To: MTB Distribution

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Subject: Multics Communication System Memory Configurator

INTRODUCTION

This MTB provides a Multics Communication System memory configurator which can be used to approximate maximum memory utilization on the DN355, DN6632, and the DN6670 front end processors. The data in this configurator is based upon MR8.0. It will be updated for future releases.

The calculations outlined in steps 1 through 5 apply only to FNPs not configured for 64K of memory.

The calculations outlined in steps 6 through 8 apply only to a DN6670 configured with 64K of memory.

Many terms and mechanisms that are refered to in this document are described in the following Multics manuals;

MAM - Communications (Order No. CC75)
MPM - Communications (Order No. CC92)
SDN - Communications System (Order No. AN85)

MULTICS COMMUNICATION SYSTEM MEMORY CONFIGURATOR

For FNPs not configured with 64K of memory

1. Table 1 lists those modules that are required to be in the image. Also included is the memory required to support the iom table and interrupt vectors. The init module is released for buffer space at the end of FNP initialization and is not to be included in the total count. The FNP requires around 30 buffers for dia queues and other support operations and this is included in the minimum buffer pad entry.

T A B L E 1

MODULE	LENGTH	TOTAL
control_tables	1680	1680
dia_man	3360	3360
interpreter	1930	1930
scheduler	1212	1212
utilities	2308	2308
minimum buffer pad	960	960
interupt vect	512	512
iom tables	32	32
init	3604	----
	SubTotal1	11994

2. Table 2 lists the modules that a site may optionally configure based on the CDT and other site requirements. Refer to section 6 of the CC75-00A manual (MAM - Communications) for details of when one of these should be included. Sum the TOTAL column and enter result in the box after SubTotal2.

MULTICS COMMUNICATION SYSTEM MEMORY CONFIGURATOR
For FNPs <u>not</u> configured with 64K of memory

T A B L E 2

MODULE	LENGTH	TOTAL
acu_tables	112	
ards_tables	674	
autobaud_tables	254	
breakpoint_man	220	
bsc_tables	2296	
console_man	476	
g115_tables	1884	
ibm3270_tables	616	
ic_sampler	2090	
hsla_man	3171	
lsla_man	1221	
polled_vip_tables	1258	
t202_tables	546	
trace	250	
trace buffer		
vip tables	532	
	SubTotal2	

3. Table 3 is used to determine the amount of memory required to support the various types of channels and devices. Echoplexed channels for this discussion are those which use any one of the following modes; echoplex, crecho, lfecho or tabecho. A blank is provided in the table to enter the number of each type of channel or device. Multiply this number by the number in the third column and place result in fourth column. Sum the entries in the "memory required" column and enter result in the box after SubTotal3.

NOTES:

On the line labeled, "LSLA device", enter the number of LSLAs configured on the FNP.

On the line labeled, "HSLA device", enter the number of the HSLAs configured on the FNP.

The following abbreviations are used below;

TIB = terminal information block
TB tbl = TIB table entry
TB ext = TIB extension buffer
SFCM = software communications region
IO buf = input, output and echo buffers
JP tbl = jump table
HSLA = high speed line adapter
LSLA = low speed line adapter

MULTICS COMMUNICATION SYSTEM MEMORY CONFIGURATOR
For FNPs not configured with 64K of memory

T A B L E 3

type of channel	number channels	X memory/ channel	= memory required
non-echoplexed LSLA		124 (1)	
echoplexed LSLA		156 (2)	
non-echoplexed tty HSLA		176 (3)	
echoplexed tty HSLA		208 (4)	
g115 protocol		308 (5)	
polled-vip protocol		312 (6)	
ibm2780 protocol		350 (7)	
ibm3780 protocol		382 (8)	
LSLA device		166 (9)	
HSLA device		97 (10)	
		SubTotal3	

Legend: (1) =

TIB	42
TB tbl	2
IO buf	80
	124

Legend: (2) =

TIB	42
TB tbl	2
IO buf	112
	156

Legend: (3) =

SFCM	52
TIB	42
TB tbl	2
IO buf	80
	176

Legend: (4) =

SFCM	52
TIB	42
TB tbl	2
IO buf	112
	208

Legend: (5) =

SFCM	52
TIB	42
TB tbl	2
TB ext	20
IO buf	192
	308

Legend: (6) =

SFCM	52
TIB	42
TB tbl	2
TB ext	24
IO buf	192
	312

Legend: (7) =

SFCM	52
TIB	42
TB tbl	2
TB ext	30
IO buf	224
	350

Legend: (8) =

SFCM	52
TIB	42
TB tbl	2
TB ext	30
IO buf	256
	382

Legend: (9) =

SFCM	38
IO buf	128
	166

Legend: (10) =

JP tbl	97
	97

MULTICS COMMUNICATION SYSTEM MEMORY CONFIGURATOR
For FNPs not configured with 64K of memory

IO Buffer Values

The above HSLA asynchronous IO buffer entries include two mini-buffers for input. Each mini-buffer is 8 words long to hold 14 characters and one word for housekeeping. These entries do not apply to those channels which will operate in block transfer mode. Two input buffers will be assigned to each channel in block transfer mode. The length of each buffer is set to hold at least one-half second of transmission (in whole 32 word blocks). A 32 word buffer will work for 1200 baud, 64 word buffer for 2400 baud, etc.

Only one input buffer is asigned on LSLA channels when the first character of a line is received. The value used (16 words) for the LSLA IO buffer entries assumes that half of the LSLA channels have received input and the input is less than 60 characters.

All asynchronous channels were given 2 output buffers in the above IO buffer entries. It has been shown that an FNP running with all channels generating traffic will service all channels smoothly if 2 output buffers are assignable to each asynchronous channel.

An echo-buffer of 32 words is assigned to each channel that is operating with any of the following modes turned on; echoplex, crecho, lfecho or tabecho.

4. Calculate the sum of SubTotal1, SubTotal2 and SubTotal3. Subtract this sum from 32768. The result is the amount of free buffer space.

MULTICS COMMUNICATION SYSTEM MEMORY CONFIGURATOR
For FNPs not configured with 64K of memory

5. It is possible that there may not be enough memory available during FNP initialization. This occurs while init is still executing and allocating TIBs and SFCMs. Table 4 and Table 5 will help determine if too many channels are configured given the core image size in SubTotal1 and SubTotal2.

   Enter the appropriate numbers into the "number channels" column. Perform the multiplication and enter the results into the "memory required" column. Sum the "memory required" column and enter the result into the box after SubTotal4.

T A B L E 4

type of channel	number channels	X memory/ channel	= memory required
LSLA device (≤6)		166	
LSLA channels		42	
HSLA device (≤3)		97	
HSLA channels		94	
		SubTotal4	

If there are no LSLA devices configured, strike out the "LSLA initialization code" entry in Table 5 since the code to initialize LSLA devices will be released prior to TIB and SFCM allocation.

Insert the previously determined values for SubTotal1, SubTotal2 and SubTotal4 into Table 5 and calculate the sum.

T A B L E 5

SubTotal1	
SubTotal2	
SubTotal4	
basic size of init	2209
LSLA initialization code	957
SubTotal5	

If SubTotal5 is over 32768, FNP initialization will fail. If it is close, initialization may fail. This will depend on where buffer boundaries are in relation to the boundaries of the executable code that is released in the init module.

For DN6670s configured with 64K of memory

6. Table 6 lists those modules that are required to be in the image of a DN6670 with 64K of memory configured. Also included is the memory required to support the iom table and interrupt vectors. The init module is released for buffer space at the end of FNP initialization and is not to be included in the total count. The FNP requires around 30 buffers for dia queues and other support operations and this is included in the minimum buffer pad entry.

T A B L E 6

MODULE	LENGTH	TOTAL
control_tables	1680	1680
hsla_man	3171	3171
dia_man	3360	3360
interpreter	1930	1930
scheduler	1212	1212
utilities	2308	2308
minimum buffer pad	960	960
interupt vect	512	512
iom tables	32	32
init	3604	----
	SubTotal6	15165

MULTICS COMMUNICATION SYSTEM MEMORY CONFIGURATOR
For DN6670s configured with 64K of memory

7. Table 7 lists the modules that a site may optionally configure based on the CDT and other site requirements. Refer to section 6 of the CC75-00A manual (MAM Communications) for details of when one of these should be included. Note that the trace buffer size is not included in this table. The trace buffer is allocated in the upper 32K of memory when 64K is configured. The maximum size of the trace buffer is determined in step 10. Sum the TOTAL column and enter result in the box after SubTotal7.

T A B L E 7

MODULE	LENGTH	TOTAL
acu_tables	112	
ards_tables	674	
autobaud_tables	254	
breakpoint_man	220	
bsc_tables	2296	
console_man	476	
g115_tables	1884	
ibm3270_tables	616	
ic_sampler	2090	
polled_vip_tables	1258	
t202_tables	546	
trace	250	
vip_tables	532	
	SubTotal7	

MULTICS COMMUNICATION SYSTEM MEMORY CONFIGURATOR
For DN6670s configured with 64K of memory

8. Table 8 is used to determine the amount of memory required to support the various types of channels and devices. Echoplexed channels for this discussion are those which use any one of the following modes; echoplex, crecho, lfecho or tabecho. A blank is provided in the table to enter the number of each type of channel or device. Multiply this number by the number in the third column and place result in fourth column. Sum the entries in the "memory required" column and enter result in the box after SubTotal8.

   The following abbreviations are used below;

   TIB = terminal information block
   TB tbl = TIB table entry
   TB ext = TIB extension buffer
   SFCM = software communications region
   IO buf = input, output and echo buffers
   JP tbl = jump table
   HSLA = high speed line adapter

T A B L E 8

type of channel	number channels	X	memory/ channel	=	memory required
non-echoplexed tty HSLA			82 (1)		
echoplexed tty HSLA			114 (2)		
g115 protocol			214 (3)		
polled-vip protocol			218 (4)		
ibm2780 protocol			256 (5)		
ibm3780 protocol			288 (6)		
			SubTotal8		

Legend: (1) = TB tbl 2
IO buf 80
82

Legend: (2) = TB tbl 2
IO buf 112
114

Legend: (3) = TB tbl 2
TB ext 20
IO buf 192
214

Legend: (4) = TB tbl 2
TB ext 24
IO buf 192
218

Legend: (5) = TB tbl 2
TB ext 30
IO buf 224
256

Legend: (6) = TB tbl 2
TB ext 30
IO buf 256
288

IO Buffer Values

All the above asynchronous IO buffer entries include two mini-buffers for input. Each mini-buffer is 8 words long to hold 14 characters and one word for housekeeping. These entries do not apply to those channels which will operate in block transfer mode. Two input buffers will be assigned to each channel in block transfer mode. The length of each buffer is set to hold at least one-half second of transmission (in whole 32 word blocks). A 32 word buffer will work for 1200 baud, 64 word buffer for 2400 baud, etc.

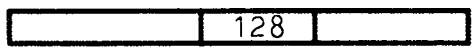
All asynchronous channels were given 2 output buffers in the above IO buffer entries. It has been shown that an FNP running with all channels generating traffic will service all channels smoothly if 2 output buffers are assignable to each asynchronous channel.

An echo-buffer of 32 words is assigned to each channel that is operating with any of the following modes turned on; echoplex, crecho, lfecho or tabecho.

9. Calculate the sum of SubTotal6, SubTotal7 and SubTotal8. Subtract this sum from 32768. The result is the amount of free buffer space.

10. The maximum size of the trace buffer can be determined from how many channels are configured. The TIB and SFCM allocation mechanism is constrained to keep the TIB and SFCM for a channel in the same page (256 word block) of memory. The following calculation can be used to determine how large the trace buffer can be given the channel configuration of the FNP.

number
channels x 128 = memory



The product of the above calculation is the memory required to hold the TIBs and SFCMs. Subtract this product from 32768 and the result is the maximum size of the trace buffer. This result (or something less) may be used after the size key-word for the trace module in the bindfile for the FNP core image.