Honeywell

FOR INTERNAL USE ONLY

LEVEL 66 & 66/DPS CONFIGURATION GUIDE

SERIES 60 (LEVEL 66 & 66/DPS)

CONFIGURATION GUIDE

FOR INTERNAL USE ONLY

SUBJECT

Information for Configuring the Level 66 Processor, IOM, and System Control Unit

ORDER NUMBER

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PREFACE

This guide provides nearly complete freestanding information for configuring any portion of a Level 66 system except for terminals. Do not use it until you have read the preceding hardware outlines.

Included are the Level 66 systems as modified by announcements of June and September, 1976, and the 66/DPS systems announced in January, 1978.

All configuring rules are given on the basis of use of 4K bit MOS memory chips with 16 pins. Shipment of this memory began in Third Quarter, 1977. Prior 4K bit MOS chips had 22 pins. The 16-pin chip increases the quantity of memory which can be included in cabinets which contain memory.

The guide is constructed to be as self-teaching as possible and to provide for configuring both initial system orders and subsequent add-ons.

Material in this guide dealing with Level 66 mainframes consists primarily of a set of charts and brief summaries which are designed to be largely self-explanatory. The charts provide a foundation based on definitions and fundamental rules. By following the appropriate flowcharts, step charts, and tables you will be able quickly and easily to configure any initial system order or add-on order accurately.

This material is divided into gross functional sections. Be sure to read the Table of Contents before using the configuration material. The Table will show you the pattern of approach used in configuring.

Section I summarizes key general rules and policies which govern configuration of Level 66 systems. Included also are key definitions, some of which are standard or official and others which are unofficial, used only in this material. Before doing any configuring you should always review Section I.

Section II provides a master flowchart which identifies the sequence and components to be considered in configuring mainframes. Detach this flowchart and keep it in view while you use it to access other portions of this material in order to configure easily, completely, and accurately.

The flowchart has page numbers for various sections to refer to for configuration of the component at each level of the flowchart.

Section III explains how to order a whole mainframe initially, where there are no optional replications (like modules) in the mainframe. It guides you to various pages and tables which define the CPS (central processing system) or base type numbers for each possible Level 66 model and mainframe packaging (ICU-based and freestanding).

Section IV covers the aspects for configuring the components needed within each IOM. These components relate to physical IOM channels for peripheral subsystems, the assignment of logical channels (data paths) for each physical channel, and the assignment of the scratchpad feature called DRE (data rate expansion).

Section V provides for configuring optional mainframe functional components - processors, IOMs, SCUs. Use this section for both the initial order and for additional orders which involve these components.

Section VI handles the cases for expanding the size of memory on an installed system.

Sections VII and VIII relate to the simple tasks of configuring motor generator/control sets and console subsystems respectively.

Section IX gives examples of various mainframe configurations. Use these in conjunction with the master flowchart from Section II to get some practice in configuring for virtually every combination possible in mainframes.

Sections X and above deal with individual types of peripheral subsystems and peripheral switches. Included also is configuration of all FNPs.

Contents

SECTION I
General Policies and Definitions

A. Model Restrictions for Level 66 Balanced Multidimensional Family

1. These are indicated for those models where special restrictions apply. Restrictions shown are based on USISG policies. Other organizations may have different policies. All systems are governed by the peripheral subsystem maximums and minimums in Section I. C.

2. 66/Ø5

a. 18 physical IOM channel spaces standard. No additional provided.

b. Magnetic tape -- maximum of one single-channel or dual-channel MTP with 8 tape units of Ø41Ø, Ø412/Ø411 type. No other tape units are allowed.

c. Disk -- maximum of one single-channel MSP with maximum of 8 spindles - MSUØ4Ø2/Ø451/Ø5ØØ units.

d. Unit record -- maximum of one URP and 4 unit record devices.

e. FNP -- INP ("integrated" network processor) is included with CPS6Ø58 version only, and used only for that version. It is supplementable by DN616/6624/6632/667Ø. The INP cannot be deleted from the system. An upgrade kit, DCK66Ø4 is available which removes the 8 line limitation. GRTS required in INP. CPS6Ø5Ø does not include any FNP.

f. Only ICU-based type of mainframe is available.

g. See also Section I. E. for replication options.

B. Model Restrictions for Level 66 Time Sharing Biased Multidimensional Family

1. These are indicated for those models where special restrictions apply. All systems are governed by the peripheral subsystem maximums and minimums in Section I.C.

2. 66/Ø7

   a. 18 physical IOM channel board spaces maximum (and standard).

   b. Magnetic tape -- maximum of one single-channel MTP with 8 tape units of Ø41Ø,Ø412/Ø411 type. No other tape units are allowed. No dual-channel MTP allowed.

   c. Disk -- maximum of two MSPs and system total of two simultaneous disk channels and 8 MSUØ4Ø2 or MSUØ451 or 4 MSUØ5ØØ disk units or mixtures, to a total of 8 spindles.

   d. Unit record -- maximum of one URP and 4 unit record devices.

   e. FNP -- maximum of one DN6616 or DN6624 or DN6632 or DN6670.

   f. Only the ICU-based type of mainframe is available.

   g. Maximum of one DHPØ7Ø1.

   h. Software release 3/I or later required.

   i. See also Section I.E. for replication options.

3. 66/17

   a. 18 physical IOM channel board spaces in IOM.

   b. FNP -- maximum of one DN6624 or DN6632 or DN6616 or DN6670.

c. Software release 3/I or later required.

d. See also Section I. E. for replication options.

4. 66/27

a. 18 physical IOM channel board spaces in IOM.

b. FNP -- maximum of one DN6624 or DN6632 or DN6670 or DN6616.

c. Software release 3/I or later required.

d. See also Section I.E. for replication options.

C. Minimum and Maximum Peripheral Subsystems per Level 66 System

1. Lower speed peripheral subsystems.

		Min	Max
a.	System console (CSU6004)	1 or	(1) (4)
b.	System control center (CSU6005)	1	(1) (4)
c.	Card reader or card reader/punch	1	As needed (5)
d.	Card punch	0	As needed (5)
e.	Printer	1	As needed (5)
f.	DHP0700/0701	0	1-3 (2) (4)
g.	FNP (3).	0	4 or 8 (4/JS)

Footnotes:

1) Every system must contain at least one console subsystem. GCOS supports a maximum of 4 consoles (5 console CRT screens). See console discussion in Peripherals outline.

2) A DHPØ7ØØ may have up to 4 document handlers running simultaneously. A DHPØ7Ø1 may run one or two simultaneously. Depending on Level 66 model and memory size, and amount of work done per document by DHP, it may be possible to use up to 3 per Level 66 system (3 DHPs), and a maximum of 9 document handlers simultaneously.

3) Depends on memory size of Level 66 system.

4) Maximum of one DHPØ7ØØ or DHPØ7Ø1 on 66/Ø7/Ø5.

5) Maximum of 4 unit record devices and one URP in 66/Ø5/Ø7.

2. Higher speed peripherals.

		Min	Max
a.	Magnetic tapes	1-3 (1)	As needed (2)
b.	Disk storage	About 4Ø-5Ø million char (3)	As needed (2)(4)

Footnotes:

1) Check with your GCOS technical support people. One tape unit is normally used for the GCOS Statistical Collection File. Other tape units may be needed for the GCOS system journal file used by FMS for file recovery, for DM-IV/TP or TDS or TPS journals, etc. At software release installation time the availability of a minimum of only one tape unit complicates the System Edit process. Two or three (better three) tape units make the System Edit process easier and simpler. If three tape units are not available for System Edit process an appreciable quantity of disk scratch space must be available.

2) On 66/Ø5 the maximum is one tape and one disk subsystem with 8 tape units and 8 disk spindles respectively. On 66/Ø7 the maximum is 8 tape units, and 8 disk spindles with one or two disk channels.

3) Check with your GCOS technical support people. This figure does not provide for any user data files or user temporary files. It represents the recommended minimum of GCOS residence, GCOS scratch files, SYSOUT file space and the minimum for other Phoenix-supported software.

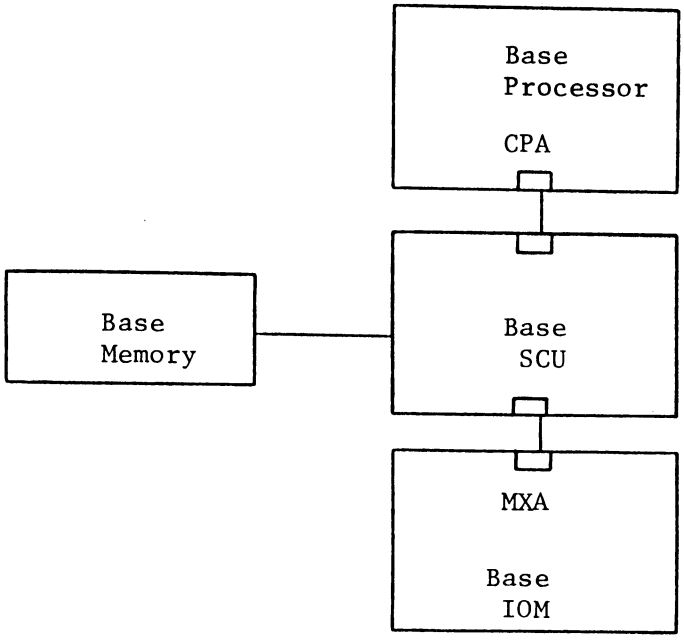
4) You must provide space for GCOS System Scheduler, NPS execution modules, NPS journal files, NPS checkpoint dump areas, and user files. We feel that there should be at least 11ØMC or 75MB of mass storage total in a Level 66 system to allow space for system software and work files, plus the minimum space for user files in a large disk-oriented system such as Level 66.

D. Key Mainframe Definitions

1. For non-DPS models.

a. Base CPS Systems -- non-DPS

This is the configuration which is the heart of each mainframe. It is obtained by use of the CPS number shown on the pertinent Base Mainframe Configurator chart for the model you want to order. The base CPS system type number is the first type number you write on your initial order. All additions at the time of the initial order or after the system has been installed are made to the base CPS system. Base CPS system is also known as base system, or basic system or base mainframe.

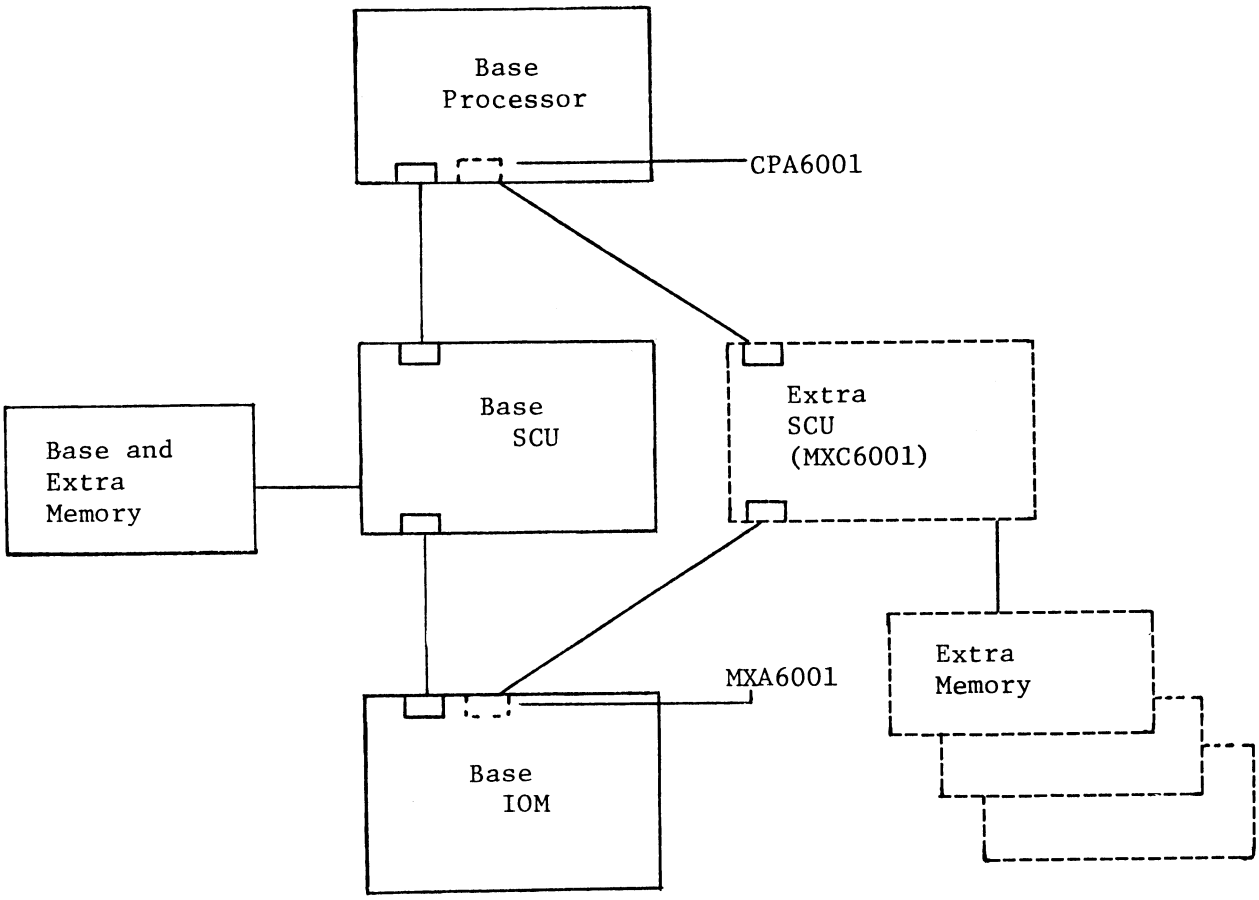


Each CPS number gives you a complete main frame as shown:

One processor, one SCU with a base quantity of memory, one IOM, plus one Central Processor Addressing feature or port (CPA) in base processor and one IOM Addressing feature or port (MXA) in base IOM. Components in base CPS system do not have individual type numbers

b. Net Base System -- non-DPS

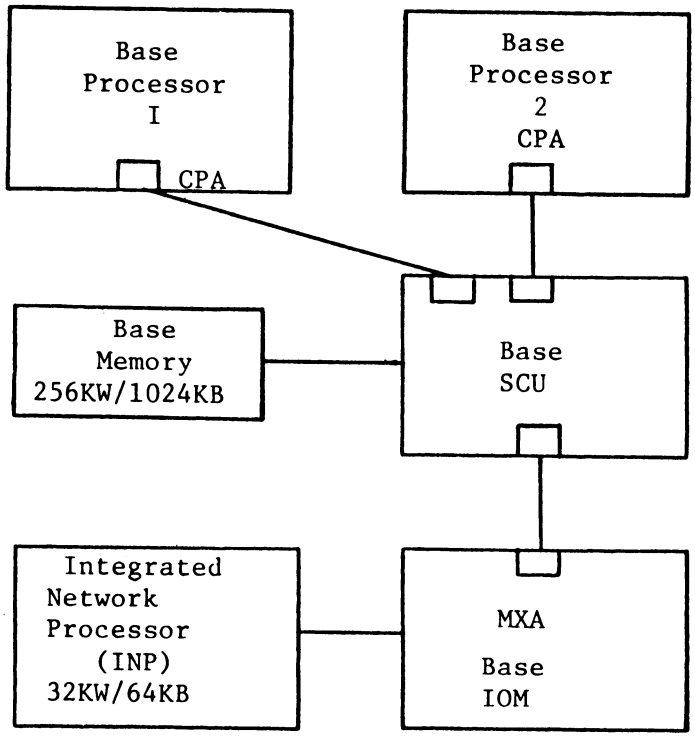
This is the base CPS system plus the second SCU which is required but not included when the system has 768KW/3072KB or 1024KW/4096KB of memory. With the second SCU there must also be one CPA6001 (Central Processor Addressing feature or port) and one MXA6001 (IOM Addressing feature or port). The CPA and MXA are necessary to connect the base processor and base IOM to each extra SCU. Note - when you use the appropriate Base Mainframe Configurator chart for the model and memory size you want, the net base system requirements are included in the type number shown. Note -- the term "net base system" is not an official term and is used only in this guide for purposes of clarifying configuring rules.



2. For DPS Systems.

   a. Base CPS System for DPS -- This is the configuration which is the heart of each basic mainframe. It is obtained by use of the CPS665Ø number shown in Section III.D. The base CPS system type number is the first type number you write on your initial order. All additions at the time of the initial order or after the system has been installed are made to the base CPS system. Base CPS system is also known as base system, or basic system, or base mainframe.

   Components of each CPS 665Ø system for any DPS model:

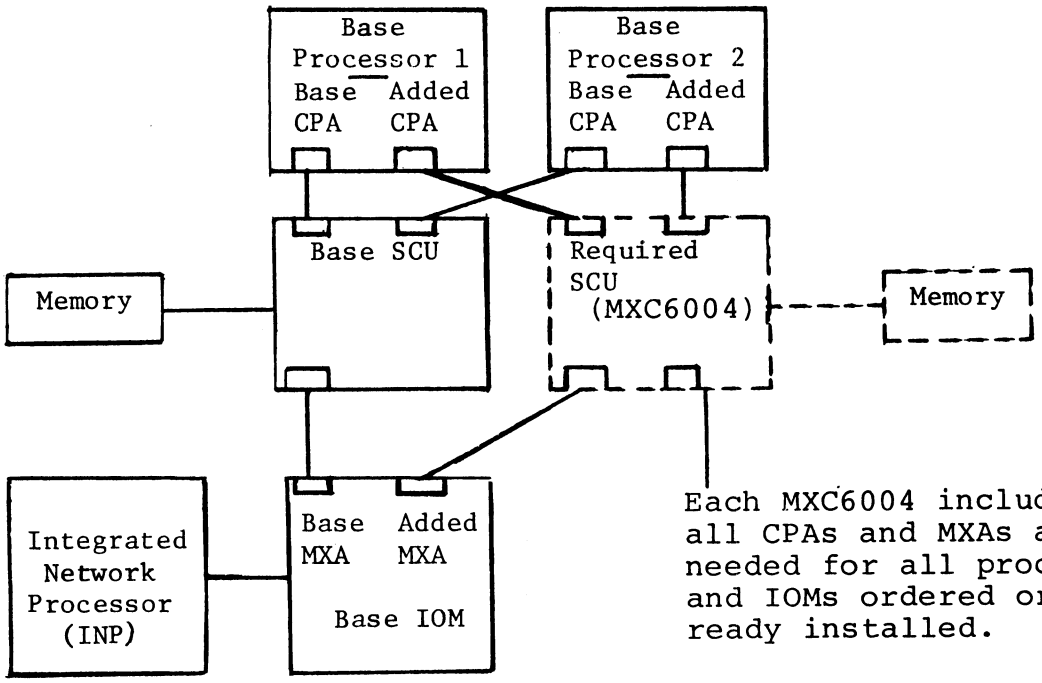


The 66/DPS CPS number gives you a complete mainframe as shown:

Two processors, one SCU with a base quantity of memory, one IOM, plus two Central Processor Addressing features or ports (CPA) in base processor and one IOM Addressing feature or port (MXA) in base IOM. Components in base CPS system do not have individual type numbers.

b. Net Base System for DPS -- This is the base CPS system plus the second SCU which is required but not included when the system has more than 1Ø24KW/4Ø96KB of memory. Note --the term "net base system" is not an official term and is used only in this guide for purposes of clarifying configuring rules.

Components of each net base system for any DPS model:



E. Summary of Mainframe Replication Options

1. Non-DPS systems replication options.

Model and Total Memory	Maximum Selective Processors	Maximum Selective IOMs	SCUs. See also Section F Below			Tandem Systems
			Required	Optional		
66/05	1	None	1	1		RPQ.2 CPS Systems
66/07	1	None	1	1		
				ICU	FS	
66/10 96-512KW 513-1024KW (FS)	1	1	 1 2	 1 -	 1-3 1-2	Yes, 2 CPS systems or module by module
66/17 96-512KW 513-1024KW (FS)	1	1	 1 2	 1 -	 1-3 1-2	Yes, 2 CPS systems or module by module
66/20 128-512KW 513-1024KW (FS)	1	1	 1 2	 1 -	 1-3 1-2	Yes, 2 CPS systems or module by module
66/27 128-512KW 513-1024KW (FS)	1	1	 1 2	 1 -	 1-3 1-2	Yes, 2 CPS systems or module by module
66/40 128-512KW 513-1024KW (FS)	1	1	 1 2	 1 -	 1-3 1-2	Yes, 2 CPS systems or module by module
66/60 192-512KW 513-1024KW (FS)	1 (ICU) 3 (FS)	1 (ICU) 3 (FS)	 1 2	 1 -	 1-3 1-2	Yes, 2 CPS systems or module by module
66/80 256-512KW 513-1024KW (FS)	1 (ICU) 3 (FS)	1 (ICU) 3 (FS)	 1 2	 1 -	 1-3 1-2	Yes, 2 CPS systems or module by module

2. DPS systems replication options.

Model and Total Memory	Maximum Selective Processors	Maximum Selective IOMs	SCUs. See also F below.		Tandem Systems
			Required	Optional	
DPS - 1	0	3			Yes, module by module
1024-4096KB			1	1-3	
4097-8192KB			2	1-2	
DPS - 2	0	3			Yes, module by module
1024-4096KB			1	1-3	
4097-8192KB			2	1-2	
DPS - 3	2 (1=DPS-4, 2=DPS-5)	3			Yes, module by module
1024-4096KB			1	1-3	
4097-8192KB			2	1-2	

3. System controller quantities per system.

System Total Memory	66/05/07 REQ	66/05/07 OPT	66/10/17 REQ	66/10/17 OPT	66/20/27 REQ	66/20/27 OPT	DPS REQ	DPS OPT
384KB/96KW	1	-	-	-	-	-	-	-
512KB/128KW	1	1	1	1	1	1	-	-
768KB/192KW	1	1	1	1-2	1	1-2	-	-
1024KB/256KW	1	1	1	1-3	1	1-3	1	1-3
1536KB/384KW	1	1	1	1-3	1	1-3	1	1-3
2048KB/512KW	1	1	1	1-3	1	1-3	1	1-3
3072KB/768KW[a]	-	-	2	1-2	2	1-2	1	1-3
4096KB/1024KW[a]	-	-	2	1-2	2	1-2	1	1-3
6144KB/1536KW	-	-	-	-	-	-	2	1-2
8192KB/2048KW	-	-	-	-	-	-	2	1-2

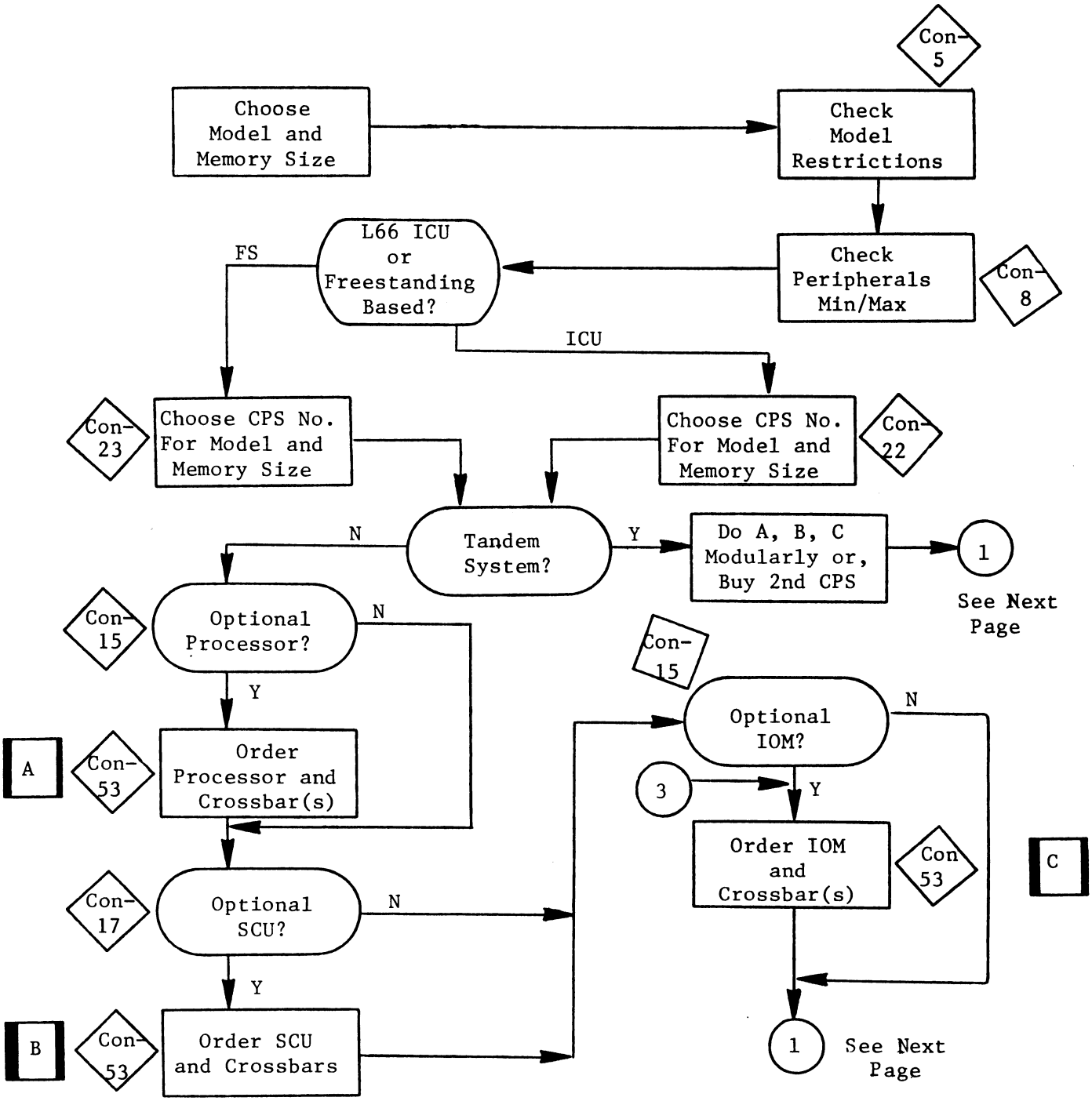
REQ = Quantity of SCUs required to support system total memory size. Main frame CPS number includes one SCU.

OPT = Optional extra SCUs addable selectively. Always freestanding.

[a] = Applies to freestanding versions. Maximum of 2 SCUs in any system containing an ICU.

SECTION II
Master Flowcharts for Mainframe Configuring

A. Initial System Order for Non-DPS Systems



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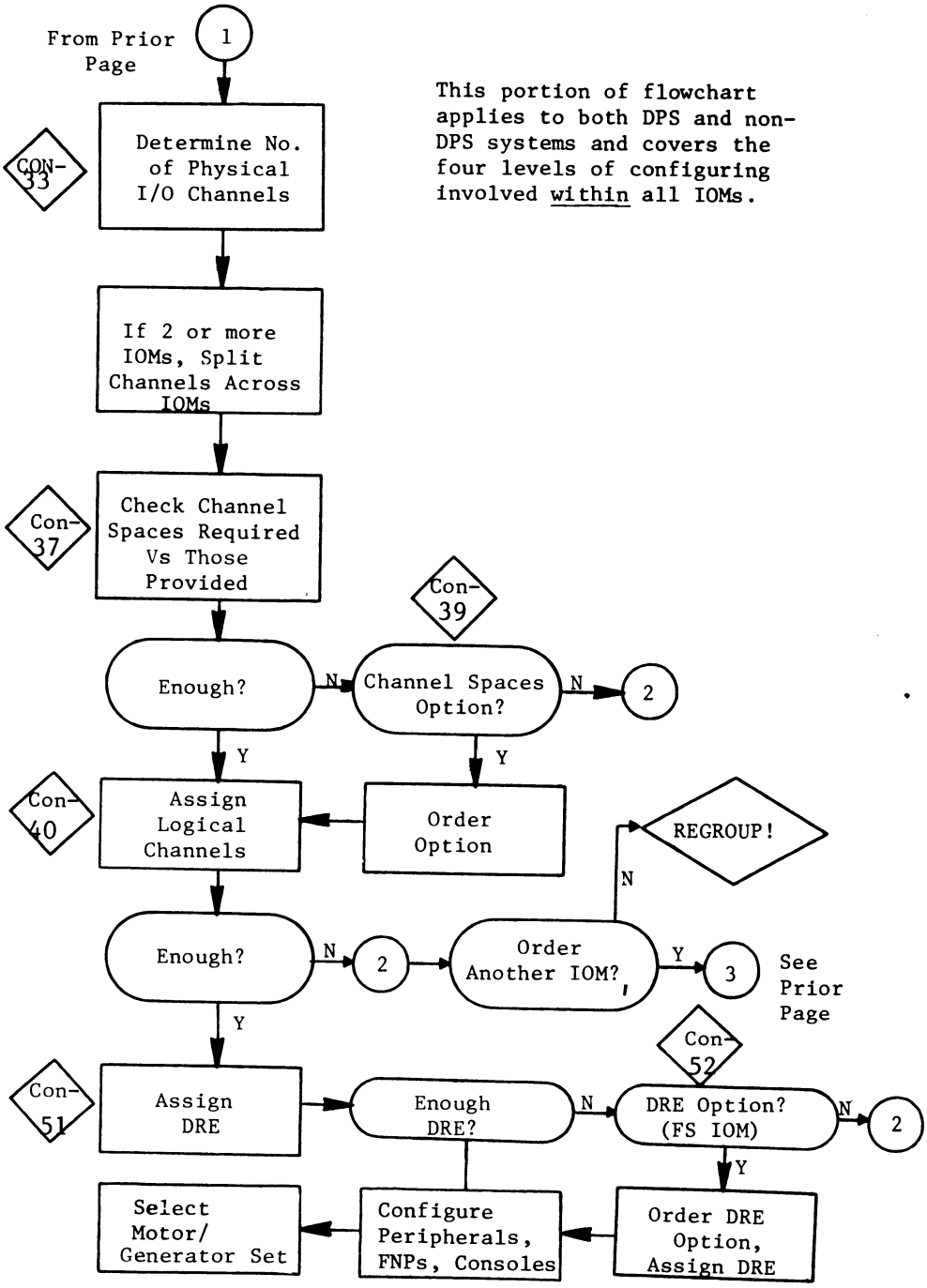
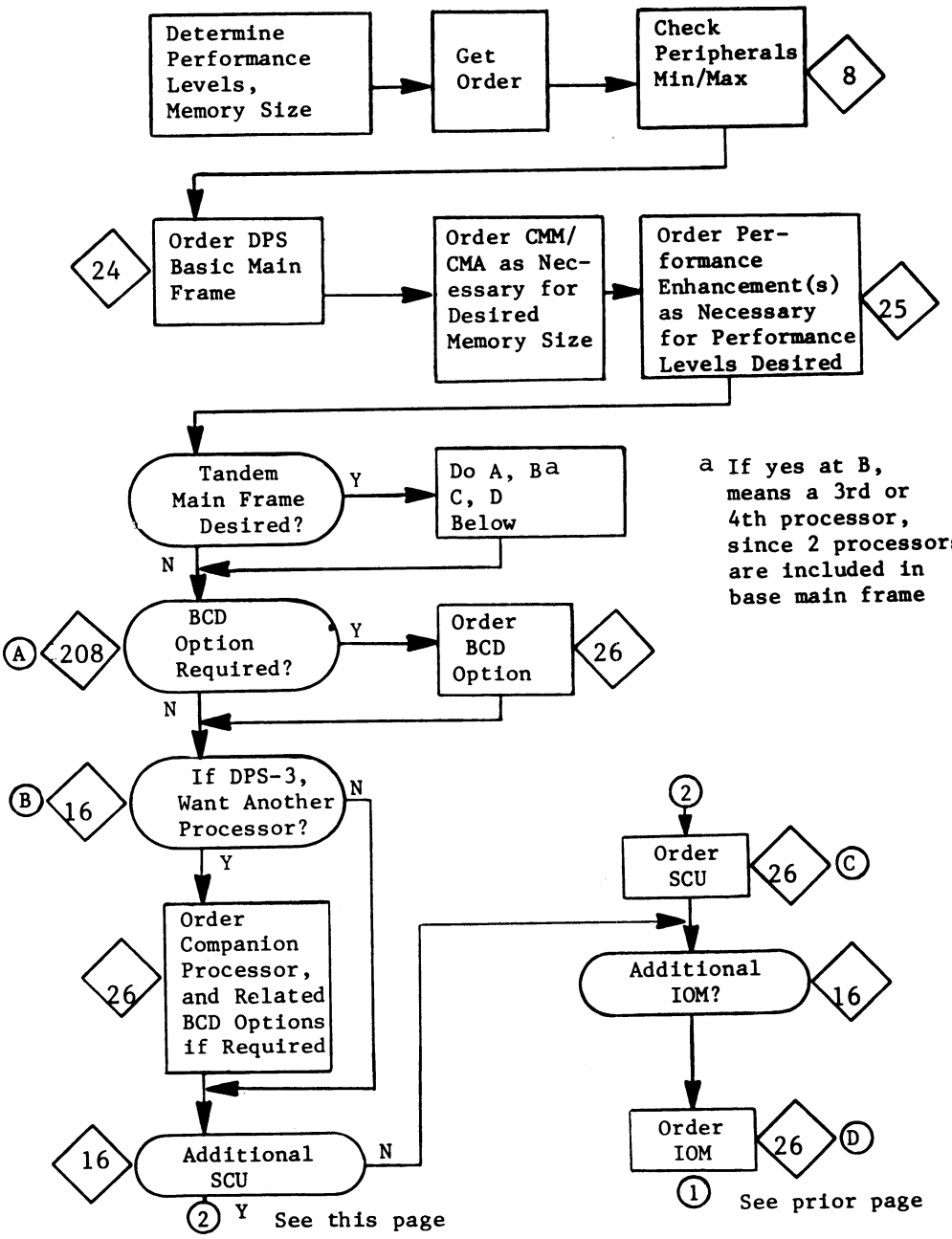
Master Flowcharts for Mainframe Configuring



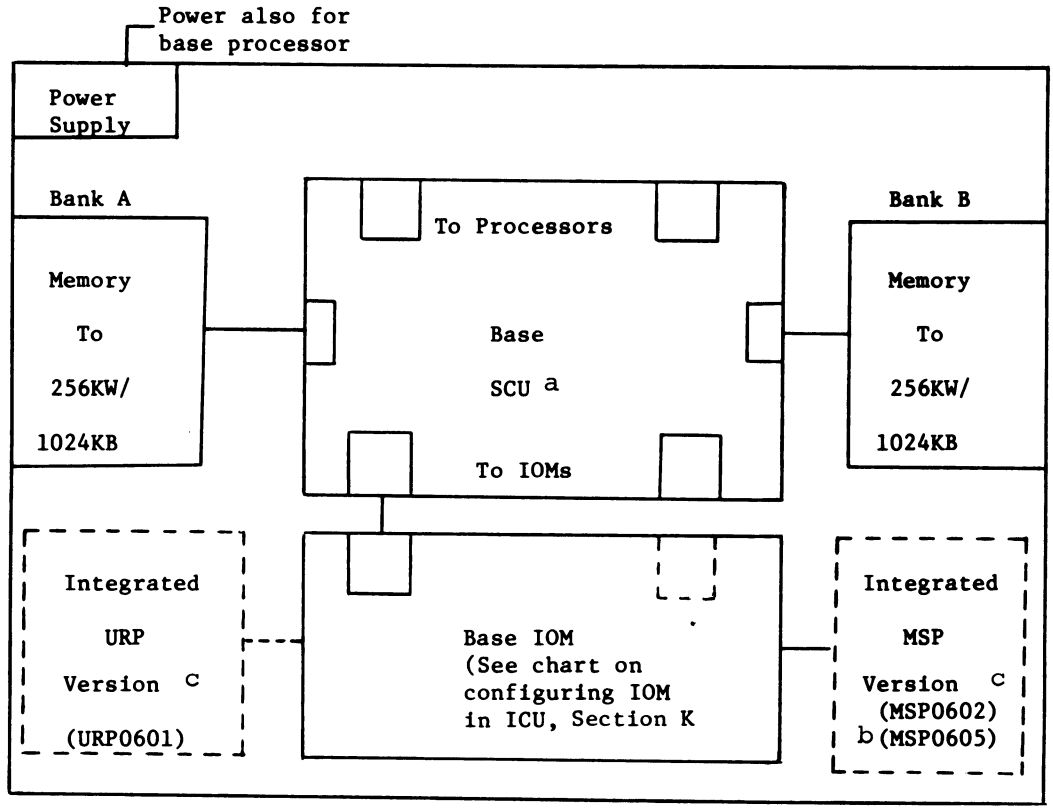
SECTION II
Master Flowcharts for Mainframe Configuring

B. Initial System Order For DPS Systems



SECTION III
Initial Order for Base Mainframe - Configurator Tables

A. ICU Contents Block Diagram - Not for DPS



ICU Cabinet

a For 66/60/80, and 66/40 with MXF6004 Channel Expansion feature, the SCU will be in an external cabinet in systems with 384/512KW. The ICU cabinet will hold first 256KW, the external cabinet will hold the rest. SCU is still powered via ICU.

b MSP0605 on 66/05 only

c "Integrated" versions are optional. Every system must have URP and MSP

B. Non-DPS ICU-Based Systems (No FNP included except CPS6058)

MODEL	CENTRAL SYSTEM IDENTIFIER	BASIC MEMORY SIZE	REQUIRED FOR INDICATED MEMORY INCREMENT				
			96KW-128KW	128KW-192KW	192KW-256KW	256KW-384KW	384KW-512KW
66/05	CPS6050	96KW/384KB	CMM6000[a]	CMM6001	CMM6002	CMM6003	CMM6004
66/05	CPS6058 [d]	96KW/384KB				CMA6003	CMA6004
66/07	CPS6070	96KW/384KB					
66/10	CPS6110	96KW/384KB				c	c
66/17	CPS6170	96KW/384KB					
66/20	CPS6210	128KW/512KB					
66/27	CPS6270	128KW/512KB					
66/40	CPS6410	128KW/512KB					
66/60	CPS6610	192KW/768KB			CMM6010[b]	CMM6011	CMM6012
66/80	CPS6810	256KW/1024KB				CMA6011	CMA6012

[a] CMM6000 is available only with Models 66/05, 66/07, 66/10 and 66/17 (which start at 96KW/384KB)

[b] CMM6010 is available only with Model 66/60 (which starts at 192KW/768KB)

[c] 66/60/80, and 66/40 systems with MXF6004 Channel Expansion, will have an external cabinet for the SCU. ICU contains first 256KW, SCU cabinet the remainder.

[d] Includes "integrated FNP". A DN6616/6624/6632/6670 may be used in addition

Procedure:

1. Select Model, and list appropriate CPS number or Central System Identifier.
2. Select the Memory Increment column containing a maximum size corresponding to total desired memory.
3. List the type numbers contained in that column, plus the type numbers contained in all appropriate columns to the left of the selected Memory Increment column.

Note 1. An IOM Data Rate Expansion feature (DRE) is included within each CPS number. (Any additional IOMs do not include this feature but one DRE is required)

Note 2. K in memory size indicates a value of 1024. Maximum memory in any system containing an ICU is 512KW/2048KB, whether tandem or not

C. Non-DPS freestanding systems (No FNP included)

MODEL	CENTRAL SYSTEM IDENTIFIER	BASIC MEMORY SIZE	REQUIRED FOR INDICATED MEMORY INCREMENTS						
			96KW-128KW	128KW-192KW	192KW-256KW	256KW-384KW	384KW-512KW	512KW-768KW	768KW-1024KW
66/10	CPS6120	96KW/384KB	CMM6000[a]	CMM6001	CMM6002	CMM6003	CMM6004	CMM6005	CMM6006
66/17	CPS6180	96KW/384KB				CMA6003	CMA6004	CMA6005	CMA6006
66/20	CPS6220	128KW/512KB						MXC6001 —	SCU
66/27	CPS6280	128KW/512KB						MXA6001	
66/40	CPS6420	128KW/512KB						CPA6001	
66/60	CPS6620	192KW/768KB			CMM6010[b]	CMM6011	CMM6012	CMM6013	CMM6014
66/80	CPS6820	256KW/1024KB				CMA6011	CMA6012	CMA6013	CMA6014
66/80	CPS6821 (1.15 X CPS6820)	256KW/1024KB						MXC6001 —	SCU
66/80	CPK6815 (Note 3)							MXA6001	
								CPA6001	

[a] CMM6000 is available only with Models 66/10 and 66/17 (which start at 96KW/384KB)
[b] CMM6010 is available only with Model 66/60 (which starts at 192KW/768KB)

Procedure:

1. Select Model, and list appropriate CPS number or Central System Identifier.
2. Select the Memory Increment column containing a maximum size corresponding to total desired memory.
3. List the type numbers contained in that column, plus the type numbers contained in all appropriate columns to the left of the selected Memory Increment column.

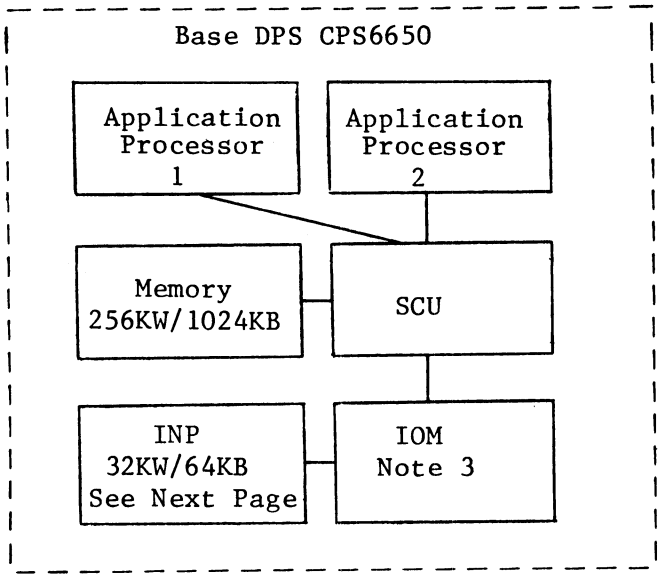
Note 1. K in memory size indicates a value of 1024. Maximum memory in any totally freestanding system is 1024KW/4096KB, whether tandem or not. Maximum in one SCU is 512KW

Note 2. An IOM Data Rate Expansion feature (DRE) is included within each CPS Number. (Any additional IOMs do not include this feature but one DRE is required)

Note 3. CPK6815 is kit to upgrade purchased CPS6820 system performance 1.15 times. A kit is required for each processor.

D. DPS Systems

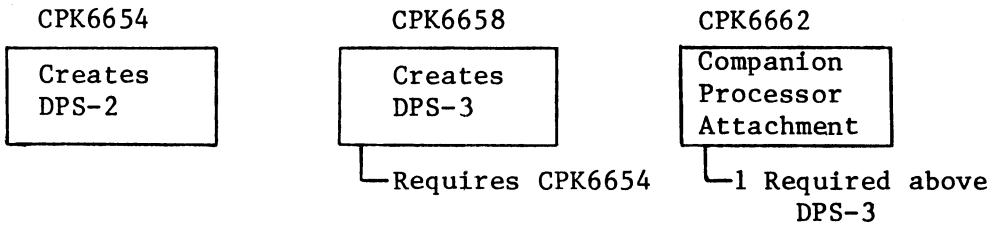
1. Base Mainframe (Note 1)



2. Memory Expansion Options (Note 6)

Memory Increment	Marketing Identifier	
256- 384 KWords 1024-1536 KBytes	CMM6021	
384- 512 KWords 1536-2048 KBytes	CMM6022	
512- 768 KWords 2048-3072 KBytes	CMM6052 CMA6052	
768-1024 KWords 3072-4096 KBytes	CMM6053 CMA6053	
1024-1280 KWords 4096-5120 KBytes	CMM6054 CMA6054	ORDER 2nd SCU MXC6004 UNLESS ALREADY INSTALLED
1280-1536 KWords 5120-6144 KBytes	CMM6055 CMA6055	
1536-1792 KWords 6144-7168 KBytes	CMM6056 CMA6056	
1792-2048 KWords 7168-8192 KBytes	CMM6057 CMA6057	
2048-2560 KWords 8192-1024 KBytes	CMM6058 CMA6058	ORDER 3rd SCU MXC6004 UNLESS ALREADY INSTALLED
2560-3072 KWords 10240-12288 KBytes	CMM6059 CMA6059	
3072-3584 KWords 12288-14336 KBytes	CMM6060 CMA6060	
3584-4096 KWords 14336-16384 KBytes	CMM6061 CMA6061	ORDER 4th SCU MXC6004

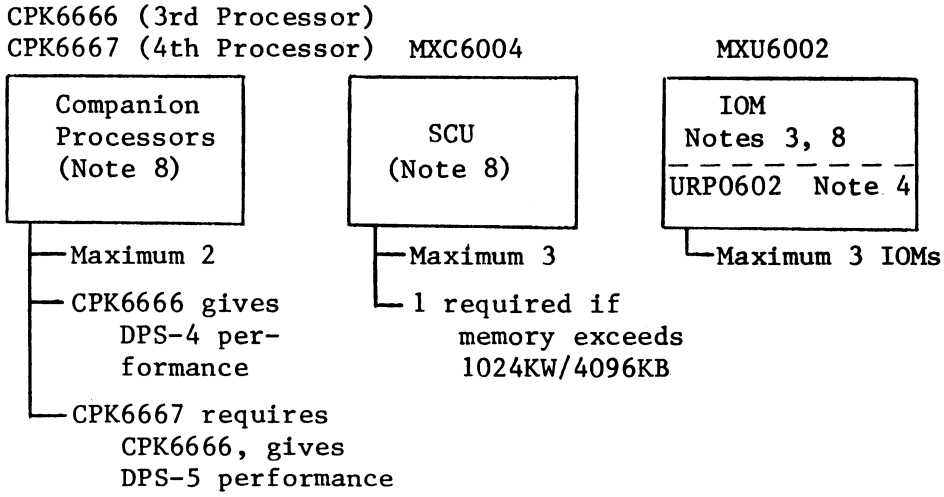
3. Processor Incremental Performance Enhancements



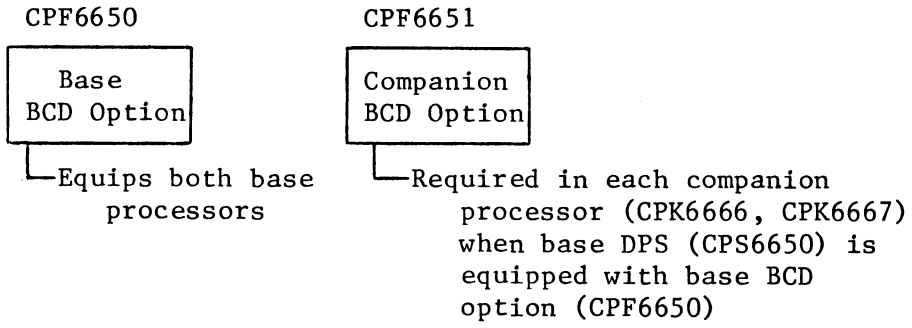
a. For DPS-4 -- add 1 companion processor (CPK6666) and 1 CPK6662 to DPS-1. Maximum 1 CPK6662 per DPS.

b. For DPS-5 -- add 2 companion processors (CPK6666, CPK6667), and 1 CPK6662 to DPS-3; or 1 companion processor (CPK6667) to DPS-4. Maximum 1 CPK6662 per DPS.

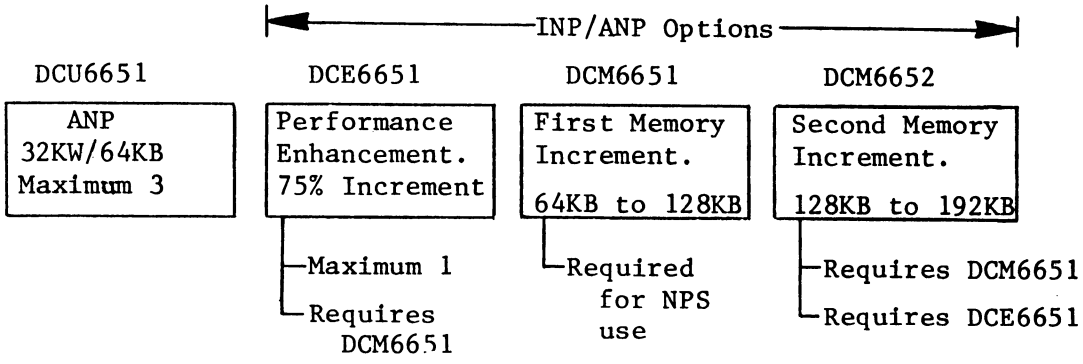
4. Additional Processors, SCUs, IOMs (Note 5)



5. BCD options (See Section XXI)



6. Additional Communication Network Processors (ANPs) (Note 7)



7. Notes

1) CPS665Ø must always be ordered to provide base mainframe. Includes all components shown in box with dotted outline. This is base mainframe for entire DPS range of performance levels - DPS-1,2,3,4,5. DPS2,3 levels are obtained by addition of cumulative performance enhancements as shown. DPS-4,5 can be obtained only if DPS-3 is configured. DPS-1,2,3,4,5 designations do not imply relative performance levels, i.e., DPS-2 is not twice as fast as DPS-1. All mainframe components are freestanding, except that base processors are packaged in one cabinet, and memory to the maximum of 1Ø24KW/4Ø96KB per SCU is contained in the SCU cabinet. Each processor, SCU, IOM has own power supply.

2) At least one motor/generator set is required but is not included in base main price. See Section VII.

3) For each IOM there are components which must be configured and considerations which apply within the IOM. See Section IV.

4) Every system must have at least one URP subsystem. There is the choice of using a unit record processor URPØ6Ø2 within an IOM cabinet, sharing IOM power supply, or using a freestanding URPØ6ØØ which has own power supply. Use of URPØ6Ø2 affects physical I/O channel capacity of IOM.

5) A minimum tandem mainframe consists of two processors, two SCUs, and two IOMs. The base mainframe (CPS665Ø) always gives you two processors. Additional SCU and IOM must be separately configured.

6) Use the memory expansion table to configure memory beyond the base size (256KW/1Ø24KB) on initial order or for memory size upgrade on an installed system. Each row represents a specific increment. Choose all increments necessary to reach a given total size of memory from any starting size. Remember that a second system controller must be used to support memory size greater than 1Ø24KW/4Ø96KB.

7) To complete the configuring of 66/DPS INP/ANP communications processor, refer to Section XX. "Configuring Level 6-Based FNPs (Not DN66ØØ-1)".

8) All necessary ports to connect all processors and all IOMs to all SCUs are included in the price of the add-on components. You do not configure them in DPS systems.

SECTION IV
Configuring Within IOM

A. Objectives of This Section

1. To show how you determine the number of physical I/O channels required for the peripheral subsystems you wish for your system.

2. To show how, by using the information from #1 above, you determine the quantity of 12" x 12" circuit boards required to contain the electronic logic for the number and type of physical I/O channels you desire. Also, in this section you will determine whether there are sufficient channel board spaces available on a standard basis or via option in the Level 66 system you wish to configure.

3. To show how, by using the information from #1 above, you determine how many logical channels or data paths must be assigned for the quantity of physical I/O channels you wish. We will also explain the role of logical channels, indicate how many may be assigned optionally beyond the quantity required, and how they are physically assigned.

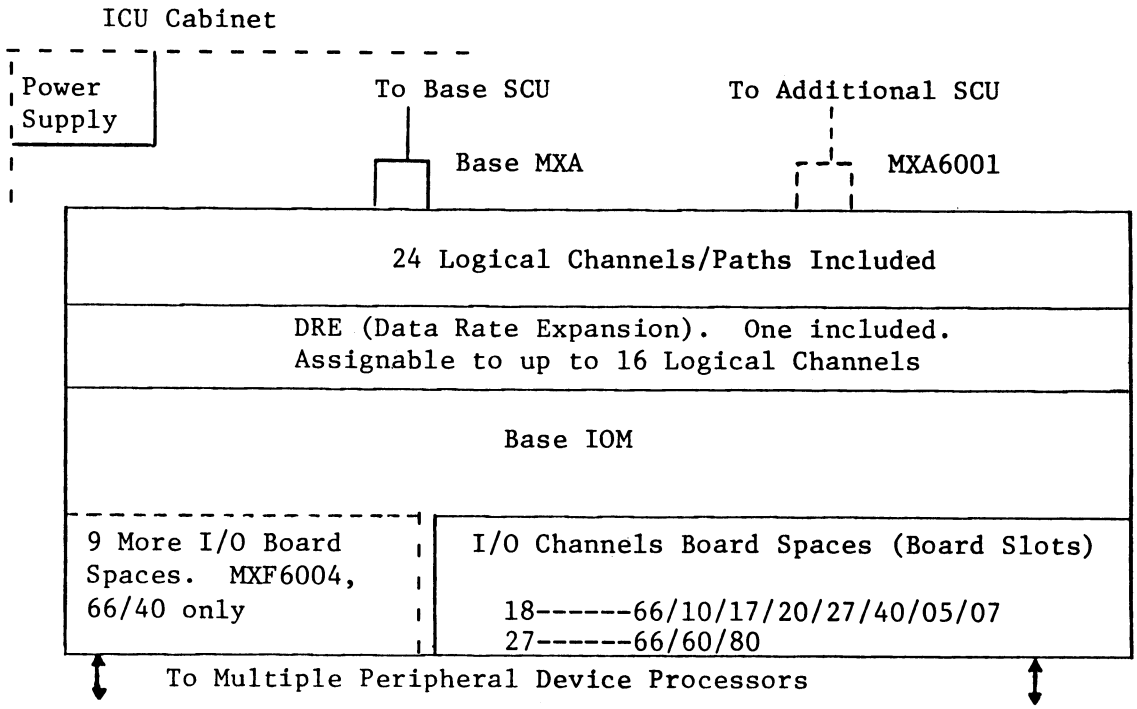
4. To show how, by using the information from #3 above, you determine how to assign the scratchpad capabilities furnished by the data rate expansion (DRE) feature. We will also cover the role of DRE feature, how it is obtained, and how it is physically assigned to appropriate logical channels.

B. Steps for Configuring Within IOM in ICU

1. There is no type number. This IOM is part of ICU in ICU-packaged base CPS systems. These steps apply to all ICU-oriented models.

SECTION IV
Configuring Within IOM

Block Diagram of IOM in ICU:



2. Determine the quantity of physical I/O channels your planned mix of peripheral subsystems will require. See Section D.

3. Determine how many 12" x 12" circuit boards will be required based on Step 2, and how many are furnished and can be added optionally, if any, for the Level 66 model you are configuring. See Section E.

4. Determine how many logical channels or data paths must be assigned, from the built-in complement of 24, for the quantity of physical I/O channels from Step 2. Determine how many more you wish to assign optionally, if any. See Section F.

5. Determine to how many, and which, logical channels assigned in Step 4 you wish to assign the scratchpad capability which is furnished by DRE feature (data rate expansion). See Section G.

C. Steps for Configuring Within Freestanding IOM

1. Base IOM (freestanding systems) has no type number. All IOMs configured selectively beyond base IOM, whether in ICU-packaged or freestanding systems, are freestanding. This chart applies to all freestanding IOMs.

   a. Freestanding IOMs may be obtained in 3 ways ---

      1) One is included in base CPS number of freestanding systems.

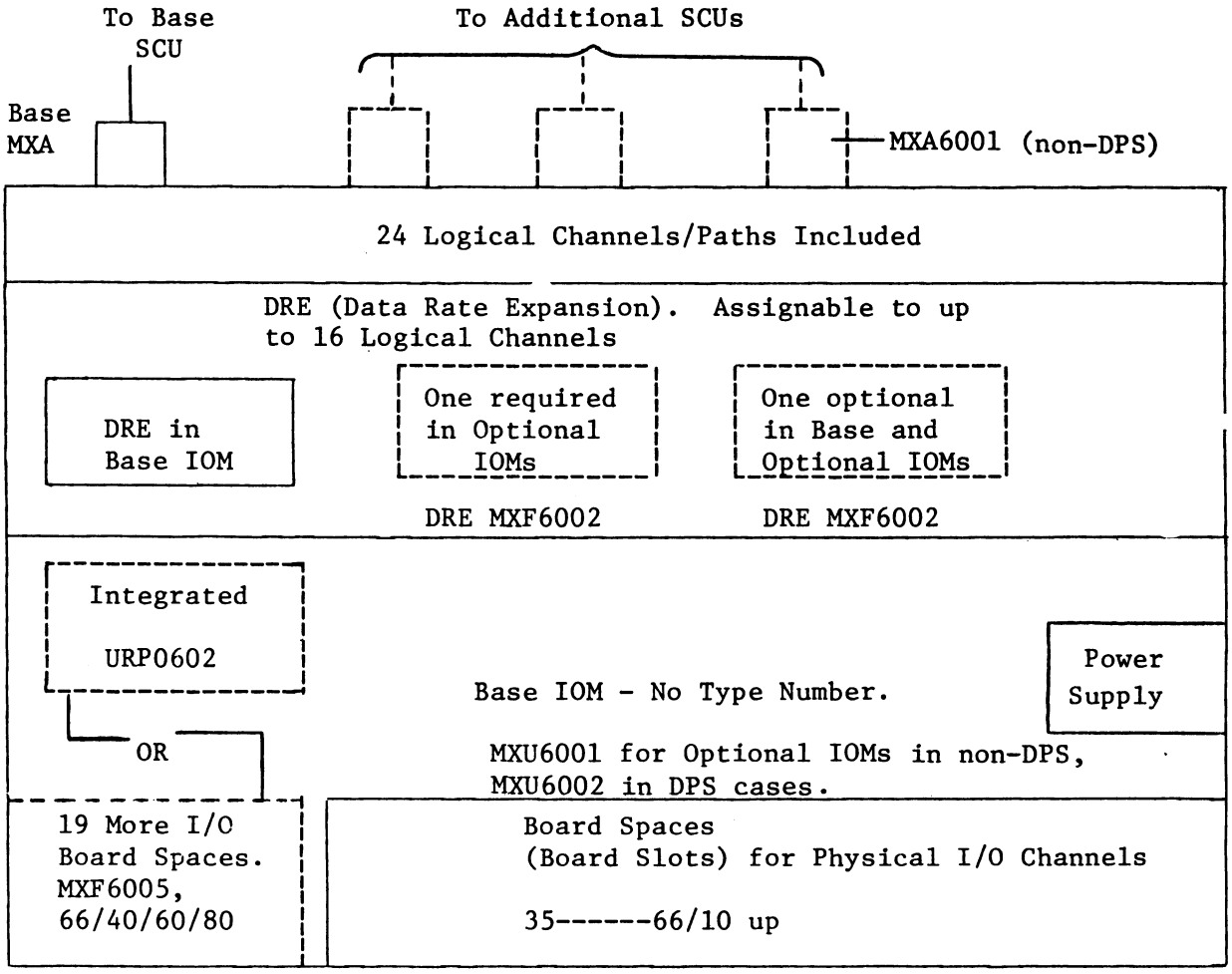
      2) One or more may be ordered optionally on your initial order along with the CPS components. One more is maximum of 66/40, and 66/60/80 ICU versions; up to 3 more on 66/60/80 freestanding versions, and DPS systems.

      3) One or more may be ordered optionally as add-on components after your system has been installed. Limits are the same as in 2) above

b. Each freestanding IOM, whether optional or included in CPS number, has its own power supply.

c. No ports for connection to SCUs on non-DPS systems are included in the price of optional IOMs, but a port (MXA6001 addressing feature) must be configured for each SCU in the system for non-DPS models. Does not apply to DPS models.

d. Block diagram of freestanding IOM.



2. Determine the quantity of physical I/O channels your planned mix of peripheral subsystems will require. See Section D.

3. Determine how many spaces for 12" x 12" circuit boards will be required based on Step 2, and how may spaces are furnished and can be added optionally, if any, for the Level 66 model you are configuring. See Section E.

4. Determine how many logical channels or data paths must be assigned, from the built-in complement of 24, for the quantity of physical I/O channels from Step 2. Determine how many more you wish to assign optionally, if any. See Section F.

5. Determine to how many, and which, logical channels assigned in Step 4 you wish to assign the scratchpad capability which is furnished by DRE feature (data rate expansion). See Section G.

D. Determining the Quantity of Physical I/O Channels Required For Your Peripheral Subsystems Mix

1. Use the table in Section 3 below or use table in Section 4 below.

   a. Remember that MSP0602/0603 can be configured with or without MSU0500 spindles. If MSU0500 is not used there can be one or two MSPs per subsystem, each with one or two prime channels, and each prime channel can be equipped with a switched channel path feature to terminate in an IOM physical channel.

   b. If MSU0500 spindles are included, with or without MSU0402/0451 spindles, MSPs cannot be configured with two prime channels.

   c. There can be one or two MSPs per subsystem, unless the subsystem includes MSU0500 spindles. Such subsystems can have up to 4 MSPs. Each MSP has one prime channel which can optionally be equipped with a switched channel path feature to terminate in an IOM physical channel.

2. Explanation of use of each column in table in Section 3 below

   a. Make a separate calculation for each subsystem of each type. There may be different options used on each (1).

   b. This represents the prime IOM channel always included in price of each subsystem device processor. Note that CSU6005 System Control Center price includes two prime channels (2).

   c. This represents those device processors where a second prime channel can be configured. In case of MTP, MSP0602/0603 when no MSU0500 is configured, both channels can operate simultaneously. In case of DN6624/6632/6670 and DPS INP/ANP and DHP0700/0701, the second prime channel is non-simultaneous, acting as a backup to the first, and not effective until after a GCOS warm restart or reboot has occurred (3).

   d. This represents the fact that the path from a prime channel can be switched to two different IOM channels. The switch can be either electronic, controlled transparently by GCOS and contained in the device processor (URP, MTP, MSP0602/0603), or can be an external, manually controlled peripheral switch. See Section XVI (4).

   e. Indicates the two cases where a switched path feature can be applied to a second prime channel. This switch could be electronic or manual as discussed in (4) above (5).

   f. This column indicates the maximum possible number of physical I/O channels in an IOM for one subsystem of a type. It is the sum of (2), plus (3), (4), (5), where these are applicable and actually configured (6).

g. You fill in this number. Remember that you use one repetition of each row for each subsystem of a given type. There could easily be different maximums for each subsystem when multiple subsystems of same type are used (7).

h. Multiply for each row (and each subsystem of same type) the figure in (7) times the sum of (2), plus (3), (4), (5) as applicable and as actually configured (8).

i. Multiply the figure per subsystem of each type in (8) times the figure in (9). Add the figures in all rows for all subsystems and place that figure in (10). Now go to Section E below to see if the Level 66 model you are bidding has sufficient spaces for the required number of physical channel circuit boards (9).

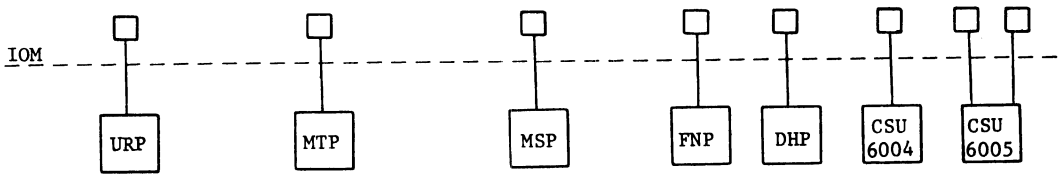
3. Table of physical I/O channels required in IOM

① Sub-System	② Standard Prime Channel	③ Optional Prime Channel	④ Optional Switched Path-Std Prime Channel	⑤ Optional Switched Path-Opt Prime Channel	⑥ Max IOM Channels This Sub-System	⑦ No. Sub-Systems This Type	⑧ Total Physical Channels Required in IOM	⑨ Channel Boards Per Channel
URP	1	-	1	-	2			3
MTP	1	1[a]	1	1	4			3
MSP0602/ 0603 w/o MSU0500	1	1	1	1	4			3
MSP0602/ 0603 with MSU0500	1	-	1	-	2			3
MSP0605 (66/05)	1	-	1[c]	-	2			3
CSU6001	1	-	-	-	1			1[d]
CSU6002	2	-	-	-	2			1[e]
Int FNP — CPS6058	1	-	-	-	1			1
DN6616/ 6624/ 6632/ 6670	1	1[b]	-	-	2			1
DHP0700/ 0701	1	1	-	-	2			1

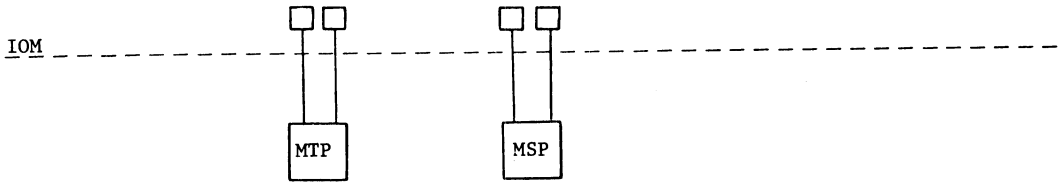
a Required, not optional, when more than 8 tape units will be in subsystem
b Not permitted on DN6616
c Would be possible only by use of manual switch
d If used in system with 384KW/1536KB or more, add 1 more board per channel (2 boards total per subsystem)
e If used in system with 384KW/1536KB or more, add .5 more board per channel (3 boards total per subsystem)

4. Alternate table for determining quantity of physical channels required in IOM (channel terminations). See Page 37.

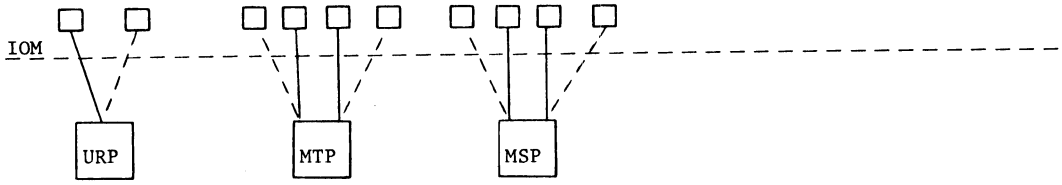
   a. Each peripheral processor includes one physical IOM channel in its price except two for CSU6005 System Control Center console subsystem.



   b. Additional simultaneous channels can be added to MTP, and MSP (if no MSU0500 spindles configured).

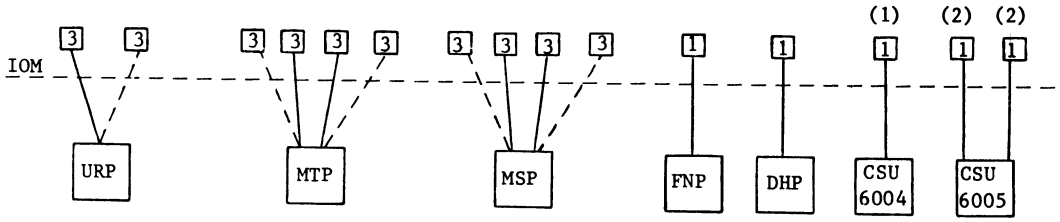


   c. Software-switched non-simultaneous channel features can be added to URP, MTP, MSP channels.



d.

Each ☐ represents physical channel (termination) in IOM, each requiring 1-3 circuit boards to carry the channel logic.



(1) 2 boards if more than 256KW/1Ø24KB in system
(2) 1.5 boards if more than 256KW/1Ø24KB in system

E. Determining How Many Spaces are Available Per IOM for the 12" x 12" Channel Logic Boards for Physical I/O Channels

1. Spaces needed for carrying electronic logic boards for the required number of physical channels based on Section D above.

2. Refer to the table below. Once you have configured two or three systems you will probably be able to come directly to this table for determining both the channel spaces available and the quantity required for each physical channel, bypassing Section D above. In any event, before you use the table below you must know the number of physical I/O channels you need for each subsystem, i.e., channel terminations needed in IOM.

3. The table gives you the information necessary to determine how many peripheral subsystems can be configured in a Level 66 system.

4. If you cannot configure the desired number of peripheral subsystems and their complement of physical channels and switched paths, consider these alternatives :

a. Bid a second IOM if the Level 66 model permits and the prospect will allow it.

b. Use fewer simultaneous channels and/or switched paths.

c. Use fewer subsystems of same type.

d. Use fewer subsystems.

e. Use different mix of subsystems.

f. Change the Level 66 model you are bidding.

g. In case of a freestanding IOM use URPØ6ØØ (freestanding) instead of URPØ6Ø2 (in IOM cabinet).

5. Don't forget the impact when the total memory size is greater than 256KW/1Ø24KB. Know your prospect/customer growth plans. Don't be surprised yourself, and even worse, don't let the prospect/customer be surprised.

6. Determine next the logical channels or data paths which must be assigned to each physical channel and switched path, and the quantity which may optionally be assigned. See Section F below.

7. IOM Physical I/O Channel Board Spaces Allocation Table -- This table shows the number of circuit boards required for each physical channel termination in IOM. Use this table to determine how many peripheral subsystems can be configured per Level 66 IOM. Prime channel is physical channel in device processor price, and physical channel addable optionally to run simultaneously with first, except for FNP.

	Model	Available Spaces for Boards			Boards Required			
					Subsystem		System Memory Size	
		Basic	Optional	Total	Type	Prime[d]	To 256KW	Over 256KW
INTEGRATED IOM IN ICU	66/07/05	18	-	18	URP	1[a]	3	3
	66/10/17	18	-	18				
	66/20/27	18	-	18				
	66/40	18	9(MXF6004)	27				
	66/60	27	-	27				
	66/80	27	-	27	MTP	1[a]	3	3
					MTP	2[a]	6	6
FREESTANDING IOM	66/10/17	35	-	35				
	66/20/27	35	-	35	MSP	1[a]	3	3
	66/40	35	19(MXF6005)	54	MSP	2[a]	6	6
	66/60	35	19(MXF6005)	54	FNP	1[c]	1	1
	66/80	35	19(MXF6005)	54				
	66/DPS	35	19(MXF6005)	54	SCC-CSU6005	2	2	3 With CSF 6004[b]
FREESTANDING IOM WITH INT. URP	66/10/17	35	-	35				
	66/20/27	35	-	35				
	66/40	35	-	35	Syst. Con. CSU6004	1	1	2 With CSF 6004[b]
	66/60	35	-	35				
	66/80	35	-	35				
	66/DPS	35	-	35	DHP0700	1[c]	1	1
					DHP0701	1[c]	1	1

[a] Add 3 spaces required for each switched or other non-simultaneous channel path used

[b] CSF6004 must be ordered

[c] Add 1 space required for each additional IOM prime channel connected (via DIA)

[d] This column represents the number of prime channels to be configured in the subsystem. See Section D to determine number of physical channels required.

SECTION IV
Configuring Within IOM

F. Determining Logical Channel Assignments

1. Rules for assignment of IOM logical channels to physical channels

a. Every physical channel must be assigned one logical channel or data path. URP, MTP, MSP may use more than one logical channel per physical channel, as explained below.

b. Logical channels are related to physical channels by wiring and logic chips on the pertinent IOM logic boards. Assignment is established on-site by the field engineer according to the mix of required and optional logical channels you specify.

c. A table showing the assignment of logical to physical channels and of physical channels to peripherals is given to GCOS at system startup time. Accordingly, GCOS always knows what logical channels to use (thus physical channels) to reach a given device processor, console, FNP, or document handler processor.

1) In effect GCOS "sees" the peripherals it wants to reach via the logical channels.

2) The logical channel concept provides a link to slave program buffer areas (their size and locations). Without such a link the transfer path to/from memory could not be established. Review the IOM outline for the principle used, involving secondary mailboxes and connect channel mailbox.

2. Why assign more than one IOM logical channel to a physical channel?

a. Use of multiple non-simultaneous logical channels or data paths per physical channel is our approach to the IBM concept of block multiplexing (BMX) type of channel. We both use similar principles with different nomenclature.

b. Use of multiple logical channels per physical channel allows multiple places to which GCOS can send or can queue I/O commands.

   1) As long as a logical channel is available GCOS can send the next I/O command to a given subsystem, even though the physical channel is busy with data transfers for a prior operation initiated through another logical channel. Otherwise, with a single logical channel, the physical and logical channel would be tied up during the data transfer and interrupt sequence, preventing the overlapped stacking of the next I/O command by GCOS. GCOS would have to wait for an opportunity to gain access to the single channel.

   2) The intended effect here is potentially greater subsystem throughput by using the physical channel more efficiently, stacking commands in front of the subsystem at any time as long as a logical channel is available.

   3) Looking at it another way, the use of more than one logical channel per physical channel (block multiplexing) allows multiple I/O operations to be in some stage of execution concurrently. There can be as many concurrent stages as logical channels assigned to the subsystem involved. In the URP, e.g., there could be as many as 7 card reading/card punching/line printing operations simultaneously, using one physical channel.

c. Summary of potential benefits of assigning more than one logical channel to a physical channel.

   1) Greater subsystem throughput.

   2) Use of fewer physical channels.

3) Larger number of I/O operations in some stage of execution concurrently.

4) Better use of physical channels.

5) Combines with rotational position sensing (RPS) in disk subsystems to increase subsystem throughput further.

d. See the two charts below on Physical Channel and Logical Channel concepts in Section 4.

3. Subsystems allowing multiple logical channels per physical channel

a. In Unit Record Processor (URP) subsystems there must be one and only one logical channel assigned to each unit record device connected to URP. A specific logical channel is assigned to each device.

1) URP can handle up to 7 unit record devices.

2) URP, in combination with its channel and 1-7 logical channels in IOM, performs a block (unit record) multiplexing function, allowing up to 7 devices to run simultaneously. URP buffers a full physical record from/for each device and assigns each record to the IOM physical channel as soon as last record has transferred. Each unit record device must be permanently preassigned to a logical channel to be used by GCOS in issuing commands to it. The logical channel controls the transfer into memory into/from the proper buffer area for the device concerned.

b. In Magnetic Tape Processor (MTP) subsystems a second logical channel may optionally be assigned to each physical channel.

1) NOTE - the customer may assign more logical channels optionally if he has them available. The figures for optional channels above are based on those found sufficient for the usual customer site. Conceivably, a system with a large number of tape drives, a planned high multiprogramming depth (MPD) and heavy tape I/O activity might benefit from assigning more logical channels.

2) The value of the second logical channel for each physical channel is that it allows GCOS to send a new command to an open logical channel, even though the physical channel may be transferring data under command of another logical channel assigned to the subsystem. As soon as the first operation terminates a second could be initiated immediately from the command standing by in the second logical channel. GCOS could then send another command to the first logical channel, which is now open again, etc. If only one logical channel is used, GCOS cannot have any next command standing by when a command is already in operation.

   This can potentially increase subsystem throughput appreciably.

c. Disk subsystems

1) A normal useful maximum of logical channels for a mass store subsystem is 8 regardless of the number of physical channels or MSPs in the particular subsystem. This figure includes the required logical channel per physical channel used in the subsystem involved.

2) MSP and disk spindles obtain automatic latency reduction via rotational position sensing and block multiplexing of the physical channel(s) involved. Both features can increase subsystem throughput and should always be used, at least on single-channel subsystems. They depend on multiple logical channels per subsystem.

3) The number of logical channels assigned for a subsystem should not normally exceed the number of spindles in the subsystem. There is little or no gain with a greater number of logical channels.

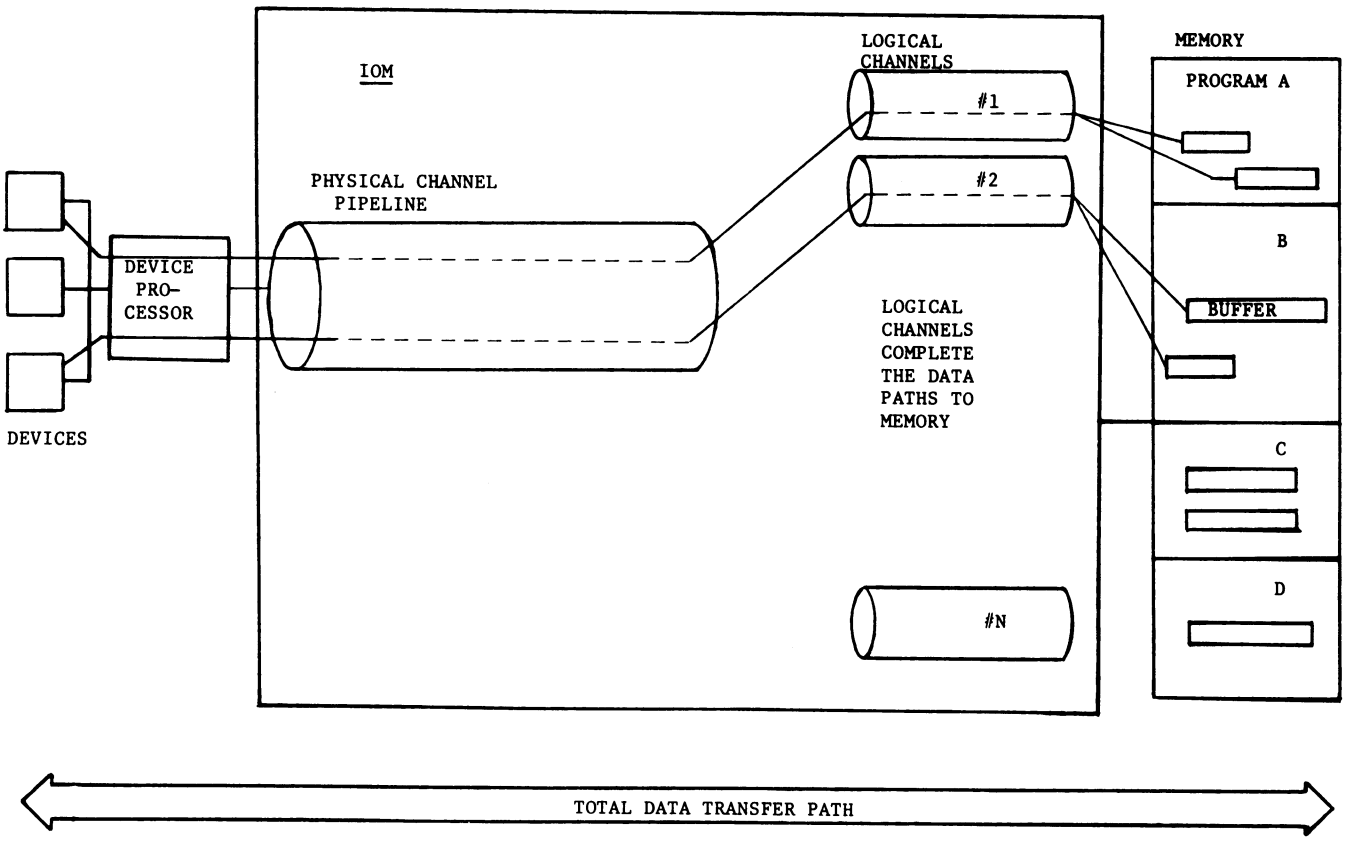
4) The number of logical channels assigned also should not be greater than the average anticipated multiprogramming depth (MPD). MPD would in general determine the average maximum possible I/O command queue size, thus dictating the usable number of logical channels.

5) The greatest benefit from multiple logical channels occurs on single-channel MSP. With two-channel subsystems commands tend to be serviced almost as soon as they are delivered to the subsystem in most cases. As a result there is not as much chance to have command queues build up, thus there is less relative effect from multiple logical channels in a dual-channel subsystem case. Dual-channel systems will probably give greater throughput in all cases, especially where the subsystem includes more than four or five disk units.

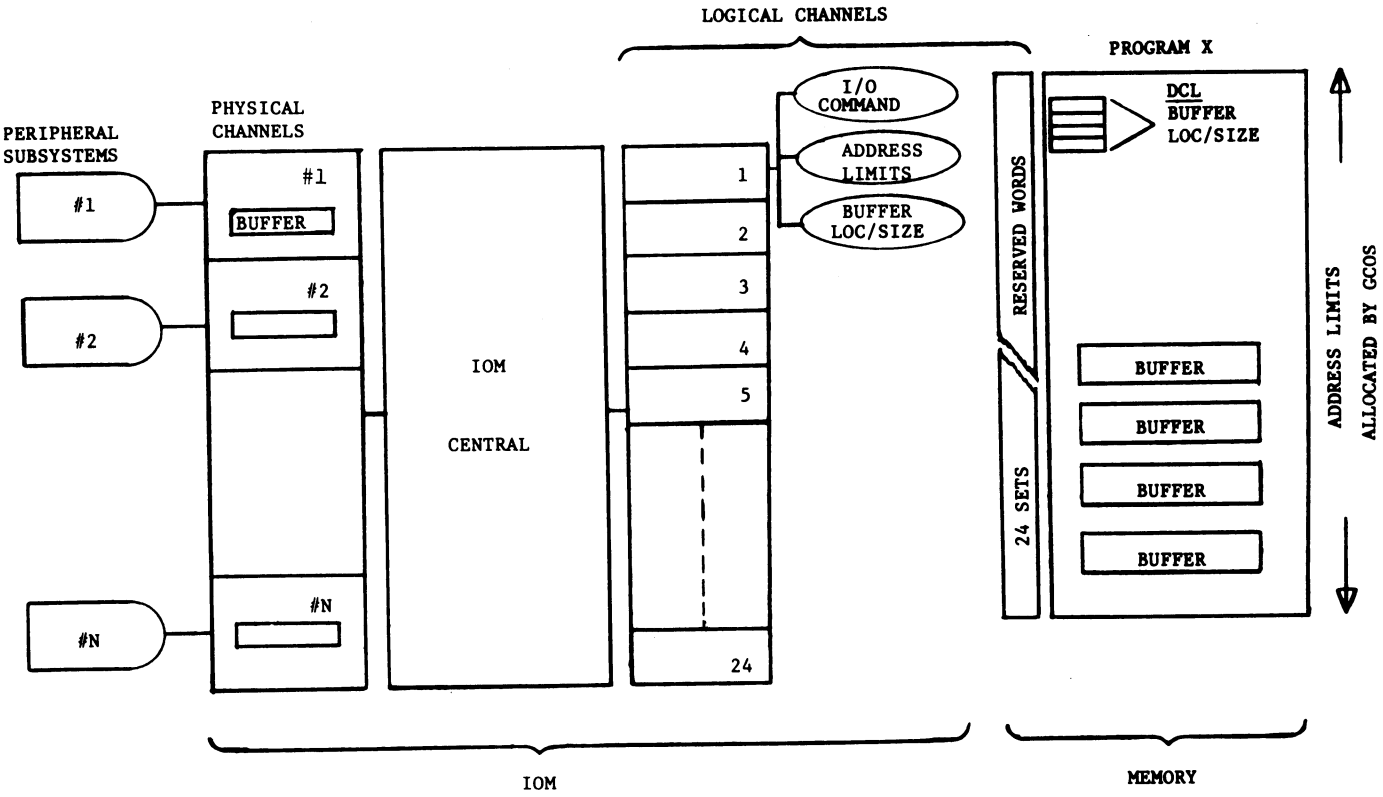
d. See tables in Section 5 below for determining required and optional logical channels.

4. Physical/logical channel concepts

   a. Multiple logical channels/paths per physical channel

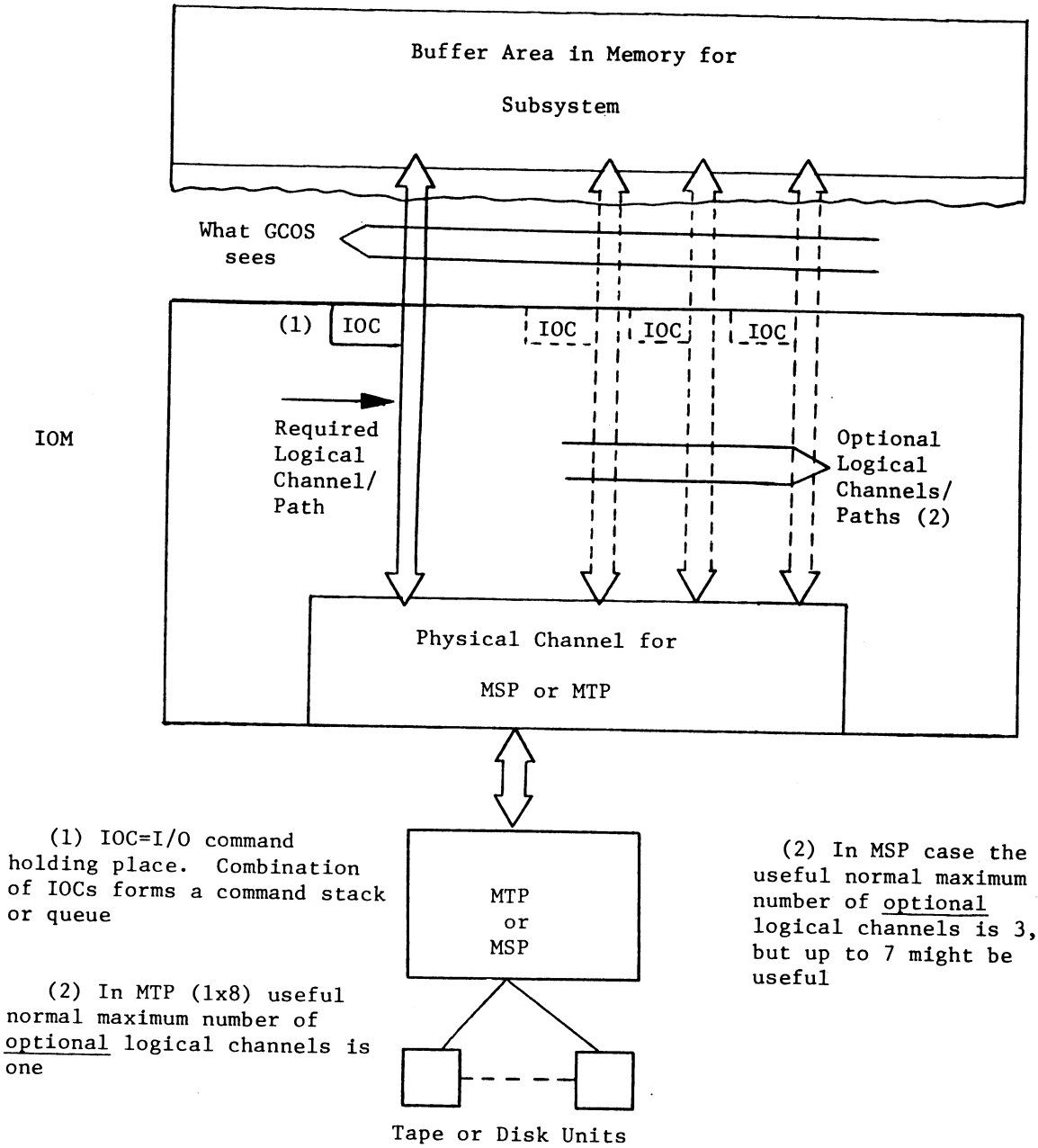


b. Linkage to slave program to complete the data transfer path



5. IOM logical channel/data path assignment - tape and disk subsystems

   a. Single-channel MTP (1x8) or single-channel MSP subsystem

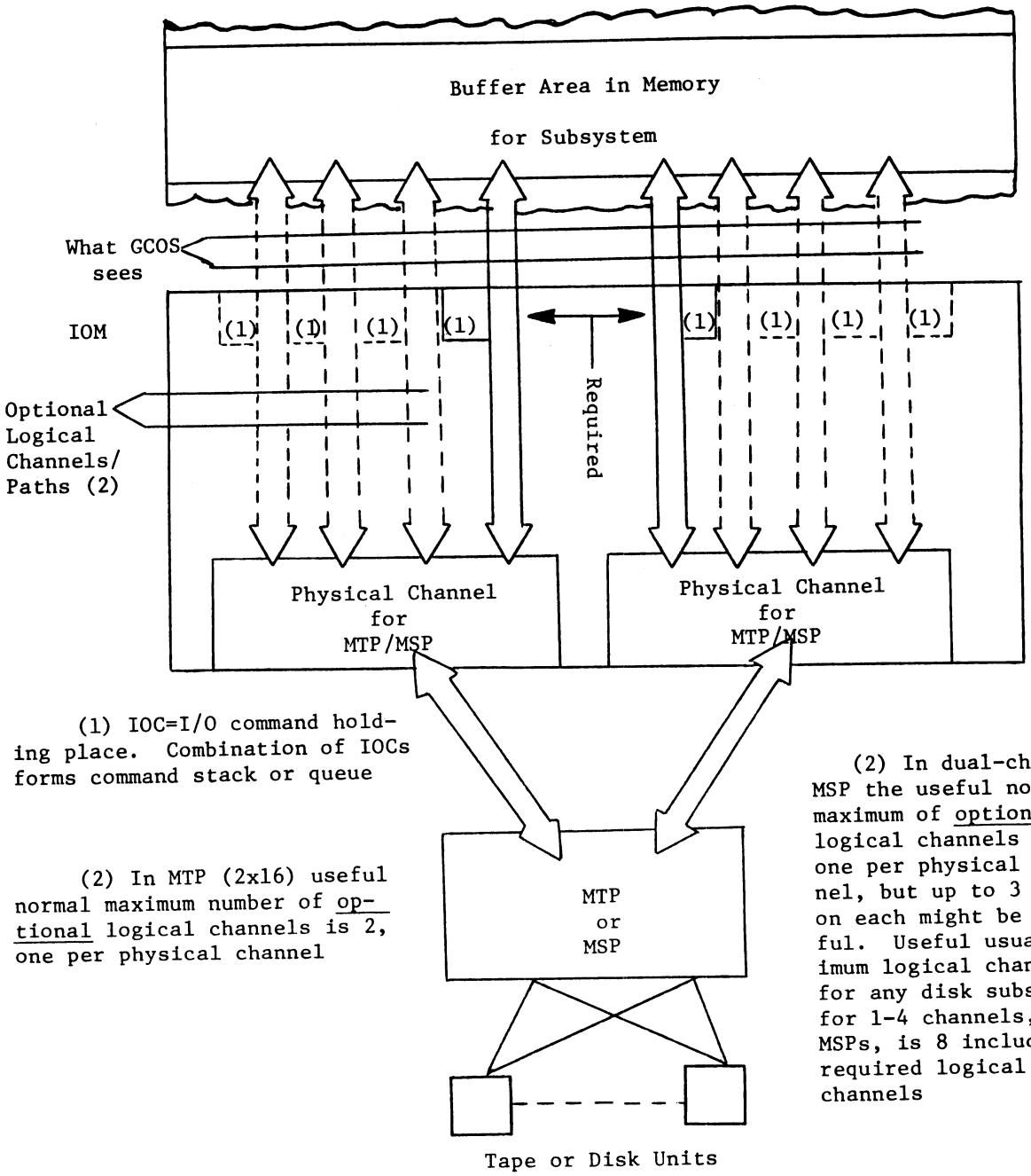


(1) IOC=I/O command holding place. Combination of IOCs forms a command stack or queue

(2) In MTP (1x8) useful normal maximum number of optional logical channels is one

(2) In MSP case the useful normal maximum number of optional logical channels is 3, but up to 7 might be useful

b. Dual-channel MTP (2x16) or dual-channel MSP or multi-MSP subsystem



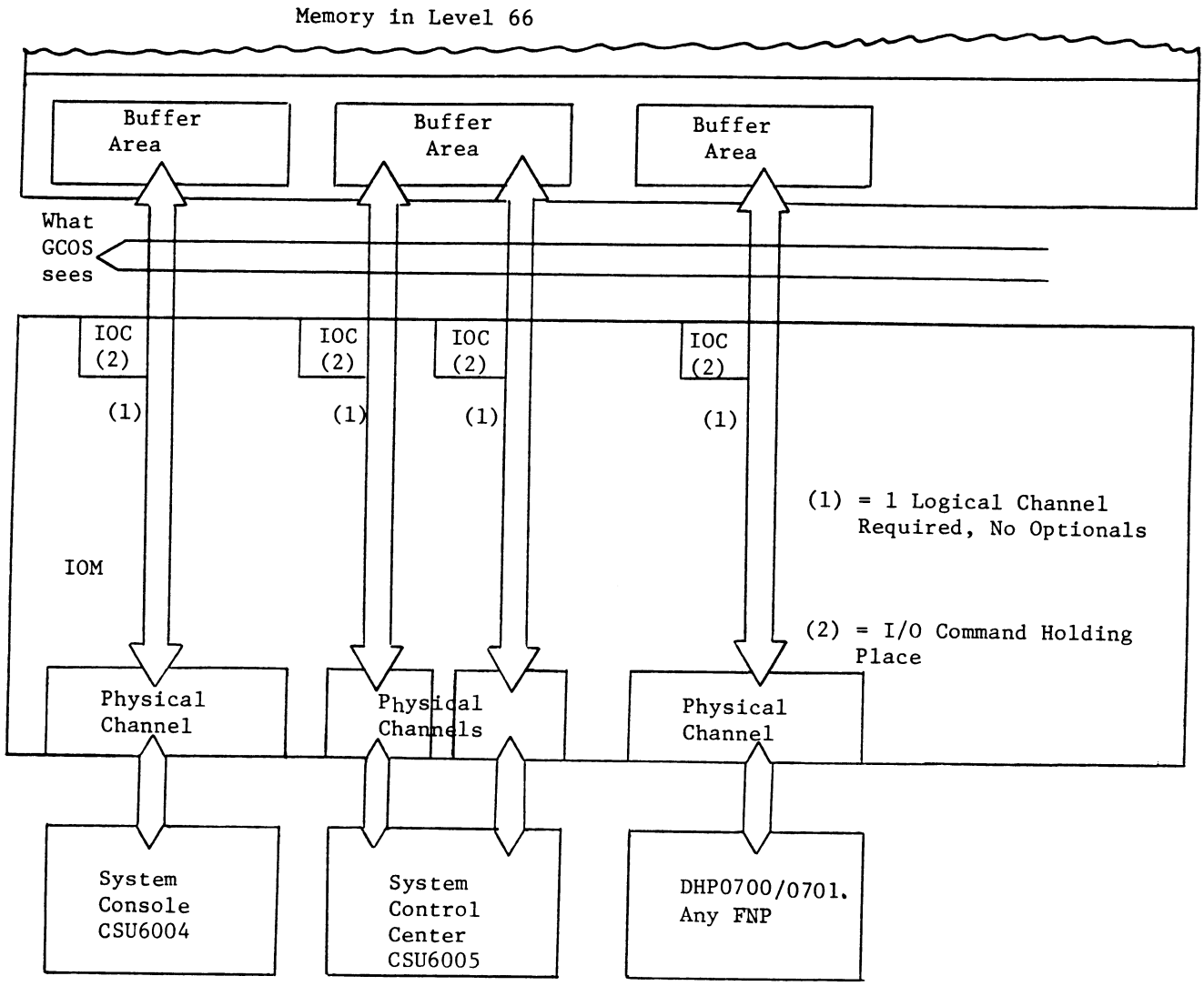
(1) IOC=I/O command holding place. Combination of IOCs forms command stack or queue

(2) In MTP (2x16) useful normal maximum number of optional logical channels is 2, one per physical channel

(2) In dual-channel MSP the useful normal maximum of optional logical channels is 2, one per physical channel, but up to 3 more on each might be useful. Useful usual maximum logical channels for any disk subsystem, for 1-4 channels, 1-4 MSPs, is 8 including required logical channels

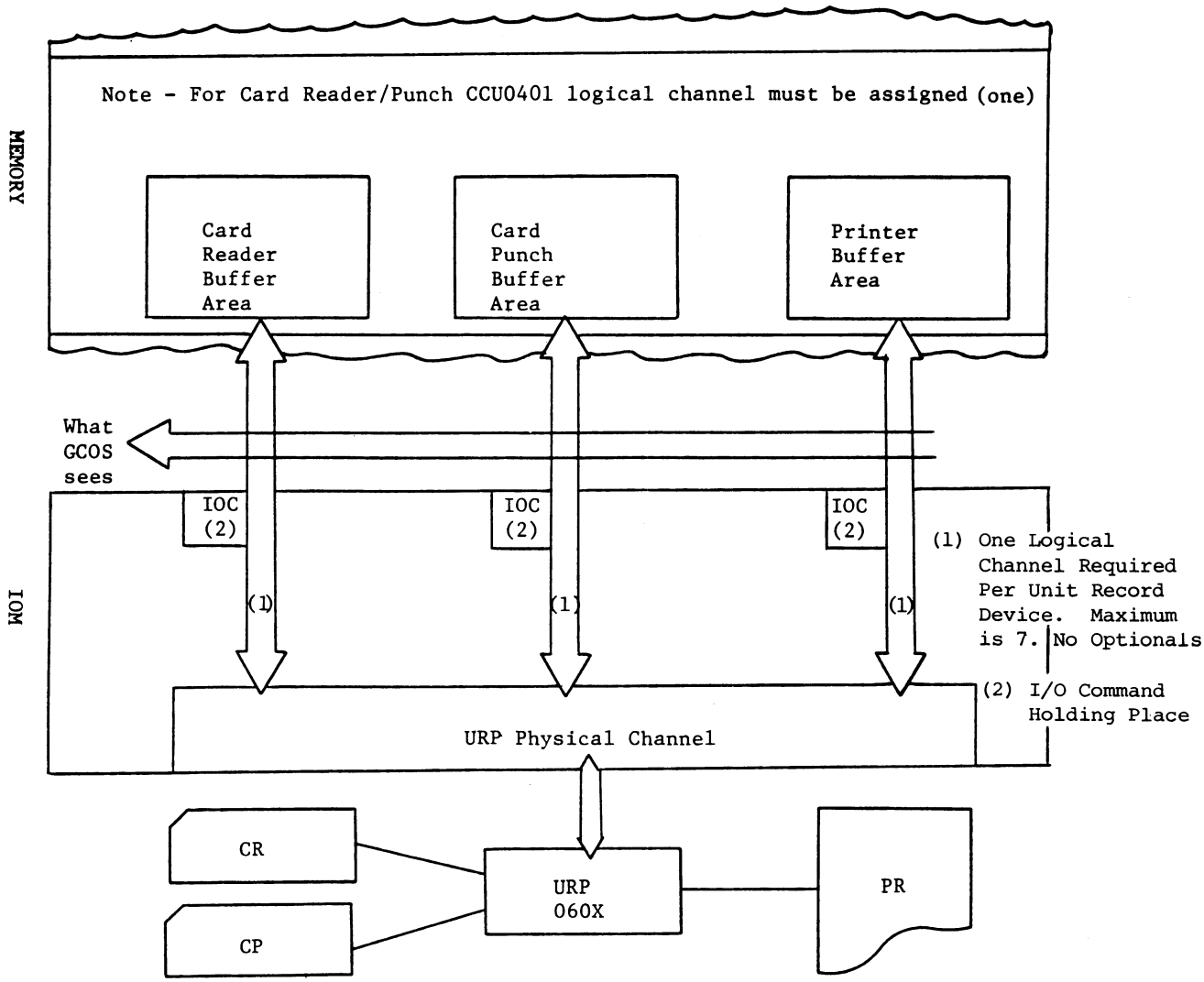
SECTION IV
Configuring Within IOM

6. Logical channel assignments for Document Handler Processors/FNPs and Consoles



SECTION IV
Configuring Within IOM

7. Logical channel assignments for Unit Record Processor subsystem



8. Summary Table of IOM physical and logical channels/paths per peripheral subsystem

Use this as a convenient summary table to know how many physical and logical channels are required for a subsystem. It also shows how many more logical channels might optionally be assigned up to a normal useful subsystem maximum. 24 logical channels provided per IOM.

PERIPHERAL SUBSYSTEM DEVICE PROCESSOR	PHYSICAL CHANNEL TYPE	PHYSICAL CHANNELS REQUIRED [b]	LOGICAL CHANNELS REQUIRED [d]	SUBSYSTEM TOTAL USEFUL LOGICAL CHANNELS
URP (PLUS 1-7 UNIT RECORD DEVICES)	PSI	1	1 PER DEVICE [c] →	SAME
MSP/MSU 0402/0451 (1x32) (2x16)	PSI	1 2	1 2	8
MSP/MSU 0500	PSI	1 per MSP	1 per MSP	8
MTP (1x8) (2x16)	PSI	1 2	1 2	2 4
SYSTEM CONSOLE CSU6001	SPECIAL	1	1 →	SAME
SYSTEM CONTROL CENTER CSU6002	SPECIAL	2	2 →	SAME
Any FNP	DIRECT	1	1 →	SAME
DHP0700/0701 DOC HDLR PROC	DIRECT	1	1 →	SAME
	CPI [a]	1	1 →	SAME

[a] This type of channel is used for certain peripherals from G400 and Series 600 purchased systems where these are allowed in certain cases on Level 66. Applies to such users who move to Level 66 main frame while retaining certain of their present peripherals. See Section I.C.

[b] Each device processor includes one physical IOM channel in its price, except SCC CSU6602 which includes two

[c] CCU0401 Card Reader/Punch considered one device

[d] Don't forget that URP, MTP, MSP allow for switched path feature to be added to each physical channel. Each termination must be allotted separate logical channel(s), the same quantity for each termination.

G. Determining DRE (Date Rate Expansion) Requirements and Assignments

Use of DRE scratchpad storage feature

1. One DRE feature is standard in each base IOM, i.e., the IOM included in base CPS system. The base IOM in freestanding system can have one more DRE (MXF6ØØ2). Optional (thus freestanding) IOMs do not come with a DRE but one must be ordered. A second can also be ordered for freestanding IOMs.

   Each DRE feature will be assigned by your field engineer to up to 16 logical channels, based on the assignments that you define to him. There are 24 logical channels per IOM.

2. DRE scratchpad assignment must be used on the involved logical channels when:

   a. FNP is used.

   b. Disk spindles are used.

   c. Peripheral with transfer rate greater than 5ØØKC/355KB is configured on a physical channel.

   d. Combined data transfer rates of all I/O subsystems planned to be in operation simultaneously on the IOM exceed 1.3 million characters per second or 87Ø thousand bytes per second.

3. DRE assignment rules

   a. Assign a DRE facility to each logical channel on a basis of transfer rates in descending speed. Each logical channel used for subsystems below must have a DRE facility assigned to it, including logical channels used in switched non-simultaneous physical channel cases.

b. Assignment priorities for DRE facilities in descending order.

1) FNP.

2) DHP.

3) Disk (or tape if its transfer rate is higher).

4) Tape.

4. DRE scratchpad assignment is recommended on the involved logical channels when:

a. 4 or more physical channels are to be used simultaneously for any disk and/or magnetic tape combination.

b. I/O channel traffic will be heavy. The DRE feature significantly cuts memory accesses by each logical channel assigned to it, by as much as 3 to 1. This frees memory cycles for use by processor or IOM.

5. When do you need more than one DRE?

a. Permitted only on freestanding IOM.

b. Determine your total logical channel assignments to physical channels using Section F.8.

1) If the combined FNP, DHP, disk and tape logical channel requirements exceed 16, order another MXF6002.

2) If you have unused scratchpad capacity left assign it to other logical channels to the limit of 24 logical channels in the order of descending transfer rates of the peripherals.

SECTION V
Configuring Non-DPS Optional Processors, SCUs, IOMs - Initially or as Upgrades

A. Non-DPS Processor and IOM Addressing Feature Rules

Prior to starting your mainframe configuring, draw a simple block diagram of the mainframe you want showing all modules and addressing features.

1. Remember the simple rule that every processor and IOM must be ported (have an addressing feature) for every SCU. Processors and IOMs not included in base CPS system do not come equipped with addressing features. Base processor and base IOM come equipped with an addressing feature only for the base SCU.

2. As you write down on your order the type numbers required based on the mainframe and model that you want, check off that component on the target mainframe you block diagrammed in Step 1 above. You will save yourself problems from incorrect, incomplete, excessive ordering of type numbers.

3. Check your block diagram against the configurator below in Section B.5. Remember that the base CPS system components have no individual type numbers. Every component added beyond the base CPS system has a specific type number which must be used on any order. In ordering optional processors the type number always starts with the "CPU" alphabetic prefix.

   a. Now use Section B below.

B. Steps for Configuring Non-DPS Optional Processors, IOMs, SCUs

1. Use steps 2-5 below in sequence based on the Configurator for Adding Optional Mainframe Modules below. For optional configuring, where permitted, of processors beyond the base CPS processor, and/or IOMs beyond the base CPS IOM, and/or SCUs (beyond the quantity required for the memory size, i.e., beyond the net base system), see Section I.D.1. See also Section I.E.1 for summary of replication options.

2. Optional Processors -- For each such processor, order one CPA6001 (Central Processor Addressing feature or port) for each required SCU (net base system) in the configuration. If a processor is being added to an installed system, order a CPA6001 for each SCU in installed system.

   a. Find the appropriate type number for the additional processor (CPU6xxx) in this table --

System	CPU	System	CPU	System	CPU
66/07	CPU6007	66/05	CPU6005	66/40	CPU6401
66/17	CPU6107	66/10	CPU6101	66/60	CPU6601
66/27	CPU6207	66/20	CPU6201	66/80	CPU6801 (for CPS6820)
				66/80	CPU6802 (for CPS6821)

   b. Configuring optional processor involves only two type numbers, one for appropriate processor and one for processor addressing port feature(s).

   c. Ability to configure optional processors on a standard basis begins with 66/05, for which one may be configured. All ICU versions may have one more, 66/60/80 freestanding versions may have 3 more, other non-DPS freestanding systems may have one more.

   d. All optional processors are freestanding components.

   e. Each freestanding processor, whether optional or included in base CPS number of freestanding systems, has its own power supply.

   f. No ports for connection to SCUs are included in price of optional processors.

3. Optional IOMs -- For each such IOM (MXU6001), order a quantity of MXA6001 (IOM addressing feature or port) for each required SCU (net base system) in the configuration. If an IOM is being added to an installed system, order a MXA6001 for each SCU in the installed system. Consult also Section IV for configuring rules within each IOM.

4. Optional SCUs -- For each such SCU (MXC6001) beyond the quantity required (net base system) for the memory size, order as many CPA6001 Central Processor Addressing features as the total processors in the configuration, including any processors ordered in Step 2 above. Order also as many MXA6001 IOM addressing features as there are IOMs in the system, including any IOMs ordered under Step 3 above. Don't forget to count the IOM in any ICU included in the system.

   a. Configuring optional SCUs involves only three type numbers, one for the SCU itself, and one each for processor and IOM addressing port features to connect IOM and processor to extra SCU. An SCU must be ordered for each 512KW/2048KB of memory (net base system). In some models SCUs can be ordered optionally beyond the required number.

   b. All optional SCUs are free-standing components. Likewise, all SCUs other than base SCU in ICU-based mainframe are free-standing. Where an ICU-based system is equipped with 27 I/O channel board spaces (66/60/80, or 66/40 with MXF6004) the SCU will be in an external cabinet along with the memory beyond 256KW/1024KB. The external SCU still shares power supply in ICU.

   c. All free-standing or external SCU cabinets can contain up to 512KW/2048KB of memory, also ICU cabinets with 18 I/O channel board spaces.

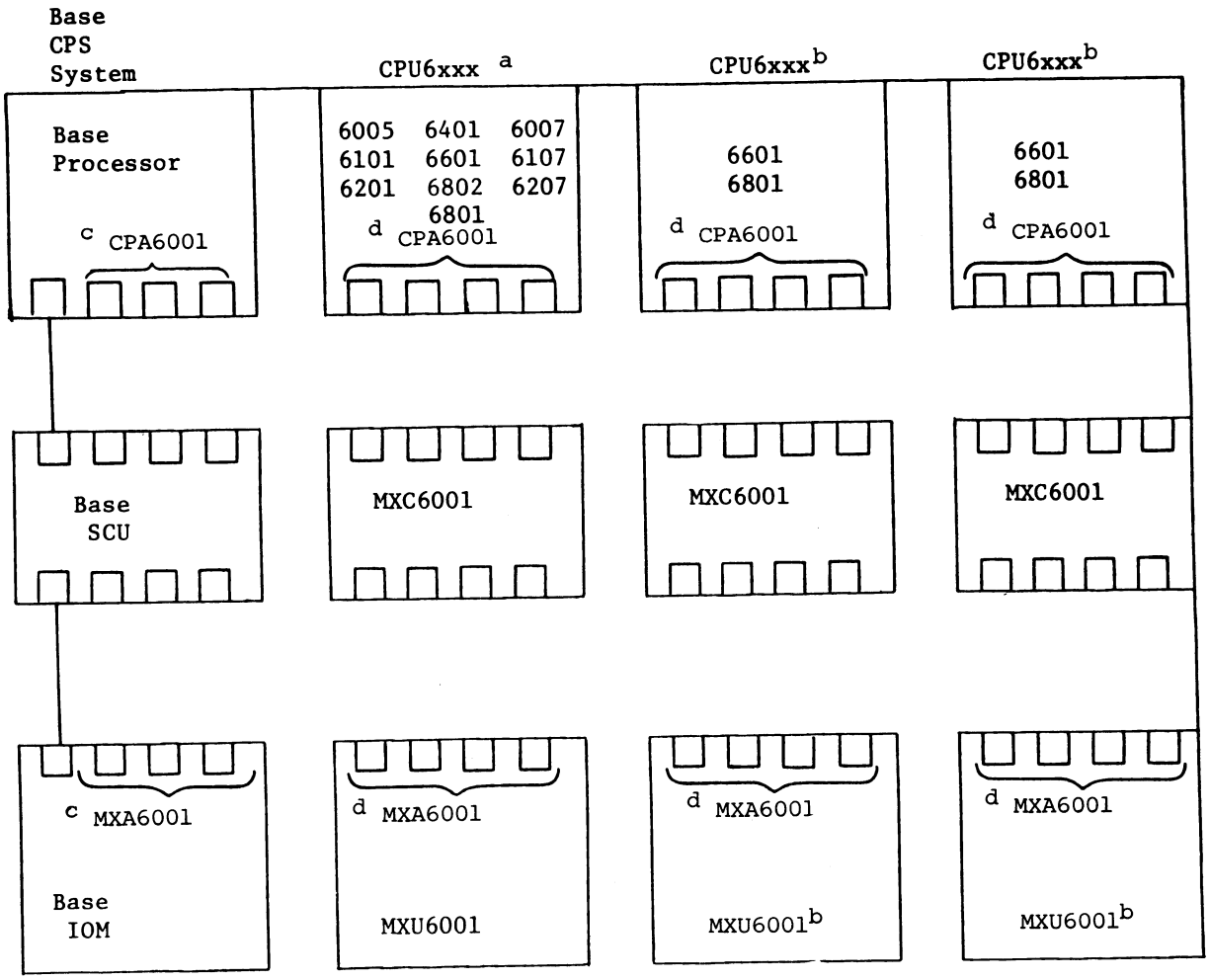
d. Each free-standing SCU, whether optional or required, has its own power supply, except as noted in b. above. The power supply is also used for the memory contained in the SCU cabinet.

e. Each free-standing SCU provides up to 8 active module ports for connecting processors and IOMs. Processors and IOMs in turn must contain an addressing port feature for each SCU in system.

f. Maximum number of SCUs for any free-standing mainframe is four, or two in any system containing an ICU.

SECTION V
Configuring Non-DPS Optional Processors,
SCUs, IOMs - Initially or as Upgrades

5. Configurator for Adding Optional Mainframe Modules - Non-DPS Systems



a CPU 6801 applies to 66/80 CPS6819, CPS6820. CPU6802 applies to 66/80 CPS6821

b Only freestanding 66/60 and 66/80 systems can have 3 or 4 processors and/or IOMs

c One required for each SCU beyond base SCU

d One required for each SCU in the system along with the extra processor (CPU6xxx) and/or extra IOM (MXU6001)

SECTION VI
Configuring Non-DPS Memory Additions/Upgrades

A. Steps for Memory Additions/Upgrades to Installed Non-DPS Systems

1. Refer to the Memory Upgrade Configurator (MUC) charts on following pages. The MUCs relate only to upgrading (increasing) the amount of memory on an installed system. MUC data is based on a system with one processor and one IOM.

2. In the appropriate MUC find the Level 66 model to which you are adding more memory. Begin with the square that represents the first add-on quantity of memory, and read straight across through as many squares as necessary to give you the new total memory size you want. Use all the type numbers (marketing identifiers) in each square required for the total new memory size. For example, to increase a 66/10 from 128KW/512KB to 256KW/1024KB, order the hardware listed in the square for the 128KW to 192KW column plus the square for the 192 to 256KW column.

3. When your memory upgrade or add-on crosses a 512KW/2048KB boundary on the MUC (marked by the triangle at the top), you must also configure an SCU, plus CPA6001 and MXA6001 to link the SCU to the base processor and base IOM in the installed system. However, your installed system may already have at least the required number of SCUs (via use of optional SCUs) for the total memory size to which your system is being upgraded. If so, disregard the MXC6001/CPA6001/MXA6001 combination.

4. For each additional processor already installed beyond the base processor, order another CPA6001 for any SCU that you are ordering because of Step 3 above. For each additional IOM already installed beyond the base IOM, order another MXA6001 for any SCU that you are ordering because of Step 3 above.

B. Non-DPS Memory Upgrade Configurator

1. Part 1

(1) (2)

MODEL	CPS NO. ICU	CPS NO. FS	From 96KW to 128KW	From 128KW to 192KW	From 192KW to 256KW	From 256KW to 384KW	From 384KW to 512KW	From 512KW to 768KW	From 768KW to 1024KW
66/05 or 66/07	CPS6050 CPS6058 CPS6070		CMM6000	CMM6001	CMM6002	CMM6003 CMA6003	CMM6004 CMA6004		
66/10 or 66/17	CPS6110 CPS6170		CMM6000	CMM6001	CMM6002	CMM6003 CMA6003	CMM6004 CMA6004		
66/10 or 66/17		CPS6120 CPS6180	CMM6000	CMM6001	CMM6002	CMM6003 CMA6003	CMM6004 CMA6004	CMM6005 CMA6005 (2)	CMM6006 CMA6006
66/20 or 66/27	CPS6210 CPS6270			CMM6001	CMM6002	CMM6003 CMA6003	CMM6004 CMA6004		
66/20 or 66/27		CPS6220 CPS6280		CMM6001	CMM6002	CMM6003 CMA6003	CMM6004 CMA6004	CMM6005 CMA6005 (2)	CMM6006 CMA6006
66/40	CPS6410			CMM6001	CMM6002	CMM6003 CMA6003	CMM6004 CMA6004		
		CPS6420		CMM6001	CMM6002	CMM6003 CMA6003	CMM6004 CMA6004	CMM6005 CMA6005 (2)	CMM6006 CMA6006

(1) Add squares cumulatively
(2) See Steps 3,4, on prior page

Non-DPS Memory Upgrade Configurator (continued)

2. Part 2

(1) (2)

MODEL	CPS NO. ICU	CPS NO. FS	From 96KW to 128KW	From 128KW to 192KW	From 192KW to 256KW	From 256KW to 384KW	From 384KW to 512KW	From 512KW to 768KW	From 768KW to 1024KW
66/60	CPS6610				CMM6010	CMM6011 CMA6011	CMM6012 CMA6012		
		CPS6620			CMM6010	CMM6011 CMA6011	CMM6012 CMA6012	CMM6013 CMA6013 (2)	CMM6014 CMA6014
66/80	CPS6810					CMM6011 CMA6011	CMM6012 CMA6012		
		CPS6820 CPS6821				CMM6011 CMA6011	CMM6012 CMA6012	CMM6013 CMA6013 (2)	CMM6014 CMA6014

(1) Add contents of each square horizontally for a given total memory size for a given model

(2) See Steps 3, 4 of Section VI A

SECTION VII
Configuring Motor Generator and Control Sets

A. Type numbers -- MGS6001, 6002, 6004, 6005

B. At least one set must be ordered for each Level 66 system. In some cases two may be desirable, depending on electrical supply quality, and size of system. If two are ordered, typical use would be to have one for the mainframe, one for the peripherals.

C. These are used in applying power in an orderly fashion and in regulating the electrical quality fed to the hardware. They level out voltage variations and compensate for power interruptions for a brief period. The length of period is affected by the load imposed by your configuration. Check your field engineer for specific figures.

D. You determine which model to order in the following way:

1. Decide on your complete system configuration - mainframe and peripherals, and FNPs, DHPs, consoles.

2. Refer your configuration to your pertinent branch field engineer. He will use his data on the KVA load applied by each component in your configuration. Adding the individual KVA loads gives a total figure which determines which MGS type number to order. Do not skimp on the MGS to use. Talk over with your field engineer the need or desirability of using two units in the specific customer case. The price of these units is insignificant in the typical total system price but they serve a very important function in helping maintain the Level 66 system in an available condition. If you find the Level 66 Automated Marketing Configurator is satisfactory for your purpose, it will provide you with the KVA load for the system you have specified.

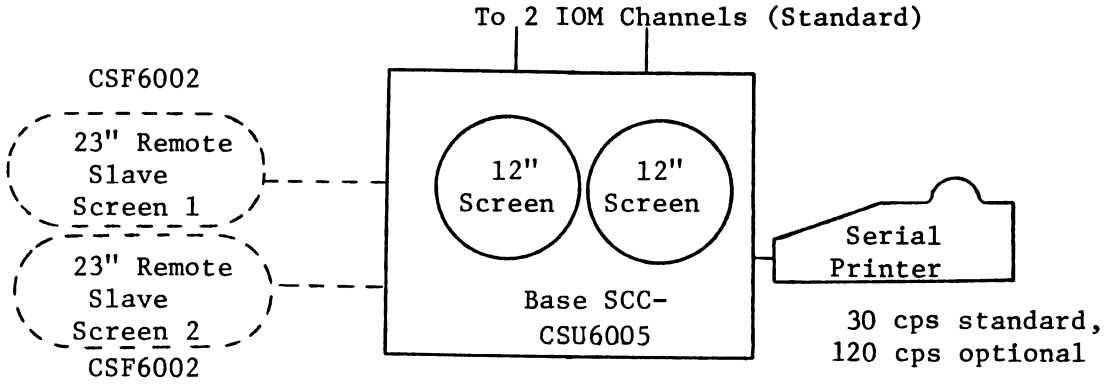
3. The sets are heavy, bulky, noisy and unattractive. Frequently they are installed away from people in order to avoid noise and appearance problems. For this reason it is undesirable to bid a minimal MGS. Your customer will grow. Give him some growth leeway before an MGS swap would be involved.

SECTION VIII
Configuring Consoles -
Rules For Console Subsystems

A. System Control Center (SCC) subsystem (CSU6005)

1. CSU6005 is closely similar to, but replaces, the CSU6002 version previously used. Primary difference is use of our new dot matrix serial printer in place of TN300 printer, and optional print speed increase to 120 cps. CSU6002 can be field modified to provide for an increased printing speed to 120 cps.

2. Block diagram



Channels to IOM are not switchable

3. Type number list

Type Number	Description	Required or Option
CSU6005	Base System Control Center with power supply, 2 12" CRT screens, 1 30 cps serial printer, 2 Level 66 IOM channels, operator control/ indicator panel, 64-key keyboard	At least one CSU6005 or CSU6004 console subsystem is required
CSF6002	Remote 23" CRT remote slave screen. Carries same display as 12" screen to which it is cabled. Maximum 2 per CSU6005	Option
CSF60023	Exchange of 30 cps printer for 120 cps printer. Applies to CSU6002, CSU6005	Option

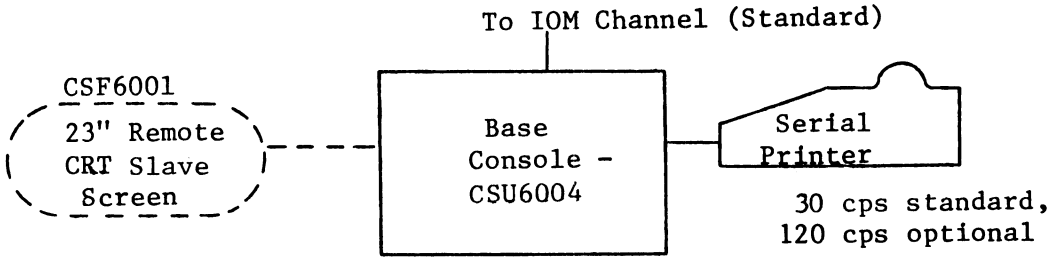
CSK0002 Field modification kit for CSU6002 to permit increase of printer speed to 120 cps. Required use with CSF6023 on CSU6002

CSF6004 Console Memory Addressing feature. Required for each console (CSU6005, CSU6002) in a Level 66 system when memory exceeds 256KW/1024KB. A no-charge feature

B. System console subsystem (CSU6004)

1. CSU6004 is closely similar to, but replaces, the CSU6001 version previously used. Primary difference is use of our new dot matrix serial printer in place of TN300 printer, and optional speed increase to 120 cps. CSU6001 can be field modified to provide for an increased printing speed to 120-cps.

2. Block diagram



Channel to IOM is not switchable

3. Type number list for System Console CSU6004

Type Number	Description	Required or Option
CSU6004	Base System Console with power supply, 30 cps serial printer, operator control/indicator panel, 64-key keyboard	At least one CSU6004 or CSU6005 console subsystem required
CSF6001	Remote 23" CRT slave screen. Reflects line being typed on key-	Option

	board and printer. Maximum 1 per CSU6004	
CSF6023	Exchange of 30-cps printer for 120-cps printer. Applies to CSU6001, CSU6004	Option
CSK0001	Field modification kit for CSU6001 to permit increase of printer speed to 120 cps. Required use with CSF6023 on CSU6001	
CSF6004	Console Memory Addressing feature. Required for each console (CSU6004, CSU6001) in a Level 66 system when memory exceeds 256KW/1024KB. A no-charge feature	

C. Number of console subsystems per Level 66 system

1. Two CSU6005, or 1 CSU6005 and 3 CSU6004, or 4 CSU6004. Maximum of 5 CRT screens in any combination per system. Where five CRT screens are used one must be used for VIDEO. If more than one CSU6005 is used, VIDEO is displayed once, on the master console subsystem.

2. In large systems which have multiple devices requiring operator file mounting/dismounting, it is desirable to have more than one console subsystem. One would be the master console subsystem for the system operator, at least one more would be placed in the center of the area involving file mount/dismount peripherals (tapes, disks, printers), or perhaps in the tape/disk library, or both.

   GCOS automatically separates messages and sends only file mount/dismount messages to peripheral area consoles and only system messages to the master console, and tape reel/disk pack requests to library area.

SECTION IX
Mainframe Configuration
Examples - Initial Orders and Additions

A. Initial Mainframe Order -- Examples

1. Customer wants 66/05 system with 192KW/768KB

1 CPS6058 (with INP) or 1 CPS6050 (no INP)	
1 CMM6000	96 to 128KW/384 to 512KB
1 CMM6001	128 to 192KW/512 to 768KB

2. Customer wants 2-processor, 1-IOM 66/20 ICU type with 384KW/1536KB

1 CPS6210	
1 CMM6001	128 to 192KW/512 to 768KB
1 CMM6002	192 to 256KW/768 to 1024KB
1 CMM6003	256 to 384KW/1024 to 1536KB
1 CMA6003	
1 CPU6201	Extra 66/20 processor, FS
1 CPA6001	Extra processor and IOM
1 MXA6001	addressing for base SCU

3. Customer wants tandem 66/20FS with 384KW/1536KB

1 CPS6210	
1 CMM6001	128 to 192KW
	First CPS, 256KW/1024KB
1 CMM6002	192 to 256KW
--------	
1 CPS6210	2nd CPS, 128KW/512KB
--------	
2 CPA6001	2 processor and 2 IOM addressing
2 MXA6001	features, 1 for each SCU

State on your order that you want a tandem system and give all cable lengths

4. Customer wants DPS-2 system with 512KW/2048KB memory and a second (optional) SCU

1 CPS6650	Base mainframe with 256KW/1024KB
1 CPK6652	DPS-1 to DPS-2
1 CMM6021	256 to 384KW/1024 to 1536KB
1 CMM6022	384 to 512KW/1536 to 2048KB
1 MXC6004	2nd SCU with all processor and IOM addressing features (ports)

5. Customer wants DPS-4 system with 768KW/3072KB memory and a tandem configuration. He will use some of our Management Sciences applications software (presently BCD mode). Use example 4 above and add

1 CPK6658	DPS-2 to DPS-3
1 CPK6662	3rd processor
1 CPK6666	and attachment for DPS-3 to DPS-4
1 CMM6013	512 to 768KW/2048
1 CMA6013	to 3072KB
1 CPF6650	BCD options for
1 CPF6651	base processors and 3rd processor
1 MXU6002	2nd IOM

B. Additions to Mainframe Orders -- Examples

1. Customer has a 1-processor, 1-IOM 66/05 installed with 192KW/768KB. Wants memory upgrade to 256KW/1024KB

1 CMM6002	192 to 256KW/768 to 1024KB

2. Customer has 2-processor, 1-SCU, I-IOM ICU 66/20 installed with 384KW/1536KB. Wants memory upgrade to 768KW/3072KB (thus another, required, SCU)

1 CMM6013	512 to 768KW/2048 to 3072KB
1 CMA6013	
1 MXC6001	Second, required, SCU plus its
1 CPA6001	addressing features to base
1 MXA6001	processor and IOM

3. Customer has DPS-1 installed with 384KW/1536KB. Wants a second (optional) SCU and memory upgrade to 512KW/2048KB. Also wants to upgrade performance of his INP

1 MXC6004	2nd SCU with all addressing features (ports) for base processors and IOM
1 CMM6022	384 to 512KW/1536 to 2048KB
1 DCE6651	INP performance upgrade
1 DCM6651	INP 64KB to 128KB required to use DCE6651

4. Customer has a 1-processor, 1-IOM 66/20FS installed with 256KW/1024KB and 2 SCUs (1 optional). Wants to make it a tandem system at same memory size

1 CPU6201	2nd processor
2 CPA6001	Addressing features to connect 2nd processor to 2 existing SCUs
1 MXU6001	2nd IOM
2 MXA6001	Addresssng features to connect 2nd IOM to 2 existing SCUs

SECTION X
Configuring Unit Record Subsystems
Examples - Initial Orders and Additions

A. Required Configuration Elements Per Unit Record Subsystem

1. URP (unit record processor) - choose one of three models.

2. URA (unit record addressing) - for each unit record unit/device, select the specific URA for that unit/device.

3. Card reader - at least one card reading device must be in each Level 66 system.

4. Printer - at least one high-speed printer must be present in each Level 66 system.

B. Summary table of URP subsystem

DEVICE	MODEL	PHYSICAL CHANNEL	LOGICAL CHANNELS	MAX NUMBER PER URP	SPEED
URP	URP0600 (Freestanding) (1 or more/IOM)	1 PSI (Included with URP)	1-7 (1 per Unit Record Device)		
	URP0601 (In ICU) (1/ICU)				
	URP0602 (In freestanding IOM) (1/IOM)				
Card Reader	CRU1050			1-2[a]	1050 cpm
Card Punch	PCU0121			1-2[a]	100-400 cpm
Card Reader Punch	CCU0401			1-2[a]	CR 400 cpm CP 100-400 cpm
Printers	PRU1100 (Drum)			1-3[a]	To 1100 lpm
	PRU1200 (Belt)				To 1200 lpm
	PRU1600 (Belt)				To 1600 lpm

[a] Maximum number of unit record devices per URP is 7 except that limit is 4 on 66/05/07. Maximums may be chosen from combinations shown immediately below.

2 CRU1050
2 PCU0121
2 CCU0401 (Each counts as 1 CR and 1 CP)
3 printers (Maximum of 2 PRU1200 printers per URP)

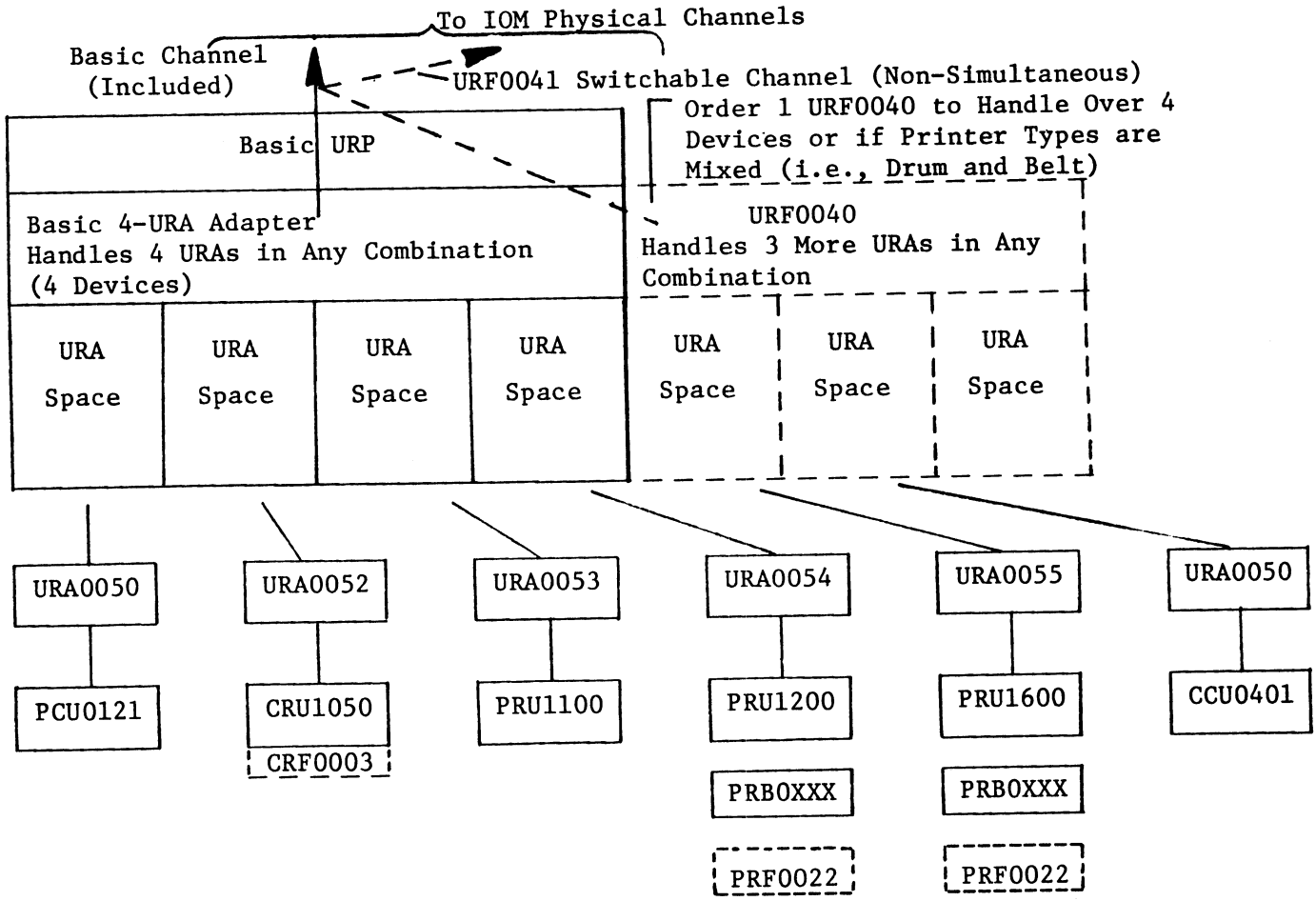
C. URP Subsystem Configurator - Rules For Use

1. Complement of devices is a user option as to quantities, except that every Level 66 system must contain at least one card reader and one printer.

2. Every unit record device in URP subsystem must be configured with a specific unit record adapter or addressing feature (URA).

3. Options are identified by dotted lines or boxes. In general options are priced features beyond the standard complement included in basic URP or device price.

4. You must show on your order any pertinent item with a type number.



D. Summary of Type Numbers Related to URP Subsystem

Type No.	Description	Remarks
URP0600	Freestanding URP	All URPs include 1 IOM Channel
URP0601	URP in ICU	Not for DPS
URP0602	URP in Freestanding IOM	
URF0040	Unit Record Addressing (URA) Expansion	Handles up to 3 more intermixed URAs beyond standard maximum of 4. Required if more than 4 devices are configured or drum and belt printers are mixed
URF0041	Software-Switchable URP Channel Path	Includes PSI IOM Channel for switched channel path termination
PCU0121	100-400 cpm Card Punch	
URA0050	Unit Record Addressing for PCU0121	1 Required Per PCU0121
CRU1050	1050 cpm Card Reader	
URA0052	Unit Record Addressing for CRU1050	1 Required Per CRU1050
CRF0003	51-Column Card Feature for CRU1050	No software support
CCU0401	Card Reader/Punch Unit	
URA0050	Unit Record Addressing for CCU0401	1 Required Per CCU0401
PRU1100	Drum Printer, to 1100 lpm	
URA0053	Unit Record Addressing for PRU1100	1 Required per PRU1100
PRU1200	Belt Printer, to 1200 lpm	
URA0054	Unit Record Addressing for PRU1200	1 Required Per PRU1200
PRK1216	PRU1200 to PRU1600 Upgrade Kit	

PRU1600	Belt Printer, to 1600 lpm	
URA0055	Unit Record Addressing for PRU1600	1 Required Per PRU1600
PRF0022	Expansion of PRU1200/1600 from 136 to 160 Print Columns	
PRB0500	64-character BCD Belt	At least one belt is required per PRU1200 or PRU1600. See Peripherals Outline for belt descriptions
PRB0501	64-character Belt, IBM 1403 print set	
PRB0513	64-character ASCII Belt	
PRB0524	64-character Belt, with OCR-A/B numeric font	
PRB0532	Puerto Rico Belt, 64-characters, 407 font	
PRB0549	64-character Belt, with OCR-A alphanumeric font	
PRB0600	96-character ASCII Belt	
PRB0703	64-character Belt, 200/0 char. set, OCR-B numeric font	

E. Example of URP configuring

1. Assume you want a URP subsystem with a card reader, card punch, one 1100 lpm printer and one 1600 lpm printer. The 1600 lpm printer is to have both 64-character (BCD) and 96-character (ASCII) printing capability. The URP is to be integrated within the mainframe ICU.

2. You would order as follows:

Qty	Type No.	Description
1	URP0601	Basic URP Integrated in ICU
1	CRU1050	Card Reader
1	URA0052	Unit Reader Addressing for CRU1050
1	PCU0121	Card Punch
1	URA0050	Unit Record Addressing for PCU0121
1	PRU1100	Drum Printer
1	URA0053	Unit Record Addressing for PRU1100
1	PRU1600	Belt Printer
1	URA0055	Unit Record Addressing for PRU1600
1	URF0040	Additional Device Ports (since there are Mixed Printer Types)
1	PRB0500	64-Char BCD Belt for PRU1600
1	PRB0600	96-Char ASCII Belt for PRU1600

SECTION XI
Configuring Magnetic Tape Subsystems
Examples - Initial Orders and Additions

A. Required configuration elements

1. MTP (magnetic tape processor)

2. MTU (magnetic tape unit)

   a. Note - with the announcement of the cluster-priced MTU0412 there is ambiguity in the term "tape unit", since MTU0412 price includes 2 separate cabinets and is simply a price cluster, not a physically packaged cluster. In this tape configuration material the term "tape unit" will be used to mean a single tape cabinet with provisions for reading/writing on one tape reel.

   b. Multiples of any MTU type number can be used in any combination except for MTU0411, which must be used only with MTU0412.

   c. MTU0400 is used outside U.S. and Canada in place of MTU0410/0412/0411. It has same characteristics as MTU0410/0412/0411 in table below except that MTU0400 provides automatic threading of tape reel, push-on reels, and optional tape cartridge feature.

   d. Must be a minimum of 1-3 tape units per Level 66 system. Review Section I.C. for minimum and maximum peripherals.

3. MTU density feature

   a. Every tape unit must be equipped with only one density feature from the MTU features table below. Density features are upgradable on-site by Field Engineering.

   b. Each tape unit when equipped with the desired density feature has one 7-track read/write head or one 9-track read/write head, not both. MTU0600 is for 9-track operation only.

c. See table in Section F.2. below

4. MTA (magnetic tape addressing) - one per 4 tape units, two for first 8 units in case of dual-channel MTP. See table in Section E.2. below

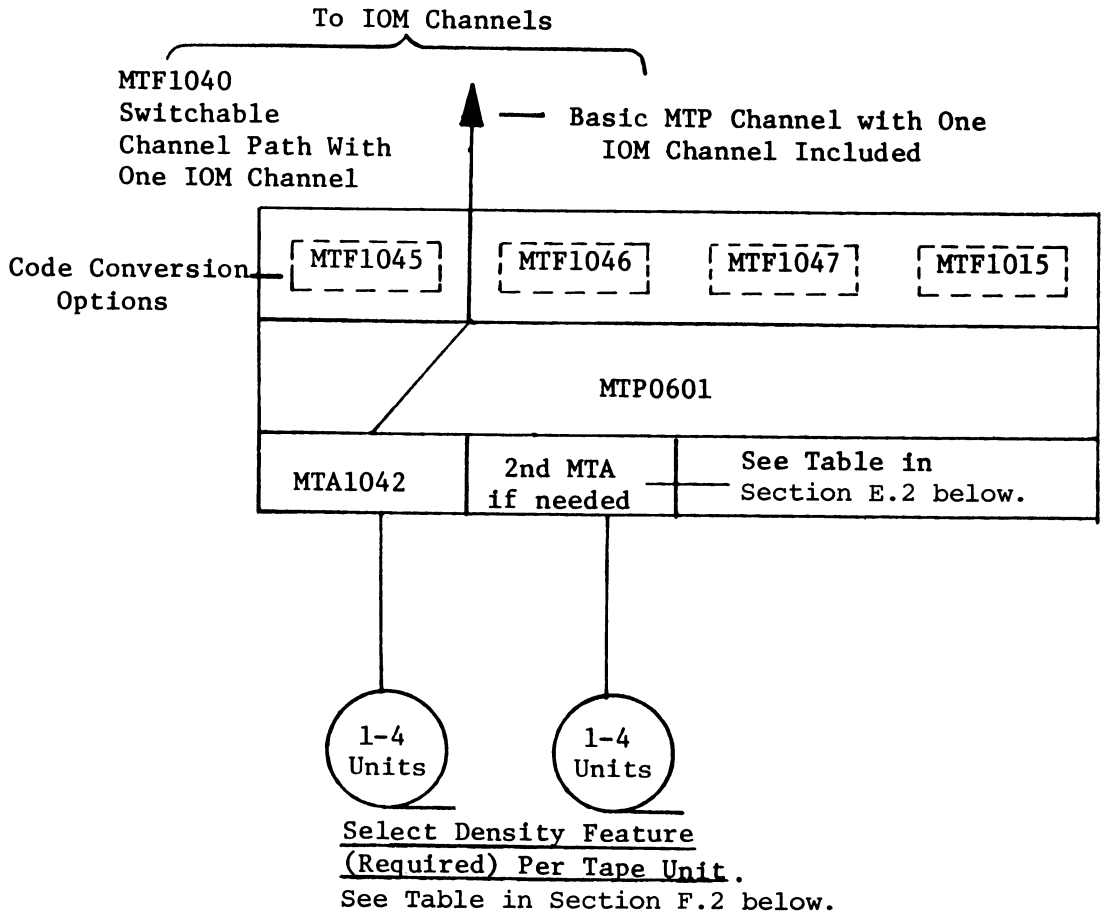
5. Second prime IOM physical channel (MTF1Ø42) - required if more than 8 tape units will be configured in a tape subsystem, otherwise it is optional.

B. Table of tape unit characteristics

	MTU 0410 0412 0411	MTUØ5ØØ	MTUØ61Ø
Automatic threading	Semi	Y	Y
Inches/second forward speed	75	125	2ØØ
Cartridge load option	N	Y	Y
Rewind speed (inches/second)	45Ø	5ØØ	64Ø
Power windows	Y	Y	Y
NRZI or PE recording (PE for 16ØØ bpi)	Both	Both	Both
7-track operation	Y	Y	N
Inter-record gap	.75 in	.75 in	NA
2ØØ bpi-character rate	15KC	25KC	NA
556 bpi-character rate	41.7KC	69.5KC	NA
8ØØ bpi-character rate	6ØKC	1ØØKC	NA
9-track operation	Y	Y	Y
Inter-Record Gap	.6 in	.6 in	.6 in
2ØØ bpi-byte/character rate	15KB/2ØKC	25KB/33.3KC	NA
556 bpi-byte/character rate	41.7KB/ 55.5KC	69.5KB/ 92.4KC	NA

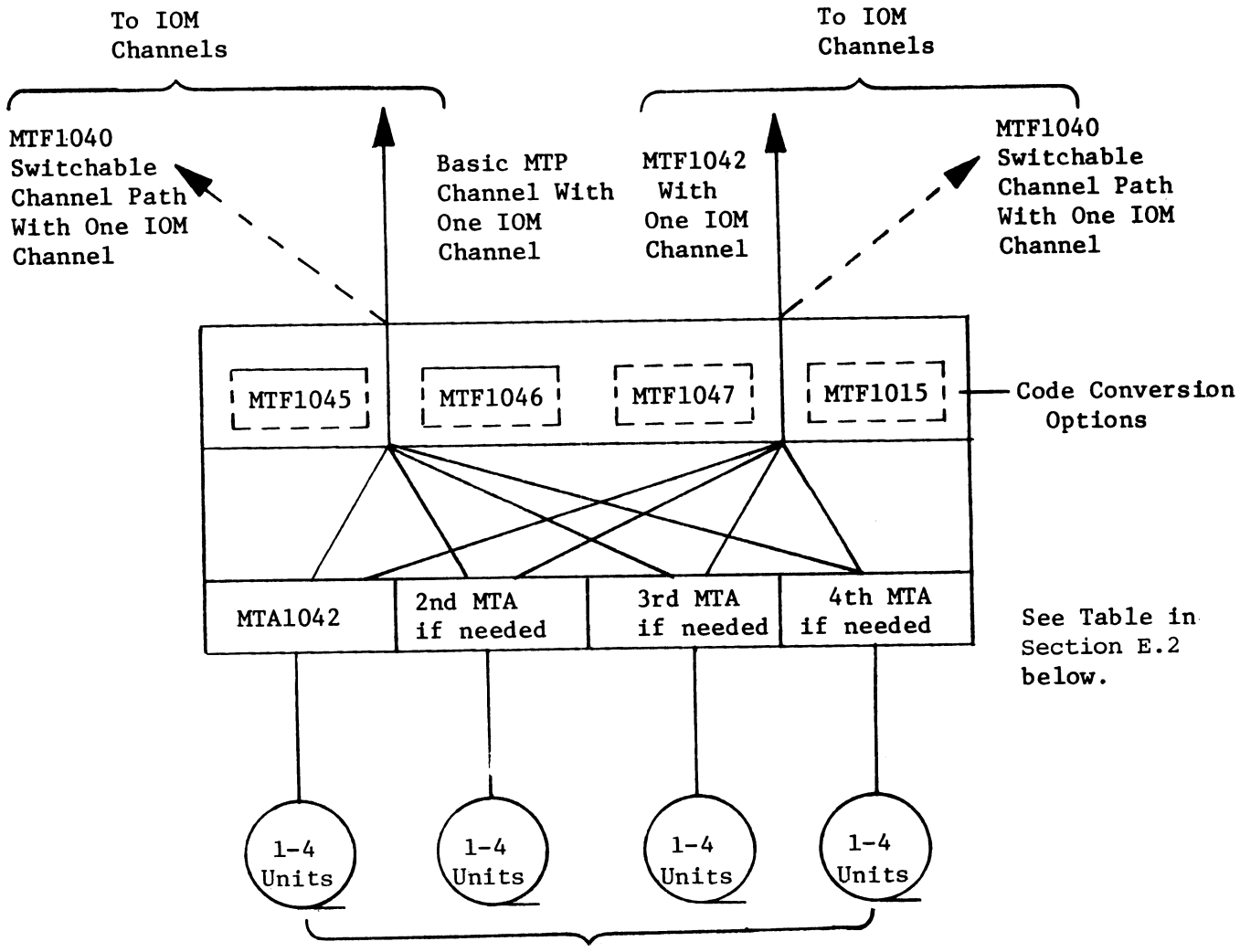
800 bpi-byte/character rate	60KB/80KC	100KB/130KC	160KB/213KC
1600 bpi-byte/character rate	120KB/ 160KC	200KB/ 266KC	320KB/ 426KC

C. Configurator for Single-Channel MTP (1 x 8 subsystem)



D. Configurator for Dual-Channel MTP (2 x 16 subsystem)

Second channel (MTF1Ø42) is required if more than 8 units are used in a subsystem.



E. Magnetic Tape Processor (MTP) Components

1. List of Device Processor (MTP) Type Numbers

Type Number	Description	Required	Optional
MTPØ6Ø1	Basic Tape Processor - Handles to 8 tape units (1x8) or to 16 with MTF1Ø42 (2x16). Includes IOM physical channel	X	
MTF1Ø4Ø	Switchable Non-simultaneous Channel. Makes a MTP channel software-switchable. Includes IOM physical channel for termination of switched channel path		X
MTF1Ø42	Dual Simultaneous Channel (device processor channel) for MTPØ6Ø1. Includes IOM Channel	Required to support more than 8 units. Optional otherwise.	
MTA1Ø42	Magnetic Tape Addressing Adapter for MTPØ6Ø1	1 per 4 MTUs(1)	
(3) MTF1Ø45	ASCII Code in Tape to/from 6-bit BCD Code Translator (9-track tape)		X (2)
(3) MTF1Ø46	Unpacked EBCDIC Code in Tape to/from 6-bit BCD Code Translator (9-track tape)		X (2)
(3) MTF1Ø47	Unpacked EBCDIC Code in Tape to/from ASCII Code Translator (9-track tape)		X (2)
(3) MTF1Ø15	Tape Interchange Feature for H2ØØ/Ø Tapes (7-track/9-track tape). Required to use H2ØØ/Ø tapes with CM66 (emulator), also to use COBOL-74 UFAS with 2ØØ/Ø tapes		X (2)

Footnotes

(1) 2 required for first 8 tape units if MTF 1Ø42 is configured, i.e., you are configuring a dual simultaneous channel MTP. See MTA table on next page.

(2) 2 required if you are configuring a dual simultaneous channel MTP

(3) May all be present in same MTP. No software support for these except MTF1Ø15

2. Table showing quantities of required magnetic tape unit addressing adapters (MTA1Ø42). Each MTA1Ø42 interfaces to up to 4 tape units and to a device processor channel. Two MTAs are required for the first 8 tape units in a dual simultaneous channel MTP.

MTA Table

No. of Tape Units on MTP	MTP0601	
	1x8 MTP No. of MTAs	2x16 MTP No. of MTAs
1-4	1	2
5-8	2	2
9-12	-	3
13-16	-	4

F. Magnetic Tape Unit Components

1. List of tape unit type numbers. After selecting a tape unit you must select a tape density feature from the features table in Section F.2. below. Density feature establishes transfer rate.

Type Number	Description
MTU0400	75 ips, 15KC to 160KC, 15KB to 120KB. Not usable in U.S. and Canada
MTU0410	75 ips, 15KC to 160KC, 15KB to 120KB. More expensive than MTU0412/0411 but with identical characteristics
MTU0412	Same characteristics as MTU0410. MTU0412 is available only as a 2-unit cluster (2 cabinets). Your lowest price per tape unit is provided by MTU0412
MTU0411	Same characteristics as MTU0410 but available only when MTU0412 has also been configured. A single tape unit
MTU0500	125 ips, 25KC to 266KC, 25KB to 200KB
MTU0610	200 ips, 213.3KC or 426.6KC, 160KB or 320KB. 9-track operations only

2. Table of MTU density and other features and type numbers.

Every tape unit must have only one density feature. Not more than one type of 7-track density feature and one type of 9-track density feature per Level 66 system. For MTU0412, select two density features since there are two tape units. Density feature establishes transfer rate.

MTU0410/0412/0411/0400 75 inches per second	MTU0500 125 inches per second	MTU0610 200 inches per second
MTF0113: 7-track density, 200/556/800 bpi	MTF0013: 7-track density, 200/556/800 bpi	MTF0607 9-track density, 800/1600 bpi
MTF0116: 7-track density, 556/800 bpi	MTF0016: 7-track density, 556/800 bpi	MTF0618: Cartridge Load, factory installed option
MTF0112: 9-track density, 800/1600 bpi	MTF0012: 9-track density, 800/1600 bpi	
[a]MTF0117: 9-track density, 800/1600 bpi	MTF0017: 9-track density, 200/556/800/1600 bpi	
[a]MTF0118: 8-track density, 556/800 bpi	MTF0018: Cartridge Load, factory installed option	
	MTF0019: Cartridge Load, field installed option	
	MTF0020: Optional High Altitude Adapter, for altitudes 4000-7500 ft.	
	MTF0021: Optional High Altitude Adapter, field installed for altitudes 4000-7500 ft.	
	MTF0022: Optional DC Power-On Meter, factory installed only	
	MTF0023: Optional Tape Movement Meter, factory installed only	

a For MTU0412/0411 only. Others are for MTU0400 only.

G. Magnetic Tape Subystem Configuring Example

A 66/1Ø prospect wants a 2x6 MTP with 6 9-track units at the lowest possible price. The answer is to use 3 MTUØ412 clusters (2 units each). You would order as follows:

Qty	Type Number	Description
1	MTPØ6Ø1	Magnetic tape processor with one IOM channel
1	MTF1Ø42	Second simultaneous channel for MTP. Includes one IOM channel
2	MTA1Ø42	Magnetic tape addressing features or ports on MTP. Each handles 4 tape units
3	MTUØ412	6 units, 2 units per cluster
6	MTFØ117	9-track density feature, 8ØØ/16ØØ bpi, one per tape unit

SECTION XII
Configuring Mass Storage Subsystems
Not For Use On 66/Ø5

A. Required configuration elements

1. Note - DO NOT USE THIS SECTION FOR 66/Ø5 SYSTEMS. SEE SECTION XIII.A.

2. MSPØ6Ø2/Ø6Ø3 (mass store processor) - choose one or more MSPs consistent with packaging of Level 66 mainframe (ICU-oriented or freestanding), with number of simultaneous channels desired and with type of disk spindle used. Every Level 66 system must include a mass storage subsystem. See Section I.C. for minimum and maximum peripherals complement. See also Section I.B. for 66/Ø7 restrictions. MSPØ6Ø2 cannot be used in DPS systems because they have no ICU.

3. Disk device adapter (MSF1ØXX) - choose one consistent with MSUØ4Ø2/Ø451 spindles or one consistent with MSUØ5ØØ spindles, whichever spindle type is used. If MSUØ5ØØ is mixed with other spindle types, both device adapter types must be in each MSP used with the subsystem. These features supply the proper "personality" for the MSP to interface to each spindle type.

4. MSA1ØXX (device addressing) - choose one for each four spindles of MSUØ451 or MSUØ4Ø2 type and one for each four MSUØ5ØØ spindles (2 units).

5. MSUØXXX (mass store unit) - with announcement of MSUØ5ØØ an ambiguity was introduced in use of word "unit". Prior to MSUØ5ØØ a unit was equal to a spindle, but an MSUØ5ØØ (unit) provides for 2 spindles. In this disk configuration section "spindle" will be used as the unambiguous term for the device which contains one disk reading/ writing pack or module.

6. RPS (rotational position sensing) feature - one per spindle. MSUØ5ØØ includes RPS feature for each spindle.

7. Dual access spindle feature - required per spindle when two channels are crossbarred in the mass store subsystem. This feature provides an access path to each spindle from each channel. No more than 2 MSP channels can be used to access any given spindle.

8. Two-MSP crossbar feature - required when two MSPs are to be used to reach the same set of spindles.

9. Delta link to FNP.

   a. Required when NPS is used in FNP.

   b. See Section K below for delta configuration considerations.

B. MSP Components and Type Numbers

Type	Description	Required or Option
MSP0602		
	MSP in ICU, with one standard MSP channel and one IOM physical channel included. Max of one per ICU. Standard channel can be used with MSU0500/0402/0451 disk spindles. Maximum of 8 MSU0500 (16 spindles) or 16 MSU0402/0451 disk spindles and 8 MSU0500 disk units (16 spindles) in one subsystem. If MSU0500 spindles are not used, a second simultaneous prime channel (MSF1028) can be included. If MSU0500 spindles are included, two-channel simultaneity can only be achieved by use of 2 MSPs and the 2-MSP crossbar feature (MSF1036)	Either or MSP0603 required. Neither can be used on 66/05 system. MSP0602 not usable on DPS systems
MSP0603		
	Freestanding MSP with one standard MSP channel and one IOM physical channel included. Standard channel can be used with MSU0500/0402/0451 disk units. Maximum of 4 MSPs in one subsystem. Maximum of 8 MSU0500 (16 spindles) or 16 MSU0402/0451 disk spindles and 8 MSU0500 disk units (16 spindles) in one subsystem. If MSU0500 spindles are not used, a second	Must be used in DPS systems

simultaneous prime channel (MSF1Ø28) can be included. If MSUØ5ØØ spindles are included, two-channel simultaneity can only be achieved by use of 2 MSPs and the 2-MSP crossbar feature (MSF1Ø36)

MSA1Ø27

MSUØ4Ø2/Ø451 device addressing capability	One required for each 4 MSUØ4Ø2/Ø451 spindles for each MSP in a subsystem. Two required for each 4 spindles on a MSP equipped with MSF1Ø28

MSA1Ø29

MSUØ5ØØ device addressing capability	One per MSP for each 2 MSUØ5ØØ units (4 spindles)

MSF1Ø19

Software-switchable channel. Can be used to switch a prime channel between two IOM channels or between an IOM channel and an FNP (for delta link). Includes IOM channel termination	Option in MSP only if no MSUØ5ØØ spindles in subsystem. To obtain delta link when MSUØ5ØØ spindles are included MSF1Ø27 must be used for link to FNP and MSF1Ø26 to switch prime MSP channel between 2 IOM channels

MSF1Ø24

Device adapter for MSUØ5ØØ when MSUØ5ØØ units configured	One required per MSP

MSF1Ø26

Non-simultaneous switched standard MSP channel. Software-switchable channel, makes MSP channel switchable to two IOM physical channels. Use MSF1Ø26 where it is desired to switch between two IOM channels when MSUØ5ØØ spindles are in	Option.

subsystem, otherwise use MSF1019. Can not be used to link to FNP for delta configuration. (MSF1027 required).

MSF1027

Additional non-simultaneous MSP channel. Used only to terminate to FNP to provide NPS delta link to disk. Can not run simultaneously with standard MSP channel. Provides a path to MSU0402/0451/0500 spindles.

Required if NPS used with the disk subsystem and the subsystem includes MSU0500 spindles

MSF1028

Dual simultaneous channel in same MSP

Option only if no MSU0500 spindles used. Max of 16 MSU0402/0451 spindles

MSF1033

Spindle expansion for MSU0402/0451

Required when more than 16 MSU0402/0451 spindles used

MSF1035

Device adapter for MSU0402/0451 when such spindles exist in subsystem

One required per MSP

MSF1036

Dual-MSP crossbarring

Required when 2 MSPs crossbarred to same subsystem

C. Disk Unit/Spindle Components and Type Numbers

MSU0500

Disk unit with 2 spindles. Non-removable disk modules. Includes rotational position sensing (RPS) feature per spindle

At least one required if non-removable storage wanted

MSF0011	
Dual access spindle feature for MSU0500	One required for each MSU0500 disk unit (2 spindles) when 2 MSPs are crossbarred to MSU0500 units in subsystem

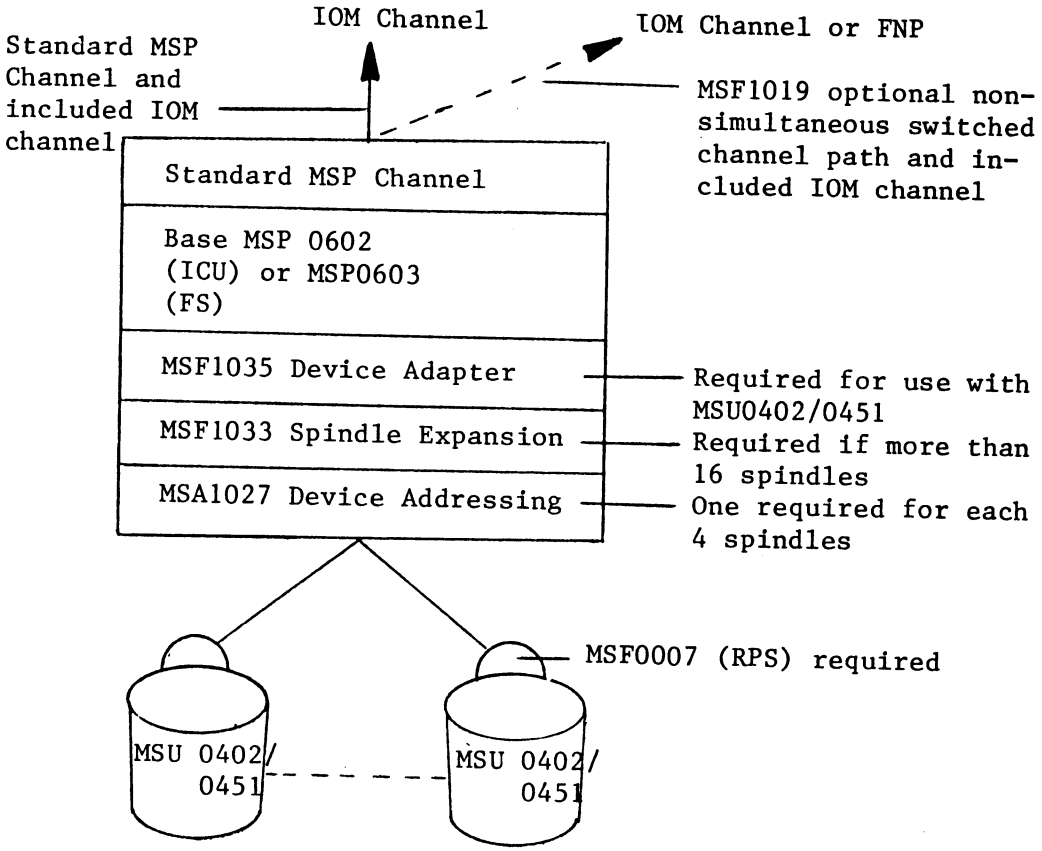
- -

MUS0402	
Removable-pack disk unit. 1 spindle	MSU0402 or MSU0451 required if removable storage wanted
MSU0451	
Removable-pack disk unit. 1 spindle. Same essentially as MSU0402 except with double capacity	
MSF0007	
RPS feature for MSU0451/0402	Required per MSU0402/ 0451 disk spindle on all but 66/05 systems
MSF0006	
Dual access spindle feature for MSU0402/0451	One per MSU0402/0451 spindle in two-MSP subsystems. Allows crossbarring a channel from each of 2 MSPs for non-simultaneous access to a disk unit. Also required if a 2-channel MSP is used (no MSU0500 spindles)

D. Configurator for One Single-Channel MSP Without Use of MSUØ5ØØ Spindles (1 x 32 subsystem)

1. Block diagram.

Note - 66/Ø7 is limited to 8 spindles per system



2. Configuration Table for Single-Channel MSP and Removable Pack Spindles (no MSUØ5ØØ)

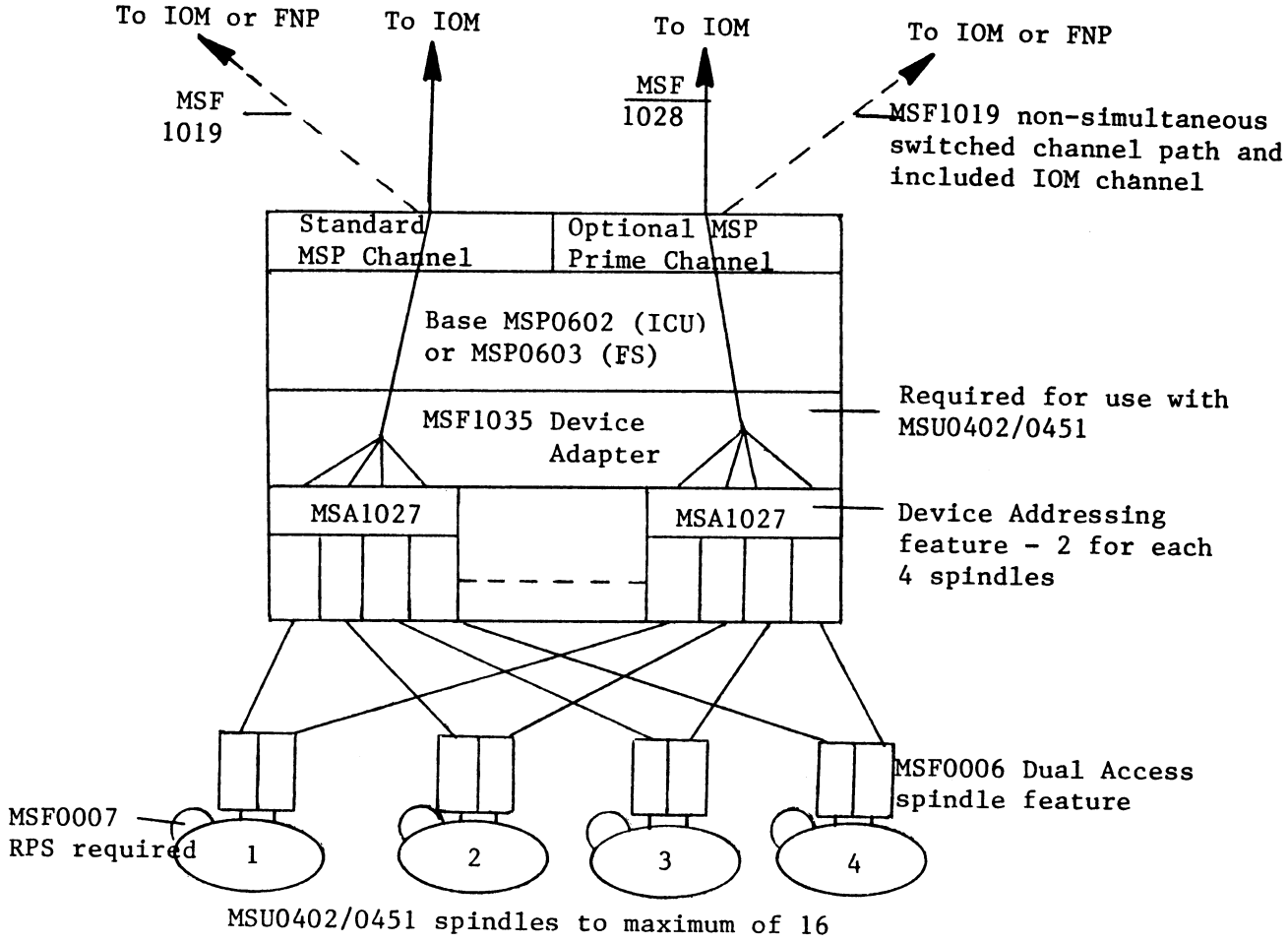
Maximum of 8 spindles for 66/Ø7 system

	MSU0402/ MSU0451	MSF0007 RPS	MSF1035 Device Adapter	MSA1027 Device Addressing	MSF1019 Switch Channel	MSF1033 Spindle Expansion
MSP 0602 (ICU) or MSP 0603 (FS)	1	1	1	1	One Optional	
	2	2	1	1		
	3	3	1	1		
	4	4	1	1		
	5	5	1	2		
	6	6	1	2		
	7	7	1	2		
	8	8	1	2		
	9	9	1	3		
	10	10	1	3		
	11	11	1	3		
	12	12	1	3		
	13	13	1	4		
	14	14	1	4		
	15	15	1	4		
	16	16	1	4		
	17-20	17-20	1	5		1
	21-24	21-24	1	6		1
	25-28	25-28	1	7		1
	29-32	29-32	1	8		1

E. Configurator for One dual-Channel MSP Without Use of MSUØ5ØØ Spindles (2 x 16 subsystem)

1. Block diagram

Maximum of 8 spindles per system on 66/Ø7



2. Configuration Table for One Dual-Channel MSP and Removable Pack Spindles (no MSUØ5ØØ)

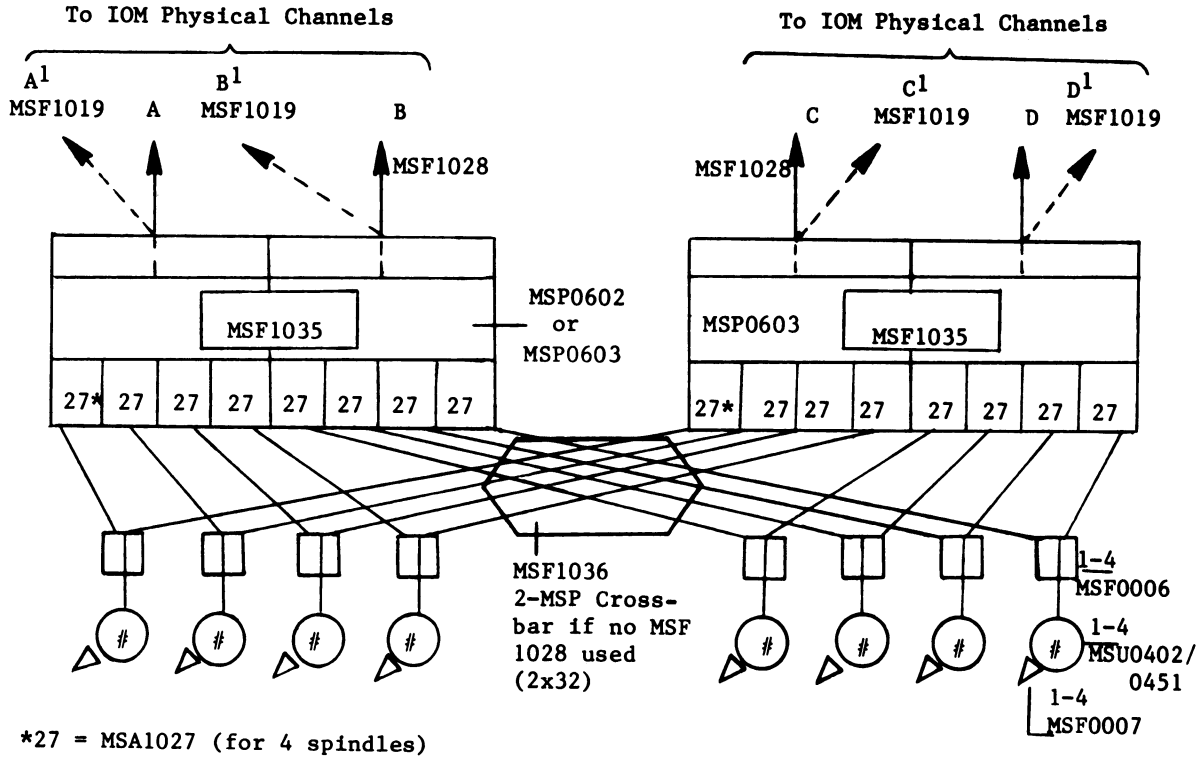
	MSU0402/ MSU0451	MSF0007 RPS	MSF0006 Dual Spindle Acess	MSF1035 Device Adapter	MSA1027 Device Addressing	MSF1028 Dual Channel	MSF1019 Switch Channel
MSP 0602 (ICU)	1	1	1	1	2	1	One or Two Optional
	2	2	2	1	2	1	
	3	3	3	1	2	1	
	4	4	4	1	2	1	
or	5	5	5	1	4	1	
	6	6	6	1	4	1	
MSP 0603 (FS)	7	7	7	1	4	1	
	8	8	8	1	4	1	
	9	9	9	1	6	1	
	10	10	10	1	6	1	
	11	11	11	1	6	1	
	12	12	12	1	6	1	
	13	13	13	1	8	1	
	14	14	14	1	8	1	
	15	15	15	1	8	1	
	16	16	16	1	8	1	

Note - Maximum of 8 spindles per system on 66/07

F. Configurator for 2-MSP Subsystem Without Use of MSUØ5ØØ Spindles (2x32 or 4x32 subsystem)

1. Block diagram

For 66/Ø7 system the maximum is one 2x8 subsystem, i.e., with single prime channel per MSP.



*27 = MSA1027 (for 4 spindles)

Note - any one MSP/IOM channel connects to 16 spindles. Channels A or A^1 and C or C^1 connect to same 16, B or B^1 and D or D^1 to the other 16. Each MSP connects to all 32 spindles

Note - 1-2 MSF1019 or 1-2 MSF1028 may be connected to a FNP instead of IOM. FNP includes 1 channel to terminate MSF1019 or 1 MSF1028 in DN6624/6632/6670

Each symbol represents up to 4 spindles

For maximum 4x32 subsystem order:

2 MSPs (max of 1 MSP0602 per ICU)
2 MSF1028
16 MSA1027
32 MSU0402/0451 (can be intermixed)
32 MSF0006
2 MSF1035
0-4 MSF1019 (as desired)
32 MSF0007

2. Configuration Table for 2-MSP Subsystem and Removable Pack spindles (no MSUØ5ØØØ). Table could be used for a 2x32 or 4x32 subsystem. Maximum for 66/Ø7 system is one 2x8 subsystem, i.e., with single prime channel per MSP.

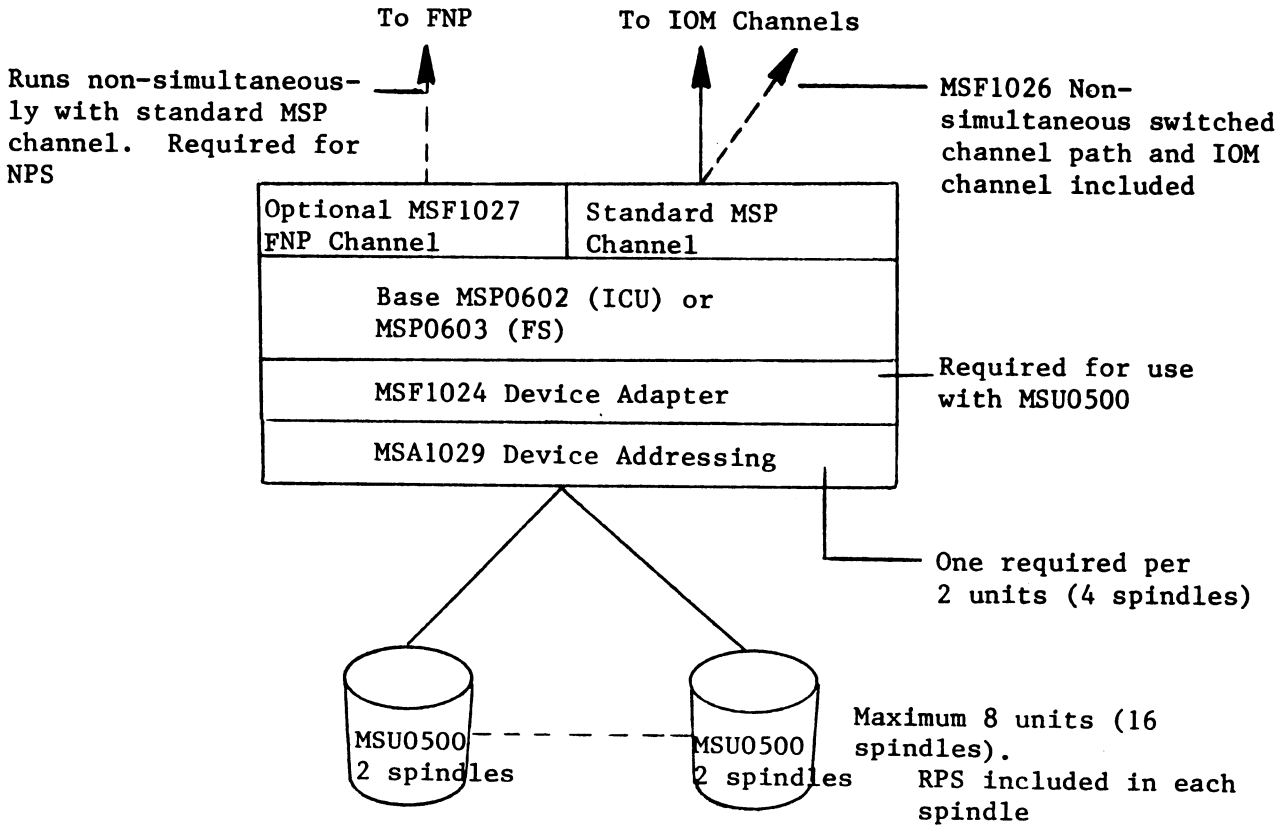
2 MSPs (MSP0602-1 Max per ICU) (MSP0603-FS)	MSU0402/ MSU0451	MSF0007 RPS	MSF0006 Dual Access	MSF1035 Adapter	MSA1027 Addressing	MSF1028 Dual Channel	MSF1019 Switch Channel
	1	1	1	2	2	None for 2x32 Subsystem - (Order 1 MSF1036 Crossbar). Two for 4x32 Subsystem	One to Four Optional
	2	2	2	2	2		
	3	3	3	2	2		
	4	4	4	2	2		
	5	5	5	2	4		
	6	6	6	2	4		
	7	7	7	2	4		
	8	8	8	2	4		
	9	9	9	2	6		
	10	10	10	2	6		
	11	11	11	2	6		
	12	12	12	2	6		
	13	13	13	2	8		
	14	14	14	2	8		
	15	15	15	2	8		
	16	16	16	2	8		
	17-20	17-20	17-20	2	10		
	21-24	21-24	21-24	2	12		
	25-28	25-28	25-28	2	14		
	29-32	29-32	29-32	2	16		

Note - MSF1036 2-MSP Crossbar feature must be ordered when no MSF1028 is ordered

G. Configurator For One Single-Channel MSP With Use of MSUØ5ØØ Spindles Only (1x15 units, 1x3Ø spindles)

1. Block diagram

For 66/Ø7 maximum number of units is 4 (8 spindles) per system.



2. Configuration Table For One Single-Channel MSP With Only MSUØ5ØØ Spindles (1x8 units or 1x16 Spindles)

For 66/Ø7 the maximum number of units is 4 (8 spindles) per system.

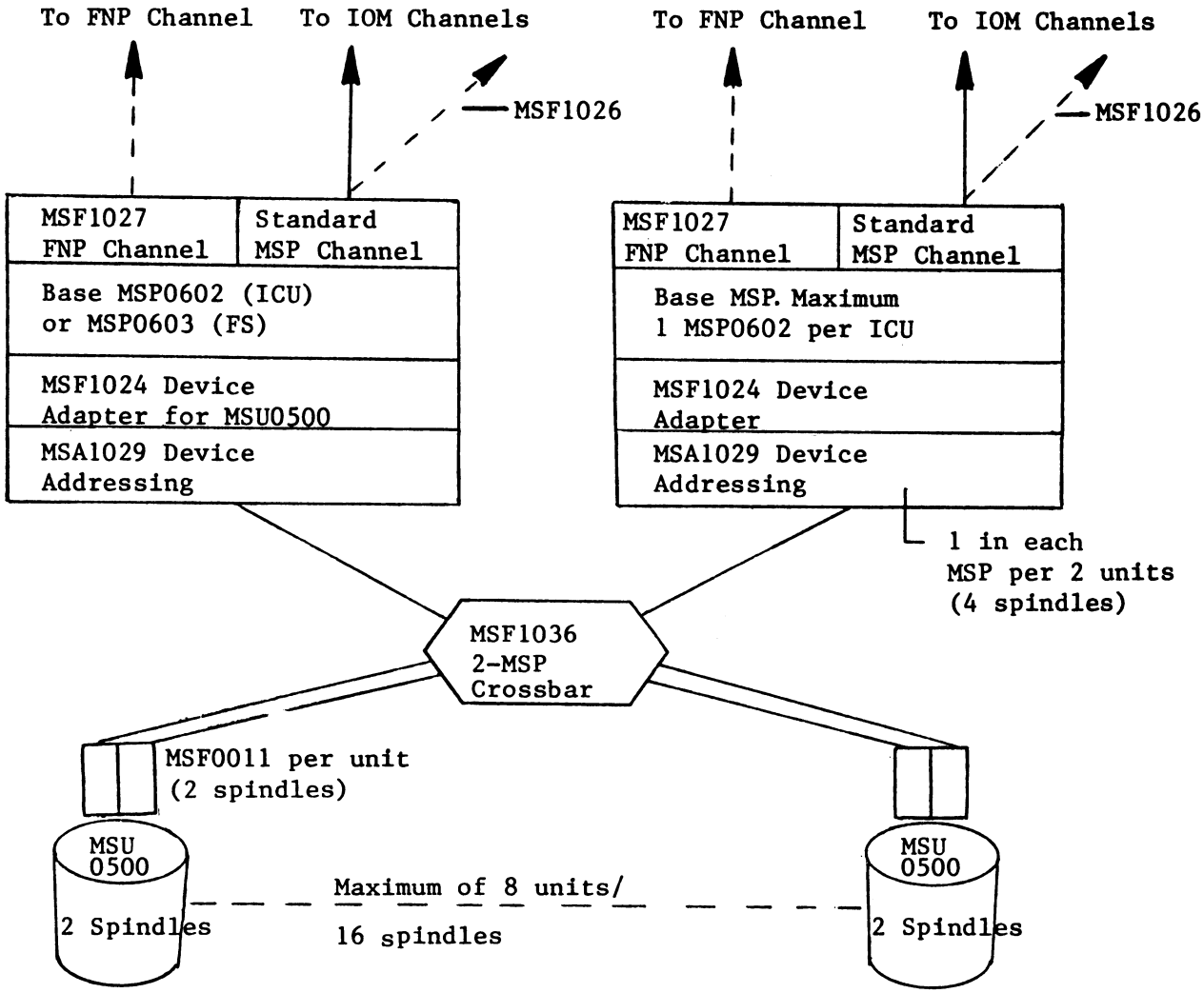
	MSU0500 Units/ Spindles	MSF1024 Device Adapters	MSA1029 Device Addressing	MSF1026 Switched Channel	MSF1027 FNP Channel
MSP 0602 (ICU) or MSP 0603 (FS)	1/2 2/4	1 1	1 1	1 Optional	Required for Use of NPS
	3/6 4/8	1 1	2 2		
	5/10 6/12	1 1	3 3		
	7/14 8/16	1 1	4 4		

H. Configurator For 2-MSP Subsystem With Use of MSUØ5ØØ Spindles Only (2x8 units, 2x16 spindles). Gives dual-channel simultaneity

1. Block diagram

a. See discussion Section K for delta link considerations

b. Maximum number of units on 66/Ø7 is 4 (8 spindles) per system.



2. Configuration Table for 2-MSP Subsystem With MSUØ5ØØ Spindles Only (2x8 units, 2x16 spindles)

   a. See discussion in Section K for delta link considerations.

   b. Maximum number of units on 66/Ø7 is 4 (8 spindles) per system.

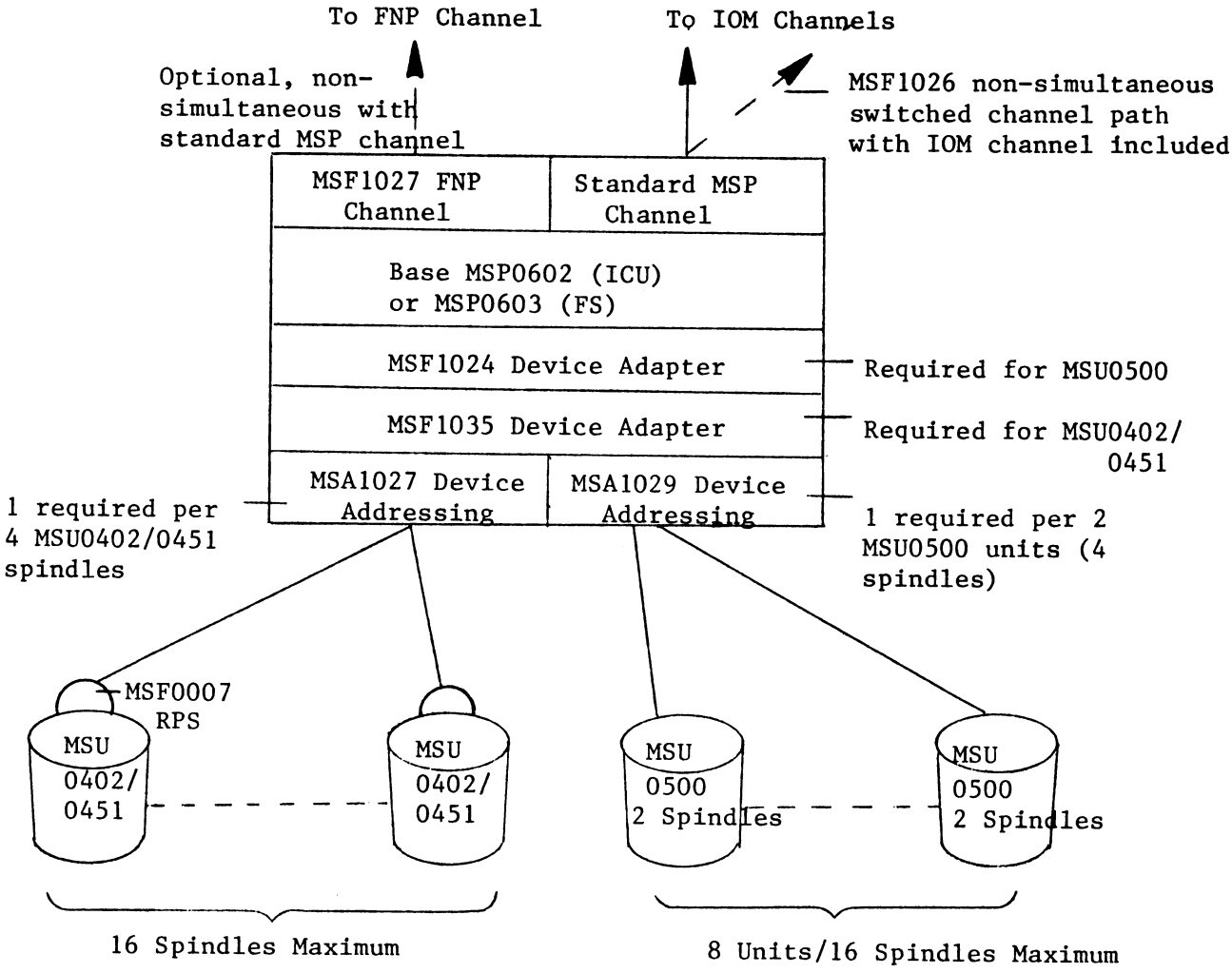
2 MSPs - MSP0602 (ICU) or MSP0603 (FS). Maximum of One MSP0602 per ICU						
MSU0500 Units/ Spindles	MSF0011 Dual Access	MSF1024 Adapter	MSA1029 Addressing	MSF1026 Sw. IOM Channel	MSF1027 FNP Channel	MSF1036 Crossbar
1-2/2 or 4	1-2	2	2	One or Two Optional	One or Two Optional	1
3-4/6 or 8	3-4	2	4			1
5-6/10 or 12	5-6	2	6			1
7-8/14 or 16	7-8	2	8			1

SECTION XII
Configuring Mass Storage Subsystems
Not For Use On 66/Ø5

I. Configurator for One Single-Channel MSP With Mixed MSUØ4Ø2/Ø451/Ø5ØØ Spindles

1. Block diagram

Maximum number of spindles on 66/Ø7 is 8 per system.



2. Configuration Table for One Single-Channel MSP With Mixed MSUØ4Ø2/ Ø451/Ø5ØØ Spindles (1x32). Limit is 16 MSUØ4Ø2/Ø451 spindles and 8 MSUØ5ØØ units (16 spindles).

Maximum number of spindles for 66/Ø7 is 8 per system

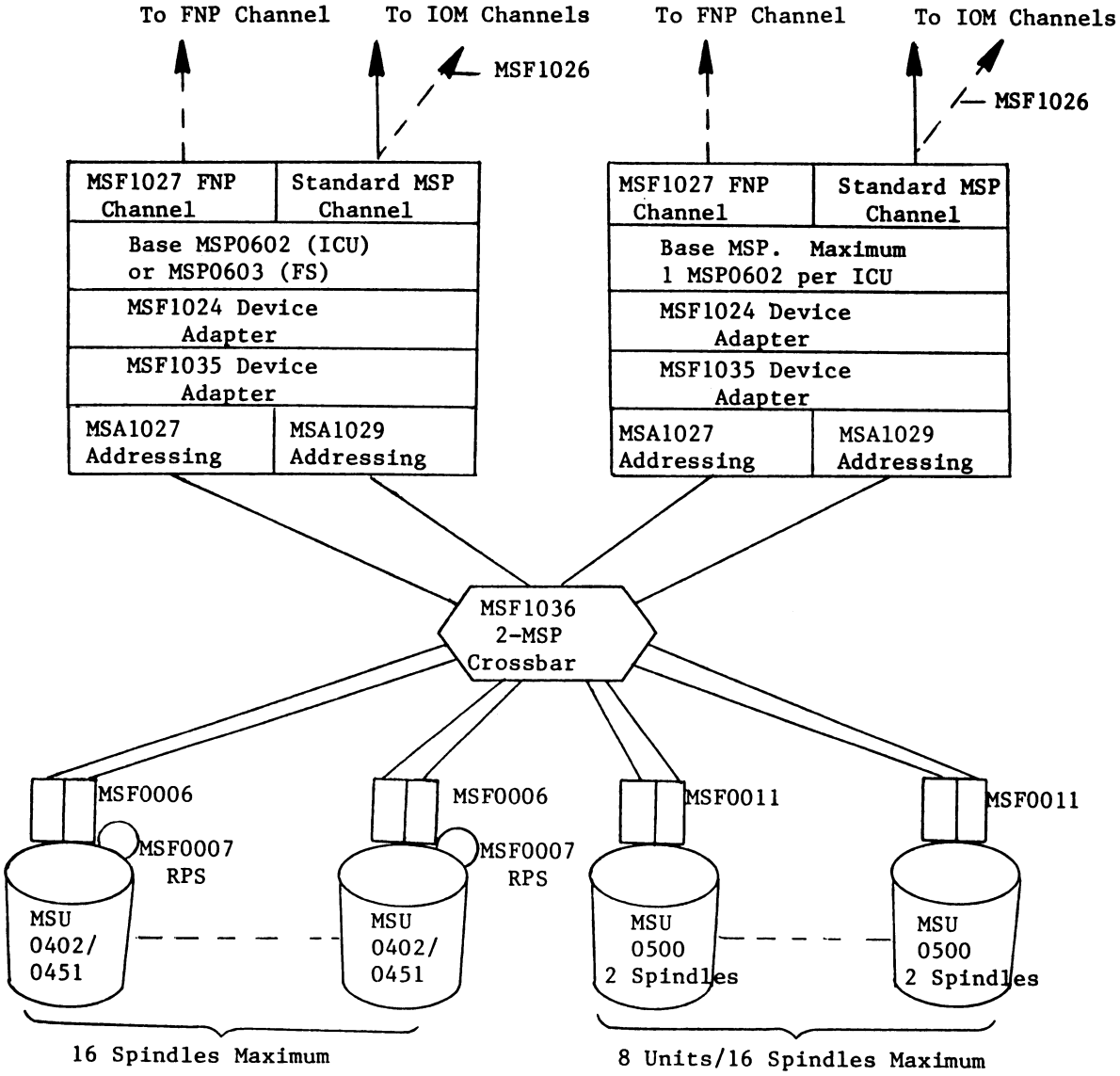
MSP0602 (ICU) or MSP0603 (FS)								
MSU0402/ MSU0451 Spindles	MSU0500 Units/ Spindles	MSF0007 RPS 402/451	MSF1035 Adapter 402/451	MSF1024 Adapter 500	MSA1027 Addressing 402/451	MSA1029 Addressing 500	MSF1026 SW.IOM Chan. 402/451/500	MSF1027 FNP Chan. 402/451/500
1-4 ↓	1-2/2 or 4	1-4 ↓	1	1	1	1	One Optional	One Required for NPS Support
	3-4/6 or 8		1	1	1	2		
	5-6/10 or 12		1	1	1	3		
	7-8/14 or 16		1	1	1	4		
5-8 ↓	1-2/2 or 4	5-8 ↓	1	1	2	1		
	3-4/6 or 8		1	1	2	2		
	5-6/10 or 12		1	1	2	3		
	7-8/14 or 16		1	1	2	4		
9-12 ↓	1-2/2 or 4	9-12 ↓	1	1	3	1		
	3-4/6 or 8		1	1	3	2		
	5-6/10 or 12		1	1	3	3		
	7-8/14 or 16		1	1	3	4		
13-16 ↓	1-2/2 or 4	13-16 ↓	1	1	4	1		
	3-4/6 or 8		1	1	4	2		
	5-6/10 or 12		1	1	4	3		
	7-8/14 or 16		1	1	4	4		

SECTION XII
Configuring Mass Storage Subsystems
Not For Use On 66/Ø5

J. Configurator For 2-MSP Subsystem With Mixed MSUØ4Ø2/Ø45l/Ø5ØØ Spindles

1. Block diagram

See Section K for delta link considerations



2. Configuration Table for 2-MSP Subsystem With MSUØ4Ø2/Ø451/Ø5ØØ Spindles

   a. See Section K for delta link considerations.

   b. For 66/Ø7 system the maximum is one 2x8 subsystem, with a single channel per MSP.

2 MSPs. MSP0602 (ICU) or MSP0603 (FS). Maximum of one MSP0602 per ICU											
MSU0402 MSU0451	MSU0500 (x2 = Spindles)	MSF0007 RPS 402/451	MSF0006 D. Access 402/451	MSF0011 D. Access 500	MSF1035 Adapter 402/451	MSF1024 Adapter 500	MSA1027 Address'g 402/451	MSA1029 Address'g 500	MSF1026 SW.IOM CH. 402/451/500	MSF1027 FNP CH. 402/451/500	MSF1036 Crossbar
1-4 ↓	1-2 3-4 5-6 7-8	1-4 ↓	1-4 ↓	1-2 3-4 5-6 7-8	2 2 2 2	2 2 2 2	2 2 2 2	2 4 6 8	One Optional per MSP	One Required for NPS	1 1 1 1
5-8 ↓	1-2 3-4 5-6 7-8	5-8 ↓	5-8 ↓	1-2 3-4 5-6 7-8	2 2 2 2	2 2 2 2	4 4 4 4	2 4 6 8			1 1 1 1
9-12 ↓	1-2 3-4 5-6 7-8	9-12 ↓	9-12 ↓	1-2 3-4 5-6 7-8	2 2 2 2	2 2 2 2	6 6 6 6	2 4 6 8			1 1 1 1
13-16 ↓	1-2 3-4 5-6 7-8	13-16 ↓	13-16 ↓	1-2 3-4 5-6 7-8	2 2 2 2	2 2 2 2	8 8 8 8	2 4 6 8			1 1 1 1

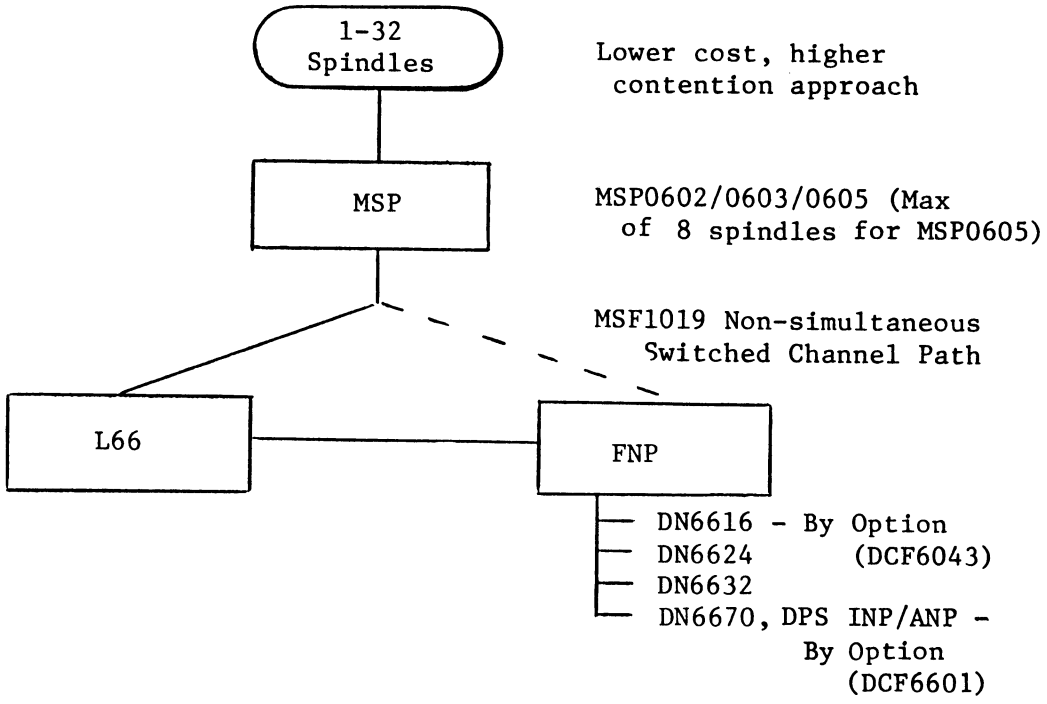
D. Access = Dual access spindle feature

K. Delta Link Considerations

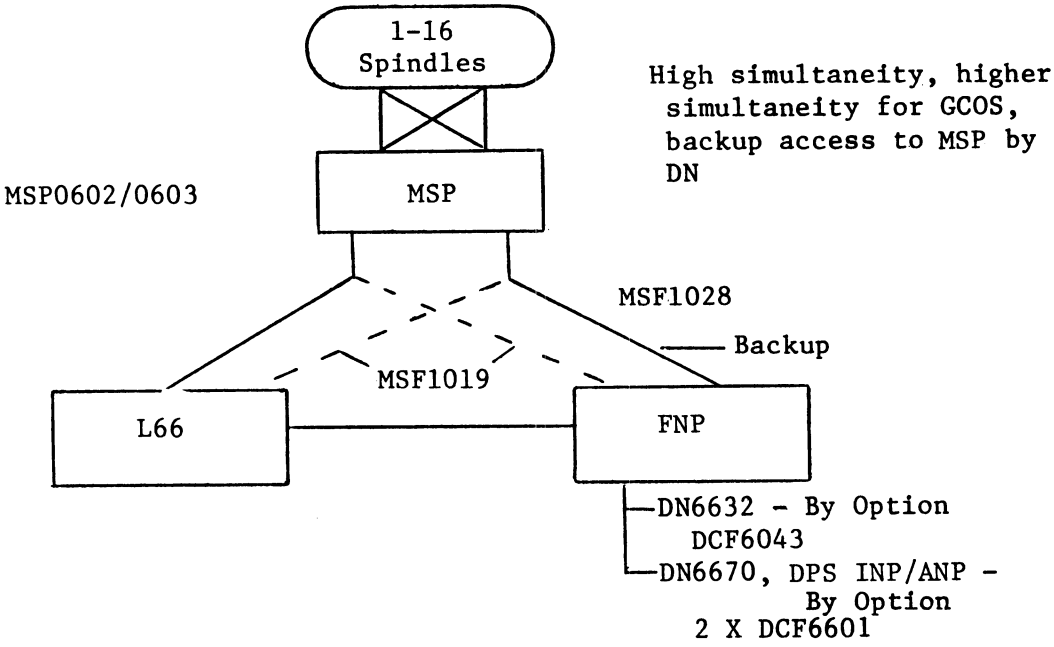
1. Delta link to MSP required in NPS environment.

2. Possible delta link configurations.

a. Single MSP with no MSUØ5ØØ spindles.

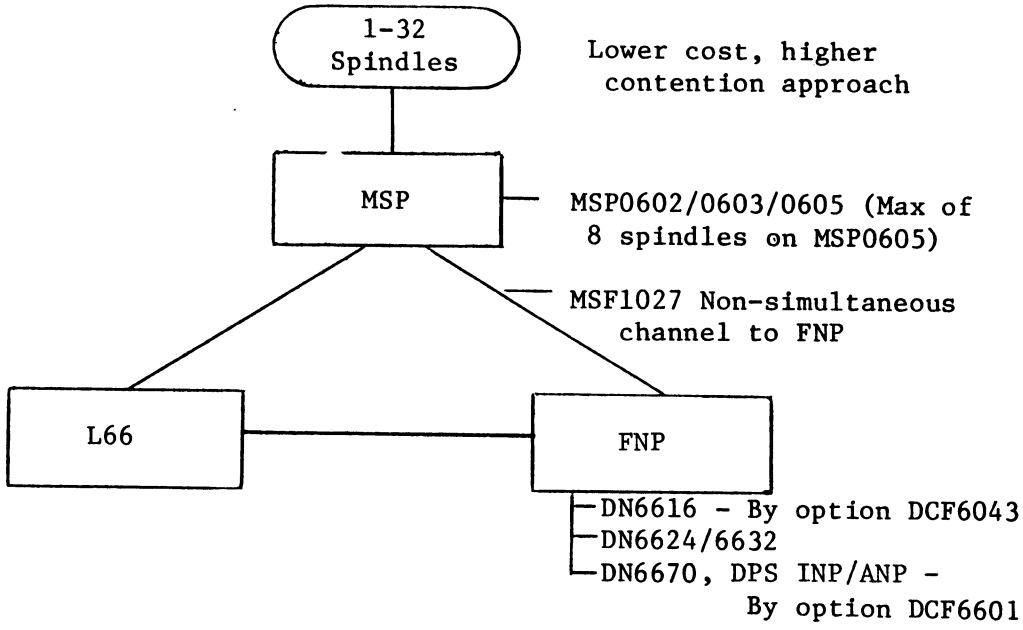


SECTION XII
Configuring Mass Storage Subsystems
Not For Use On 66/Ø5



Note - Since NPS cannot support more than one MSP channel at a time, the failure of the one channel declared at NPS bootload time would require a new NPS bootload. In the second bootload the alternate channel would be declared as effective. Bootload time of NPS is about one minute or less.

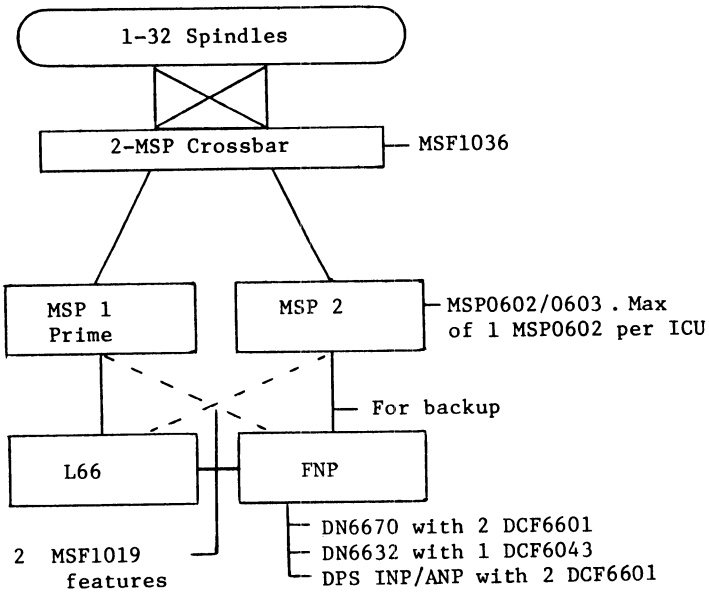
b. Single MSP with MSUØ5ØØ spindles in the subsystem, solely, or mixed with MSUØ4Ø2/Ø451 spindles.



c. Dual-MSP, dual-channel subsystem with no MSU0500 spindles.

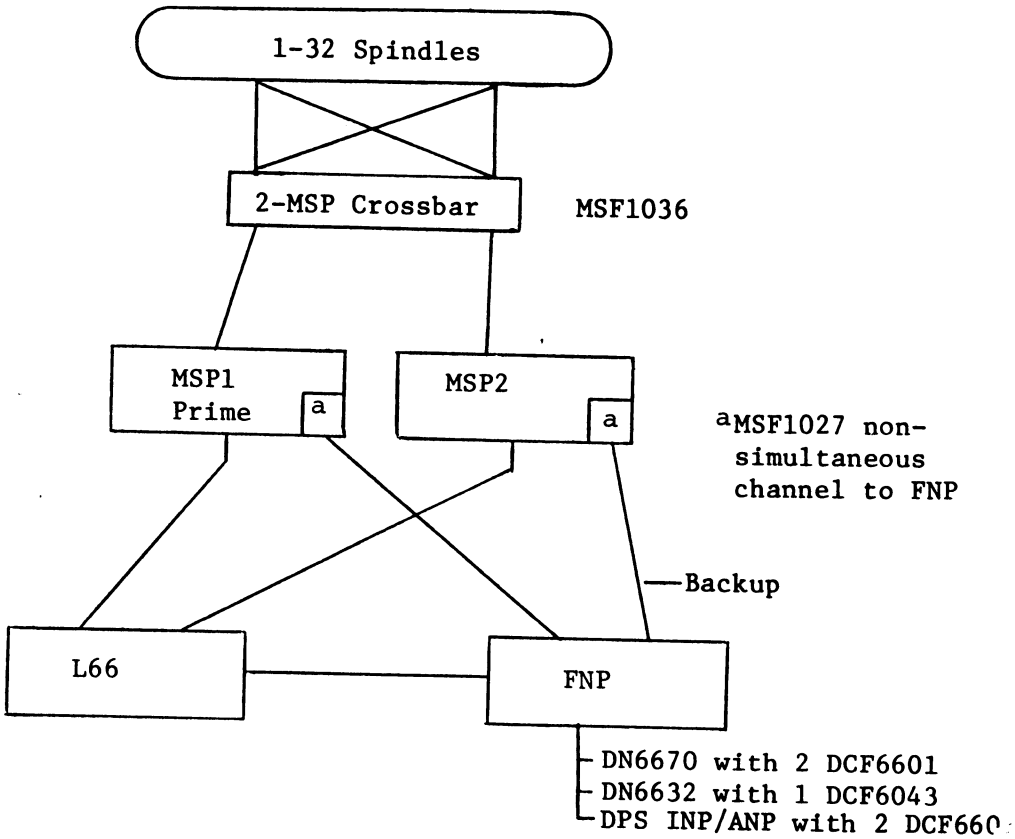
1) The path declared at NPS bootload time for NPS access to disk would be to MSP1 via the MSF1019 switched path feature. NPS cannot support two disk channels following any given bootload. If GCOS and NPS share same spindle, the GCOS SMS (shared mass storage) feature must be used. In such case both NPS and GCOS must use certain tables which are protected by lock byte (gating) provisions in the firmware loaded into MSP declared as the prime MSP. If there is a failure in MSP1 or in the switched path to FNP from MSP1, the lock byte firmware must be loaded into MSP2. A new NPS bootload must be executed to define the backup path to MSP2 as the path to be used by NPS.

2) In normal operation this approach gives GCOS the benefits of dual-channel simultaneity when NPS is not using the path to MSP1. On the other hand, in a high volume NPS/high volume GCOS environment it has the potential for high contention to MSP1.



d. Dual-MSP, 2-channel subsystem with MSU0500 spindles exclusively (not recommended) or mixed with MSU0402/0451 spindles.

This configuration has identical approach to the one immediately prior except that the switched paths are furnished by MSF1027 instead of MSF1019.



SECTION XIII
Configuring Mass Storage Subsystems on 66/Ø5 Only

A. Required Configuration Elements

1. MSPØ6Ø5 - every Level 66 system must include a mass storage subsystem. See Sections I.A. and I.C. for 66/Ø5 model restrictions and minimum/ maximum peripheral complements for Level 66 systems.

2. Device adapter (MSF1ØXX) - choose one consistent with MSUØ4Ø2/Ø451 spindles or one consistent with MSUØ5ØØ spindles, whichever type is used. If MSUØ4Ø2/Ø451 and MSUØ5ØØ are mixed in the subsystems, both adapters must be in MSP. These features supply the proper "personality" for the MSP to interface to each spindle type.

3. MSA1ØXX (device addressing) - choose one for each four MSUØ4Ø2/Ø451 spindles and one for each four MSUØ5ØØ spindles (2 units).

4. MSUØXXX (mass store unit) - with announcement of MSUØ5ØØ an ambiguity was introduced in use of word "unit." Prior to MSUØ5ØØ a "unit" was equal to a spindle, but an MSUØ5ØØ (unit) provides 2 spindles. In this configuration section "spindle" will be used as the unambiguous term for the device which contains one disk reading/writing pack or module.

5. RPS (rotational position sensing) feature. MSUØ5ØØ includes feature per spindle. MSUØ4Ø2/Ø451 provide for RPS as an optional feature for 66/Ø5.

6. Delta link to FNP required when NPS is used. Remember that 66/Ø5 CPS6Ø58 system price includes an FNP which cannot be used with NPS and provides for no delta link. A CPS6Ø58 system to use NPS would need to be supplemented with a DN6616/6624/6632/667Ø, all of which can use the delta link (by option on DN6616 and DN667Ø)

B. MSP components and type numbers

Type No.	Description	Required or Option
MSP0605		
	MSP in ICU, with one MSP channel and one IOM physical channel included. No dual-channel capability. No dual-MSP capability. No switchable IOM channel capability. A "universal" MSP--can handle to 8 spindles of MSU0402 or MSU0451 or MSU0500 type, or mixes.	MSP0605 must be used.
MSA1027		
	MSU0402/0451 device address capability	One required for each 4 units (4 spindles)
MSA1029		
	MSU0500 device addressing capability	One required for each 2 units (4 spindles)
MSF1027		
	Additional non-simultaneous channel in MSP to allow NPS delta link to disk. For CPS6058 version of 66/05, must terminate in a supplemental FNP, since the 66/05 integrated FNP does not support a disk channel.	Option
MSF1037		
	Device adapter for MSU0500	One required if MSU0500 units used
MSF1038		
	Device adapter for MSU0451/0402	One required if MSU0451/0402 units used

SECTION XIII
Configuring Mass Storage Subsystems on 66/05 Only

MSF6005

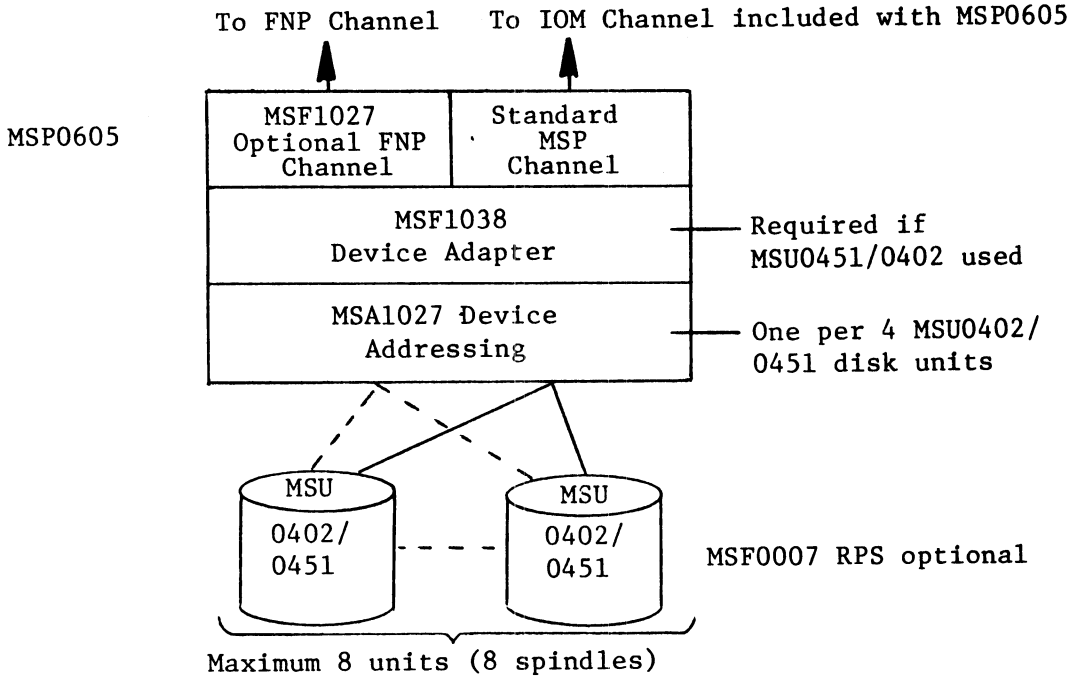
Upgrade kit to MSP0602. See Section XII for MSP0602	Needed when 66/05 is upgraded. Use MSP0602 adapters and addressing features as necessary

C. Disk spindle components and type numbers

Type No.	Description	Required or Option
MSF0007		
	Rotational position sensing for MSU0402/0451	Option - 1 per spindle when used
MSU0402		
	Removable-pack disk unit. 1 spindle	Two spindles of some type are required as normal minimum per subsystem. May be freely intermixed with MSU0451 and MSU0500 disk spindles
MSU0451		
	Removable-pack disk unit. 1 spindle. Same essentially as MSU0402 except with doubled capacity	Ditto
MSU0500		
	Fixed-module disk unit. 2 spindles. Includes rotational position sensing (RPS) feature	Ditto

D. Configurator for One Single-Channel MSPØ6Ø5 Without Use of MSUØ5ØØ Spindles (1 X 8 subsystem)

1. Block diagram



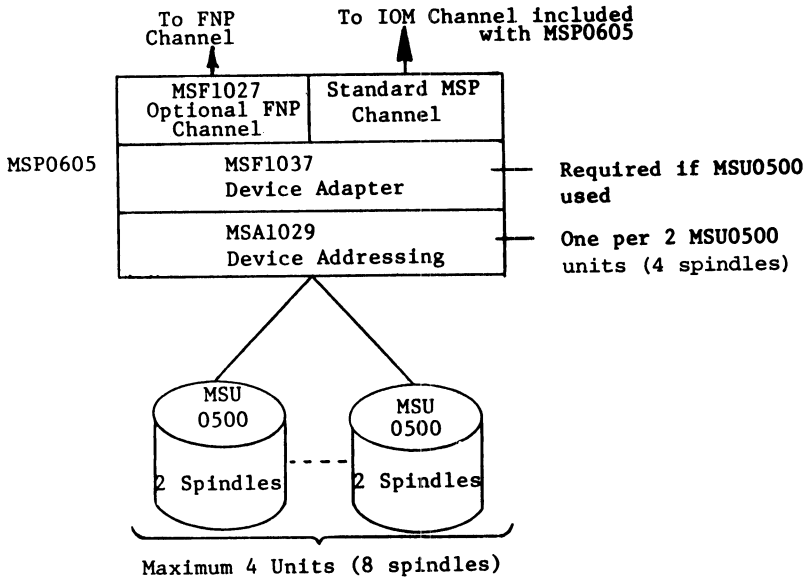
2. Configurator for One Single-Channel MSP0605 With Use of MSU0402/0451 Spindles Only (1 X 8 subsystem)

MSP0605				
MSU0402/ MSU0451	MSF1038 DEVICE ADAPTER	MSA1027 DEVICE ADDRESSING	MSF0007 RPS — OPTION	MSF1027 FNP CHANNEL
1	1	1	1	1 OPTIONAL
2	1	1	2	
3	1	1	3	
4	1	1	4	
5	1	2	5	
6	1	2	6	
7	1	2	7	
8	1	2	8	

SECTION XIII
Configuring Mass Storage Subsystems
on 66/05 Only

E. Configurator for One Single-Channel MSP0605 With Use of MSU0500 Spindles Only (1 X 8 subsystem)

1. Block diagram



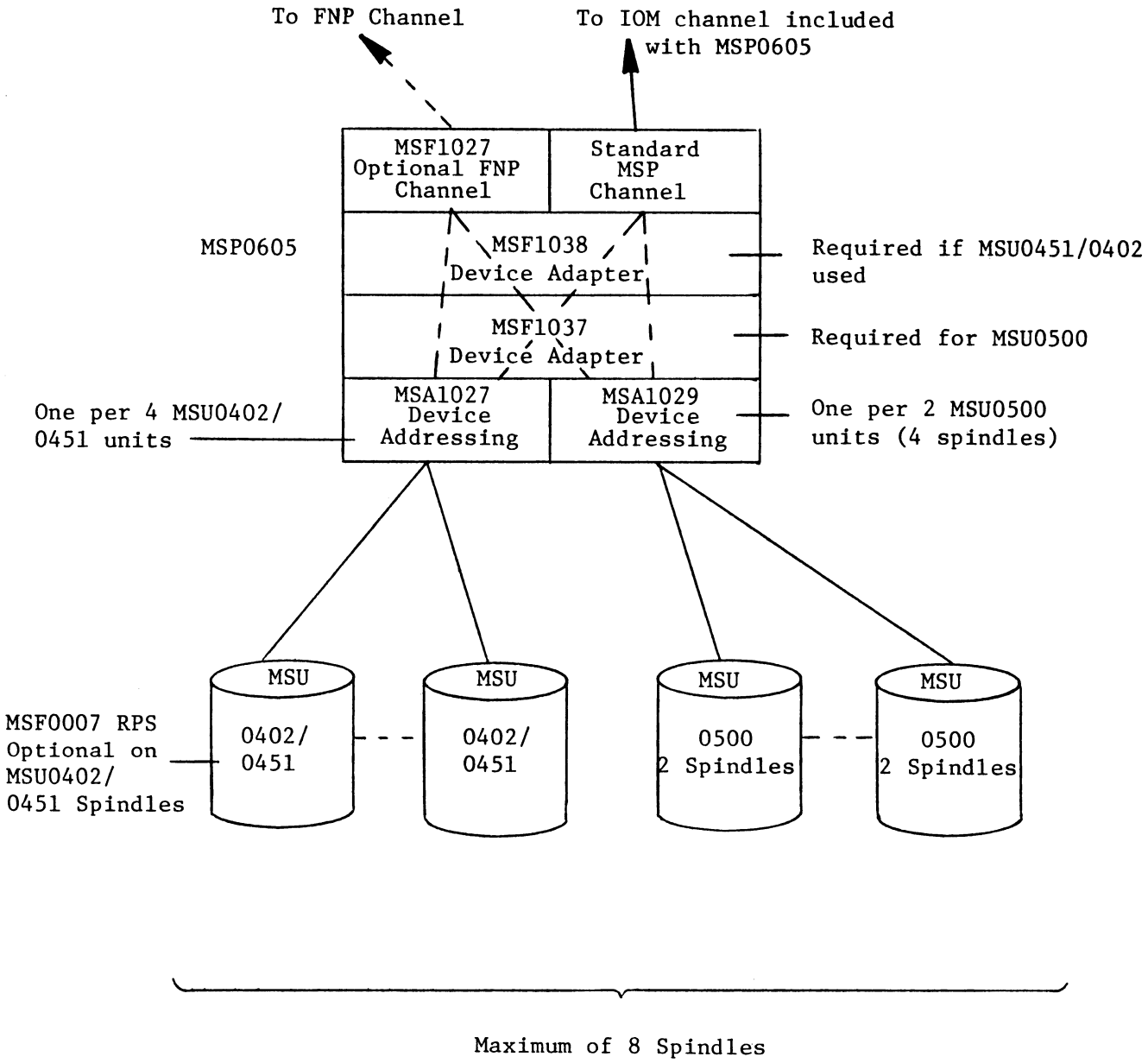
2. Configuration Table for One Single-Channel MSP0605 With Use of MSU0500 Spindles Only (1 X 8 subsystem)

MSP0605			
MSU0500 (2 DRIVES EACH)	MSF1037 DEVICE ADAPTER	MSA1029 DEVICE ADDRESSING	MSF1027 FNP CHANNEL
1	1	1	1
2	1	1	
3	1	2	OPTIONAL
4	1	2	
COMMENTS: No spindle options. RPS is included.			

SECTION XIII
Configuring Mass Storage Subsystems
on 66/05 Only

F. Configurator for One Single-Channel MSP0605 With Mixed MSU0402/0451/0500 Spindles (1 X 8 subsystem)

1. Block diagram



2. Configuration Table for One Single-Channel MSPØ6Ø5 With Mixed MSUØ4Ø2/Ø451/Ø5ØØ Spindles (1 X 8 subsystem)

MSP0605							
MSU0402/ MSU0451	MSU0500 (2 Spindles Each)	MSF1037 ADAPTER 500	MSF1038 ADAPTER 402/451	MSA1027 ADDRESSING 402/451	MSA1029 ADDRESSING 500	MSF0007 RPS — OPTION	MSF1027 FNP CHANNEL
1	1	1	1	1	1	1 PER MSU0402/ 0451 SPINDLE	1 OPTIONAL
1 - 2	2	1	1	1	1		
1 - 2	3	1	1	1	2		
2 - 4	1	1	1	1	1		
2 - 4	2	1	1	1	1		
5 - 6	1	1	1	2	1		

SECTION XIV
Mass Storage Configuration Examples

A. Configuring Example for Mass Storage for 66/Ø7 Up (not 66/Ø5)

66/2Ø ICU-oriented prospect wants a 2-MSP subsystem, each MSP with a single prime channel. Each MSP is to communicate with a DN667Ø FNP which will be using NPS. Prospect will start with 1Ø MSUØ451 spindles and 5 MSUØ5ØØ units (1Ø spindles).

1	MSPØ6Ø2	MSP in ICU for lowest price
1	MSPØ6Ø3	2nd MSP. Cannot be in ICU
1Ø	MSUØ451	1Ø spindles
1Ø	MSFØØØ7	RPS per MSUØ451 spindle
1Ø	MSFØØØ6	Dual access spindle feature per MSUØ451 spindle
2	MSF1Ø35	Device adapter per MSP for MSUØ451
6	MSA1Ø27	Device addressing for MSUØ451, 3 per MSP for 1Ø spindles crossbarred to 2 MSPs
5	MSUØ5ØØ	1Ø spindles, 5 units
5	MSFØØ11	Dual access spindle feature per MSUØ5ØØ unit (2 spindles)
2	MSF1Ø24	Device adapter per MSP for MSUØ5ØØ
6	MSA1Ø29	Device addressing for MSUØ5ØØ, 3 per MSP for 1Ø spindles/5 units crossbarred. Each MSA1Ø29 addresses 2 units/4 spindles per MSP, thus 6 MSA1Ø29 needed
2	MSF1Ø27	Non-simultaneous channel to FNP from each MSP. Only one effective from a given FNP/NPS bootload (starting) operation. See Section XIII.K.
1	MSF1Ø36	2-MSP crossbar

B. Configuring example for mass storage for 66/Ø5

66/Ø5 (CPS6Ø58) prospect wants 4 MSUØ4Ø2 spindles and 2 MSUØ5ØØ spindles (1 unit). Prospect will use GRTS.

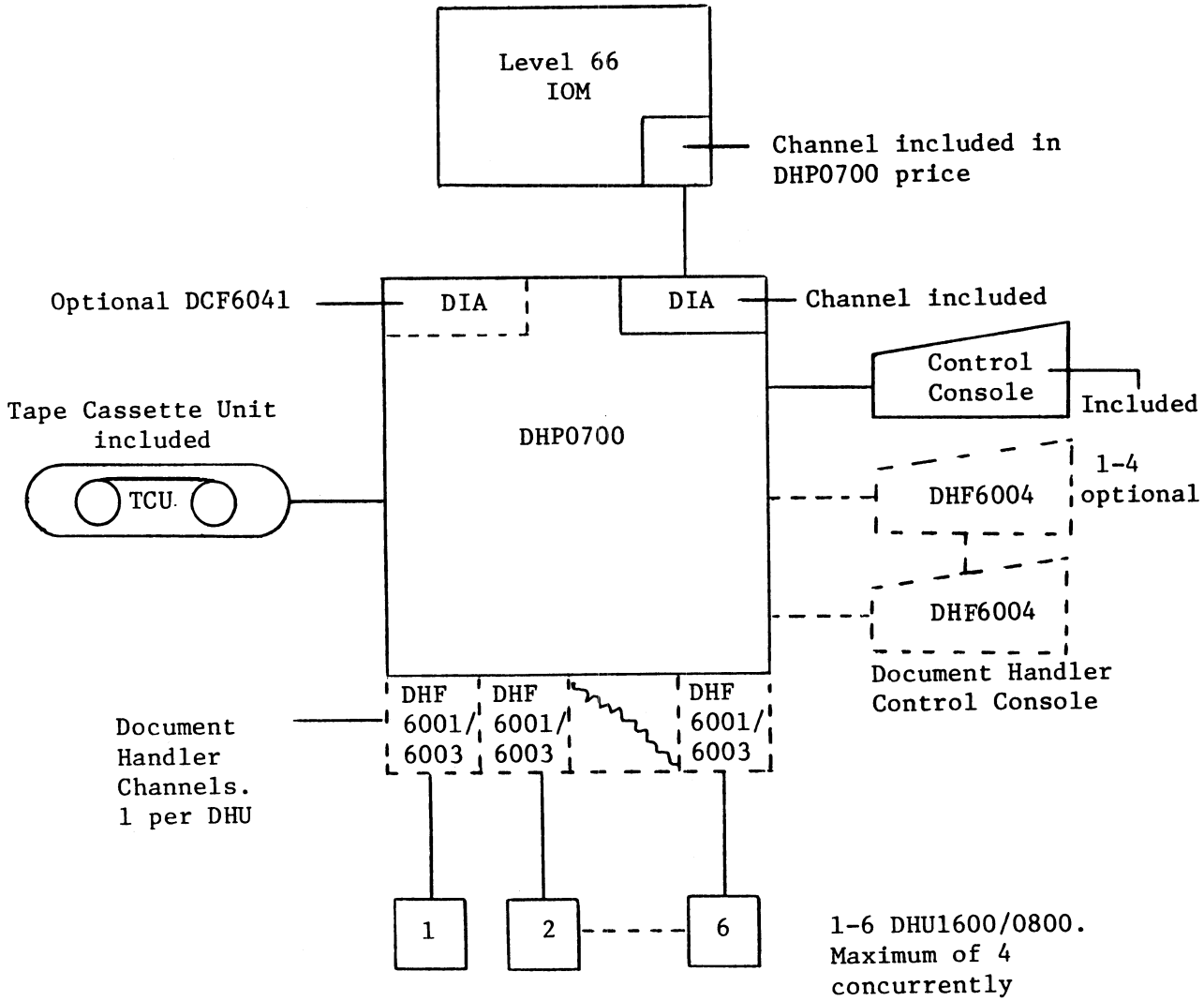
1	MSPØ6Ø5	
4	MSUØ4Ø2	4 spindles
4	MSFØØØ7	RPS per spindle, optional
1	MSF1Ø38	Device adapter for MSUØ4Ø2
1	MSA1Ø27	Device addressing for 4 MSUØ4Ø2 spindles
1	MSUØ5ØØ	2 spindles, 1 unit
1	MSF1Ø37	Device adapter for MSUØ5ØØ
1	MSA1Ø29	Device addressing for 1 MSUØ5ØØ unit (2 spindles)

SECTION XV
Document Handler Subsystems

A. Configuring DHP0700/0701 Document Handling Processors

1. DHP0700

a. Block diagram



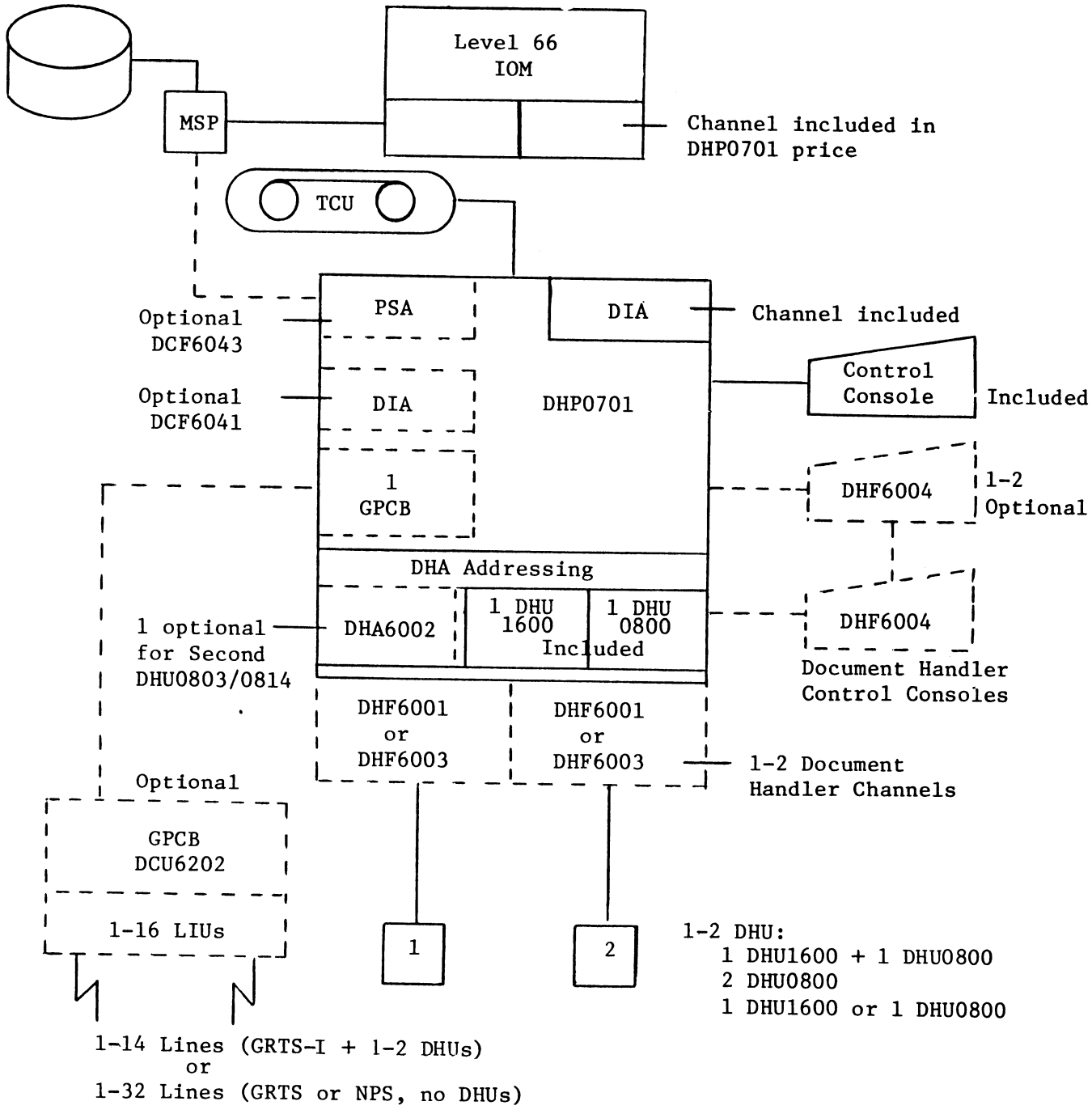
b. List of DHP0700 type numbers and their functions

Type Number	Description
DHP0700	Base DHP number. Corresponds roughly to base CPS number for Level 66 mainframe. One must be ordered for each DHP0700 subsystem. Price includes TTY33 type of DHP subsystem control console and its adapter, tape cassette unit and its adapter for offline test and diagnostic operations by Field Engineering, direct interface adapter channel (DIA) for connection to a Level 66 IOM channel, and the Level 66 IOM physical channel itself. Maximum of 3 DHP0700 or DHP0701 or combination per Level 66 system. On 66/05/07 the maximum is one. NOTE - each DHP counts as an FNP in determining the maximum (4) FNPs allowed on a Level 66 system. Use of one DHP, e.g., means a maximum of 3 FNPs.
DHF6003	Document handler channel. One DHF6003 is required for each DHU0803/0814 handler. Maximum of 6 DHF6003 or DHF6001 or combined document handler channels can be configured. Maximum of 4 channels in any combination (4 document handlers) operational concurrently in one DHP.
DHF6001	Document handler channel. One DHF6001 is required for each DHU1600 handler. Maximum of 6 DHF6001 or DHF6003 or combined document handler channels can be configured. Maximum of 4 channels in any combination (4 document handlers) operational concurrently in one DHP.
DHF6004	Document handler control console and its adapter. At least one required. One is recommended for each one or two document handlers running concurrently. Maximum of four. Used by document handler operator for a variety of purposes, including DES software interfaces - initialization of entry run for a DHU, requesting pertinent pocket selection file from Level 66, stopping a DHU, taking a DHU offline, etc.
DCF6041	Additional DHP0700 direct interface adapter channel (DIA) and channel in Level 66 IOM. One DIA is included in DHP0700 price. Second DIA used

where it is desired to connect DHP0700 to a second Level 66 IOM or second channel in first IOM as a backup provision. At startup time one of the two is designated as logically connected and is used for communication between DHP0700 and Level 66 mainframe.

2. DHPØ7Ø1

a. Block diagram



b. List of DHP0701 type numbers and their functions

Type Number	Description
DHP0701	Base DHP number. Corresponds roughly to base CPS number for Level 66 mainframe. One must be ordered for each DHP0701 subsystem. Price includes TTY33 type of DHP subsystem control console and its adapter, tape cassette unit and its adapter for offline test and diagnostic operations by Field Engineering, direct interface adapter (DIA) for connection to a Level 66 IOM channel, and the Level 66 physical IOM channel itself. Maximum of 3 DHP0701 or DHP0700 or combination on one Level 66 system. On 66/07 the maximum is one DHP. DHP0701 also includes device addressing features for one DHU1600 and one DHU0803 or DHU0814. NOTE - one DHP counts as an FNP in determining the maximum (4) FNPs allowed on a Level 66 system. Use of one DHP, e.g., means a maximum of 3 FNPs
DHA6002	Device handler addressing. One must be ordered when no DHU1600 is configured and two DHU0803 or DHU0814 or combination are to be used
DHF6003	Document handler channel. One DHF6003 is required for each DHU0803 or DHU0814. Maximum of two DHUs may be connected and running - 1 DHU1600 plus DHU0803 or DHU0814, or 2 DHU0803 or 2 DHU0814, or one DHU0803 and one DHU0814
DHF6001	Document handler channel. One DHF6001 required for DHU1600. See DHF6003 above for allowed quantities of channel types and DHU types
DHF6004	Document handler control console and its adapter. See description under DHF6004 for DHP0700 above
DCF6041	Additional direct interface adapter (DIA). See description under DCF6041 for DHP0700 above
DCF6043	Peripheral subsystem adapter. Provides a DHP channel for terminating a mass store processor (MSP) channel, to establish a direct link to disk for DHP0701. Required if NPS is to be used in DHP0701. NPS cannot be used during the period

when document handler operation is desired. DES (Document Entry System) software interfaces only to GRTS-I.

DCU6202 General Purpose Communications Base. Required when DHP0701 is to be used with up to 14 communications lines with GRTS or NPS. Maximum of one per DHP0701. GRTS-I must be used for concurrent document handling and data communications.

When used for concurrent communications and document handling a maximum of 12 asynchronous lines up to 1,200 bps each and 2 synchronous or asynchronous lines at up to 9,600 bps each can be used. If DHP0701 is used for communications alone, either in NPS or GRTS mode, up to 32 lines can be configured as if for a GPCB in a DN6632 FNP.

Usual line interface units (LIU) for GPCB must be configured for the communication lines. Use the DN6632 FNP configurator portion of this outline to configure the GPCB. Don't forget to configure an asynchronous speed adapter (ASA) (DCF6001 or DCF6002) even though no asynchronous-only LIUs will be used (DCF6010, DCF6011). See Section XVIII.

B. Configuring DHU1600 and DHU0800 Document Handlers

1. DHU1600 family

a. Come in 4 models which differ only in number of pockets included. Any model can be expanded in the field to the maximum of 32 pockets.

b. List of required type numbers and their functions

Type Number	Description
DHU1604	Document Reader-Sorter, Four-Pocket, 1625 dpm
DHU1608	Document Reader-Sorter, Eight-Pocket, 1625 dpm
DHU1612	Document Reader-Sorter, 12-Pocket, 1625 dpm
DHU1616	Document Reader-Sorter, 16 Pocket, 1625 dpm

c. List of options and their functions

DHF163Ø Multilevel E-13b Recognition. E-13b MICR characters and symbols located along the bottom edge of the documents are read via a multitrack recognition read head. One only must be configured.

DHF160Ø3 Endorser. Provides the ability to endorse documents on the back side in one of three 3/8-inch bands. A 3-digit consecutive batch number is provided. Band location must be specified on order.

DHF160Ø4 Expansion Unit. Permits the attachment of 1-4 additional 4-pocket expansion modules, DHF160Ø5, on the sixteen-pocket DHU1616

DHF160Ø5 Expansion Module. A single 4-pocket expansion module, for DHU1616 pocket expansion. Maximum of four allowed. Requires DHF160Ø4

DHF160Ø6 Mobile Carrier. Holds one storage document tray

DHF160Ø7 Short Document Read. Enables the handling of 51-column-size MICR documents (applies to sorting in first four pockets). Short documents are handled at the rate of 170Ø documents per minute. Presence of this option slows processing of normal-size documents

DHF160Ø9 Batch Ticket Detector. Halts the reader upon detection of a 2x5-inch black band and signals for external control

DHF161Ø Resettable Item Counter. A 6-digit resettable counter that totals the number of documents read.

DHF1611 Basic Offline Sort. Provides the ability to process two sort fields with a maximum of 12 digits per field.

DHF1612 Expanded Offline Field Sort. An additional 12-digit field sort. A maximum of six additional field sorts can be added to the basic offline sort configuration.

DHF1613 (1) Digit Override. A rotary switch that allows a document to be sorted to an override pocket if a preselected digit (or two digits) appears in a sorted digit position(s).

DHF1614 (1) Digit Edit. Document will be sorted to a regular pocket if a preselected digit (or two digits) appears in a sorted digit position. All other documents go to a "designated" pocket.

DHF1615 (1) Zero Kill. Document will be sorted to a designated "zero kill" pocket if the digit position contains a zero and all digits to the left are zeros.

DHF1616 (1) Field Override. Document will be sorted to an override pocket if a preselected 8-digit consecutive code appears in the field.

DHF1617 (1) Field Edit. Document will be sorted to a regular pocket if an 8-digit preset code appears in the field.

DHF1618 (1) No-Field/No-Digit Outsort. Document will be sorted to a specific pocket if the field being sorted is not present or to another pocket if no digit appears in the sorting position.

DHF1619 Stacker Overflow. Enables documents which are intended for the last offline pocket (maximum of 16) to be routed to available adjacent overflow pockets.

DHF162Ø Valid Character Check. This feature checks the "readability" of each MICR character and symbol in the field that is being sorted.

DHF1621 Extended Sort Control. Provides an operator-settable control panel that extends the capability of the edit and override functions.

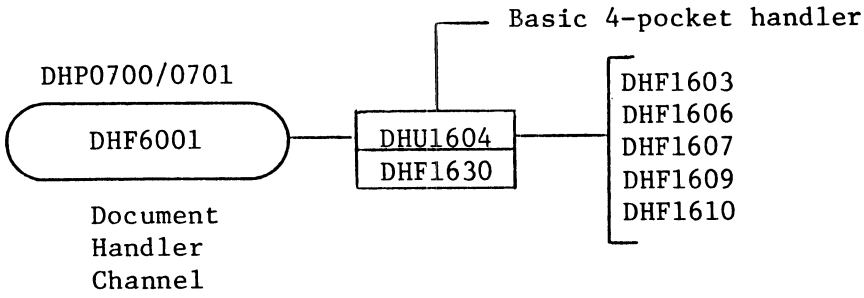
DHF1622 8-Pocket Offline Sort. Provides capability to fine sort documents on DHU16Ø8.

- - - - - - - -

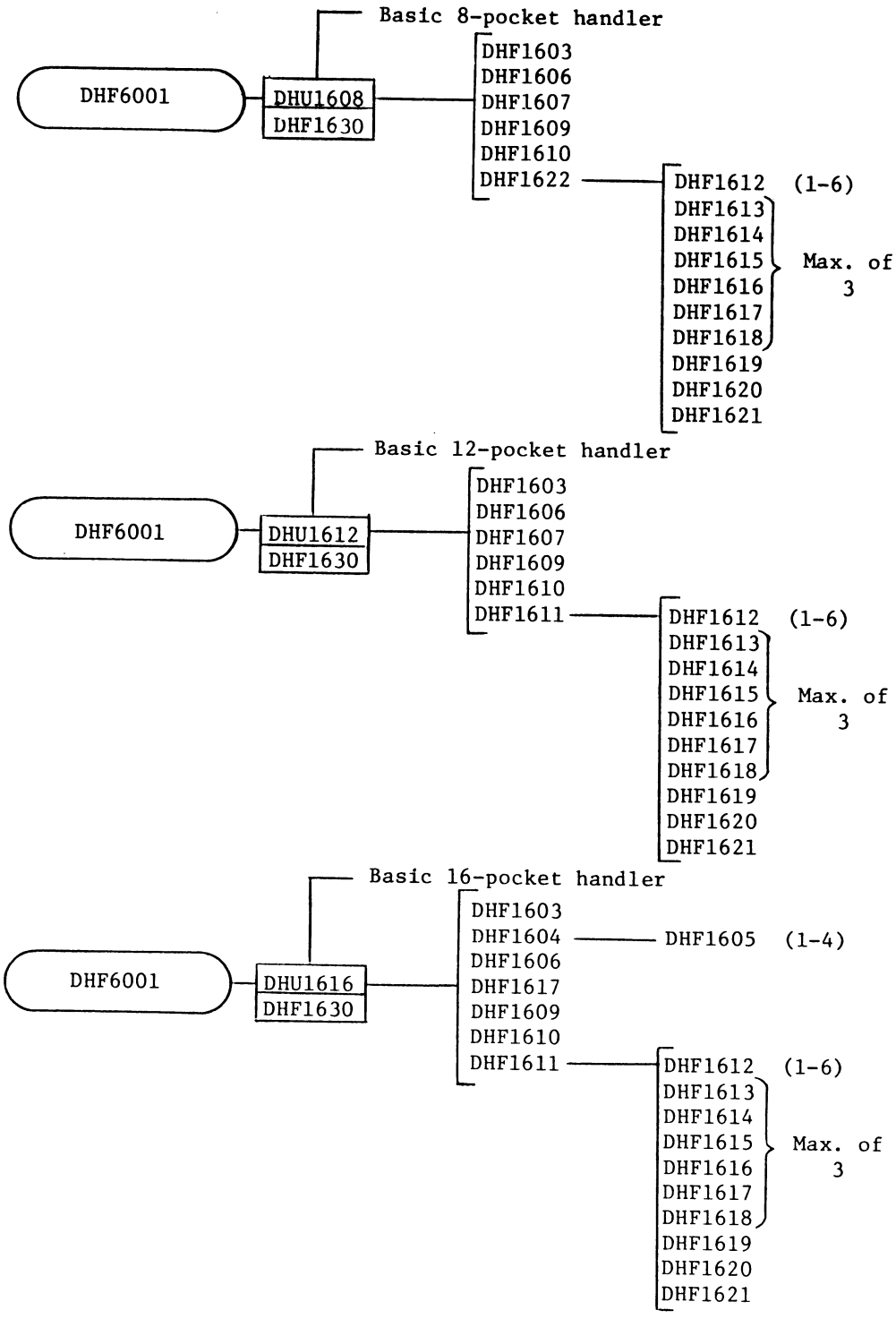
(1) Of these six optional features, up to three can be installed in any one document handler.

d. DHU160Ø configurators

The items fully enclosed in balloons and boxes must be ordered. Others are optional for the DHU160X models shown.



DHU1600 configurators (continued)



2. Summary of DHU1600/0800 document sizes and character/mark recognition feature.

Handler	Pockets	Speed (Documents per minute maximum)	Document Size (inches)			Recognition Features		
			Length	Width	Thickness	E13b/ CMC7	OCR	Mark Read
DHU0803 DHU0814	3 14	830 (6" Doc.) [a]	4.85-8.75	2.85-4.25	0.003-0.013	DHF0801 (E13b) DHF0802 (CMC7)	DHF0803 or DHF0804	DHF0805 (CIIHB) DHF0806 (IBM)
DHU1604 DHU1608 DHU1612 DHU1616	4 8 12 16	1620 (5.75" Doc.)	5.75-9.75	2.5-4.25	Up to 0.009	DHF1630 (E13b)	NA	NA

[a] 1000 dpm and 1200 dpm can be ordered by RPQ
Must have 1000 dpm option to grow to 1200 dpm

3. DHU0800 family

   a. Comes in 2 models which differ only in number of pockets included. Document reading capability is not included but must be ordered.

   b. Each model provides for MICR, OCR and OMR capability.

      1) MICR font can be read magnetically and/or optically.

      2) OCR font can be alphanumeric or numeric, depending upon font type.

a) Numeric-only OCR documents can have up to 3 numeric fonts on up to 2 lines. In any one pass 2 of the three fonts can be read.

b) Documents containing a single line of OCR data can be read on the basis of program-controlled selecting up to two or four separate fields on the line for reading. Selection is made as the program is loaded into the DHPØ7ØX and initialized. Applicable feature is called Autoload Data Format Control.

c) Several types of font support are available.

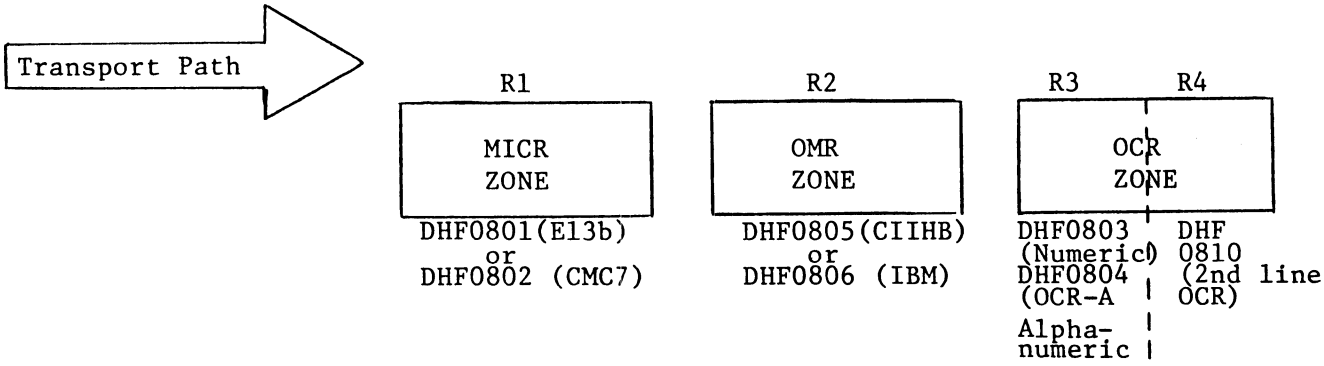
3) OMR is obtainable for either 1Ø-level or 12-level marking. 12-level is IBM-type, 1Ø-level is CIIHB-type.

c. Read zones per DHUØ8ØØ.

1) Each DHU is divided into 3 read zones -- one for MICR font reading (magnetically), one for mark reading or punched hole reading (OMR), one for optical character recognition (OCR).

2) OCR zone provides for two read stations.

3) It is considered that there are four read stations along the document transport path, designated R1, R2, R3, R4. Ability for reading at each station depends on whether the pertinent read feature has been configured. The figure below shows the read zones and stations, together with the type numbers configurable to give document reading capability.



4) Depending on the options configured it is possible to have all four read stations active during the pass of documents in some kinds of operations.

5) Up to 72 characters of data can be read from a document. If OMR is used, up to 31 columns of OMR data can be read but each column counts as two characters in the limit of 72 characters. Also, if an MICR-font field is to be read both magnetically and optically the field is counted as two fields in the 72-character limit. The limit of 72 characters read must be carefully considered in designing your applications.

d. List of DHUØ8ØØ required type numbers and their functions.

Type Number	Description
DHUØ8Ø3	3-pocket document handler. No font reading capability included but at least one font or mark reading feature must be configured.
DHUØ814	14-pocket document handler. No font reading capability included but at least one font or mark reading feature must be configured. No offline document sorting capability is included but is available optionally.

Required options -- at least one must be selected. Up to 3 can be configured --

DHFØ8Ø1	MICR font reading magnetically. For E13b font (U.S.A.). Occupies read zone 1 and read station R1.
DHFØ8Ø2	Same as DHFØ8Ø1 but applies to CMC7 font
DHFØ8Ø5	Optical mark/punch reading. Occupies OMR zone as read station R2. For CIIHB 10-level format.
DHFØ8Ø6	Same as DHFØ8Ø5 but applies to IBM 12-level format.
DHFØ8Ø3	OCR recognition, numeric only. If configured, DHFØ8Ø4 cannot be configured. Occupies OCR zone

as read station R3. Specify one to three fonts from the following choices:

DHF0850	OCR-A Numeric, Sizes I, IV
DHF0851	OCR-B Numeric and Symbols
DHF0852	OCR-B Numeric and Characters
DHF0854	7B Numeric
DHF0856	12F Numeric
DHF0855	E13b Numeric (to allow MICR font to be read optically)
DHF0853	407-1 numeric

DHF0804 OCR-A recognition, alphanumeric font, Size 1. If configured, DHF0803 cannot be configured.

e. List of other DHU0800 options and their functions.

DHF0810 Second Line OCR. Provides ability to read two lines of OCR on a single document pass. Requires DHF0803 or DHF0804. This provides OCR read station R4. It will read only the font selected for R3 (via DHF0803 or DHF0804).

DHF0820 Offline Fine Sort for MICR font. For use with DHU0814, this option provides the ability to fine sort documents encoded in E13b font per the ABA (American Bankers Association) check format. If sorting is to be of MICR font read magnetically, you must also configure DHF0801. If sorting is to be of E13b font read optically (OCR A or OCR B), you must also configure either DHF0803 or DHF0804. If you wish to sort MICR font on an optical reading basis, DHF0803 must be configured. There is no offline fine sorting for OMR data (R2) or for OCR data read at R4.

DHF0821 Same as DHF0820 but applies to CMC7 font. No optical reading of CMC7 font.

DHF0822 Offline Fine Sort for OCR font. For use with DHU0814. Requires DHF0803 or DHF0804. No offline fine sort for OMR data (R2) or OCR data read at R4.

DHF0830 Multiple Digit Special Outsort. For use with the DHU0814, this option provides the capability of out-sorting documents with a pre-selected code or range of codes in a given data field. Selection

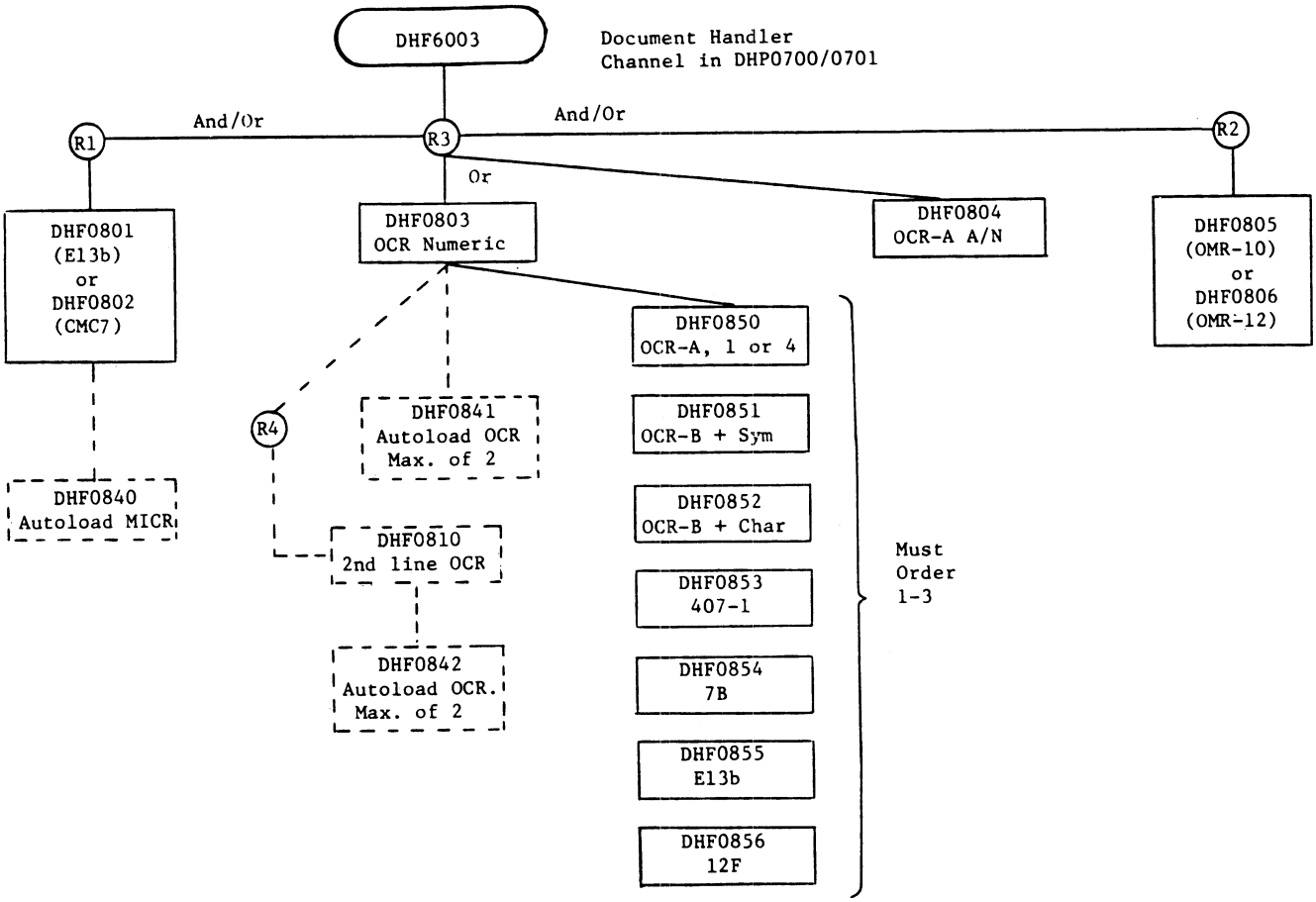
is made on the basis of ten unique digits or two selections can be made on the basis of five unique digits. Requires DHFØ82Ø.

DHFØ84Ø Autoload Data Format Control-MICR. Provides the ability for the DHP program to precondition the DHUØ8Ø3 or DHUØ814 with MICR capability to read up to two separate field locations within a single line of print. Requires DHFØ8Ø1.

DHFØ841 Autoload Data Format Control Line 1-OCR. Provides the ability for the DHP program to precondition the DHUØ8Ø3 or DHUØ814 with OCR capability to read up to two separate field locations within a single line of print. Maximum of 2 DHFØ841s allowed.

DHFØ842 Autoload Data Format Control Line 2-OCR. Same function as DHFØ841 but for a second OCR line. Requires DHFØ81Ø. Maximum of 2 DHFØ842s allowed.

f. Configurator for DHUØ8Ø3



g. Configurator for DHU0814

1) Use configurator for DHU0803

2) Added options for DHU0814

DHF0820
DHF0821 See Descriptions
DHF0822 on prior pages
DHF0830

4. DHP0700 Configuring Example

Prospect is a bank interested in your CHECS software. You plan to bid a DHP0700 supporting two DHU1612s and a DHU0803. Each DHU1612 will read MICR documents only and is to be used also for offline sorts on 1-2 fields and to have zero-kill capability. The DHU0803 will be used for turnaround applications involving OCR-B numeric documents with OCR-B-plus-characters font feature on one line.

1	DHP0700	Base DHP
1	DHF6003	Document handler channel for DHU0803
2	DHF6001	Document handler channels for 2 DHU0612s
2	DHU1612	2 MICR sorter-reader for CHECS
2	DHF1630	E13b font recognition for 2 DHU1612
2	DHF1611	Basic offline sort for DHU1612, for 1-2 fields
2	DHF1615	Zero-kill feature for 2 DHU1612
1	DHU0803	Document handler for turnaround application
1	DHF0803	OCR recognition for R3
1	DHF0852	OCR-B plus characters font handling
1	DHF6004	Document handler control console

5. DHP0701 Configuring Example

Prospect is interested in a small 66/10 and wants to run an OCR application and 1 DHU involving sorting of OCR-A size 1 numeric font documents. To minimize costs the prospect plans to use the DHP0701 for communications as well. He will start with two 300 bps asynchronous lines using our dot matrix teleprinter terminals and two 2400 bps synchronous lines for VIP7705R terminals. VIP terminals use ASCII code. See Section XVIII for configuring the GPCB for communications.

SECTION XV
Document Handler Subsystems

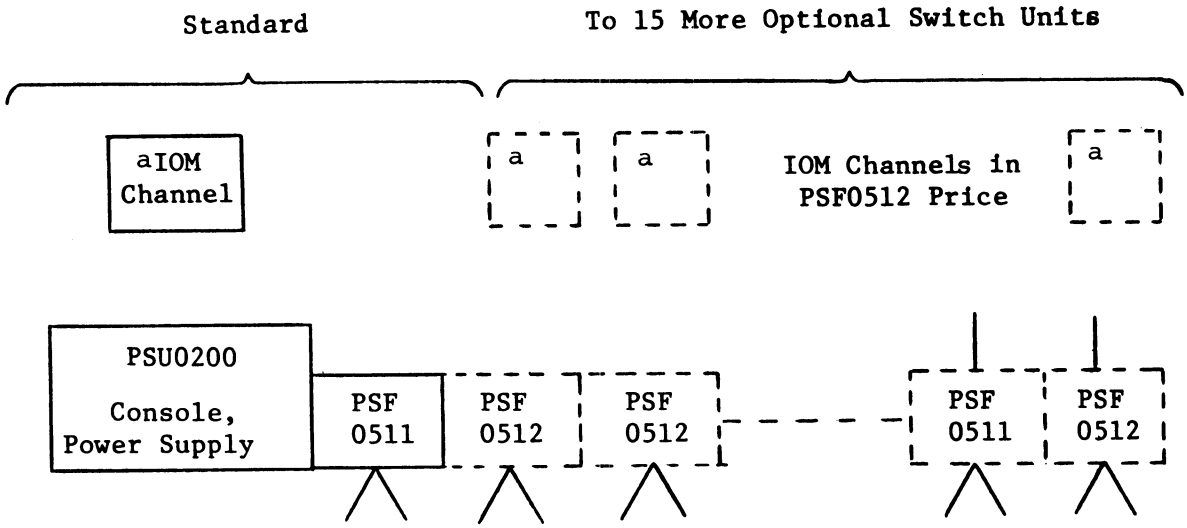
1	DHPØ7Ø1	Base DHP
-	- - - - - -	-
1	DHF6ØØ3	DHUØ814 channel in DHP
1	DHUØ814	Document handler
1	DHFØ8Ø3	OCR recognition, R3
1	DHFØ85Ø	OCR-A size 1 font handling
1	DHFØ822	Offline fine sorting for DHUØ814
-	- - - - - -	-
1	DCU62Ø2	GPCB for communications
1	DCF6ØØ1	ASA for 3ØØ-bps lines on DCF6Ø1Ø
1	DCF6Ø1Ø	Asynchronous-only LIU for 2 3ØØ-bps T-3ØØ-lines
1	DCF6Ø13	Synchronous-only LIU for 2 24ØØ-bps VIP lines

SECTION XVI
Configuring Manual Peripheral Switch Subsystems

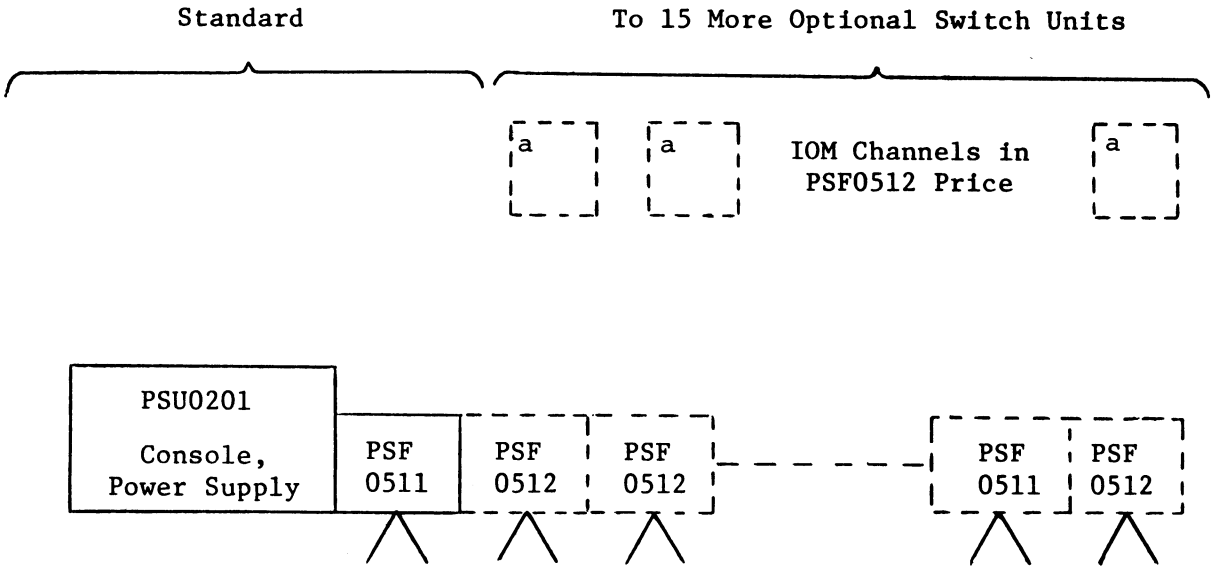
A. List of Type Numbers and Their Functions

Type No.	Description	Remarks
PSU0200	Switch console and power supply. Includes one physical PSI channel (URP/MTP/MSP) in IOM and one PSF0511	Every manual switch subsystem must include only one switch console, either PSU0200 or PSU0201. Each console handles up to 16 switch units
PSU0201	Switch console and power supply. Same as PSU0200 except that no IOM channel is included. Includes one PSF0511	
PSF0511	Manual switch unit to switch a device to one of two device processors, or to select one of two devices to switch to a device processor. Does not include a channel in IOM. Usable with URP and MTP devices only. Could also be used to switch a PSI channel in IOM between 2 device processors - URP, MTP or MSP	Each console includes one. May be mixed with PSF0512 to maximum of 16 switch units per console
PSF0512	Manual switch unit to switch a device processor to one of two IOM PSI type physical channels. Includes one IOM PSI channel. Usable with URP, MTP, MSP only	May be mixed with PSF0511 to maximum of 16 switch units per console

B. Configurator for PSU0200 Manual Peripheral Switch Subsystem



C. Configurator for PSU0201 Manual Peripheral Switch Subsystem

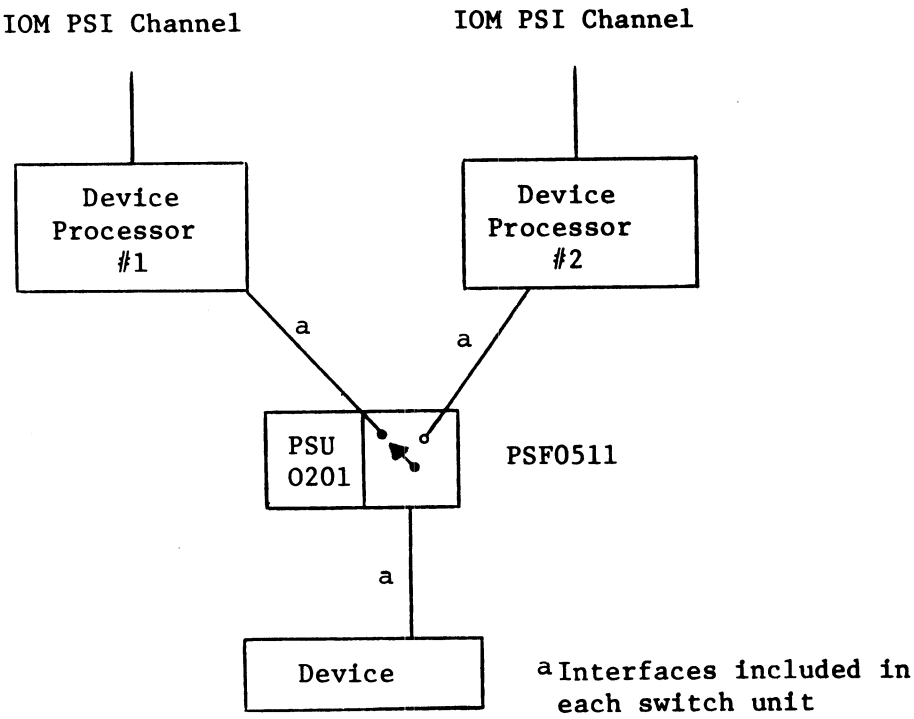


[a]3 channel spaces (board slots) required in the IOM. See Section IV.E.

D. Examples of Use of Manual Peripheral Switches

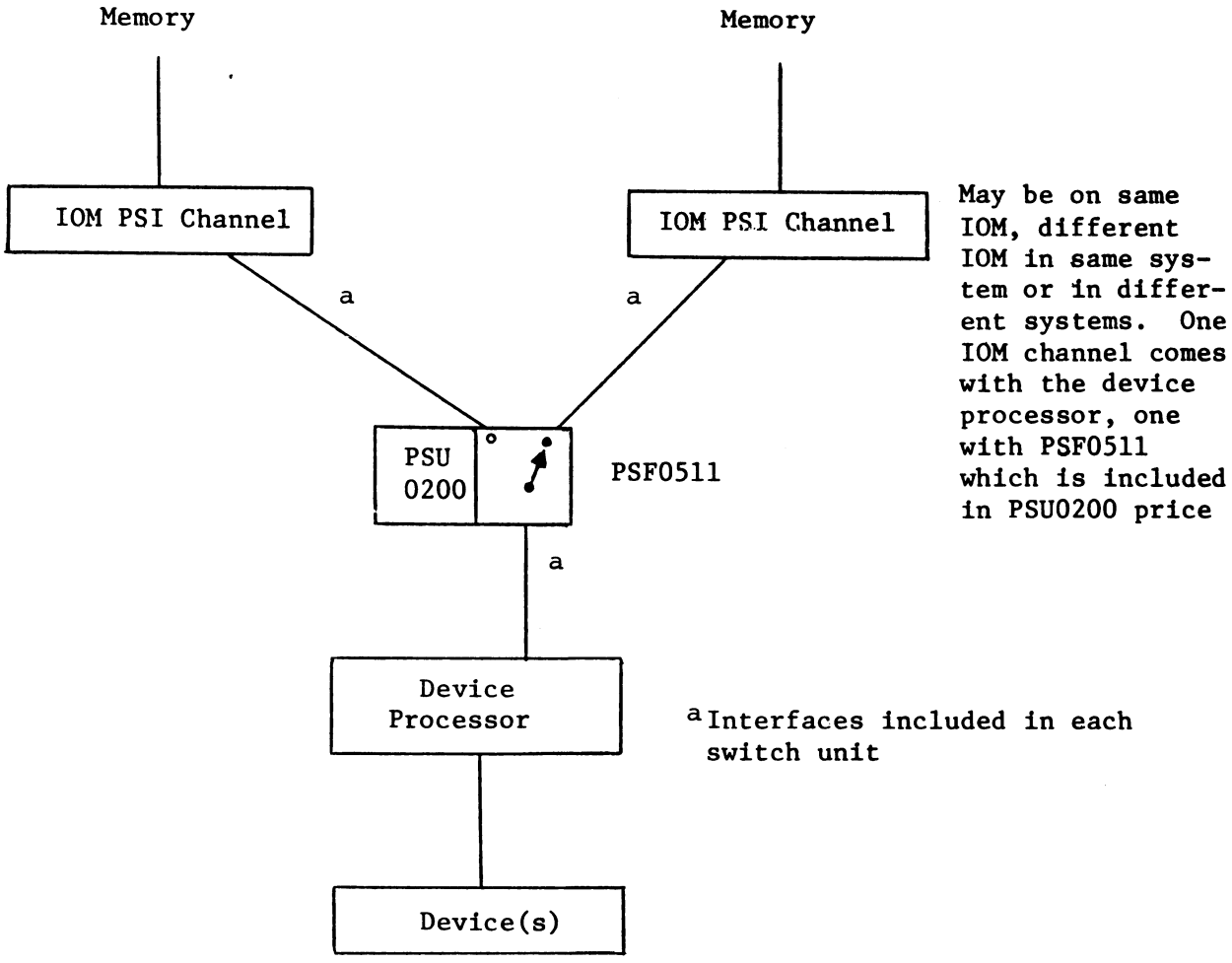
1. Example 1 - to switch a peripheral device between two device processors. Could use, for example, to switch a tape unit between two MTPs or a card reader between two URPs.

   The reverse approach could also be used, i.e., to select one of two devices to connect a device processor.



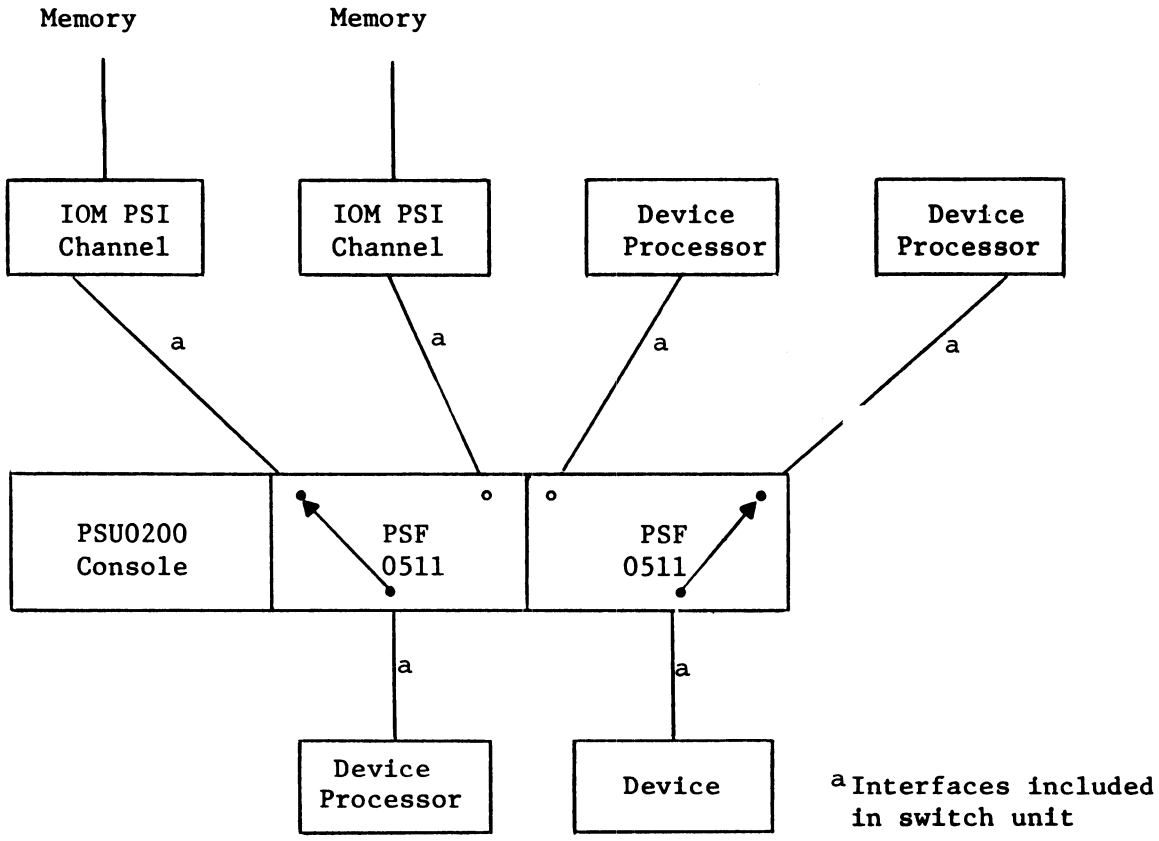
2. Example 2 - to switch a device processor between two physical IOM PSI channels. Could use, for example, to switch an MTP between two physical IOM PSI channels.

The reverse appproach could also be used, i.e., to select one of two device processors to connect to an IOM PSI channel. Since only one IOM channel is required, and one each would have been included in the prices of the device processors, PSU0201 would be the lower priced approach. PSU0201 price does not include an IOM channel, which would be superfluous in this case.



3. Example 3 - to switch a device between two device processors and to switch a device processor between two IOM physical channels.

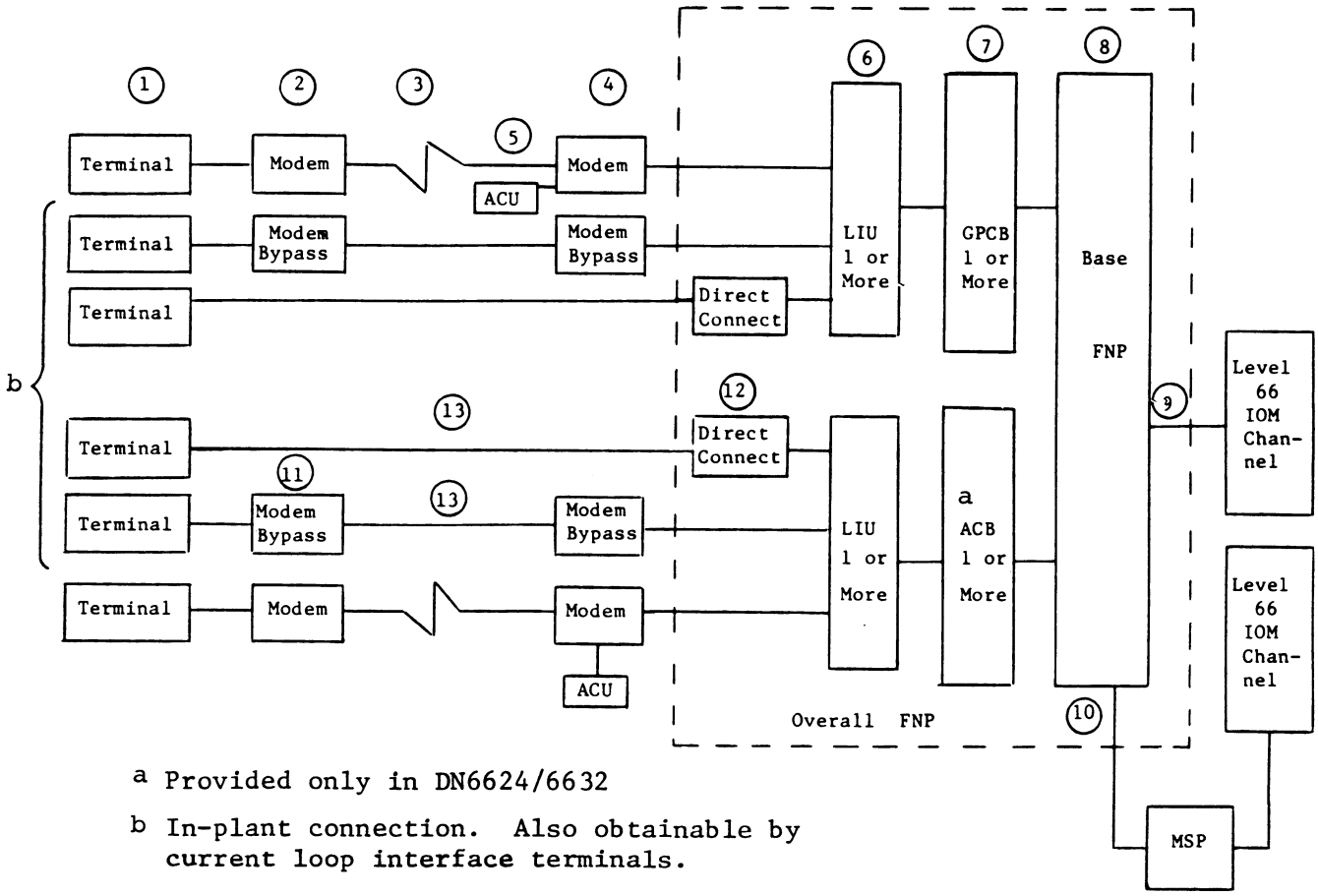
In this example you would order one PSFØ511 switch unit in addition to the PSUØ2ØØ console, which includes one PSFØ511. Note that this example could be handled by configuring a PSUØ2Ø1 console and one PSFØ512 switch unit at a slightly higher cost



SECTION XVII
Generics of Data Communications
Front-end Network Processors (FNPs)

A. Generic Data Communications World Components

Block diagram of typical components



a Provided only in DN6624/6632

b In-plant connection. Also obtainable by current loop interface terminals.

B. Summary of functions of generic components and their potential configuration effects.

1. Based on block diagram above.

2. A conceptual approach at this point. Actual sequence of considerations may vary from that shown on block diagram.

SECTION XVII
Generics of Data Communications
Front-end Network Processors (FNPs)

(1) Terminal selection is one of the fundamental components which exerts a major configuring effect. Some terminal considerations affecting configuring:

a. Terminal type - batch, keyboard (CRT or hard copy or both). May affect the choice of line interface unit (LIU) and communications base used in the FNP.

b. Terminal operating speed in bits per second or baud rate or characters per second. Determines minimum line speed and modem speed to be selected.

c. FDX (full-duplex) or HDX (half-duplex) operation of the line and terminal. May affect choice of modem, line type, LIU type.

d. Synchronous or asynchronous physical transmission technique. Affects modem type, and choice of LIU and communications base in FNP.

e. Code set used. May affect LIU choice in FNP.

f. Line discipline or link protocol used by terminal. May affect LIU and communications base choices in FNP, may determine whether synchronous or asynchronous transmission technique is to be used. BSC (Binary Synchronous Communications) protocol, e.g., requires a specific BSC-oriented LIU if the BSC CRC (Cyclic Redundancy Check) feature is to be used. HDLC protocol also requires a specific LIU. May affect choice of modem used.

(2) Modem selection is directly affected by terminal selection and line speed. Modem stands for modulator-demodulator, a device for transforming signals between the line and the device at the end of the line. Other generic names -- data set, digital subset, subset, coupler.

g. Most comonly there will need to be a modem (or equivalent device), at each end of a line obtained from a public carrier company. Thus modem costs can become significant.

h. Some terminals use a current loop type of interface. These do not use modems. At the LIU end a special connection is required in the LIU, which we include.

i. Modems are often either for synchronous or asychronous transmission. In synchronous operation the modem at each end furnishes timing signals to keep each end of the line in synchronism with the other. If modem used does not provide timing signals in synchronous transmission cases, a timing device must be attached to terminal and also be a feature of the LIU used.

(3) Communication line considerations are multiple. This paragraph refers to "line" in the sense of links provided directly or indirectly by public service carriers, such as telephone companies. Such companies are also known as common carriers. In (13) we will show "in-plant" type links or lines which do not involve public service carriers and do not require modems. Some line considerations affecting configuring are:

j. Whether 2-wire or 4-wire lines are used. May affect modem choice or whether a modem is used.

k. Whether public lines are used (also known as dialed, switched or dial-up lines) or private lines are used (also known as leased or direct lines). Private lines do not involve dialing. There is in effect a permanent path established. May affect modem choice and modem attachments such as ACU (automatic calling unit).

l. If private lines are involved, there are various levels of line conditioning available from the telephone company to regulate line quality - noise level, error probability, etc. Level of conditioning chosen does not affect modem type or other considerations normally.

m. Whether line is to be used on half-duplex (HDX) two-way alternate (TWA) basis, or full-duplex (FDX) basis. FDX lines can be used on either a TWA basis or two-way simultaneous basis (TWS). May affect modem type.

n. Whether line is used for both data and voice transmission, called DUV (data under voice). Normally the use of such transmission does not affect the modem or LIU choice.

(4) (5) Modems when used must normally be used at each end. Modems at ends of a line must be carefully matched in their characteristics. Some modems support ACU (automatic calling unit) feature. This requires an LIU with matching feature. ACU capability allows the FNP NPS software to "dial" the telephone number of a terminal and to send output to the terminal if the terminal is in operational condition. Eliminates need for programmer to keep asking about status of his job as to whether output is ready.

(6) Line interface unit (LIU) is contained within a communication base which in turn is in an FNP. LIU is a generic term used in this material and not found in published Honeywell FNP or Level 66 material. There is a specific Honeywell name for LIUs used in our GPCB (general purpose communications base) and a different name for LIUs used in our ACBs (asynchronous communications bases).

LIU is a termination point or connection point into our FNP for a line. The path for a given line through an LIU is often called a channel, sometimes a subchannel.

There are multiple types of LIUs, some very general, some specialized. Some LIUs interface one line each, some two lines each, some 3 or 4 lines each.

LIUs divide grossly into those that connect only in the ACB and those that connect only into the GPCB. LIUs are not included in the base FNP price, but LIUs must be configured. Every line must terminate at an LIU, regardless of the type of line, whether by common carrier or in-plant connection.

⑦ GPCB (general purpose communications base) provides common service logic for a mixture of LIUs, the number of LIUs varying with the FNP model.

GPCB is completely general in its capabilities. Any line speed, code set, link protocol, transmission technique that is supported by our FNP hardware is supported by GPCB.

ACB (asynchronous communications base) provides common service logic for up to 24 lines (ACB1) or 52 lines (ACB2). Only asynchronous lines at up to 300 bps lines can be terminated into ACB. Only original models of DN6624 and DN6632 provide ACB.

⑧ Base FNP. Maximum of 4 FNPs per Level 66 system, depending on Level 66 model and configuration.

⑨ Link to Level 66 mainframe is provided by a DIA (direct interface adapter) included in base price of every FNP. The DIA also includes a physical channel in the Level 66 IOM. The link allows use as a front-end (processor) to the information processor (Level 66).

⑩ Link to mass store processor is required in NPS environment. The channel logic to receive the MSP channel is included in base price of DN6624 and DN6632 FNPs. It is available as an option on DN6616/6670 and DPS INP/ANP. Not available on 66/05 CPS6058 INP.

⑪ Modem Bypass. Used for in-plant connection. No line furnished by a common carrier. Modem bypass units perform same basic function as modems.

Cable length restrictions exist between two successive bypass units but additional units can be inserted into the line to act as repeaters or signal strengtheners. In-plant connection approach is considerably lower in long-term cost versus use of modems and common carrier lines.

⑫ Direct Connect. Another way to use in-plant connection. Line or cable length is much shorter than with use of Modem Bypass approach. Direct connect features cannot be repeated in a line. Current loop approach is another form of in-plant connection for distances up to 1000 cable feet.

(13) An in-plant line established by a cable. No involvement of a common carrier. Connection line must not, by law, cross a public boundary, otherwise the line must be furnished by a (regulated) common carrier company, directly or indirectly. Advantage -- lower costs. Disadvantage -- no access to telephone network, no way to dial another destination.

SECTION XVIII
Configuring Original DN6616/6624/6632 FNPs

A. Required Components

1. Base FNP -- DCP66XX.

2. One or more line interface units (LIUs).

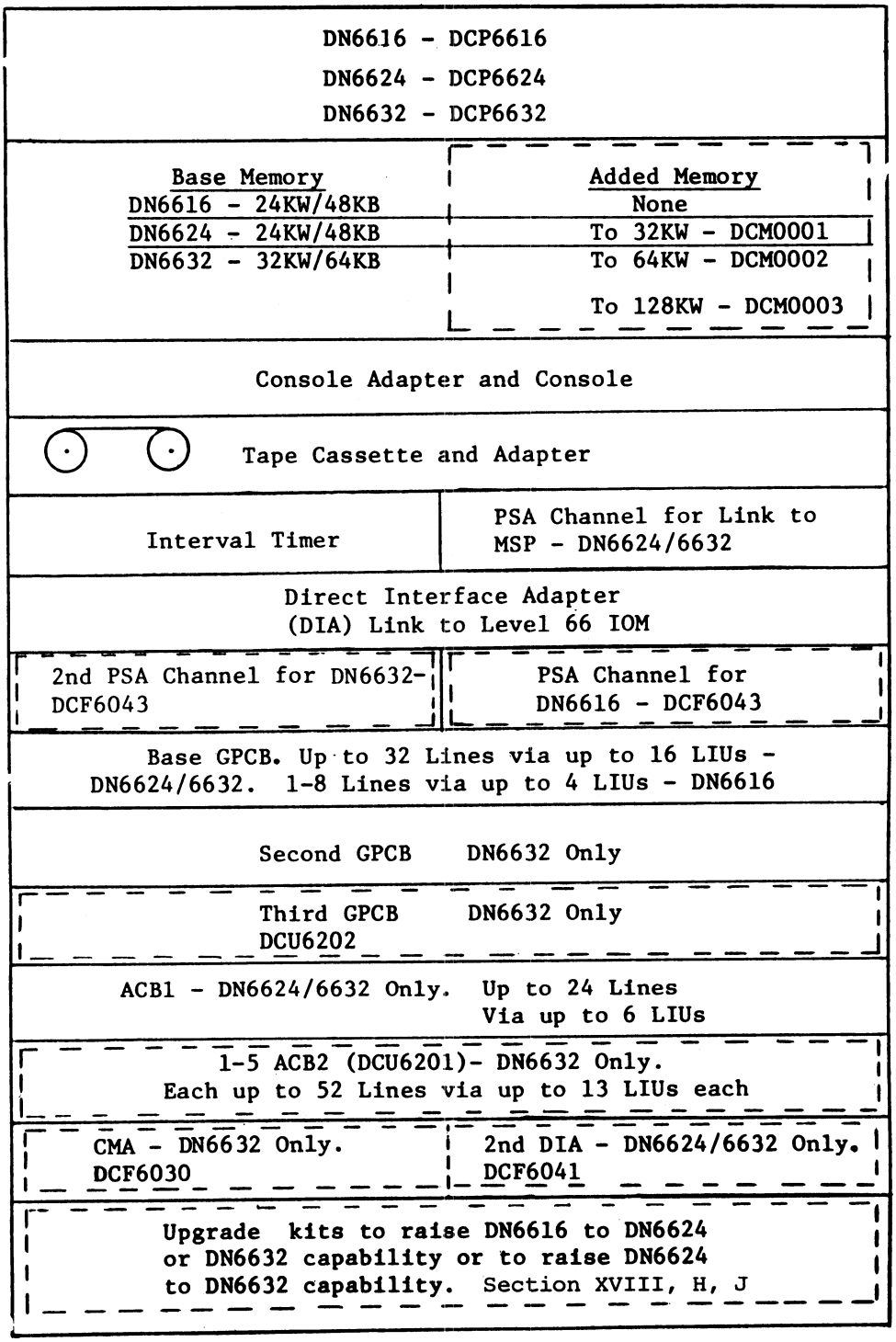
   a. Every line must terminate in an LIU, via any line from a common carrier or an in-plant connection.

   b. Every LIU represents electronic logic on circuit boards for which space is provided in slots in a communication base - GPCB or ACB type. Every LIU thus connects to a GPCB or ACB. Lines terminated in ACB cannot run at more than 300 bps each.

3. One or more in-plant connection features if lines are not furnished by common carrier companies. In-plant connection is by use of modem bypass or direct features. Each must connect to an appropriate LIU. Depending on the terminal and distance, current loop interface LIUs can be used, with no need for specific direct connect or modem bypass features.

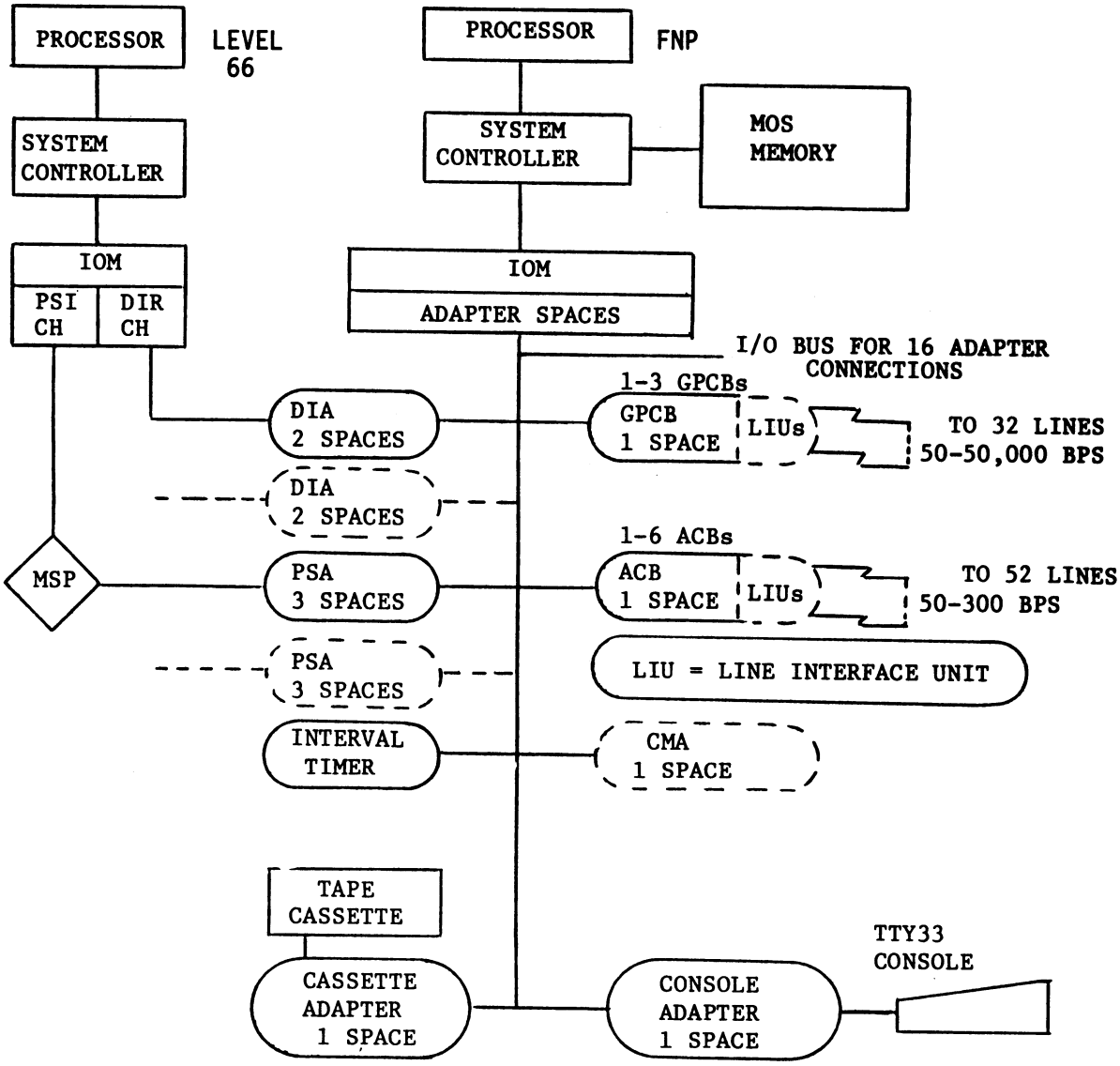
4. If required quantity of lines to be connected cannot be handled by the standard quantity of communication base(s) furnished, configure more GPCBs and/or ACBs as required. Requires DN6632.

B. Block Diagram of Original DN6616/6624/6632 FNPs - all optional type numbers are in dotted form.



C. Original DN6616/6624/6632 Architecture and FNP IOM Adapter Spaces

1. Block diagram - showing maximum capability of DN6632. DN6616 and DN6624 have subsets of this capability in their basic configuration.



NOTE - If you attempt to configure a DN6632 with all possible options in addition to standard complement of features connected along I/O bus, the total would be 17 adapter connections. The limit of adapter connections, however, is 16.

SECTION XVIII
Configuring Original DN6616/6624/6632 FNPs

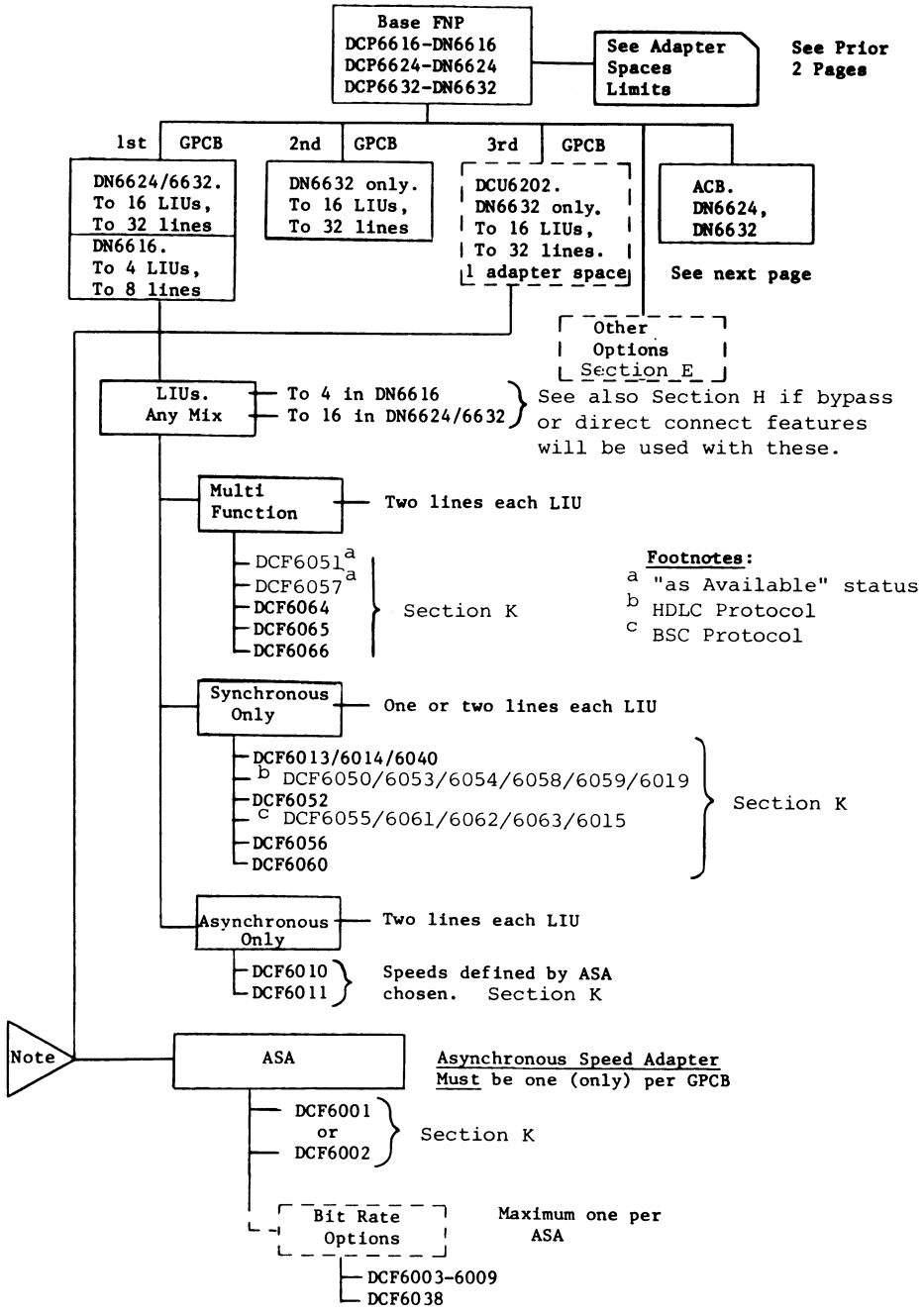
2. FNP IOM Adapter Spaes

FNP	Standard Complement	Spaces for Standard Complement	Extra Spaces Available	Options Available	Spaces Needed By Options
DN616	DIA Cassette Console 1 GPCB	5	3	PSA Channel- DCF6043	3
DN6624	DIA Cassette Console 1 GPCB 1 ACB 1 PSA	9	2	CMA-DCF6030 2nd DIA-DCF6041	1 2
DN6632	DIA Cassette Console 2 GPCB 1 ACB 1 PSA	10	11	CMA-DCF6030 2nd DIA - DCF6041 1-5 ACB2 - DCU6201 3rd GPCB - DCU6202 2nd PSA Channel DCF6043	1 2 1 each 1 each 3

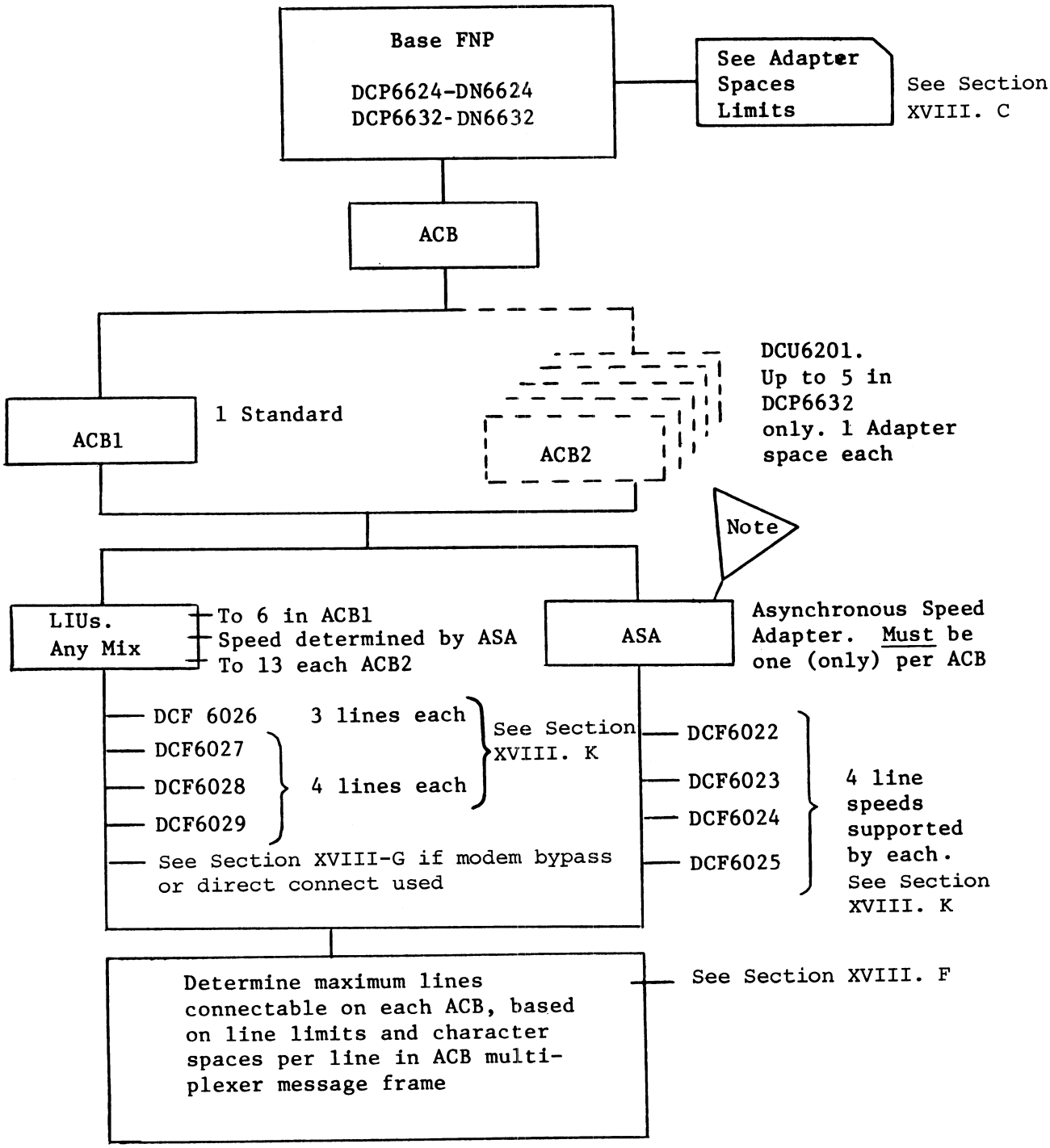
NOTE - If you attempt a DN6632 with all possible options in addition to standard complement of features connected along I/O bus, the total would be 17 adapter connection. The limit of adapter connections, however, is 16.

D. Configurator Flowcharts for Original DN6616/6624/6632 FNPs

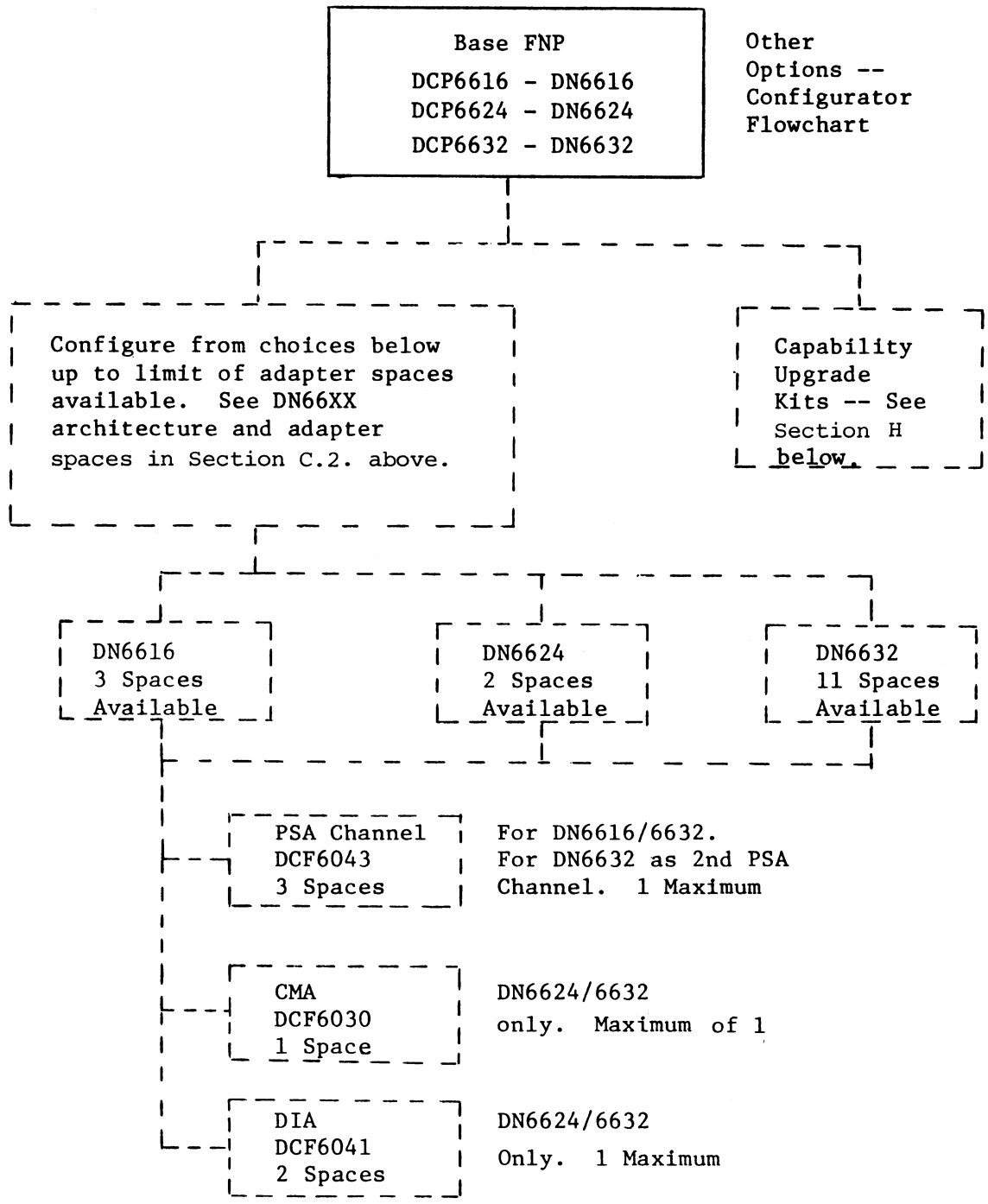
1. Base FNP and GPCB.



2. For ACB (Asynchronous Communication Base)



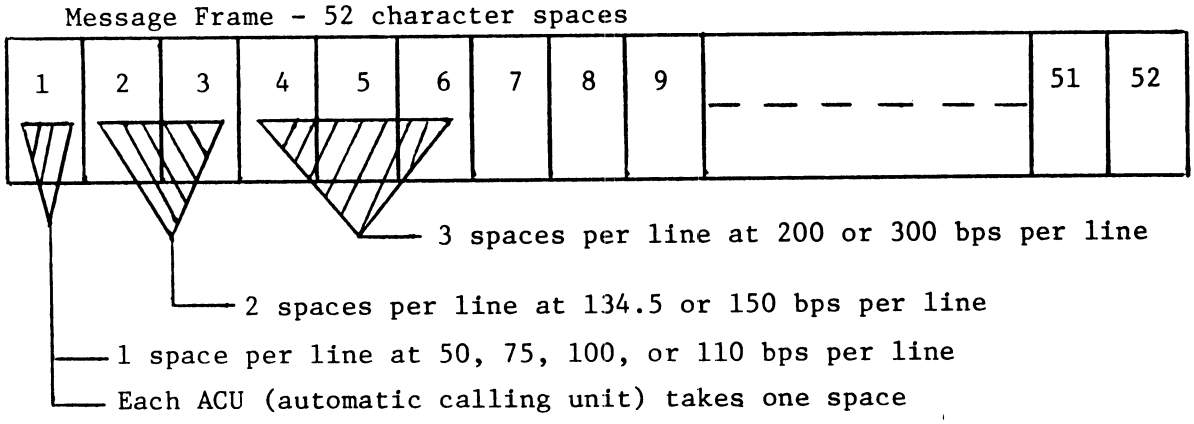
E. Configurator Flowchart for Original DN6616/6624/6632 (continued) - for other options



F. ACB Line Connectability Determination - Original DN6624/6632

1. Number of lines which an ACB can terminate is determined by the ACB type (ACB1 or ACB2) and the line speed.

2. Every 100 ms (equal to interval from character to character on a 110bps/10cps line) ACB automatically composes a message frame containing 52 character spaces. The number of character spaces which must be allocated to a line is a direct function of the line speed, i.e., how many characters that line can deliver in a 1000-ms period:



3. Determining Line Mix Capacity of an ACB

a. Determine total character spaces required for the number and speed.

1) Maximum character spaces - 52

2) Maximum number of lines - 24 (ACB1) or 52 (ACB2)

b. Whichever limit is reached first controls the actual number of lines configurable.

c. You can configure various line speed mixes up to 300 bps to use all 52 character spaces so long as you do not exceed the line limit.

d. Example 1 - 24 110-bps lines could be configured on ACB1, using only 24 character spaces.

e. Example 2 - 24 150-bps lines could be configured on ACB1, using only 48 character spaces.

f. Example 3 - 24 300 bps lines could not be configured on ACB1 because 72 character spaces would be required against the limit of 52. 17 300-bps lines and one 110 bps lines could be configured on ACB1, for example, using all 52 character spaces.

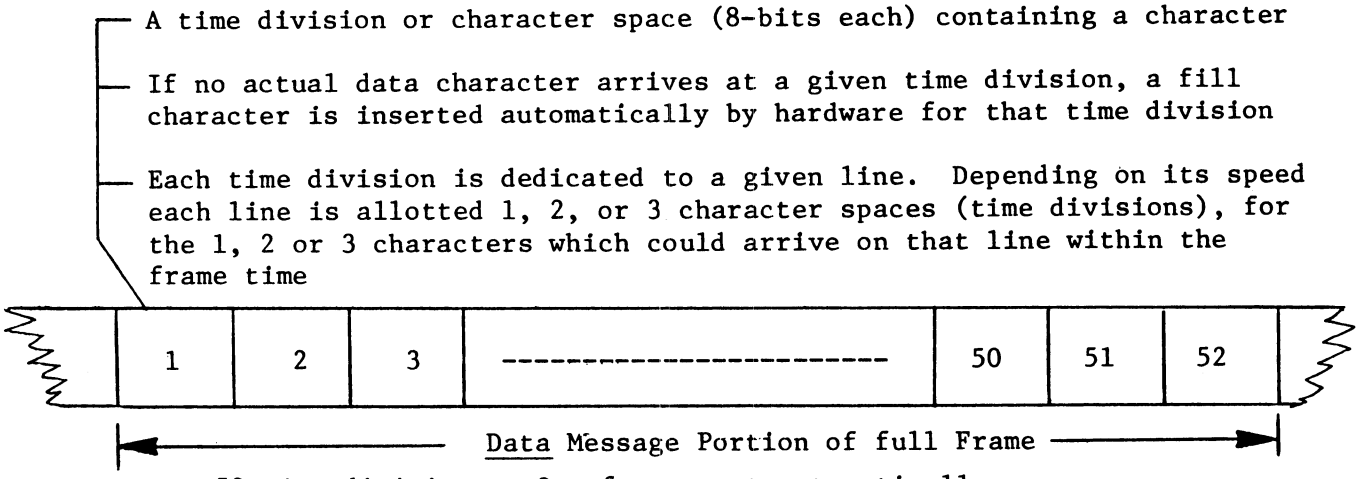
4. Time-division multiplexer aspects affect configuring by limiting the number of lines configurable on an ACB as a function of mix of line speeds involved.

5. NPS or GRTS does the demultiplexing on input from ACB (separating characters into their respective buffer areas, in memory, one for each line). On output NPS or GRTS does the combining (multiplexing), composing data frames with mixed characters to send to the ACB

6. NPS or GRTS thus builds up input messages for each line by demultiplexing the incoming frames from ACB. It does the opposite on outgoing messages to terminals.

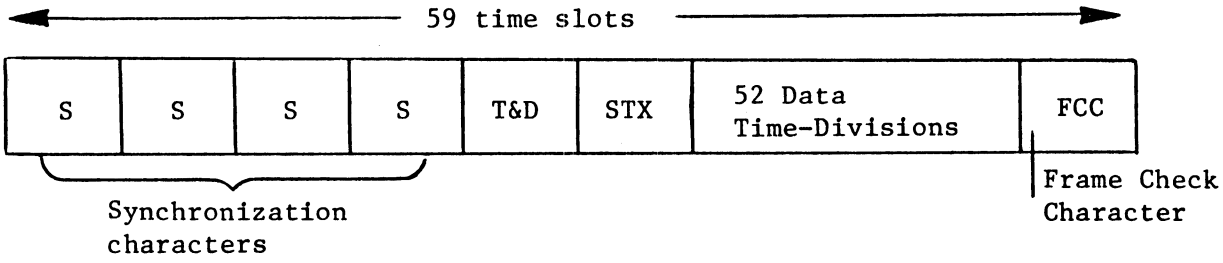
7. There is no program interrupt of FNP on message completion in case of ACB lines. The ACB itself causes an interrupt every 100 ms, the time interval between frames.

8. Additional aspects of ACB as a time-division multiplexer.



52 time divisions. One frame sent automatically every 100 ms, whether or not any data has arrived from terminals or from FNP.

Full ACB message frame actually has 59 time divisions



9. How many lines may use one ACB simultaneously?

   a. A function of the line speed, thus how long it takes for the bits to arrive to form one character.

   b. For example, one ACB with DCF6Ø25 ASA handles up to 52 11Ø bps terminals, or up to 26 terminals operating at 134.5 bps/15Ø bps, or up to 17 terminals operating at 3ØØ bps, or combinations of these terminals and speeds.

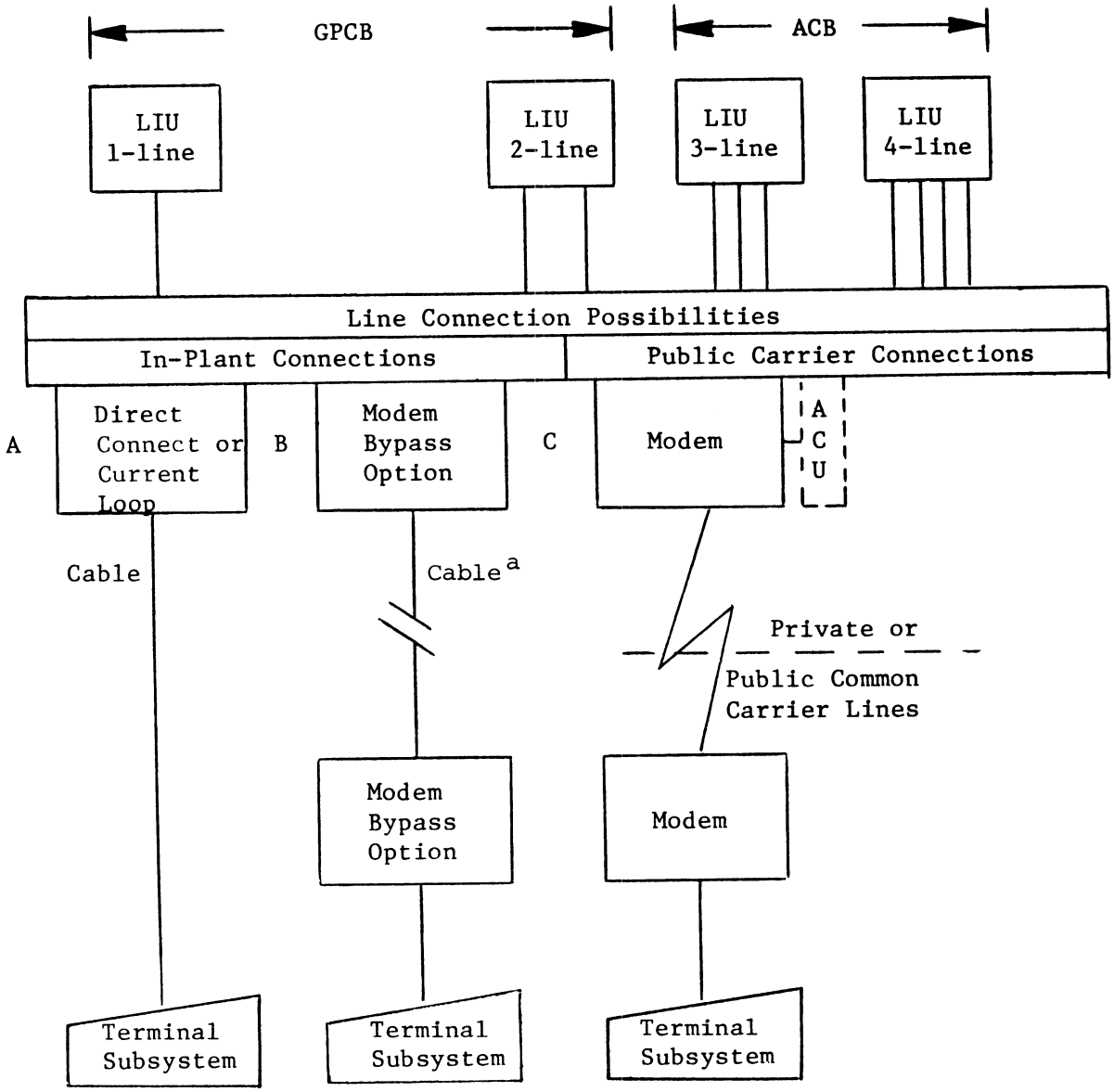
   c. The frame time is 1ØØ ms.

   d. 1Ø cps asynchronous terminals (TTY 33/35) = 1ØØ ms/character = 1 character arriving per line in one frame time, thus up to 52 such terminals simultaneously. One time division allocated per line.

   e. 15 cps asynchronous terminals (TTY 37/T-3ØØ/IBM2741/DATEL) - 66.7 ms/ character = 1.5 characters arriving per line in one frame time, thus up to 26 such terminals simultaneously. 2 time divisions allocated per line.

   f. 3Ø cps asynchronous terminals (T-3ØØ) = 33.3 ms/character = 3 characters arriving per line in one frame time, thus up to 17 such terminals simultaneously, 3 time divisions allocated.

G. Block Diagram of Communication Line Connection Possibilities for Original DN6616/6624/6632



[a] 2500 cable feet between successive modem bypass features. Multiple bypasses can be used

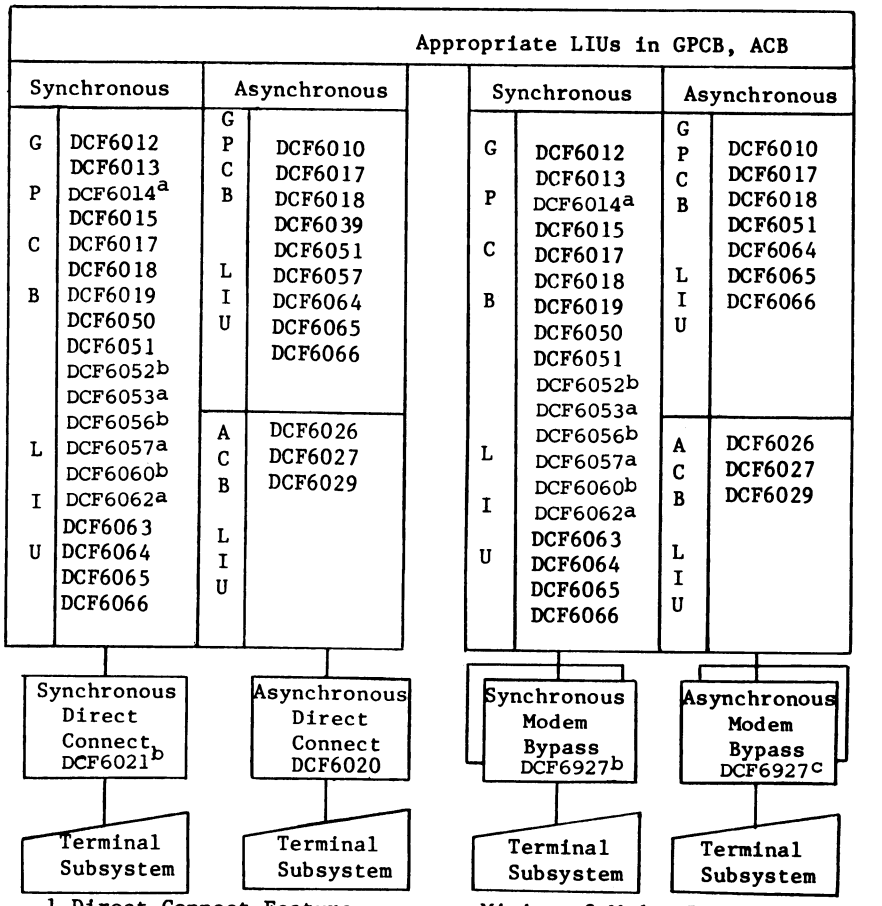
Mixtures of approaches A, B, C can be used in a multiline LIU, one approach per line

See next page for LIUs usable with in-plant connections.

H. In-plant Line Connection Features for Original DN6616/6624/6632

1. Use this chart for Direct Connect and Modem Bypass features options. It shows the applicable LIUs to which those in-plant connection features can be attached. Identify on your order the terminal to be used with each feature.

2. Terminals using 20 ma current loop interfaces cable-connect to current loop-oriented LIUs.



a No ACU Support
b Not for speed greater than 9,600 bps
c Maximum speed 1,800 bps

SECTION XVIII
Configuring Original DN6616/6624/6632 FNPs

I. Upgrade Configuration Flowchart for Original DN6616/6624/6632

1. Installed DN6616 can be upgraded on-site to a base DN6624 or DN6632 capability level.

2. Installed DN6624 can be upgraded on-site to a base DN6632 capability.

3. Installed DN6632 can be upgraded on-site with extended memory capacity.

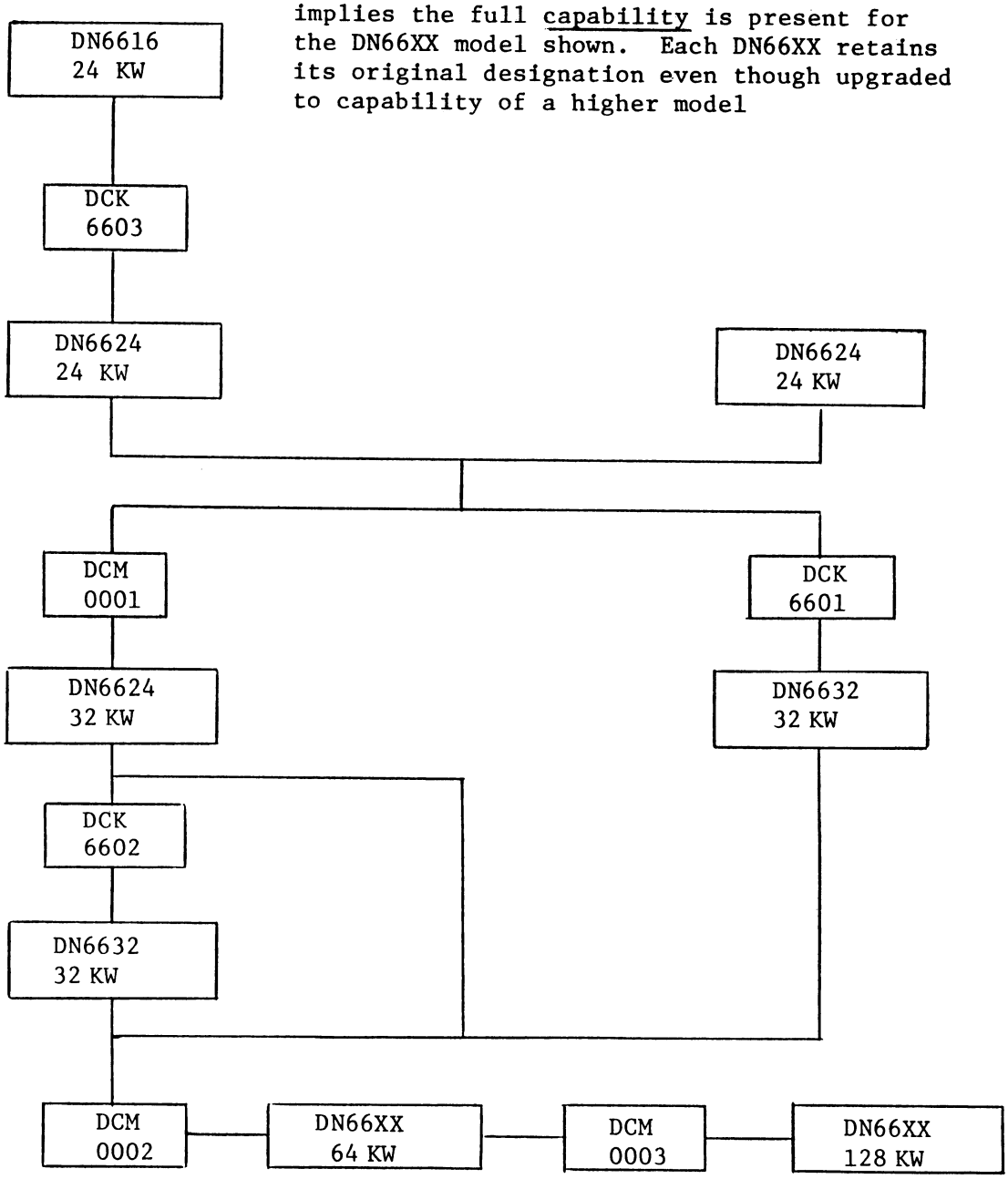
4. Any installed FNP of DN6616/6624/6632 type can be upgraded on-site to the maximum DN6632 capability.

5. All upgrades are achieved via standard upgrade kits.

6. All above FNPs retain original DN66XX identity after being upgraded. A DN6616 raised to maximum DN6632 capability is still a DN6616, for example.

7. Upgrade kit sequence flowchart for all possible upgrades of original DN6616/6624/6632.

1) Note -- Each box with DN66XX in it implies the full capability is present for the DN66XX model shown. Each DN66XX retains its original designation even though upgraded to capability of a higher model



8. Refer also to Section C above for DN66XX architecture and adapter spaces allotments. DN6624 and DN6632 or FNPs raised to the equivalent of DN6624 or DN6632 cannot have an adapter spaces complement which exceeds that for an actual DN6624 or DN6632.

J. Configuring for Dual-FNP Fail-Soft System

1. For NPS environment. See discussion in ASP Outline on Data Communication Hardware - FNPs and Communications Software - NPS and GRTS.

   Applies only to Original DN6632 currently. Original DN6624 does not offer enough memory to support current NPS versions.

2. Required components.

   a. CMA (Computer Monitor Adapter) -- One for each of the two FNPs. Type number is DCF6030.

   b. LTD (Line Transfer Device) -- One required for each 15 LEFs.

   c. LEF (Line Expansion Function) -- Select at least one. Choose type apropos to line switching function and type of line wanted.

3. Check your total configuration for each FNP to ensure that the CMA configuring does not exceed the available extra FNP IOM adapter spaces allowance. See Section XVIII.C.

4. Schematic of LTD and LEFs

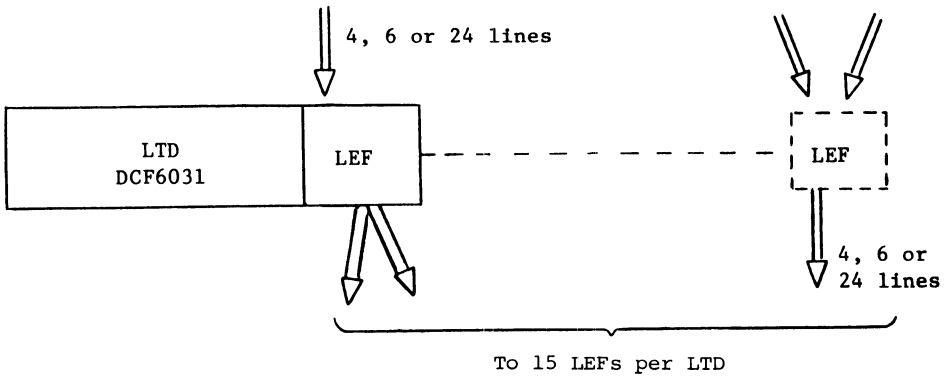
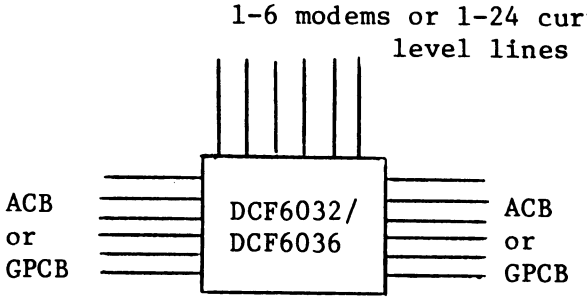


FIGURE 4

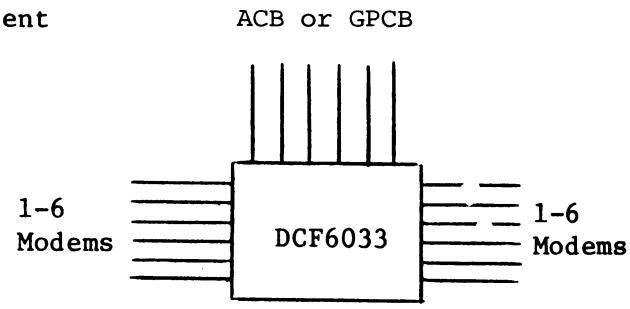
5. Roles and Types of Line Expansion Functions (LEF)

   a. Five models - 3 used to switch a group of lines (modems) between 2 communication bases, 2 used to select between two sets of lines to switch to one communications base.

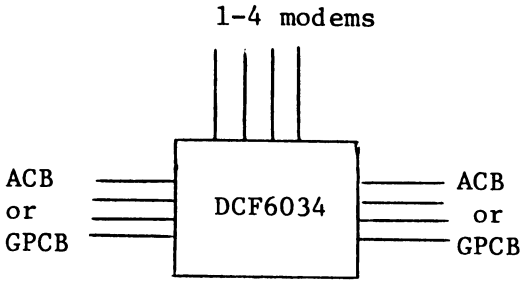
   b. LEF schematics -



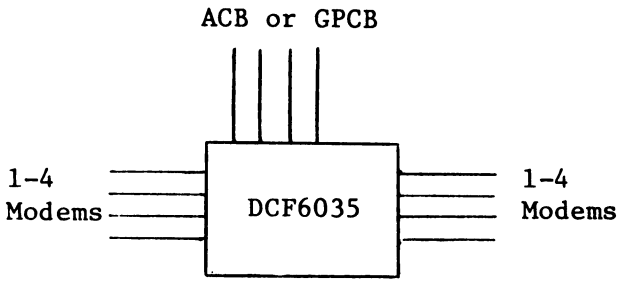
DCF6032 is for 1-6 asynchronous lines without supervisory channels. Lines switched between 2 communications bases. DCF6036 is for switching up to 24 2-wire current interface lines



For 1-6 asynchronous lines without supervisory channels. Lines switched between 2 sets of modems and a communications base



For 1-4 synchronous or asynchronous lines, with/without supervisory channels. Lines switched between 1-4 modems and 2 communications bases



For 1-4 synchronous or asynchronous lines with/without supervisory channels. Lines switched between 2 sets of modems and a communications base

c. Except in case of current loop lines a direct connect feature of appropriate type (asynchronous or synchronous) or modem bypass (asynchronous or synchronous) may be used in place of a modem.

K. List of Type Numbers and Their Functions for Original DN6616/6624/6632

Type Number Function

1. Base DN6600 FNP (1 or more ASAs required as shown later in this section)

DCP6616 DN6616 with 24KW/48KB memory, supervisory console and adapter, tape cassette unit and adapter, interval timer, DIA link to Level 66 IOM channel, one abbreviated GPCB equipped to handle 1-4 LIUs for maximum of 4-8 lines. No LIUs included. Memory size insufficient for NPS.

DCP6624 Same as DCP6616 plus PSA channel for direct link to MSP, one full GPCB equipped to handle 1-16 LIUs for a maximum of 16-32 lines, one ACB1 equipped to handle 1-6 LIUs for a maximum of 18/24 lines. No LIUs included. 24KW/48KB memory insufficient for NPS. 32KW/64KB maximum memory of DN6624 is marginal for NPS 2/H or NT1. Not usable for NPS NT2 or later, or DP1 (DPS).

DCP6632 Same as DCP6616 but with 32KW/64KB memory plus PSA channel for direct link to MSP, 2 full GPCBs each equipped to handle 1-16 LIUs for a maximum of 16-32 lines each, one ACB1 equipped to handle 1-6 LIUs for a maximum of 18-24 lines. No LIUs included. 32KW/64KB base memory is marginal for NPS 2/H or NT1. NT2/NT3/DP1(DPS) require 64KW/128KB minimum. Maximum useful memory for NPS on DN6632 is 96KW/192KB.

2. Memory Expansion Kits - limit of one each

DCM0001 Upgrade on-site to raise DCP6624 from 24KW/48KB to 32KW/64KB. Also to raise DN6616 to 32KW size with DCK6603 as prerequisite.

DCM0002 Extension or first upgrade on-site to raise FNP memory size from 32KW/64KB to 64KW/128KB. For DCP6632. Also for DCP6616/6624 which have been upgraded to 32KW/64KB.

DCM0003 Extension or second upgrade on-site to raise FNP from 64KW/128KW to 128KW/256KB. Cannot be installed without DCM0002.

3. Capability Upgrades

DCK6603 Upgrade DCP6616 on-site to standard capability of DCP6624. DCF6043 must also be ordered.

DCK6601 Upgrade on-site from DCP6624 having 24KW/48KB memory to 32KW/64KB and with full capability content of standard DCP6632. Can also be applied to DCP6616 with DCK6603 as prerequisite.

DCK6602 For DCP6624 or DCP6616, both with DCM0001 as prerequisite. If DCP6616, DCK6603 also a prerequisite. Upgrade on-site to full capability content of standard DCP6632.

4. Special Options to Base FNP other than GPCB, ACB - Where DCP6624/6632 are indicated in the following type numbers it is understood that the feature applies also to DCP6616 or DCP6624 upgraded to equivalent standard DCP6624 or DCP6632 capability.

DCF6030 CMA (computer monitor adapter) for DCP6624 or DCP6632. Used as watchdog timer in dual (redundant) FNP standby configuration in NPS environment. One required for each of the paired FNPs. DCP6624 does not provide enough memory to support current NPS versions.

DCF6Ø31 LTD (line transfer device) for DCP6624 or DCP6632. Used in dual (redundant) FNP standby configuration in NPS environment. Supports mixes of up to 15 LEFs (DCF6Ø32, DCF6Ø33, DCF6Ø34, DCF6Ø35, DCF6Ø36) for maximum of about 9Ø lines. Multiple LTDs can be used in a chained fashion.

DCF6Ø32 LEF (line expansion function) for DCP6624 or DCP6632. Used in dual (redundant) FNP standby configuration in NPS environment. Switches 1-6 asynchronous lines without supervisory channels between two ACBs or GPCBs. Cannot be used for current level terminals.

DCF6Ø33 LEF same as DCF6Ø32 above except that it switches 1-6 asynchronous lines from GPCB or ACB between two sets of modems or asynchronous Direct Connect features (DCF6Ø2Ø) or Modem Bypass features (DCF6927).

DCF6Ø34 LEF same as DCF6Ø32 above except that it switches 1-4 asynchronous or synchronous lines, with or without supervisory channels, between two GPCBs or ACBs. Cannot be used with current level terminals.

DCP6Ø35 LEF same as DCF6Ø32 above except that it switches 1-4 asychronous or synchronous lines, with or without supervisory channels, from GPCB or ACB between two sets of modems or asynchronous Direct Connect features (DCF6Ø2Ø) or synchronous Direct Connect features (DCF6Ø21) or asynchronous Modem Bypass features (DCF6927) or synchronous Modem Bypass features (DCF6927).

DCF6Ø36 LEF same as DCF6Ø32 above except that it switches 1-24 asynchronous lines from current level terminals between 2 ACBs or 2 GPCBs or mixed ACB and GPCB.

DCF6Ø41 DIA (direct interface adapter) for DCP6624 or DCP6632. Provides link to a second Level 66 IOM or second IOM physical channel. Price includes IOM channel. Remember that each FNP includes one DIA on standard basis. DCF6Ø41 uses two adapter spaces in FNP IOM. If used on DCP6624 no other options to base FNP can be configured.

DCF6043 PSA (peripheral subsystem interface adapter) for DCP6616. Provides channel in DCP6616 for direct link to MSP. Required if NPS is used. Can also be used to provide a second PSA for DN6632. No NPS support of 2 PSAs concurrently. New NPS bootload required. See Section XII.K.

5. GPCB options (LIUs in GPCB are known officially as CCIs - communication channel interfaces).

DCU6202 Third GPCB in DCP6632. Equipped to handle 1-16 LIUs for a maximum of 16-32 lines. No LIUs are included but must be configured for all line terminations.

6. Multi-function LIUs - at least one should be configured, if possible, per FNP for greatest flexibility.

DCF6051 Terminates 2 lines. EIARS232C interface. Any code 5-8 bits. HDX or FDX. Synchronous (to 9600 bits per second) or asynchronous (to 2400 bits per second). Either line can be used either way. On "As Available" status.

DCF6057 Same as DCF6051 except ACU is included to support one of the two data lines. ACU support requires NPS. On "As Available" status.

DCF6064 Terminates 2 lines. EIARS232C interface. Any code 5-8 bits. HDX or FDX. Synchronous to 9,600 bps or isochronous to 9,600 bps. Asynchronous to 2,400 bps. Each line can run at different speed and with different transmission technique - synchronous, asynchronous, isochronous. Isochronous allows use of standard synchronous modems with asynchronous terminals above 2,400 bps.

DCF6065 Same as DCF6064 except provides Military Standard 188C interface.

DCF6066 Same as DCF6066 except that ACU is included to support one of the lines. ACU support requires NPS.

7. GPCB Synchronous-only LIUs.

DCF6013 Terminates 2 lines at up to 9,600 bits per second each. Each line can run at different speed. EIA RS232C interface. ASCII code. HDX or FDX. For Honeywell VIP, RCI, MMI link protocols and various others.

DCF6014 Same as DCF6013 but includes ACU for one line. ACU support requires NPS. On "As Available" status.

DCF6015 Terminates 1 line at up to 9,600 bits per second. For BSC link protocol with use of CRC (Cyclic redundancy check). CRC hardware included in DCF6015. EIA RS232C interface. ASCII or EBCDIC code, transparent or non-transparent mode. HDX or FDX.

DCF6019 Terminates 1 line at up to 9,600 bits per second. Honeywell logical HDLC link protocol. Software support via NPS NT2 and DP1(DPS), and GRTS-II, 1Q79. Any code. Bit-oriented protocol. EIA RS232C interface. HDX or FDX.

DCF6040 Terminates 2 lines at up to 9,600 bits per second. Military standard 188C interface. HDX or FDX. Any code 5-8 bits. On "As Available" status.

DCF6050 Terminates 1 line at up to 9,600 bits per second. Honeywell logical HDLC link protocol. Software support via NPS NT2 and DP1 (DPS), and GRTS-II, 1Q79. Any code. Bit-oriented protocol. Military standard 188C interface.

DCF6052 Terminates 2 lines. One line can run at up to 50,000 bits per second (wideband line). Second line can run at up to 9,600 bits per second, EIA RS232C interface. Any code 5-8 bits. HDX or FDX. Type 301 or 303 modems or equivalent for wideband line.

DCF6053 Same as DCF6019, for Honeywell logical HDLC link protocol, but includes ACU support. ACU support requires NPS. HDLC software support by NPS NT2 and DP1 (DPS), and GRTS-II, 1Q79.

DCF6054 Terminates 1 line at up to 50,000 bits per second, wideband line. Honeywell logical HDLC link protocol. Software support via NPS NT2 and DP1 (DPS), and GRTS-II, 1Q79.

DCF6055 Terminates 1 line at up to 50,000 bits per second, wideband line. BSC link protocol.

CRC Cyclic Redundancy Check hardware included. ASCII or EDCDIC code, transparent or non-transparent mode. HDX or FDX.

DCF6056 Terminates 2 lines. Military standard 188C interface. One line at up to 50,000 bits per second, wideband line. Second line at up to 9,600 bits per second. HDX or FDX. Any code 5-8 bits.

DCF6058 Terminates 1 line at up to 50,000 bits per second. Honeywell logical HDLC link protocol. HDX or FDX. HDLC software support via NPS NT2 or DP1 (DPS), and GRTS-II, 1Q79. V.35 interface, CCITT standard, analogous to EIA interface in U.S.

DCF6059 Terminates 1 line at up to 50,000 bits per second. Wideband line, military standard 188C interface. Honeywell logical HDLC link protocol. Software support via NPS NT2 and DP1 (DPS), and GRTS-II, 1Q79.

DCF6060 Terminates 2 lines. One line at up to 50,000 bits per second, wideband line, V.35 interface. One line at up to 9,600 bits per second, EIA RS232C interface.

DCF6061 Terminates 1 line at up to 50,000 bits per second, wideband line, V.35 interface.

DCF6062 Same as DCF6015, for BSC link protocol, except ACU support is included. ACU support requires NPS.

DCF6063 Terminates 1 line at up to 9,600 bits per second. Military standard 188C interface. BSC link protocol.

8. GPCB ASA and Bit Rate Options Related to ASAs.

DCF6001 ASA (asychronous speed adapter). Provides standard support for 7 specific asynchronous line speeds - 110, 134.5, 150, 300, 1050, 1200, 1800 bits per second. Supports one more speed by means of one optional bit rate option below. One ASA, DCF6001 or DCF6002, must be configured in every GPCB regardless of whether asynchronous lines are connected. Only one ASA per GPCB. Asynchronous lines can run only at one of the ASA-supported speeds. GRTS/NPS software version used defines the acceptable speed for each asynchronous line.

Note - ASA does not terminate or interface lines, LIUs do that. ASA provides the mix of speeds at which lines connected to the asynchronous type LIUs can run.

DCF6002 ASA (asynchronous speed adapter). Same as DCF6001 except that it provides standard support for 6 specific asynchronous line speeds - 50, 110, 200, 300, 600, 1200 bits per second. DCF6002 intended for European use since in U.S.A. we do not have 50 or 200 bits per second speeds. See DCF6001 description also.

DCF6003 Bit rate option for ASA for 50 bits per second asynchronous lines. Supports only 5-bit code.

DCF6004 Bit rate option for ASA for 75 bits per second asynchronous lines. Supports only 5-bit code.

DCF6005 Bit rate option for ASA for 134.5 bits per second asynchronous lines.

DCF6006 Bit rate option for ASA for 200 bits per second asynchronous lines.

DCF6007 Bit rate option for ASA for 600 bits per second asynchronous lines.

DCF6008 Bit rate option for ASA for 1,050 bits per second asynchronous lines.

DCF6009 Bit rate option for ASA for 1,800 bits per second asynchronous lines.

DCF6038 Bit rate option for ASA for 2,400 bits per second asynchronous lines.

9. GPCB Asynchronous-only LIUs

DCF6010 Terminates 2 lines at speeds limited by ASA DCF6001 or DCF6002. Each line can run at different speed. Any code 5-8 bits. EIA RS232C interface. HDX or FDX. On "As Available" status.

DCF6011 Terminates 2 lines at speeds limited by ASA DCF6001 or DCF6002. Each line can run at different speed. Any code 5-8 bits. HDX or FDX. 20 milliampere current loop interface. No modem used.

DCF6039 Same as DCF6010 except Military Standard 188C interface. On "As Available" status.

10. ACB2 Option

DCU6201 ACB2 for DCP6632 only. 1-5 DCU6201 ACBs can be configured. Each is equipped to handle 1-13 LIUs for a maximum per ACB2 of 17-52 lines. Each must be equipped with one ASA from list below.

11. ACB ASAs (asynchronous speed adapters) - for DCP6624/6632 only. Every Asynchronous Communications Base (ACB) must be equipped with one (only) ASA regardless of whether asynchronous lines are used on ACB. Remember that ASAs do not terminate or interface any lines to ACB1 or ACB2. Only ACB LIUs chosen from ACB LIUs section below do that.

DCF6022 Provides support for 4 specific asynchronous line speeds - 50, 75, 100, 200 bits per second - for ACB LIUs listed in LIUs section below. Lines connected to appropriate LIUs can run at any mix of these 4 speeds.

DCF6024 Same as DCF6022 except that the line speeds supported are 75, 110, 150, 300 bits per second.

DCF6025 Same as DCF6022 except that the line speeds supported are 110, 134.5, 150, 300 bits per second.

DCF6023 Same as DCF6022 except that the line speeds supported are 50, 75, 110, 200 bits per second.

12. ACB LIUs (ACB LIUs are known officially as asychronous channel groups)

DCF6026 Terminates 3 asynchronous lines at line speeds limited by the ACB ASA configured. Each line can run at different speed. Includes ACU (automatic calling unit) for one line. EIA RS232C interface. Any code 5-8 bits. HDX or FDX. 103A, 103E, 103F or 113 type modems or equivalent. ACU support requires NPS.

DCF6027 Same as DCF6026 execpt that 4 asynchronous lines are terminated and no ACU is included.

DCF6028 Terminates 4 asychronous lines at speeds limited by the ACB ASA configured. Each line can run at different speed. HDX or FDX. Any code 5-8 bits. 20-milliampere current level interface. No modem used. For in-plant cable connection.

DCF6029 Terminates 4 asynchronous lines at speeds limited by ACB ASA configured. Military Standard 188C interface. Each line can run at different speed. HDX or FDX.

13. Options for in-plant Line Connections (that is without use of public carrier company lines). See Terminals For All Levels Bulletins 10 (1/6/78) and 14 (3/17/78) for cabling considerations.

DCF6020 Direct Connect feature for connection to asynchronous LIU for one line (cable). Length determined by maximum cable length from the terminal subsystem. One per line. Cannot be used with current level LIUs. No inherent speed limit.

DCF6021 Same as DCF6020 except for synchronous LIU. Maximum 9,600 bps.

DCF6927 Universal Modem Bypass feature for connection to one asynchronous or synchronous line (cable). A Level 6 feature usable into FNP LIUs. Minimum of two per line, one at FNP and, other at terminal

end. Maximum cable distance between two successive bypasses is 2500 cable feet. Intermediate bypasses can be used as line signal repeaters or strengtheners. Check your Level 6 technical support people for maximum cable lengths and maximum number of bypasses usable at satisfactory line noise levels. Speed to 9,600 bits per second. Cannot be used with current level LIUs. Can also be used with keyboard terminals.

Note: Current loop interface terminals cable-connect directly to a current loop-oriented LIU (DCF6011 on GPCB, DCF6028 on ACB). Up to 1000 cable feet.

L. Optimizing Price of Original DN6616/6624/6632 That You Propose

1. Due to great modularity of these FNPs you have various ways to configure for the same set of line requirements. Some configuration approaches will price out less than others. Pricing at lowest cost may be one of the optimization objectives you may have. FNPs can be configured to optimize toward lowest price or toward maximum terminals connectivity or toward line type flexibility or toward protection in case of GPCB/ACB failure (DN6632).

   a. Always examine carefully the line requirements as to quantity, speed, code requirements, terminal type.

   b. Don't be satisfied with just one pricing. Try one or two others to be sure you offer your prospect his maximum performance for lowest possible price, using some of the hints given below.

2. Hints on configuring these FNPs to minimize price for line requirements.

a. In GPCB try to use the LIUs which supply 2 lines each. They give lower costs per line at the loss of some generality.

b. Start with the built-in ACB1 (in DN6624 or DN6632) first in trying to satisfy all your asynchronous line requirements for speeds of 300 bps or less.

1) If built-in ACB1 capacity is not enough, then start using the built-in GPCB.

2) In configuring ACBs (either built-in ACB1, or optional ACB2 in DN6632) configure first your lowest speed requirements if you have a mix of asynchronous low-speed requirements not greater than 300 bps. This is due to the fact that varying numbers of ACB character spaces are used depending on line speed (1-3 spaces each).

Example: Assume prospect plans 30 TTY lines at 110 bps each and 15 T-300 lines at 300 bps each. You are considering a DN6624 in response. Remember that ACB1 provides max of 24 lines or 52 time divisions (character spaces), whichever limit is reached first.

Solution A - if you configure the 15 T-300 lines first:

- 15 x 3 time divisions = 45, leaving 7 unused
- 24 lines max minus 15 = 9 lines left for 9 TTYs x 1 time division = 9 time divisions required but only 7 are left; therefore, we could configure only 7 TTY lines on the ACB1
- We have used only 22 of the maximum 24 lines on ACB1 and all 52 time divisions. This means we will need to configure 23 remaining TTY lines on the built-in GPCB

Solution B - if you configure the lowest speed line requirements first (the TTY lines):

- 24 TTY lines x 1 time division = 24, leaving 28 unused
- We have used the maximum 24 lines on ACB1 here also but we will need to configure only 21 lines on GPCB

c. If you find that you must configure one or more optional communications bases and your requirements are for mixed speeds, including some above 300 bps, you will need to configure at least an extra GPCB. Since GPCB can, however, handle low speed and higher speed lines, do not configure an ACB2 for low speed lines until you exhaust the line capacity of your additional GPCB. To configure both an optional GPCB and optional ACB arbitrarily in this case would mean paying the price of two communications bases unnecessarily. While the price per line is lower in ACB2 than GPCB, the cumulative difference would not be enough to offset the price of the ACB2 itself. ACB2 is for DN6632 only.

M. Configuring Example

Prospect wants original DN6624 for 10 asynchronous lines (5 at 300 bps, 5 at 1200 bps) using ASCII code. Also wants 10 synchronous lines at 2400 bps each (5 using ASCII, 5 using EBCDIC and BSC link protocol). Will use GRTS. Wants to minimize his costs:

1 DCP6624 Base DN6624, 24KW/48KB

---

1 DCF6025 ACB ASA including 300-bps line speed support

2 DCF6027 LIUs for 5 300-bps asynchronous lines, with 3 lines of growth left in 2nd LIU

---

1 DCF6001 GPCB ASA for asynchronous-only LIUs. Includes 1200-bps asynchronous line speed support

3 DCF6010 LIUs for 5 1200-bps asynchronous lines with one line of growth in 3rd LIU. ASCII code

3 DCF6013 LIUs for 5 2400-bps synchronous lines, ASCII, with one line of growth on 3rd LIU

5 DCF6015 LIUs for 5 2400-bps BSC lines, EBCDIC

---

11 LIU spaces used of 16 available in GPCB. In ACB1 we used 5

of possible 24 lines and 5 x 3 = 15 of 52 possible character spaces (time divisions)

SECTION XIX
Configuring New DN6616/6624/6632 (DN6600-1)

A. Relation to original DN6616/6624/6632

The original FNPs were based on DN355 technology. The new FNPs are based on Level 6 technology.

1. Are known collectively also as DN6600-1 series, are not available for DPS systems.

2. Will run under GRTS-I, GRTS-II or NPS. Some minor modifications have been made to the hardware that affect GRTS software. If your customer has modified his GRTS software or has written his own communications supervisor, you should review the hardware changes to ensure that they have no undue effect on customer's software. Contact Steve Wales, 8-341-7008 if clarification is needed.

3. Apply to all orders and contracts for DN6616/6624/6632 after 8/15/78.

   a. Have same price and performance.

   b. New FNPs have smaller floor space.

   c. New FNPs have different cabinetry (Level 6 minirack).

   d. New DN6632 has maximum (and standard) capacity of 88 lines versus (theoretically) 352 on old DN6632.

   e. New DN6616/6624 can be upgraded onsite to functionality and line connection capacity of new DN6632, retaining their starting serial and model numbers.

4. Most type numbers (marketing identifiers) are same between original and new DN FNPs.

CMA (Computer Monitor Adapter) is not presently available, thus new DN FNPs do not support the dual-FNP fail-soft configuration.

5. Orginal DN FNPs cannot be upgraded to the new versions, but both versions can be used on same Level 66 system.

B. Required components

1. Base FNP - DCP66XX.

2. One or more line interface units (LIUs).

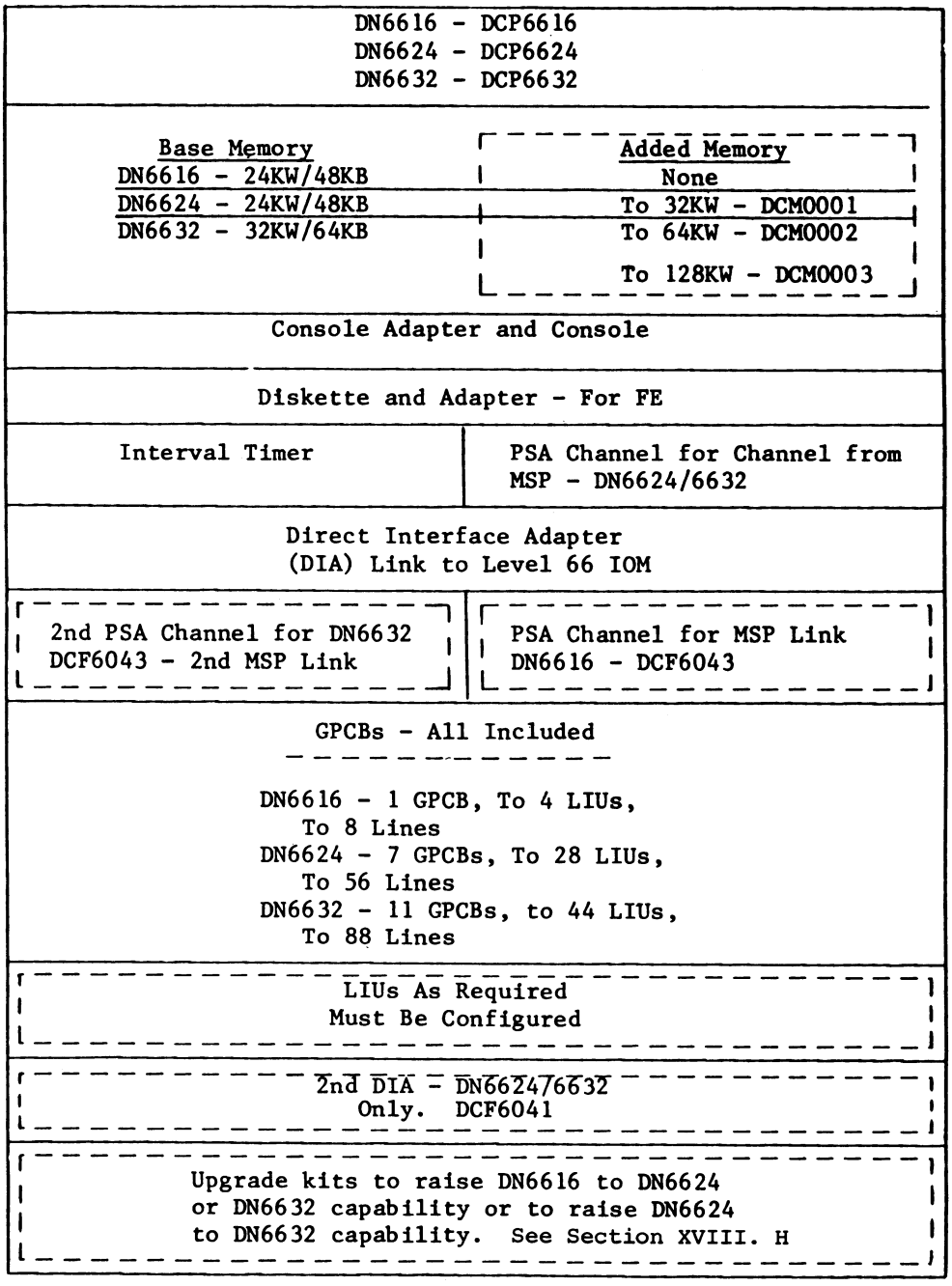
   a. Every line must terminate in an LIU, via any line from a common carrier or an in-plant connection.

   b. Each LIU represents a Level 6 type daughter board occupying one quarter or one half a GPCB (Level 6 type mother board).

   c. Line connectivity is determined by the size of LIU boards (quarter or half) required (for line speed, transmission type, protocol) and the quantity of GPCBs included in FNP price (1, 7, 11). Depending on their type, LIUs can support one or two lines each.

3. One or more in-plant connection features if lines are not furnished by common carrier companies. In-plant connection is by use of specific direct connect or modem bypass features. Each must connect to an appropriate LIU. Depending on the terminal and distance, current loop interface LIUs can be used, with no need for specific direct connect or modem bypass features.

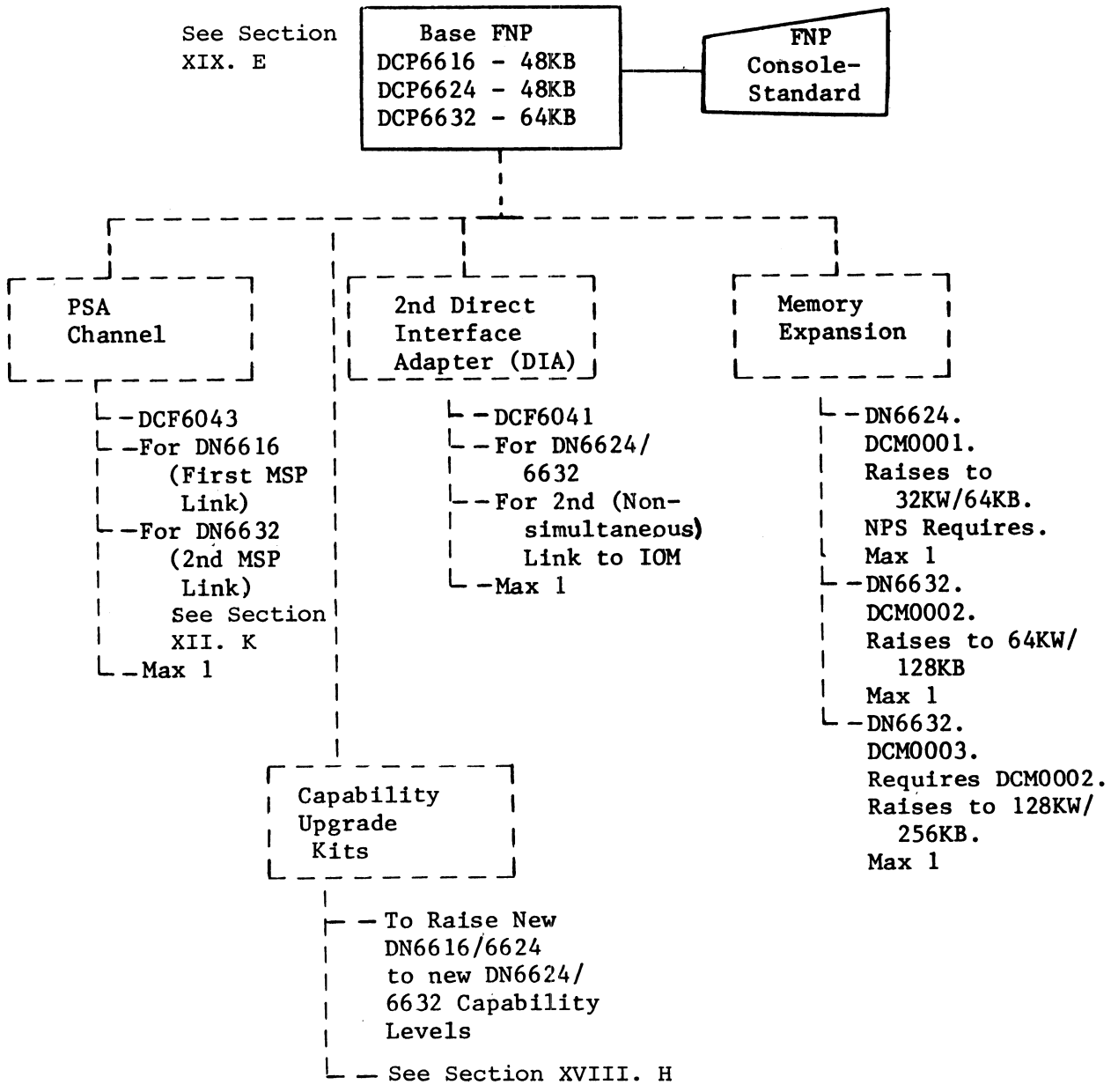
C. Block Diagram of New DN6616/6624/6632 FNPs -- all optional type numbers are in dotted form.



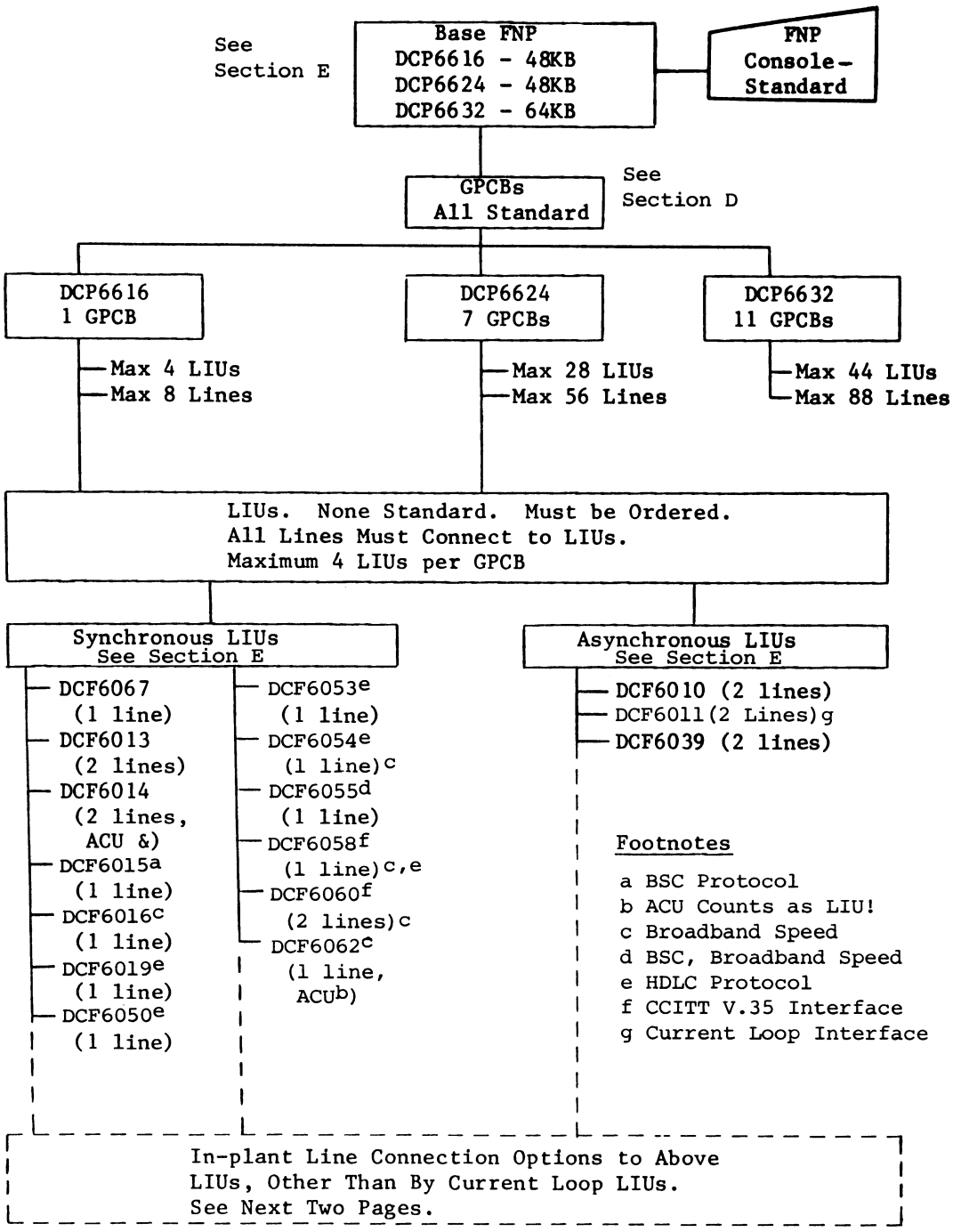
SECTION XIX
Configuring New DN6616/6624/6632 (DN6600-1)

D. Configurator Flowcharts for New DN6616/6624/6632

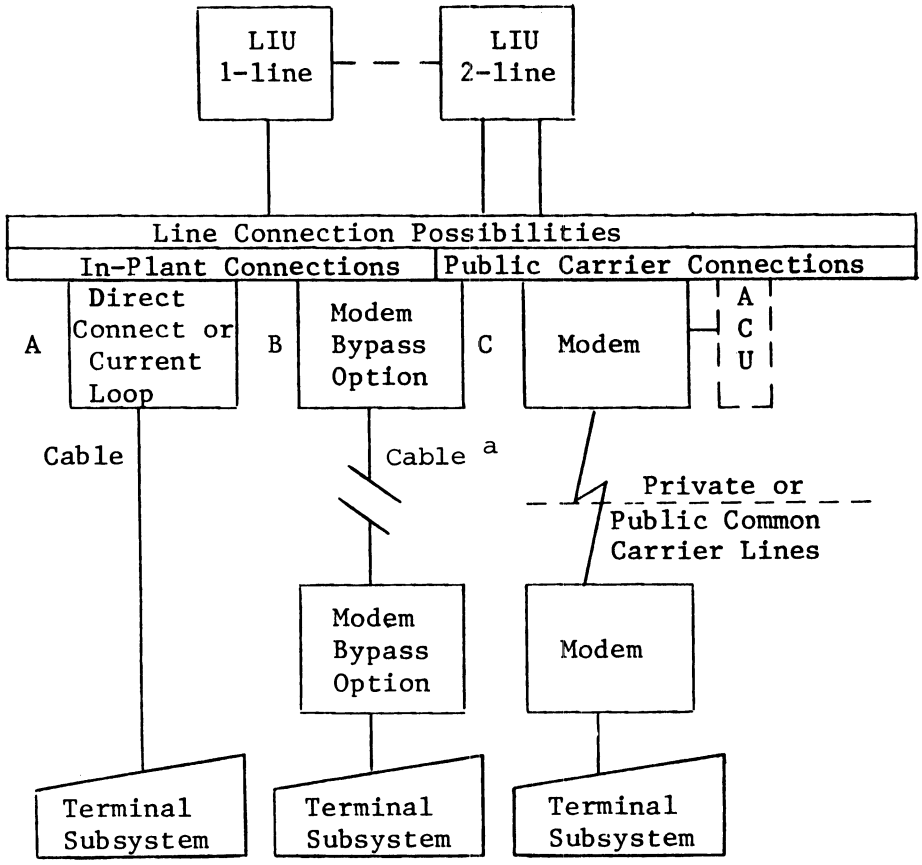
1. For options other than interfacing communication lines. See also Section E below



2. For Standard and Optional Configuring of Communication Lines. See also Section E below



3. Block Diagram of Communication Line Connection Possibilities for New DN6616/6624/6632.



[a] 2500 cable feet between successive modem bypass features. Multiple bypasses can be used.

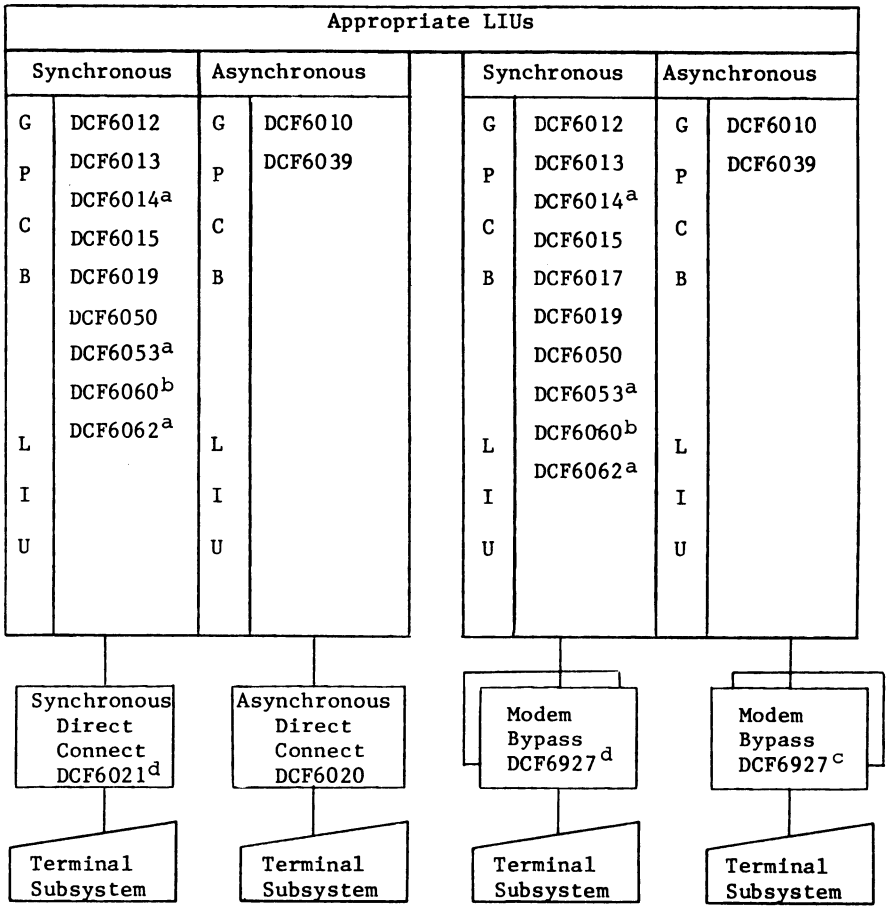
Mixtures of approaches A, B, C can be used in a multiline LIU, one approach per line.

See next page for LIUs usable with in-plant connections.

4. In-plant Line Connection Features for New DN6616/6624/6632 FNPs

   a. Use this chart for Direct Connect and Modem Bypass features options. It shows the applicable LIUs to which those in-plant connection features can be attached. Identify terminal to be used with each such feature on your order.

   b. Terminals using 20 ma current loop interfaces cable-connect to current loop-oriented LIUs.



1 Direct Connect Feature Per Line Involved. Cable Length Determined By Subsystem Controller

Minimum 2 Modem Bypass Features Per Line Involved. Maximum 2500 Cable Feet Between 2 Successive Bypass Units

[a] No support of ACU
[b] Not for speeds above 9,600 bps
[c] Maximum speed 1,800 bps
[d] Maximum speed 9,600 bps

5. GPCB (or Channel Interface Base in official terminology) throughput load factor calculations and LIU board packaging.

   a. Refer to Section XX.E before using the tables on next two pages.

   b. Maximum load factor per GPCB (CIB) is 99.

   c. Note on Table 1 that DCF6014 and DCF6015 LIUs support ACU (Automatic Call Unit) and that each LIU requires two quarter boards. ACU logic occupies a quarter board separate from the LIU quarter board. ACU supports one line for automatic callout. ACU support requires NPS in FNP. The ACU board must be on same GPCB (mother board) as the LIU board.

   d. Note that on Table 2 the DCF6060 LIU requires two quarter boards. One quarter board is for the V.35 wideband line, second quarter board is for one EIA synchronous line at up to 9,600 bps.

   e. Figures in parentheses after description of LIU. indicate the number of lines terminated by the LIU.

SECTION XIX
Configuring New DN6616/6624/6632 (DN6600-1)

TABLE 1
DN6600-1 LOAD FACTOR TABLE
SYNCHRONOUS AND ASYNCHRONOUS

THROUGHPUT LOAD FACTORS PER LINE

LIU	LIU DESCRIPTION	TO 2400 BPS		TO 4800 BPS		TO 9600 BPS		LIU BOARD SIZE
		NO CCT	CCT [b]	NO CCT	CCT [b]	NO CCT	CCT [b]	
DCF6010	Dual Asynch, EIA RS232C (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6011	Dual Asynch, Current Interface (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6067	MIL 188C, Synchronous (1)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6013	Dual Synch, EIA RS232C (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6014	Dual Synch, EIA RS232C, with Auto Call (2)	1.1	2.0	2.3	4.1	4.5	8.2	2-1/4
DCF6015	Bisynchronous Channel (1)	2.5	2.5	5.1	5.1	10.1	10.1	1/4
DCF6019	HDLC to 9600 bps (1)	2.2(FDX) [a]	2.2(FDX)	4.4(FDX) [a]	4.4(FDX)	8.8(FDX) [a]	8.8(FDX) [a]	1/4
DCF6050	MIL 188C, HDLC, to 9600 bps (1)	2.2(FDX) [a]	2.2(FDX)	4.4(FDX) [a]	4.4(FDX)	8.8(FDX) [a]	8.8(FDX) [a]	1/4
DCF6053	HDLC, EIA, to 9600 bps, with Auto Call (1)	2.2(FDX) [a]	2.2(FDX)	4.4(FDX) [a]	4.4(FDX)	8.8(FDX) [a]	8.8(FDX) [a]	2-1/4
DCF6062	Bisynch to 9600, with Auto Call (1)	2.5	2.5	5.1	5.1	10.1	10.1	2-1/4
DCF6039	Dual Asynch MIL STD (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4

TOTAL LOAD FACTOR PER GPCB --------99 OR LESS

Notes:

Factors are for half-duplex or FDX transmission TWA (Two-Way Alternate) per line unless otherwise stated.

[a] FDX indicated in Table means TWS (Two Way Simultaneous) use of the FDX line. If TWS is not needed. divide the factor shown in half.

[b] The Character Control Table is a software table used by both NPS and GRTS to distinguish control of, e.g., function key characters. This enables the user of the terminal to specify that certain keys are to perform particular system functions. Example: a control -J might be set to mean "back space the cursor to the beginning of line".

SECTION XIX
Configuring New DN6616/6624/6632 (DN6600-1)

TABLE 2

DN6600-1 LOAD FACTOR TABLE

WIDEBAND

		THROUGHPUT LOAD FACTORS PER LINE						
		TO 19.2K BPS		TO 40K BPS		TO 56K BPS		LIU BOARD SIZE
LIU	LIU DESCRIPTION	NO CCT	CCT[b]	NO CCT	CCT[b]	NO CCT	CCT[b]	
DCF6016	Wideband Channel, 19.2 - 56.0 K bps (1)	11.9	18.7	25	39.3	35.0	55.0	1/4
DCF6048	MIL-188 Wideband Channel (1)	11.9	18.7	25	39.3	35.0	55.0	1/4
DCF6054	HDLC Wideband Channel (1)	13.6(FDX)[a]	13.6(FDX)[a]	28.6(FDX)[a]	28.6(FDX)[a]	40.0(FDX)[a]	40.0(FDX)[a]	1/2
DCF6055	Bisynch Wideband Channel (1)	23.8	23.8	50.0	50.0	70.0	70.0	1/4
DCF6058	HDLC, V.35 (1)	13.6(FDX)[a]	13.6(FDX)[a]	28.6(FDX)[a]	28.6(FDX)[a]	40.0(FDX)[a]	40.0(FDX)[a]	1/2
DCF6060	Dual Channel - One V.35 and One EIA Synch to 9600 bps (2)[c]	11.9	18.7	25	39.3	35.0	55.0	2-1/4
	TOTAL LOAD FACTOR PER GPCB ---- 99 OR LESS							

NOTES:

Factors are for half-duplex or FDX transmission TWA (Two Way Alternate) per line unless otherwise stated.

[a] FDX indicated in Table means TWS (Two Way Simultaneous) use of the FDX line. If TWS is not needed, divide the factor shown in half.

[b] The Character Control Table is a software table used by both NPS and GRTS to distinguish control of, e.g., function key characters. This enables the user of the terminal to specify that certain keys are to perform particular system functions. Example: a control -J might be set to mean "back space the cursor to the beginning of line".

[c] One Channel is for the V.35 wideband line and the second channel is for an EIA synchronous line at up to 9600 bps. Load factors shown are for the V.35 wideband line. Use the factors for DCF6013 for the EIA synchronous line.

E. List of Type Numbers and Their Functions for New DN6616/6624/6632

Type Number Function

1. Base DN66ØØ FNP

DCP6616 DN6616 with 24KW/48KB memory, supervisory console and adapter, diskette unit and adapter, interval timer, DIA link to Level 66 IOM channel, one GPCB equipped to handle 1-4 LIUs for maximum of 4-8 lines. No LIUs included. 24KW/48KB memory size (standard and maximum) is insufficient for NPS.

DCP6624 Same as DCP6616 plus PSA channel for interfacing to disk channel from MSP, 7 GPCBs equipped to handle 1-4 LIUs each for a maximum FNP total of 56 lines. No LIUs included. 24KW/48KB memory size is insufficient for NPS. 32KW/64KB maximum memory is marginal for NPS 2/H and NT1, insufficient for NT2, NT3, DP1 (DPS).

DCP6632 Same as DCP6616 but with 32KW/64KB memory plus PSA channel for interfacing to disk channel from MSP, 11 GPCBs each equipped to handle 1-4 LIUs for a maximum FNP total of 88 lines. No LIUs included. 32KW/64KB base memory size is marginal for NPS 2/H and NT1. 64KW/128KB memory size required for NPS NT2, NT3, DP1(DPS). Maximum useful memory size for NT2, NT3 is 96KW/192KB on DN6632.

2. Memory Expansion Kits - limit of one each (see also XVIII.H).

DCM0001 Upgrade on-site to raise DCP6624 from 24KW/48KB to 32KW/64KB. Also to raise DN6616 to 32KW size with DCK6603 as prerequisite.

DCM0002 Extension or first upgrade on-site to raise FNP memory size from 32KW/64KB to 64KW/128KB. For DCP6632. Also for DCP6616/6624 which have been upgraded to 32KW/64KB.

DCM0003 Extension or second upgrade on-site to raise FNP from 64KW/128KB to 128KW/256KB. Cannot be installed without DCM0002.

3. Capability Upgrades (See also XVIII.H)

DCK6603 Upgrade new DCP6616 on-site to standard capability of new DCP6624. DCF6043 must also be ordered.

DCK6601 Upgrade on-site from new DCP6624 having 24KW/48KB memory to 32KW/64KB and with full capability content of standard new DCP6632. Can also be applied to DCP6616 with DCK6603 as prerequisite.

DCK6602 For new DCP6624 or new DCP6616, both with DCM0001 as prerequisite. If DCP6616, DCK6603 also a prerequisite. Upgrade on-site to full capability content of standard new DCP6632.

DCF6041 DIA (direct interface adapter) for DCP6624 or DCP6632. Provides link to a second Level 66 IOM or second IOM physical channel. Price includes IOM channel. Remember that each FNP includes one DIA on standard basis. Use of DCF6041 provides a backup connection to Level 66, effective only after a warm start following malfunction of standard DIA.

DCF6043 PSA (peripheral subsystem interface adapter) for DCP6616. Provides a termination point for the physical channel connection from MSP. Required if NPS is used. Can also be used to provide a second PSA for DN6632. No NPS support of 2 PSAs concurrently. New NPS bootload required. See Section XII.K.

4. GPCB Synchronous-only LIUs

DCF6013 Terminates 2 lines at up to 9,600 bits per second each. Each line can run at different speed. EIA RS232C interface. ASCII code. HDX or FDX. For Honeywell VIP, RCI, MMI link protocols and various others. Lines can run at different speeds.

DCF6014 Same as DCF6013 but includes ACU support for one line. ACU support requires NPS. ACU occupies space equal to a quarter board LIU, thus counts as an LIU in limit of 1-4 LIUs per GPCB.

DCF6015 Terminates 1 line at up to 9,600 bits per second. For BSC link protocol with use of CRC (Cyclic redundancy check). CRC hardware included in DCF6015. EIA RS232C interface. ASCII or EBCDIC code, transparent or non-transparent mode. HDX or FDX.

DCF6016 Terminates 1 line at up to 56,000 bits per second. HDX or FDX.

DCF6019 Terminates 1 line up to 9,600 bits per second. Honeywell logical HDLC link protocol. Software support via NPS NT2 and DP1(DPS), and GRTS-II, 1Q79. Any code. Bit-oriented protocol. EIA RS232C interface. HDX or FDX.

DCF6050 Terminates 1 line at up to 9,600 bits per second. Honeywell logical HDLC link protocol. Software support via NPS NT2 and DP1(DPS), and GRTS-II, 1Q79. Any code. Bit-oriented protocol. Military standard 188C interface.

DCF6053 Same as DCF6019, for Honeywell logical HDLC link protocol, but includes ACU support. ACU support requires NPS. HDLC software support by NPS NT2 and DP1 (DPS), and GRTS-II, 1Q79. ACU occupies space equal to a quarter board LIU, thus counts as an LIU in limit of 1-4 LIUs per GPCB.

DCF6054 Terminates 1 line at up to 56,000 bits per second, wideband line. Honeywell logical HDLC link protocol. Software support via NPS NT2 and DP1(DPS), and GRTS-II, 1Q79.

DCF6055 Terminates 1 line at up to 56,000 bits per second, wideband line. BSC link protocol.

CRC Cyclic Redundancy Check hardware included. ASCII or EDCDIC code, transparent or non-transparent mode. HDX or FDX.

DCF6058 Terminates 1 line at up to 56,000 bits per second. Honeywell logical HDLC link protocol. HDX or FDX. HDLC software support via NPS NT2 or

DP1(DPS), and GRTS-II, 1Q79. V.35 interface, CCITT standard, analogous to EIA interface in U.S.

DCF6060 Terminates 2 lines. One line at up to 56,000 bits per second, wideband line, V.35 interface. One synchronous line at up to 9,600 bits per second, EIA RS232C interface.

DCF6062 Same as DCF6015, for BSC link protocol, except ACU support is included. ACU support requires NPS. ACU occupies space equal to a quarter board LIU, thus counts as an LIU in limit of 1-4 LIUs per GPCB.

DCF6067 Terminates one line at up to 9,600 bits per second. Military standard 188C interface. HDX or FDX. Any code 5-8 bits.

5. GPCB Asynchronous-only LIUs

DCF6010 Terminates 2 lines at up to 9,600 bits per second. Each line can run at different speed. Any code 5-8 bits. EIA RS232C interface. HDX or FDX.

DCF6011 Terminates 2 lines at up to 9,600 bits per second. Each line can run at different speed. Any code 5-8 bits. HDX or FDX. 20 milliampere current loop interface. No modem used.

DCF6039 Same as DCF6010 except Military Standard 188C interface.

6. Options for In-plant Line Connections (that is, without use of public carrier company lines). See Terminals For All Levels Bulletins 10 (1/6/78) and 14 (3/17/78) for cabling considerations.

DCF6020 Direct Connect feature for connection to asynchronous LIU for one line (cable). Length determined by maximum cable length from the terminal subsystem. One per line. Cannot be used with current loop LIUs. No inherent speed limit.

DCF6021 Same as DCF6020 except for synchronous LIU. Maximum 9,600 bps.

DCF6927 Universal Modem Bypass feature for connection to one asynchronous or synchronous line (cable). A Level 6 feature usable into FNP LIUs. Minimum of two per line, one at FNP end, other at terminal end. Maximum cable distance between two successive bypasses is 2500 cable feet. Intermediate bypasses can be used as line signal repeaters or strengtheners. Check your Level 6 technical support people for maximum cable lengths and maximum number of bypasses usable at satisfactory line noise levels. Speed to 9,600 bits per second. Cannot be used with current loop LIUs. Can also be used with keyboard terminals.

Note: Current loop interface terminals cable-connect directly to a current loop-oriented LIU (DCF6011). Up to 1000 cable feet.

F. Configuration example for new DN FNP.

Prospect wants DN6624 for 10 asynchronous lines (5 at 300 bps, 5 at 1,200 bps) using ASCII code. Also wants 5 synchronous lines at 2,400 bps for VIP terminals, 3 synchronous lines at 2,400 bps for BSC terminals, 3 synchronous lines for HDLC FDX, TWS links to Level 6 systems at 4,800 bps. Prospect will use NPS. Wants ACU support for one BSC line and one HDLC line.

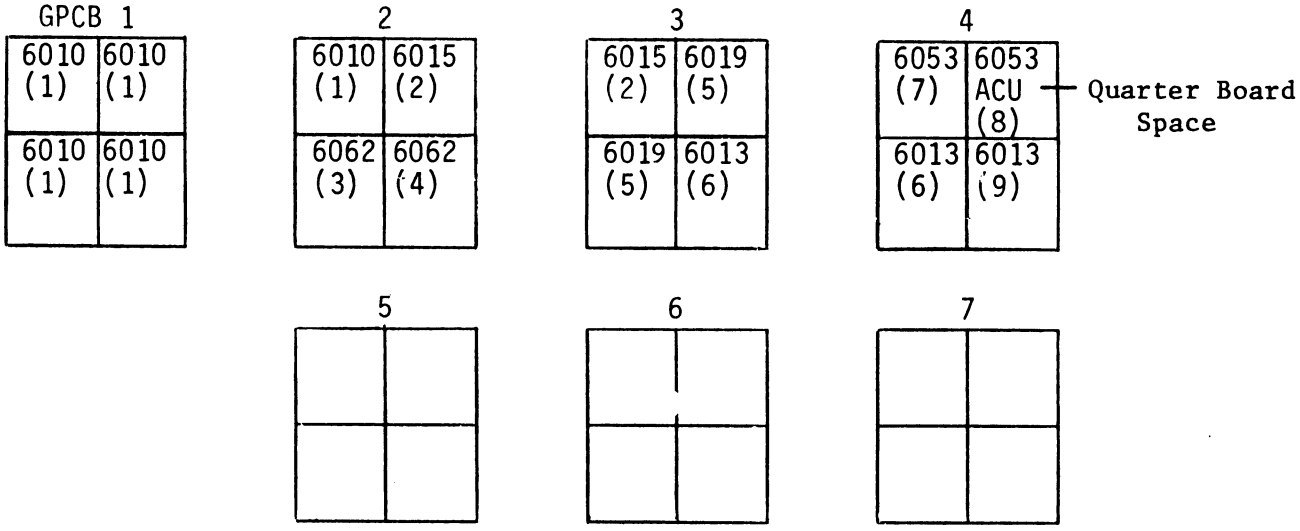
1 DCP6624	Base FNP, 24KW/48KB
1 DCM0001	Memory increase to 32KW/48KB, minimum for NPS use
5 DCF6010	LIUs for 10 asynchronous lines
2 DCF6015	LIUs for 1 BSC protocol line, no ACU support
1 DCF6062	LIU for 1 BSC protocol line, ACU support
2 DCF6019	LIUs for 2 HDLC protocol lines, no ACU support
1 DCF6053	LIU for 1 HDLC protocol line, ACU support
3 DCF6013	LIUs for 5 VIP synchronous lines

SECTION XIX
Configuring New DN6616/6624/6632 (DN6600-1)

1. GPCB/LIU (mother/daughter) board allotments assumed are shown below. CCT use also assumed, where it is applicable

2. Board space and throughput (load factor) calculations, based on distribution of quarter boards assumed as shown below. Maximum load factor per GPCB (CIB) is 99.

SECTION XIX
Configuring New DN6616/6624/6632 (DN6600-1)



Board	Load Factor Calculation	Total Load Factor
1	(1) 8 lines (up to 1200 bps) x2.0	16.0 ok
2	(1) 2 lines (up to 1200 bps) x2.0	4.0
	(2) 1 line (up to 2400 bps) x2.5	2.5
	(3) 1 line (up to 2400 bps) x2.5	2.5
	(4) No load factor for ACU	-
		9.0 ok
3	(2) 1 line (up to 2400 bps) x2.5	2.5
	(5) 2 lines (up to 2400 bps) x4.4 (FDX)	8.8
	(6) 2 lines (up to 2400 bps) x2.0	4.0
		15.3 ok
4	(7) 1 line (up to 4800 bps) x4.4 (FDX)	4.4
	(8) No load factor for ACU	-
	(6) 2 lines (up to 2400 bps) x2.0	4.0
	(9) 1 line (up to 2400bps) x2.0	2.0
	(Last DCF6013 carries only one line due to odd number of VIP lines)	10.4 ok

SECTION XX
Configuring Level 6-Based FNPs (Not DN66ØØ-1)
66/Ø5 INP, DN667Ø, DPS INP/ANP

A. Required Configuration Components

1. Base FNP

   a. INP = "Integrated FNP" -- no separate type number. Is included in price and standard components for base CPS system for 66/Ø5 - CPS6Ø58, and for all 66/DPS systems.

   b. DN667Ø - DCP6678

   c. ANP - Additional network processor for 66/DPS system. Type number - DCU6651.

2. Console -- required but not included under base type number or price except for 66/DPS systems.

   a. In case of DN667Ø there are two consoles available. One is for the GRTS environment. One is for the heavier duty environment of NPS.

   b. DPS INP/ANP console is the heavier duty device.

   c. During 1978-1979 time period it is the plan for new shipments to use the teleprinter from our dot matrix series of terminals as FNP consoles. This is a heavy duty printer.

3. One or more line interface units (LIUs)

   a. Every line (sometimes called a subchannel or channel) must terminate in an LIU from any common carrier or any in-plant connection.

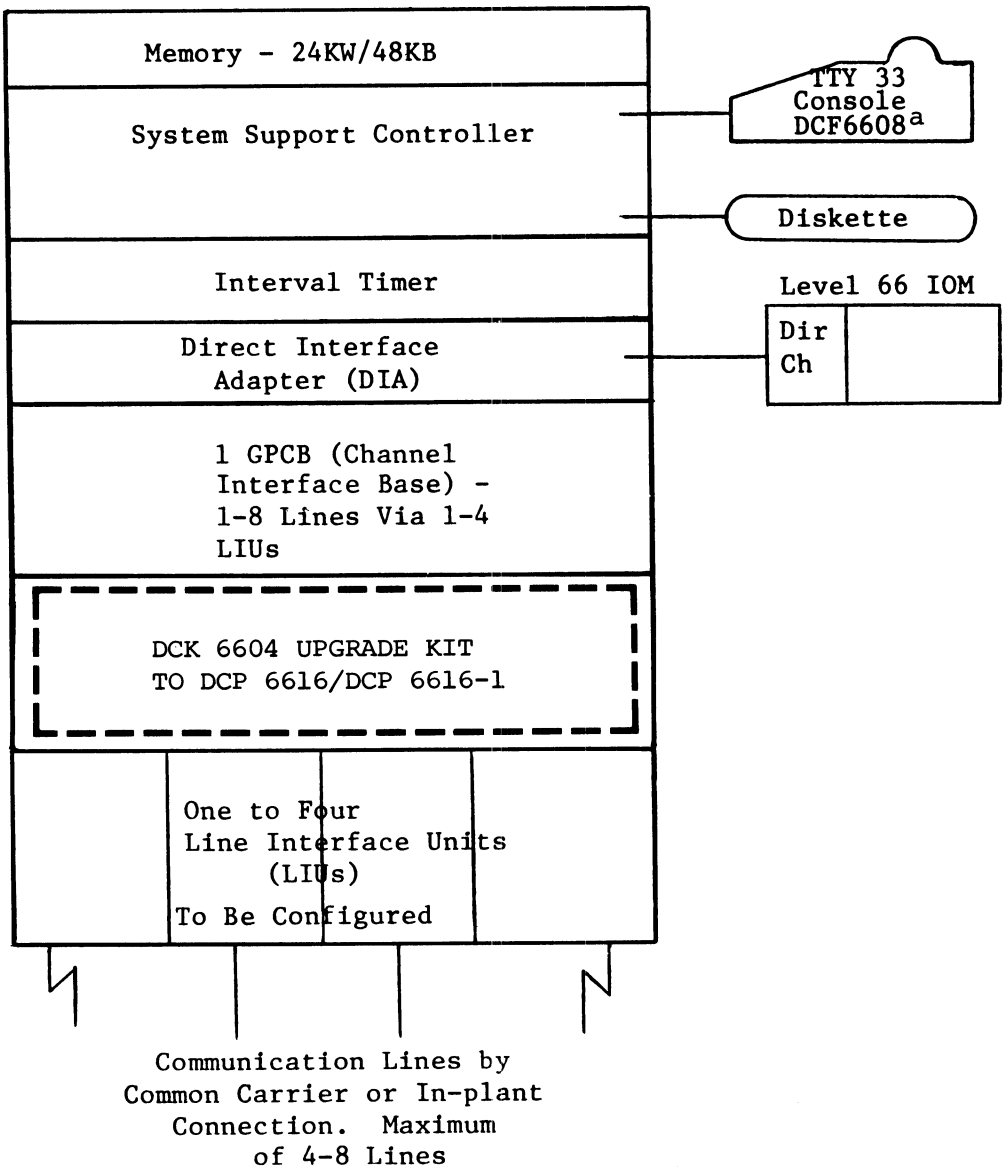
   b. Every LIU represents electronic logic on circuit boards for which space is provided in "slots" in a general purpose type of communication base (GPCB), also known in Level 6-based FNPs as a channel interface base (CIB).

4. Sufficient quantity of GPCBs of appropriate type to connect the quantity of LIUs needed to support the desired number of lines. INP for 66/05 CPS6058 and DN6670 include a standard component of GPCB(s). Additional GPCBs can be configured on DN6670, if needed. DPS INP/ANP models do not include any GPCBs in base price, but one or more GPCBs must be configured in order to provide for the LIUs needed to connect the lines to INP/ANP.

5. One or more in-plant connection features if lines are not furnished by common carrier companies. In-plant connection is by use of modem bypass or direct connect features. Each must connect to an appropriate LIU.

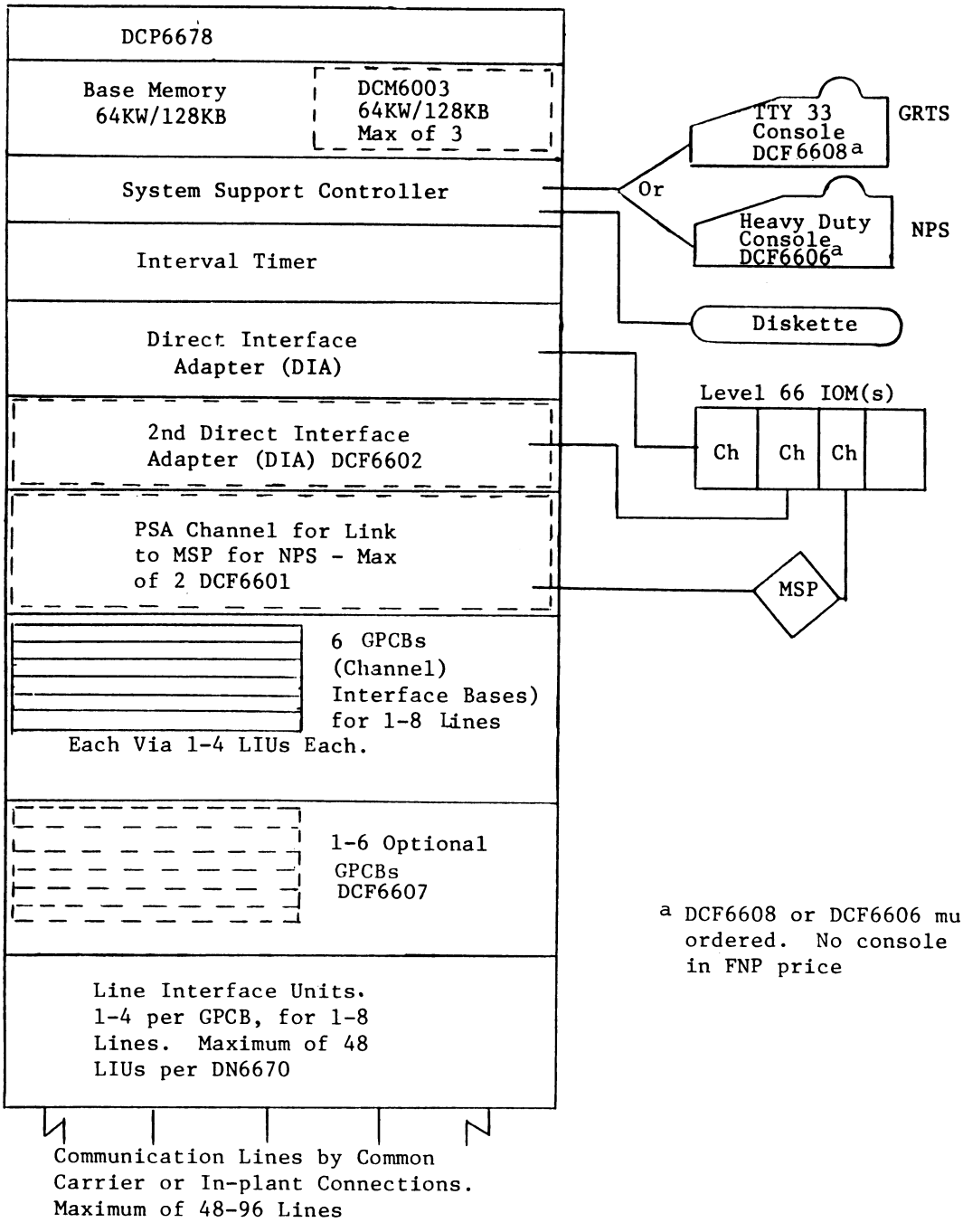
B. Block Diagrams of Level 6-based FNPs -- options are shown in dotted lines

1. "Integrated FNP" for CPS6058 version of 66/05



[a] DCF6608 console system must be ordered.
Not included in FNP price

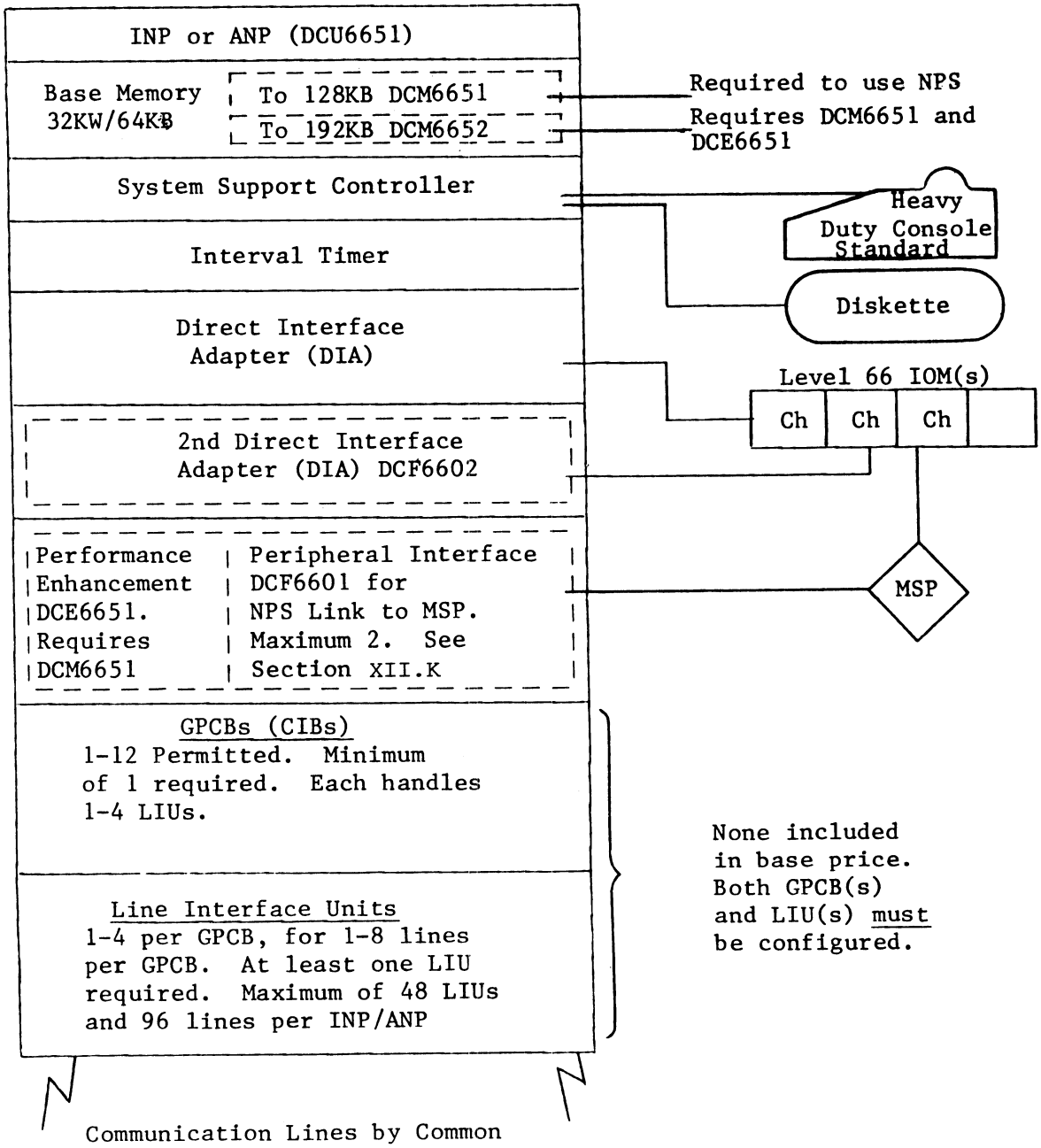
2. DN6670 block diagram



a DCF6608 or DCF6606 must be ordered. No console included in FNP price

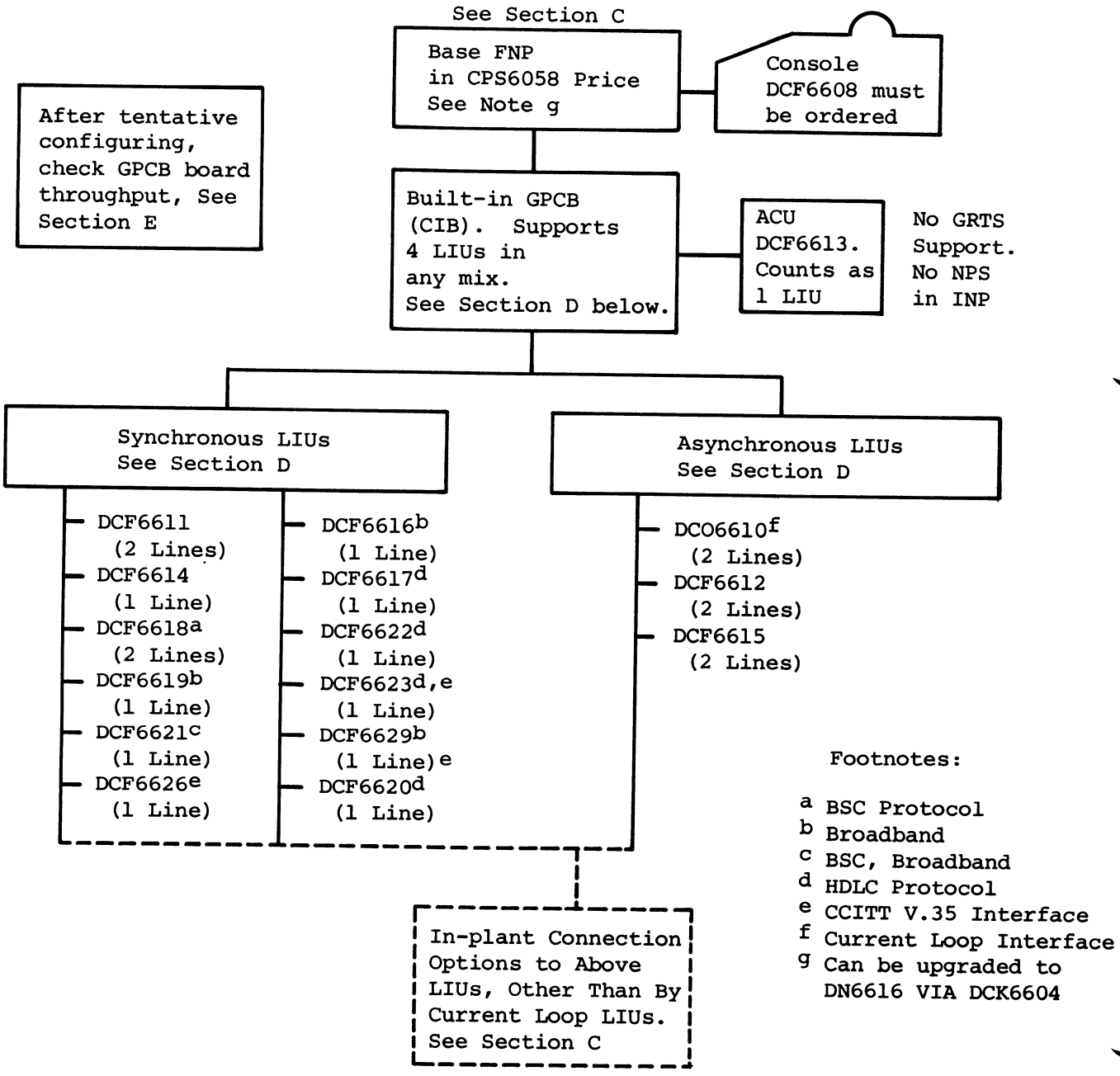
3. Block diagram for 66/DPS INP/ANP

GRTS-II or NPS/DP1 (or later release) required. GRTS-I not permitted



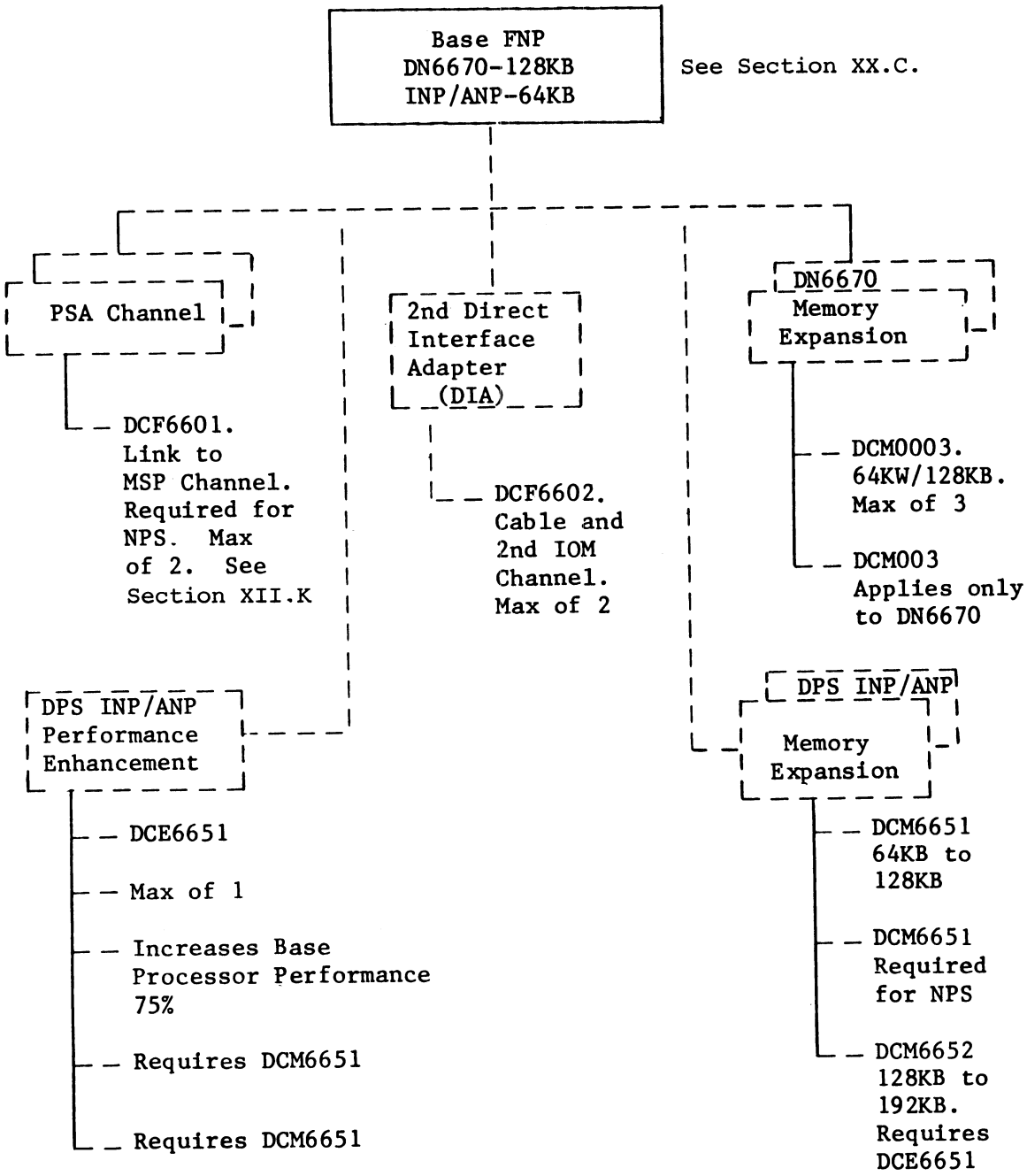
C. Configurator Flowcharts for Level 6-based FNPs

1. For "Integrated FNP" in CPS6058 version of 66/05

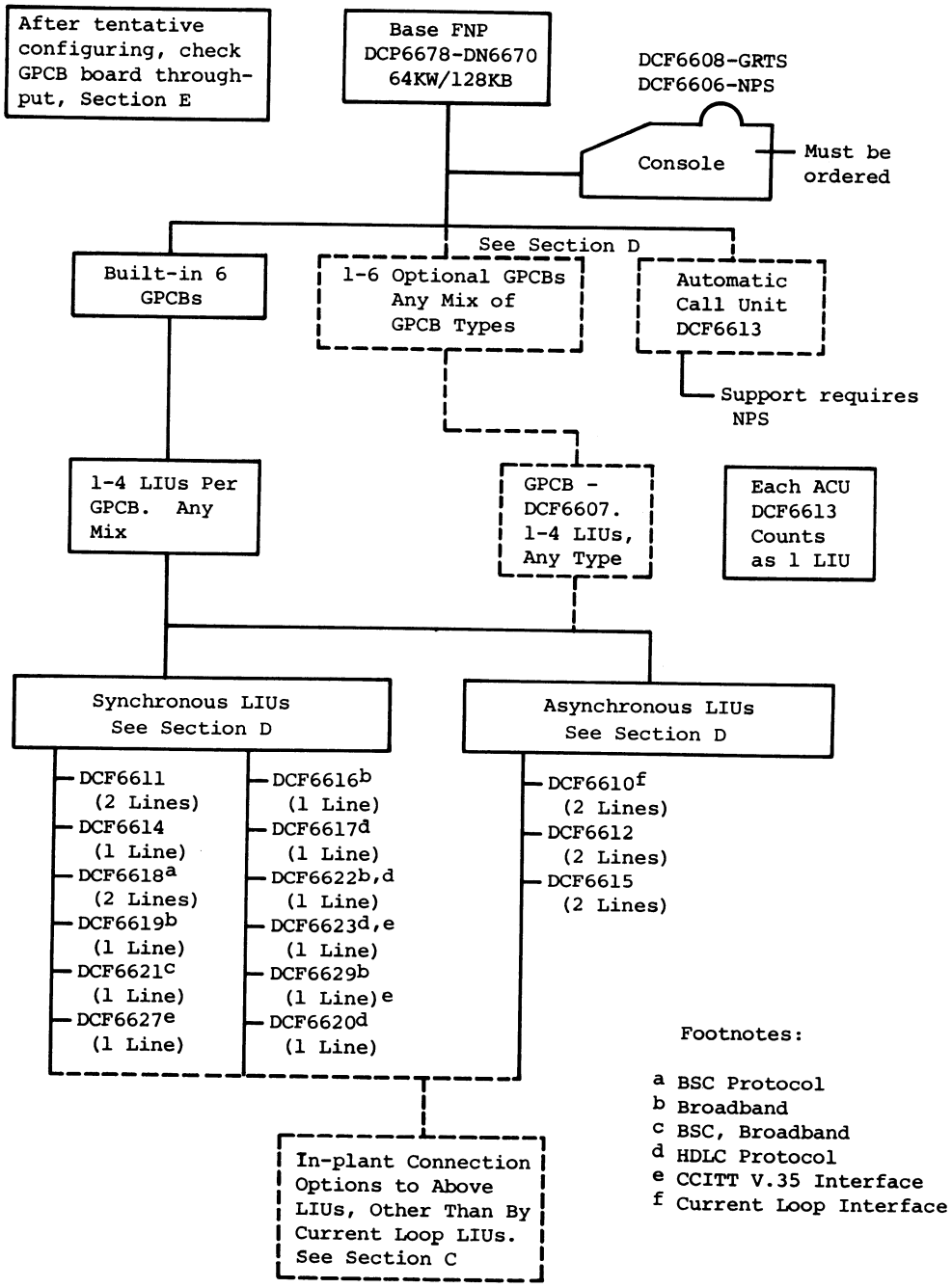


2. For DN6670 and 66/DPS INP/ANP

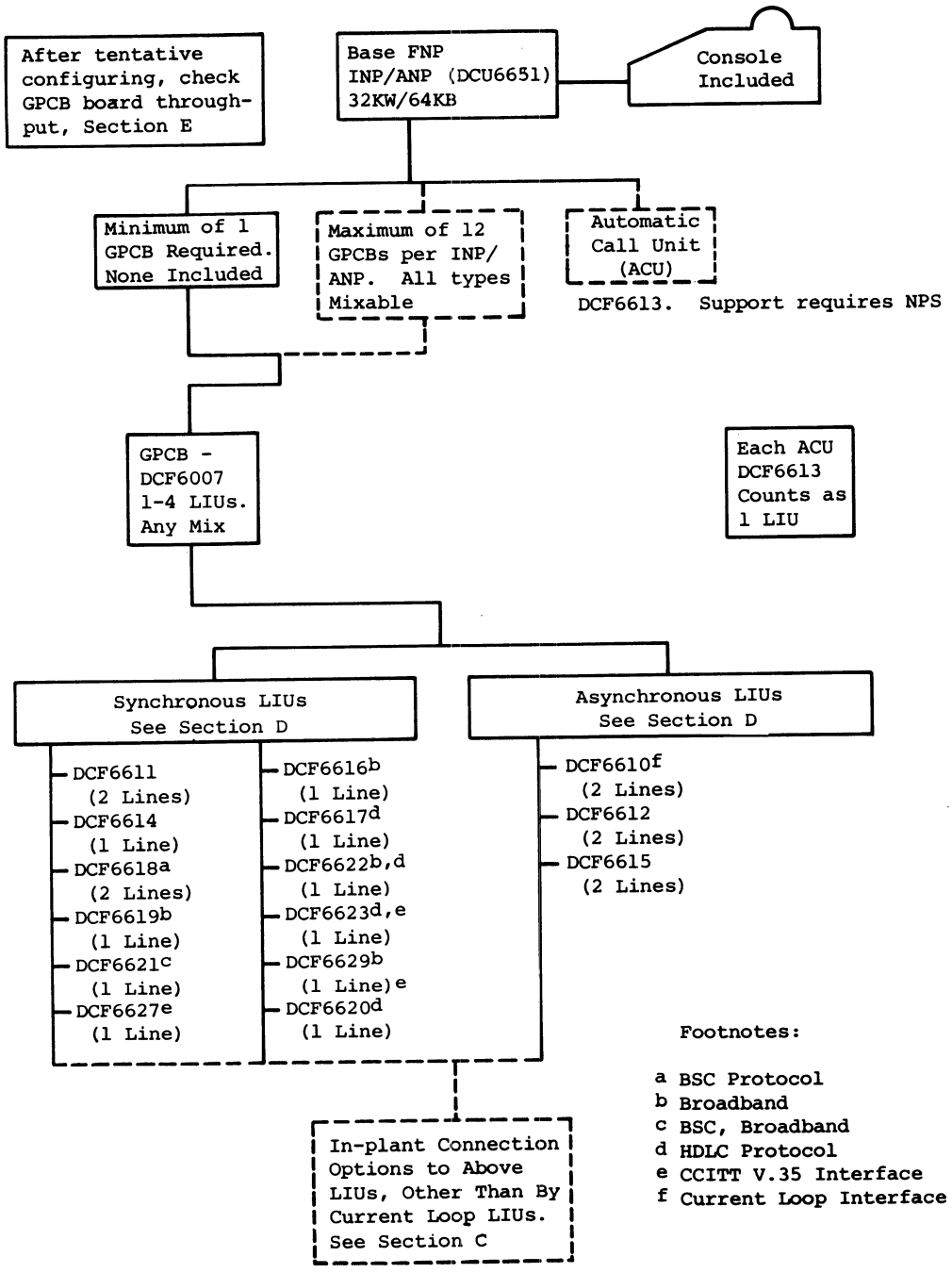
   a. For options other than interfacing communication lines. See also Section D below.



b. For standard and optional configuring of communication lines on DN6670. See Section D below



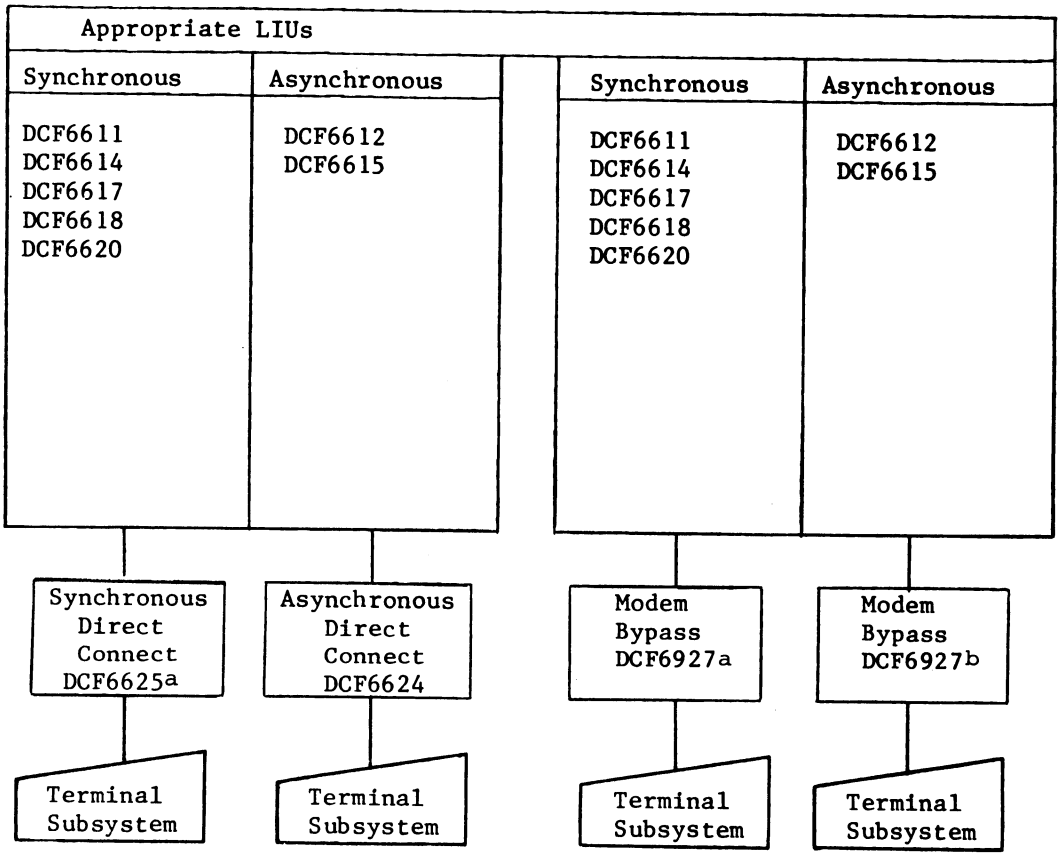
c. For standard and optional configuring of communication lines on 66/DPS INP/ANP.



3. In-plant connection features (other than current loop interface) for connecting terminals on in-plant cables.

   a. Use this chart for Direct Connect and Modem Bypass features options. It shows the applicable LIUs to which such in-plant connection features can be attached. Identify terminal to be used with each feature on your order.

   b. Terminals using 20 ma current loop interfaces cable-connect to current loop-oriented LIUs.



No support of ACU by in-plant connection features

[a] Maximum speed 9,600 bps

[b] Maximum speed 1,800 bps

D. List of all Level 6-based FNP-related type numbers and their functions - for 66/05 INP, DN6670 and 66/DPS INP/ANP except as shown.

1. Base FNP

Type Number	Description
66/05 INP	No type number. Included with 66/05 CPS6058 version. A freestanding FNP with 24KW/48KB memory, diskette for Field Engineering use, interval timer, DIA link to Level 66 IOM channel and the IOM channel, one abbreviated GPCB (channel interface base) equipped to handle 1-4 LIUs for maximum of 8 lines. No LIUs included. ACU feature DCF6613 counts as one LIU. NPS cannot be used. (See DCK6604 upgrade kit below.)
DCP6678	DN6670 with 64KW/128KB memory, diskette for Field Engineering use, interval timer, DIA link to Level 66 IOM channel and the IOM channel, 6 GPCBs equipped to handle 1-4 LIUs each of any type except HDLC. Can be equipped with up to 6 more GPCBs - DCF6605 or DCF6609 or DCF6607 or combination. No LIUs included. ACU feature DCF6613 counts as one LIU. 32KW/64KB is marginal for NPS 2/H or NT1. NPS NT2, NT3, DPl(DPS) require 64KW/128KB minimum memory size. Maximum useful memory size for NPS NT2, NT3, DPl(DPS) is 128KW/256KB.
66/DPS INP	No type number. Included with 66/DPS base system CPS6650. A freestanding FNP with 32KW/64KB memory, diskette for Field Engineering use, interval timer, DIA link to Level 66 IOM channel and the IOM channel. No GPCB (channel interface base) is included but at least one must be configured. Maximum of 12 GPCBs can be configured - DCF6605 or DCF6609 or DCF6607 or combination. No LIU is included but at least one must be configured. ACU feature DCF6613 counts as one LIU. 32KW/64KB is marginal for NPS 2/H or NT1. NPS NT2, NT3, DPl(DPS) require 64KW/128KB minimum memory size. Maximum useful memory size for NPS NT2, NT3, DPl(DPS) is 128KW/256KB.

2. Model 66/05 (CPS6058) INP Upgrade

DCK6604 Upgrade kit to remove the eight line connection limitation from the CPS6058 (INP) and upgrade it to DCP6616/DCP6616-1 functionality. All upgrade kits and available options for DCP6616/DCP6616-1 can be connected to grow functionality up through DCP6632/DCP6632-1. (See Section XIX, Configuring New DN6616/6624/6632 for available options.)

3. Adding More FNPs

DCU6651 Additional Network Processor (ANP) for use with 66/DPS system. Supplements INP included in 66/DPS base price. Maximum of 3 DCU6651, for maximum of 4 network processors per DPS system. Description otherwise is identical to 66/DPS INP above.

4. Performance Enhancement for 66/DPS INP/ANP

DCE6651 Performance enhancement for any 66/DPS INP or ANP. Increases INP/ANP processor performance by 75%. Requires DCM 6651 Memory Increment below. Can be added to one network processor or all.

5. Memory Expansion

DCM0003 64KW/128KB increment for DCP6678 (DN6670). Can be ordered initially or installed on-site as upgrade. Maximum of 3.

DCM6651 Memory Increment for 66/DPS INP/ANP. Raises base memory from 32KW/64KB to 64KW/128KB. Maximum of one. Order initially or as upgrade. Required for NPS.

DCM6652 Memory Increment for 66/DPS INP/ANP. Raises memory from 64KW/128KB to 96KW/192KB. Requires DCM6651 and DCE6651. Maximum of one. Order initially or as upgrade.

6. General Purpose Communicaions Bases (GPCB), also known as communications channel interface bases.

DCF6605 Handles 1-4 LIUs of any type except those servicing BSC (binary synchronous communications) protocol. BSC LIUs are handled by DCF6609 and DCF6607 below. ACU DCF6613 counts as one LIU.

DCF6607 Handles 1-4 LIUs of any type. Preferred to use of DCF6605 and DCF6609 though slightly more expensive. ACU DCF6613 counts as one LIU.

DCF6609 Handles 1-4 LIUs of any type except those servicing HDLC (high level data link control) protocol. HDLC LIUs are handled by DCF6605 and DCF6607 above. ACU DCF6613 counts as one LIU.

7. Asynchronous Line Interface Units (LIUs)

DCF6610 Terminates 2 asychronous lines at up to 9,600 bps each. Current loop interface, 20 milliamps, for in-plant connections. HDX or FDX. Any code 5-8 bits. No modem used. Level 66 FNP software not quality assured for asynchronous speeds above 2,400 bps. See Terminals For All Levels Bulletins 10 (1/6/78) and 14 (3/17/78) for current loop cabling information.

DCF6612 Terminates 2 asynchronous lines at up to 9,600 bps each. Each line can run at different speed. EIA RS232C interface. HDX or FDX. Any code 5-8 bits. 1 or 2 stop bits per character for 6, 7, 8-bit codes; 1 or 1.5 stop bits per character for 5-bit codes. For Dataphone 103, 113, 202 or equivalent modem or modem bypass or direct connect. Level 66 FNP software not quality assured for asynchronous speeds above 2,400 bps.

DCF6615 Same as DCF6612 above except that interface is Military Standard 188C

8. Synchronous Line Interface Units (LIUs)

DCF6611 Terminates 2 synchronous lines at up to 9,600 bps each. Each line can run at different speed. EIA RS232C interface. ASCII code. HDX or FDX. For Dataphone 201, 203, 208 or equivalent modem or modem bypass or direct connect.

DCF6614 Terminates 1 synchronous line at up to 9,600 bps. Military Standard 188C interface. HDX or FDX. ASCII code.

DCF6616 Same as DCF6619 below except that interface is Military Standard 188C.

DCF6617 Same as DCF6620 below except that interface is Military Standard 188C.

DCF6618 Terminates 2 synchronous lines at up to 9,600 bps each, running under BSC protocol. ASCII or EBCDIC code, transparent or non-transparent mode. Each line can run at different speed. EIA RS232C interface. HDX or FDX.

DCF6619 Terminates one line in broadband (wideband) synchronous range, up to 56,000 bps. Telpak interface. Any code 5-8 bits. HDX or FDX. Type 301 or 303 modems or equivalent.

DCF6620 Terminates one line at up to 9,600 second. For Honeywell HDLC link protocol. Software support via NPS NT2 or DP1(DPS), or GRTS-II,1Q79. Any code. Bit-oriented protocol. EIA RS232C interface. HDX or FDX.

DCF6621 Terminates 2 lines running under BSC protocol at up to 56,000 bps. ASCII or EBCDIC code, transparent or non-transparent mode. Any code 5-8 bits.

DCF6622 Terminates one line in broadband (wideband) range at up to 56,000 bps. Honeywell HDLC link protocol. Software support via NPS NT2 or DP1(DPS), or GRTS-II, 1Q79. Any code. Bit-oriented protocol. HDX or FDX.

DCF6623 Terminates one line at up to 56,000 bps. Honeywell HDLC link protocol. Software support via NPS NT2 or DP1(DPS), or GRTS-II,1Q79. For CCITT V.35 interface, similar to EIARS232C, any code 5-8 bits. HDX or FDX.

DCF6627 Terminates one line in broadband (wideband) range at up to 56,000 bits per second. For CCITT V.35 interface, similar to EIARS232C interface, any code 5-8 bits. HDX or FDX.

9. Automatic Call Unit (ACU)

DCF6613 Provides ability to perform automatic call-out on 2 lines. DCF6613 does not include any line termination capability itself, but it counts as one LIU in the LIU complement allowed on any GPCB. Thus when used this feature cuts the line connectivity maximum of a GPCB by two lines. The call-out capability of DCF6613 applies to lines terminated by some LIU external to DCF6613. Requires NPS.

10. Delta link Mass Storage (MSP) required to use NPS

DCF6601 Peripheral interface adapter for receiving delta link channel/cable from MSP. Maximum of two (see Section XII.K) Cannot use with 66/05. CPS6058 INP

11. Additional Channel/Cable From FNP to Level 66 IOM Channel

DCF6602 Direct interface adapter (DIA). Includes channel in IOM. Maximum of one. Cannot be used in 66/05 CPS6058 INP. Base FNP always includes one DIA in its price. Second DIA cannot run simultaneously with first. A new GCOS warm start is needed to define the second IOM channel as the new path to reach the FNP.

12. In-plant Connection Options to Connect to LIUs above (See Terminals For All Levels Bulletins 10 (1/6/78) and 14 (3/17/78) for cabling considerations)

DCF6624 — Direct connect feature for connection to asynchronous LIU for one line (cable). Length of cable determined by maximum cable length of terminal subsystem. One per line (cable). No inherent speed limit.

DCF6625 — Same as DCF6624 except for synchronous LIU. Maximum speed 9,600 bps.

DCF6927 — Universal Modem Bypass feature for connection to one synchronous or asynchronous line (cable). A Level 6 feature usable into FNP LIUs. Minimum of two per line, one at FNP end, other at terminal end. Maximum cable length between 2 successive bypass units is 2500 feet. Intermediate bypass units can be used as line signal repeaters or strengtheners. Check your Level 6 technical support people for maximum cable lengths and maximum number of bypass units in a line at satisfactory line noise levels. Speed to 9,600 bps. Cannot be used with current loop LIUs.

Note: Current loop-oriented terminals cable-connect directly to a current loop-oriented LIU. Up to 1000 cable feet.

13. Console Subsystems for Level 6-based FNPs

a. For 66/05 CPS6058 INP and DN6670 (DCP6678) no console is included in FNP price but a console must be ordered for each such FNP:

1) DCF6606 - heavy duty console required for use with NPS. Applies to DN6670 since "Integrated FNP" with CPS6058 66/05 does not support NPS.

2) DCF66Ø8 - light duty TTY33 console for use with GRTS on DN667Ø or 66/Ø5 CPS6Ø58 "Integrated FNP".

b. For 66/DPS INP/ANP a heavy duty console of the DCF66Ø6 type is included with each and need not be ordered.

c. In 1978-1979 it is the plan on new installations to use our dot matrix type teleprinter/keyboard terminals as FNP consoles. Will not be terminal as such and will not use an LIU.

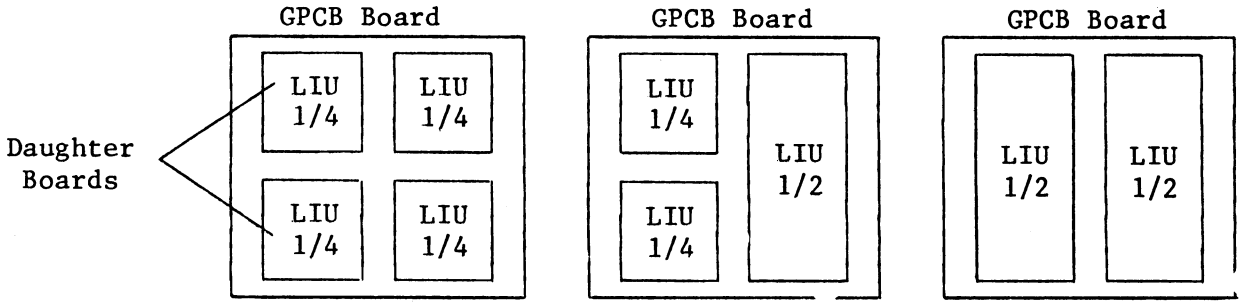
E. GPCB (or Channel Interface Board in official terminology) throughput calculations (load factors) and LIU board packaging tables

1. Configurability of LIUs is affected by two facts:

a. The fact that each GPCB is a mother board (IC board) in Level 6 type circuit packaging. Each mother board supplies common power and common logic to 1-4 daughter boards packaged on top of the mother board. Daughter boards represent specific tailored functions, serviced as a group of 1-4 by a mother board (GPCB in FNP case).

1) In Level 6-based FNPs the LIUs are daughter boards, either quarter boards or half boards, depending on the specific functionality each LIU supplies.

2) Capacity of each GPCB (mother board) is either four quarter-board daughters, two half-board daughters, or two quarter-board daughters and one half-board daughter as illustrated below:



b. The fact that each GPCB (mother board) has a throughput limit (more accurately called load limit) for the bit stream(s) from lines serviced by its cluster of LIU daughter boards. Throughput of a GPCB is expressed as the sum of load factors related to its LIU daughter boards.

Maximum permissible throughput (load) factor for any GPCB (mother board) is 99. Any combination of LIU daughter boards can be used on a GPCB mother board if the LIU daughter boards fit, and if their cumulative throughput factors do not exceed 99.

2. To determine both the fit and throughput factors use the table below.

   a. Note that there is a column for cases where the software will use the Character Control Table (CCT) feature. The table is tied to hardware. Its use exerts some overhead which increases the timing load placed on the affected GPCB mother board. If you don't know in your preliminary configuring whether CCT will be used, assume it will to give your worst case protection. It is used in supporting certain link protocols, such as BSC, and for other uses.

   b. Note that especially where broadband (wideband) speeds are used (second part of table below) the actual number of GPCBs required can be affected by both the half-board LIUs involved and/or the high value of their throughput factors.

   c. Remember that several of the LIUs interface two lines each. Each line exerts its own throughput factor which must be taken into account.

   d. Maximum load factor for each GPCB is 99.

   e. Figures in parentheses indicate number of lines terminated by the LIU.

SECTION XX
Configuring Level 6-Based FNPs (Not DN6600-1)
66/05 INP, DN6670, DPS INP/ANP

DPS INP/ANP, 66/05 INP, DN6670
LOAD FACTOR TABLE 1
SYNCHRONOUS AND ASYNCHRONOUS

THROUGHPUT LOAD FACTORS PER LINE

LIU	LIU DESCRIPTION	TO 2400 BPS		TO 4800 BPS		9600 BPS		LIU BOARD SIZE
		NO CCT	CCT[b]	NO CCT	CCT[b]	NO CCT	CCT[b]	
DCF6612	Dual Asynch, EIA RS232C (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6610	Dual Asynch, Current Interface (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6614	MIL 188C, Synchronous (1)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6611	Dual Synch, EIA RS232C (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4
DCF6618	Bisynchronous Channels (2)	2.5	2.5	5.1	5.1	10.1	10.1	1/4
DCF6620	HDLC to 9600 BPS (1)	2.2(FDX)[a]	2.2(FDX)	4.4(FDX)[a]	4.4(FDX)	8.8(FDX)[a]	8.8(FDX)[a]	1/4
DCF6617	MIL 188C, HDLC, to 9600 bps (1)	2.2(FDX)[a]	2.2(FDX)	4.4(FDX)[a]	4.4(FDX)	8.8(FDX)[a]	8.8(FDX)[a]	1/4
DCF6613	ACU for 2 lines. Not an LIU itself	-	-	-	-	-	-	1/4
DCF6615	Dual Asynch MIL STD (2)	1.1	2.0	2.3	4.1	4.5	8.2	1/4

TOTAL LOAD FACTOR PER GPCB ---- 99 OR LESS

Notes:

Factors are for half-duplex or FDX transmission TWA (Two-Way Alternate) per line unless otherwise stated.

a FDX indicated in Table means TWS (Two Way Simultaneous) use of the FDX line. If TWS is not needed. divide the factor shown in half.

b The Character Control Table is a software table used by both NPS and GRTS to distinguish control of, e.g., function key characters. This enables the user of the terminal to specify that certain keys are to perform particular system functions. Example: a control -J might be set to mean "back space the cursor to the beginning of line".

SECTION XX
Configuring Level 6-Based FNPs (Not DN6600-1)
66/05 INP, DN6670, DPS INP/ANP

66/05 INP, DN6670,
DPS INP/ANP LOAD FACTOR TABLE 2
WIDEBAND

THROUGHPUT LOAD FACTORS PER LINE

LIU	LIU DESCRIPTION	TO 19.2K BPS		TO 40K BPS		TO 56K BPS		LIU BOARD SIZE
		NO CCT	CCT[b]	NO CCT	CCT[b]	NO CCT	CCT[b]	
DCF6619	Wideband Channel, 19.2 - 56.0 K bps (1)	11.9	18.7	25	39.3	35.0	55.0	1/4
DCF6616	MIL-188 Wideband Channel (1)	11.9	18.7	25	39.3	35.0	55.0	1/4
DCF6622	HDLC Wideband Channel (1)	13.6(FDX)[a]	13.6(FDX)[a]	28.6(FDX)[a]	28.6(FDX)[a]	40.0(FDX)[a]	40.0(FDX)[a]	1/2
DCF6621	Bisynch Wideband Channel (1)	23.8	23.8	50.0	50.0	70.0	70.0	1/4
DCF6623	HDLC, V.35 (1)	13.6(FDX)[a]	13.6(FDX)[a]	28.6(FDX)[a]	28.6(FDX)[a]	40.0(FDX)[a]	40.0(FDX)[a]	1/2
DCF6627	V.35 (1)	11.9	18.7	25	39.3	35.0	55.0	1/4
DCF6613	ACU for 2 Lines. Not an LIU	-	-	-	-	-	-	1/4
	TOTAL LOAD FACTOR PER GPCB --- 99 OR LESS							

NOTES:

Factors are for half-duplex or FDX transmission TWA (Two Way Alternate) per line unless otherwise stated.

a FDX indicated in Table means TWS (Two Way Simultaneous) use of the FDX line. If TWS is not needed, divide the factor shown in half.

b The Character Control Table is a software table used by both NPS and GRTS to distinguish control of, e.g., function key characters. This enables the user of the terminal to specify that certain keys are to perform particular system functions. Example: a control -J might be set to mean "back space the cursor to the beginning of line".

F. Configuration Examples for Level 6-based FNPs (not DN6600-1)

1. "Integrated FNP" with 66/05 (CPS6058)

Prospect wants to use 6 lines. Two lines will serve our TWU1005 ASCII keyboard terminals running asynchronously at 1,200 bits per second. Two lines will serve VIP7760 ASCII terminals running synchronously at 2,400 bits per second. Two lines will serve BSC-oriented remote batch terminals at up to 2,400 bits per second. The TWU1005 terminals will be in-plant, about 2,000 feet from the FNP. No common carrier lines will be used for them.

Qty	Type NO.	Description
1	DCF6608	Console device required
1	DCF6612	Asynchronous LIU for TWU1005 terminals
4	DCF6927	Modem bypass units for two TWU1005 lines. Cable length assumed not greater than 2500 feet
1	DCF6611	Synchronous LIU for VIP7760 terminals
1	DCF6618	BSC LIU for remote batch terminals

2. DN6670 Configuration Sample

Prospect for 66/20 will use GRTS and wants 20 lines as follows:

5 lines for VIP7200 terminals, asynchronous, to 2,000 bits per second, ASCII code
5 lines for TWU1003, asynchronous, to 300 bits per second, ASCII code
2 lines for Level 6 HASP Multileaving Facility terminals, BSC protocol, to 4,800 bits per second, EBCDIC code
2 lines for BSC terminals, synchronous, to 2,000 bits per second, EBCDIC code
4 lines for VIP terminals, synchronous, to 2,000 bits per second, ASCII code
2 lines for HDLC-oriented Level 6 RBF (remote batch facility) terminals, synchronous, to 2,400 bits per second.

SECTION XX
Configuring Level 6-Based FNPs (Not DN6600-1)
66/05 INP, DN6670, DPS INP/ANP

Qty	Type NO.	Description
1	DCP6670	Base FNP
1	DCF6608	Console for GRTS-type load
5	DCF6612	LIUs for 10 asynchronous lines
3	DCF6611	LIUs for 2 RBF lines and 4 VIP terminals, all synchronous
1	DCF6618	LIU for 2 lines for BSC HASP workstation terminals
1	DCF6607	GPCB to handle HDLC lines. Built-in GPCBs do not handle HDLC
1	DCF6620	LIUs for 2 HDLC-oriented RBF terminals

3. 66/DPS INP Configuration Example

Prospect will use NPS and wants 50 lines as follows:

10	lines for VIP7200 terminals, asynchronous, to 2,000 bits per second, ASCII code
5	lines for TWU1003 terminals, asynchronous, to 300 bits per second, ASCII code
3	lines for Level 6 RBF (remote batch facility) terminals, synchronous, to 4,800 bits per second, ASCII code, HDLC protocol
10	lines for BSC CRT terminals, synchronous, to 2,00 bits per second, EBCDIC code
22	lines for VIP terminals, synchronous, to 2,000 per second, ASCII code

Qty.	Type No.	Description
1	DCF6601	Peripheral interface adapter for delta link to MSP for NPS use
7	DCF6007	GPCBs (channel interface bases) for LIUs.
11	DCF6611	LIUs for 22 VIP synchronous lines
8	DCF6612	LIUs for 15 asynchronous lines
5	DCF6618	LIUs for 10 lines, BSC protocol
3	DCF6620	LIUs for 3 RBF lines, HDLC protocol

SECTION XX
Configuring Level 6-Based FNPs (Not DN6600-1)
66/05 INP, DN6670, DPS INP/ANP

To determine if 7 GPCBs (DCF6007) will be sufficient based on throughput factor calculations described in Section E above, assume distribution is as follows and that CCT table will be used. Remember that maximum throughput factor (load factor) is 99 per GPCB (CIB)

GPCB	LIUs	Load Factor	Total GPCB Factor
1	4-DCF6611	8x2.0	16.0=ok
2	4-DCF6611	8x2.0	16.0=ok
3	3-DCF6611	6x2.0=12.0	
	1-DCF6612	2x2.0=4.0	16.0=ok
4	4-DCF6612	8x2.0	16.0=ok
5	3-DCF6612	5x2.0=10.0	
	1-DCF6618	2x2.5=5.0	15.0=ok
6	4-DCF6618	8x2.5	20.0=ok
7	3-DCF6620	3x4.4 (FDX)	13.2=ok

SECTION XXI
Summary of DPS/Non-DPS Software Aspects
Preliminary, Subject to Change and Correction

A. Based in part on OTL66 Bulletin 185, 3/3/78

B. 66/DPS models reflect Honeywell's continuing moves toward hardware and software oriented and optimized toward the ASCII mode operation.

C. 66/DPS models are basically ASCII mode machines. ASCII-mode software is that for which ASCII is the native character set, which uses UFAS ASCII file types, and where the files/records are byte-oriented. In general, the ASCII-oriented software is that associated with COBOL-74, I-D-S/II, DM-IV, new FORTRAN/I-D-S/II (Aberdeen).

Non-DPS systems execute both ASCII mode and BCD mode programs and system software.

D. If a software item does not fall into the ASCII-oriented category, it is considered as operating in BCD mode. For some such software the BCD hardware option is not required, as in the case of the operating system itself (GCOS III); in other cases the BCD option is required. In general, BCD-oriented software is that associated with GMAP, COBOL-68, I-D-S/I, JOVIAL, FORTRAN-Y (original FORTRAN), ALGOL.

1. Examples of BCD-oriented software which is bundled and does not require BCD option --- GCOS (SR 4/J S), time-sharing, BASIC compiler, GMAP assembler, Sort/Merge, TPE-I (BCD version). With regard to time-sharing, a general rule is that if software executes in the time-sharing swap area it will not require BCD option, though it may still be an unbundled software item. The original FORTRAN (FORTRAN-Y) compiler, which can run in time-sharing swap area or in batch area of memory, requires use of the BCD option.

2. At present most applications software is BCD-oriented and requires the BCD option in DPS systems. The showing of applications software in the table below with regard to DPS systems is for general guidance only. For definitive information on requirements of applications software for BCD option, and for plans regarding our conversion of such packages to ASCII mode, please consult the Industry Marketing Market Manager for the industry concerned.

E. Table Showing DPS and Non-DPS Systems and Relationship to ASCII/BCD Mode Software

Type No.	Title	ASCII, BCD Mode	DPS, Non-DPS	Priced	DPS-BCD Option Needed
SES6100	GCOS SR4/J: HCM,Allocators, System Scheduler, System I/O, Test and Diagnostic Routines(TOLTS, HEALS, Offline), GFRC, FMS, SMS,GMAP,BMC, Sort/Merge,GFRC File Utilities, System Editors, Loaders/Linkers, UFAS	Varies	Both	No	No
SEP6101	(1)Time-sharing (TSE)			No(Now)	
SEL6103	(1)BASIC Compiler			No(Now)	

(1) Present versions not priced but future enhanced versions will be

OTHER SYSTEM SOFTWARE

SEU6101	File Generations (ADF2)	ASCII	Both	Yes	No
SEJ6001	TPE-II(TPS,COBOL-68 TPAPs)(TPE-II not released yet)	BCD	Both	Yes	Yes
Coming	TPE-II(TPS,COBOL-74 TPAPs)(TPE-II not released yet)	ASCII	Both	Yes	No
SES6102	TPE-I(TPS,COBOL-68 TPAPs)	BCD	Both	No	Yes
SFP6001	TDS	BCD	Both	Yes	Yes
SEP6001	TDS/T-S Load Generator	BCD	Both	Yes	Yes
SEU6001	HONEYEDIT	ASCII	Both	Yes	No
AES0019	T-S Library	ASCII	Both	Yes	No
SEL6018	TEX	ASCII	Both	Yes	No
SEL6019	TEX Library	ASCII	Both	Yes	No
AES0010	Concordance	ASCII	Both	Yes	No
----	T-S Text Editor	ASCII	Both	No	No
SEU6003	Peripheral	Both	Both	Yes	No

SECTION XXI
Summary of DPS/Non-DPS Software Aspects
Preliminary, Subject to Change and Correction

	Resource Monitor				
SEU6004	Tape Testing System	Both	Both	Yes	No
SEU6005	Mass Storage Utility	Both	Both	Yes	No
System Languages					
----	COBOL-68 Compiler	BCD	Both	No	Yes
----	FORTRAN(Y-old)	BCD	Both	No	Yes
----	ALGOL Compiler	BCD	Both	No	Yes
----	JOVIAL Compiler	BCD	Both	No	Yes
SEL6001	COBOL-74 Compiler	ASCII	Both	Yes	No
SEL6102	FORTRAN/I-D-S/II DML	ASCII	Both	Yes	No
SFL6002	PL/1 Compiler	Both	Both	Yes	No
SEL6106	RPG II (Unannounced)	Both	Both	Yes	No
SEL6012	LISP/66	ASCII	Both	Yes	No
SEL6013	PASCAL	ASCII	Both	Yes	No
SEL6014	Compiler B	ASCII	Both	Yes	No
AEL6008	APL/66	ASCII	Both	Yes	No
AEL6011	APL/66 Level II	ASCII	Both	Yes	No
Data Management					
SED6005	DM-IV Basic (Data Manager I-D-S/II)	ASCII	Both	Yes	No
SED6006	DM-IV TP	ASCII	Both	Yes	No
SED6007	DM-IV QRP	ASCII	Both	Yes	No
SED6008	DM-IV PLP	ASCII	Both	Yes	No
SED6009	DM-IV Full Pkg	ASCII	Both	Yes	No
SED6010	DM-IV Coexistence-TDS,I-D-S/I, I-D-S/II COBOL-74	BCD	Both	Yes	Yes
SEL6009	Subschema Translator	ASCII	Both	Yes	No
SEV6101	I-D-S/II FORTRAN Subschema Translator (Use with FORTRAN/ I-D-S/II DML)	ASCII	Both	Yes	No
SFP6002	MDQS-II	BCD	Both	Yes	Yes
SFP6004	MDQS-IV	BCD	Both	Yes	Yes
----	I-D-S/I	BCD	Both	No	Yes
----	I-D-S DQS	BCD	Both	No	Yes

----	dataBASIC	BCD	Both	No	Yes
SED6001	66/TOTAL Central	BCD	Both	Yes	Yes

Conversion Aids

----	CAPS-68/74 SPLICE,BAL-to-COBOL,RPG-to-COBOL,EASYGO, ESTIMATE,CPS, All Others	BCD	Both	No	No(1)

(1) No, if used in object form, yes if source used

Application PAckages

Manufacturing -

AMF0034	IMS(I-D-S/I)	BCD	Both	Yes	Yes
AEM0003	PSC(I-D-S/I)	BCD	Both	Yes	Yes
AMF0061	IMS(I-D-S/II)	ASCII	Both	Yes	No
AMF0062	IMS(I-D-S/II)	ASCII	Both	Yes	No
AMF0063	IMS(I-D-S/II)	ASCII	Both	Yes	No
AMF0065	PSC(I-D-S/II)	ASCII	Both	Yes	No
AFS0035	APT/66	BCD	Both	Yes	Yes
AFS0036	APT/66	BCD	Both	Yes	Yes

Distribution -

AED0001	SOPS	BCD	Both	Yes	Yes
AFD0001	PROFIT/66	ASCII	Both	Yes	No

Financial -

AEB6004	CHECS-Complete	BCD	Both	Yes	Yes
AEB6001	-DES	BCD	Both	Yes	Yes
AEB6002	-PTS	BCD	Both	Yes	Yes
AEB6005	-Online Balancing	BCD	Both	Yes	Yes

Health Care -

AEH6001	HCSS	BCD	Both	Yes	Yes

Education -

AEE6002	SCRIBE/66	BCD	Both	Yes	Yes
AEE6001	SCRIBE/66	BCD	Both	Yes	Yes

AES0024	IMI/66	BCD	Both	Yes	Yes
HLSUA	PLANIT/66	BCD	Both	Yes	Yes
	Management Sciences -				
----	SPLICE II	BCD	Both	Yes	Yes
AES0019	T-S Library	ASCII	Both	Yes	No
AES0022	PMCS/66	BCD	Both	Yes	Yes
AES0023	PMCS/66	BCD	Both	Yes	Yes
AES0013	ASTRA II	BCD	Both	Yes	Yes
AES0021	BMD-P	BCD	Both	Yes	Yes
AES0012	COGO	BCD	Both	Yes	Yes
AES0020	SIMSCRIPT	BCD	Both	Yes	Yes
AES0005	GPSS	BCD	Both	Yes	Yes
Vendor	NISA	BCD	Both	Yes	Yes
AES6009	ADA	BCD	Both	Yes	Yes
Vendor	SPSS	BCD	Both	Yes	Yes
AES0015	MPS	BCD	Both	Yes	Yes
AES6010	SPM	BCD	Both	Yes	Yes
AES6011	SPM	BCD	Both	Yes	Yes
AES6012	SPM	BCD	Both	yes	yes
	Financial Management -				
AEF0004	Payroll	ASCII	Both	Yes	No
AEF6004	Payroll Tax Rtn	ASCII	Both	Yes	no
AEF0001	Accounts Rec	ASCII	Both	Yes	No
AEF0002	Accounts Pay	ASCII	Both	Yes	No
AEF0003	General Ledger	ASCII	Both	Yes	No
	Miscellaneous -				
	UDA, FDA, ARI or Referral Vendors AS Sources	BCD	Both	Yes	Yes(1)
		(1) Unless source produces ASCII version			
Networking Software					
----	GRTS-I	(1)	Both(2)	No	(1)
SES6001	GRTS-II Basic System (1Q79)	(1)	Both	Yes	(1)
SEC6003	GRTS-II HDLC Support	(1)	Both	Yes	(1)

SECTION XXI
Summary of DPS/Non-DPS Software Aspects
Preliminary, Subject to Change and Correction

SEC6004	NPS DP1(128KB FNP Required) Basic System	(1)	DPS	Yes	(1)
SEC6005	NPS DP1 HDLC Support	(1)	DPS	Yes	(1)
----	NPS NT2 (64KB FNP Required) Basic System	(1)	Non-DPS	No	(1)
SEC6005	NPS NT2 HDLC Support	(1)	Non-DPS	Yes	(1)
SEC6002	Host File Transceiver for Level 6 FTF	ASCII	Both	Yes	No
SEL6015	Host Resident Level 6 Remote Program Dev System (RPDS) Includes Assembler, Macro Preprocessor and linkers	ASCII	Both	Yes	No
SEL6016	Host Resident Level 6 FORTRAN Cross-compiler. Requires SEL6015	ASCII	Both	Yes	No
SEL6017	Host Resident Level 6 COBOL-74 Cross-Compiler. Requires SEL6015	ASCII	Both	Yes	No

(1) Not pertinent. Software runs in FNP

(2) Permitted in DPS or bridged DPS-like case only to provide interface to Document Entry System. (DES portion of CHECS) to run document handlers

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