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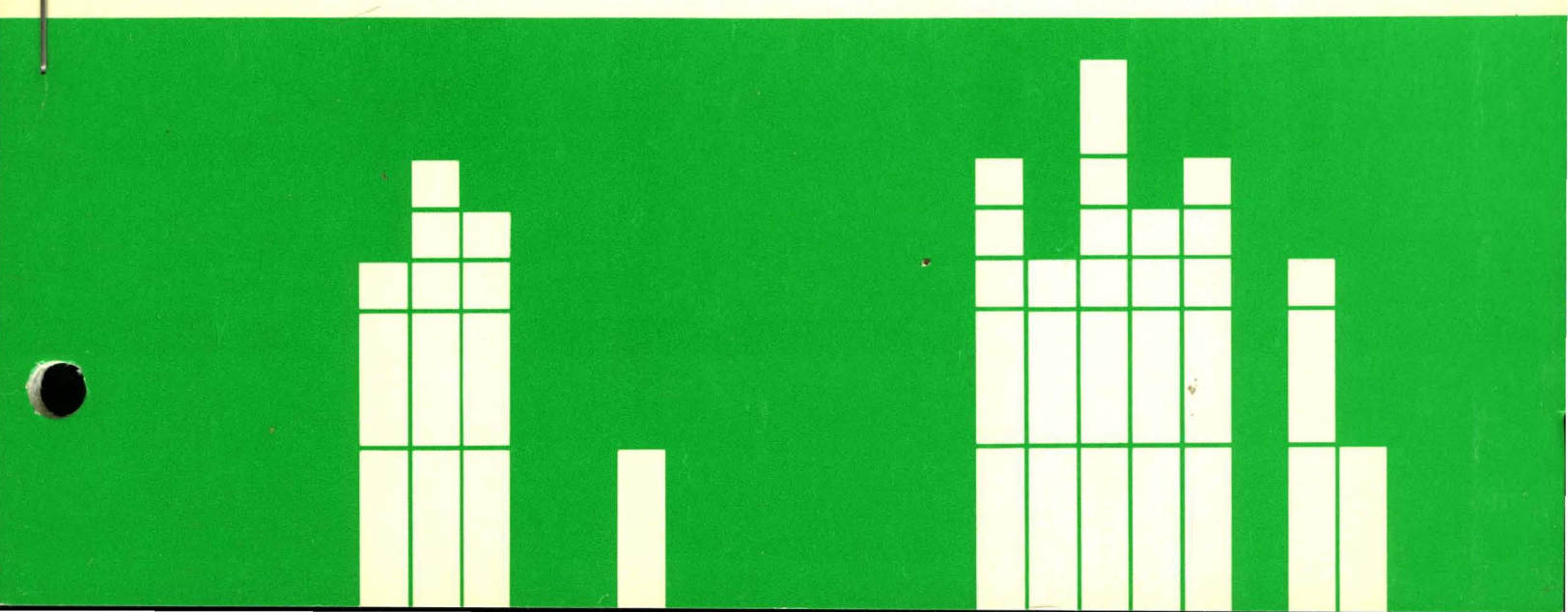
4700 Finance Communication System

System Configurator

Release 3

IBM



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Fifth Edition (December 1983)

This major revision obsoletes GC31-2017-4. This edition, GC31-2017-5, applies to Release 3 of the IBM 4700 Finance Communication System, and to all subsequent versions and releases until otherwise indicated in new editions or Technical Newsletters.

Changes to the information are indicated by a vertical line to the left of each change. Changes to the information herein can occur often; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370 Bibliography of Industry Systems and Application Programs*, GC20-0370, for the editions that are applicable and current.

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About This Book

This publication has technical information you need in planning to order an IBM 4700 Finance Communication System. It is for evaluation and planning purposes only. Some of the devices and programs described herein might not be available at the time you first receive this publication, and some might not ever be available in all countries. Consult your local IBM representative regarding the availability of 4700 system components in your locality.

Who Should Read This Book

This information is primarily for data processing specialists such as systems analysts or programmers.

How This Book Is Organized

This publication has five chapters and an appendix:

- Chapter 1 introduces the concept of configuration and briefly describes the storage organization and requirements of a 4700 controller, the configuration of loops, and the configuration of diskettes.
- Chapter 2 shows you a quick procedure for estimating storage requirements.
- Chapter 3 gives loop specifications.
- Chapter 4 shows you how to estimate diskette storage.
- Chapter 5 gives a detailed procedure for estimating storage requirements.
- Appendix A tabulates the storage requirements for the optional controller functions (optional modules) both in storage bytes and in diskette sectors.
- Appendix B tabulates specific features of the various units in the 4700 system family.

What Else to Read

Before using this publication, you should be familiar with the content of *IBM 4700 Finance Communication System: System Summary*, GC31-2016.

Summary of Amendments

GC31-2017-5 Changes

This edition includes changes for the dual-density magnetic stripe support on the IBM 4704 Display, and changes to the way you order storage for the IBM 4701 Controller Models 1 and 2.

GC31-2017-4 Changes

This edition contains changes for the IBM 4720 Forms/Passbook Printer, and the IBM 4704 Display Models 2 and 3, as well as changes for disk storage and the RKAP, KSAP, and ASDS data set formats.

GC31-2017-3 Changes

This edition contains information in support of the newly-available IBM 4701 Model 2 Controller and certain functional enhancements that are field-installable by request for price quotation (RPQ) to upgrade the 4701 Model 1 Controller.

- Additional diskette storage, for a total available of two megabytes. More is available for the Model 2 than for the Model 1 because both drives of the Model 2 are one-megabyte drives that can accommodate the two-sided, double density, one-megabyte Diskette 2D. The primary drive (in the controller) of the Model 1 is only a half-megabyte drive.

- Improved Model 2 loop performance for synchronous data link communication (SDLC):

  - Maximum aggregate bit-per-second (bps) rate of 19,200 for loops independent of host SDLC link speed

  - Maximum aggregate bps rate of 16,800 for loops including the host link speed when using bisynchronous communication (BSC)

- Enhanced device cluster adapter support in Models 1 and 2 for:

  - 3279 Model 2A and Model 2B color terminal
  - APL feature on the 3278 Model 2 and the 3279 Model 2B
  - Magnetic slot reader on the 3278 Model 2 and 3279 Models 2A and 2B

- X.21 switched and non-switched network adapter.

Contents

Chapter 1. Introducing 4700 System Configuration

This book gives you the information you need to select from among the various features and functions available on the IBM 4700 Finance Communication System. It describes how to select the amount of storage, the number of loop adapters, and the capacity and number of diskettes for your system. It also lists, by code, the special and specify features that are available on the 4700.

Chapter 2 presents a procedure for quickly arriving at approximate requirements for storage. Chapters 3 and 4 describe procedures for estimating your loop and diskette requirements. These methods should help you define a general set of requirements from which you can order the system.

If, after using the procedure in Chapter 2, you think you still need more precise storage calculations (which rely on more knowledge about the 4700), use Chapter 5, which describes detailed methods for estimating storage requirements. The techniques in Chapter 5 can also help you customize your system after you have used it awhile.

Appendix A contains a list of optional controller functions, along with there storage requirements in bytes and in diskette sectors.

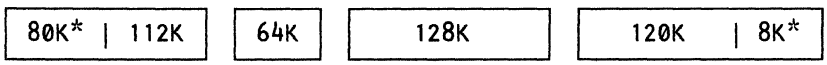
Appendix B lists 4700 features from which you can select those that satisfy your needs.

Note: Your requirements will change and grow as you continue to use your 4700 system. So, after you use these procedures to configure your storage requirements, be sure to add some storage for system growth, new controller functions, and new or enhanced application programs.

Organizing 4701 Model 1 Storage

The basic 4701 Controller Model 1 has 192K bytes (K = 1024) of storage, of which approximately 112K bytes are available for optional uses. The remaining 80K bytes are used by the 4700 system itself. You can order up to 512K bytes of storage with one 64K increment and up to two 128K increments. In the final 128K increment, the 4700 system uses 8K bytes, leaving 120K bytes in this last increment for your use.

Figure 1-1 shows the layout of storage for the 4701 Model 1.



* Used by 4700 system

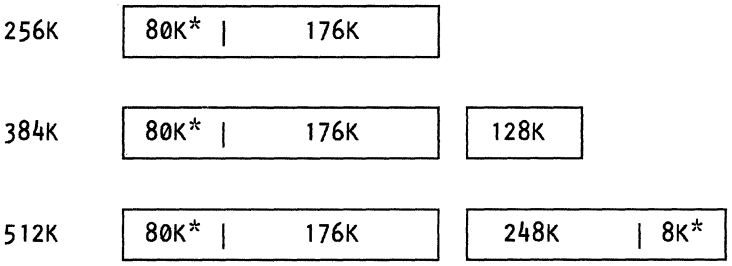
Figure 1-1. 4701 Storage Layout for Model 1

Organizing 4701 Model 2 Storage

You can order the 4701 Model 2 with the basic 256K bytes of storage, or you can order additional 128K or 256K increments to increase your storage to 384K, 512K, 640K, 768K, or 896K bytes.

Model 2 with 512K Bytes or Less

If you order 256K, 384K, or 512K bytes, the system resides in storage with your application programs and any optional controller functions. Figure 1-2 shows the layout of storage for the 4701 Model 2 with up to 512K bytes of storage.

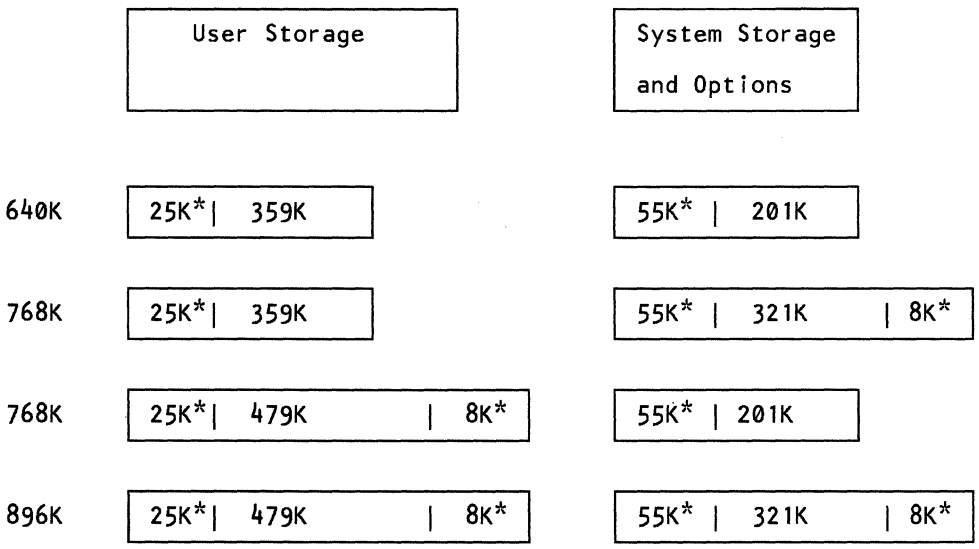


* Used by 4700 system

Figure 1-2. 4701 Storage Layout for Model 2 with 512K Bytes or Less

Model 2 with More than 512 Bytes

If you order more than 512K bytes, a small part of the system resides in storage with your programs. The largest part of the system resides above the 512K byte boundary, with the optional controller functions. Figure 1-3 shows the layout of storage for the 4701 Model 2 with more than 512K bytes of storage.



* Used by 4700 system

Figure 1-3. 4701 Storage Layout for Model 2 Over 512K Bytes

Types of Data in Storage

The storage that you order is used to store five types of data for the system:

- The *base 4700 system*, which is the minimum system required to execute your application programs, includes: the base microcode support, the basic system monitor, the system log area, the host communication support, and the diskette adapter. A portion of the basic system support resides above the 512K boundary in controllers with more than 512K bytes of storage.

- *Common configuration data* — data that you specify only once for the system to define the characteristics that apply to the system as a whole. Common configuration data always resides below the 512K boundary.

- *Station configuration data* — data specified for *each* work station in the system. You must allocate storage for the configuration definition of that work station. Station storage always resides below the 512K boundary.

- *Optional controller data* — extra, optional system support for such optional features as auxiliary diskette, disk, and optional instructions. This storage thus contains 4700 system support over and above the support for the basic system.

  If you order 512K bytes or less, the optional controller functions reside with your programs.

  If you order more than 512K bytes, these optional controller functions reside above the 512K boundary. Therefore, if you order the 4701 Model 2 with the storage enhancement feature, the amount of storage above the 512K byte boundary must be large enough to contain a part of the basic system along with your optional controller functions.

- *Application programs* — your institution's applications as they reside at the controller. Your application programs always reside below the 512K boundary.

Storage Capacities

These tables show you the quantities of storage you can order for each model of the 4701, and the storage available for your application programs, common and station storage, and optional controller functions.

4701 Model 1

Total	System	Available
192	80	112
256	80	176
384	80	304
512	88	424

4701 Model 2 with 512K Bytes or Less

Total	System	Available
256	80	176
384	80	304
512	88	424

4701 Model 2 with more than 512K Bytes

Total	System	CPGEN and APs	Options
640	80	359	201
768	88	359	321
768	88	479	201
896	96	479	321

The "CPGEN and APs" column represents your application programs and CPGEN data, as well as the system's common and station storage. The "Options" column represents the optional controller functions.

Use the simplified storage configuration procedure in Chapter 2 to decide how many increments of storage you will need. Later, as you are building and adding functions, you might need the more detailed procedure in Chapter 5 to calculate just how many functions you can support and how many work stations you can add. Also, if the calculation in Chapter 2 brings you just over or just under an increment's storage boundary, use the procedure in Chapter 5 to make your estimate more precise. Always make sure your IBM representative verifies your results.

Choosing a Loop Configuration

The 4701 Controller has an adapter for two loops and can support a second adapter for two more loops. Loops can perform at 1200, 2400, or 4800 bits per second (bps), which is the same as 120, 240, or 480 characters per second (cps), respectively. To decide how many loops you need, calculate how many devices (or work stations) you must support, and at what speeds.

The method that Chapter 3 describes divides the total output capacity of one loop (120, 240, or 480 cps) into fractional parts called slots. A slot is one-sixteenth of its loop's output capacity. For a 2400-bps loop, a slot is 15 cps; for a 4800-bps loop, a slot is 30 cps.

You can assign up to eight slots to a device, enabling that device to operate at a selected speed (in characters per second -- cps). For example, on a 4800 bps loop, one slot equals 30 cps. You can assign the device one slot to operate at 30 cps, or you can assign the device eight slots to operate at 240 cps.

You can also share several slots among two or more devices. This enables you to attach more terminals to your loop, or to assign more slots to a device. Keep in mind that devices must use the shared slots serially. Delays will occur when several devices try to use the same shared slots at the same time.

By either dedicating a set of slots to a single device, or sharing the slots among the devices of a work station, you will discover how many work stations each loop can support at the speed you want to maintain. Then you can determine whether to order the additional loop adapter.

Choosing a Diskette Configuration

The 4700 system offers a choice of either one or two diskette drives. Depending on which model of 4701 controller you have, each drive can handle either a diskette type 1, which has one recording surface, a diskette type 2, which has recording surfaces on both sides, or a diskette type 2D, which has recording surfaces capable of storing information in double density on both sides. The following table summarizes the capacities of each diskette type, and which diskette types can be used on which diskette drives.

Diskette Drive	1	2	2D
4701 Controller	X	X	
4701 Auxiliary 0.5M	X	X	
4701 Auxiliary 1.0M	X	X	X
Nominal Megabytes	0.25	0.50	1.00
Sides	1	2	2
Formatted Bytes	284160	568320	985088
Formatted Sectors	1110	2220	3848

The diskettes are for storing application programs, data files, transaction logs, and administrative files. The diskette configuration procedure in Chapter 4 shows you how to estimate how much diskette storage you need.

Disk Storage

The 4701 Controller Model 2 offers a disk storage drive in the disk expansion unit. You can order the disk expansion unit to contain:

- One 15M-byte disk or one 30M-byte disk, or
- Two 30M-byte disk drives, or
- One 15M-byte or 30M-byte disk drive, and one 1M-byte diskette drive.

You can store the system monitor and your own application programs and data sets (files) on the disk.

Chapter 2. Quick Storage Estimating Procedure

This procedure helps you estimate the amount of storage you need. This is a rough estimate only; you must evaluate the applicability of each of the following estimates with respect to your environment. You can use the more involved procedure in Chapter 5 for a more precise calculation. Always have your IBM representative verify your estimate before you place an order.

This procedure contains four sections. Items 1 through 5 apply to teller systems that use 4704 Model 1 displays and 4710 or 3616 printers. Items 6 through 9 apply to an administrative application added to the teller-only system. Items 10 through 13 apply to a consumer transaction facility (CTF – another term for an automated teller machine) application added to the teller system. Item 14 is the total of the functions you estimated in items 1 through 13.

Note that all application storage requirements in this procedure are based on programs written in 4700 assembler language.

Quick Estimate

For each item, put your estimated storage needs in the space right after the item number and then add the individual estimates to determine the totals, according to the instructions below.

1. Any *application programs* that reside in storage at the same time require storage. The efficiency with which these application programs are coded affects their sizes.

   1. _____

   A full-function teller application program, including electronic journaling and the efficient use of overlay programming, requires approximately 25K to 35K bytes. Estimate the size of your teller application program.

   All application programs run below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

2. A teller application requires approximately 6.5K bytes of *common storage* to support 4704-1 displays with 3616 printers. If you use 4704-1 displays with 4710 printers, the common storage requirement is approximately 8K bytes.

   Common storage resides below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

   2. _____

3. For a teller application, *station storage* is approximately 2.5K bytes per teller work station. Multiply 2.5K by the number of teller work stations in your controller's system.

   Station storage resides below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

   3. _____

4. For a teller application, the *optional controller functions* provide support for additional devices and features.

   Optional controller functions reside above the 512K-byte boundary whenever possible. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those above the 512K-byte boundary.

   4. _____

Appendix A, "Optional Controller Functions" on page A-1 tabulates all optional functions and their storage requirements. You can use the items in that table or just select from among these items for your quick estimate.

4710 and 3616 printer support	5.0K_____
Instruction enhancements	1.1K_____
Interval timer instruction	1.2K_____
Data encryption (3600 encode-decode)	0.5K_____
Set diskette function	1.1K_____
Data encryption (4700 encode-decode)	4.0K_____
	TOTAL_____

5. _____

5. The expanded system monitor, the Local Configuration Facility, and a CNM/CS work station reside below the 512K-byte boundary. Add 4.5K bytes for the expanded system monitor; add 1.0K bytes for the Local Configuration Facility; add 4.0K bytes for the CNM/CS work station.

6. If you plan an administrative application, the *optional controller functions* will require approximately 20K bytes. (Data stream mapping requires approximately 15K bytes; support for a printer requires approximately 5K bytes.): _____

   If your administrative work stations will be attached through the device cluster adapter (DCA), add 12K bytes once for 3278s and 3279s (_____) and add another 5K bytes for 4704-2 or 4704-3 displays (_____).

   Optional controller functions reside above the 512K-byte boundary whenever possible. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those above the 512K-byte boundary.

6. _____

7. Estimate the storage required by your *administrative application program*. If you code efficiently and use overlays, a simple pass-through application requires approximately 9K bytes. Remember that this simple administrative application will rely on the host computer for all of its processing.

   All application programs run below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

7. _____

8. The *common storage* requirement for an administrative application will be approximately 2.5K bytes if you use a loop attachment, or 5K bytes if you use the DCA. Enter the appropriate number.

8. _____

   Common storage resides below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

9. The *station storage* requirement for an administrative application is approximately 6K bytes per work station. Multiply 6K by the number of administrative work stations you plan to attach to the controller.

If you have a 4704-2 or a 4704-3 in local-tracking mode, allocate 2K bytes for each such station.

Station storage resides below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

9. _____

10. If you plan a CTF application, you will need some of these *optional controller functions*:

CTF Support (3624/4730 devices)	1.2K_____
LSEEKP instruction	2.1K_____
SCRPAD instruction	2.0K_____
Data encryption standard	0.5K_____
	TOTAL_____

Optional controller functions reside above the 512K-byte boundary whenever possible. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those above the 512K-byte boundary.

10. _____

11. Estimate the size of your *CTF application program*. A full-function CTF application program, with efficient use of overlay programming, requires approximately 30K bytes.

All application programs run below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

11. _____

12. A CTF application requires approximately 8K bytes of common storage.

Common storage resides below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

12. _____

13. A CTF application requires approximately 2.5K bytes of station storage for each CTF. Multiply 2.5K by the number of CTFs attached to the controller.

Station storage resides below the 512K-byte boundary. If you are ordering a 4701 Model 2 with more than 512K bytes, add this item to those below the 512K-byte boundary.

13. _____

14. Total: add all the entries in items 1 through 13.

14. _____

Compare your storage estimate (the entry in item 14) with the figures shown in "Storage Capacities" on page 1-3, and choose the amount of storage that you need to contain your applications and optional system functions along with the basic system. Be sure to verify this calculation and resulting decision with your IBM representative.

If the result exceeds the storage available with a 4701 Model 1 or Model 2 with 512K bytes or less, you should consider a Model 2 with more than 512K bytes. Add items 4, 6, and 10. These represent the optional controller functions; they will reside above the 512K-byte boundary. Separately, add items 1, 2, 3, 5, 7, 8, 9, 11, 12, and 13. These items reside below the 512K-byte boundary.

	below	above

Compare your storage estimate with the figures shown in "Storage Capacities" on page 1-3, and choose the amount of storage that you need above and below the 512K-byte boundary. Be sure to verify this calculation and resulting decision with your IBM representative.

Examples

Using the simplified procedure, you can calculate your fixed storage requirements to see how much storage remains to support your work stations (station storage).

Teller System

In a teller-only system, using a full-function application program with overlays, your storage requirements might be:

Basic system	80.0K
Optional controller function	14.8K
Common storage	8.0K
Application program	30.0K
TOTAL	132.8K

If you order 192K bytes of storage, you have approximately 59K bytes of storage remaining. You can use this storage to support teller work stations and, in a small branch, an administrative or CTF application.

Teller and CTF Application

Add to the teller-only estimate a CTF application:

Optional controller function	5.3K
Common storage	8.0K
Application program	30.0K
TOTAL	43.3K
Teller estimate from above	132.8K
TOTAL	176.1K

This leaves approximately 16K bytes in a 192K system, or 80K bytes in a 256K system, for teller and CTF work stations.

Teller and Administrative Application

Add to the teller-only estimate an administrative application using Data Stream Mapping and DCA attachment for the administrative terminals:

Optional controller function	30.0K
Common storage	5.0K
Pass-through application program	9.0K
TOTAL	44 K
Teller estimate from above	132.8K
TOTAL	176.8K

This leaves approximately 15K bytes in a 192K system, or 79K bytes in a 256K system, for teller and administrative work stations.

Teller, CTF, and Administrative Application

With a 256K or larger system, you could install both an administrative and a CTF application. For example, add a CTF application to the previous teller and administrative application:

Optional controller function	5.3K
Common storage	8.0K
Application program	30.0K
TOTAL	43.3K
Teller estimate from above	176.8K
TOTAL	220.1K

This leaves approximately 36K bytes in a 256K system or 164K bytes in a 384K system for work stations.

Summary of Examples

The following table summarizes the storage that remains available in a Model 1 controller to support work stations in the previous examples:

Application	*Additional Storage Increments*		
	0	**1**	**2**
Teller	59K		
Teller,CTF	16K	80K	
Teller,Admin	15K	79K	
Teller,Admin,CTF		34K	162K

Larger Systems

Now, configure a large system with four big teller applications, a large administrative application, and a CTF program. This system will support ten teller work stations, five administrative work stations, and five CTFs.

Item	Total	Below 512K	Above 512K
Teller application	200K	200K	
Teller common storage	32K	32K	
Teller station storage	25K	25K	
LCF/CNM/Expanded monitor	10K	10K	
Teller optional functions	25K		25K
Admin application	25K	25K	
Admin common storage	5K	5K	
Admin station storage	40K	40K	
Admin optional functions	35K		35K
CTF application	35K	35K	
CTF common storage	8K	8K	
CTF station storage	12K	12K	
CTF optional functions	6K		6K
TOTAL	458K	392K	66K

In comparing these numbers to the figures in "Storage Capacities," you might decide to order 768K bytes of storage, consisting of an initial 512K bytes, with an additional 256K bytes above the 512K-byte boundary.

Chapter 3. Specifying Loop Requirements

The ability of the controller to support loops depends on the way in which the controller attaches to the host. If you use SDLC, multi-line loop, or X.21, the total *loop* capability is 16,800 bps for a 4701-1, or 19,200 bps for a 4701-2. If you use Binary Synchronous (BSC), the capacity of the loops *plus* the capacity of the host link is 14,400 bps for a Model 1, and 16,800 bps for a Model 2.

Terminal Loops

The 4700 system controller uses a loop to communicate with terminal devices at various work stations. When the work stations are at the same site as the controller, the loop is called a local loop. The cabling for local loops goes from the controller to the first work station, then from that work station to the next one, and so on. From the last work station in the sequence, the cable returns to the controller to complete the loop.

When the terminals are at a location that is different from (remote with respect to) the controller, the loop is called a remote loop. The terminals at a remote location are cabled together in the same way as in a local loop. The difference is that a remote loop begins and ends at a modem (at the remote location) such as the IBM 3603 Terminal Attachment Unit. Another modem (at the controller's location) connects to the modem attached to the terminal loop.

Loop Cable Length Limitations

Each interconnecting cable segment that is used for wiring either local or remote loops can be no longer than the driving or redriving length capability of the unit to which it is connected. Each loop device that has its power on can drive a maximum of 610 meters (2000 feet) of cable.

When the power to a unit is off, however, the system bypasses the unit and effectively connects two lengths of cable to keep the loop operational. Such a connection must not result in a total length that exceeds the driving or redriving capability of any of the units that are still operational on the loop (that is, with their power on). Thus, for the loop to remain operational, the total length of cable segment between units with power on must not exceed 610 meters (2000 feet). Note that terminal maintenance normally requires you to turn off the unit's power or run the cable around it.

You can arrange a loop so that a terminal need not devote a significant part of its power-on time solely to performing as a repeater. Instead, the Loop Repeater (PN 4400002) can provide this function. The Loop Repeater can support a 610-meter (2000-foot) extension in a loop cable. You can add as many as five repeaters to a loop, enabling the loop to extend an additional 3048 meters (10,000 feet) to a maximum length of 3658 meters (12,000 feet). Thus, five Loop Repeaters can extend both the outgoing and returning cables of a loop.

Loop Configuration Constraints

Loop speeds and terminal allocations must abide by the following rules:

1. The total speed of all loops to terminals is:

Device	HPCA	BSC
4701-1	16,800 bps	14,400 bps
4701-2	19,200 bps	16,800 bps

2. Loop capacity is allocated in sixteenths of total loop capacity. Each 1/16 is called a slot. You can allocate no more than half the loop capacity (8 slots) to any one terminal. The full capacity need not be allocated.

3. Remote loops can experience delays that affect the maximum loop capacity to a terminal. If you have remote loops, refer to "Calculating Propagation Delays" later in this chapter.

4. The 3610, 3611, and 3612 printers should be allocated the fraction of a loop that most nearly matches or exceeds the printer speed. The allocation should not exceed 60 cps, as Figure 3-1 shows. The other terminals are restricted only by the loop allocation rule (the second rule in this list).

5. The minimum suggested loop allocation for an automated teller is 15 cps.

6. Assign each terminal an address in the range 1 through 16 by using its mechanical address switches. Except for the address-shared terminals, each terminal on a loop must have a unique address.

Arranging a Loop Configuration

The basic 4700 controller has two loops, with an option for two additional loops. Specify one of three possible speeds for each loop:

Loop Speed (Bits per Second)	Effective Capacity (Characters per Second)**
1200	120
2400	240
4800 (local loops)	480

Note: ** These bytes-per-second-per-terminal rates are for output mode. Terminal-input (to controller) rate is limited to one-half the output rate. Note that the effective loop capacity, as given, assumes output mode.

Loop Speed (bps)	Effective Capacity (cps)	Terminal Speed for Modulus (in cps)				
		2 8/16	4 4/16	8 2/16	16 1/16	Modulus Value Fraction of Loop
1200	120	60	30	15	7.5	
2400	240	120	60	30	15	
4800	480	240	120	60	30	

Figure 3-1. Terminal Speeds Available for Various Loop Speeds

The most common methods for arranging terminals on a loop are:

- Assign a dedicated number of slots (sixteenths of loop capacity) to each terminal; those slots serve only that terminal.
- Assign a set of slots to serve a display monitor and printer combination. This enables the same set of slots to serve an entire work station.
- Assign a set of slots to a group of similar devices, for example, a set of printers.

Dedicating Slots

If you dedicate a set of slots to serve a terminal, you guarantee that a certain percentage of the loop's capacity will always be available to the terminal whenever a message is ready to be sent between the terminal and the controller. Assume you have two 4800-bit-per-second loops, yielding a total of 960 characters-per-second. Each slot is 30 characters-per-second (480 bps). You could dedicate four slots (120 cps) to each terminal and support eight terminals.

You can also allocate different speeds to different terminal types. In the same two-loop, 4800-bps-per-loop controller as above, you can allocate two slots (60 cps) to each display, and four slots (120 cps) to each printer. Then, one controller with two loops can support five displays and five printers with dedicated slots, and still have spare capacity.

Sharing Slots Among Unlike Devices

By sharing the same set of slots among devices, you increase the number that can be attached to a single loop, but you increase the response time to any single terminal. In "Dedicating Slots" (above), a controller with two loops supported five displays at 60 cps each and five printers at 120 cps each. Because each display-and-printer combination constitutes a single operator's work station, you could share the same set of slots between the two work-station devices for the same operator. All devices that share slots run at the same speed.

If you assign each display-and-printer work station four slots (120 cps), the controller with two 4800-bps loops now supports eight work stations rather than the five stations in the dedicated-slot example. Contention occurs, however, if an operator tries to enter data at the same time a message is printing at the work station's printer. A well-designed application program can avoid this contention by scheduling printing operations when the operator is *not* entering data.

Sharing Slots Among Like Devices

You can share slots among certain like devices, for example, the 4710, 4720, and 3616 printers.

If you share slots among the printers, the contention occurs when data arrives for printing by both printers at the same time. This contention might not cause noticeable delays. The number of printers that can share slots depends on the message lengths and transaction rates. As a general rule, no more than three printers should share 120 cps, but as many as seven printers might share twice that rate (240 cps). If your printers do share the same slots in this way, you can use the remaining slots for displays.

Attaching Work Stations

The following table shows how attachability varies for different choices of slot sharing and device speeds. In this table, a work station consists of one keyboard-display unit and a printer. Like-device address sharing assumes three terminals sharing 120 cps or seven sharing 240 cps.

Design	Devices You Want to Attach	What You Can Attach	Number of Loops Required
Dedicated Slots	120 cps displays and 120 cps printers	4 work stations on 9600 bps 7 work stations on 16800 bps 8 work stations on 19200 bps	2 4 4
Dedicated Slots	60 cps displays and 120 cps printers	5 work stations on 9600 bps 9 work stations on 16800 bps 10 work stations on 19200 bps	2 4 4
Unlike-device address sharing	120 cps displays* and 120 cps printers*	8 work stations on 9600 bps 14 work stations on 16800 bps 16 work stations on 19200 bps	2 4 4
Slot-sharing printers; dedicated slots for displays	120 cps printers* and 120 cps displays	6 work stations on 9600 bps 12 work stations on 19200 bps	2 4

Note: * These devices might experience some contention.

For example, to dedicate slots to 120-cps displays and 120-cps printers, you can support 4 display/printer work stations on 9600 bps (2 loops) or 8 work stations on 19200 bps (4 loops). If you want to share slots between printers, and dedicate slots to the display stations, you can attach up to 5 display/printer work stations on 2 loops whose capacity is 9600 bps, or up to 12 work stations on 19200 bps.

Calculating Propagation Delays

This section applies if you are planning configurations for remote loops. Remote loops can experience signal delays that affect the maximum loop capacity of a terminal. The actual delays depend in part on the common-carrier-circuit lengths and the circuit medium itself.

Point-to-point distances and propagation delays for open-wire circuits (if less than 322 km or 200 miles) are recommended approximations, but it is possible that the actual delay will exceed the estimated delay. If the loop capacity allocated to a terminal exceeds that permissible for the overall delay, that terminal operates at only one-half the expected speed. Also, the effectiveness of the error recovery from circuit noise or disturbance is reduced.

During installation, you should time the data-acceptance speed (while displaying or printing a line of text) of the highest-speed terminal on the remote loop. If the display or printing time of the line is one-half the expected speed, either reduce the terminal's loop-capacity allocation or rearrange the loop to reduce one or more of the delay elements.

Modem	Propagation Delay per modem in bits
3603-1	2.5
3606-2	2.5
3608-2	2.5
3603-2	1.0
3603-2/clock	2.0
3603-3 External	4.0
1200 bps External	PD/0.834
2400 bps External	PD/0.417
4800 bps	PD/0.208

PD = Modem's end-to-end propagation delay in milliseconds (obtain from modem vendor).

The loop propagation delay (in bits) =

$$M + T + (K)\ (D)\ (S)$$

Where:

M = sum of all modem propagation delays (in bits).

T = number of terminals on the loop exclusive of all 3603, 3606-2, and 3608-2 terminals.

K = constant of 0.05 when D is km (0.08 when D is miles).

D = point-to-point distance of line segments in the remote loop. A duplex line segment, if in use, counts as two segments.

S = 1 for 1200-bps loops; 2 for 2400-bps loops; 4 for 4800-bps loops.

This equation applies only if all line segments are relatively short.

When one or more line segments exceed 322 km (200 miles), use the following equation:

Loop propagation delay =

$$M + T + (K)\ (D\text{-}E)\ (S) + (0.1K)\ (E)\ (S)$$

Where:

E = sum of the excess length over 322 km (200 miles) of each line segment.

For example:

Two remote locations (A and B) are to be attached to a controller on the same 1200-bps remote loop. Each location has two terminals and a 3603-1. A 3603-1 is also at the controller. Location A is 403 km (250 miles) from the controller, location B is 32 km (20 miles) from location A, and the controller is 419 km (260 miles) from location B.

Loop delay =

$$2.5(3) + 4 + (0.05)\ (854\text{-}178)\ (1) + (0.005)\ (178)\ (1) = 46.19$$

The loop propagation delay factor indicates how many slots you can allocate to that terminal.

When Loop Propagation Delay Is Equal To or Less Than:	Maximum Allocation per Terminal	Modulus Value
13	8/16	2
31	5/16	3
49	4/16	4
67	3/16	5
121	2/16	8
265	1/16	16

Chapter 4. Disk and Diskette Configuration Procedures

Use these procedures to estimate the amount of disk and diskette storage you need, calculated in sectors.

Diskette storage is used for:

- Basic system residence.
- Program storage — application programs, program overlay sections, the expanded system monitor, and the controller's optional modules.
- Work-station storage — storage to support data from teller terminals, administrative terminals, and automated teller machines.
- Transaction logs — storage to support teller journals, teller transaction logs, administrative transaction logs, and logs for automated teller machines.
- Reference files — storage to contain administrative screen formats, and a negative file.

Disk storage is available to contain your application programs, your data sets, and the system monitor.

1. Estimate 437 sectors for the basic system, and add 4 sectors if you use KANJI.

   1. _____

2. Add 76 sectors if you use the expanded system monitor.

   2. _____

3. Add 70 sectors if you code a CNM/CS work station.

   3. _____

4. Estimate the size of your CPGEN in bytes, and divide this by 256. Enter the result on this line. If you use LCF, enter 320 on this line.

   4. _____

5. Estimate the total size of your files.

   a. Multiply the number of temporary-file units by 16.

      5a. _____

   b. Add the number of permanent file records.

      5b. _____

   c. Add the number of anticipated APDUMP records you will need.

      5c. _____

d. For automated teller machines, estimate 40-100 records for each CTF. Add 100-400 records for the negative file (which depends on the size of your card base, and your experience with losses).

5d. _____

Total 5a - 5d: _____

6. Add storage for your application programs. Use your own sector estimates here, or use a value from this table:

	Teller	Administrative	CTFs
Sectors	68	20	140

If you do your own estimates, be sure to include all overlays. This estimate is the number of 256-byte sectors required. For each sixteen programs, add an additional 1 sector for the directory entries.

6. _____

7. Add sectors for optional modules. Appendix A, "Optional Controller Functions" tabulates the sectors required for each optional module so that you can accumulate the sectors required for each optional controller function. (Module MB1 is required if there are system or user application programs residing in disk storage.)

7. _____

8. Total all items.

Total: _____

The result is the number of diskette sectors your system requires. Compare your result with the diskette capacities listed in "Choosing a Diskette Configuration."

Chapter 5. Detailed Storage Configuration Procedure

This chapter presents a detailed procedure by which you can estimate your controller storage needs. Normally, you can use the simpler method shown in Chapter 2 for actual configuration estimates, and use this chapter only when the simpler method gets you close to a storage boundary, or when you want to add functions or work stations to an existing configuration.

Many of the steps in this procedure rely on a thorough knowledge of the 4700 system, and on the kind of configuration details you will need to design the applications for your institution.

This procedure enables you to estimate common, station, optional-module, and application storage requirements. The formulas, work sheets, and summary sheets can help you calculate a close estimate of the storage requirements for your configuration.

Preparing Common Storage Estimates

The necessary common storage depends on the functions and options you select during the configuration of the 4700 using either the CPGEN procedure or the local configuration facility. The common storage requirement is not affected by the number of work stations.

The following pages ask you questions about your intended configuration and, based on your answers, tell you how much storage each item requires. As you complete each estimate, transfer it to the Common Storage Summary Sheet, later in this section. When you complete the common storage section, transfer the total common storage requirement to the appropriate line of the Total Storage Summary Sheet at the end of this chapter.

Preparing Individual Estimates for Common Storage

1. Host Communication Requirements

   a. This estimate depends on the type of host communication link you use (see the TYPE operand of the COMLINK macro).

      Communication base: +400

      Now, select only one figure from the following list:

Binary synchronous link	+400
SDLC	+650
Multiuse loop	+714
SDLC/X.21	+950

Total for 1a. _____

b. This estimate is based on the expected performance of the host communication link. You must be able to estimate the sizes and numbers of buffers that will be selected with the COMLINK macro.

INPUT BUFFERS — Use the formula:

Bytes = BFRS x (LEN+22)

Where:

BFRS is the number of input buffers for receiving input data from the host; the default value is 1.

LEN is the length, in bytes, of each input buffer; the default value (and minimum size) for LEN is 72 bytes.

BINARY SYNCHRONOUS OUTPUT BUFFERS — Use the formula:

Bytes = N x 28

Where:

N is the greater of:

- The maximum number of messages in a batch transmission,

-or-

- The number of stations that will use this link,

SDLC OUTPUT BUFFERS — Use the formula:

Bytes = WRTS x 60

Where WRTS is the number of concurrent output messages before acknowledgment is required of the host. The valid range is 1 through 7, and the default value is 1.

1b. _____

Total 1a - 1b: _____

2. Global and Shared Segments

a. Global segment 15 is available to all work stations for common data and requires a minimum of 78 bytes. During the actual configuration procedure, you can increase the size of segment 15. Enter either 78 bytes or the larger value you will use on STARTGEN during CPGEN or LCF.

2a. _____

b. Global segment 13 is available to all work stations and can be allocated or omitted. Enter the number of bytes you require.

2b. _____

c. A number of segments (each known as segment 13) can be shared. Each such segment is shared among a specific set of work stations. These shared segments are used *instead* of the one, global segment 13 in item b, above. Enter the number of bytes required for *all* segments to be known as segment 13.

2c. _____

Total 2a - 2c: _____

3. Storage to Support Disk and Diskette Access

a. Temporary File Index Read Buffers (optional)

Add 258 bytes for the controller drive	_____
Add 258 bytes for a second drive, disk or diskette	_____
Add 258 bytes for a third drive, disk or diskette	_____

3a. _____

These buffers contain the track index when reading from the diskette, and improve performance when reading from the temporary file.

b. Temporary file index: Each temporary file, subfile, and composite file requires storage for an index. The amount of storage necessary for each index depends on the number of sectors in the file.

Controller drive, temporary file indexes

_____

Second drive, indexes and control blocks (disk or diskette)

_____

Third drive, indexes and control blocks (disk or diskette).

_____

For each drive with the TF option, determine the necessary storage by using this formula:

Bytes = (tf + sf) x (n + 4) + 20 (sf + 1) +82*

Where:

tf	is the number of temporary files, plus 1.
sf	is the total of subfiles and composite files.
n	is the number of temporary file units (16 sectors each) in all temporary files.

* Do NOT add these 82 bytes for the controller drive.

3b. _____

c. If you have an auxiliary diskette drive, add 1320 bytes.

3c. _____

d. Add 1824 bytes for one disk or add 2440 bytes for two disks.

3d. _____

Total 3a - 3d: _____

4. Extended Disk/Diskette Access Method

a. If you use EDAM, determine storage requirements as follows:

Bytes = 120 + 154(n) + 268(m)

Where:

n is the number of data sets specified in all FILES macros.
m is the number of EDAM buffers defined in all FILES macros.

4a. _____

b. 1230 bytes for each diskette drive on which EDAM will be used.

4b. _____

c. 1600 bytes for each disk drive on which EDAM will be used.

4c. _____

Total 4a - 4c: _____

5. Multiple-Block Input/Output

a. If you intend to use multiple-block I/O when accessing disks or diskettes, add 124 bytes for each diskette drive and 150 bytes for each disk drive.

5a. _____

b. If the system monitor will use multiple-block I/O, add (256 * n), where *n* is the number blocks specified on STARTGEN.

5b. _____

Total 5a - 5b: _____

6. Format Diskette: If you plan to use the Format Diskette function, add 4000 bytes.

6. _____

7. Compress Diskette: If you plan to use the Compress Diskette function, add 1500 bytes.

7. _____

8. Loop Attachment

Determine the storage required in support of the number of loops and loop addresses in your system by using the following formula:

Bytes = 300(loops) + 64(bslts) + 16(shdslts)

Where:

loops is the number of loops to be attached to the controller.

bslts is the number of loop addresses supporting single devices (called base address slots). This is the number of DEFADDR macros coded in the CPGEN.

shdslts is the number of loop addresses in support of multiple devices (called shared address slots). This is the number of DEFADDR macros that point to multiple devices.

8. _____

9. Input Translation Tables

Input translation tables are necessary for keyboards, magnetic stripe readers, and PIN keypads. Translation tables can be shared by like devices or by different devices that have the same translation requirements.

a. Keyboards

9a. _____

Keyboard translation tables are defined by code, the TRTBHDR and INTRTBL macros. You can use the following formulas to calculate storage sizes:

For each INTRTBL coded, bytes = 2A + C + 2
For each TRTBHDR coded, bytes = 2B + D + 4

Where:

A = (high - low scan +12) — if INTRTBL specifies the SCRANGE operand; otherwise, A is the fixed requirement per keyboard type:

Keyboard	No.Keys	A=
4704 Model 1		
KYBD= 470450	50	71
47US62	62	78
47US77	77	131
47US112	112	137
4704 Model 2/3		
KYBD = 470450	50	80
47US62	62	80
47US77	77	140
47US107	107	150
47US112	112	150

Keyboard	No.Keys	A=
3604 KYBD = 4661	30	32
4663	45	60
4662	74	98
4662J	77	120
4664J	92	120
4664	94	118
36047	77	120
3278 KYBD = 3278A	87	97
3278K	88	97
3606 KYBD = 3606	16	16
3608 KYBD = 3608	16	16

B is the number of shift cases (1 through 4).

C is the number of necessary bytes of off-pointed data, computed as follows:

1) Add one byte for each key that translates to more than one character or is assigned any combination of translation value, function, or EOM designation.
2) Add the total number of translation characters defined.
3) Add one byte for each key that is also designated as an EOM key.
4) Add one byte for each key that is also assigned a function.

D is either 0 or 16. The user of an alphameric keyboard can specify as many as 16 nonlocking shift keys or typematic keys, or some combination of the two. If the user chooses to define any, 16 bytes are reserved for the purpose; otherwise, D is 0.

b. Magnetic Stripe Readers

9b. _____

Translation tables for the magnetic stripe reader require 32 bytes of storage each and are defined by the MSTRTBL macro.

c. PIN Keypads

9c. _____

PIN pads require 40 bytes.

Total 9a - 9c: _____

10. Output Translation Tables

You need to allocate storage for each translation table used in your system. Each type of display monitor or printer requires a special translation table. If you use special country-dependent characters, each device using them requires translation storage.

a. Estimate 200 bytes for each translation table for a display monitor for a 4704. Each separate type requires a 200-byte translation table.

10a. _____

b. Estimate 130 bytes for each 4704-2 or 4704-3 local tracking table (DCATRTBL) shift case.

10b. _____

c. Estimate 200 bytes for each type of printer attached to your controller. DO include the 4720 here.

10c. _____

d. Estimate 120 bytes for each printer that needs special characters and country variations. DO NOT include 4720 printers here.

10d. _____

e. Estimate 150 bytes for each type of printer (excluding the 4720) that is to print special user-defined characters.

10e. _____

For the 4720, estimate 220 bytes, and up to 700 bytes to support quality customer-definable characters.

f. Estimate 32 bytes for each translation table for a magnetic stripe encoder. Add 2 bytes each time an EBCDIC value is assigned to more than one of the 16 encodable values.

10f. _____

Total 10a - 10f: _____

11. Extended Statistical Counters

11. _____

Extended statistical counters record loop segments that generate excessive noise and degrade overall performance. To estimate the storage necessary for these counters, use this formula:

Bytes = 16 + (L x 14) + (E x 12) + (D x 2) + (T x 32)

Where:

L = The number of statistical counters necessary for your loops.

E = The number of counters necessary for your loop devices.

D = The actual number of devices assigned to all statistical counters.

T = The number of loop base slots used for 3606 and 3608 terminals.

You will usually use a single counter for all devices at a single location to measure the noise at that location.

12. Device Pool

12. _____

For each device pool you will use, calculate the required storage as:

Bytes = (2 X d) + (2 X c)

where:

d = the number of devices in the pool
c = the number of components in the pool

13. Additional Functions

If you select one of these functions, you must estimate additional storage, as shown:

a. Encryption, 500 bytes _____
b. Interval timer, 18 bytes per timer _____
c. Scratch pad, number of bytes defined _____
d. Zoned-decimal arithmetic, 175 bytes _____
e. Local Configuration Facility, 1000 bytes _____
f. Communication adapter wrap test, 210 bytes _____
g. TRANPL macro, number of bytes defined _____

Total 13. _____

14. Common Storage for Device Attachments

The following storage is necessary to support specific types of devices. If an item below applies to your configuration, include its estimate only once.

a. If you have any 4704-1s, add 1100 bytes once. _____
b. If you have any 4704-2/3s, add 1800 bytes once. _____
c. If you have any 3616s, add 50 bytes once. _____
d. If you have any 4710s, add 1600 bytes once. _____
e. If you have any 4720s, add 3600 bytes once. _____
f. If you have any 3262 or 3287 DCA printers, add 80 bytes once. _____
g. If you have any DCA devices, add 2200 bytes once. _____
h. If you have any 3278s, add 300 bytes once. _____

Total 14. _____

15. If you use the APLIST function, calculate the storage as:

Bytes = 32 + 30 (AP)

where AP is the number of application programs in your controller.

15. _____

16. If your application program will use DATSM to map data to and from 3270 format, include the size of the common system buffer as defined by DEFSBF.

16. _____

Common Storage Summary Sheet

1. Host Communication Requirements _____

   a. Types selected _____
   b. Buffering and performance specified _____

2. Global and Shared Segments _____

   a. Global 15 _____
   b. Global 13 _____
   c. Global 13s _____

3. Disk and Diskette Access _____

   a. Temporary file read index buffers _____
   b. Temporary file indexes and control blocks _____
   c. Auxiliary diskette drive _____
   d. Disk drives _____

4. Extended Diskette Access Method (EDAM) _____
5. Multiple-Block I/O _____

   a. Per-drive total _____
   b. For system monitor multiple-block I/O _____

6. Format Diskette _____
7. Compress Diskette _____
8. Loops _____
9. Input Translation Tables _____

   a. Keyboards _____
   b. Magnetic stripe readers _____
   c. PIN keypads _____

10. Output Translation Tables _____

    a. Displays _____
    b. Printers _____
    c. Printer, special character _____
    d. Printer, user-defined character _____
    e. Magnetic stripe encoder _____

11. Extended Statistical Counters _____
12. Device Pool _____
13. Function Requirements _____

_____
_____
_____
_____

14. Common Storage for Device Attachments _____

_____
_____
_____
_____
_____

15. APLIST _____

16. DATSM Common System Buffer _____

Total Common Storage = _____

Station Storage Estimates

Each station assigned to your system requires supporting storage. To estimate this requirement, you define each *type* of station in your configuration in terms of devices attached and functions used. Then you calculate the storage necessary to support that station type and multiply the result by the number of similar stations in the configuration.

The following information guides you in estimating the necessary storage for each type of station. For each type, calculate the various requirements and record them on the Station Storage Summary Sheet. Use a separate column for each type of station.

Finally, put the total for each column at the bottom of the Station Storage Summary Sheet and multiply it by the number of stations of the type that will be attached to the controller.

Estimating Station Storage

1. Station Definition

   a. Add 150 bytes (the basic requirement for each station); also, add 50 bytes more if this station communicates with a host computer(_____).

      Add 30 bytes more if this station communicates using BSC (_____).

      1a. _____

   b. Estimate storage to permit nested levels of call and return for subprograms, using this formula:

      1b. _____

      Bytes = 66m

      Where *m* is the number of allowable nested subprograms as specified by the APSTACK keyword.

   c. Station Machine Segment (segment 1)

      1c. _____

      The size of the station machine segment (SMS) in segment 1 depends on the number of link stack entries requested. Each entry is 2 bytes; the default number of entries is 6. The formula for this estimate is:

      Bytes = 96 + 2(LSE)

      Where LSE is the number of link stack entries.

      Total 1a - 1c: _____

2. Data Stream Mapping (DATSM)

2. _____

If your application will use DATSM to map data streams to and from 3270 format, use this formula:

Bytes = 200 + 6(F) + (I * X)

Where:

F is the maximum number of data fields to be handled in any screen image.

I is the larger of:

- The size in bytes of the output screen image

-or-

- The size in bytes of the original input screen image.

X is 2 if you specify EAB for the DSM operand of the STATION macro during configuration, or X is 1 if you do *not* specify EAB for the DSM operand of the STATION macro. EAB (the Extended Attribute Buffer) is required if you use color or APL.

3. Terminals

Each station in your configuration can have as many as eight devices assigned to logical device addresses 0 through 7. Each device requires supporting storage, as the following table shows. For each station type, add the necessary storage for each *type* of terminal in your configuration.

3a. _____

a. 4700 Terminals

Terminal	Bytes
4704-1	400
4704-2/3	1000
4704 Encoder	+120
4710/4720	200

b. 3600 Terminals

3b. _____

Terminal	Bytes
3604 (1,2,3,5,6)	330
3604 (4)	360
3604 Encoder	+120
3604 (7)	400
3610	220
3611	240
3612 (1,2,3,12,13)	460
3612 (12P,13P)	500
3614, 3624	130
3615	400
3616	370
3278, 3279	510
3287, 3262	200

c. 3606 and 3608 Terminals

3c. _____

Total 3a - 3c: _____

You can associate several 3606 and 3608 terminals with a single loop address. The number of terminals associated with that address determines the storage necessary to support that address. You estimate the storage necessary for *each* terminal group or station as follows:

Number of 3606 and 3608 Terminals at Address	Bytes Necessary
One 3606	202
More than one 3606	202+16n
One 3608	376+aml
More than one 3608	366+aml+16n+10m
At least one each 3606 and 3608	366+aml+16n+10m

Where:

n is the number of 3606 and 3608 terminals assigned in the terminal group.
m is the number of 3608 terminals assigned in the terminal group.
aml is the largest average message length for output data sent to a 3608 at the terminal group.

4. Segment Header Space

The necessary space is twelve times the number of headers, which is:

a. the number specified in the MAXSEG operand of the STATION macro, if you specify MAXSEG.

4a. _____

-or-

b. 17(APSTACK + 1) if you specify APSTACK on the STATION macro but do not specify MAXSEG.

4b. _____

-or-

c. as follows if you specify neither MAXSEG nor APSTACK on the STATION macro:

4c. _____

Segments 14, 15, 1, 0	4
If shared stations option	+1
If global or shared 13 this station	+1
Number (n) of nonzero segments defined by SEGSTORE	+n
TOTAL	____

Total 4a - 4c: _____

5. MAXSTOR or Segment Space

a. MAXSTOR, if specified (required when using APCALL and APRETURN with applications that need storage allocation).

5a: _____

b. Segments for this station

5b: _____

Segment 0: Each station has at least one segment 0. If the station is defined with the shared station option, two segment 0s are necessary. Segment 0 has two parts:

- A fixed-length area of 96 bytes
- An optional user-defined area

Segments 2 - 12: The sizes of these segments depend on the needs and designs of the applications.

Total 5a - 5b: _____

Station Storage Summary Sheet

Use a separate column to calculate each unique type of station definition.

	A	B	C	D	E	F
1. Station Definition						
Base						
APSTACK						
Station Machine Segment						
2. Function Extensions						
_____						
_____						
_____						
_____						
3. Terminal Devices						
LDA - 0 _____						
LDA - 1 _____						
LDA - 2 _____						
LDA - 3 _____						
LDA - 4 _____						
LDA - 5 _____						
LDA - 6 _____						
LDA - 7 _____						
4. Segment Header Space						
MAXSTOR						
Segment Space						
0 - A _____						
0 - B _____						
2 _____						
3 _____						
4 _____						
5 _____						
6 _____						
7 _____						
8 _____						
9 _____						
10 _____						
11 _____						
12 _____						
Sum of each column						
Number of stations						
Total for each type						
TOTAL STORAGE ESTIMATE						

Optional Controller Functions

Use the table in Appendix A, "Optional Controller Functions" to estimate the amount of storage necessary for optional modules when adding any devices, features, or optional controller functions to the 4700 system controllers. The module ID identifies the support for the device, feature, or function.

To estimate the amount of storage necessary for optional modules, use the storage byte requirements from Appendix A, "Optional Controller Functions." Select a device, feature, or function from that table, and record the amount of storage necessary for that item in the summary sheet.

Be sure to add the amount of storage necessary for any device, feature, or function *only once* for each option selected from the first column. For example, if the controller has two 4710s and two 3616s attached, add the necessary bytes for a 4710-and-3616 combination (5000) once.

When you have selected all the options, add the items to determine the amount of storage you need. Carry this total over to the Total Storage Summary Sheet at the end of this chapter.

Summary of Storage Estimates

Use the following Total Storage Summary Sheet to estimate total storage requirements. Use the totals you derived on the previous work sheets and estimates of actual application program sizes.

Total Storage Summary Sheet

1. Enter total from "Common Storage Summary Sheet":

   Total for 1. _____

2. Enter total from "Station Storage Summary Sheet":

   Total for 2. _____

3. Enter total from Appendix A, "Optional Controller Functions":

   Total for 3. _____

4. Application Programs

   a. If any station AP is not on a diskette, +100 _____
   b. AP - _____ Size _____
   c. AP - _____ Size _____
   d. AP - _____ Size _____
   e. AP - _____ Size _____
   f. AP - _____ Size _____
   g. AP - _____ Size _____
   h. AP - _____ Size _____
   i. AP - _____ Size _____

   Total for 4. _____

5. Add items 1-4:

   Total for 1-4. _____

If item 5 is greater than 424K bytes, you must order more controller storage, and allocate common storage, station storage, and application storage below the 512K-byte boundary, and optional module storage above the 512K-byte boundary.

Add items 1, 2, and 4:

Total for 1,2,4. _____

Configure this storage below the 512K-byte boundary.

Configure item 3 above the 512K-byte boundary.

Total for 3. _____

Compare your results to the storage capacities listed in "Storage Capacities." Choose the storage you need below and above the 512K-byte boundary.

Appendix A. Optional Controller Functions

This appendix contains the storage requirements for the optional controller functions (optional modules). Use this table to estimate the total amount of storage you need for optional modules to support new devices, features, or optional controller functions. Check off the applicable module IDs. Add the required storage in the "TOTAL BYTES" and "TOTAL SECTORS" spaces at the end of the table.

Transfer the total storage bytes to the "Total Storage Summary Sheet."

Transfer the total sectors required to Chapter 4, "Disk and Diskette Configuration Procedures."

Controller Data Summary Sheet Device - Feature - Function	Optional Module ID	Storage Bytes Required	Sectors
Communication link (Note 3)			
SDLC Communications	L01+L82	0	57
Binary Synchronous Feature (1422)	L03	0	54
X.21 Switched Secondary (1424)	L01+L83	5800	69
X.21 Switched Diagnostic (1424)	L01+L84	7000	75
X.21 Adapter, Nonswitched (1424)	L01+L82	0	57
Multiuse Loop (4850 — WT only)	L01+L85	2000	65
Device Attachments			
PIN Keypad	M0B	1000	4
4704-2/3 Support (Notes 1, 5, 6)	MAB	5000	27
Magnetic Stripe Reader-Encoder	M86	700	3
3606	M88	2800	11
3608	M89	2800	11
3610, 3611, 3612	M83	2600	11
3614, 3624	M87	1200	6
3615	M8A	3700	15
4710/4720,3616,3262,3287,5210,3283-52 Pt 1	M93	5000	22
**For a 4710, ADD:		0	7
**For a 4720, ADD:		0	15
Device Cluster Adapter (3101) (Note 1)	M95	6000	32
3278-2/3279-2A, 2B Part 1 (Note 1)	M98	4000	16
3278-2/3279-2A Part 2	MA8	2000	8
Color Convergence Support	M04	4000	16
3262,5210,3287,3283-52 Pt 2 (Notes 1,4)	M99	1750	7
3278-52/3279-2B (Note 1)	MA7	3000	12
Change Loops	M01	1000	4
3278/3279 MSR	M0C	500	2
Change DCA Port	M13	500	2
UDP/TGU Address Processor	M15	600	3
4730 SNA-Primary			
4730/SNA-Primary support	M1A	6700	27
4730 Common	P67	6800	39
4730/SDLC	M03	9200	37
4730/Dynamic Control Instructions	M0E	2000	8
SNA-Primary Diagnostics	M11	1000	4
SNA-Primary Wrap Test	P6A	8000	33

Controller Data Summary Sheet Device - Feature - Function	Optional Module ID	Storage Bytes Required	Sectors
Disk/Diskette Support			
EDAM Base Processor (Note 7)	M1B	9800	39
Allocate/Deallocate Base	M1D	3200	13
Temporary File Support (Note 2)	M1E	1500	6
KSAP Support	MB5	9000	36
RKAP Support	MB6	7000	28
ASDS Support	MB8	4000	16
Disk Access (Note 7)	MB1	23500	94
EDAM Base for Disk	MB3	8500	34
Multiblock for Disk	MB7	2000	8
EDAM Base for Diskette	MB2	4500	18
Allocate/Deallocate for Diskette	MB4	3000	12
Multiblock for Diskette (Note 7)	M06	1500	6
EDAM Extended LDKT	MBB	5000	20
LED Message Support (Note 7)	MBC	2000	8
Optional Instructions			
Instruction Enhancements	P68	1100	5
LSEEKP Instruction	P24	2100	9
Translate Instruction (LTRT)	P21	1400	6
Decompression-Decompaction	P26	1400	6
Compression-Compaction	P27	1900	8
SCRPAD Instruction	P2A	2000	8
INTMR Instruction	P2C	1200	5
DES (Data Encryption Standard)	P57	500	2
Data Sequencing (LSort, LMerge)	P5C	1600	7
Extended Statistical Counters	P25	1500	6
Set Diskette (SETDSKT)	P5E	1100	5
LU Assignment	M18	650	3
3270-4704-3604 Data Stream Mapping	P70	15000	63
LTIMEV	P32	1000	4
Zoned Decimal Arithmetic	P31	2500	10
DES (4700 Data Encryption)	P28	4000	16
Device Pool Management	P42	1400	6
Transient AP Support (Note 7)	M29	5750	24
SEGALLOC/DTACCESS	M36	1750	7
LCONVERT	P34	400	2
Diskette Compress	P41	8000	32
Diskette Format	P40	5500	22
FINDAP Statistics Extension	M45	1000	4
LDIAG Instruction	P30	600	3
TOTAL BYTES TOTAL SECTORS			

Notes:

1. Include the device cluster adapter (3101) if you use any combination of the 4704-2/3, 3262, 3278-2, 3279, 5210, or 3287.

2. Include the EDAM base (M1B) once if you use EDAM temporary file support (M1D) or EDAM allocate-deallocate (M1E). Include M1D if you use EDAM allocate for the diskette.

   See the Volume 6 of the *Controller Programming Library* for the optional modules required to use the various EDAM functions.

3. If the configuration includes more than one link, include only the largest value.

4. Include the 3262, 5210, or 3287 Parts 1 and 2 if you use a 3262, 5210, or a 3287. Include the storage space for any printer only ONCE, even if you use more than one of these device types.

5. If you configure more than 80,000 bytes of optional controller storage, add 4096 bytes once for each 50,000 bytes of storage over and above the 80,000-byte mark.

6. The 4704-2/3 also requires modules M95, M98, and MA8.

7. If you include one or more of these optional modules, add 4 sectors *once*: M1B, MB1, M06, MBC, M29. (These optional modules share 4 overlay sectors.)

Appendix B. System Unit Features

4701 Controller Model 1 -- Basic Features

- 192K bytes of storage minimum.
- 512K bytes of storage maximum, with features.
- Diskette storage:
  - The controller drive — a *half-megabyte drive* can accommodate the quarter-megabyte (single-sided) diskette (Diskette 1) or the half-megabyte (two-sided) diskette (Diskette 2).
  - The auxiliary drive — a *half-megabyte* or *one-megabyte drive* — can accommodate either the quarter-megabyte diskette, the half-megabyte diskette, or the double-density, one-megabyte diskette (Diskette 2D). (One megabyte = 1 048 576 bytes.)
- Two loops.
- Host system communications.
- Enhanced device cluster adapter support for:
  - 3278 Model 2
  - 3279 Model 2 color terminal
  - APL feature on the 3278 Model 2 and the 3279 Model 2B
  - 5210 printer
  - Magnetic slot reader on the 3278 Model 2 and 3279 Models 2A and 2B

Specify Feature	Code
Power (single-phase)*	
World Trade**	
50 Hz 100 V	2804
50 Hz 110 V	2805
50 Hz 200 V	2806
50 Hz 220 V	2813
50 Hz 230 V	2821
50 Hz 240 V	2801
60 Hz 100 V	2730
60 Hz 110 V	2822
60 Hz 120 V	9911
Canada and the U.S.A.	
60 Hz 120 V	
Locking Plug	9890
Nonlocking Plug	9891

Specify Feature	Code
Language (Nomenclature)	
Canadian French bilingual	2934
Danish	2936
Dutch	2923
English	2927
Finnish	2921
French	2928
French-Dutch bilingual	2941
German	2929
Italian	2932
Japanese	2930
Norwegian	2940
Portuguese	2933
Spanish	2931
Swedish	2935
Controller Designation	
Local configuration facility (LCF) necessary	9490
Initial order for use with S/370 or S/370-compatible host.	9491
Identify additional controllers per S/370 or S/370 compatible host or other controllers not requiring host or LCF.	9492
Identify additional controllers for no host or non-S/370-compatible host, *not* using LCF.	9493
If 9491 is specified, and the desired medium is:	
9/1600 Magnetic Tape	9413
9/6250 Magnetic Tape	9414
If magnetic tape is not available on the host system, select the following (DOS/VS users only):	
80-column card	9431
Note that when 9491 is specified, additional information is necessary. See your IBM representative.	
If you order feature 1007, 1008 or 1009, specify one of these codes:	
256K System (base + one 64K increment)	9616
384K System (base + one 64K + one 128K increment)	9617
512K System (base + one 64K + two 128K increments)	9618
For each feature 1551 ordered, select one of these codes:	
9600 line speed	9181
4800 line speed	9182
2400 line speed	9183
For each feature 1424 ordered, select one of these codes:	
switched	9750
nonswitched	9751

* Country-approved connector is provided at the time of shipment.

** EMEA — Specify #2999 and a country code;
AFE — Specify #2998 and a feature code.

Special Feature	Code
Additional Storage: 64K increment	1008
128K increment	1009
64K increment (for field upgrade)	1007
Additional Loop: Provides two additional loops	4745
Device Cluster Adapter	3101
Diskette Expansion Unit	3651
0.5-megabyte Auxiliary Diskette Drive	1035
1.0-megabyte Auxiliary Diskette Drive	1045
BSC Without Clocking	1422
X.21 Adapter	1424
Multiuse Loop Adapter (WT only)	4850
SDLC/4730 Communications Adapter w/o clocking	4502
4730 Fan Out Communications Adapter	1551
4730 EIA/CCITT Interface	3701

4701 Controller Model 2 -- Basic Features

- 256K bytes of storage minimum.
- Maximum of 896K bytes of storage with features.
- Disk storage -- a 15- or 30-megabyte disk, or two 30-megabyte disks in the disk expansion unit. (One megabyte = 1 048 576 bytes.)
- Diskette storage -- more diskette storage available than for the Model 1 because both the controller and auxiliary drives are one-megabyte drives that can accommodate either the quarter-megabyte (single-sided) Diskette 1, the half-megabyte (two-sided) Diskette 2, or the one-megabyte (two-sided, double-density) Diskette 2D. The 4701 Model 2 is not available with the half-megabyte controller or auxiliary drive.
- Two loops.
- Host system communications.
- Improved performance for synchronous data link communication (SDLC):
  - Maximum aggregate bit-per-second (bps) rate of 19,200 for loops independent of host SDLC link speed
  - Maximum aggregate bps rate of 16,800 for loops including the host link speed when using bisynchronous communication (BSC)
- Enhanced device cluster adapter support for:
  - 3278 Model 2
  - 3279 Model 2 color terminal
  - APL feature on the 3278 Model 2 and the 3279 Model 2B
  - 5210 printer
  - Magnetic slot reader on the 3278 Model 2 and 3279 Models 2A and 2B

Specify Feature	Code
Power (single-phase)*	
World Trade**	
50 Hz 100 V	2804
50 Hz 110 V	2805
50 Hz 200 V	2806
50 Hz 220 V	2813
50 Hz 230 V	2821
50 Hz 240 V	2801
60 Hz 100 V	2730
60 Hz 110 V	2822
60 Hz 120 V	9911
Canada and the U.S.A.	
60 Hz 120 V	
Locking Plug	9890
Nonlocking Plug	9891
Language (Nomenclature)	
Canadian French bilingual	2934
Danish	2936
Dutch	2923
English	2927
Finnish	2921
French	2928
French-Dutch bilingual	2941
German	2929
Italian	2932
Japanese	2930
Norwegian	2940
Portuguese	2933
Spanish	2931
Swedish	2935
Controller Designation	
Local configuration facility (LCF) necessary	9490
Initial order for use with S/370 or S/370-compatible host.	9491
Identify additional controllers per S/370 or S/370 compatible host or other controllers not requiring host or LCF.	9492
Identify additional controllers for no host or non-S/370-compatible host, *not* using LCF.	9493
If 9491 is specified, and the desired medium is:	
9/1600 Magnetic Tape	9413
9/6250 Magnetic Tape	9414
If magnetic tape is not available on the host system, select the following (DOS/VS users only): 80-column card	9431
Note that when 9491 is specified, additional information is necessary. Ask your IBM representative.	

Specify Feature	Code
If you order feature 1009, specify one of these codes:	
256K System (base)	9616
384K System (base + one 128K increment)	9617
512K System (base + two 128K increments)	9618
640K System (base + three 128K increments)	9619
768K System (base + four 128K increments)	9620
768K System (base + four 128K increments)	9621
896K System (base + five 128K increments)	9622
For each feature 1424 ordered, select one of these codes:	
switched	9750
nonswitched	9751

* Country-approved connector is provided at the time of shipment.
** EMEA — Specify #2999 and a country code;
AFE — Specify #2998 and a feature code.

Special Feature	Code
Additional Storage: 128K increment	1009
Additional Loop: Provides two additional loops	4745
Device Cluster Adapter	3101
Diskette Expansion Unit	3651
1-megabyte Auxiliary Diskette Drive	1045
BSC Without Clocking	1422
X.21 Adapter	1424
Multiuse Loop Adapter (WT only)	4850
Disk Expansion Unit	3652
15-megabyte disk	1055
30-megabyte disk	1065
Second 30-megabyte disk	1075

4704 Display Models 1, 2, 3 -- Basic Features

- Upper and lowercase display characters
- Normal and intensified display characters
- Attachment for keyboard, magnetic stripe unit, PIN keypad

Specify Feature	Code
1. Power — AC, 1-Phase	
Canada and United States	
- Line Cord = 1.8 m (6 ft)	
60 Hz, 120 V (Locking plug)	9890
60 Hz, 120 V (Nonlocking plug)	9891
Europe - Middle East - Africa	
- Line cord = 3 m (9.8 ft)	
Power is selected by the fifth character of the order code (50 Hz, 220 or 240 V for all except Saudi Arabia, which has 60 Hz, 120 V)	
Americas - Far East	
- Line cord = 3.0 m (9.8 ft)	
Specify number 2998 and a country; then select one of the following:	
50 Hz	
100 V	2804
110 V	2805
200 V	2806
220 V	2813
230 V	2821
240 V	2801
60 Hz	
100 V	2730
110 V	2822
120 V	9911

Specify Feature	Code
2. Plugs Countries other than Canada and Japan: plugs will match the most commonly used power supply. Note that if an uncommon power supply is selected, a power cord without a plug will be shipped. See your local IBM representative for exceptions. Canada only 60 Hz, 120 V (Locking plug) 60 Hz, 120 V (Nonlocking plug) Japan only Under 200 V (Locking) Under 200 V (Nonlocking)	 9890 9891 9890 9891
3. Nomenclature Europe - Middle East- Africa Nomenclature is defined by the fifth character of the order code. Order codes 4704Z1 (International), 4704V1 (Saudi Arabia), 470411 (Netherlands), 4704H1 (Israel), 470421 (South Africa) will be shipped with United Kingdom English nomenclature. Americas - Far East Canadian French bilingual English Japanese Spanish	 2934 2927 2930 2931
4. Spare Display Control Module (without Display Monitor or Keyboard)	9480

Specify Feature	Code
5. Anti-glare Filter (For EMEA, see the EMEA Order Codes later in this specification.)	
For Model 1 Display Monitor 3255, order one:	
Green filter	9181
Amber filter	9191
For Model 1 Display Monitor 3290, order one:	
Green filter	9182
Amber filter	9192
For Display Station Model 2, order one:	
Green filter	9183
Amber filter	9193
For Display Station Model 3, order one:	
Green filter	9184
Amber filter	9194

Special Feature	Code
For EMEA controllers, see the EMEA order codes.	
1. Display Monitor for Model 1 only	
(One must be selected.)	
139.7 mm (5.5-in) Monitor	3255
228.6 mm (9.0-in) Monitor	3290
2. Keyboards for Models 1, 2, and 3	
Numeric - Function (50-key)	4650
Alphameric (60-key)	4662
Expanded alphameric (77-key)	4677
Administrative (107-key)	4602
Specify language (all keyboards)	
The EMEA keyboard nomenclature is specified by the fifth character of the order code.	
Americas - Far East	
Canadian French	2977
International	2950
Japan (English)	2955
Japan (Katakana)	2973
Spanish speaking	2969
United Kingdom	2958
United States	2956
EBCDIC	2951
3. Magnetic Stripe for Models 1, 2, and 3	
Magnetic Stripe Reader (75 and 210 bpi)	4901
Magnetic Stripe Reader (75 bpi only)	4904
Magnetic Stripe Reader-Encoder	4905

Accessories

Magnetic Stripe Unit Cleaning Card
PIN Keypad
Encrypting PIN Keypad
Cradle
Filter (Green)
Filter (Amber)
Key Label Sheet
Keytop Caps
PIN Keypad Privacy Shield

EMEA Order Codes

The following tables group the ordering codes by subcomponents of the 4704 Display.

Display Control Module -- Model 1 only

Code	Description	Code	Description
4704Z1	International	4704B1	Belgium (French-Dutch)
4704F1	France	4704P1	Portugal
4704G1	Germany	4704T1	Spain
4704I1	Italy	470411	Netherlands
4704U1	United Kingdom	4704H1	Israel
4704J1	Finland	470421	South Africa
4704D1	Denmark	4704K1	Switzerland (French)
4704N1	Norway	4704L1	Switzerland (German)
4704S1	Sweden	4704V1	Saudi Arabia

Display Monitor -- Model 1 only

Code	Description
471XW1	5.5-in. Green Filter
471XA1	5.5-in. Amber Filter
471XG1	5.5-in. Green Filter (Germany)
471X01	5.5-in. Amber Filter (Germany)
471XW2	9.0-in. Green Filter
471XA2	9.0-in. Amber Filter
471XG2	9.0-in. Green Filter (Germany)
471X02	9.0-in. Amber Filter (Germany)

Display Module with Green Filter for Models 2 and 3

All order codes are in the format XXXXXn, where n is a 2 for the Model 2, or a 3 for the Model 3.

Code	Description	Code	Description
4704Zn	International	4704B1	Belgium (French-Dutch)
4704Fn	France	4704P1	Portugal
4704Gn	Germany	4704T1	Spain
4704In	Italy	470411	Netherlands
4704Un	United Kingdom	4704H1	Israel
4704Jn	Finland	470421	South Africa
4704Dn	Denmark	4704K1	Switzerland (French)
4704Nn	Norway	4704L1	Switzerland (German)
4704Sn	Sweden	4704V1	Saudi Arabia
47043n	Turkey	4704An	Arabic

Display Module with Amber Filter for Models 2 and 3

All order codes are in the format XXXXXn, where n is an 8 for the Model 2, or a 9 for the Model 3.

Code	Description	Code	Description
4704Zn	International	4704B1	Belgium (French-Dutch)
4704Fn	France	4704P1	Portugal
4704Gn	Germany	4704T1	Spain
4704In	Italy	470411	Netherlands
4704Un	United Kingdom	4704H1	Israel
4704Jn	Finland	470421	South Africa
4704Dn	Denmark	4704K1	Switzerland (French)
4704Nn	Norway	4704L1	Switzerland (German)
4704Sn	Sweden	4704V1	Saudi Arabia
47043n	Turkey	4704An	Arabic

Function Keyboard (50-Key) for Models 1, 2, and 3

Code	Description	Code	Description
472XF1	France	472XU1	United Kingdom
472XG1	Germany - Austria	472XT1	Spain
472XI1	Italy		

Alphameric Keyboard (60-Key) for Models 1, 2, and 3

Code	Description	Code	Description
472XF2	France (AZERTY)	472XS2	Sweden
472XQ2	France (QWERTY)	472XK2	Switzerland (French)
472XG2	Germany - Austria	472XB2	Belgium
472XI2	Italy	472XL2	Switzerland (German)
472XU2	United Kingdom	472XM2	Greece
472XC2	United States	472XP2	Portugal
472XE2	EBCDIC	472XT2	Spain
472XJ2	Finland	472XZ2	International
472XH2	Israel (Hebrew)	472XX2	Iceland
472XD2	Denmark	472XR2	Faroe Islands
472XN2	Norway	472XY2	Yugoslavia
472X32	Turkey	472XA2	Arabic

Extended Alphameric Keyboard (77-Key) for Models 1, 2, and 3

Code	Description	Code	Description
472XF3	France (AZERTY)	472XS3	Sweden
472XQ3	France (QWERTY)	472XK3	Switzerland (French)
472XG3	Germany - Austria	472XB3	Belgium
472XI3	Italy	472XL3	Switzerland (German)
472XU3	United Kingdom	472XM3	Greece
472XC3	United States	472XP3	Portugal
472XE3	EBCDIC	472XT3	Spain
472XJ3	Finland	472XZ3	International
472XH3	Israel (Hebrew)	472XX3	Iceland
472XD3	Denmark	472XR3	Faroe Islands
472XN3	Norway	472XY3	Yugoslavia
472X33	Turkey	472XA3	Arabic

Administrative Keyboard (107-Key) for Models 2 and 3

Code	Description	Code	Description
472XF4	France (AZERTY)	472XS4	Sweden
472XQ4	France (QWERTY)	472XK4	Switzerland (French)
472XG4	Germany - Austria	472XB4	Belgium
472XI4	Italy	472XL4	Switzerland (German)
472XU4	United Kingdom	472XM4	Greece
472XC4	United States	472XP4	Portugal
472XE4	EBCDIC	472XT4	Spain
472XJ4	Finland	472XZ4	International
472XH4	Israel (Hebrew)	472XX4	Iceland
472XD4	Denmark	472XR4	Faroe Islands
472XN4	Norway	472XY4	Yugoslavia
472X44	Turkey	472XA4	Arabic

4710 Receipt/Validation Printer Model 1 -- Basic Features

- Receipt validation and journal printer
- 96-character set (10 or 12 cpi)
- Shared work station
- Bold printing
- Clean-hands ribbon replacement

Specify Feature	Code
1. Power (AC, 1-phase)	
Canada and United States	
- Line cord = 1.8 m (6 ft)	
120 V, 60 Hz (Locking plug)	9890
120 V, 60 Hz (Nonlocking plug)	9891
Europe - Middle East - Africa	
- Line cord = 3.0 m (9.8 ft)	
Power is selected by the fifth character of the order code (50 Hz, 220/240 V for all except Saudi Arabia, which has 60 Hz, 120 V)	
Americas - Far East	
Specify 2998 and a country; then select one of the following:	
50 Hz	
100 V	2804
110 V	2805
200 V	2806
220 V	2813
230 V	2821
240 V	2801
60 Hz	
100 V	2730
110 V	2822
120 V	9911
2. Plugs	
Countries other than Canada and Japan: plugs will match the most commonly used power supply.	

Specify Feature	Code
Note that if an uncommon power supply is selected, a power cord without a plug will be shipped. See your local IBM representative for exceptions.	
Canada only	
120 V, 60 Hz (Locking)	9890
120 V, 60 Hz (Nonlocking)	9891
Japan only	
Under 200 V (Locking)	9890
Under 200 V (Nonlocking)	9891
3. Nomenclature	
Europe - Middle East - Africa Nomenclature is specified by the fifth character of the order code. Order codes 4710Z1 (International), 4710V1 (Saudi Arabia), 471011 (Netherlands), 4710H1 (Israel), and 471021 (South Africa) will be shipped with United Kingdom English nomenclature.	
Americas - Far East	
Canadian - French bilingual	2934
English	2927
Japanese	2930
Spanish	2931
4. Katakana Character Set	2973
5. Hebrew, Arabic, Greek Character Set	2974

EMEA Order Codes

Code	Description	Code	Description
4710Z1	International	4710B1	Belgium (French - Dutch)
4710F1	France	4710P1	Portugal
4710G1	Germany	4710T1	Spain
4710I1	Italy	4710V1	Saudi Arabia
4710U1	United Kingdom	471011	Netherlands
4710J1	Finland	4710H1	Israel
4710D1	Denmark	471021	South Africa
4710N1	Norway	4710K1	Switzerland (French)
4710S1	Sweden	4710L1	Switzerland (German)

4720 Forms/Passbook Printer Models 1, 2, 3, 4 -- Basic Features

- Cutform, passbook, and journal printer
- 192-character set
- Single print station
- Bold printing
- Clean-hands ribbon replacement

Specify Feature	Code
1. Power (AC, 1-phase)	
Canada and United States	
- Line cord = 1.8 m (6 ft)	
120 V, 60 Hz (Locking plug)	9890
120 V, 60 Hz (Nonlocking plug)	9891
Europe - Middle East - Africa	
- Line cord = 3.0 m (9.8 ft)	
Power is selected by the fifth character of the order code (50 Hz, 220/240 V for all except Saudi Arabia, which has 60 Hz, 120 V)	
Americas - Far East	
Specify 2998 and a country; then select one of the following:	
50 Hz	
100 V	2804
110 V	2805
200 V	2806
220 V	2813
230 V	2821
240 V	2801
60 Hz	
100 V	2730
110 V	2822
120 V	9911
2. Plugs	
Countries other than Canada and Japan: plugs will match the most commonly used power supply.	

Specify Feature	Code
Note that if an uncommon power supply is selected, a power cord without a plug will be shipped. See your local IBM representative for exceptions.	
Canada only	
120 V, 60 Hz (Locking)	9890
120 V, 60 Hz (Nonlocking)	9891
Japan only	
Under 200 V (Locking)	9890
Under 200 V (Nonlocking)	9891
3. Nomenclature	
Europe - Middle East - Africa Nomenclature is specified by the fifth character of the order code. Order codes 4720Z1 (International), 4720V1 (Saudi Arabia), 472011 (Netherlands), 4720H1 (Israel), and 472021 (South Africa) will be shipped with United Kingdom English nomenclature.	
Americas - Far East	
Canadian - French bilingual	2934
English	2927
Japanese	2930
Spanish	2931
4. Katakana Character Set	2973

EMEA Order Codes

Code	Description	Code	Description
4720Z1	International	4720B1	Belgium (French - Dutch)
4720F1	France	4720P1	Portugal
4720G1	Germany	4720T1	Spain
4720I1	Italy	4720V1	Saudi Arabia
4720U1	United Kingdom	472011	Netherlands
4720J1	Finland	4720H1	Israel
4720D1	Denmark	472021	South Africa
4720N1	Norway	4720K1	Switzerland (French)
4720S1	Sweden	4720L1	Switzerland (German)

Basic 3616

The following standard functions are included with the basic 3616:

- Passbook and journal print stations
- One- or two-part paper capacity for the journal print station
- Program selection of printing density; 10 or 12 characters per inch
- Program selection of bold format printing
- 100 twelve-pitch or 83 ten-pitch character positions in the passbook printing station; 57 twelve-pitch or 47 ten-pitch character positions in the journal printing station
- Cut-form printing at both passbook and journal stations; cut-form printing at the journal station limited to one line
- A character set of 96 characters (including World Trade extenders)
- Program selection of print line density at the passbook station; 5 or 6 lines per inch
- Maximum printing speed of 100 characters per second at 10 characters per inch, or 120 characters per second at 12 characters per inch.

Specify Features

For each of the features listed below, one code must be specified.

Specify Feature	Code	Comments
1. Power — 1-Phase		
Europe-Middle East-Africa		
Specify number 2999 and one of the following:		
50 Hz 110 V	2805	
50 Hz 220 V	2813	
50 Hz 240 V	2801	
Americas-Far East		
Specify number 2998 and one of the following:		
50 Hz 110 V	2805	
50 Hz 220 V	2813	
50 Hz 240 V	2801	
60 Hz 100 V	2730	
60 Hz 120 V	9911	
Canada and United States		
60 Hz 120 V (Locking plug)	9890	
60 Hz 120 V (Nonlocking plug)	9891	
2. Language - Character Set Austria - Germany Brazil - Portugal Denmark - Norway Finland - Sweden France Italy Spain Spanish Speaking United Kingdom United States		The character set language is specified during the controller configuration procedure.
3. Language — Nomenclature		The nomenclature designation applies to the language used in the text on areas of the machine such as labels, keys, and indicators.
English	2927	
French	2828	
German	2929	
Spanish	2931	
Italian	2932	
Japanese	2930	
Canadian French	2935	
4. Journal Security	9351	

Special Features

Features in this category are not necessary to make the unit operational, but they serve to increase the unit's capability.

Special Feature	Code
Vertical Fold Passbook	8701

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Reader's Comment Form

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