Configuration Guide

GA33-0063-2

3720
3721

Communication Controllers

IBM

IBM 3720
Models 1, 2, 11, and 12
IBM 3721 Models 1, and 2
Communication Controllers
Configuration Guide

System/370, 30xx, 4300,
and 9370 Processors

Publication Number
GA33-0063-2

File Number
3720/3721 -15

Third Edition (March 1987)

This is a revision of GA33-0063-1 which is obsolete.

Information has been added concerning:

- A reference to *Selecting and Ordering IBM Machine External Cables,* GA23-0278, which describes cable ordering.
- Scanner rules and line weights.
- Modem Requirements.
- Native Subchannel (NSC) Addresses.
- Port Swapping.

Various points have been clarified.

This major revision should be read in its entirety.

References in this publication to IBM products, programs, or services does not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM program product in this publication is not intended to state or imply that only IBM's program product may be used. Any functionally equivalent program may be used instead.

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

Publications are not stocked at the addresses given below; requests for copies of IBM publications should be made to an IBM representative or to the local IBM branch office.

A form for readers' comments is provided at the back of this publication. If the form has been removed, comments may be addressed to either of the following:

- International Business Machines Corporation, Department 6R1LG, 180 Kost Road, Mechanicsburg, PA 17055, USA
- IBM France, Centre d'Etudes et Recherches, Service 0798, 06610 La Gaude, France

IBM may use or distribute any of the information supplied in any way it believes appropriate without incurring any obligation.

This publication was formatted by the IBM text processor SCRIPT/VS (part of program number 5748-XX9) and printed on an IBM 4250 printer.

© Copyright International Business Machines Corporation 1986, 1987

Federal Communications Commission (FCC) Statement

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

In addition to the above FCC statement, the user should be aware that:

- The statement applies only to IBM 3720/3721 Communication Controllers used in the United States and having a label on the back that indicates compliance.

- The phrase ***instruction manual*** means:

  - For installation information:

    3720/3721 Planning and Site Preparation Guide, GA33-0061
    3720/3721 Configuration Guide, GA33-0063
    3720 Model 1 Setup Instructions, GA33-0110
    3720 Model 11 Setup Instructions, GA33-0111
    3720 Model 2 Setup Instructions, GA33-0112
    3720 Model 12 Setup Instructions. GA33-0113
    3721 Models 1 and 2 Setup Instructions, GA33-0114
    3720/3721 System Integration, GA33-0067

  - For user information:

    3720/3721 Operator's Guide, GA33-0065
    3720/3721 Problem Determination Guide, GA33-0086
    3720/3721 Extended Services, GA33-0066

Preface

This publication is a guide to the manual configuring of a number of 3720 or 3721 Communication Controllers. IBM representatives have access to various software aids to check the results obtained by using this publication, or to assist in the process of configuration.

The reader should have a prior knowledge of telecommunications, and will probably be a telecommunication network specialist or system programmer.

The structure of the 3720/3721 is explained with step-by-step instructions on what and how to order.

This guide has the following chapters and appendixes:

Chapter 1, "Overview" describes the possible configurations and lists the component parts.

Chapter 2, "Worksheets" describes the manual configuration procedures based on sets of worksheets.

Chapter 3, "Clocking Considerations" discusses clocking.

Chapter 4, "Scanner and LIC Rules" gives the rules to be followed.

Chapter 5, "Traffic Loading" describes how to determine if the CCU, BUS or CA(s) will be overloaded by the proposed traffic load.

Chapter 6, "Integrating with the Network" describes how to integrate the controller with the network.

Chapter 7, "Relocation and Upgrading" describes relocation and upgrading.

Chapter 8, "Examples" gives examples of configuration.

Chapter 9, "IBM Token-Ring Networks" describes attachment to one or two IBM Token-Ring Networks.

Appendix A, "Requirements Sheet" is used to list the controller requirements.

Appendix B, "Traffic Loading Sheet" is used to sum the traffic loading.

Appendix C, "Channel Adapter Sheet" is used to list the information needed by IBM to install the channel adapter(s) and any two-processor switches of a 3720 Model 1 or 11.

Appendix D, "Plugging Sheet" is used to list the physical location of the LICs/TICs that will support the controller requirements.

Appendix E, "Order Sheet" is used to list the items to be ordered.

Appendix F, "Console Sheet" is used to list the console information needed for system integration.

Appendix G, "Setup Sheet" is used to list the information needed by the setup personnel to plug in the cables to the controller.

Appendix H, "Link IPL Sheet" is used to list the link IPL information needed for system integration.

Appendix I, "Task-Oriented Bibliography" relates tasks to be performed to the appropriate 3720/3721 manuals.

Prerequisite Publications

It is assumed that the user of this guide has read the *3720/3721 Introduction*, GA33-0060, where glossary terms and abbreviations are explained.

Related Publications

Related 3720/3721 Communication Controller publications are described in Appendix I, "Task-Oriented Bibliography."

Other related publications are:

- *Selecting and Ordering IBM Machine External Cables*, GA23-0278.
- *System/370 IBM Input/Output Configuration*, GA22-7002
- *IBM PC 3101 Emulation Program*, 6024042
- *IBM 3101 Display Terminal Description*, GA18-2033
- *IBM 3161/3163 ASCII Display Station Description*, GA18-2310
- Any other related publication that describes the use of the console to be connected to the unit.
- *NCP-SSP Migration*, SC30-3252
- Any other related publication that describes network management software migration

- *5841 Guide to Operations*, GA27-3649 or *5842 Guide to Operations*, GA27-3738.
- *Original Equipment Manufacturer's Information*, GA33-0068.
- *IBM Token-Ring Network, Introduction and Planning Guide*, GA27-3677.

Retention Period

Do not discard this publication even when obsolete. It is a useful record of how each configuration was defined.

Note: Use the log sheet that precedes Chapter 1 to record each configuration.

History of Amendments

First Edition

May 1986.

June 1986 TNL (GN33-7135) to clarify information relative to EP start-stop configurations.

Second Edition

September 1986:

- Relocation and upgrading.
- Support of token-ring networks.
- Definition of link IPL ports.
- Modem requirements and options.

Contents

Chapter 1. Overview **1-1**
The Units 1-1
3720 Model 1 (Base) 1-1
3720 Model 2 (Base) 1-2
3720 Model 11 (Base) 1-3
3720 Model 12 (Base) 1-3
3721 Model 1 (Expansion) 1-4
3721 Model 2 (Expansion) 1-5
Possible Configurations 1-5
3720 Model 1 and 3721 Model 1 1-7
3720 Model 1 and 3721 Model 2 1-8
3720 Model 2 and 3721 Model 1 1-9
3720 Model 2 and 3721 Model 2 1-10
3720 Models 11 and 12, and 3721 Models 1 and 2 1-11
LICs/TICs and Ports 1-11
Attachment Limits 1-11
Controller Components 1-12
Operator Consoles 1-15
LIC Characteristics 1-15
LIC Type 1 1-15
LIC Type 2 1-16
LIC Type 3 1-16
LIC Type 4A 1-17
LIC Type 4B 1-17
TIC Characteristics 1-18
TIC Type 1 1-18
Port Swapping 1-18

Chapter 2. Worksheets **2-1**
How Many Worksheet Sets? 2-2
Line Weights and Traffic Loading 2-3
Unit Identification 2-4
For Each 3720 Order 2-6
For Each 3721 Order 2-7
After Ordering 2-8
Before Delivery 2-8

Chapter 3. Clocking Considerations **3-1**
Clocking Provided by DTE 3-1
DTE Characteristics 3-1
Data Transmission Speeds 3-2
Clocking Provided by DTE - No DCE Present 3-2

DTE Characteristics 3-2
Data Transmission Speeds 3-3
Clocking Provided by the Controller 3-3
DTE Characteristics 3-3
Data Transmission Speeds 3-3
Clocking Provided by DCE (Modem) 3-4
DTE Characteristics 3-4
Data Transmission Speeds 3-4
Clocking Restrictions 3-6
19 200 bps 3-6
9600 bps 3-6

Chapter 4. Scanner and LIC Rules 4-1
Scanner Rules 4-1
Contiguous LIC Positions 4-2
Spare Lines 4-4
LIC Rules (Initial Sequence) 4-4
3720 Models 1, 2, 11, and 12, 3721 Model 1 4-4
3721 Model 2 4-5
LIC Rearrangement of New Units 4-5

Chapter 5. Traffic Loading 5-1
Load Table 5-2
Configuration Parameters 5-5
Ready-Made Configurations 5-9
Mixed Configurations 5-9
Total Load Determination Procedure 5-9
Conclusions 5-12

Chapter 6. Integrating with the Network 6-1
Console Requirements 6-1
Modem Requirements 6-2
Cable Wiring Requirements, 3720 to Modem 6-2
Modem Requirements, 3720 to Remote Console 6-2
Modem Requirements, Remote Console to 3720 6-3
Modem Requirements, 3720 to Remote Support Facility 6-4
General Operating Characteristics 6-5
Examples of IBM 5841/5842 Modem Switch Settings 6-6
Link IPL Ports 6-7
Worksheets 6-7

Chapter 7. Relocation and Upgrading 7-1
Software Migration 7-1
Empty Cassettes 7-1
Port Swapping 7-1
Unwanted LICs or TICs 7-2
Cables 7-2
Worksheets 7-2
Unit Identification 7-3
After Ordering 7-4
Retention of Worksheets 7-4
IBM Token-Ring Networks 7-4

Chapter 8. Examples **8-1**
Example 1: Link-Attached with Expansion and 17 Lines 8-1
Example 2: Channel-Attached with Expansion and 12 Lines 8-2
Support of Token-Ring Network 8-2

Chapter 9. IBM Token-Ring Networks **9-1**
Overview 9-1
Worksheets 9-1
Number of Worksheet Sets 9-3
Rules and Restrictions 9-3
Traffic Loading 9-3
System Integration 9-4
Relocation and Upgrading 9-4
Example: Channel-Attached with Expansion, 12 Lines and Two Token Rings . 9-4

Appendix A. Requirements Sheet **A-1**
Filling in the Requirements Sheet A-1

Appendix B. Traffic Loading Sheet **B-1**
Filling in the Traffic Loading Sheet B-1

Appendix C. Channel Adapter Sheet **C-1**
Filling in the Channel Adapter Sheet C-1
Burst Length C-1
Emulation Subchannel (ESC) Address C-1
Data-In/Data-Out Feature on Host C-2
Select Out Priority C-2
Native Subchannel (NSC) Address C-3

Appendix D. Plugging Sheet **D-1**
Filling in the Plugging Sheet D-1

Appendix E. Order Sheet **E-1**
Filling in the Order Sheet E-1

Appendix F. Console Sheet **F-1**
Filling in the Console Sheet F-1
Operator Console F-2
Remote Support Facility F-2
Remote Operator Console F-2

Appendix G. Setup Sheet **G-1**
Filling in the Setup Sheet G-1

Appendix H. Link IPL Sheet **H-1**
Filling in the Link IPL Sheet H-1
Individual IPL Link Parameters H-3
Common IPL Link Parameters H-3

Appendix I. Task-Oriented Bibliography **I-1**
Tasks to Be Performed: Before Installation I-1

Tasks to Be Performed: During Installation I-3
Tasks to Be Performed: at Integration into the Network I-4
Tasks to Be Performed: During Operation I-5
Tasks to Be Performed: IBM Maintenance I-6

Figures

1-1. 3720 Model 1 Configuration 1-1
1-2. 3720 Model 2 Configuration 1-2
1-3. 3720 Model 11 Configuration 1-3
1-4. 3720 Model 12 Configuration 1-4
1-5. 3721 Model 1 Configuration 1-4
1-6. 3721 Model 2 Configuration 1-5
1-7. 3720 Model 1 and 3721 Model 1 Configuration 1-7
1-8. 3720 Model 1 and 3721 Model 2 Configuration 1-8
1-9. 3720 Model 2 and 3721 Model 1 Configuration 1-9
1-10. 3720 Model 2 and 3721 Model 2 Configuration 1-10
1-11. Positions and Ports for 3720 Models 1 and 2 1-11
1-12. Positions and Ports for 3720 Models 11 and 12 1-11
1-13. Positions and Ports for 3721 Models 1 and 2 1-11
1-14. Maximum Quantity of Components per Model 1-14
2-1. Quantity of Units for Scanner Requirements 2-3
3-1. DTE Attached via DCEs that do not provide clocking 3-1
3-2. Clocking Provided by DTE - No DCE Present 3-2
3-3. DTE Clocking Provided by Base ICC 3-3
3-4. DTE Attached via DCEs that Provide Clocking 3-4
4-1. Line Weight Table - LICs 2, 3, and 4B 4-1
4-2. Line Weight Table - LICs 1 and 4A 4-2
4-3. Four-Port LICs (LICs 1 and 4A) 4-3
4-4. One-Port LICs (LICs 2, 3, and 4B) 4-3
5-1. Traffic Load Table (Part 1 of 2) 5-3
5-2. Traffic Load Table (Part 2 of 2) 5-4
5-3. Range of Traffic Weights 5-11
5-4. Traffic Paths Through the Controller 5-12
8-1. Example 1: A 3720 Model 2 and 3721 Model 1 8-1
8-2. Example 2: A 3720 Model 1 and 3721 Model 1 8-2
9-1. Example of a 3720 Model 11 and 3721 Model 1 9-4
C-1. Processors Supporting Data In/Out Feature C-2

Log Sheet

This is an important record of the configurations that have been made using this version of this document. It can be an aid to problem determination.

In consequence, this publication should not be discarded even when obsolete. Instead, mark "OBSOLETE" after the last entry.

Date	Order No.	Installation Address	Configured by

Date	Order No.	Installation Address	Configured by

Date	Order No.	Installation Address	Configured by

Chapter 1. Overview

There are different configurations, and combinations of units. Various controller components are configurable.

The Units

There are six units, four base and two expansion.

3720 Model 1 (Base)

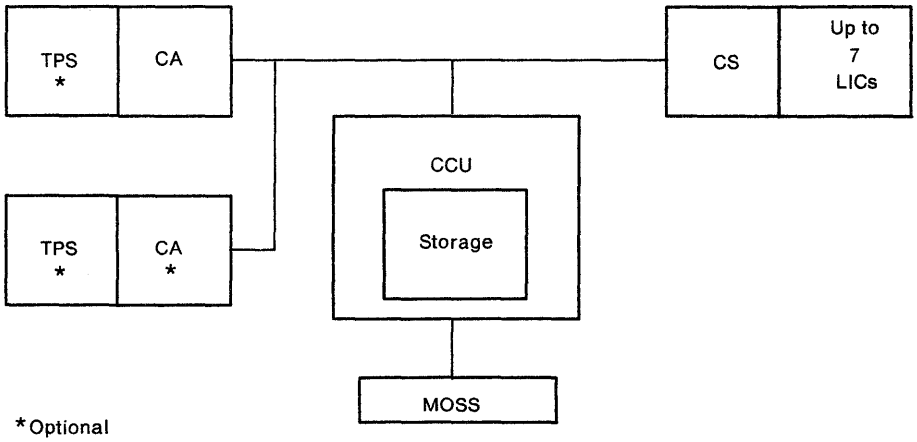


Figure 1-1. 3720 Model 1 Configuration

The 3720 Model 1 is a ***channel-attached*** controller directly attached to the host(s). It provides:

- A communication controller unit (CCU) with a main storage of 1 or 2 megabytes (1024K or 2048K, where K equals 1024)
- A maintenance and operator subsystem (MOSS)
- One or two channel adapters (CAs) with or without two-processor switches (TPSs)
- One communication scanner (CS), including one internal clock control (ICC)

- Up to seven line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 28 ports for teleprocessing lines.

3720 Model 2 (Base)

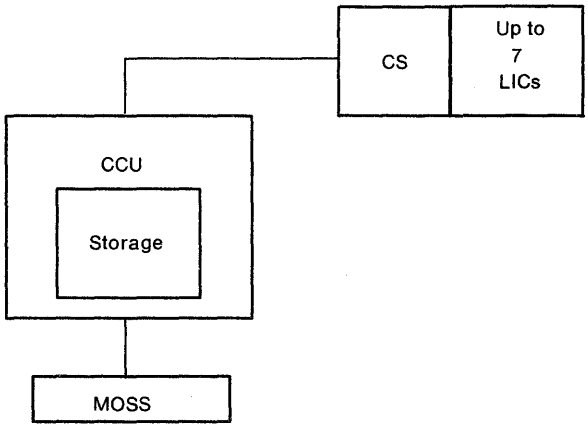


Figure 1-2. 3720 Model 2 Configuration

The 3720 Model 2 is a ***link-attached*** controller connected to host(s) via telecommunication links and modems, or through another controller. It provides:

- A communication controller unit (CCU) with a main storage of 1 or 2 megabytes (1024K or 2048K)
- A maintenance and operator subsystem (MOSS)
- One communication scanner (CS), including one internal clock control (ICC)
- Up to seven line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 28 ports for teleprocessing lines.

3720 Model 11 (Base)

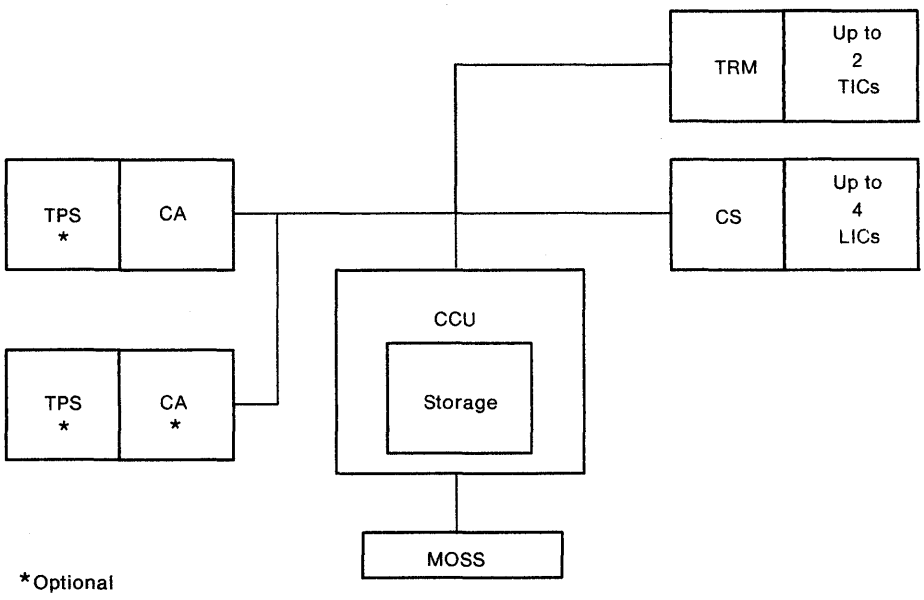


Figure 1-3. 3720 Model 11 Configuration

The 3720 Model 11 provides the same attachments as a 3720 Model 1 (with a limit of four LICs), plus:

- A token-ring multiplexer (TRM)
- One or two token-ring interface couplers (TICs).

3720 Model 12 (Base)

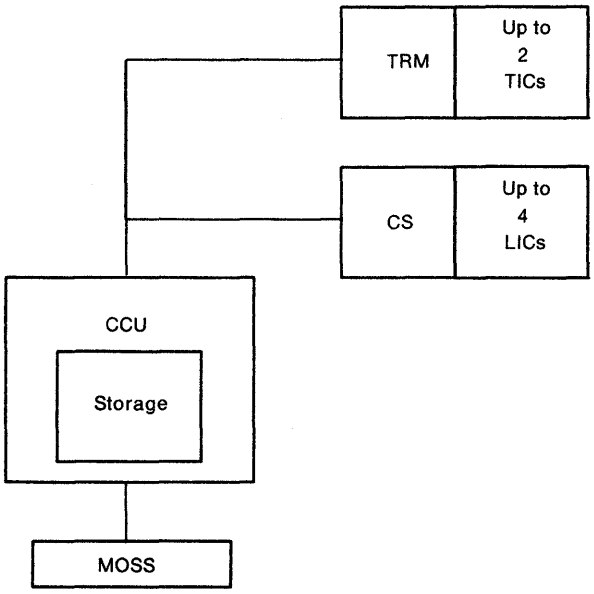


Figure 1-4. 3720 Model 12 Configuration

The 3720 Model 12 provides the same attachments as a 3720 Model 2 (with a limit of four LICs), plus the attachment of one or two TICs.

3721 Model 1 (Expansion)

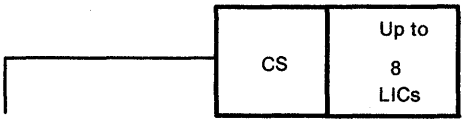


Figure 1-5. 3721 Model 1 Configuration

The 3721 Model 1 is an expansion unit that can be connected to a 3720 Model 1 or 2. Only one expansion unit can be connected to a base unit. It provides:

- One communication scanner (CS), including one internal clock control (ICC)
- Up to eight line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 32 ports for teleprocessing lines.

3721 Model 2 (Expansion)

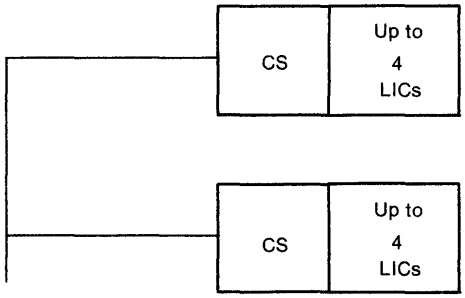


Figure 1-6. 3721 Model 2 Configuration

The 3721 Model 2 is an expansion unit that can be connected to a 3720 Model 1 or 2. Only one expansion unit can be connected to a base unit. It provides:

- Two communication scanners (CSs), each including one internal clock control (ICC)
- Up to eight line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 32 ports for teleprocessing lines.

Possible Configurations

There are 12 possible configurations:

1. 3720 Model 1
2. 3720 Model 1 and 3721 Model 1
3. 3720 Model 1 and 3721 Model 2
4. 3720 Model 2
5. 3720 Model 2 and 3721 Model 1
6. 3720 Model 2 and 3721 Model 2.
7. 3720 Model 11
8. 3720 Model 11 and 3721 Model 1
9. 3720 Model 11 and 3721 Model 2

10. 3720 Model 12

11. 3720 Model 12 and 3721 Model 1

12. 3720 Model 12 and 3721 Model 2.

3720 Model 1 and 3721 Model 1

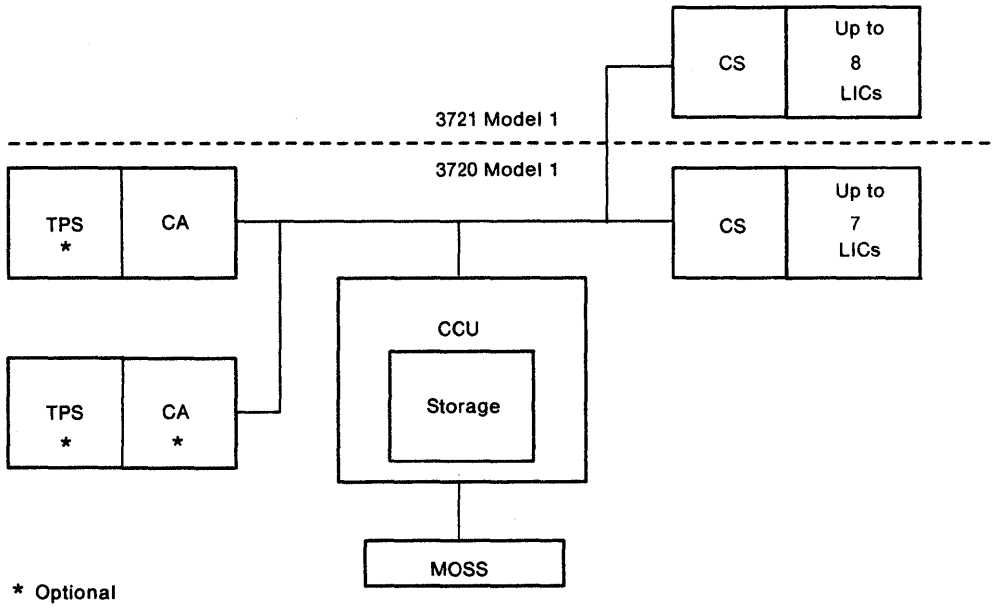


Figure 1-7. 3720 Model 1 and 3721 Model 1 Configuration

It provides:

- A communication controller unit (CCU) with a main storage of 1 or 2 megabytes (1024K or 2048K)
- A maintenance and operator subsystem (MOSS)
- One or two channel adapters (CA) with or without two-processor switches (TPSs)
- Two communication scanners (CSs), each including one internal clock control (ICC)
- Up to 15 line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 60 ports for teleprocessing lines.

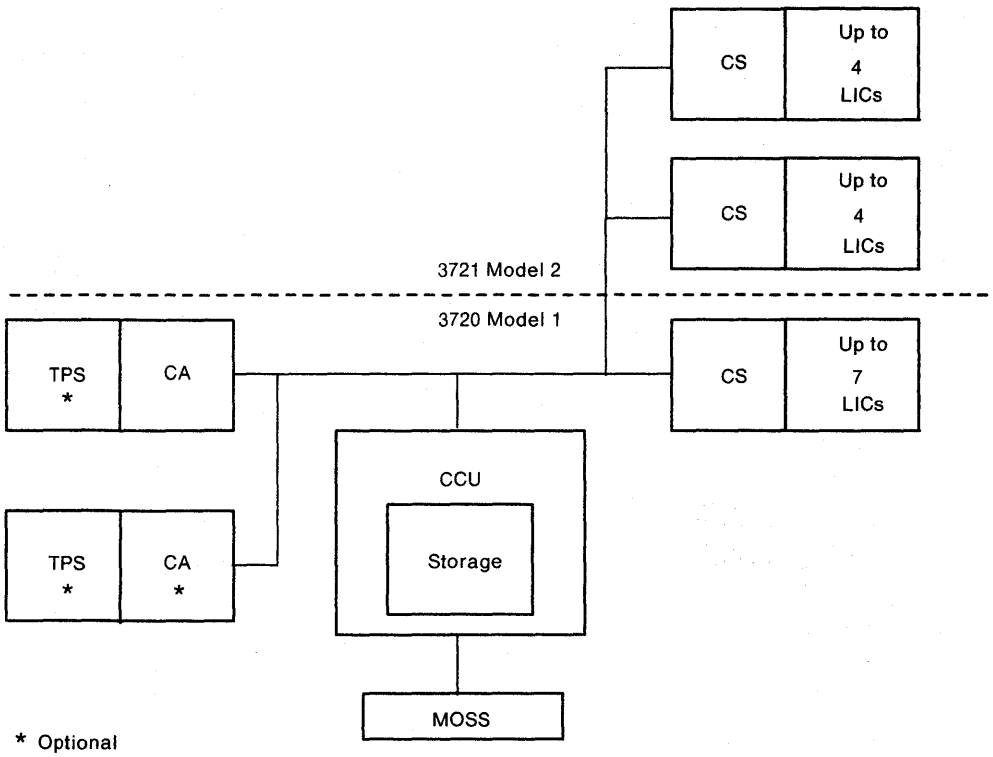


Figure 1-8. 3720 Model 1 and 3721 Model 2 Configuration

It provides:

- A communication controller unit (CCU) with a main storage of 1 or 2 megabytes (1024K or 2048K)
- A maintenance and operator subsystem (MOSS)
- One or two channel adapters (CA) with or without two-processor switches (TPSs)
- Three communication scanners (CSs), each including one internal clock control (ICC)
- Up to 15 line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 60 ports for teleprocessing lines.

3720 Model 2 and 3721 Model 1

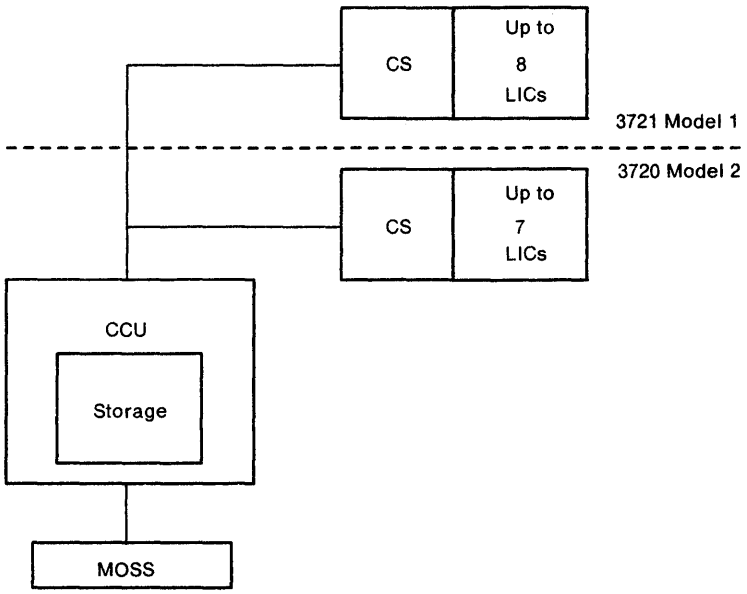


Figure 1-9. 3720 Model 2 and 3721 Model 1 Configuration

It provides:

- A communication controller unit (CCU) with a main storage of 1 or 2 megabytes (1024K or 2048K)
- A maintenance and operator subsystem (MOSS)
- Two communication scanners (CSs), each including one internal clock control (ICC)
- Up to 15 line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 60 ports for teleprocessing lines.

3720 Model 2 and 3721 Model 2

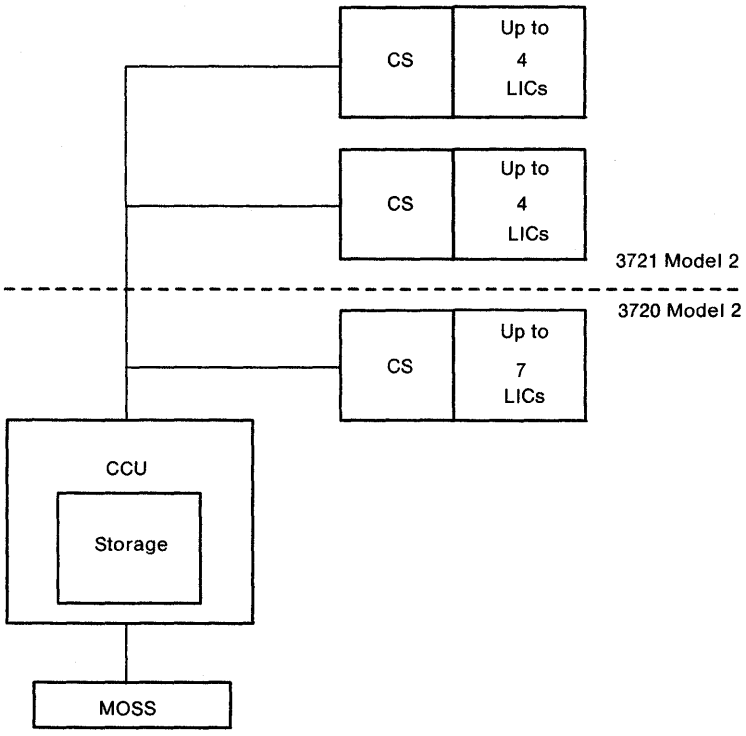


Figure 1-10. 3720 Model 2 and 3721 Model 2 Configuration

It provides:

- A communication controller unit (CCU) with a main storage of 1 or 2 megabytes (1024K or 2048K)
- A maintenance and operator subsystem (MOSS)
- Three communication scanners (CSs), each including one internal clock control (ICC)
- Up to 15 line interface couplers (LICs)

  Note: For the maximum number by speed see "Attachment Limits" on page 1-11

- Up to 60 ports for teleprocessing lines.

3720 Models 11 and 12, and 3721 Models 1 and 2

The 3720 model 11 and 12 can be expanded by adding a 3721 (model 1 or 2). Refer to the previous figures that illustrate the addition of an expansion unit.

LICs/TICs and Ports

The interface coupler positions and the ports they contain are shown in the following three figures. There is also a graphical representation in Appendix G, "Setup Sheet."

Position:	1	2	3	4	5	6	7	8
	LIC	LIC	LIC	LIC	LIC	LIC	LIC	
Port Addresses:	00-03	04-07	08-11	12-15	16-19	20-23	24-27	not used

Figure 1-11. Positions and Ports for 3720 Models 1 and 2

Position:	1	2	3	4	5	6	7	8
	TIC	TIC	LIC	LIC	LIC	LIC		
Port Addresses:	16	17	00-03	04-07	08-11	12-15	not used	not used

Figure 1-12. Positions and Ports for 3720 Models 11 and 12

Position:	1	2	3	4	5	6	7	8
	LIC	LIC	LIC	LIC	LIC	LIC	LIC	LIC
Port Addresses:	32-35	36-39	40-43	44-47	48-51	52-55	56-59	60-63

Figure 1-13. Positions and Ports for 3721 Models 1 and 2

Remember that the positions are numbered 1 through 8, for all models of the 3720 and the 3721.

Attachment Limits

These limits are based on the number of available LIC/TIC positions, the scan limits, and line weights.

The maximum numbers of attachments for each controller are:

- For the 3720 model 1 and 2

  Seven LICs, 28 lines at 9600 bps (half-duplex)

Four LICs, 16 lines at 19 200 bps (half-duplex)

Four LICs, four lines at 64 000 bps (half-duplex/duplex)

One LIC, one line at 256 000 bps (half-duplex/duplex).

- For the 3720 models 11 and 12

  Four LICs, 16 lines at 9600 bps (half-duplex/duplex)

  Four LICs, 16 lines at 19 200 bps (half-duplex)

  Four LICs, four lines at 64 000 bps (half-duplex/duplex)

  One LIC, one line at 256 000 bps (half-duplex/duplex).

  And additionally, in every case:

  Two TICs, two IBM Token-Ring Networks.

- For the 3721 Model 1

  Eight LICs, 32 lines at 9600 bps (half-duplex)

  Four LICs, 16 lines at 19 200 bps (half-duplex)

  Four LICs, four lines at 64 000 bps (half-duplex/duplex)

  One LIC, one line at 256 000 bps (half-duplex/duplex).

- For the 3721 Model 2

  Eight LICs, 32 lines at 9600 bps (half-duplex/duplex)

  Eight LICs, 32 lines at 19 200 bps (half-duplex)

  Eight LICs, eight lines at 64 000 bps (half-duplex/duplex)

  Two LICs, two lines at 256 000 bps (half-duplex/duplex).

The layout of the LIC and TIC positions within the controllers is shown in the respective *Setup Sheet*, (see Appendix G, "Setup Sheet").

Controller Components

The components that are configurable are:

- Channel adapters and two-processor switches
- Communication scanners

Note: 3721 Model 1 with one CS and 3721 Model 2 with two CSs

- Line interface couplers (LICs):
  - LIC Type 1
  - LIC Type 2
  - LIC Type 3
  - LIC Type 4A
  - LIC Type 4B

  See also "LIC Characteristics" on page 1-15.

- Token-ring interface couplers (TICs):
  - TIC Type 1

  Note: The token-ring multiplexer (TRM) is part of the 3720 Model 11 and 12, and is not configurable.

- Storage:
  - The 1M-byte storage increment.

Controller components are described in the *3720/3721 Introduction*. The maximum quantity of components per model (and their Feature Codes) are listed in Figure 1-14 on page 1-14.

Component and Feature Code		Maximum Quantity per Model					
		3720		3720		3721	3721
		Model 1	11	Model 2	12	Model 1	Model 2
Second channel adapter	FC1561	1	1	N/A	N/A	N/A	N/A
Two-processor switches	FC8320	2	2	N/A	N/A	N/A	N/A
1M-Byte storage increment	FC7100	1	1	1	1	N/A	N/A
LIC Type 1	FC4911	7	4	7	4	8	8
LIC Type 2	FC4921	7	4	7	4	8	8
LIC Type 3	FC4931	7	4	7	4	8	8
LIC Type 4A	FC4941	7	4	7	4	8	8
LIC Type 4B	FC4942	7	4	7	4	8	8
TIC Type 1	FC4991	N/A	2	N/A	2	N/A	N/A

Notes:

1. *N/A means not applicable.*

2. *A second CA can be ordered for a 3720 Model 1 or 11. This is in addition to the first CA delivered as part of the original order.*

Figure 1-14. Maximum Quantity of Components per Model

Operator Consoles

These can be:

- Local operator console
- Remote operator console
- Remote support facility (RSF) with a supporting modem.

Note: For more details on consoles, refer to Chapter 6, "Integrating with the Network."

LIC Characteristics

Telecommunication lines, usually terminated by a modem, are connected via cables to line interface couplers (LICs).

LICs provide the functions that interface the communication scanner with the various external facilities, such as DCEs and other telecommunication common carriers or telephone interfaces.

A LIC receives the data coming from the attached lines, sends it to the communication scanner, and distributes the data coming from the communication scanner to the attached lines.

Each LIC type can attach lines using different protocols, with internal or external clocking.

For example, a LIC 1 can handle start-stop protocols as well as SDLC or BSC protocols at line speeds up to 19 200 bps (selection is made by control program generation parameters, or automatically by MOSS and IPL action based on customized MOSS files). Different coupler types can be plugged into the same controller. This flexibility is useful when different types of lines must be controlled at one site.

The five types of LIC connect most of the common line interfaces.

LIC Type 1

Type of Interface:

- EIA RS232/CCITT V.24 interface
- Autocall interfaces corresponding to EIA RS232/CCITT V.25 and X.21 bis, leased or switched, interfaces

Number of Lines: A maximum of four lines.

Protocols:

- Asynchronous (start-stop)
- Synchronous (SDLC and BSC).

Data Speed: Up to 19 200 bps.

Type of Attachment:

- Modem-attached
- Direct-attached at distances up to 150 meters (492 feet).

The four attachments can be of the same or different type, protocol, and speed, and are configured by cabling, scanner microcode, and control program generation.

LIC Type 2

Type of Interface: A high-speed interface used to connect wideband data stations:

- Bell 303 interface.

Number of Lines: One line.

Protocols:

- Synchronous (SDLC and BSC).

Data Speed: From 19 200 to 256 000 bps (analog lines) for SDLC. From 19 200 to 64 000 bps (analog lines) for BSC.

Type of Attachment:

- Modem-attached

Note: The single line can be plugged into the first or second socket.

LIC Type 3

Type of Interface: A high-speed interface:

- CCITT V.35 interface.

Number of Lines: One line.

Protocols:

- Synchronous (SDLC and BSC).

Data Speed: Up to 256 000 bps for SDLC. Up to 64 000 bps for BSC

Type of Attachment:

- Modem-attached
- Direct-attached at distances up to 150 meters (492 feet) for speeds up to 56 kbps, or up to 100 meters (328 feet) for speeds up to 245 760 bps.

Note: The single line must be plugged into the first socket if it is modem-attached and the second socket if it is direct-attached.

LIC Type 4A

Type of Interface: Leased or switched interface:

- X.21 interface.

Number of Lines: A maximum of four lines.

Protocols:

- Synchronous (SDLC).

Data Speed: Up to 9600 bps.

Type of Attachment:

- Modem attached
- Direct attached at distances up to 600 meters (1968 feet).

LIC Type 4B

Type of Interface: Leased or switched interface:

- X.21 interface.

Number of Lines: One line.

Protocols:

- Synchronous (SDLC).

Data Speed:

- Up to 256 000 bps in Europe, Middle East and Africa
- Up to 64 000 bps in Asia, Far East and USA.

Type of Attachment:

- Modem attached
- Direct attached at distances up to 600 meters (1968 feet) for speeds up to 19 200 bps, and distances up to 300 meters (984 feet) for speeds up to 245 760 bps.

TIC Characteristics

IBM token-ring network, and their attachments, are connected via the IBM cabling system to token-ring interface couplers (TICs).

TICs provide the functions that interface the token-ring multiplexer with the cabling system.

A TIC receives the data coming from the attached token-ring network, sends it to the multiplexer, and distributes the data coming from the multiplexer to the attached token-ring.

There is one type of TIC.

TIC Type 1

Type of Interface: An interface used to connect to an IBM token-ring.

Number of Links: A maximum of 1500 virtual circuits on a single token-ring.

Protocols: Token-ring subsystem (TRSS)

Type of Attachment: The IBM Cabling System.

Port Swapping

LICs that are to support backup lines must be ordered and installed with their cables before port swapping can take place.

Notes:

1. *The LICs swapped must be of the same type. That is, ports can be swapped only between LICs of the same type.*
2. *Backup lines do not add to the line weights or traffic loading of the lines they support.*
3. *The scanner limits described in "Contiguous LIC Positions" on page 4-2 must be respected. That is, the positions occupied by the LICs supporting the backup line and the original line must both still be scanned. Refer to page 4-2 for more details.*

Chapter 2. Worksheets

The manual configuration process is based on filling in a number of worksheets. When the process is complete there will be one or more sets of worksheets, one set for each unit (base or expansion). Each set can contain one or more copies of:

Requirements Sheet:

Traffic Loading Sheet:

3720 only (but includes loading from a 3721)

Channel Adapter Sheet:

3720 Models 1 and 11 only

Plugging Sheet:

Order Sheet:

Console Sheet:

3720 only

Setup Sheet:

Link IPL Sheet:

The worksheets are contained in the Appendixes. Copies may be made, as required. The Setup Sheet can be copied if desired, but because of its size more than one copy has been included.

In addition there will be an entry in the Log Sheet that precedes Chapter 1 for each unit configured.

How Many Worksheet Sets?

It is assumed in this chapter that all the requirements are to be met by one or more 3720/3721 units. That is, any other requirements are to be satisfied by attachments to other controllers, as part of a new order or upgrade. For the upgrading of a 3720/3721 refer to Chapter 7, "Relocation and Upgrading."

Requirements Sheet:

Make one or two copies

Consider the controller component characteristics listed in "Controller Components" on page 1-12.

Using Chapter 4, "Scanner and LIC Rules," fill in the destination, speed, protocol, and line weight of each line that will be connected to the controller. Then specify this information on the *Requirements Sheet* as described in Appendix A. Sum the line weights.

Calculate the number of scanners required by dividing by 100 and rounding up. For example, a total weight of 243 requires three scanners.

Calculate how many 3720/3721 systems are necessary. Figure 2-1 lists the minimum alternatives for requirements of up to three scanners and the total number of units involved. For example, three scanners can be provided by:

- One 3720 and one 3721 Model 2
- Two 3720s and one 3721 Model 1
- Three 3720s.

If the quantity of scanners required is greater than three, additional 3720/3721 systems will be required.

Note: Even if you only need three scanners or less, you may still prefer to have more than one 3720/3721 system for reliability, or to allow for future expansion.

TOTAL SCANNERS (Note 1)	QUANTITY OF EACH UNIT			TOTAL UNITS (Notes 2, 3)
	3720 All Models (1 Scanner)	3721 Model 1 (1 Scanner)	3721 Model 2 (2 Scanners)	
1	1			1
2 2	1 2	1		2 2
3 3 3	1 2 3	1	1	2 3 3

Figure 2-1. Quantity of Units for Scanner Requirements

Notes:

1. *More scanners, and therefore units, may be necessary if scanners are assigned lines that have a total weight of less than 100.*

2. *This is the minimum number of 3720/3721 units necessary to provide the required number of scanners. It could be desirable to order a greater capacity than needed initially. For example, a 3721 Model 2 could be ordered in place of a model 1 if it is expected that new lines are to be added to the network in the future.*

3. *The total number of units needed can be greater if 3720 Model 11 or 12 are involved (to support token-ring networks).*
   Refer to Chapter 9, "IBM Token-Ring Networks."

Consider the total number of units involved in providing the scanners. The configuration of each unit will generate a separate set of worksheets. That is, the total number of units equals the total number of worksheet sets.

Line Weights and Traffic Loading

Requirements Sheet:

Make one copy for each unit and fill in

Refer to Appendix A, "Requirements Sheet" on page A-1.

Remember that the total of line weights for each unit's *Requirements Sheet* cannot exceed 100, except for a 3721 Model 2, which has a maximum of 200 (100 per scanner).

Before filling in each set of worksheets, the traffic loading on each proposed Physical Unit (PU) must be estimated. The number of PUs is equal to the number of base units.

Traffic Loading Sheet:

Make one or two copies for each PU and fill in

Refer to Appendix B, "Traffic Loading Sheet" on page B-1.

If none of the resources of any proposed PU will be overloaded, then identify the sets of worksheets as described in "Unit Identification."

If any of the resources will be overloaded, two possibilities exist to redistribute the loading:

1. Move a number of attachments from overloaded to underloaded units.

2. Increase the number of base units. That is, increase the amount of resources for a given load.

   Notes:

   a. *As shown in Figure 2-1 on page 2-3, increasing the number of base units does not always increase the total number of units.*

   b. *Having more spare traffic capacity means that free LIC positions are more "available," that is, will handle faster and heavier LICs that will be installed in the future.*

Repeat the calculations for line weights and traffic loading described above until successful results are achieved. Retain the most recent *Requirements Sheet* and *Traffic Loading Sheet*.

Identify the sets of worksheets as described in "Unit Identification" below.

Unit Identification

Unit identification is essential when more than one controller is to be configured and installed in the same place. It is sufficient to give the model of each unit, and the PU name that it belongs to, so that each set of worksheets are clearly distinguished from each other during and after the configuration process. PU names can be for example, Newyork6, London1, Paris2, Overseas, and so on. A hierarchy of controllers can be identified by names that indicate their rank or significance in the network.

Note: The PU name for a 3721 expansion is the same as its 3720 base. If the PU name is not known at configuration time then pencil in a name for each base set and expansion set of worksheets that will distinguish it from other PUs.

The order number, which is given by an IBM marketing representative, is to be filled in on all worksheets after the order is confirmed.

The serial number is not known during configuration. To avoid confusion between two or more similar units, fill in the serial number on all worksheets before delivery.

The serial number related to each order number is available, shortly before delivery, from an IBM marketing representative, upon request.

The serial number of each unit also exists in the machine level control (MLC) history that will be found inside the packaging, after the unpacking has begun.

For Each 3720 Order

Remember to fill in the unit and physical unit (PU) name on every worksheet of each worksheet set.

Requirements Sheet:

Fill in the remaining columns

Refer to Appendix A, "Requirements Sheet"

Traffic Loading Sheet:

Retain the copy from the successful calculation

Channel Adapter Sheet:

(3720 Model 1 or 11 only, host channel-attached): Make one or two copies and fill in

Refer to Appendix C, "Channel Adapter Sheet"

Plugging Sheet:

Make one or two copies and fill in

Refer to Appendix D, "Plugging Sheet"

Order Sheet:

Make one copy and fill in

Refer to Appendix E, "Order Sheet"

Console Sheet:

Make one copy and fill in

Refer to Appendix F, "Console Sheet"

Setup Sheet:

Make one copy, or use one of the copies in this publication, and fill in

Refer to Appendix G, "Setup Sheet"

Link IPL Sheet:

If required, make one copy and fill in

Refer to Appendix H, "Link IPL Sheet"

Log Sheet:

Fill in the *Log Sheet* that precedes Chapter 1. It is an important record showing that the configuration has been determined with this version of this publication.

Contact an IBM marketing representative to check the final order.

Ensure that this publication and the worksheet set are retained for the life of the configuration.

For Each 3721 Order

Remember to fill in the unit and physical unit (PU) name on every worksheet of each worksheet set.

Requirements Sheet:

Fill in the remaining columns

Refer to Appendix A, "Requirements Sheet"

Plugging Sheet:

Make one or two copies and fill in

Refer to Appendix D, "Plugging Sheet"

Order Sheet:

Make one copy and fill in

Refer to Appendix E, "Order Sheet"

Setup Sheet:

Make one copy, or use one of the copies in this publication and fill in

Refer to Appendix G, "Setup Sheet"

Link IPL Sheet:

If required, make one copy and fill in

Refer to Appendix H, "Link IPL Sheet"

Log Sheet:

Fill in the Log Sheet that precedes Chapter 1. It is an important record showing that the configuration has been determined with this version of this publication.

Contact an IBM marketing representative to check the final order.

Ensure that this publication and the worksheet set are retained for the life of the configuration.

After Ordering

IBM will confirm the order and give an order number. Fill in this order number at the top of each worksheet in the related worksheet set.

Before Delivery

Make sure that the serial number is filled in at the top of each worksheet in the related worksheet set when more than one controller of the same type are to be delivered.

The serial number related to each order number is available, shortly before delivery, from an IBM marketing representative, upon request.

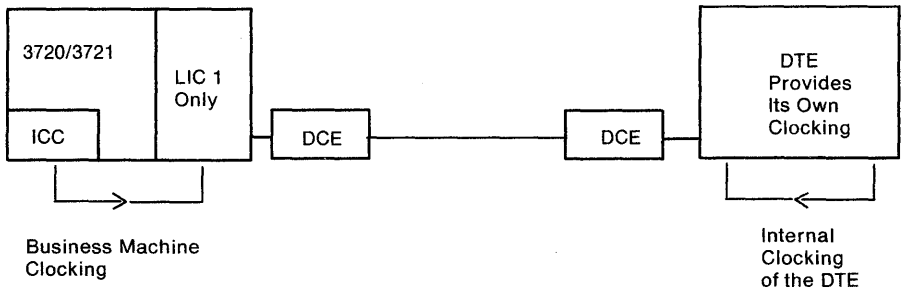
The serial number of each unit also exists in the machine level control (MLC) history that will be found inside the packaging, after the unpacking has begun.

Chapter 3. Clocking Considerations

Clocking of telecommunication lines is provided:

- By DTE - DCE present
- By DTE - No DCE present
- By the controller
- By DCE (modem).

Clocking Provided by DTE



Note: The 3720/3721 is considered as a DTE.

Figure 3-1. DTE Attached via DCEs that do not provide clocking

DTE Characteristics

Protocol: Asynchronous (start-stop) or synchronous (SDLC or BSC).

Clocking: Internal (provided by DTE itself).

Note: The controller provides the LIC with business machine clocking to match the speed of the DTE.

Attachment to the Controller, LIC 1 Only, via:

- Modem attachment with DCE that does not provide clocking

Data Transmission Speeds

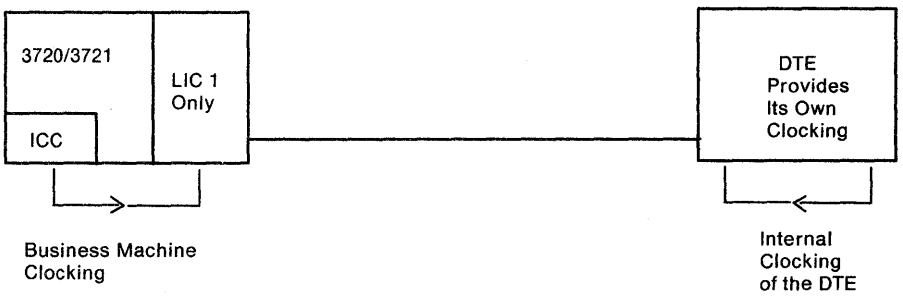
The Internal Clock Control (ICC) provides clocking to the 3720/3721 at the following rates:

Asynchronous Protocols: 50, 75, 100, 110, 134.5, 200, 300, 600, 1200, 2400, 4800, 9600, and 19 200 bps.

Synchronous Protocols: 50, 110, 134.5, 200, 300, 600, and 1200 bps.

Speed Selection: Done by the IBM system support program (ACF/SSP) at generation time, for each port of a LIC attaching a DTE.

Clocking Provided by DTE - No DCE Present



Note: The 3720/3721 is considered as a DTE.

Figure 3-2. Clocking Provided by DTE - No DCE Present

DTE Characteristics

Protocol: Asynchronous (start-stop) or synchronous (SDLC or BSC).

Clocking: Internal (provided by DTE itself).

Note: The controller provides the LIC with business machine clocking to match the speed of the DTE.

Direct Attachment to the Controller, LIC 1 Only.

Data Transmission Speeds

The Internal Clock Control (ICC) provides clocking to the 3720/3721 at the following rates:

Asynchronous Protocols: 50, 75, 100, 110, 134.5, 200, 300, 600, 1200, 2400, 4800, 9600, and 19 200 bps.

Synchronous Protocols: 50, 110, 134.5, 200, 300, 600, and 1200 bps.

Speed Selection: Done by the IBM system support program (ACF/SSP) at generation time, for each port of a LIC attaching a DTE.

Clocking Provided by the Controller

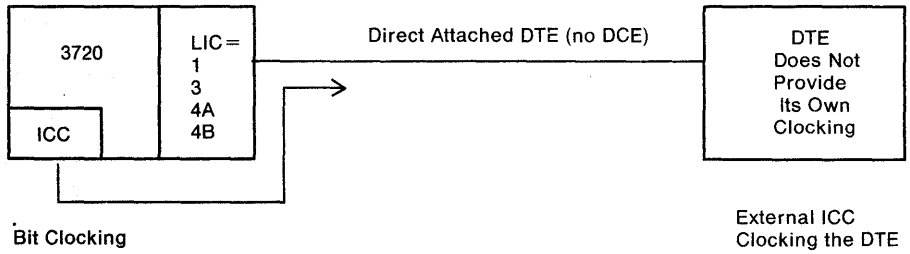


Figure 3-3. DTE Clocking Provided by Base ICC

DTE Characteristics

Protocol: Asynchronous (start-stop) or synchronous (SDLC or BSC).

Clocking: External bit clocking to match the speed of the DTE (provided by the controller).

Attachment to the Controller: Direct attachment (no DCE) via:

- LIC 1 for asynchronous start-stop DTE
- LIC 1 or LIC 3 for synchronous BSC DTE
- LIC 1, LIC 3, LIC 4A, or LIC 4B for synchronous SDLC DTE.

Data Transmission Speeds

The speeds are in bps:

Asynchronous Protocols: 2400, 4800, 9600, and 19 200.

Synchronous Protocols: 2400, 4800, 9600, 19 200, 38 400, 55 855, and 245 760.

Speed Selection

- For synchronous lines, by modifying the configuration data file (CDF) using the 3720 MOSS (CDF data speed selection) for each port of a LIC attaching a DTE (see *3720/3721 System Integration*, GA33-0067).
- For asynchronous lines, by the IBM system support program (ACF/SSP) at generation time, for each port of a LIC attaching a DTE.
- Speed must be provided to SSP/NCP when using the network performance monitor (NPM). When the NPM is not used, the speed is useful for documentation support.

Clocking Provided by DCE (Modem)

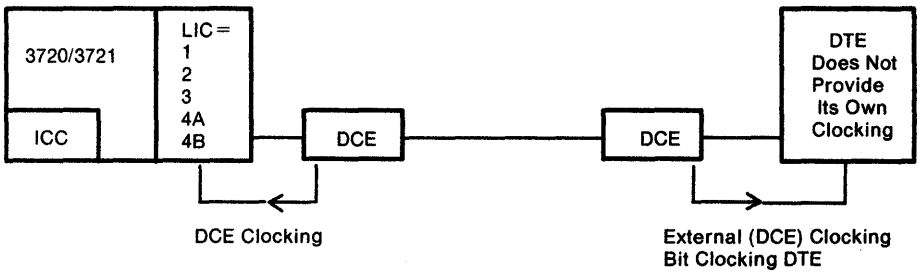


Figure 3-4. DTE Attached via DCEs that Provide Clocking

DTE Characteristics

Protocol: Asynchronous (start-stop) or synchronous (SDLC or BSC)

Clocking: External bit clocking provided by DCE (no controller clocking).

Attachment to the Controller: Modem attachment with DCE that provides clocking. The attachment is made via:

- LIC 1 for asynchronous start-stop DTE
- LIC 1, LIC 2, or LIC 3 for synchronous BSC DTE
- Any LIC type for synchronous SDLC DTE.

Data Transmission Speeds

The speeds are in bps:

Asynchronous Protocols: Up to 19 200.

Synchronous Protocols: Up to 256 000.

Speed Selection

- By DCE
- For each port of a LIC attaching a DTE.

Clocking Restrictions

These restrictions apply to the 3720 and 3721 for asynchronous clock operation at 19 200 and 9600 bps. Remember that the LIC/TIC positions are numbered 1 through 8, for the base and expansion. See figures 1-11, 1-12, and 1-13.

19 200 bps

Asynchronous lines operating at 19 200 bps can be located only at LIC positions 1 or 5. A maximum of two lines can be attached per LIC1:

1. When a line operates at LIC position 1, then the corresponding line of LIC positions 2, 3, and 4 cannot receive internal clocking for asynchronous (or clocking for direct-attached).

2. When a line operates at LIC position 5, then the corresponding line of LIC positions 6, 7, and 8 cannot receive internal clocking.

Note: The first line of a LIC corresponds to the first line of another, the second line to the second line, and so on.

9600 bps

Asynchronous lines operating at 9600 bps can be located only at LIC positions 1, 2, 5, or 6. A maximum of four lines can be attached per LIC1:

1. When a line operates at LIC position 1 then the corresponding line of LIC position 4 cannot receive internal clocking.

2. When a line operates at LIC position 2 then the corresponding line of LIC position 3 cannot receive internal clocking.

3. When a line operates at LIC position 5 then the corresponding line of LIC position 8 cannot receive internal clocking.

4. When a line operates at LIC position 6 then the corresponding line of LIC position 7 cannot receive internal clocking.

Note: The first line of a LIC corresponds to the first line of another, the second line to the second line, and so on.

Chapter 4. Scanner and LIC Rules

Scanner Rules

A CS has a maximum capacity of a total of *line weights of 100*. The line weight is the percentage of the CS capacity it consumes. The line weights are given in Figure 4-1 and Figure 4-2 on page 4-2.

For example, five lines each with a line weight of 20 will take up 100% of the capacity of a CS.

Line Speeds (bps)	Protocols				
	SDLC		BSC		Start/ Stop
	DUPLEX	HALF D.	EBCDIC	ASCII	
256 000	100.0	60.0	N/S	N/S	N/S
245 760	94.0	58.0	N/S	N/S	N/S
230 400	90.0	54.0	N/S	N/S	N/S
128 000	50.0	30.0	N/S	N/S	N/S
72 000	27.5	16.8	16.8	30.0	N/S
64 000	24.5	15.0	15.0	26.7	N/S
57 600	22.0	13.5	13.5	24.0	N/S
56 000	21.4	13.1	13.1	23.3	N/S
50 000	19.1	11.7	11.7	20.8	N/S
48 000	18.4	11.2	11.2	20.0	N/S
40 800	15.6	9.5	9.5	17.0	N/S
24 000	9.2	5.6	5.6	10.0	N/S
20 400	7.8	4.8	4.8	8.5	N/S
19 200	7.3	4.5	4.5	8.0	N/S

Notes:

1. *N/S means non-supported line types.*
2. *EP BSC tributary stations are supported at the same speeds as other BSC lines.*

Figure 4-1. Line Weight Table - LICs 2, 3, and 4B

Line Speeds (bps)	Protocols				
	SDLC		BSC		Start-Stop
	DUPLEX	HALF D.	EBCDIC	ASCII	
19 200	12.5	6.2	6.2	10.5	50.0
16 800	10.9	5.5	5.5	9.2	43.8*
14 400	9.4	4.7	4.7	7.9	37.5*
12 000	7.8	3.9	3.9	6.6	31.3*
-------	-------	-------			
9600	6.2	3.1	3.1	5.3	25.0
7200	4.7	2.3	2.3	3.9	18.8*
4800	3.1	1.6	1.6	2.6	12.5
2400	1.6	0.8	0.8	1.3	6.2
1200	0.8	0.4	0.4	0.7	3.1
600	0.4	0.2	0.2	0.4	1.6
300	0.2	0.1	0.1	0.2	0.8
200	0.1	0.1	0.1	0.1	0.5
≤150	0.1	0.1	0.1	0.1	0.4
Autocall	0	0	0	0	0

Figure 4-2. Line Weight Table - LICs 1 and 4A

Notes:

1. *This figure shows the line weights for start-stop, half-duplex, at 10 bits per character only. For n bits per character, divide the line speed by (n x 38.4). An asterisk (*) means supported only for externally clocked DTEs.*

   Start-stop weights include the transmission of parity, stop, and data bits.

2. *LIC 4As support lines using SDLC at speeds of 9600 bps or less (shown in this figure below the broken line).*

Contiguous LIC Positions

The maximum number of LIC positions supported per communication scanner depends on the line with the highest transmission speed connected to the communication scanner. Refer to Figure 4-3 on page 4-3 and Figure 4-4 on page 4-3.

Notes:

1. *These figures do not take into account the physical limits of each CS:*

   - *Seven LIC positions for the scanner of the 3720 Model 1 and 2*
   - *Eight LIC positions for the scanner of the 3721 Model 1, and four LICs for each scanner of the 3721 Model 2*

- *Four LIC positions for the scanner of the 3720 Models 11 and 12.*

2. *A CS supports a certain number of contiguous (adjacent) LIC positions, occupied by LICs or blank positions between occupied LIC positions. This includes LICs that support spare, backup, lines to be used in port swapping.*

Max Line Speed	Total Number of Four-Port LICs
19 200	4
16 800	4
14 400	5
12 000	6
---	---
9600	8

Notes:

1. *Speeds shown above the broken line are not supported by LIC4As.*

2. *The total includes blank positions between occupied LIC positions.*

Figure 4-3. Four-Port LICs (LICs 1 and 4A)

Max Line Speed	Total Number of One-Port LICs
256 000	1
230 400	1
128 000	2
72 000	4
64 000	4
57 600	5 (note 3)
56 000	5 (note 3)
50 000	6 (note 3)
48 000	6 (note 3)
40 800	7 (note 3)
24 000	8 (note 3)
20 400	8 (note 3)
19 200	8 (note 3)

Figure 4-4. One-Port LICs (LICs 2, 3, and 4B)

Notes:

1. *If one- and four-port LICs are mixed on the same scanner, then for the LIC with the greatest speed, compare the total number of LICs per scanner in the corresponding figures (Figure 4-3 and Figure 4-4). The lower of the two "total number of LICs" is the maximum number of LIC positions supported by the scanner.*

2. *The total includes blank positions between occupied LIC positions.*

3. *There is a maximum of four LIC type 3s per scanner.*

Example: For a scanner with one LIC type 3 at 48 000 bps and one LIC type 1 at 19 200 bps. Figure 4-4 on page 4-3 gives a "total number of LICs" of six for 48 000. Figure 4-3 on page 4-3 gives a "total number of LICs" of four for 19 200. Therefore, the maximum number of mixed (and contiguous) LIC positions supported by the scanner is four.

Spare Lines

Spare (unused) lines have a weight of zero.

LIC Rules (Initial Sequence)

The initial (delivery) plugging sequence of new controllers tends to avoid the clocking restrictions described in "Clocking Restrictions" on page 3-6.

This initial sequence can be subsequently rearranged so that control software can be easily migrated.

Notes:

1. *This rearrangement can leave intermediate positions unused. An empty cassette must be plugged into each unused position.*

2. *Only recent releases of control software can be migrated, and only from 3725 controllers.*

The layout of the LIC positions is shown in the *Setup Sheet* for each model, see Appendix G, "Setup Sheet."

3720 Models 1, 2, 11, and 12, 3721 Model 1

For new orders the LICs are plugged in (before delivery) in the initial LIC type sequence:

1, 2, 3, 4A, 4B

The LICs are plugged starting from the leftmost position, leaving no intermediate position empty, except for the 3720 Models 11 and 12, where the first two (left) positions are reserved for TICs. One or both of these positions may be empty.

3721 Model 2

This model has two CSs. Each CS supports four LIC positions.

For new orders, the LICs of the first CS, that is, from positions 1 to 4, are plugged in (before delivery) in the initial LIC type sequence:

1, 2, 3, 4A, 4B

The LICs are plugged starting from the leftmost position, leaving no intermediate position empty.

For new orders the LICs of the second CS, that is from positions 5 through 8, are plugged in (before delivery) in the initial LIC type sequence:

1, 2, 3, 4A, 4B

The LICs are plugged starting from position 5, leaving no intermediate position empty.

Note: For each LIC type position occupied in the second CS, order the following specify codes (SC) per LIC type in addition to the feature code (FC):

LIC1 SC 9211
LIC2 SC 9221
LIC3 SC 9231
LIC4A SC 9241
LIC4B SC 9242

LIC Rearrangement of New Units

The installation coordinator should be informed when a sequence is required, for a new controller, that is different from the initial sequence.

The steps of setup and system integration are different so that the LICs, and their cables, can be plugged in the sequence that was filled in on the *Setup Sheet* at configuration time:

1. The setup is performed according to the *Setup Instructions,* GA33-0064, except that the cables are not plugged in.

2. System integration is performed according to the *System Integration,* GA33-0067, except that the lines are not defined in the;

   a. Line definition file (LDF)

   b. Link IPL file (LKP)

c. Configuration data file (CDF).

3. The LICs are rearranged according to the *Setup Sheet.*

4. The cables are plugged in according to the *Setup Instructions,* GA33-0110 through GA33-0114 according to the machine and model number, as if they were new features.

5. The lines in the:

   a. Line definition file (LDF)

   b. Link IPL file (LKP)

   c. Configuration data file (CDF)

   are defined according to *System Integration,* GA33-0067, as if they were new features.

Note: The rearrangement (including addition) of LICs of an existing controller involves only steps 3, 4, and 5 above.

Chapter 5. Traffic Loading

This chapter describes how to determine whether the CCU, BUS or CA(s) will be overloaded on the proposed physical unit (PU).

Notes:

1. *CA loading concerns only PUs that include a 3720 Model 1 or 11.*

2. *Peak CCU loading only concerns PUs that include one or more buffered (block mode) start-stop devices that send bursts (or blocks) of data.*

The procedure described here assumes that all the configuration rules have been followed. The links are:

- Physical links: TP lines under SS, BSC, or SDLC protocols.

- Virtual links: Virtual circuits under X.25 or TRSS protocols.

  Note: For TRSS, the number of links is equal to the number of control units (each virtual link is point-to-point).

The results produced are only an approximation. Any deviation will result in a corresponding reduction in reliability.

The degree of success depends on a number of factors many of which are not under the control of IBM.

Refer to IBM in the case of doubt. IBM representatives have access to various aids in the IBM Hands On Network Environment (HONE) system that calculate traffic load. These aids enable IBM to check the results that were obtained from this chapter. Alternatively, traffic loading can be calculated by IBM for the proposed requirements.

Make sure that the appropriate level of this document is in use.

Load Table

Important: The load table in this chapter is for ACF/NCP Version 4 Release 2. It is accurate if the user's parameters are identical to the ready-made values in the table.

READY-MADE CONFIGURATIONS

CFG ID	CTL PGM	LINK PROT	LINK TYPE	LINK SPEED	LNK ATT	SOURCE - DEST	CU TYPE	APPL TYPE	MESSAGE SIZE RU IN/OUT	CU PER LINK	TERM PER CU	FREQ PER TERM
Low-Speed Links												
L1	EP	SS	HDX	1200	PTP	-CA	3767	INQ	40; 100	1	1	1/60
L2	NTO	SS	HDX	1200	PTP	BNN-CA	3767	INQ	40; 100	1	1	1/60
L4	EP	SS	HDX	4800	PTP	BNN-CA	3767	INQ	40;1000	1	1	1/60
L5	NCP	SDLC	HDX	4800	PTP	BNN-CA	3274	INQ	40;1000	1	12	1/50
Medium-Speed Links												
M0	EP	SS	HDX	9600	PTP	-CA	3767	INQ	40;1000	1	1	1/50
M1	EP	BSC	HDX	9600	MPT	-CA	3274	INQ	40;1000	2	12	1/50
M2	NCP	BSCE	HDX	9600	PTP	BNN-CA	3274	INQ	40;1000	1	16	1/50
M3	NCP	SDLC	HDX	9600	MPT	BNN-CA	3274	INQ	40;1000	2	12	1/50
M4	NCP	SDLC	DX	9600	MPT	BNN-CA	3274	INQ	40;1000	2	12	1/50
M7	NTO	SS	HDX	19200	PTP	BNN-CA	OEM	GRAPH	80;2000	1	1	1/120
M5	EP	BSC	HDX	19200	MPT	-CA	3274	INQ	40;1000	3	12	1/50
M6	NCP	BSCE	HDX	19200	MPT	BNN-CA	3274	INQ	40;1000	3	12	1/50
M8	NCP	SDLC	DX	19200	MPT	BNN-CA	3274	INQ	40;1000	3	12	1/50
High-Speed Links												
H1	EP	BSC	HDX	56k	PTP	-CA	372X	BATCH	2000; 2000	1	1	
H2	NCP	SDLC	DX	56k	MPT	BNN-CA	3274	INQ	40; 1000	3	12	1/50
H2A	NCP	SDLC	DX	56k	PTP	BNN-CA	OEM	GRAPH	40;40000	1	2	1/120
H3	NCP	SDLC	DX	56k	PTP	INN-CA	372X	BATCH	2000; 2000	1	1	
H4	NCP	SDLC	DX	56k	PTP	-INN	372X	INQ	1000; 40	1	1	
+M4		+SDLC	DX	9600	MPT	BNN-	3274	INQ	40; 1000	2	12	1/50
H10	NPSI	PCNE	DX	56k	PTP	BNN-CA		INQ	128; 128	1	1	
H11	NPSI	PCNE	DX	56k	PTP	BNN-CA		INQ	512; 512	1	1	
H12	NPSI	PCNE	DX	56k	PTP	BNN-CA		INQ	1024; 1024	1	1	
H5	NCP	SDLC	DX	64k	PTP	INN-INN	372X	BATCH	2000; 2000	1	1	
H6	NCP	SDLC	DX	256k	PTP	INN-CA	372X	BATCH	2000; 2000	1	1	
H7	NCP	SDLC	DX	256k	PTP	-INN	372X	INQ	1000; 40	1	1	
+M4		+SDLC	DX	9600	MPT	BNN-	3274	INQ	40; 1000	2	12	1/50
H8	NCP	SDLC	DX	256k	PTP	INN-INN	372X	BATCH	2000; 2000	1	1	
H9	SNI	SDLC	DX	256k	PTP	INN-INN	372X	INQ	40; 1000	1	1	
Token-Ring Links												
R1	NTRI	TRSS	HDX	4M	PTP	BNN-CA	4700	INQ	25; 256	1	1	10/60
R2	NTRI	TRSS	HDX	4M	PTP	BNN-CA	PC	INQ	40; 1000	1	1	1/50
R3	NTRI	TRSS	HDX	4M	PTP	BNN-CA	327X	INQ	40; 1000	1	12	1/50
R4	NTRI	TRSS	HDX	4M	PTP	BNN-CA	327X	INQ	40; 1000	1	24	1/50
R5	NTRI	TRSS	HDX	4M	PTP	BNN-CA		PRINT	0; 2000	1	1	5/60
R6	NTRI	TRSS	HDX	4M	PTP	BNN-CA	43XX	BATCH	2000; 2000	1	1	25/60

Refer to pages 5-5 through 5-8 for an explanation of the parameters used in the above table.

Figure 5-1. Traffic Load Table (Part 1 of 2)

READY-MADE CONFIGURATIONS

CFG ID	SS LIMIT	< USE PER LINK ON CCU	ON BUS	ON CAs	PEAK CCU >
Low-Speed Links					
L1	60	1.52m	0.20m	0.51m	31m
L2	60	2.09m	0.23m	0.66m	15.9m
L4	24	5.53m	0.81m	2.53m	111m
L5	60	12.1m	3.37m	2.75m	8.67m
Medium-Speed Links					
M0	12	6.45m	0.97m	3.01m	226m
M1	60	18.6m	7.83m	11.6m	12.6m
M2	60	18m	4.31m	3.53m	13.1m
M3	60	23.7m	6.73m	5.64m	16.6m
M4	48	25.8m	7.04m	5.66m	18.8m
M7	6	5.8m	1.06m	0.15m	221m
M5	48	28.4m	12.8m	17.3m	28.6m
M6	48	40.4m	9.69m	7.95m	27.4m
M8	24	39.9m	10.8m	8.48m	38.3m
High-Speed Links					
H1	13	84.5m	66.6m	96.9m	74.2m
H2	12	43.3m	11.2m	8.06m	116m
H2A	12	19.4m	8.2m	4.96m	88.9m
H3	12	191m	136m	114m	143m
H4	12				
+M4	48	33.3m	7.45m	0	22.9m
H10	12	135m	13.4m	8.36m	29m
H11	12	66.7m	10.6m	8.24m	14.8m
H12	12	53.3m	6.07m	5.4m	13.7m
H5	12	86.3m	63.6m	0	73m
H6	3	710m	482m	446m	539m
H7	3				
+M4	48	31.8m	6.4m	0	20.6m
H8	3	218m	136m	0	171m
H9	3	283m	70.7m	0	141m
Token-Ring Links					
R1	1500	7.88m	1.79m	0.85m	1.94m
R2	1500	1.59m	0.45m	0.21m	0.46m
R3	1500	14.5m	5.35m	2.52m	5.55m
R4	1500	28.5m	10.7m	5.03m	11.1m
R5	1500	6.91m	3.11m	1.34m	3.37m
R6	1500	41.6m	21.3m	12.8m	21.1m

Figure 5-2. Traffic Load Table (Part 2 of 2)

Configuration Parameters

CFG ID: The ID of the configuration link entry in the load table:

- L (Low Speed)
- M (Medium Speed)
- H (High Speed)
- R (Token-Ring)

CTL PGM: The proposed type of control program:

- EP (Emulation Program)
- NCP (Network Control Program)
- NPSI (NCP Packet Switching Interface)
- NTO (Network Terminal Option)
- NTRI (NCP/Token-Ring Interconnection)
- SNI (System Network Interface).

LINK PROT: The proposed type of link protocol.

- BSC (binary synchronous communication)
- BSCE (binary synchronous communication EBCDIC characters)
- PCNE (protocol converter network expansion)
- SS (Start-Stop)
- SDLC (synchronous data link control)
- TRSS (token-ring subsystem).

LINK TYPE: Link type (duplex or half-duplex).

Note: TRSS links are only half-duplex.

LINK SPEED: The proposed link speed in bits per second (bps).

Note: The suffix k indicates multiples of 1000. In each case, the lower order three digits are not significant. For example, 18k means a value from 18 000 through 18 999.

LNK ATT: The proposed link attachment;

- Point-to-point means one CU per link.

  Note: TRSS links are only point-to-point.

- Multipoint means several CUs per link.

Note: There can be more than one terminal per link.

SOURCE-DEST: Indicates, in symbolic form, the proposed traffic paths through the controller:

```
-> BNN  -> CA   ->          -> CA   -> BNN  ->
-> INN  -> CA   ->          -> CA   -> INN  ->
-> BNN  -> INN  ->          -> INN  -> BNN  ->
-> INN  -> INN  ->          -> CA   -> CA   ->
```

- BNN (boundary network node) layer, for communication within the subarea
- INN (intermediate network node) for communication to other subareas
- CA (channel adapter) for communication to the local host.

Traffic paths through the controller are illustrated in Figure 5-4 on page 5-12, which shows the major layers of a simplified NCP structure.

CU TYPE: The proposed control unit type (IBMxxxx product number, or code name, and so on)

APPL TYPE: The proposed type of control unit, terminal, end user, transaction size, and frequency. They have been grouped together as:

- XFER (one-way file transfer)
- BATCH (two-way file transfer)
- INQ (inquiry)
- GRAPH (graphics)
- PRINT (printing).

MESSAGE SIZE: The proposed message size (in characters) for the user data request unit (RU):

- RU IN; from end user to application.
- RU OUT; from application back to end user (screen control characters included: up to 40% of RU OUT for 327x terminals).

CU PER LINK: The proposed number of control units per link

TERM PER CU: Proposed number of "active" terminals per control unit terminal.

FREQ PER TERM: The proposed number of transactions per "active" terminal in the indicated time period (seconds). For example, 1/50 means one transaction every 50 seconds.

SS LIMIT: Maximum number of links allowed by the subsystem.

Note: For the TRSS, 1500 is the maximum number of interactions possible with the NCP.

USE PER LINK: Use, or load, per link given as a weight per link:

- ON CCU: Average load demand on CCU to handle one link
- ON BUS: Average load demand on BUS to handle one link
- ON CAs: Average load demand on the CA(s) to handle one link
- PEAK CCU: Peak load demand on the CCU to handle one link.

Note: The suffix m means milli, that is, one thousandth of the resource. For example, 1.43m means 0.143%.

Control Parameters

The control parameters handle user data frames, and associated control frames, which are dependent upon:

1. The RU (Receive Unit) messages
2. The control frames; parameters such as segmenting, buffers, link level response length, and pacing frequency rates.

The frequency of control frames is related to the frequency of the user data frames and is given as a set of typical frequency ratios. These rates are mostly installation-dependent and not IBM-dependent.

The values below are assumed to be the same for all proposed links and for convenience have been omitted from the load table.

Definite Response:

- 6 for every 10 RUs in an interactive application.

(Interactive is assumed to be 40 bytes in / 1K bytes out)

Note: 6 for every 10 means 60% of the RUs in are file update requests or imply file updates. Definite response is given only when the file is updated. The remaining 40% is assumed to be standard file applications without file updates.

Link Level Responses to RU (IN or OUT):

- 1 for every 7 RUs for an INN link in a batch application
- 1 for every 4 RUs for an INN link in an interactive application
- 1 for every 1 RU for an INN link in any other application.

Modem Turnaround Time for Half-Duplex Links:

- 2 ms (default) for links > 9600 bytes per second
- 8.5 ms for links < = 9600 bytes per second.

NCP Buffer Size:

- 240 bytes for NCP
- 4 bytes for EP SS.

Poll Delay:

- 0.1 seconds for BSC (medium or low speed)
- 0.2 seconds for SDLC (high speed)
- 0.5 seconds for SDLC (medium or low speed).

Note: SDLC poll delay *includes* the search order table scan time, unlike BSC where the poll delay is the time between polls.

Route Pacing:

- 1 for every 6 RUs for BNN links
- 1 for every 12 RUs for INN links
- 1 for every 16 RUs for INN-INN links.

Segmenting Size: For RU outs, which are segmented according to the size of the control units, the size is:

- 256 bytes in all cases.

Virtual Route Pacing:

- 1 for every 10 RUs for an INN link in a batch application.

VTAM Buffer Size:

- 500 bytes in all cases.

Ready-Made Configurations

These are arbitrary (uniform) configurations. Their parameters have been defined according to typical field applications.

They provide a resultant "use-per-link weight" whose maximum value is limited either by the sub system or by saturation of a resource.

Each ready-made configuration consists of a single type of transaction through a single type of link; and a single type of path and processing through the control program.

The configurations are identified in three general categories:

1. Configuration ID "Ln" for low-speed links (< = 4800).
2. Configuration ID "Mn" for medium-speed links (4800 > < = 19 200).
3. Configuration ID "Hn" for high-speed links (> 19 200).
4. Configuration ID "Rn" for token-ring links (4 million).

Mixed Configurations

They are a selection (mix) of the previously defined ready-made configurations (in appropriate proportions).

The proposed number of links is given as an input to the traffic load calculation, having been previously checked for feasibility.

The output of the traffic load calculation is checked against limits to determine that the controller will not be overloaded by saturation of any of the resources.

To approximate the traffic load ready-made configurations are added together (or mixed) to calculate the total load on each resource.

Total Load Determination Procedure

Examine the parameters set out in Figure 5-1 on page 5-3 and Figure 5-2 on page 5-4, and select the ready-made configurations that are closest to the required types.

For example: A mixed configuration based upon several ready-made cases:

Four links of configuration ID L2
Two links of configuration ID M3
One link of configuration ID H1
Ten links of configuration ID R3.

Enter these values onto a copy of the *Traffic Loading Sheet* (shown in Appendix B, "Traffic Loading Sheet").

From Figure 5-2 on page 5-4 select the use-per-link weight (the last four columns) of each link on the resources. Fill in these values on the *Traffic Loading Sheet.*

There are four steps (using the *Traffic Loading Sheet*) to calculate the total weight on each of the three resources:

1. Multiply the CCU use-per-link weight for each link by the number of links. Sum the results to get UCCU (the total CCU use for the mixed configuration), for example:

4 X 2.09m	= 8.36m	(CCU use for L2 traffic)
2 X 23.7m	= 47.4m	(CCU use for M3 traffic)
1 X 84.5m	= 84.5m	(CCU use for H1 traffic)
10 X 14.5m	= 145m	(CCU use for R3 traffic)
UCCU	= 285m (rounded to three significant digits)	

   Note: The suffix m means milli, that is, one thousandth of the resource. For example, 1.43m means 0.143%.

   Check the value of UCCU with the limits in Figure 5-3 on page 5-11.

2. Repeat the calculations made at step 3a using the BUS use-per-link weights for each link to get UBUS (the total BUS use for the mixed configuration).

   Check the value of UBUS with the limits in Figure 5-3 on page 5-11.

3. Repeat the calculations made at step 3a using the CAs use-per-link weights for each link to get UCA (the total CA use for the mixed configuration).

   Check the value of UCA with the limits in Figure 5-3 on page 5-11.

   These rules apply to the interpretation of the CA total weight:

   a. If the number of CAs required for the worst and best cases are equal (and do not exceed the limit of two), then the indicated number of CAs will not be overloaded by the proposed mixed configuration.

   b. If the number of CAs required for the worst and best cases are **not** equal and:

      - The worst-case value does not exceed the limit of two, then the configuration is feasible (may be successful) with the best case number of CAs and successful with the worst case.

      - The worst-case value does exceed the limit of two, then the configuration is doubtful with the best case number of CAs and unsuccessful with the worst case.

   Note: The number of CAs needed is usually equal to the number of VTAMs: that is, hosts.

4. If buffered (block mode) start-stop devices exist in the proposed configuration, then repeat the calculations made at step 3a using the peak CCU use-per-link

weights for each link to get PUCCU (the total peak CCU use for the mixed configuration).

Check the value of PUCCU with the limits in Figure 5-3.

The significance of the four totals is illustrated in Figure 5-3.

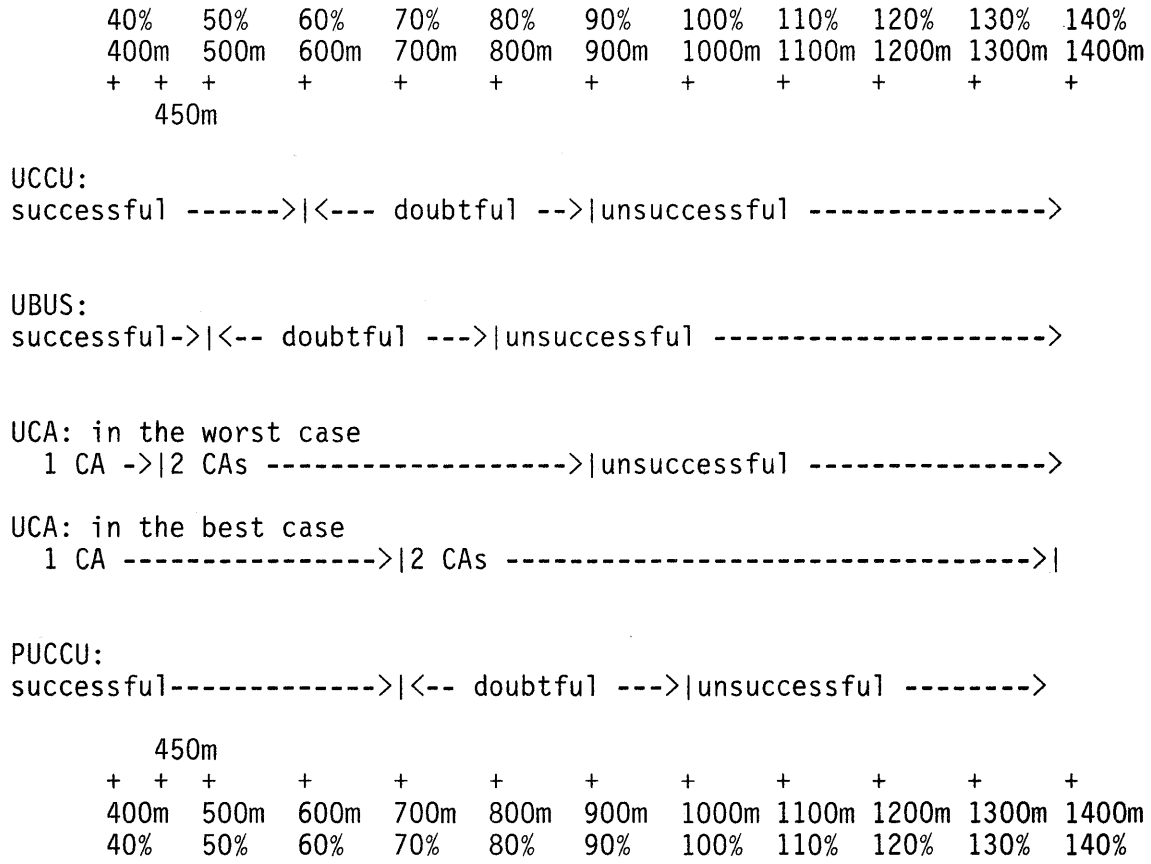


Figure 5-3. Range of Traffic Weights

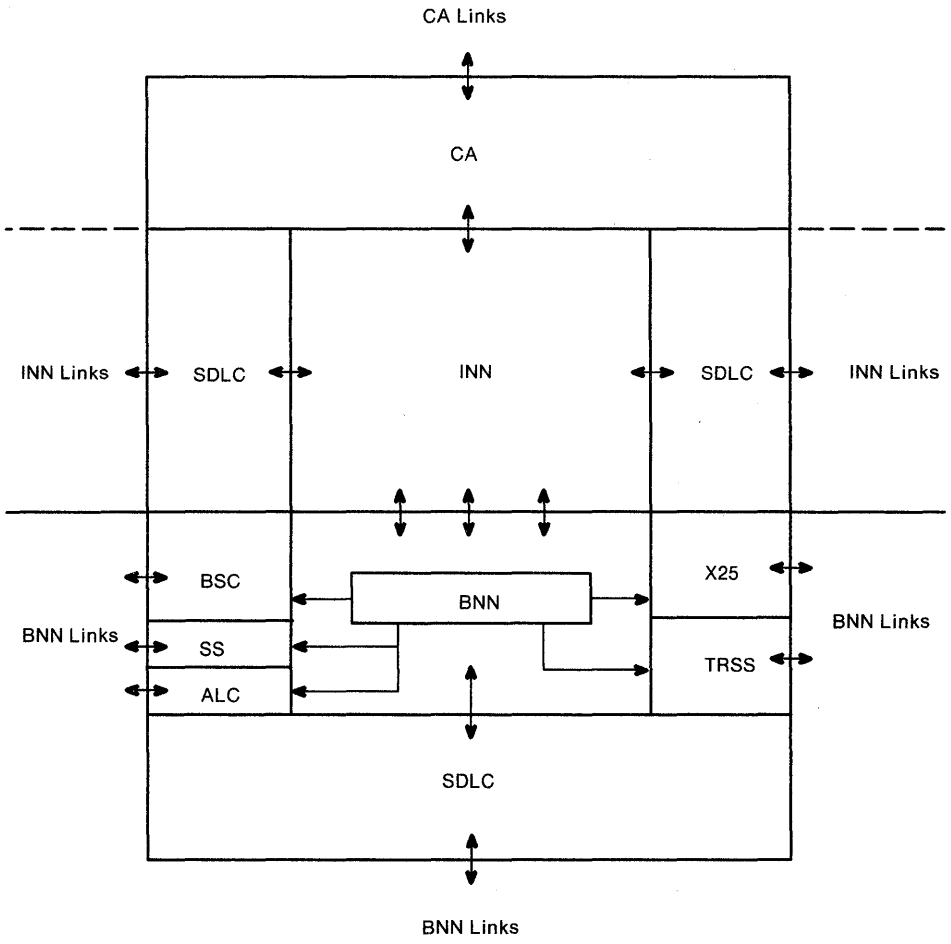


Figure 5-4. Traffic Paths Through the Controller

Conclusions

A "doubtful" total weight means that unpredictable results such as loss of data or poor response can occur. It is recommended to verify the results with IBM.

One or more "unsuccessful" total weights mean that the proposed number of links will overload the controller.

Chapter 6. Integrating with the Network

The tasks of integrating a new controller, or upgrades made to an existing controller, are described in *3720/3721 System Integration*, GA33-0067.

Console Requirements

The console can be local or remote. If the RSF link is not to be used, a local console is necessary. Consoles must have certain characteristics:

Characteristic	Value
Machine mode	IBM 3101
Operating mode	Block
Interface	RS232C
Line control	Permanent request to send (PRTS)
Line speed	2400 bps for a local console 1200 bps for a remote console
Parity	Even
Turnaround character	DC3 (X'13' = decimal 19)
Stop bits	2 (See note)
Word length	7
Response delay (ms)	100
Break signal (ms)	500

Note: Two stop bits for the console provide a long-stop that will handle low quality transmissions.

A console can be:

- An IBM 3161 Model 11 or 12 with 3101 emulation.
- An IBM 3163 Model 11 or 12 with 3101 emulation.
- An IBM 3164 Model 11 or 12 with 3101 emulation.

- An IBM PC 5150, 5155, 5160, 5170, 5550, 3270 PC, or 3270 PC/AT with an asynchronous communication adapter and 3101 emulation program (Program Number 6024042).
- An IBM 3101 Model 23.

Or any other equipment that is compatible with the IBM 3101 Model 23. The related documentation is:

- For a PC, the *IBM PC 3101 Emulation Program,* 6024042
- For a 3101 Model 23, the *IBM 3101 Display Terminal Description,* GA18-2033
- For a 3161/3163, the *IBM 3161/3163 ASCII Display Station Description,* GA18-2310.

It should be ordered now, if needed.

Modem Requirements

Modems are needed to connect a remote console, or the remote support facility (RSF), to a 3720. They connect:

- The 3720 to the remote console site via the public network.
- The remote console to the 3720 via the public network.
- The RSF connection at the 3720 to the RSF center via the public network.

The modems **must** conform to certain requirements, otherwise communication will not be possible.

5841 modem options are selected by setting up to eight physical switches. For other modems refer to the respective installation documentation, or the *3720/3721 Original Equipment Manufacturer's Inforantion,* GA33-0068.

Cable Wiring Requirements, 3720 to Modem

IBM can supply a suitable cable to connect to a modem, refer to the *3720/3721 Planning and Site Preparation Guide,* GA33-0061.

Modem Requirements, 3720 to Remote Console

The modem used to connect the 3720 to the public network, that goes to the remote console site, must conform to certain standards.

Transmission Standards

IBM 5841, or IBM 5842, equivalent (compatible with Bell 212A) or CCITT V.22 bis (1200 bps) in the USA and Canada.

CCITT V.22 alternate B, or V.22 bis (1200 bps), in other countries.

Operating Characteristics

Connection over a switched line.

Duplex operation.

Asynchronous transmission.

Transmission speed: 1200 bits per second.

Ten bits per character (1 start bit, 7 data bits plus 1 parity bit, 1 stop bit).

Even parity.

Auto-answer and auto-disconnect features.

Modem Requirements, Remote Console to 3720

The modem used to connect the remote console to the public network, that goes to the 3720 site, must conform to certain standards.

Transmission Standards

IBM 5841, or IBM 5842 equivalent (compatible with Bell 212A) or CCITT V.22 bis (1200 bps) in the USA and Canada.

CCITT V.22 alternate B, or V.22bis (1200 bps), in other countries.

Operating Characteristics

Connection over a switched line.

Duplex operation.

Asynchronous transmission.

Transmission speed: 1200 bits per second.

Ten bits per character (1 start bit, 7 data bits plus 1 parity bit, 1 stop bit).

Even parity when auto-dialing.

Transmission in block mode.

Dialing can be manual or, in some cases automatic (from the console keyboard). Manual dialing is recommended because some auto-dial modems will only handle remote consoles operating in character mode.

- For manual dialing, the modem must provide a voice/data switch.
- For the exceptions that allow auto-dialing in character mode, refer to an IBM marketing representative.

Auto-answer is not used.

Modem Requirements, 3720 to Remote Support Facility

The modem used to connect the 3720 to the RSF center must conform to certain standards.

Transmission Standards (USA and Canada)

IBM 5841 or equivalent (compatible with Bell 212A), or IBM 5842 at 1200 bps or equivalent (compatible with ATT 2224).

Operating Characteristics (USA and Canada)

Connection over a switched line.

Duplex operation.

Synchronous transmission.

Auto-answer feature.

Transmission speed: 1200 bits per second.

Clocking provided by modem clock.

Transmission Standards (Other Countries)

CCITT V.23.

Operating Characteristics (Other Countries)

Connection over a switched line.

Half-duplex operation.

Synchronous transmission.

Auto-answer feature.

Transmission speed: 1200 bits per second.

Non-clocked modem.

Clocking provided by DTE.

General Operating Characteristics

These general characteristics apply to the 3720 side of remote console modems and RSF modems.

The 3720 controls Data Terminal Ready (DTR) and Request to Send (RTS).

The modem must present Ring Indicator (RI) to the 3720 when ringing is detected from an incoming call. The 3720 will then present DTR to the modem. The modem will not auto-answer until the 3720 presents DTR.

The modem must present Clear to Send (CTS) ON when communication has been established and the modem is ready to transmit data.

Data Set Ready (DSR) must be OFF when no connection is established, and ON when communication has been established.

Data Carrier Detector (DCD) must be ON when receiving the carrier from the remote console modem.

The 3720 does not:

- Set codes
- Accept return codes
- Accept result codes
- Provide modem interface settings
- Issue modem commands for setting conditions.

Modem settings must remain set when the modem is powered off.

Examples of IBM 5841/5842 Modem Switch Settings

The following are two examples (that would apply in the USA or Canada) of a remote console and the remote support facility, respectively. 5841 modem options are selected by setting up to eight physical switches during the installation, as described in the *5841 Guide to Operations,* GA27-3649, or *5842 Guide to Operations,* GA27-3738.

Remote Console Modem

In this example of an IBM 5841 modem, the eight switches are set the same on the 3720 site modem and the remote console site modem:

1. Set ON: Received Line Signal Detector (RLSD).
2. Set OFF for 5841; ON for 5842.
3. Set OFF: Transmit timing is not applicable.
4. Set ON: Asynchronous mode.
5. Set ON: Data Terminal Ready.
6. Set OFF: Transmit Clocking is not applicable.
7. Set ON: Request to Send.
8. Set OFF: Data Set Ready.

Remote Support Facility Modem

In this example of an IBM 5841 modem, the eight switches are set on the 3720 site modem:

1. Set ON: Received Line Signal Detector (RLSD).
2. Set OFF for 5841; ON for 5842.
3. Set ON: Transmit timing.
4. Set OFF: Synchronous mode.
5. Set ON: Data Terminal Ready.
6. Set ON: Transmit Clocking.
7. Set ON: Request to Send.
8. Set OFF: Data Set Ready.

Link IPL Ports

An IPL port is any telecommunication line used to transfer the control program from the host to the controller. The IPL port table contains the communication link address used to IPL the controller. Each physical unit can have a maximum of eight IPL ports.

The IPL port table is maintained on the MOSS disk, and contains the parameters of each IPL port. The link addresses in the IPL port table are initialized at system installation time by using the link ports file (LKP) function. The table must be updated if the link IPL addresses are changed.

The *Link IPL Sheet* lists the information needed for the LKP function and is described in Appendix H, "Link IPL Sheet."

Worksheets

The worksheets that are used at system integration time are:

Requirements Sheet:

Plugging Sheet:

Console Sheet:

Link IPL Sheet:

Optional

They are described in Chapter 2, "Worksheets"

Chapter 7. Relocation and Upgrading

The relocation and upgrading of the 3720 Model 2 or 12, and 3721 Model 1 or 2, is described in the *3720 Model 2 Setup Instructions*, GA33-0112, *3720 Model 12 Setup Instructions*, GA33-0113, and *3721 Models 1 and 2 Setup Instructions*, GA33-0114.

The relocation of the 3720 Model 1 or 11 is done by IBM. Some aspects of upgrading a Model 1 or 11 are described in the *3720 Model 1 Setup Instructions*, GA33-0110, and *3720 Model 11 Setup Instructions*, GA33-0111.

Software Migration

When existing software is to be migrated, then the related documentation should be available, such as *NCP-SSP Migration*, SC30-3252.

Empty Cassettes

Positions that are not occupied by LICs or TICs must contain an empty cassette (part number 6398770). This is the protective plastic casing without the LIC or TIC electronics inside. Original orders are delivered from the plant with empty cassettes in unused positions.

When an upgrade results in a reduction in the total number of LICs or TICs then a corresponding number of empty cassettes must be ordered. When an upgrade results in an increase, then the unnecessary empty cassettes should be stored in a cool, dry place for future use.

Port Swapping

Backup lines, and their LICs, to be used in port swapping can be added as an upgrade.

Unwanted LICs or TICs

When an upgrade results in a reduction in the total number of LICs or TICs, then the unwanted items should be stored in a cool, dry place for future use.

Cables

There are two points to consider about reusing existing cables.

1. Although it can be possible to carefully remove most cables, certain damage may not be apparent.

   It is the customer's responsibility to ensure that any reused cables are in sound condition, and have been tested by a qualified person.

2. The time required to remove cables must be added to the time required to transport, test, and relay them.

   Order new cables, as for a new order, if the controller is to be out-of-service for the shortest possible time.

The removed cables can be used for future upgrades after they have been successfully tested.

Worksheets

New copies of the worksheets (described in Chapter 2, "Worksheets") are filled in for an upgrade as for a new order, but with some additional considerations:

Requirements and Traffic Loading Sheets:

The totals for line weight and traffic loading of the existing configuration are carried forward to the new worksheets. For example, a previous total line weight of 68 means that additional lines of a total line weight of 32 (or less) can be added. Therefore, the first entry on the new *Requirements Sheet* is the value of 68 brought forward from the previous *Requirements Sheet*

Consequently, the current worksheet set should be available. This will avoid the need to repeat the filling in that was done at the time of the previous configuration.

Channel Adapter Sheet:

When a 3720 model 1 or 11 is to be upgraded by the addition of a second CA, fill in the necessary information on a new worksheet under the heading CA 2.

Plugging Sheet:

Fill in the necessary information for positions that are to be used for the first time, or that are to have new, or different, LICs/lines or TICs/token-rings.

The current Plugging Sheet should be available. This will avoid the need to repeat the filling in that was done at the time of the previous configuration.

Order Sheet:

Fill in the feature and specify codes, and quantities for the additional items.

Console Sheet:

Fill in the required information.

Setup Sheet:

Fill in the required information for positions that are to be used for the first time, or that are to have new, or different LICs/lines or TICs/token-rings.

The date of the previous order must be taken from the current *Setup Sheet* and filled in under "Date of previous order". It is the *Order Dates* that link each update to the original order

The current Setup Sheet (kept inside the rear door) should be available. This will avoid the need to repeat the filling in that was done at the time of the previous configuration.

Link IPL Sheet:

Fill in the required information if up to eight of the new, or existing ports, are to become link IPL ports.

Unit Identification

Remember to fill in:

- The unit and model number
- The PU name
- Serial number

on each worksheet of every upgrade worksheet set.

After Ordering

IBM will confirm the order and give an order number. Fill in this order number at the top of each worksheet in the related, upgrade worksheet set.

Retention of Worksheets

For the lifetime of the configuration keep all upgrade worksheet sets together with the original worksheets to which they relate, except for the *Setup Sheets* that are kept in the controller.

IBM Token-Ring Networks

The 3720 Models 1 and 2 can be field upgraded to become Models 11 and 12, respectively, in order to support IBM Token-Ring Networks.

This is done by ordering an MES Model Conversion. The parts removed by IBM in the course of this field upgrade become the property of IBM.

Remember that the 3720 Models 11 and 12 support a maximum of four LICs. Consequently, if the Model 1 or 2 that is to be converted has more than four LICs attached, then one or more will need to be attached elsewhere in the network.

Chapter 8. Examples

The following examples show arrangements of configurable components.

Example 1: Link-Attached with Expansion and 17 Lines

This is a combination of a 3720 Model 2 and a 3721 Model 1, with a total of 17 telecommunication lines.

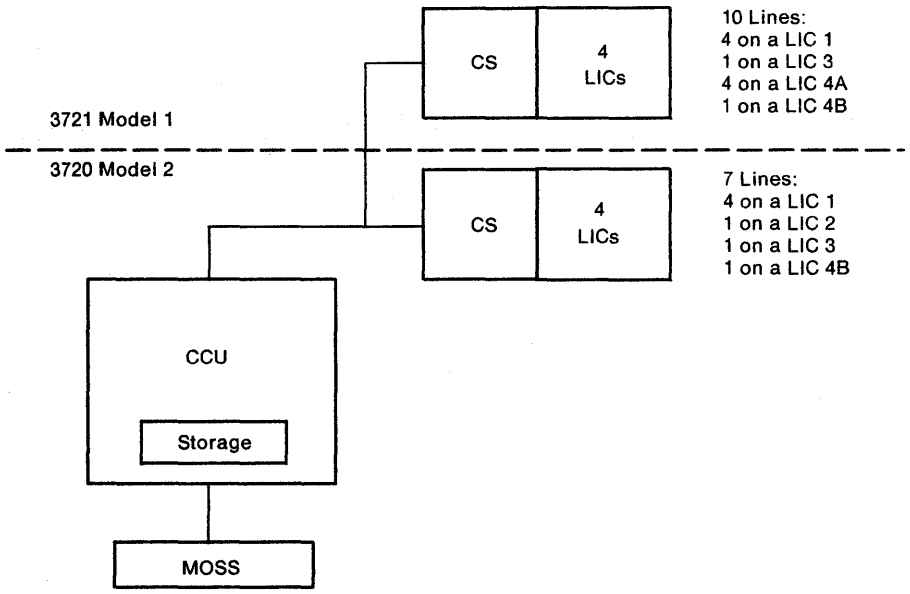


Figure 8-1. Example 1: A 3720 Model 2 and 3721 Model 1

Example 2: Channel-Attached with Expansion and 12 Lines

This is a combination of a 3720 Model 1 and 3721 Model 1, with a total of 12 telecommunication lines.

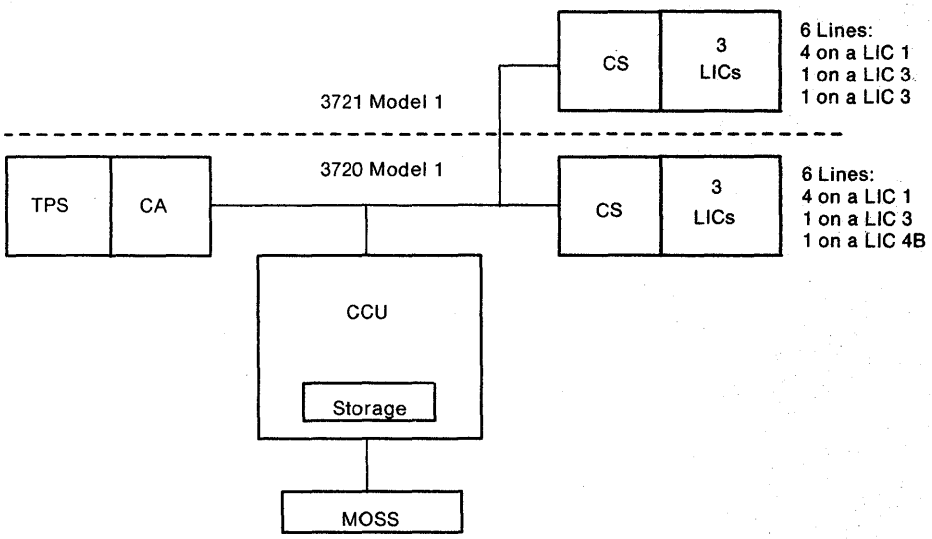


Figure 8-2. Example 2: A 3720 Model 1 and 3721 Model 1

Support of Token-Ring Network

For an example including token-ring attachment see "Example: Channel-Attached with Expansion, 12 Lines and Two Token Rings" on page 9-4.

Chapter 9. IBM Token-Ring Networks

Overview

The 3720 models 11 and 12 provide attachment of one or two TICs and up to four LICs. (The two TICs can attach to the same IBM Token-Ring Network.)

A token-ring multiplexer (TRM) manages one or two TICs, supporting one or two token-ring networks. A communication scanner (CS) manages a maximum of four LICs, supporting a maximum of 16 lines. In other respects they are similar to the 3720 Models 1 and 2, respectively. Refer to Chapter 1, "Overview."

The Models 11 and 12 can be extended by adding a 3721 Model 1 or 2 expansion unit.

This chapter adds information regarding the 3720 models 11 and 12 to that already given for the 3720 models 1 and 2 under the respective headings below.

Worksheets

The configuration process for the 3720 Model 11 or 12 involves steps additional to the configuration of a Model 1 or 2, respectively. That is, the configuration of token rings is an extension of the configuration of telecommunication lines. All references in the worksheets to LICs and lines should be understood to relate to TICs and token rings, as appropriate.

Requirements Sheet:

The token-rings are included in addition to the line requirements.

Refer to Appendix A, "Requirements Sheet."

Traffic Loading Sheet:

The loading of each token-ring virtual circuit is included in addition to the physical line loading.

Channel Adapter Sheet:

The channel adapter information is included (for a 3720 model 11) as for a 3720 model 1.

Refer to Appendix C, "Channel Adapter Sheet."

Plugging Sheet:

The physical plugging sequence of the token rings is included in addition to the lines.

Refer to Appendix D, "Plugging Sheet."

Order Sheet:

The TIC feature code and the quantity (one or two) is included in addition to the LIC feature/specify codes and their quantities.

Refer to Appendix E, "Order Sheet."

Console Sheet:

The console information is included as for a 3720 Model 1 or 2.

Refer to Appendix F, "Console Sheet."

Setup Sheet:

The TIC positions and cable information are included with the LIC positions and their cable information.

Refer to Appendix G, "Setup Sheet."

Link IPL Sheet:

Not applicable, token-rings do not link the controller with the host.

Refer to Appendix H, "Link IPL Sheet."

Number of Worksheet Sets

The 3720 model 11 and 12 have one scanner (like the model 1 and 2) with a maximum weight of 100. However, the maximum number of LICs is four. Therefore, if the requirements are for only low weight lines as well as token rings then using Figure 2-1 on page 2-3 can result in an underestimate of the number of units needed.

For example, five LICs and one token ring. A 3720 model 11 or 12 will support the token ring but, although the total line weight can be less than 100, there are only four LIC positions and a second (base or expansion) unit is needed.

Consequently:

1. Group the token-rings, one or two to a controller, according to the proposed physical siting.

2. For each group of token rings subtract a weight of 100 from the total line requirements. This is the total line weight of lines that can be supported by the scanner of the 3720 Model 11 or 12.

3. Repeat the above two steps until all the token rings have been allocated.

The remaining line requirements can then be satisfied by the minimum number of units shown in Figure 2-1 on page 2-3.

Remember that this is only a guide to the minimum number of 3720/3721 units needed.

Rules and Restrictions

Unlike LICs there are no weights, clocking considerations, or special (initial) plugging sequences for TICs.

Traffic Loading

The traffic loading from all the token ring *circuits* must be added to that of all the telecommunication *lines.*

Token ring circuits and their loading is calculated by referring to Chapter 5, "Traffic Loading."

System Integration

Token rings are integrated with the network in the same way as telecommunication lines.

Relocation and Upgrading

There are no special considerations to the relocation and upgrading of token rings.

Example: Channel-Attached with Expansion, 12 Lines and Two Token Rings

This is a combination of a 3720 Model 11 and 3721 Model 1, with a total of 12 telecommunication lines and two token rings.

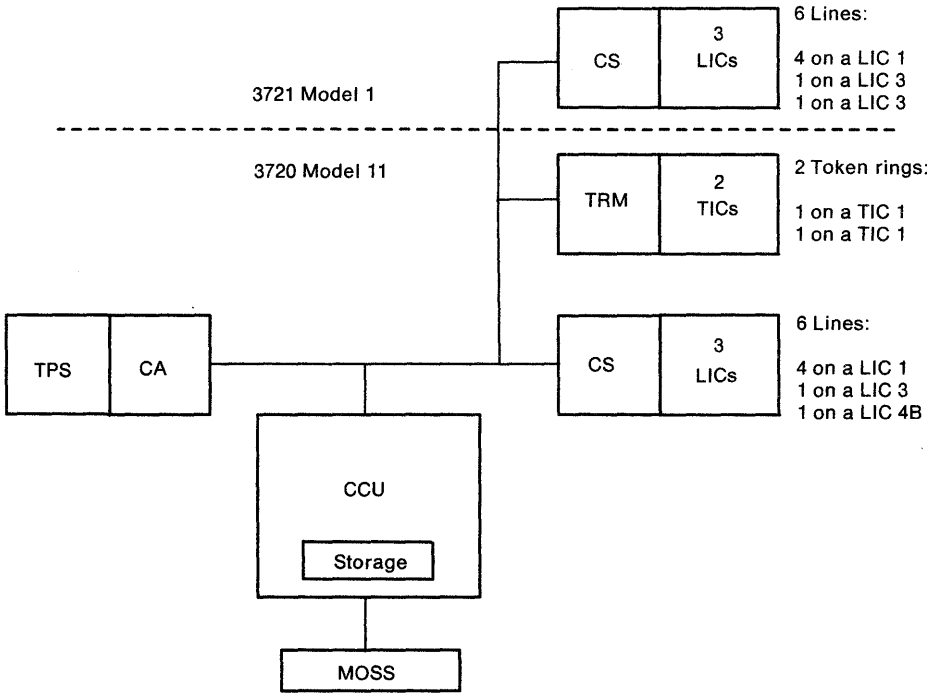


Figure 9-1. Example of a 3720 Model 11 and 3721 Model 1

Appendix A. Requirements Sheet

This *worksheet* is a logical list of what is required.

Backup lines, that can be involved in port swapping, must be included. However, they have no line weight and this column should be marked "backup".

Filling in the Requirements Sheet

This is described in the Chapter 2, "Worksheets."

Note: So that the entries can be cross referenced with the *Plugging Sheet*, fill in an entry number in the column #. For example, 1, 2, 3, and so on.

Line Destination: The user identification of the line.

Line Protocol: The protocol of the line. Refer to Chapter 4, "Scanner and LIC Rules".

Line Speed: The maximum speed of the line.

Line Weight: The weight of the line. Refer to Chapter 4, "Scanner and LIC Rules".

Line Interface: The line interface, for example, V.24, V.35, and X.21. Refer to the *3720/3721 Introduction*.

LIC/TIC Type: The LIC Type, 1, 2, 3, 4A, or 4B, refer to "Controller Components" on page 1-12. This is a function of line interface and line speed. Refer to the *3720/3721 Introduction*. In the case of a TIC write 'TIC' in this column.

Modem: The line cable will be attached to a modem (yes or no).

Link IPL: The line will be defined as a link IPL port according to parameters filled in on the *Link IPL Sheet* (yes or no).

Line Name: The symbolic control program name for the line.

Note: When executing the line definition file (LDF) function of system integration, the line name is the only key to the related entry in the respective *Requirements Sheet*.

Requirements Sheet

37____Model:	PU Name:
Serial Number:	Order Number:

#	**Line Destination**	**Line Protocol**	**Line Speed**	**Line Weight**	**Line Interface**	**LIC/ TIC Type**	**Modem**	**Link IPL**	**Line Name**

Appendix B. Traffic Loading Sheet

This worksheet sums the traffic loading. Backup lines, which can be involved in port swapping, are excluded. However, the original lines that they may back up are included.

Filling in the Traffic Loading Sheet

This is described in Chapter 5, "Traffic Loading" on page 5-1.

Traffic Loading Sheet

37__Model:	PU Name:
Serial Number:	Order Number:

CFG ID	Quantity of Links	CCU Use Per Link	CCU Total	BUS Use Per Link	BUS Total	CA Use Per Link	CAs Total	Peak CCU Use Per Link	Peak CCU Total

Carry forward totals if necessary	UCCU		UBUS		UCA		PUCCU	

Successful configuration:	(<600m)	(<500m)	(<700m)
Doubtful configuration:	(600> <900m)	(500> <800m)	(700> <1000m)
Unsuccessful configuration:	(≥900m)	(≥800m)	(≥1000m)

IBM Part of GA33-0063-2

Appendix C. Channel Adapter Sheet

Note: This worksheet applies only to a 3720 Model 1 or 11.

This worksheet should be completed before delivery. The IBM service representative will require this information to be able to connect the 3720 to the host channel.

One sheet is filled in for one or two channels.

Filling in the Channel Adapter Sheet

Two-Processor Switch (TPS)

Circle the YES if the channel has a two-processor switch.

Burst Length

This information is required for BYTE channels only.

1. If devices on the BYTE channel are buffered, then the burst length is 255 for NCP, and 64 for EP or PEP.

2. If there are non-buffered devices on the BYTE channel, then the burst length is:

   16 for the processors 4341 and 4381.

   32 for the processors 3031, 3032, 3033, 308X, and 3090

   8 for the 4361 and other processors.

Emulation Subchannel (ESC) Address

This information is required for EP or PEP, if the emulation subchannel is used. Give the HIGH ESC ADDRESS, and the LOW ESC ADDRESS.

For NCP, this information is not applicable and the HIGH ESC ADDRESS is 53, and the LOW ESC ADDRESS is C0.

Data-In/Data-Out Feature on Host

Circle the YES or the NO according to the following:

Circle NO when:

1. The channel interface cables, anywhere in the entire chain, do not propagate the data-in or data-out feature.

2. One or both of the channel interfaces on the 3720 (if a TPS is installed), are connected to a host that does not support the data-in or data-out feature.

Processor	Byte Channel	Block Channel	Selector Channel
148		x	x
158		x	x
3031		x	x
3032		x	x
3033		x	x
3081/2/3	x	x	
3090	x	x	
4331		x	x
4341	x	x	x
4361	x	x	
4381	x	x	

Figure C-1. Processors Supporting Data In/Out Feature

Select Out Priority

Circle the select-out priority for each interface of a channel (if a TPS is installed).

The recommended select-out priority is HIGH for a 3720 channel interface, otherwise refer to the *System/370 IBM Input/Output Configuration,* GA22-7002

Native Subchannel (NSC) Address

This information must be specified for each interface of a channel (if a TPS is installed).

Channel Adapter Sheet

Note: This worksheet applies only to a 3720 Model 1 or 11.

3720 Model:	PU Name:
Serial Number:	Order Number:

	CA 1		CA 2	
• **Two-processor switch:**	YES	NO	YES	NO
• **Burst Length:**				
• **Emulation Subchannel Address (ESC):**				
– High ESC Address:	_____		_____	
– Low ESC Address:	_____		_____	
• **Data In/Out on Host:**	YES	NO	YES	NO
• **Select Out Priority:**				
– Interface A:	HIGH	LOW	HIGH	LOW
– Interface B:	HIGH	LOW	HIGH	LOW
• **Native Subchannel Address (NSC):**				
– Interface A:	_____		_____	
– Interface B:	_____		_____	

Appendix D. Plugging Sheet

This worksheet lists the physical location of the requirements. That is, where the requirements are physically located within a controller unit.

Filling in the Plugging Sheet

1. For each line fill in the LIC/TIC position and port address (see page 1-10):

   The initial (delivery) sequence is described in "LIC Rules (Initial Sequence)" on page 4-4. This sequence tends to avoid the clocking restrictions described in "Clocking Restrictions" on page 3-6. Subsequent rearrangement is described in "LIC Rearrangement of New Units" on page 4-5.

2. There are two physical connections to the one-port LICs type 2 and 3:

   a. For LIC 2, the single line can be plugged into the first or second socket.

   b. For LIC 3, the single line must be plugged into the first socket if it is modem-attached and the second socket if it is direct-attached.

   Note: The two physical connections have the same NCP address.

   To represent this on the *Setup Sheet*, the sockets map to the port addresses (that are filled in on the *Plugging Sheet*):

   a. For the first socket, 0, 4, 8 ... 52, 56, 60.

   b. For the second socket, 1, 5, 9 ... 53, 57, 61.

3. For each line:

   a. Define the clocking speed, if clocking is provided by the controller for synchronous protocols, and fill in under "Controller Clocking". Refer to Chapter 3, "Clocking Considerations."

   b. Define the cable needed using the *3720/3721 Planning and Site Preparation Guide*, and fill in the corresponding columns.

Note: So that the entries can be cross referenced to the *Requirements Sheet*, fill in the respective entry number in the column #. For example, 1, 2, 3, and so on.

Plugging Sheet

37____Model:	PU Name:
Serial Number:	Order Number:

Line Dest. & Interface	**LIC/TIC Type & Pos.**	**Port Address**	#	**Controller Clocking**	**Cable Group/ Part Number**	**Cable Length**

Appendix E. Order Sheet

This worksheet lists the configurable features of each unit. Remember that each unit is a different order.

Filling in the Order Sheet

This order is a draft, the final order will be made together with an IBM marketing representative.

1. Determine if the 1M-byte storage increment is needed by reference to the control program documentation

2. For the features fill in the four-digit feature code from "Controller Components" on page 1-12. Do not exceed the maximum quantity of features allowed for each model.

3. For a 3721 Model 2:

   - Fill in the feature codes for the LICs (a maximum of four) on the first scanner.

   - Fill in the feature and specify codes for the LICs (a maximum of four) on the second CS:

     - LIC type 1; SC9211

     - LIC type 2; SC9221

     - LIC type 3; SC9231

     - LIC type 4A; SC9241

     - LIC type 4B; SC9242

4. For 3720 Models 11 and 12, fill in the quantity of TICs.

All the units are installed and set up by the customer, except for the 3720 Models 1 and 11, which are installed by IBM. The channel adapters and the two-processor switches are connected to host systems by IBM.

Fill in the cable group numbers, using the *3720/3721 Planning and Site Preparation Guide*. In Europe, Middle-East, and Africa specify the automatic cable shipment, if needed. The task of ordering cables, and the responsibilities involved, is described in *Selecting and Ordering IBM Machine External Cables*, GA23-0278.

There are various options:

- Power cord
- Machine nomenclature
- Documentation group
- Safety labels

Notes:

1. *For the USA, if not specified, the power supply assumed will be 200 Volts, 60 Hertz, for the 3720 Model 1 or 11, and 120 Volts, 60 Hertz, for the 3720 Model 2 or 12. Expansion units must be ordered with the same power rating as the respective base. Refer to the 3720/3721 Planning Site Preparation Guide for order codes.*

   The power cord shipped is 4.3 meters (14 ft) long with a nonlocking plug for the 3720 Models 1 and 2.

2. *For other countries, if not specified, the power supply assumed will be 200 Volts, 50 Hertz, for all models with standard power cords.*

For each model ordered, order the cables for the lines, for the channel adapter if any, and optionally for the operator console or the remote support facility (RSF) link.

Because cable ordering procedures are country-dependent, there are different procedures to follow. Unless specified, country defaults are assumed. For the available options contact an IBM marketing representative.

If you already have a suitable console, then the related documentation should be available at system integration time. It should be ordered now, if needed.

When existing software is to be migrated to the controller, then the related IBM documentation, on migration, should be available. It should be ordered now, if needed.

Update Orders: When an update order results in a reduction of the total number of LICs/TICs, fill in the quantity of empty cassettes required (part number 6398770).

For information on update orders, refer to Chapter 7, "Relocation and Upgrading."

Order Sheet (Part 1 of 2)

37____Model:	PU Name:
Serial Number:	Order Number:

Document Number	Quantity	Description
GA18-2033		IBM 3101 Display Terminal Description
GA18-2310		IBM 3161/3163 ASCII Display Station Description
SC30-3252		NCP-SSP Migration

Specify Code	Quantity	Description
SC9211		LIC type 1 on second CS of 3721 Model 2
SC9221		LIC type 2 on second CS of 3721 Model 2
SC9231		LIC type 3 on second CS of 3721 Model 2
SC9241		LIC type 4A on second CS of 3721 Model 2
SC9242		LIC type 4B on second CS of 3721 Model 2
		TIC

Part Number	Quantity	Description
6398770		Empty Cassette
6024042		IBM PC 3101 Emulation Program

IBM Part of GA33-0063-2

Order Sheet (Part 2 of 2)

Feature Code	Quantity	Description

IBM Part of GA33-0063-2

Appendix F. Console Sheet

This worksheet lists the console information needed at system integration time.

Filling in the Console Sheet

Console Description: Consoles are local or remote.

Note: If the RSF link is not to be used, a local console is necessary. Refer to the description of consoles in the *3720/3721 Introduction*, and Chapter 6, "Integrating with the Network."

The console cable description is obtained from the *3720/3721 Planning and Site Preparation Guide*.

Modem Description for remote console and RSF: This should include:

- The type and model
- The options or switch settings (ON, OFF, or ANY if the setting is not relevant).

  Note: 5841/5842 modem options are selected by setting up to eight physical switches.

Console Sheet

37____Model:	PU Name:
Serial Number:	Order Number:

Operator Console

Console Description
Cable Description

Remote Support Facility

Modem Description
3720 side:

Cable Description	Options/Switches	ON, OFF, ANY

Remote Operator Console

Console Description	Modem Description		Modem Description	
	3720 side:		Remote console side:	
Cable Description	**Options/Switches**	**ON, OFF, ANY**	**Options/Switches**	**ON, OFF, ANY**

Appendix G. Setup Sheet

This worksheet indicates which cable is plugged into which port address, and is used at setup time.

Filling in the Setup Sheet

Remember that the positions are numbered 1 through 8 for the 3720 and for the 3721.

1. Use the correct sheet for the relevant model. There are three copies of each of the three types:

   a. 3720 Models 1 or 2

   b. 3721 Models 1 or 2

   c. 3720 Models 11 or 12

2. Fill in the general information at the top of the sheet. This information allows the person who is going to set up the model to identify it. Remember to fill in the edition and date of this *Configuration Guide*. This can be useful when undertaking problem determination.

3. Fill in the corresponding LIC/TIC types under the associate position on the *Plugging Sheet* that was filled in previously.

4. Cross out unused positions.

5. Consider one LIC/TIC at a time. For each line, fill in the cable group or part number, and the destination, for the corresponding port address.

6. Cross out unused port addresses.

Note: When you use a LIC type 3 for direct attachment, the physical location of the connector is the second position, but the addressing is as for the first position.

Setup Sheet

3720 Model 1 or 2

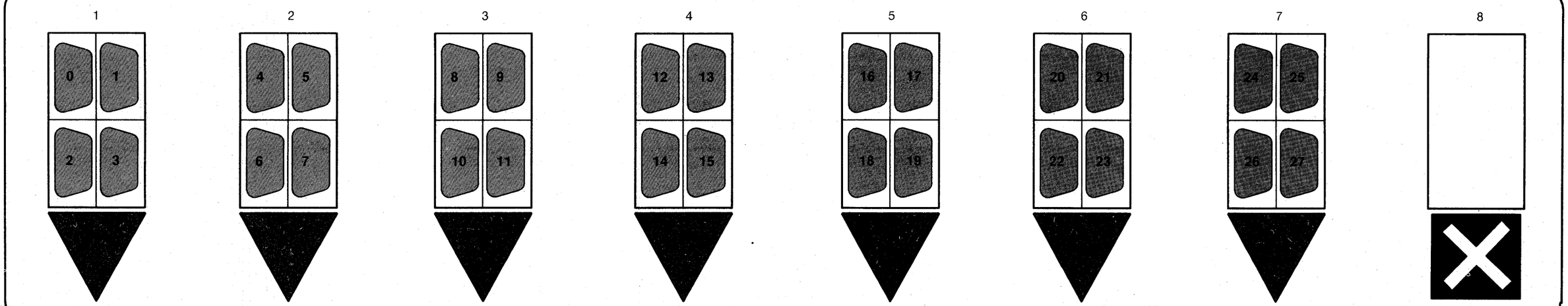
IBM
Part of GA33-0063-1

Setup Sheet

3720 Model: .....
(Model 1 or 2)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of previous order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



0 Cable group or part number: ..... Destination:	1 Cable group or part number: ..... Destination:	4 Cable group or part number: ..... Destination:	5 Cable group or part number: ..... Destination:	8 Cable group or part number: ..... Destination:	9 Cable group or part number: ..... Destination:	12 Cable group or part number: ..... Destination:	13 Cable group or part number: ..... Destination: .....
2 Cable group or part number: ..... Destination:	3 Cable group or part number: ..... Destination:	6 Cable group or part number: ..... Destination:	7 Cable group or part number: ..... Destination:	10 Cable group or part number: ..... Destination:	11 Cable group or part number: ..... Destination:	14 Cable group or part number: ..... Destination:	15 Cable group or part number: ..... Destination: .....

16 Cable group or part number: ..... Destination:	17 Cable group or part number: ..... Destination:	20 Cable group or part number: ..... Destination:	21 Cable group or part number: ..... Destination:	24 Cable group or part number: ..... Destination:	25 Cable group or part number: ..... Destination:		
18 Cable group or part number: ..... Destination:	19 Cable group or part number: ..... Destination:	22 Cable group or part number: ..... Destination:	23 Cable group or part number: ..... Destination:	26 Cable group or part number: ..... Destination:	27 Cable group or part number: ..... Destination:		

Setup Sheet

3720 Model 1 or 2

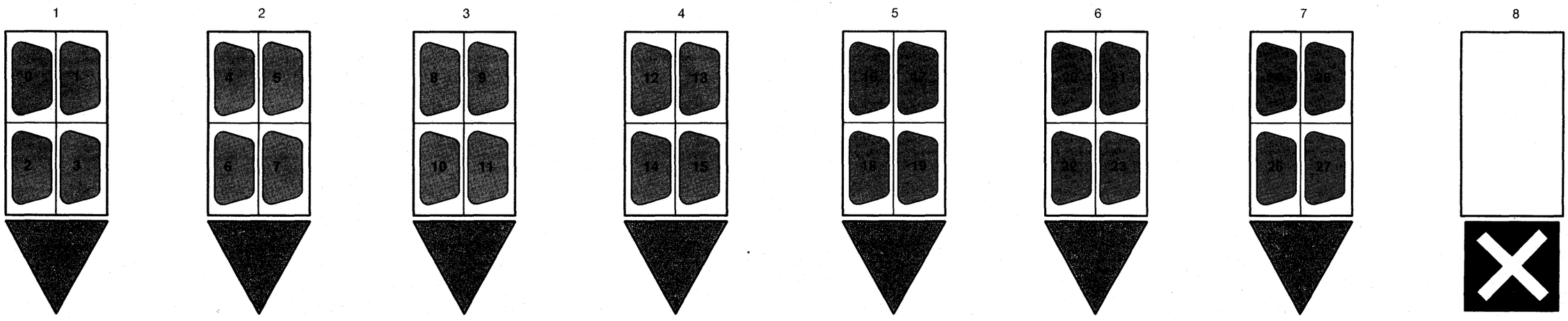
IBM
Part of GA33-0063-1

Setup Sheet

3720 Model: .....
(Model 1 or 2)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of previous order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



0 Cable group or part number: ..... Destination:	1 Cable group or part number: ..... Destination:	4 Cable group or part number: ..... Destination:	5 Cable group or part number: ..... Destination:	8 Cable group or part number: ..... Destination:	9 Cable group or part number: ..... Destination:	12 Cable group or part number: ..... Destination:	13 Cable group or part number: ..... Destination: .....
2 Cable group or part number: ..... Destination:	3 Cable group or part number: ..... Destination:	6 Cable group or part number: ..... Destination:	7 Cable group or part number: ..... Destination:	10 Cable group or part number: ..... Destination:	11 Cable group or part number: ..... Destination:	14 Cable group or part number: ..... Destination:	15 Cable group or part number: ..... Destination: .....

16 Cable group or part number: ..... Destination:	17 Cable group or part number: ..... Destination:	20 Cable group or part number: ..... Destination:	21 Cable group or part number: ..... Destination:	24 Cable group or part number: ..... Destination:	25 Cable group or part number: ..... Destination:		
18 Cable group or part number: ..... Destination:	19 Cable group or part number: ..... Destination:	22 Cable group or part number: ..... Destination:	23 Cable group or part number: ..... Destination:	26 Cable group or part number: ..... Destination:	27 Cable group or part number: ..... Destination:		

Setup Sheet

3720 Model 1 or 2

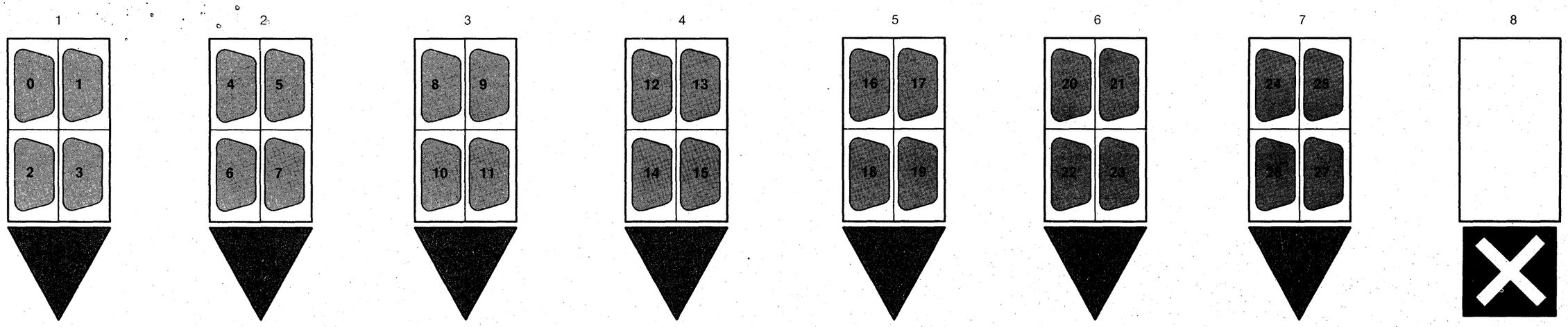
IBM
Part of GA33-0063-1

Setup Sheet

3720 Model: .....
(Model 1 or 2)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of previous order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



0 Cable group or part number: ..... Destination: .....
1 Cable group or part number: ..... Destination: .....
2 Cable group or part number: ..... Destination: .....
3 Cable group or part number: ..... Destination: .....

4 Cable group or part number: ..... Destination: .....
5 Cable group or part number: ..... Destination: .....
6 Cable group or part number: ..... Destination: .....
7 Cable group or part number: ..... Destination: .....

8 Cable group or part number: ..... Destination: .....
9 Cable group or part number: ..... Destination: .....
10 Cable group or part number: ..... Destination: .....
11 Cable group or part number: ..... Destination: .....

12 Cable group or part number: ..... Destination: .....
13 Cable group or part number: ..... Destination: .....
14 Cable group or part number: ..... Destination: .....
15 Cable group or part number: ..... Destination: .....

16 Cable group or part number: ..... Destination: .....
17 Cable group or part number: ..... Destination: .....
18 Cable group or part number: ..... Destination: .....
19 Cable group or part number: ..... Destination: .....

20 Cable group or part number: ..... Destination: .....
21 Cable group or part number: ..... Destination: .....
22 Cable group or part number: ..... Destination: .....
23 Cable group or part number: ..... Destination: .....

24 Cable group or part number: ..... Destination: .....
25 Cable group or part number: ..... Destination: .....
26 Cable group or part number: ..... Destination: .....
27 Cable group or part number: ..... Destination: .....

Setup Sheet

3721 Model 1 or 2

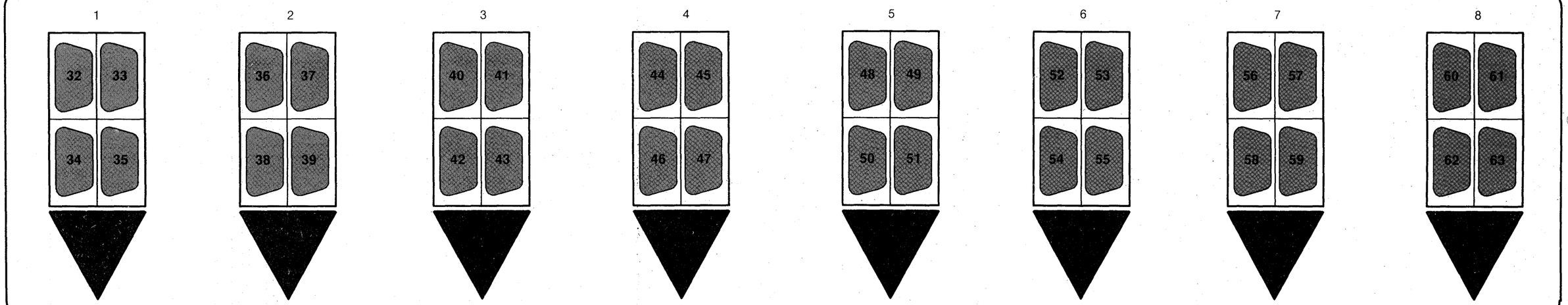
IBM
Part of GA33-0063-1

Setup Sheet

3721 Model: .....
(Model 1 or 2)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of last order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



32 Cable group or part number: ..... Destination:	33 Cable group or part number: ..... Destination:	36 Cable group or part number: ..... Destination:	37 Cable group or part number: ..... Destination:	40 Cable group or part number: ..... Destination:	41 Cable group or part number: ..... Destination:	44 Cable group or part number: ..... Destination:	45 Cable group or part number: ..... Destination: .....
34 Cable group or part number: ..... Destination:	35 Cable group or part number: ..... Destination:	38 Cable group or part number: ..... Destination:	39 Cable group or part number: ..... Destination:	42 Cable group or part number: ..... Destination:	43 Cable group or part number: ..... Destination:	46 Cable group or part number: ..... Destination:	47 Cable group or part number: ..... Destination: .....

48 Cable group or part number: ..... Destination:	49 Cable group or part number: ..... Destination:	52 Cable group or part number: ..... Destination:	53 Cable group or part number: ..... Destination:	56 Cable group or part number: ..... Destination:	57 Cable group or part number: ..... Destination:	60 Cable group or part number: ..... Destination:	61 Cable group or part number: ..... Destination: .....
50 Cable group or part number: ..... Destination:	51 Cable group or part number: ..... Destination:	54 Cable group or part number: ..... Destination:	55 Cable group or part number: ..... Destination:	58 Cable group or part number: ..... Destination:	59 Cable group or part number: ..... Destination:	62 Cable group or part number: ..... Destination:	63 Cable group or part number: ..... Destination: .....

Setup Sheet

3721 Model 1 or 2

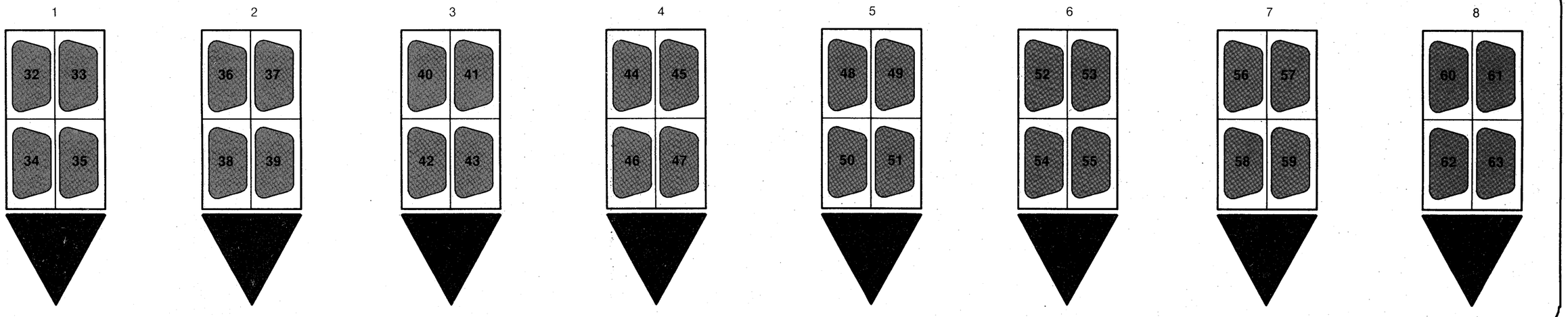
IBM
Part of GA33-0063-1

Setup Sheet

3721 Model: .....
(Model 1 or 2)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of last order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



32 Cable group or part number: ..... Destination:	33 Cable group or part number: ..... Destination:	36 Cable group or part number: ..... Destination:	37 Cable group or part number: ..... Destination:	40 Cable group or part number: ..... Destination:	41 Cable group or part number: ..... Destination:	44 Cable group or part number: ..... Destination:	45 Cable group or part number: ..... Destination: .....
34 Cable group or part number: ..... Destination:	35 Cable group or part number: ..... Destination:	38 Cable group or part number: ..... Destination:	39 Cable group or part number: ..... Destination:	42 Cable group or part number: ..... Destination:	43 Cable group or part number: ..... Destination:	46 Cable group or part number: ..... Destination:	47 Cable group or part number: ..... Destination: .....

48 Cable group or part number: ..... Destination:	49 Cable group or part number: ..... Destination:	52 Cable group or part number: ..... Destination:	53 Cable group or part number: ..... Destination:	56 Cable group or part number: ..... Destination:	57 Cable group or part number: ..... Destination:	60 Cable group or part number: ..... Destination:	61 Cable group or part number: ..... Destination: .....
50 Cable group or part number: ..... Destination:	51 Cable group or part number: ..... Destination:	54 Cable group or part number: ..... Destination:	55 Cable group or part number: ..... Destination:	58 Cable group or part number: ..... Destination:	59 Cable group or part number: ..... Destination:	62 Cable group or part number: ..... Destination:	63 Cable group or part number: ..... Destination: .....

Setup Sheet

3721 Model 1 or 2

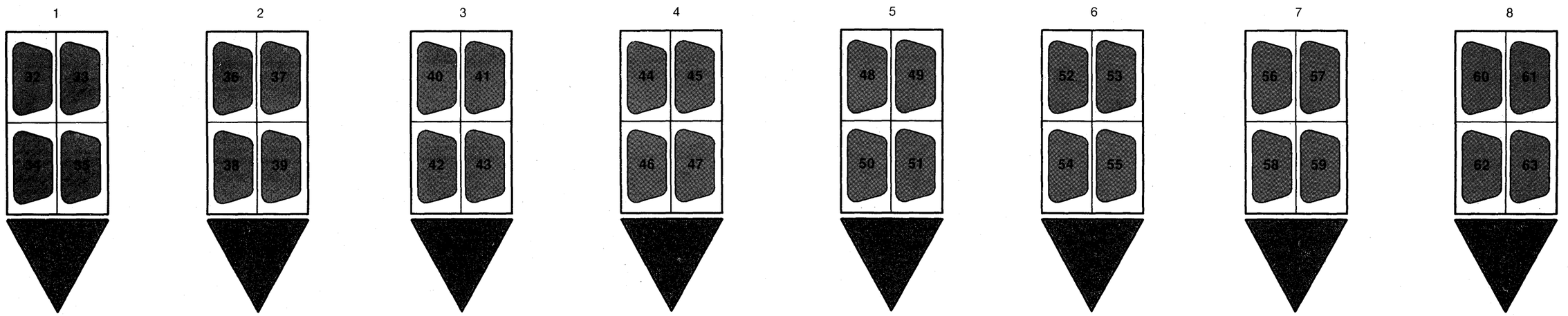
IBM
Part of GA33-0063-1

Setup Sheet

3721 Model: .....
(Model 1 or 2)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of last order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination: .....
Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination:	Cable group or part number: ..... Destination: .....

Setup Sheet

3720 Model 11 or 12

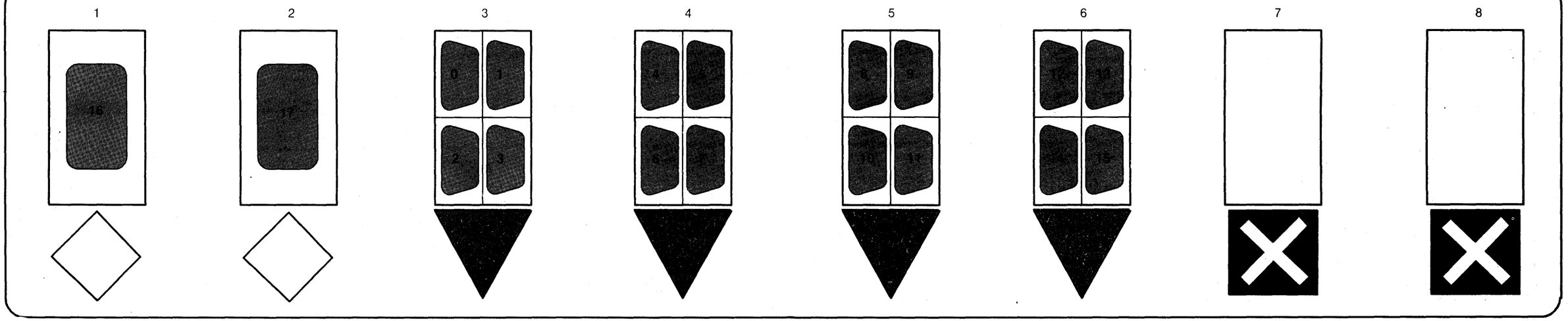
IBM
Part of GA33-0063-1

Setup Sheet

3720 Model: .....
(Model 11 or 12)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of previous order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Cable group or part number: .....
Destination: .....

Setup Sheet

3720 Model 11 or 12

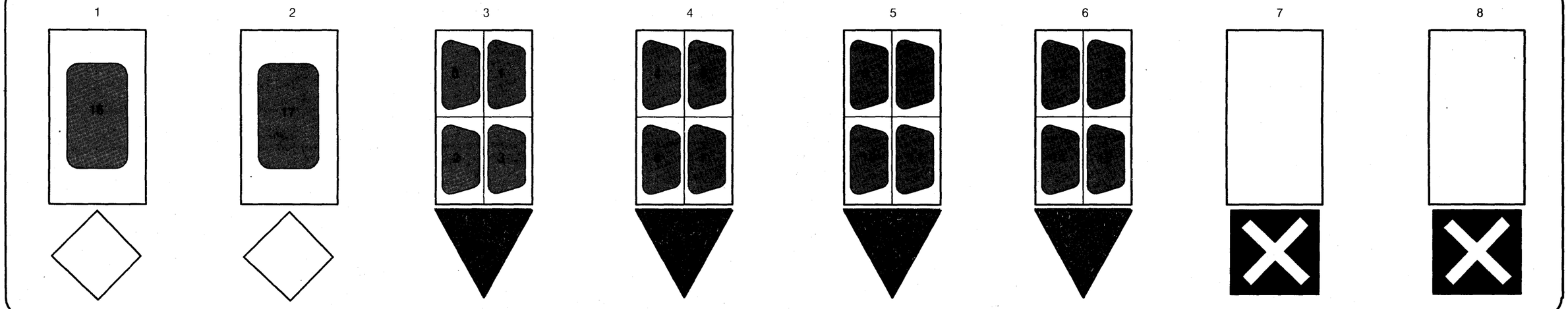
IBM
Part of GA33-0063-1

Setup Sheet

3720 Model: .....
(Model 11 or 12)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of previous order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



Cable group or part number: .....
Destination:
.....
.....
.....
.....

Cable group or part number: .....
Destination:
.....
.....
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Cable group or part number: .....
Destination:
.....
.....

Setup Sheet

3720 Model 11 or 12

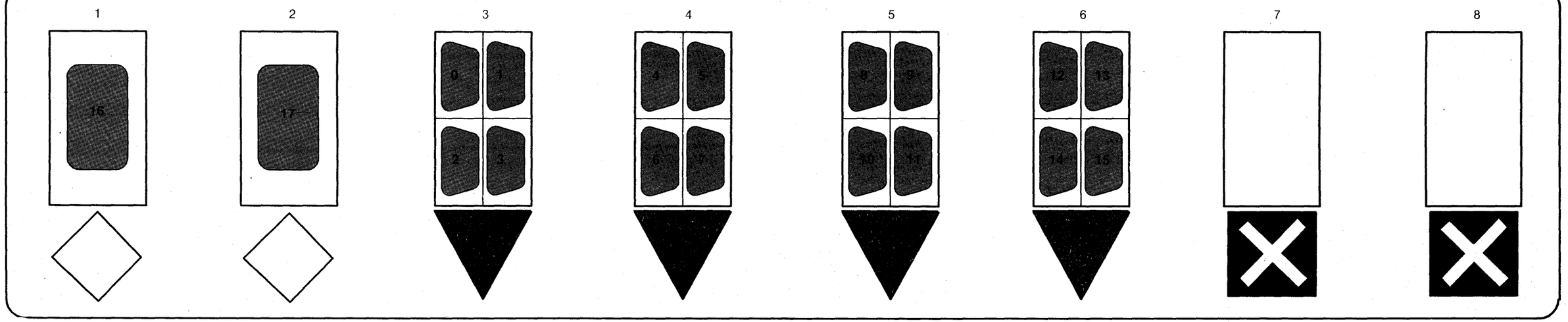
IBM
Part of GA33-0063-1

Setup Sheet

3720 Model: .....
(Model 11 or 12)

IBM
Part of GA33-0063-2

Order number: .....
Date of this order: ..... Date of previous order: .....
Installation address: .....
.....
Company address (if different): .....
.....
Configured by: ..... Telephone: .....
Installation coordinator: ..... Telephone: .....
Version of Configuration Guide used: GA33-0063- ..... Dated: .....
Serial number: .....
Physical unit (PU) name: .....



16 Cable group or part number: .....
Destination: .....

17 Cable group or part number: .....
Destination: .....

0 Cable group or part number: .....
Destination: .....

1 Cable group or part number: .....
Destination: .....

2 Cable group or part number: .....
Destination: .....

3 Cable group or part number: .....
Destination: .....

4 Cable group or part number: .....
Destination: .....

5 Cable group or part number: .....
Destination: .....

6 Cable group or part number: .....
Destination: .....

7 Cable group or part number: .....
Destination: .....

8 Cable group or part number: .....
Destination: .....

9 Cable group or part number: .....
Destination: .....

10 Cable group or part number: .....
Destination: .....

11 Cable group or part number: .....
Destination: .....

12 Cable group or part number: .....
Destination: .....

13 Cable group or part number: .....
Destination: .....

14 Cable group or part number: .....
Destination: .....

15 Cable group or part number: .....
Destination: .....

Appendix H. Link IPL Sheet

This worksheet is a list of the IPL characteristics of up to eight SDLC lines that are to be defined in the link ports file (LKP) at system integration time.

Note: During the execution of this function, the line name is the only link to the related entry in the respective *Requirements Sheet.*

The one or two channels of a Model 1 or 11 can be defined as IPL links at system integration time, in addition to any SDLC telecommunication lines. No additional information concerning channel IPL links is required on this sheet.

Filling in the Link IPL Sheet

The default values assumed during system integration are shown in parentheses on the sheet. It is only necessary to fill in values that are different from the defaults. For further information, see *3720/3721 Extended Services,* GA33-0066.

Line Address: The address is 0 through 27 for a 3720, or 32 through 63 for a 3721. There is no default value.

Full or Half-Duplex: The code is F for duplex or H for half-duplex. The default is F.

Link Interface Options: Each option is enabled by Y for yes, or disabled by N for no.

- NRZI (...), the default is Y.
- DX Facility, the default is Y.
- Switched line, the default is N.
- Answer tone, the default is N.
- Ring indicator, the default is N.

Direct-Attached or Externally-Clocked: The code is D for direct or E for externally. The default is E.

Data Rate: The modem data rate is H for high or L for low. The default is H.

Enable Timer: The timer value is given in 0.1-second intervals, up to four digits. The default is 0022.

SDLC Controller Address: The address is 1 through FE. There is no default value.

Timer Values: Each timer value is given in 0.1-second intervals, up to four digits.

- Disable timer, the default is 0030.
- Link activity timer, the default is 0600

37____Model:	PU Name:
Serial Number:	Order Number:

Individual IPL Link Parameters

(Default)	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Line Address								
Duplex/Half-Duplex (F)								
NRZI (Y)								
DX Facility (Y)								
Switched Line (N)								
Answer Tone (N)								
Ring Indicated (N)								
Direct Attached Externally Clocked (E)								
Data Rate (H)								
Enable Timer (0022)								

Common IPL Link Parameters

SDLC Controller Address	Disable Timer	Link Activity Timer
	(0030)	(0600)

IBM Part of GA33-0063-2

Appendix H. Link IPL Sheet

This worksheet is a list of the IPL characteristics of up to eight SDLC lines that are to be defined in the link ports file (LKP) at system integration time.

Note: During the execution of this function, the line name is the only link to the related entry in the respective *Requirements Sheet.*

The one or two channels of a Model 1 or 11 can be defined as IPL links at system integration time, in addition to any SDLC telecommunication lines. No additional information concerning channel IPL links is required on this sheet.

Filling in the Link IPL Sheet

The default values assumed during system integration are shown in parentheses on the sheet. It is only necessary to fill in values that are different from the defaults. For further information, see *3720/3721 Extended Services,* GA33-0066.

Line Address: The address is 0 through 27 for a 3720, or 32 through 63 for a 3721. There is no default value.

Full or Half-Duplex: The code is F for duplex or H for half-duplex. The default is F.

Link Interface Options: Each option is enabled by Y for yes, or disabled by N for no.

- NRZI (...), the default is Y.
- DX Facility, the default is Y.
- Switched line, the default is N.
- Answer tone, the default is N.
- Ring indicator, the default is N.

Direct-Attached or Externally-Clocked: The code is D for direct or E for externally. The default is E.

Data Rate: The modem data rate is H for high or L for low. The default is H.

Enable Timer: The timer value is given in 0.1-second intervals, up to four digits. The default is 0022.

SDLC Controller Address: The address is 1 through FE. There is no default value.

Timer Values: Each timer value is given in 0.1-second intervals, up to four digits.

- Disable timer, the default is 0030.
- Link activity timer, the default is 0600

Link IPL Sheet

37____Model:	PU Name:
Serial Number:	Order Number:

Individual IPL Link Parameters

(Default)	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Line Address								
Duplex/Half-Duplex (F)								
NRZI (Y)								
DX Facility (Y)								
Switched Line (N)								
Answer Tone (N)								
Ring Indicated (N)								
Direct Attached Externally Clocked (E)								
Data Rate (H)								
Enable Timer (0022)								

Common IPL Link Parameters

SDLC Controller Address	Disable Timer	Link Activity Timer
	(0030)	(0600)

IBM Part of GA33-0063-2

Appendix I. Task-Oriented Bibliography

Changes to the text have not been indicated below. For changes, refer to a particular publication.

Tasks to Be Performed: Before Installation

Network Definition Define the place of a 3720/3721 in the network. **Software Environment Definition** Define needs for IBM host-resident and controller-resident programs.	*3720/3721 Communication Controllers, Introduction,* GA33-0060
Configuration Prepare the order for one or more 3720/3721s with their configurable features, with respect to the traffic load involved. The configuration task is based on filling in sets of worksheets. The Setup Sheet is used at installation or customer setup time to plug in the cables, and remains with the controller. Other worksheets are used for system integration.	*3720/3721 Communication Controllers, Configuration Guide,* GA33-0063
Planning and Site Preparation Prepare for physical installation by planning the site environment, including power requirements. Prepare for physical installation of telephone, modem, and cables for remote console and remote support facility (RSF). Order cables and prepare cable identification labels for setup.	*3720/3721 Communication Controllers, Planning and Site Preparation Guide,* GA33-0061 *IBM Token-Ring Network Introduction and Planning Guide,* GA27-3677

Connection of non-IBM Equipment Evaluate IBM interfaces for connection of non-IBM equipment.	*3720/3721 Communication Controllers, Original Equipment Manufacturer's Information,* GA33-0068
Program Customization Prepare user s application programs. Adapt existing programs.	*3725 and 3720/3721 Communication Controllers, Principles of Operation,* GA33-0013

Tasks to Be Performed: During Installation

3720 Models 2 or 12, 3721 Models 1 or 2 Setup Instructions*	
Set up a 3720 Model 2 or 12 and/or a 3721 Model 1 or 2 and the cables. Perform the checkout (including power on, program loading, diagnostics). Requires Setup Sheets prepared with the *3720/3721 Configuration Guide* and cables pre-identified with labels prepared with the *3720/3721 Planning and Site Preparation Guide*.	*3720/3721 Communication Controllers, 3720 Model 1 Setup Instructions, Feature Addition,* GA33-0110 (can also be ordered as GK2T-0280)**. *3720/3721 Communication Controllers, 3720 Model 11 Setup Instructions, Feature Addition,* GA33-0111 (can also be ordered as GK2T-0281)**.
3720/3721 Modification Remove and/or install communication features.	*3720/3721 Communication Controllers, 3720 Model 2 Setup Instructions, Initial Setup, Feature Addition, Relocation,* GA33-0112 (can also be ordered as GK2T-0282)**.
3720/3721 Relocation Relocation of 3720 Model 2 or 12 and 3721 Model 1 or 2	*3720/3721 Communication Controllers, 3720 Model 12 Setup Instructions, Initial Setup, Feature Addition, Relocation,* GA33-0113 (can also be ordered as GK2T-0283)**. *3720/3721 Communication Controllers, 3721 Models 1 and 2 Setup Instructions, Initial Setup, Feature Addition, Relocation,* GA33-0114

* The 3720 Models 1 and 11 will be installed by IBM personnel.

** Kit also includes GA33-0067.

Tasks to Be Performed: At Integration into the Network

Connect Attached Equipment Connect operator console(s) and RSF IBM terminals Requires Console Sheet prepared with the *3720/3721 Configuration Guide*	
3720/3721 Customization Update files, such as: Passwords Line speeds Link IPL port LIC weights Save disk contents on backup diskettes. Requires Link IPL, Requirements, and Plugging Sheets prepared with the *3720/3721 Configuration Guide*.	*3720/3721 Communication Controllers, System Integration,* GA33-0067* (A copy of this manual should be available at each console)
Initialization Initialize 3720/3721.	

* Is also included in the following kits:

GK2T-0280
GK2T-0281
GK2T-0282
GK2T-0283

Tasks to Be Performed: During Operation

Daily Operation Run everyday applications.	*3720/3721 Communication Controllers, Operator's Guide* GA33-0065 (can be ordered as SK2T-0277)*
Problem Determination Use: • Procedures • Panel hexadecimal codes • Alarms, alerts, and NetView messages	*3720/3721 Communication Controllers, Problem Determination Guide* GA33-0086 (can be ordered as SK2T-0277)* *IBM Token-Ring Network Problem Determination Guide,* SY27-0280 (can be ordered as SX27-3710)*. (A copy of each of these manuals should be available at each console)
Function Management Manage MOSS functions	*3720/3721 Communication Controllers, Extended Services* GA33-0066 (must be ordered as SK2T-0278)** (A copy of this manual should be available at each console)

* SK2T-0277 includes GA33-0065 and GA33-0086 in a common binder.

** SK2T-0278 includes GA33-0066 and binder.

IBM 3720 Models 1, 2, 11, and 12
IBM 3721 Models 1, and 2
Communication Controllers
Configuration Guide
Order No. GA33-0063-2

READER'S COMMENT FORM

We would greatly appreciate your comments about this manual.

Was this manual easy to read and understand?

Did you find the information you required?

Could you follow the instructions?

Was there anything missing?

All suggestions will be considered for the next edition of this manual.
Thank you for taking the time and trouble to fill out this form.

If you would like a reply, please give details overleaf.

No postage stamp necessary if mailed in the USA. (Elsewhere, an IBM office or representative will be happy to forward your comments or you may mail directly to the address in the Edition Notice on the back of the title page.)

Note: Staples can cause problems with automated mail sorting equipment. Please use pressure sensitive or other gummed tape to seal this form.

GA33-0063-2

Reader's Comment Form

Fold and tape | **Please Do Not Staple** | Fold and tape

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 40 ARMONK. N.Y.

POSTAGE WILL BE PAID BY ADDRESSEE:

International Business Machines Corporation
Department 6R1LG
180 Kost Road
Mechanicsburg
PA 17055

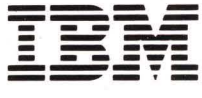
Fold and tape | **Please Do Not Staple** | Fold and tape

If you would like a reply, please print:

Your Name

Company Name _____ *Department* _____
Street Address _____
City _____
State _____ *Zip Code* _____
IBM Branch Office serving you _____

IBM

GA33-0063-2

Printed in USA