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System 11

Configuration Guide

UP-10093

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The System 11 Configuration Guide presents performance and configuration information for the SPERRY System 11 and it's associated peripheral devices.

All System 11 configurations are based on a Master configuration. This guide defines several commonly used subsets (standard configurations) of the Master configuration, and it serves as a central source of pertinent data concerning the hardware configuration requirements for the System 11.

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		RELEASE DATE: February 1984

System 11

Configuration Guide

SPERRY

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1. Introduction

1.1. General

This guide presents performance and configuration information for the SPERRY System 11 and its associated peripheral devices.

All System 11 configurations are based on a Master configuration which defines the type, quantity, and method of connection for all supported equipment. Pre-generated software is provided with the system to support any valid subset of the Master configuration.

Several commonly used subsets of the Master configuration have been defined and are marketed as a unit. These are called standard configurations, and include all necessary equipment and cables to complete an installation. Only communications equipment need be added to achieve a fully operational system.

The information presented in this guide is essentially hardware oriented. As such, this guide cannot fully serve in the capacity of a systems design handbook, but should be helpful as a central source of pertinent data concerning the hardware configuration requirements for the System 11.

This guide is divided into the following sections and appendixes:

- Section 1, Introduction, gives general system information.
- Section 2, I/O System Overview, presents an overview of the I/O System which covers the "building blocks" (components) of the System 11 and how the components fit together.
- Section 3, Master Configuration, presents four pre-configured systems and an explanation of the System 11 Master configuration.
- Section 4, Communications Equipment, discusses the configuration considerations of the System 11 communications equipment.
- Appendix A, Master Configuration for Central Complex, defines the Master configuration for the central complex and gives the mapped addresses for the Master configuration.
- Appendix B, UPI Address Assignments for DCCs, gives the preferred scheme of UPI address assignments for the DCCs.
- Appendix C, Master Configuration for Communications, defines the Master configuration for communications.
- Appendix D, I/O Performance, gives I/O performance information.

1.2. Conventions and Terminology

The following general statements apply throughout this guide:

- Type numbers are not usually preceded by a "T" – the fact it is a Type number is understood. Feature numbers are always preceded by an "F" or "K" to differentiate them from Type numbers. "C" numbers refer to customer selections which are required.

  Example:

  C2925-00

- Type numbers listed usually do not include 50 Hz versions.

- This guide contains hardware channel configuration and channel assignment information.

1.3. Acronyms and Abbreviations

Acronyms and abbreviations are used freely throughout this guide. Review the following list before proceeding through the document.

AR	Processor Arithmetic Unit
BBC	Byte Bus Channel
BDBI	Bi-Directional Byte Interface
BMC	Block Multiplexor Channel
BSC	Binary Synchronous Communications
bpi	bits per inch
CD	Card
CLCU	Communications Line Control Unit
CMS	Communications Management System
CP	Communications Processor
CR	Card Reader
CU	Control Unit
DCC	Disk Controller Channel
DCP	Distributed Communications Processor
DCSS	Direct Connect Single Station
DDP	Distributed Data Processing
DPATS	Data Processing Application Terminal System
EXP	Expansion
FEP	Front-End Processor
FEPI	Front-End Processor Interface
GASIF	Generalized Application Systems Interface
GCR	Group Coded Recording
ICP	Integrated Communications Processor
IOP	Input/Output Processor
IP	Instruction Processor
IPCU	Integrated Printer Control Unit
ISI	Internally Specified Index
ITCU	Integrated Tape Control Unit
KB	1024 Bytes
KW	1024 Words

LM	Line Module
MCB	Message Common Bank
MCT	Master Configuration Table
MSU	Main Storage Unit
NMS	Network Management System
NRZI	Non Return to Zero Indexing
PDN	Public Data Network
RPQ	Request for Price Quotation
S-bus	System bus
SCS	System Control Software
SDLC	Synchronous Data Link Control
SPC	Subsystem Power Control
SSP	System Support Processor
TIP	Transaction Interface Processing
TM	Processor Translation Management
UC	Processor Micro Control
UTS	Universal Terminal System
WCU	Workstation Control Unit

2. I/O System Overview

2.1. General

The System 11 may be configured in one or two system cabinets. The first, or basic cabinet is sufficient to accommodate most system configurations. Multiprocessor systems and large unit processor systems will require the addition of a second, or expansion, cabinet.

The major System 11 components, along with their minimum and maximum quantities are shown in Table 2-1.

Table 2-1. Major System 11 Components

Unit	Basic Cabinet		Expansion Cabinet	
	Min	Max	Min	Max
Instruction Processors	1	1	0	1
Main Storage Units*	1	2	0	2
System Support Processor	1	1	0	0
Byte Bus Channels	1	1	0	1
Disk Controller Channels	1	2	0	3
Block Multiplexer Channels	0	1	0	1

* *This table considers a Main Storage Unit (MSU) as the MSU control and one or two expansion modules. Every MSU control must have a minimum of one expansion or a maximum of two expansions. Four MSU control units are configurable with each containing 1024KW (two expansion modules) of storage.*

2.2. I/O System

The System 11 Input/Output (I/O) operations transfer information between the I/O subsystems and main storage. Once the Instruction Processor (IP) initiates the I/O operation, the Channel Input/Output Processors (Channel IOPs) manage the transfer of information between the I/O subsystem and main storage.

The System 11 Channel IOP consists of three hardware components each providing a single channel capability. The three components are Disk Controller Channel (DCC), Block Multiplexer Channel (BMC), and Byte Bus Channel (BBC).

A Channel IOP is the hardware entity that provides and controls the peripheral subsystem interface. The DCCs, BMCs, and BBCs execute input/output instructions, format and transfer data, generate interrupts and status, and establish priority among input/output instructions, data transfers and interrupts. The type of Channel IOP used depends on the type of peripheral to be attached. The DCC provides a connection for 8436 mass storage disk drives. The BBC allows connection of integrated control units attaching low speed peripherals and communications devices. The BMC allows free-standing subsystems, such as high speed tape, to be attached to the system.

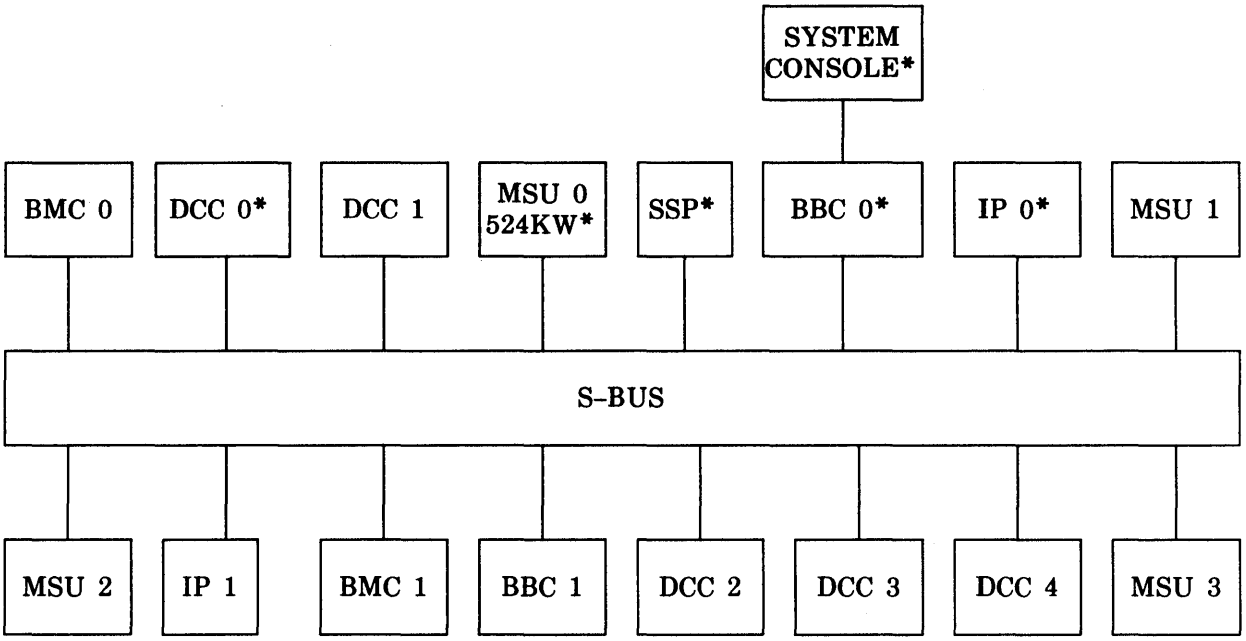
The S-bus is a common bus that provides an interface between all instruction processors, input/output processors, the system support processor and main storage units. Figure 2-1 illustrates the S-bus as the common path by which the above mentioned system components are interconnected.

Table 2-2 provides a summary of peripherals configurable on each Channel IOP and the buffer size of these peripherals. Figures 2-2, 2-3, and 2-4 illustrate the Channel IOPs.

2.3. Communications

Communications on the System 11 may be configured using integrated or free-standing components. The Workstation Control Unit (WCU) attaches directly connected workstations, the Communications Line Control Unit (CLCU) attaches workstations over a communication facility, and the Integrated Communications Processor (ICP) attaches a variety of workstations, terminals, and other processing systems over direct connect and communication facilities. All of these components are integrated into the basic system cabinet, and interface through the BBC.

Free-standing Distributed Communications Processors (DCP) may also be attached to the system for more complex communication requirements.



**Required for a viable system.*

Figure 2-1. System 11 Processing System Block Diagram

Table 2-2. System 11 Peripherals

Channel IOP		Control Unit		Device	
Name	Buffer (KB)	Name	Buffer (KB)	Name	Buffer (KB)
DCC	4	String Controller K3920	0	8436/00/01 Disk K3886-00 Disk	0
BMC	4	5055 Tape CU	0.064 IN 0.064 OUT	UNISERVO 22/24 (0876) UNISERVO 26/28 (0884)	0 0
		5058-14/15 Tape CU		UNISERVO 24 7 Track (0876)	
		Host Adapter	0	DCP/20/40	**
		(CU in Printer)		0776 Printer	0.136
BBC	4	Tape CU* F3674	4	Streaming Tape (3782) UNISERVO 22/24 (0876)	0 0
		Printer CU* F3672	0.132	0789-06/07/08 0776-06/07	0 0
		Console CU F3714	0.256 OUT 3.84 IN	UTS 20C 0425 Printer	0 0.256
		Workstation CU F3955	16	UTS 20L/30L	0
		Diskette Adapter F3720	0	8407 Diskette	0.768
		Card Reader CU* F3673	0.160	0719 Card Reader	0
		ICP 2006-99	6.096	ICP	**
		FEPI Host F3939	0.096	DCP 10	**
		Comm. Line CU F3842	6	4020,4040,CLCU on another system remote terminals	—

* *Multiple-card control units*

** *Buffer is contained within the memory of the ICP or DCP and actual buffer size is determined by Telcon software.*

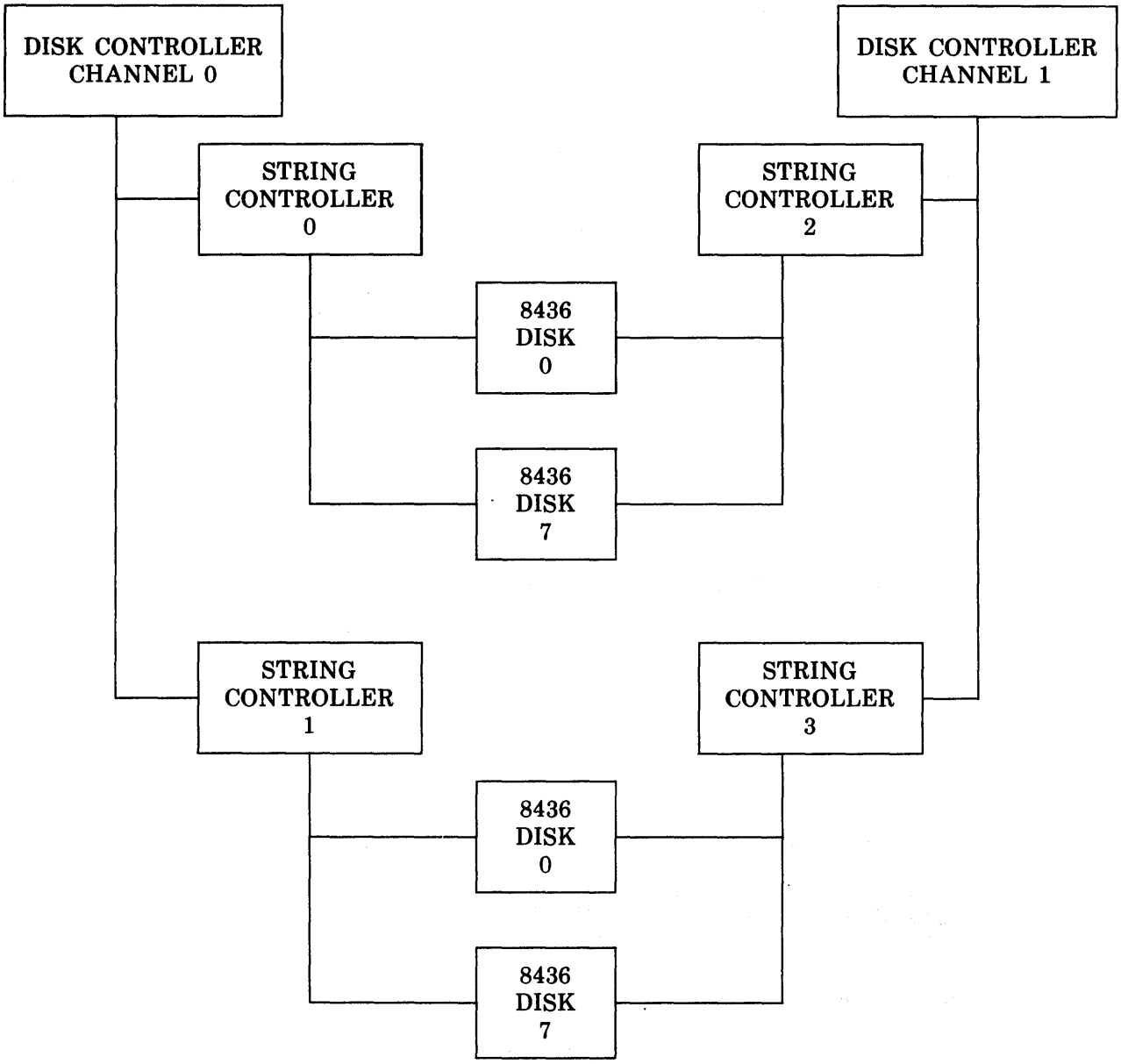
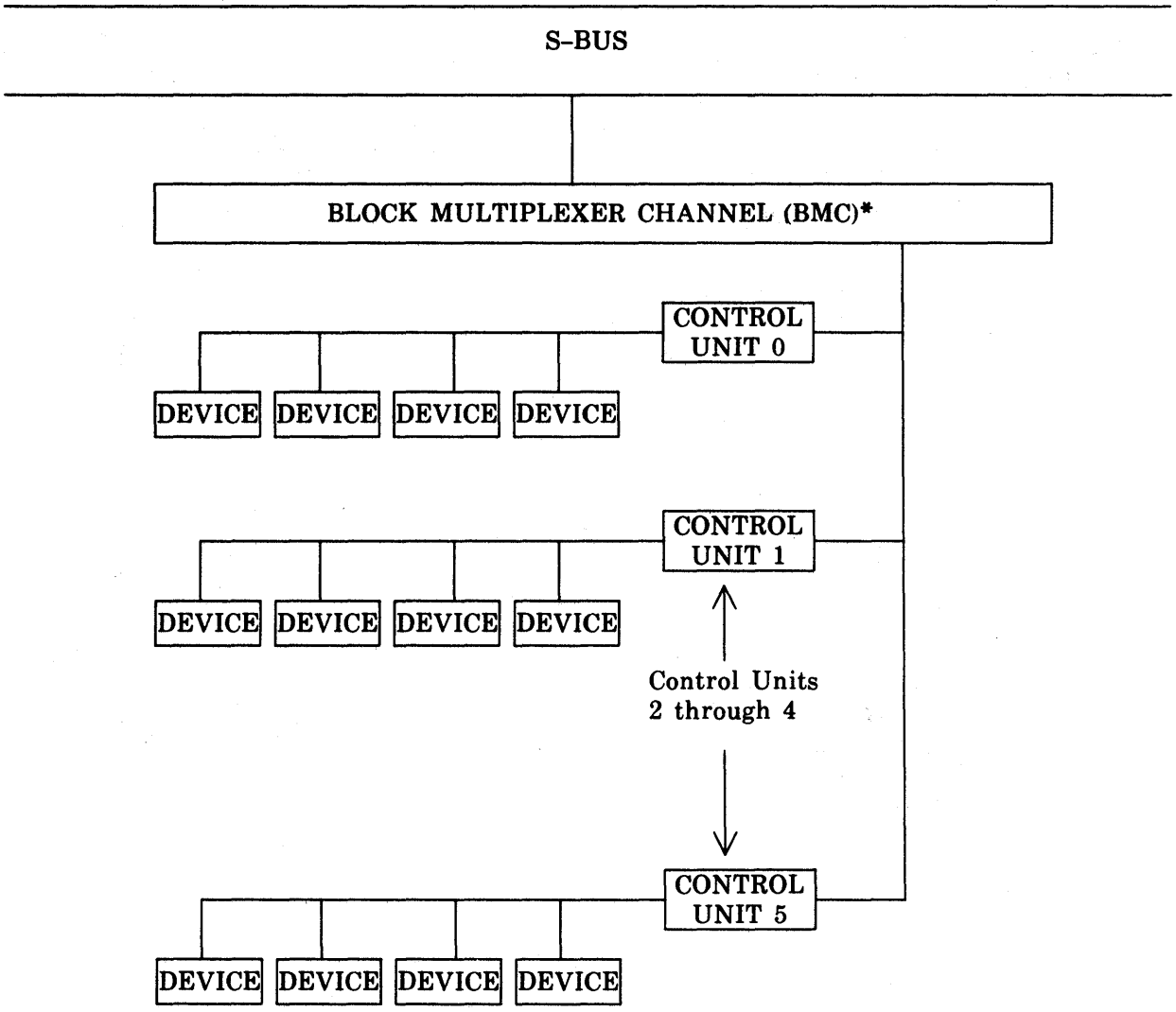
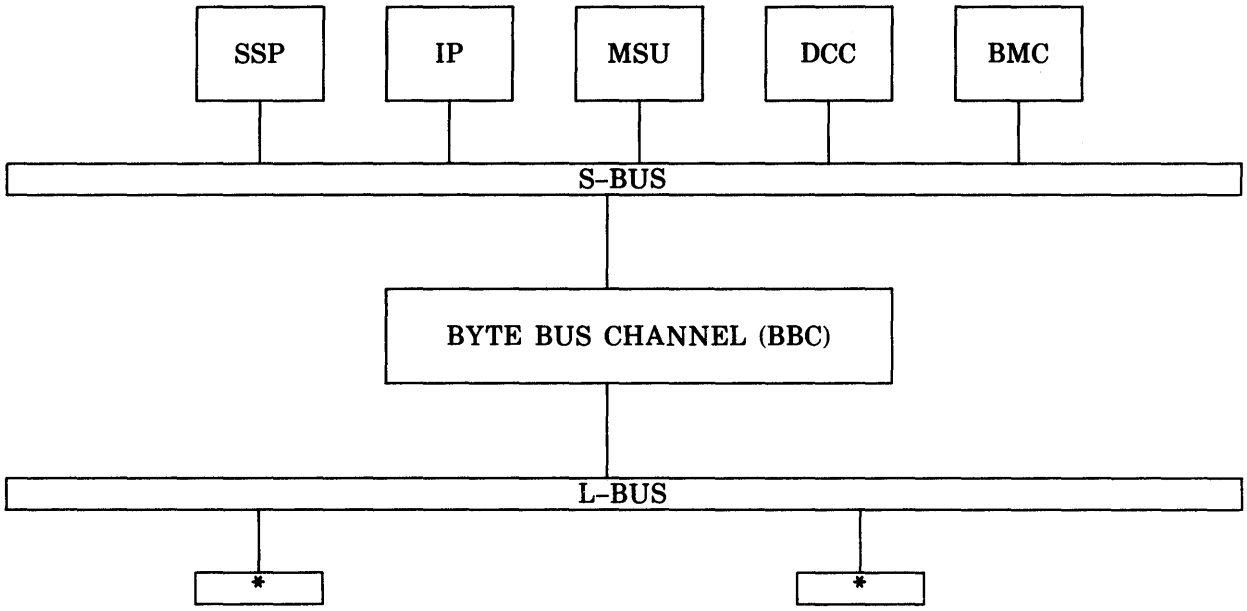


Figure 2–2. Disk Controller Channels and Dual Access Disk Configurations



**A maximum of five control units are supported per channel.*

Figure 2-3. Block Multiplexer Channel Configuration



* *See Table 2-2 for peripherals configurable on the L-bus. These are the same peripherals aligned with the BBC in Table 2-2.*

Figure 2-4. Byte Bus Channel

2.4. Control Unit Definition

A control unit provides the functional capability to adapt the standard form of control provided by a channel to the characteristics of an input/output device. Some of the System 11 control units are housed separately and some are integrated in the system cabinets.

2.5. Physical System Layout

Two cabinets contain most of the System 11 central complex hardware. The exceptions are:

- subsystems (free-standing control units and devices) that are attached to BMCs,
- free-standing communications front-end processors that are attached to BBCs or BMCs, and
- the devices that are connected to the integrated controllers via cable to the BBCs.

The two system cabinets are the Central Complex Cabinet (3065-00) and the Expansion Cabinet (3066-00). The system bus is split between these two cabinets and is considered a single System bus (S-bus). The S-bus provides the communications path and protocol required to control the flow of information between units of the System 11. The basic central complex cabinet is used for small and mid-sized System 11 configurations and requires the expansion cabinet to expand to the maximum System 11 configurations.

Slow-speed peripheral devices and communications processors are attached to the BBC via an L-bus backpanel in the main system cabinet. The L-bus provides a full duplex byte multiplexing interface between the host and the attached peripherals. Peripheral devices and communications processors are attached to integrated controllers positioned in L-bus card slots. Most integrated

controllers are contained on a single card and plug into an L-bus card location. Three integrated controllers attached to the BBC via the L-bus are multiple-card controllers. These are marked in Table 2-2 as multiple-card controllers.

A physical layout is shown in Figure 2-5 and peripheral cable length data is given in Table 2-3.

Table 2-3. Peripheral Cable Length Data

Peripheral Subsystem/Devices	Max Cable Length (feet)
3560 System Console	50
3660 Auxiliary Console	5000
0425 Console Printer*	50
0789/0776 System Printer	50
8436 Disk	200
8407 Diskette	100
5055 Tape Control Unit	200
K4035/1986 DCP/10	200
8597/8596 DCP/20/40	200
0876 Tape Drive on ITCU	50
5058-14/15 Tape Control Unit (7 Track)	200
0719 Card Reader	50

* *The console printer must be connected to the console terminal-the 50 feet is between the terminal and console printer.*

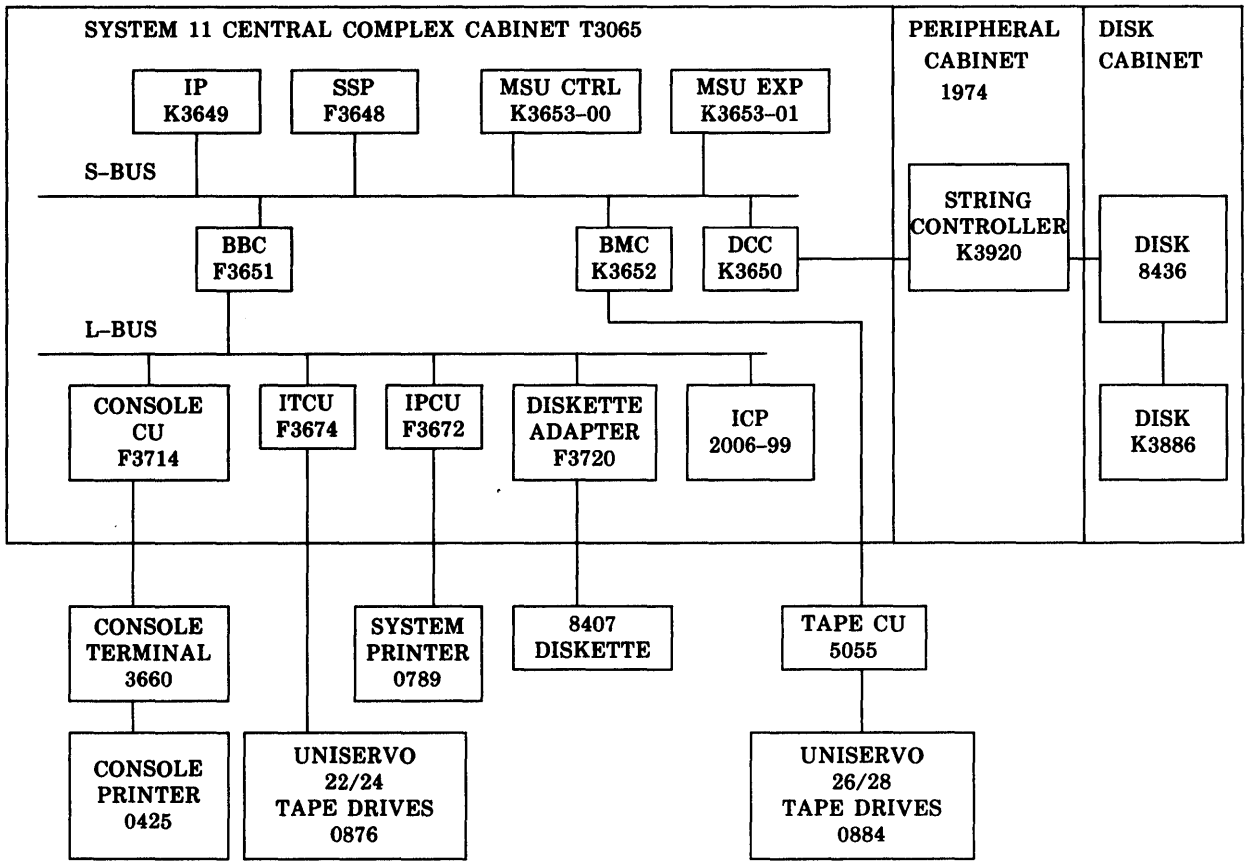


Figure 2-5. Typical System 11 Physical Layout

3. Master Configuration

3.1. General

The System 11 "Master" configuration is simply a very large System 11 configuration (see Appendix A). The Master configuration provides a basis for defining smaller configurations which are subsets of the Master. Associated with the Master configuration is a layout that defines the specific use of every S-bus and L-bus slot. Redefining the use of the slots is not supported (this includes configuration expansions in the field). All subset configurations can be expanded following Master configuration guidelines. There is only one Master configuration definition. A subset configuration is referred to as a "standard" configuration.

Specifically, the Master configuration defines where the Instruction Processors (IPs) go; where the System Support Processor (SSP), Main Storage Units (MSU), S-bus channel IOPs (BBCs, BMCs & DCCs) go; and where the integrated peripheral controllers go in the L-bus. The Master configuration also defines where the expansion cabinet is required and which and how many peripheral devices are supported on the integrated controllers. The Master configuration assigns S-bus slot positions, L-bus slot positions, Universal Processor Interface (UPI) addresses, control unit addresses, and device addresses.

Any System 11 configuration which deviates from the Master configuration requires special instructions to Manufacturing for assembly and requires a custom built operating system. All such systems are processed as RPQ's; they go through full cost estimating and are priced on an individual system basis.

The System 11 Master configuration is best understood by reviewing several tables presented in this section. The components that make up the Master configuration are listed in Table 3-1.

Figure 3-1 provides a physical layout of the bus structure configuration organization. Appendix A presents the totally addressed-mapped Master configuration which lists:

- physical component placement,
- UPI assignments, and
- control unit and device unit address assignments.

Standard configurations have S-bus unit priorities in concurrence with the system application. (Refer to Appendix D for S-bus priority assignment considerations.)

Table 3-1. System 11 Configurator

Component	Type/ Feature Number	T3065-00* Basic Cabinet		T3066-00 Exp. Cabinet		Standalone		Remarks
		Min	Max	Min	Max	Min	Max	
Instruction Processor (IP)	K3649-00	1*	1	0	1			
Main Storage Control (MSU CTL)	K3653-00	1*	2	0	2			
Main Storage-524K (MSU)	K3653-01	2*	4	0	4			2 per MSU CTL
Disk Controller Channel (DCC)	K3650-00	1*	2	0	3			
String Controller**	K3920-00					1*	10	2 per DCC
Disk Cabinet & Drive	T8436-99					1*	40	
Disk Drive Expansion	K3886-00					1*	40	
Byte Bus Channel 0 (BBC 0)	F3651-00	1*	1					
Console Control Unit 0	F3714-00	1*	1					
Console	T3660-39					1*	2	
Console Printer	T0425-88					0	2	
Clock Calendar	F3761-00					0	1	
Subsystem PWR CTL (SPC)**	T2015-99					0	1	
Console Control Unit 1	F3714-00	0	1					
Console	T3660-99					0	1	

Table 3-1. System 11 Configurator (continued)

Component	Type/ Feature Number	T3065-00* Basic Cabinet		T3066-00 Exp. Cabinet		Standalone		Remarks
		Min	Max	Min	Max	Min	Max	
Console Printer	T0425-88					0	1	
Workstation CU (WCU) See Table 3-4 for devices.	F3955-00	0	3					
Communications Line CU (CLCU) See Table 3-4 for devices.	F3842-00	0	3					
Integrated Comm Proc. (ICP)++ See Table 3-3 for Line Modules.	T2006-99	0	1					combined max is 3
Front End Proc I/F (FEPI)	F3939-99		1					
DCP 10***	T1976					0	1	
Printer Control Unit (PCU)	F3672-00	1	2					
Printer - 640 LPM	T0789-93					0+++	2	1 per PCU max
Printer - 1200 LPM	T0776-99					0+++	2	
Diskette Adapter	F3720-00	0	1					
Diskette Drive	T8407-99					0	1	
Diskette Drive Exp.	T8407-02					0	1	

Table 3-1. System 11 Configurator (continued)

Component	Type/ Feature Number	T3065-00* Basic Cabinet		T3066-00 Exp. Cabinet		Standalone		Remarks
		Min	Max	Min	Max	Min	Max	
Tape Control Unit	F3674-00	0+	1					
Streaming Tape Unit**	T2014-99					0	1	
Streaming Tape Exp.**	K3782-00					0	1	
UNISERVO 22/24 Formatter	F3851-00					0	2	
UNISERVO 22/24 Tape	T0876					0	8	any combination 4 per formatter
Byte Bus Channel 1 (BBC 1)++	F3651-99			0	1			
Workstation CU (WCU) See Table 3-4 for devices.	F3955-00	0	2					
Communications Line CU (CLCU) See Table 3-4 for devices.	F3842-00	0	2					combined max is 2
Front End Proc I/F (FEPI)	F3939-99	0	1					
DCP 10***	T1986					0	1	
Card Reader Control Unit	F3673-00	0	1					
Card Reader	T0719-04					0	1	
Tape Control Unit	F3674-00	0	1					

Table 3-1. System 11 Configurator (continued)

Component	Type/ Feature Number	T3065-00* Basic Cabinet		T3066-00 Exp. Cabinet		Standalone		Remarks
		Min	Max	Min	Max	Min	Max	
Streaming Tape Unit**	T2014-99					0	1	
Streaming Tape Exp.**	K3782-00					0	1	
UNISERVO 22/24 Formatter	F3851-00					0	2	
UNISERVO 22/24 Tape	T0876					0	8	any combination 4 per formatter
Block Mux Channel 0 (BMC 0)	K3652-00	0	1					
Tape Control Unit 0 (TCU 0)	T5055-99					0+	1	
UNISERVO 26/28 Tape	T0884					0	8	any combination
Tape Control Unit 1 (TCU 1)	T5055-99					0+	1	
UNISERVO 22/24 Tape	T0876					0	4	any combination
UNISERVO 26/28 Tape	T0884					0	4	any combination
High Speed Printer	T0776					0	1	
7-Track Tape (Control Unit & 2 Drives)	T5058-14					0	1	
DCP 20/40***	T8596/7					0	1	either/or
Block Mux Channel 1 (BMC 1)	K3652-00			0	1			

Table 3-1. System 11 Configurator (continued)

Component	Type/ Feature Number	T3065-00* Basic Cabinet		T3066-00 Exp. Cabinet		Standalone		Remarks
		Min	Max	Min	Max	Min	Max	
Tape Control Unit 2 (Used to Dual CH TCU 0)	T5055-99					0	1	
Tape Control Unit 3 (Used to Dual CH TCU 1)	T5055-99					0	1	
High Speed Printer	T0776					0	1	
7-Track Tape (Control Unit & 2 Drives)	T5058-14					0	1	
DCP 20/40***	T8596/7					0	1	either/or

* *Required for minimum system*
\+ *One tape on either the BMC or BBC is required*
** *Housed in T1974 peripheral cabinet*
++ *If either the ICP or BBC 1 are present, PWR expansion F3725-00 is required*
*** *Software generation required for support.*
+++ *One printer of either type is required.*

NOTE: Software installation and support requires the availability of local or communications connected terminal at the central complex site.

MAIN S-BUS

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
MSU 0 Exp	*MSU 0 Exp	*MSU 0 Control	*IP 0 (UC-Card)	*IP 0 (TM-Card)	*IP 0 (AR-Card)	*BBC 0	*SSP	*Clock	MSU 1 Exp	MSU 1 Exp	MSU 1 Control	DCC 1	*DCC 0	BMC 0

S-BUS EXPANSION

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
MSU 3 Control	MSU 3 Exp	MSU 3 Exp	DCC 4	DCC 3	DCC 2	Clock	BBC 1	BMC 1	IP 1 (UC -Card)	IP 1 (TM-Card)	IP 1 (AR-Card)	MSU 2 Control	MSU 2 Exp	MSU 2 Exp

L-BUS

Integrated Communications Processor										BBC 1										BBC 0										SSP/BBC Switched			SSP Only	
36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Line Module	Line Module	Line Module	Line Module	Line Module	Line Module	Line Module	FEPI Remote	ICP Store Exp	ICP IP	L-Bus Adapter	Card Reader CU 0	Card Reader CU 0	WCU 4 or CLCU 4	WCU 3 or CLCU 3	FEPI Host	Tape CU 1 CD 3 (82)**	Tape CU 1 CD 2 (81)**	Tape CU 1 CD 1 (80)**	*Tape CU 0 CD 3 (82)**	*Tape CU 0 CD 2 (81)**	*Tape CU 0 CD 1 (80)**	Printer CU 1	Printer CU 1	8407 Diskette Adapter	*Printer CU 0 (77)**	*Printer CU 0 (78)**	WCU 2 or CLCU 2	WCU 1 or CLCU 1	WCU 0 or FEPI Host CLCU 0	*L-Bus Adapter	Remote maint. I/F	Console CU	*Console CU	Auto Dial	*Diskette Interface (BDBI)
0	1	2	3	4	5	6	7	7	-	-	7	7	6	5	4	3	2	1	0	0		2	2	3	4	5	5	6	7	-	8	9	A	C	D
HIGH - - - - - - - LOW										LOW - - - - - - - HIGH										HIGH - - - - - - - - - LOW														

←ADDRESS
←PRIORITY

* *Mandatory - These cards are necessary to operate a viable system. The Integrated Tape Control Unit and its UNISERVO 22/24 tape drives may be an exception. If 5055 tape CUs and UNISERVO 22, 24, 26 or 28 tape drives are configured on the BMC then the ITCU is not needed. Tape units are required as an initialization device thus either type is permissible.*

** *The last two digits of the part number indicate card positions for multiple card control units, i.e., Tape Control Unit 0 card (80) must be in card slot 15 with address 1 for BBC 0, and Printer Control Unit 0 card (77) must be in card slot 11 with address 4.*

NOTE: Card slot positions shown from card side.

Figure 3-1. System 11 Master Configuration Bus Structure

3.2. System 11 Standard Configurations

The Master configuration provides a basis for defining smaller configurations that are subsets of the Master configuration. These subsets are referred to as "standard configurations". All standard configurations follow the S-bus and L-bus layout of the Master configuration and can be expanded following Master configuration guidelines. Table 3-2 presents the standard configurations as defined at the time of publication. These standard configurations are "starting points" which are used to build an actual System 11 configuration.

Table 3-2. System 11 Standard Configurations

Component	Small	Medium	Large	MP*
T3065 Main System Cabinet	1	1	1	1
T3066 Expansion Cabinet	0	0	0	1
K3649 Instruction Processor	1	1	1	2
K3653-00 MSU Control	1	1	1	2
K3653-01 524KW Storage Expansion	2	2	2	4
F3648 System Support Processor	1	1	1	1
F3878 Bi-Directional Byte Interface	1	1	1	1
F3726 L-Bus Adapter	1	1	1	1
F3842 Remote Diagnostic I/F	1	1	1	1
F3714 Console CU	1	1	1	1
T3560 UTS 20C Console	1	1	1	1
F3769 UTS 20C Cartridge	1	1	1	1
F3982 Console Keyboard	1	1	1	1
F3392 Console Processor Module	1	1	1	1
F3906 Console Bezel	1	1	1	1
F3924 Console Logo	1	1	1	1
F3574 Console Tilt/Rotate Base	1	1	1	1
F3699 Console Table	0	1	1	1
F3761 Console Clock	0	1	1	1
F3388 Console Keylock	1	1	1	1

Table 3-2. System 11 Standard Configurations (continued)

Component	Small	Medium	Large	MP*
K3650 Disk Controller Channel	1	2	2	4
K3920 String Controller	1	2	2	4
T8436 Disk Cabinet	1	2	3	4
K3886 Disk Drive	2	4	6	8
F3887 Dual Access	0	4	6	8
T1974 Peripheral Cabinet	1	1	1	2
F3674 Integrated Tape Control Unit	1	1	0	0
T2014 Streaming Tape	1	0	0	0
T0876 UNISERVO 24 Tape Drive	0	2	0	0
F3851 UNISERVO 22/24 Formatter	0	1	0	0
T5055 Tape Controller	0	0	1	2
T0884 UNISERVO 28 Tape Drive	0	0	2	2
F3737 UNISERVO 28 Dual Access	0	0	0	2
F3672 Integrated Printer CU	0	1	1	1
T0789 Printer	0	1	1	1
F3572 Printer Interface	0	1	1	1
F3651 Byte Bus Channel	1	1	1	1
K3652 Block Multiplexer Channel	0	0	1	2

**MP = Multiprocessor*

3.3. Master Configuration for Communications

The Master Configuration defines the supported configurations of integrated Workstation Control Units (WCU), Communications Line Control Units (CLCU), and the Integrated Communications Processor (ICP). These configurations are supported by pre-generated versions of System 11 software (EXEC, CMS 1100, MCB, and Telcon. Any hardware configuration that is a true subset of the Master configuration can be supported via standard versions of these software packages that will be included on the basic software tape. System generation runs are avoided and network configuration tasks are reduced to a few simple online keyins to condition the software for a specific subset of the Master configuration.

If a freestanding Distributed Communications Processor (DCP) is added to the configuration, a system generation is required to define the communications complex attached through the DCP.

Even though the full Master configuration will be defined in the configurations of standard software (EXEC, CMS 1100, MCB, and Telcon) various other restrictions are applied to restrict actual implementations to small subsets of the total defined configuration. These restrictions are described in 3.3.2.

The Master configuration provides for one CLCU remote maintenance interface (see 4.2.3 for detail). In addition, the Master configuration supports up to five Workstation Control Units (WCU) or Communications Line Control Units (CLCU) in any combination. Each WCU is configured to support up to 16 local workstations, either UTS20L or UTS30L in any combination (see 4.2.1 for detail). Each CLCU is configured to support up to 16 drops. These drops may be comprised of up to two UTS 4020 or 4040 cluster controllers with up to a maximum of 20 workstations each, plus up to 14 UTS 30 single station terminals. If no cluster controllers are present, then all 16 drops may be utilized for UTS 30 single station terminals. Both the cluster controllers and the single station terminals must use the appropriate software (see 4.2.2 for detail). Devices connected to the WCU or CLCU may not access a network connected via an ICP or standalone DCP.

The Master configuration also supports a single Integrated Communications Processor (ICP) (see Table 3-3). The Master configuration supports up to seven line modules on the ICP (see Table 3-4) where each line module will support either a UDLC local or remote line (the restrictions for the UDLC ICP line modules are identical to those for the CLCU and WCU above), a UNISCOPE line with up to 32 terminals or a Teletype line in either the 1x1 or 4x1 configuration. One of the line modules will also support a UDLC trunk to another Series 1100 host to be used for DDP (file transfer) activities between the System 11 and the other Series 1100 host.

Table 3-3. ICP Configurator

Functional Capability	Telcon PP	Line Module	Type	Terminals or Sessions per Line	Max No. Lines	Max Line Speed
UDLC Trunk to another ICP* or DCP*		F3163-00	MS Loadable	16	1	9600 bps 19.2K bps
UDLC Local Workstation		F3847-00	DCSS	16	7	250K bps
UNISCOPE		F3163-00	MS Loadable	32	7	9600 bps
TTY		F3163-00	MS Loadable	1	7	1200 bps
		F3165-00	4X1 ASYNC	4	7	1200 bps
X.25 PDN		F3163-01	MS Loadable	1 DCP or 64 terminals on 7 Cluster Controllers	1	9600 bps

Table 3-3. ICP Configurator (continued)

Functional Capability	Telcon PP	Line Module	Type	Terminals or Sessions per Line	Max No. Lines	Max Line Speed
BSC Link to IBM Host		F3163-00	MS Loadable	1	1	9600 bps
BSC 3270 Terminals	6276-00	F3163-00	MS Loadable	32	7	9600 bps

* *Requires software generation on one of the systems.*

Table 3-4. Integrated Communications Line Module Configuration

Component	T/F No.	Min	Max	Remarks
Workstation CU (WCU)	F3955-00			
UTS 20L	T3660	0	16	Combined max is 16
UTS 30L	T3575	0	16	
Communications Line CU (CLCU)	F3842-00			
UTS 30SS	T3675	0	16	Combined max is 16
UTS 4020/40 Cluster CTLR*	T8600/1	0	2	
UTS 20W	T3660	0	40	Combined max is 40, 20 per
UTS 40W	T3561	0	40	Cluster CTLR
Remote DCP, ICP**, or CLCU**		0	2	Only one allowed per BBC, and if used may be the only connection on the CLCU.

* *Requires SCS-DDP-4000 Software (T6707-00) in the 4020/40.*

** *Connecting two System 11 systems via the CLCU requires software generation on one of the systems.*

The ICP Master configuration supports some Telcon program products in support of IBM and PDN connectivity. One line module is configured in support of an X.25 PDN. In support of IBM connectivity, Binary Synchronous Communications (BSC) is configured as follows:

BSC - a single BSC line module for System 11 to IBM host connectivity, and up to 7 BSC line modules for System 11 to IBM 3270 terminal

NOTE: See 4.2.4 for a detailed description of the ICP.

3.3.1. Software Support

Software products are pre-conditioned to support any subset of the Master configuration allowing the system to be brought to "ready for use" status without time consuming system generation and configuration processes. The pre-built boot tape and basic software tape contains a set of matched and extensively tested software that will assure very high levels of system stability.

3.3.1.1. Communications Configuration

A single communications configuration is defined to support the System 11 Master configuration. This Master configuration provides full support for demand/IPF, batch, TIP and a single GASIF application (DDP-1100). The standard configuration defines the following major entities:

- 7 Front End Processors (FEPs)
- 1092 Position Identifiers (PIDs)
- 1092 Demand/IPF sessions

Details on these specific entities may be found in Appendix C. The following paragraphs provide some additional insite into the various software components involved in the communications configuration.

3.3.1.2. Executive

The pre-generated Master configuration Executive system recognizes the presence or absence of the primary components of the communications Master configuration. These include BBCs, WCUs, CLCUs and ICPs. The EXEC recognizes each of these components by its hardware identifier and loads it with the required microcode.

The EXEC recognizes BBC 0 as having one of two different configurations based on its hardware identifier (UPI). The difference in the two configurations is in the use of L-bus slot 7. One BBC 0 configuration contains a FEPI master card (providing connection to the ICP), and the other configuration contains either a WCU or CLCU.

The Master configuration includes all interactive and remote batch site-IDs (end user names). These are required to support demand mode, remote batch output and application program SYMing of print files.

3.3.1.3. CMS 1100

A single CMS 1100 absolute together with a standard configuration file describing the communications Master configuration is supplied. This Master configuration provides full support for demand, remote batch, TIP, and a single GASIF application (DDP-1100).

3.3.1.4. Message Control Bank

A single set of the common banks and programs which make up the Message Control Bank (MCB) are supplied. These pieces are configured to support the CMS 1100 configuration and the Executive configuration for TIP, Step Control, and Audit Control.

The MCB's configuration is compatible with the configuration of UDS in the use of TIP files; both components use TIP files, but each uses a set of files separate from the other. The MCB

configuration is also compatible with the application program configuration in the maximum number of programs which use the common banks simultaneously.

3.3.1.5. Telcon Configuration

A single Telcon configuration for the ICP is able to support a wide range of communications environments. Each of the seven line module positions is configured for several different line module types and for several different protocols. Simple online inputs, at installation time, allow initializing of any configured personality for a line to match the specific configuration. This is accomplished with the use of a new Telcon NMS command; INIT.

The Telcon configuration matches the CMS 1100 configuration in assignment of network connection addresses, transport connection identifiers and remote end user names. The System 11 host console is configured as Telcon's Network management console.

3.3.1.6. Telcon Program Products

A number of Telcon program products are available to provide IBM coexistence with BSC protocols, as well as an efficient interface to Public Data Networks (PDNs).

The specification of these non-Sperry host, terminal and communications networks is represented in the standard Telcon configuration. The terminals and/or network interfaces are transparent to the CMS configuration or are represented as standard UNISCOPE devices.

3.3.1.7. Terminals

Support for old mode terminals (UNISCOPE and TTY terminals) is via Telcon software executing in the ICP and provided for in the Telcon Master configuration.

DDP-4000 Terminals, Workstations and Cluster Controllers may be connected to the System 11 either via the integrated control units (WCU and CLCU) or via the ICP. The following requirements apply for either mode of connection:

- Network connection addresses (layer 3) must match those configured within the CMS-1100 or Telcon software that is supporting the connection. The network address used by a DDP-4000 terminal or directly connected workstation must be equal to the device's UDLC drop address multiplied by 4. The four network addressees assigned to each cluster controller will each yield the cluster's UDLC drop address when divided by 4 (remainder ignored).

- Transport connection requests from terminal to host must use an "IDENT-TO" value equal to one of the pre-defined CSU names defined in the CMS 1100 Master configuration.

- Transport connection requests from terminal to host will use generic "IDENT-FROM" value as defined in the Master configuration.

- Session connect request (layer 5) from a terminal will use the terminals remote end user name in the "IDENT-FROM" field.

The following requirements apply only to DDP-4000 terminals, workstation and cluster controllers connected via the ICP:

- Each DDP-4000 device must support a NMS network connection to its ICP using network address 68.

- Each DDP-4000 device must support a NMS session connection between itself and its ICP.

3.3.2. Master Configuration Restrictions for Communications

The Master configuration defined for the System 11 cannot be totally configured on a single system. The primary constraint that will restrict the number of realistic subsets is the need to provide certain minimal levels of system performance. A performance evaluation may be required to assure that it is reasonable in terms of response times, memory requirements, etc.

The Master configuration imposes the following restrictions on all subset implementations:

- The maximum number of active sessions allowed is 100 for transaction or MAPPER, 25 for IPF, 25 for DDP, and 10 for remote batch.
- A maximum of one connection per BBC to a remote DCP or a remote host via a CLCU.
- One ICP per system.

  NOTE: A second FEPI host is configured in the 1100 OS MCT for BBC 1 slot 21, but not supported by the Master configuration. It requires a separate system generation.

- Freestanding DCP/10/20/40 are only partially supported.

  NOTE: DCP/10/20/40 are only partially supported by the Master configuration. They are configured in 1100 OS MCT; however, a separate system generation is needed for communications support of them.

- No support of high speed (greater than 19.2K bps) communications lines.

4. Communications Equipment

4.1. General

This section provides a description of the System 11 communications equipment and presents a guide for configuration and load determination of that equipment.

4.2. Communications Complex

The System 11 communications complex supports three types of integrated communications products plus external attachment to standalone communications processors. Products configured within the System 11 Central Complex Cabinet include:

- Workstation Control Units (WCU),
- Communications Line Control Units (CLCU), and
- Integrated Communications Processors (ICP).

Three Distributed Communications Processors, the DCP/10, DCP/20, and DCP/40 are freestanding units separate from the central complex cabinet. The following paragraphs present a brief description of these components and their functions with a System 11 configuration.

4.2.1. Workstation Control Unit

The Workstation Control Unit (WCU), F3955, is comprised of one L-bus card. Refer to Figure 3-1 for placement of WCUs in BBC 0. The WCU supports a string of up to 16 local workstations connected via 250 KB/second coaxial cable. Workstations supported are the UTS 20L and UTS 30L.

The WCU supports the direct connection of a string of local workstations to the System 11 complex without need for an integrated or freestanding communications processor. The WCU provides the lowest cost solution for connecting workstations to the System 11. It is particularly appropriate for entry level systems that require local workstations but do not require the DCA Networking and gateway functions provided by communications processors. It may also be used to offload the workstation support from a configured communications processor to allow its resources to be devoted to other tasks. Workstations connected via a WCU cannot access a network connected via a DCP or ICP.

The WCU is microprocessor driven with microcode loaded from the System 11 host. No explicit configuration of the WCU is required but the WCU imposes the following addressing requirements on host software and the workstations to which it connects:

- Each of the 16 workstations connected to a WCU must be configured to support a unique UDLC (DCA Layer 2) address.
- Each workstation must use a logical subchannel address (DCA Layer 3) that is equal to 4 times its UDLC address (DCA Layer 2).
- The UDLC and logical subchannel addresses are duplicated for each WCU in the configuration; each WCU supports the same range of UDLC and logical subchannel addresses.
- Host communications software in the System 11 must be configured to support the duplicate sets of logical subchannel addresses used when multiple WCUs (or CLCUs) are configured.

4.2.2. Communications Line Control Unit

The Communications Line Control Unit (CLCU), F3842, is comprised of one L-bus card. Refer to Figure 3-1 for placement of CLCUs in BBC 0.

The CLCU provides an RS-232C interface to a variety of remote devices that can pair to the specific DCA protocols supported by the CLCU. The CLCU pairs to the remote devices using the UDLC protocol at DCA layer 2 and requires that the TS/TN protocol be used between the device and the host at DCA layer 3. Upper layer protocols (4-7) are paired between the host and the remote device and are invisible to the CLCU (see 4.2.3 for exception when supporting remote maintenance functions). Line speeds of up to 19.2K bps are supported. Multi-drop of up to 16 UDLC stations is supported. Devices connected via a CLCU may not access a network connected via a DCP or ICP.

The CLCU provides a low cost solution for support of a single RS-232C communications link. It is particularly appropriate for entry level systems that need to connect to only one or two communications lines. When larger numbers of communications lines are to be supported the ICP should be considered as a more flexible solution.

The following list of Sperry products can be connected via the CLCU to a System 11:

- type 6710 UTS 30 DDP-4000 programmable terminal;
- type 8600 4020 Cluster Controller when executing SCS-DDP-4000 Software, type 6707-00;
- type 8601 4040 Cluster Controller when executing SCS-DDP-4000 Software, type 6707-00;
- DCP/10, DCP/20, and DCP/40 systems executing Telcon software to provide a host-to-host pairing; and
- a CLCU on another System 11 (this provides a direct communications link between two systems). This requires onsite software generation on one of the systems.

The CLCU is microprocessor driven with microcode loaded from the System 11 host. No explicit configuration of the CLCU is required but the CLCU imposes the following addressing requirements on host software and devices to which it connects.

- Each of the several devices (up to 16) that may be multi-dropped on a communications link controlled by a CLCU must be configured to support a different UDLC (DCA Layer 2) address.
- Each device connected to the communications link controlled by a CLCU must use a logical subchannel address (DCA Layer 3) that is equal to 4 times its UDLC address (DCA Layer 2).
- A duplicate set of UDLC and logical subchannel addresses are used for each CLCU.
- Host communications software in the System 11 must be configured to support the specific logical subchannel addresses and to support duplicate addresses when multiple CLCUs (or WCUs) are configured.

4.2.3. Remote Maintenance

Connection to remote maintenance facilities is accomplished by a specialized use of a CLCU that is dedicated to the remote maintenance function. This CLCU is configured onto a portion of the L-bus that is switchable between the SSP and BBC (slots 3, 4 and 5). This CLCU is placed in L-bus card slot 5. Two different sets of CLCU microcode are used dependent on whether control comes from the SSP or BBC. When connected to the BBC the remote maintenance facility interfaces as a demand mode terminal with the same CLCU microcode as described in 4.2.2. When connected to the SSP the remote maintenance facility is allowed to operate as a remote console. For this application the CLCU is loaded with a different microcode package that supports the pairing of all DCA layers 1-7 to the remote facility and supports the console interface to the SSP.

4.2.4. Integrated Communications Processor

System 11 supports one Integrated Communications Processor (ICP), 2006-99. An ICP requires four L-bus cards. These are:

- ICP IP card (K3940)
- ICP Storage Expansion card (F3891-02)
- Front-End Processor Interface (FEPI) remote card (F3882)
- FEPI host card (F3939).

All of these cards are included in the 2006-99 ICP.

The remaining seven L-bus card slots (30 through 36) in the ICP section accommodate the line module cards for the ICP.

The ICP executes Telcon software to provide a wide range of network services and connections to Sperry terminals, selected non-Sperry terminals, Sperry hosts, and other communications processors including the DCP/10, DCP/20 and DCP/40. The Telcon system's extensive communications capabilities provide IBM coexistence in Binary Synchronous Communications (BSC) protocols, as well as efficient interfaces to Public Data Networks (PDN).

The processing power of the ICP is equal to that of the DCP/10. The ICP has no local mass storage facilities but is able to access the mass storage facilities of the System 11 using standard protocols and interfaces provided by Telcon and CMS 1100 software. User code development is

not supported on the ICP because of the lack of directly accessible mass storage, the lack of a ICP maintenance/control panel and the inability to separate (partition) the ICP from the System 11 for test and debug activities. Diagnostics consistent with those provided with the DCP/10 are provided and are effected using the System 11 console.

The following line modules and protocols are supported by the Master configuration on the ICPs:

Feature Number	Protocol Supported	Maximum Line Speed
F3165-00(4X1) RS-232	(Multi-Line Async) TTY	2400 bps
	(Medium Speed Loadable)	
F3163-00 RS-232	BSC	9600 bps
F3163-00 RS-232	TTY, UNISCOPE, NTR, UDLC	19.2K bps
F3163-01 X.21	UNISCOPE, UDLC	9600 bps
F3847	Direct Connect Workstation UDLC	250K bps

4.2.5. Freestanding Communications Processors

Freestanding Communications Processors may be required on a System 11 configuration to support communications throughput rates or complex networking requirements beyond the capabilities of the System 11 integrated communications facilities. A freestanding communications processor is also required if user code is to be developed for execution with the Telcon software package.

The following freestanding communications processors are supported:

- DCP/10 Connection to this communications processor from the System 11 is via a FEPI host card (F3939) on the L-bus and a FEPI remote card (F3882) on the DCP/10 L-bus. The cable connecting the two FEPI cards may be up to 200 feet in length. The DCP/10 is equal to the ICP in processing power and in the number of line modules supported but may have its own mass storage devices and is capable of supporting user code development.

- DCP/20 Connects to the System 11 host via a block multiplexor channel and a BMC card on the S-bus. A host adapter line module must be configured on the DCPs L-bus to interface with the channel. Processing power of the DCP/20 is approximately 1.4 times a DCP/10. The DCP/20 is able to support configurations of up to 47 line modules.

- DCP/40 Connects to the System 11 host via a block multiplexor channel and a BMC card on the S-bus. A host adapter line module must be configured on the DCPs L-bus to interface with the channel. Processing power of the DCP/40 is approximately 5 times a DCP/10. The DCP/40 is able to support configurations of up to 255 line modules.

NOTE: DCP/10/20/40 systems are only partially supported by the Master configuration. They are configured in 1100 OS MCT; however, a separate system generation is needed for communications support of them.

4.3. Performance of Integrated Communications Facilities

Each local Workstation Control Unit supports four transactions per second (one input of 50 characters, one output of 800 characters). Each CLCU supports a 19.2K bps line at 85 percent utilization.

4.4. ICP Performance

Performance capability of the ICP varies based on the functions being performed by its Telcon software. The wide variation of configuration capabilities of the ICP and its Telcon software implies a significant range of performance capabilities.

To provide the extended details for communications configurations reference should be made to the current Telcon Performance Sizing Manual and Telcon Software Release Documentation (SRD).

An ICP supports the following approximate performance capabilities when dedicated to any one of the following activities:

- DCA Terminal Environment - Using a transaction of 50 characters input and 800 output, inquiry/response mode, the ICP supports 9 transactions per second. At maximum throughput rates the ICP will provide a L-bus load of approximately 13K bps between itself and its BBC.

- UNISCOPE 100 (Non-DCA) Terminal Environment - Using a transaction of 50 characters input and 800 output, inquiry/response mode, the ICP supports 2.8 transactions per second. In demand mode, the ICP supports 2.2 transactions per second. Maximum throughput rate between the ICP and BBC would be approximately 6K bps.

- DDP Environment - In this environment, host-to-host transfers occur between two DCA hosts. If message size is assumed to be 4000 bytes, the ICP will support a transfer rate of 2.4 messages per second. This provides an ICP load of approximately 13K bps on the FEPI host.

Appendix A. Master Configuration for Central Complex

The following listing presents the mapped-addresses of the System 11 Master configuration. Refer to Section 3 for a complete description of the System 11 Master configuration.

Table A-1. System 11 Master Configuration Definition

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
10,11,12	IP 0-A*	0		NA	
E4,5,6	IP 1-B	1			
M8	SSP*	7			
M1	BMC 0-A	50	(0) 5055 Tape CU 0	NA	(0-7) UNISERVO 26 or 28 Tape Drives
			(1) 5055 Tape CU 1		(0-3) UNISERVO 22 or 24 Tape Drives
					(4-7) UNISERVO 26 or 28 Tape Drives
			(2) 5058 Tape CU 0		(0-1) UNISERVO 24 Tape Drives
			(3) 0776 Printer CU 0		(0) 0776 Printer
			(4) Host Adapter I/O 0		(0) DCP/20 or DCP/40
			(5-7) Not assigned		
E7	BMC 1-B	51	(0) 5055 Tape CU 2	NA	(0-7) Dual Access with CU 0
			(1) 5055 Tape CU 3		(0-7) Dual Access with CU 1
			(2) 5058 Tape CU 1		(0-1) UNISERVO 24 Tape Drives
			(3) 0776 Printer CU 1		(0) 0776-00/05 Printer
			(4) Host Adapter I/O 1		(0) DCP/20 or DCP/40

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
			(5-7) Not assigned		
M9	BBC 0-A*	47	(A) Console CU 0*	3	(0) Reserved
					(1) UTS 20C Console*
					(2) Console Printer
					(3) Clock Calendar
					(4) UTS 20C Console
					(5) Console Printer
					(6-7) Not Used
					(8) Subsystem Power Controller
					(9-15) Not Used
			(9) Console CU 1	4	(0) Reserved
					(1) UTS 20C Console
					(2) Console Printer
					(3-15) Not Used
			(8) Remote maintenance CLCU	5	Remote maintenance terminal
					(0) Reserved

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
					(2) Read
					(3) Write
			(7) FEPI Host	7	Communications Equipment
					(0) Reserved
					(2) Read
					(3) Write
			(6) WCU 1/CLCU 1	8	Communications Equipment
					(0) Reserved
					(2) Read
					(3) Write
			(5) WCU 2/CLCU 2	9	Communications Equipment
					(0) Reserved
					(2) Read
					(3) Write
			(4) Printer CU 0	10&11	(0) Reserved
					(1) 0789 or 0776 Printer

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
			(3) 8407 Diskette Adapter 0	12	(0) Reserved
					(0-1) 8407 Autoloader Diskette
			(2) Printer CU 1	13&14	(0) Reserved
					(1) 0789 or 0776 Printer
			(1) ITCU 0*	15,16,17	(0) Reserved
					(1) Streaming Tape
					(2-3) Not Used
					(4) Streaming Tape
					(5-7) Not Used
					(8-15) UNISERVO 22/24 Tape Drive and 2 Formatters*
M9	BBC 0-B*	48	(A) Console CU 0*		(0) Reserved
					(1) UTS 20C Console*
					(2) Console Printer
					(3) Clock Calendar
					(4) UTS 20C Console
					(5) Console Printer

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
					(6–7) Not Used
					(8) Subsystem Power Controller
					(9–15) Not Used
			(9) Console CU 1	4	(0) Reserved
					(1) UTS 20C Console
					(2) Console Printer
					(3–15) Not Used
			(8) Remote maintenance CLCU	5	Remote maintenance terminal
					(0) Reserved
					(2) Read
					(3) Write
			(7) WCU 0/CLCU 0	7	Communications Equipment
					(0) Reserved
					(2) Read
					(3) Write
			(6) WCU 1/CLCU 1	8	Communications Equipment

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
					(0) Reserved
					(2) Read
					(3) Write
			(5) WCU 2 CLCU 2	9	(0) Reserved
					(2) Read
					(3) Write
			(4) Printer CU 0	10&11	(0) Reserved
					(1) 0789 or 0776 Printer
			(3) 8407 Diskette Adapter 0	12	(0) Reserved
					(0-1) 8407 Autoloader Diskette
			(2) Printer CU 1	13&14	(0) Reserved
					(1) 0789 or 0776 Printer
			(1) ITCU 0*	15,16,17	(0) Reserved
					(1) Streaming Tape
					(2-3) Not Used
					(4) Streaming Tape

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
					(5-7) Not Used
					(8-15) UNISERVO 22/24 Tape Drive and 2 Formatters*
					(0) Reserved
E8	BBC 1-C	49	(1) ITCU 1	18,19,20	(0) Reserved
					(1) Streaming Tape
					(2-3) Not Used
					(4) Streaming Tape
					(5-7) Not Used
					(8-15) UNISERVO 22/24 Tape Drive
			(4) FEPI Host	21	Communications Equipment
					(0) Reserved
					(2) Read
					(3) Write
			(5) WCU 3/CLCU 3	22	Communications Equipment
					(0) Reserved

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
					(2) Read
					(3) Write
			(6) WCU 4/CLCU 4	23	Communications Equipment
					(0) Reserved
					(2) Read
					(3) Write
			(7) 0719 Card Reader CU 0	24&25	(0) Reserved
					(1) 0719 Card Reader
M2	DCC 0*	**	(0) String Controller	NA	(0-7) 8436 Disk
			(0) String Controller		(8-15) 8436 Disk
M3	DCC 1	**	(0) String Controller	NA	(0-7) 8436 Disk
			(0) String Controller		(8-15) 8436 Disk
E10	DCC 2	**	(0) String Controller	NA	(0-7) 8436 Disk
			(0) String Controller		(8-15) 8436 Disk
E11	DCC 3	**	(0) String Controller	NA	(0-7) 8436 Disk
			(0) String Controller		(8-15) 8436 Disk

Table A-1. System 11 Master Configuration Definition (continued)

S-Bus Slot	S-Bus Unit Physical -Logical	UPI Address	Interface (Address)	L-Bus Slot	Device (Address)
E12	DCC 4	**	(0) String Controller (0) String Controller	NA	(0–7) 8436 Disk (8–15) 8436 Disk

* - *Mandatory component*

** - *UPI address is set for a particular site's configuration. UPI address is based on whether the disks are configured single- or dual-access. Refer to Table A-2 for UPI address selection. Appendix B presents the preferred scheme of UPI address assignments for disk expansion.*

NOTES:

1. *If the DCC has one string controller the device address is 0–7; if two string controllers the device address is 0–15.*
2. *ITCU 0 is not mandatory if 5055 tape subsystem is on a BMC.*
3. *NA - Not Applicable*
   M - Main Cabinet
   E - Expansion Cabinet

Table A-2. UPI Address Selection for Single- and Dual-Access Disks

Single-Access	Dual-Access Pairs
40	40 Paired with 41
42	42 Paired with 43
44	
45	
46	

No two DCCs may have the same UPI address. UPI addresses 40 and 42 can be used for single access provided that UPI addresses 41 and 43 are not used.

Appendix B. UPI Address Assignments for DCCs

The following table presents the preferred scheme of UPI address assignments with regard to single- and dual-access configurations of the DCC/8436 disk subsystem.

Number of DCCs	Disk Congfig.	Physical DCCs	S-Bus Card Slot	UPI to be used
1	1 Single	DCC 0	M2	40
2	1 Dual	DCC 0	M2	40
		DCC 1	M3	41
2	2 Single	DCC 0	M2	40
		DCC 1	M3	42
3	1 Dual	DCC 0	M2	40
	1 Single	DCC 1	M3	41
		DCC 2	E10	42
3	3 Single	DCC 0	M2	40
		DCC 1	M3	42
		DCC 2	E10	44
4	2 Dual	DCC 0	M2	40
		DCC 1	M3	41
		DCC 2	E10	42
		DCC 3	E11	43

Number of DCCs	Disk Congfig.	Physical DCCs	S-Bus Card Slot	UPI to be used
4	1 Dual	DCC 0	M2	40
	2 Single	DCC 1	M3	41
		DCC 2	E10	42
		DCC 3	E11	45
4	4 Single	DCC 0	M2	40
		DCC 1	M3	42
		DCC 2	E10	44
		DCC 3	E11	45
5	2 Dual	DCC 0	M2	40
	1 Single	DCC 1	M3	41
		DCC 2	E10	42
		DCC 3	E11	43
		DCC 4	E12	46
5	1 Dual	DCC 0	M2	40
	3 Single	DCC 1	M3	41
		DCC 2	E10	42
		DCC 3	E11	45
		DCC 4	E12	46
5	5 Single	DCC 0	M2	40
		DCC 1	M3	42
		DCC 2	E10	44
		DCC 3	E11	45
		DCC 4	E12	46

Appendix C. Master Configuration for Communications

This appendix provides supplemental detail for the communications Master configuration described in 3.3. DDP sessions to terminals, workstations, and cluster controllers are configured for future use. DDP sessions to these devices are not currently supported.

C.1. Front End Processor Name Assignments

Front end processor names will be as indicated in Table C-1 (FEPA through FEPG). Each front end processor will be configured with at least one path. Each path will have separate input and output nodes.

Table C-1. Executive Communications Master Configuration

Major Component	Sub Component	Assigned Name
BBC 0 Version A (UPI address = 47)	(5) Remote maintenance CLCU	FEPA
	(7) FEPI host (Connection to ICP)	FEPB
	(8) WCU 1 or CLCU 1	FEPC
	(9) WCU 2 or CLCU 2	FEPD
BBC 0 Version B (UPI address = 48)	(7) WCU 0 or CLCU 0 (All other positions same as BBC 0 version A.)	FEPE
BBC 1 (UPI address = 49)	(21) FEPI host	FEPH
	(22) WCU 3 or CLCU 3	FEPF
	(23) WCU 4 or CLCU 4	FEPG

NOTE: A second FEPI host is configured in the 1100 OS MCT for BBC 1 slot 21 but not supported by the Master configuration. It requires a separate system generation.

C.2. Network Address Assignments (Layer 3)

The 572 configured network connections are allocated as follows:

- CLCUs or WCUs

22 to each of 5 possible CLCUs or WCUs	=	110
1 to the CLCU dedicated to remote maintenance	=	1

- ICP

22 to each of 7 possible ICP Ports serving host sessions for DDP-4000 terminals (cluster controllers, single stations or local workstations)	=	154
16 to each of 7 possible ICP ports serving NMS sessions for DDP-4000 terminals	=	112
1 allocated to all UNISCOPE and TTY terminals connected to the ICP	=	1
16 allocated to the trunk line connection from the ICP to another ICP or DCP	=	16
172 allocated to host interface connection	=	172

- NMS

6 allocated to NMS connections between host and the CLCUs, WCUs, and ICP.	=	6
TOTAL	=	572

The network addresses are assigned as follows:

- Each CLCU and WCU (except the remote maintenance CLCU) is assigned a duplicate set of the following 23 network addresses:

4 thru 7	-	assigned to UDLC link address 1 to support a cluster controller, a single station, or a host to host connection
8 thru 11	-	assigned to UDLC link address 2 to support a cluster controller or a single station
12,16,20, 24,28,32, 36,40,44, 48,52,56, 60 and 64	-	assigned to UDLC link addresses 3 thru 16 respectively to support 14 single stations
68	-	host to CLCU/WCU NMS connection.

- The remote maintenance CLCU is assigned the single network address 4.

- ICP ports supporting DDP-4000 cluster controllers and single stations use duplicate sets of Network addresses that are the same as those defined above for the CLCU and WCU. Network Address 68 is the NMS connection between the ICP and the NMS components in the connected cluster controllers or terminals.

- The ICP trunk line is assigned 16 network addresses starting with address 4 and with each additional address being an increment of 4 above the previous one (4, 8, 12, 16, etc.).

- The ICP connection to the System 11 host will support the following set of 172 network addresses:

1 thru 22	-	ICP DDP-4000 support for port 1
23 thru 44	-	ICP DDP-4000 support for port 2
45 thru 46	-	ICP DDP-4000 support for port 3
67 thru 88	-	ICP DDP-4000 support for port 4
89 thru 110	-	ICP DDP-4000 support for port 5
111 thru 132	-	ICP DDP-4000 support for port 6
133 thru 154	-	ICP DDP-4000 support for port 7
155 thru 170	-	ICP trunk line
171	-	ICP connected UNISCOPE and TTY terminals
172	-	NMS connection - ICP to host

C.3. Transport Connection Assignments (Layer 4)

The definition of Transport connections is required to support session connections between pre-defined remote end users. The Master configuration will define the following transport connections:

- Four transport connections from System 11 to each DDP-4000 directly connected workstation or single station terminal to support two interactive and one each DDP and remote batch sessions.

- Twenty five transport connections from System 11 to each DDP-4000 cluster controller to support 20 interactive, 4 remote batch and 1 DDP sessions.

- One transport connection from the System 11 to the ICP to support all configured UNISCOPE and TTY terminals.

- One transport connection, for NMS sessions, between the host and each FEP (except the remote maintenance CLCU).

- One transport connection, for NMS sessions, between the ICP and each DDP-4000 terminal and cluster controller that is supported by the ICP.

- Sixteen transport connections from the System 11 to other systems via the trunk line supported by the ICP.

Each transport connection is defined with a unique identifier that points to its network connection. The following generic names are used in the "ident to" and "ident from" fields of transport connection requests:

- Terminal Transport Connection Generic Names:

  INT = interactive
  RB = remote batch
  DDP = distributed data processing
  NMS = network management

- Host Transport Connection Generic Names:

  RSDCSU = demand
  RSBCSU = batch
  TIPCSU = Tip
  IPFCSU = distributed data processing
  CSACSU = network management

C.4. End User Identifiers (Layer 5)

A unique end user identifier is defined for each configured end user. An end user definition assigns a unique end user name and associates that name with a layer 4 transport connection that provides a path between that end user and the host. Each transport connection, in turn, points to a layer 3 network address and channel path that completes the information necessary to provide the connection. End user names will be used by applications software when initiating sessions to remote devices and by Telcon and the remote devices when initiating sessions to the System 11. The standard communications configuration will define a total of 1855 remote end user identifiers allocated as follows:

- Each DDP-4000 directly connected workstation or remote single station will be allocated five unique remote end user identifiers to describe two interactive, one remote batch console, one remote batch printer and one DDP user. Sixteen of these devices will be configured on each WCU, CLCU, and ICP line module with the exception of the remote maintenance CLCU which will be configured as a single remote single station. For CLCU and ICP configurations two of these devices share the same end user names as the cluster controllers which may alternately be configured.

- Each DDP-4000 cluster controller (maximum of two per CLCU or ICP line module) will be allocated a total of 25 remote end user identifiers to describe a single DDP, two remote batch consoles, two remote batch printers and 20 interactive end users.

- Each DDP-4000 cluster controller and terminal configured on the ICP will be assigned an additional end user identifier to identify the NMS end user that connects to the NMS component in the ICP.

- Each UNISCOPE or TTY terminal configured on the ICP will be allocated a single interactive remote end user identifier. Thirty two UNISCOPE terminals will be configured per ICP line module. Four TTY terminals will be configured per ICP line module.

- The trunk line connection supported by the ICP is configured to support sixteen DDP remote end users.

Remote end user names will consist of three alpha characters followed by three digits. Each will uniquely identify a single end user and describe its position in the Master network configuration. Figure C-1 indicates the meaning of the characters within each assigned name.

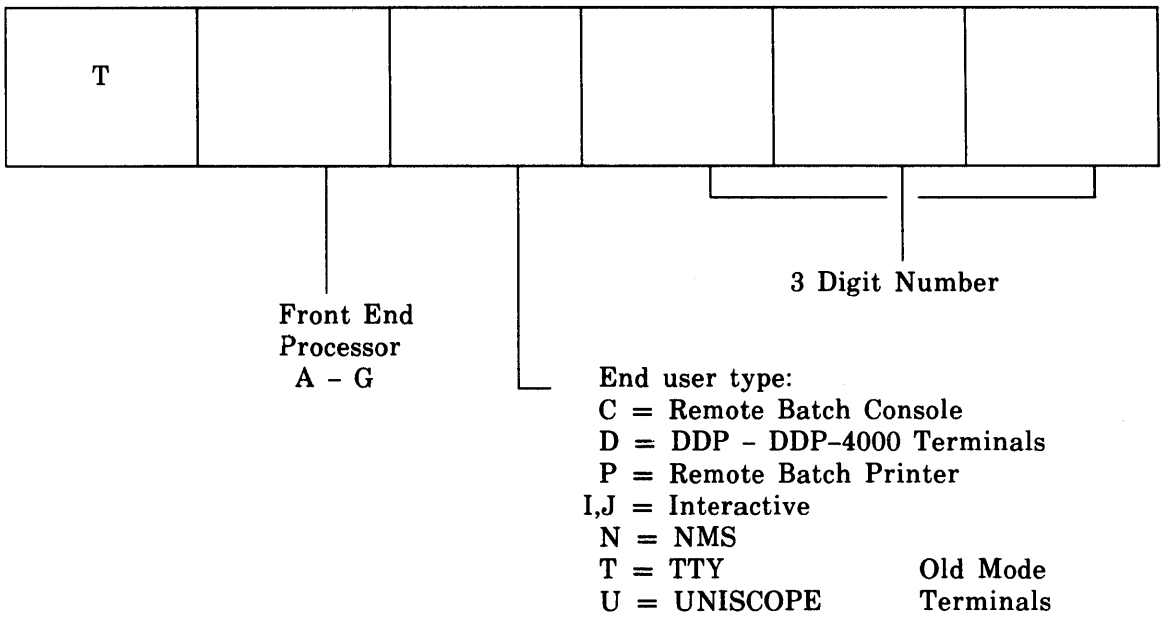


Figure C-1. End User Name Assignment Conventions

C.5. Position Identifiers

The Master configuration defines the relationship between TIP Position Identifiers (PIDs) configured in the EXEC and MCB, and those remote end user names that have been identified as "interactive" end users. PID numbers are assigned sequentially from a base number (to be defined) to the sorted list of "interactive" end user names. No group PIDs, alternate PIDs, or alternate assign PIDs will be configured.

C.6. Communications Configuration Overview

Tables C-2, C-3, and C-4 give basic configuration data used in constructing the Master configuration.

Table C-2. Overview of Master Configuration for Communications

Component	End Users	PIDs	Transports	Networks
CLCU (WCU is a subset)				
Total for each CLCU:	122	70	122	22
5 CLCUs:	610	350	610	110
Remote maint. CLCU				
1 drop w/1 station:	5	2	5	1
Total for all CLCU/WCU:	615	352	615	111
ICP				
Each DDP-4000 line:	138	70	138	38
7 DDP-4000 lines:	966	490	966	266
UNISCOPE Terminals				
7 lines w/32 each:	224	224	1/2	1/2
TTY Terminals				
7 lines w/4 TTYs each:	28	28	1/2	1/2
Host Interface:				172
Trunk Line:	16	—	16	16
Total for ICP:	1234	742	983	455
Host NMS Sessions				
One per FEP except remote maint. CLCU:	6		6	6
GRAND TOTALS:	1855	1094	1604	572

Table C-3. End User Assignments by Type

Component	Interactive	Batch	DDP	NMS
CLCU				
2 Drops W/20 Stations each	42	8	2	
14 Drops W/1 Station each	28	28	14	
Remote maintenance	2	2	1	
NMS to Host (except remote maint.)				1
Total - 5 CLCUs + remote maint.	352	182	81	5
ICP				
DDP-4000				
2 Drops W/32 Stations each	42	8	2	
14 Drops W/1 Station each	28	28	14	
MS connections per line				17
	—	—	—	—
	70	36	16	17
7 DDP-4000 lines	490	252	112	112
UNISCOPE terminals 7 lines @32	224			
TTY terminals 7 lines @4	28			
Trunk			16	
ICP total	742	252	128	112
End Users by Type	1094	434	209	118
Total end users = 1855				

Table C-4. Telcon Master Configuration for ICP

Line Module	Configured Options	Line Module H/W
1	- UDLC Trunk to another ICP or DCP	Med. Sp. Loadable
	- DDP-4000 Clusters or Single Stations	Med. Sp. Loadable
	- DDP-4000 Local Workstations	DCSS L/M
	- UNISCOPE terminals	Med. Sp. Loadable
	- TTY (1)	Med. Sp. Loadable
	- TTY (4)	4X1 Asynch
2 thru 7	- DDP-4000 Clusters or Single Stations	Med. Sp. Loadable
	- DDP-4000 Local Workstations	DCSS L/M
	- UNISCOPE terminals	Med. Sp. Loadable
	- TTY (1)	Med. Sp. Loadable
	- TTY (4)	4X1 Asynch
8	- Interface to Host	FEPI remote

NOTES:

1. *Line speed for trunk and DDP-4000 devices is configured in Telcon as 9600 bps. A line speed of 19.2K bps is also supportable without change to the Telcon configuration but will run with less than maximum efficiency.*
2. *Line speed for UNISCOPE terminal lines is configured in Telcon as 9600 bps.*
3. *Line speed for TTY lines is configured in Telcon as 1200 bps. Other speeds are supportable without change to the Telcon configuration if the "Automatic Data Rate Detection" (ADRD) option is installed.*

C.7. BSC Gateway Configuration

The BSC gateway configuration is:

- 1 BSCTIF connection to the IBM host system
- 1 3270 Inverted BSC to IBM host system
- 7 3270 BSC Terminal line connections

Terminal Combinations

Cluster Controllers	Workstations
1	32
1	16
2	8
4	4
8	2

NOTE: A given line may have any combination with a maximum of 32 workstations.

- Standard UTS configuration is used for UTS/3270 emulation.
- IBM BSC configuration must be updated to reflect the actual/virtual configuration in support of the 3270 BSC Inverted Link.
- Specific Cluster Controller/Workstation support is limited to that specifically supported by the Telcon 3270 BSC program products.

C.8. PDN Gateway Configuration

The PDN gateway configuration is:

- 1 - PDN line connection (9600 bps)
- 1 - Remote DCP defined
- 8 - Remote PDN UTS-4000 Cluster Controller (8 Workstations, 1 Printer, and 1 Diskette per cluster)
- Certain configuration parameters must be modified per customer:
  - Data Terminating Equipment (DTE) address ("DTEADR" parameter on "DTE" statement)
  - Number of actual permanent virtual circuits configured ("PERMVC" parameter on "DTE" statement)
  - Virtual circuit number range per line ("VCGRP" parameter on the "PDNGRP" statement)
  - Actual network being attached ("NETWORK" parameter on the "PDNGRP" statement)
  - LEVEL 3 Packet and window size ("PAKSIZ" and "LEVEL3" parameters on the "DTETYPE" statement)

Appendix D. I/O Performance

D.1. General

The System 11 I/O system has three special purpose single Channel Input/Output Processors (IOPs). They are:

- Byte Bus Channel (BBC)
- Disk Controller Channel (DCC)
- Block Multiplexer Channel (BMC)

Their purpose is to support slow speed peripherals, disk subsystems, and any free standing byte oriented subsystem, respectively. This appendix provides the necessary information to determine which and how many Channel IOPs are needed when configuring a System 11.

Detailed discussions on each of the Channel IOP's performance as well as a discussion on total system performance follows. These discussions are presented as background information to aid in the understanding of how the peripheral device load factors are calculated.

D.2. I/O Processor Hardware Performance

The bandpass of the Channel IOPs and the Main Storage Units must be considered when determining total system performance. Values must be determined that represent upper limits on hardware data transfer capability. Table D–1 presents the System 11 peripheral transfer rates. The performance values provided in this guide are called Load Factors and represent a percentage of Channel IOP and MSU bandpass usage. In the case of BBC operation the Load Factors are based on device transfer rate capabilities on the L–bus. The DCC has one type of device and its MSU load factor is used to determine its impact on MSU bandpass. The BMC can support several types of devices. To calculate its impact on MSU bandpass the fastest device transfer rate is selected.

D.2.1. Main Storage Unit Performance

An accumulation of MSU load factors provides an insight into MSU loading. The calculations are based on given configuration parameters such as a known set of devices and a known number of Channel IOPs. Once the MSU bandpass usage is determined, the priority among I/O processors can be selected. The method of choosing Channel IOP priorities is presented in D.2.6.

Table D-1. System 11 Peripheral Transfer Rates

IOP Name	Control Unit & Type/Feature No.	Device Name	Transfer Rate (KB/sec)
DCC	String Controller K3920	8436-00/01	
		Disk Drive and Cabinet	2100
		K3886-00 Disk Expansion	2100
BMC	T5055 Tape Control Unit	T0876-00/01	
		UNISERVO 22	
		(PE) 1600 bpi/9-track	120
		(NRZI) 800 bpi/9-track	60
	T5055 Tape Control Unit	T0876-02/03	
		UNISERVO 24	
		(PE) 1600 bpi/9-track	200
		(NRZI) 800 bpi/9-track	100
	T5055 Tape Control Unit	T0884-00/01	
		UNISERVO 26	
		(PE) 1600 bpi/9-track	120
		(GCR) 6250 bpi/9-track	469
	T5055 Tape Control Unit	T0884-02/03	
		UNISERVO 28	
		(PE) 1600 bpi/9-track	200
		(GCR) 6250 bpi/9-track	782
	Host Adapter	FEP-DCP-20/40	1000
	0776 Printer	0776-00 (760 lpm)	1.7
		0776-02 (900 lpm)	2.0
		0776-04 (1200 lpm)	2.6
BBC	8407 Diskette Adapter F3720	Diskette Mass Storage	

Table D-1. System 11 Peripheral Transfer Rates (continued)

IOP Name	Control Unit & Type/Feature No.	Device Name	Transfer Rate (KB/sec)
		Single density	31
		Double density	62
	Integrated Tape Control Unit F3674	Streaming Tape K3782	
		1600 bpi/9-track 100 ips	160
		1600 bpi/9-track 25 ips	40
		T0786-00/01 UNISERVO 22	
		(PE) 1600 bpi/9-track	120
		(NRZI) 800 bpi/9-track	60
		T0786-02/03 UNISERVO 24	
		(PE) 1600 bpi/9-track	200
		(NRZI) 800 bpi/9-track	100
	Console CU F3714	UTS 20C	31
	FEPI Host F3939	DCP-10/ICP	13
	Communications Line CU F3842	UTS 30/UTS 20	2
	Workstation Control Unit F3955	UTS Terminals	3
	Integrated Printer Control Unit F3672	0776 Printer-06/07 (1200 lpm)	2.6
		0789 Printer (640 lpm)	1.4
	Integrated Card Reader CU F3673	0719 Card Reader	
		300 cpm	.5

The MSU load factors are expressed as a percentage of MSU bandpass used by a Channel IOP. The MSU bandpass is expressed at the Channel IOP (S-bus) interface. The S-bus cycle time is 108 nanoseconds and five S-bus cycles are required to have data available to a Channel IOP.

NOTE: The MSU needs three S-bus cycle times to have data available on the S-bus, plus two additional S-bus cycles for address and data transfer.

The actual value to be used for calculation of all MSU Load Factors is:

$$\frac{1}{5 \text{ X } (108 \text{ X } 10^{-9} \text{ sec})} = 1851.8 \text{ Kwords/sec}$$

or 1851.8 x 4.5 = 8333 Kbytes/sec.

This value becomes the MSU bandpass as seen by the Channel IOPs at the S-bus interface. It uses one MSU in the configuration.

A theoretical best case MSU bandpass can be calculated using four MSUs with requestors synchronized (no memory contention) so that there are no S-bus cycles wasted. In this case four data word transfers are made every eight S-bus cycles. With processing pre-empted by I/O the resulting bandpass is 4629 Kwords/sec (20,833 Kbytes/sec).

$$\frac{4}{8 \text{ X } (108 \text{ X } 10^{-9} \text{ sec})} = 4629.6 \text{ Kwords/sec}$$

or 4629.6 x 4.5 = 20,833 Kbytes/sec.

D.2.2. Byte Bus Channel Performance

The Byte Bus Channel (BBC) is capable of continuously transferring data between the L-bus and main storage at a rate of 660K bytes per second. The fastest device listed for System 11 BBCs is the 1600 bpi/9-track (PE) UNISERVO 24 (T0876-02/03) tape drive. One UNISERVO 24 tape drive transferring data to the host uses 30 percent of the bandpass. The L-bus load factor is given in percentage of overall BBC bandpass used by a particular device when transferring data through the BBC.

The L-bus load factor of a UNISERVO 24 tape drive on the BBC is the device transfer rate (200KB/sec) divided by the BBC bandpass (660 KB/sec) which equals 30 percent. Table D-2 provides the load factors for the devices supported by the BBC. Two load factor columns are presented in Table D-2. One column gives L-bus load factors and the other column contains MSU Load Factors (see D.2.1). The MSU bandpass consumption caused by a UNISERVO 24 tape drive (1600 bpi) on a BBC is:

$$\frac{200\text{KB}}{8333\text{KB}} \text{ X } 100 = 2.4\%$$

Under the worst case conditions the aggregate bandpass of the BBC can peak at the maximum BBC bandpass (660KB). This is not the normal BBC load but presents an MSU bandpass load of:

$$\frac{660\text{KB}}{8333\text{KB}} \text{ X } 100 = 7.9\%$$

In order to discuss the BBC bandpass calculation a BBC configuration is needed. For this purpose refer to the BBC configuration as presented in the Master configuration definition in Section 3. If all devices defined in the Master configuration are considered and are making L-bus requests for data transfer, the summation of the L-bus device transfer rates is the approximate BBC bandpass usage. This value can be used in calculation of an MSU Load Factor for the BBC. A single BBC system configured as defined in the Master configuration, and the transfer rates of each device is:

FEPI Host	13 KB
WCU 1	3 KB
Printer CU 0	2 KB

CLCU 2	2 KB
8407 Diskette	62 KB
Printer CU 1	2 KB
Tape CU 0	200 KB
Console CU	31 KB
	315 KB

The BBC bandpass load is: $\frac{315}{660} \times 100 = 47.7\%$

The BBC configured as defined above presents an MSU load of:

$$\frac{315\ KB}{8333\ KB} \times 100 = 3.8\%$$

D.2.3. Disk Controller Channel Performance

The Disk Controller Channel (DCC) appears to the software as a word channel with one shared subchannel. The DCC functions as a disk controller as well as a word channel. The DCC is a buffered device, therefore, throughput is expressed in terms of transfers between the S-bus and the DCC data buffer. Rates used are instantaneous and do not reflect such things as gaps and head/cylinder boundaries on the disk or busy condition on the S-bus.

The disk interface transfers two bytes at a time and the S-bus transfers 4.5 bytes at a time. Performance parameters are:

- Controller to DCC data buffer — 3.8 megabytes/sec
- DCC data buffer to controller — 5.0 megabytes/sec
- S-bus to data buffer — 4.6 megabytes/sec - disk write
- DCC data buffer to S-bus — 5.2 megabytes/sec

The DCC is configured with 8436 disk drives that can transfer data at a rate of 2100 Kilobytes/sec. Their contribution to the MSU bandpass usage is:

$\frac{2100KB}{8333KB} \times 100 = 25\%$ of the bandpass which is equivalent to an MSU load factor of .25 for each DCC.

When three DCCs are configured priority considerations on the S-bus must be given the proper attention (refer to D.2.6).

Table D-2 provides the load factors for the devices supported by the DCC.

D.2.4. Block Multiplexer Channel Performance

The key performance indicator for the Block Multiplexer Channel (BMC) is the data throughput rate. The BMC is a buffered device and therefore data throughput is measured between the control unit interface and the data buffer and also between the S-bus interface and the data buffer. Performance parameters are as follows:

- Control unit to Buffer in Format A — 3.0 megabytes/sec
- Buffer to Control Unit in Format A — 3.0 megabytes/sec
- S-bus to Buffer — 4.6 megabytes/sec
- Buffer to S-bus — 5.2 megabytes/sec

The fastest device listed for System 11 BMCs is the 6250 bpi/9-track (GCR) UNISERVO 28 tape drive (0884- 02/03). The UNISERVO 28 tape drive transferring data to the host uses 9.4 percent of the MSU BMC bandpass.

$$\frac{782KB}{8333KB} \times 100 = 9.4\% \text{ (or .094 load factor)}$$

The S-bus priority of BMCs when multiple channel IOPs are configured is highest when over-runnable subsystems are configured.

Table D-2 provides the load factors for the devices supported by the BMC.

D.2.5. S-Bus Combined Channel IOP Load

The fastest devices transferring data for each single Channel IOP (DCC and BMC) is the Channel IOP load placed on the MSU bandpass. For the BBC the summation of all connected devices represents the I/O processor load placed on the MSU bandpass. A configuration with one BMC, and one DCC transferring data from the fastest devices simultaneously would present a worse case MSU bandpass load equal to the summation of the fastest device transfer rates on each Channel IOP. Thus, the DCC device bandpass = 2100KB and the BMC device bandpass = 782KB. The total bandpass load represented is 782KB + 2100KB or 2882KB plus the summation given in D.2.2 (315KB) for the BBC devices. The total single MSU bandpass is 8333KB indicating priority arrangement among Channel IOPs is not critical. The priority among Channel IOPs only becomes important when the MSU load becomes significant (i.e., when the MSU load factor for each Channel IOP approaches 100 percent).

D.2.6. Priority Arrangement Among Channel IOPs

The S-bus priority is arranged by priority switches on the S-bus cards. The Instruction Processors (IPs) are set for lowest priority on the S-bus. The System Support Processor (SSP) is set for highest priority on the S-bus. The rules governing priority arrangement among the Channel IOPs is dependent upon several factors including:

- the number of Channel IOPs configured,
- the type of devices configured (i.e., over-runnable, etc.),
- the frequency of use, and
- the device transfer rates.

Priority among Channel IOPs for small systems (as discussed in D.2.5) is not significant until sufficient Channel IOPs are configured to load the S-bus. Once three or more DCCs are configured, the priority arrangement needs attention. Three DCCs making simultaneous requests for I/O service to the S-bus and MSU would use 75 percent of the MSU bandpass. Fundamental guidelines are to place Channel IOPs with over-runnable devices at high priority. Another consideration is to place the Channel IOP having infrequently used slow speed devices at high priority. Large systems with multiple Channel IOPs should set the priority of BBCs highest, BMCs next highest, and DCCs lowest. Table D-3 illustrates the standard for S-bus unit priority assignments for the Master configuration.

D.2.7. Subsystem Intermix On Block Multiplexer Channels

The types of free-standing subsystems supported on the Block Multiplexer Channels are listed in Table D-1.

Table D-2. Device Load Factors

Bandpass (KB)						
DCC	BMC	BBC	Device Type	Device Transfer Rate (KB)	MSU Load Factor	L-bus Load Factor
3800			8436 Disk	2100	.25	NA
	3000		0884-02/03 (UNISERVO 28)			
			(PE) 1600 bpi	200	.024	NA
			(GCR) 6250 bpi	782	.09	NA
	3000		0884-00/01 (UNISERVO 26)			
			(PE) 1600 bpi	120	.014	NA
			(GCR) 6250 bpi	469	.056	NA
	3000		0876-02/03 (UNISERVO 24)			
			(PE) 1600 bpi	200	.024	NA
			(NRZ) 800 bpi	100	.012	NA
	3000		0876-00/01 (UNISERVO 22)			
			(PE) 1600 bpi	120	.014	NA
			(NRZ) 800 bpi	60	.007	NA
		660	0876-02/03 (UNISERVO 24)			
			(PE) 1600 bpi	200	.024	.30
			(NRZ) 800 bpi	100	.012	.15
		660	K3782 Streaming Tape			
			100 ips (Streaming)	160	.019	.24
			25 ips (Start-Stop)	40	.004	.06
		660	F3939 FEPI Host	13	.002	.02
		660	8407 Diskette	62		
		660	F3714 Console CU	31	.004	.05
		660	F3842 CLCU	2.0*	.0002	.003
		660	F3955 WCU	3.0*	.0004	.005

NA - Not Applicable

** These rates are estimated end-to-end throughput rates that reflect microcode, L-bus, etc., throughput impact.*

Table D-3. S-Bus Priority Switch Setting Assignments

Use	Card Slot**	Priority
SSP	M 8	1
MSU 0	M 13	2
MSU 1	M 4	3
MSU 2	E 3	4
MSU 3	E 15	5
Unused		6
Unused		7
BBC 0*	M 9	8
BBC 1*	E 8	9
Unused		10
BMC 0*	M 1	11
BMC 1*	E 7	12
Unused		13
Unused		14
DCC 0*	M 2	15
DCC 1*	M 3	16
DCC 2*	E 10	17
DCC 3*	E 11	18
DCC 4*	E 12	19
Unused		20
IP 0 TM Card	M 11	21
IP 0 UC Card	M 12	22
IP 1 TM Card	E 5	23
IP 1 UC Card	E 6	24

* *I/O units (specific priority assignments are dependent on system configuration and application).*

** *M - Main Cabinet, E - Expansion Cabinent*

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