
	length of 3 in. (7.62 cm) and a maximum of 14
	in. (35.56 cm).
	When the direct access Vertical Format unit is
	used, the printer may accommodate a maximum
	length of 16.5 in. (41.25 cm) when operating
	at 8 lines per inch or 21 in. (52.5 cm) when
	operating at 6 lines per inch.
Weight	A maximum forms thickness of up to 0.02 in.
	(0.5 mm) can be accommodated. (Paper weights
	are based on bond = 17 in. x 22 in. x 500
	sheets or carbons = 20 in. x 30 in. x 500
	sheets.)
Single Copy	15 lb (56 gsm) bond minimum. 18- to 20-lb (68
	to 75 gsm) bond recommended. (gsm = grams per
	square meter).
Multi Copy	Typically a 12-lb (45 gsm) bond with 6 to 8 lb
	(19 gsm) single-shot carbon for up to six
	parts.
Card Stock	15 to 125 lb (56 to 470 gsm)

APPENDIX L  
 PRINTER CHARACTER SETS

Hex Code	Printer Character	2221V		1		2
		2231V-2 5571	5570	5521 5531-2	6581W 6581WC	5573 5574
HEX (20)	Space	*	*	*	*	*
HEX (21)	!	*	*	*	*	*
HEX (22)	"	*	*	*	*	*
HEX (23)	#	*	*	*	*	*
HEX (24)	\$	*	*	*	*	*
HEX (25)	%	*	*	*	*	*
HEX (26)	&	*	*	*	*	*
HEX (27)	'	*	*	*	*	*
HEX (28)	(	*	*	*	*	*
HEX (29)	)	*	*	*	*	*
HEX (2A)	*	*	*	*	*	*
HEX (2B)	+	*	*	*	*	*
HEX (2C)	,	*	*	*	*	*
HEX (2D)	-	*	*	*	*	*
HEX (2E)	.	*	*	*	*	*
HEX (2F)	/	*	*	*	*	*
HEX (30)	0	*	*	*	*	*
HEX (31)	1	*	*	*	*	*
HEX (32)	2	*	*	*	*	*
HEX (33)	3	*	*	*	*	*
HEX (34)	4	*	*	*	*	*
HEX (35)	5	*	*	*	*	*
HEX (36)	6	*	*	*	*	*
HEX (37)	7	*	*	*	*	*
HEX (38)	8	*	*	*	*	*
HEX (39)	9	*	*	*	*	*
HEX (3A)	:	*	*	*	*	*
HEX (3B)	;	*	*	*	*	*
HEX (3C)	<	*	*	*	*	*
HEX (3D)	=	*	*	*	*	*
HEX (3E)	>	*	*	*	*	*
HEX (3F)	?	*	*	*	*	*

1  
 With word processing, an extended 112-character set is available.

2  
 If a 64-character set is used, lowercase hex codes are translated to uppercase characters.

## 2221V

Hex Code	Printer Character	1					2
		2231V-2 5571	5570	5521 5531-2	6581W 6581WC	5573 5574	
HEX (40)	@	*	*	*	*	*	
HEX (41)	A	*	*	*	*	*	
HEX (42)	B	*	*	*	*	*	
HEX (43)	C	*	*	*	*	*	
HEX (44)	D	*	*	*	*	*	
HEX (45)	E	*	*	*	*	*	
HEX (46)	F	*	*	*	*	*	
HEX (47)	G	*	*	*	*	*	
HEX (48)	H	*	*	*	*	*	
HEX (49)	I	*	*	*	*	*	
HEX (4A)	J	*	*	*	*	*	
HEX (4B)	K	*	*	*	*	*	
HEX (4C)	L	*	*	*	*	*	
HEX (4D)	M	*	*	*	*	*	
HEX (4E)	N	*	*	*	*	*	
HEX (4F)	O	*	*	*	*	*	
HEX (50)	P	*	*	*	*	*	
HEX (51)	Q	*	*	*	*	*	
HEX (52)	R	*	*	*	*	*	
HEX (53)	S	*	*	*	*	*	
HEX (54)	T	*	*	*	*	*	
HEX (55)	U	*	*	*	*	*	
HEX (56)	V	*	*	*	*	*	
HEX (57)	W	*	*	*	*	*	
HEX (58)	X	*	*	*	*	*	
HEX (59)	Y	*	*	*	*	*	
HEX (5A)	Z	*	*	*	*	*	
HEX (5B)	[	*	*	*		*	
HEX (5C)	\	*	*	*		*	
HEX (5D)	]	*	*	*		*	
HEX (5E)	↑	*	*	*		*	
HEX (5F)	←	*	*	*	*	*	
HEX (60)	o	*		*		*	
HEX (61)	a	*		*	*	*	
HEX (62)	b	*		*	*	*	
HEX (63)	c	*		*	*	*	
HEX (64)	d	*		*	*	*	
HEX (65)	e	*		*	*	*	
HEX (66)	f	*		*	*	*	
HEX (67)	g	*		*	*	*	

1

With word processing, an extended 112-character set is available.

2

If a 64-character set is used, lowercase hex codes are translated to uppercase characters.

Hex Code	Printer Character	2221V		1		2
		2231V-2 5571	5570	5521 5531-2	6581W 6581WC	5573 5574
HEX (68)	h	*		*	*	*
HEX (69)	i	*		*	*	*
HEX (6A)	j	*		*	*	*
HEX (6B)	k	*		*	*	*
HEX (6C)	l	*		*	*	*
HEX (6D)	m	*		*	*	*
HEX (6E)	n	*		*	*	*
HEX (6F)	o	*		*	*	*
<hr/>						
HEX (70)	p	*		*	*	*
HEX (71)	q	*		*	*	*
HEX (72)	r	*		*	*	
HEX (73)	s	*		*	*	*
HEX (74)	t	*		*	*	*
HEX (75)	u	*		*	*	*
HEX (76)	v	*		*	*	*
HEX (77)	w	*		*	*	*
<hr/>						
HEX (78)	x	*		*	*	*
HEX (79)	y	*		*	*	*
HEX (7A)	z	*		*	*	*
HEX (7B)	ø	*		*		*
HEX (7C)	£	*		*	*	*
HEX (7D)	é	*		*		*
HEX (7E)	ç	*		*		*
HEX (7F)	¢				*	

1

With word processing, an extended 112-character set is available.

2

If a 64-character set is used, lowercase hex codes are translated to uppercase characters.

**APPENDIX M**  
**SPLICING A PREPARED PRINTER TAPE**

Overlay ends of prepared tape so that punched holes are properly spaced. Use perforated splicing tape to hold ends together.

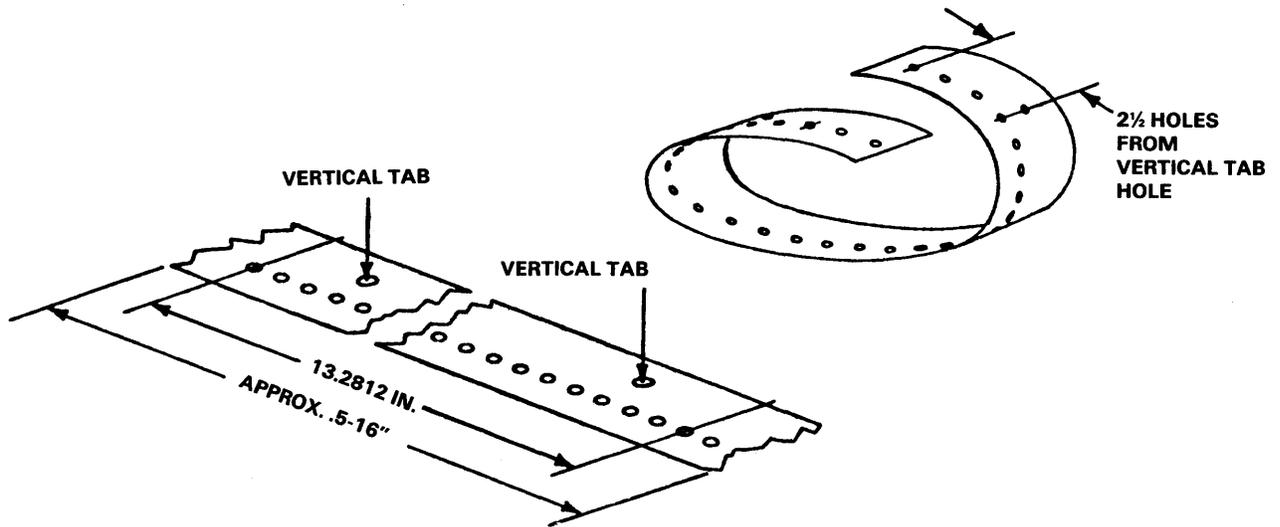


Figure M-1. Splicing Prepared Tape

**APPENDIX N  
ENVIRONMENTAL CONSIDERATIONS**

All Wang systems operate in normal office environments, but the environment should be selected with some concern for its effects on system performance. An ideal environment is one in which the temperature and humidity are controlled; airborne dirt and contaminants are minimal; the AC power source is adequate, regulated, and noise free; and there is room for future expansion. The operating environment should be easily accessible to operating personnel, yet sufficiently removed from the main traffic flow so as not to interfere with the system's smooth operation. A general rule of thumb in this respect is, "An environment comfortable to the operator will be acceptable for the system."

The operating temperature range for most peripheral devices is from 60°F to 80°F (15°C to 27°C). Whenever this range is exceeded, increased component failure and loss of data through distortion and magnetic oxide shed of the tape can be expected.

The recommended humidity range is from 30% to 60% relative humidity. Humidifiers and dehumidifiers should be installed in the environment's Heating, Ventilation, and Air Conditioning (HVAC) system as required. Low humidity in the environment increases the static charge imparted to carpets and clothing. When the operator comes in contact with the system, the resultant static discharge might cause system errors or destruction of data. Low humidity also causes oxide shed in data storage materials.

All filters in HVAC equipment should be cleaned or replaced regularly. In areas where these filters do not sufficiently remove airborne contaminants, an electrostatic air filter should be installed. Otherwise, dust, lint, and dirt can accumulate rapidly on circuit boards and their components, forming a film that prevents adequate heat dissipation.

If carpeting is to be installed, it should be of a nonstatic variety. If carpeting already exists and it is not nonstatic, either it must be treated with nonstatic spray, or an electrically conductive mat must be installed to prevent static buildup.

Computers and peripherals are susceptible to Electromagnetic Interference (EMI). EMI can enter the system by conduction through wiring and cabling or by direct radiation. To minimize such interference, the AC power line should be dedicated to the system, grounded, and properly installed in a steel conduit. Interference-generating devices (office machines, lighting, motors, HVAC units, etc.) located in close proximity to the system must be relocated, repaired, or filtered to prevent them from disturbing the system. In cases of high residual EMI, it may also be necessary to shield all peripheral cables.

## SUMMARY OF CHANGES

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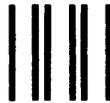
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