Honeywell

Configure AM In NCF

L61229
AM

TotalPlant

Notices and Trademarks

This module supports **TotalPlant** Solution (TPS) system network.

TPS is the evolution of TDC 3000^{X}.

Honeywell Inc.
Industrial Automation and Control
Automation College
2820 West Kelton Lane
Phoenix, AZ 85053-3028
1-800 852-3211

Table of Contents

Figures and Tables

Acronyms

AM ..... Application Module
CDS ..... Custom Data Segment
CL ..... Control Language
CPU ..... Central Processing Unit
CVB ..... Current Value Buffer
HM ..... History Module
LCN ..... Local Control Network
Mw ..... Megaword
NCF ..... Network Configuration File
PM ..... Process Manager

Parameters

AMMEMADJ ..... Total Memory Used by Functional Adjustments
AMMEMAOP ..... Total User Memory After Software Options
AMMEMTOT ..... Total memory Used by the Database
MEMFREE ..... Room left for database growth

Resources

R600	Binder
Application Module Implementation Guidelines	*TPS 3035-2*
CL/AM Reference Manual	*TPS 3035-3*
Engineer's Reference Manual	*TPS 3030-2*
Customer Resource Manual	

MODULE INTRODUCTION

Changing process needs require a mechanism to implement new and custom functions in the AM. This course module discusses the NCF configuration for the AM, which allows you to configure optional, custom, and background AM functions and to allocate AM memory.

This course module assumes that you are familiar with Network Configuration tasks.

This course module introduces some, but not all, of the various AM Processor Status Data Point (PSDP) parameters that you can either monitor or change. PSDP parameters allow you to optimize your AM's capabilities. Some AM parameters are not described in this course module; this does not imply that they are "less important." The intent is to give you a foundation to build on.

In configuring the AM, it would be unfair and unwise to say "do it right the first time." As your needs change, a more prudent approach would include an understanding of the AM NCF configuration and how you can use it to optimize your AM's performance.

It is fairly easy to perform the actual AM NCF data entry tasks. The decisions of "what" to enter require some planning and forethought on your part; for that reason, this course module attempts to give you reasons why certain entries should be made and the consequences of your decisions.

Unlike the configuration of other LCN node types, the AM node configuration contains memory mapping information and background CL task information. The configuration of the AM through the NCF creates what is called a Loader Directive File. This file is discussed throughout the course module.

MODULE OBJECTIVE

Given a Universal Station or Global User Station in the engineer or universal personality, call up the Network Configuration displays for an Application Module and interpret the information on the display.

TERMS YOU SHOULD KNOW

This course module uses the following terms:

Arguments	In this document, arguments are the terms used to pass information between the main program and the subroutine(s).
Background	Background refers to Control Language (CL) blocks that are free-running as the lowest priority tasks in the system.
Disk Storage	History Module, Floppy disk, or Cartridge disk.
Functional Adjustments	Changes to the memory allocation for the background CL capability in your AM.
Loader Directive Record	A record in the NCF file that contains the Load Module names to be loaded into the AM. It is read by the AM during startup and is user-defined for the AM during NCF configuration.
Load Module	A loadable object file (.LO file) that consists of executable program code. Resides in directory &CUS.
Set Definition File	Set definition files (.SF files) are written by Honeywell to define the calling sequences of the CL callable Pascal programs in a Set. It is read by the CL compiler: 1) to do the type checking on the arguments. 2) generate the proper code call for a subroutine in a set. Resides in directory &CLX.
Set	A collection of related subroutines. For example, the set CONV is a collection of conversion subroutines. A set is created and delivered as a load module that has a .LO suffix. The sets are referred to as Load Modules in NCF build and are also referred to as a "runtime extension" when used in the AM.
Subroutine	A CL callable routine that is either a subroutine or function.
Task	A program that is scheduled independently by the operating system. For example, an AM Point with CL programs linked to it counts as one task.

AM NCF Configuration Tasks and Displays

Tasks

In R300 and later, a mechanism is available through the Network Configuration File (NCF) to do the following:

- configure *custom functions* for Local Control Network (LCN) nodes, including the Application Module (AM),
- configure *background* AM functions,
- specify *optional runtime extensions* for the AM (example: extensions used when reading and writing to text files resident on the History Module or removable media),
- verify or modify the amount of AM *memory* available for various tasks and functions,
- specify *additional custom software* that can be loaded into an AM.

User Memory Allocation Display

One of the major AM configuration tasks that you will need to perform is allocating AM memory. Memory allocation is the overall purpose of the second page of the AM's NCF Node Configuration display. Figure 1 is an example of that NCF page.

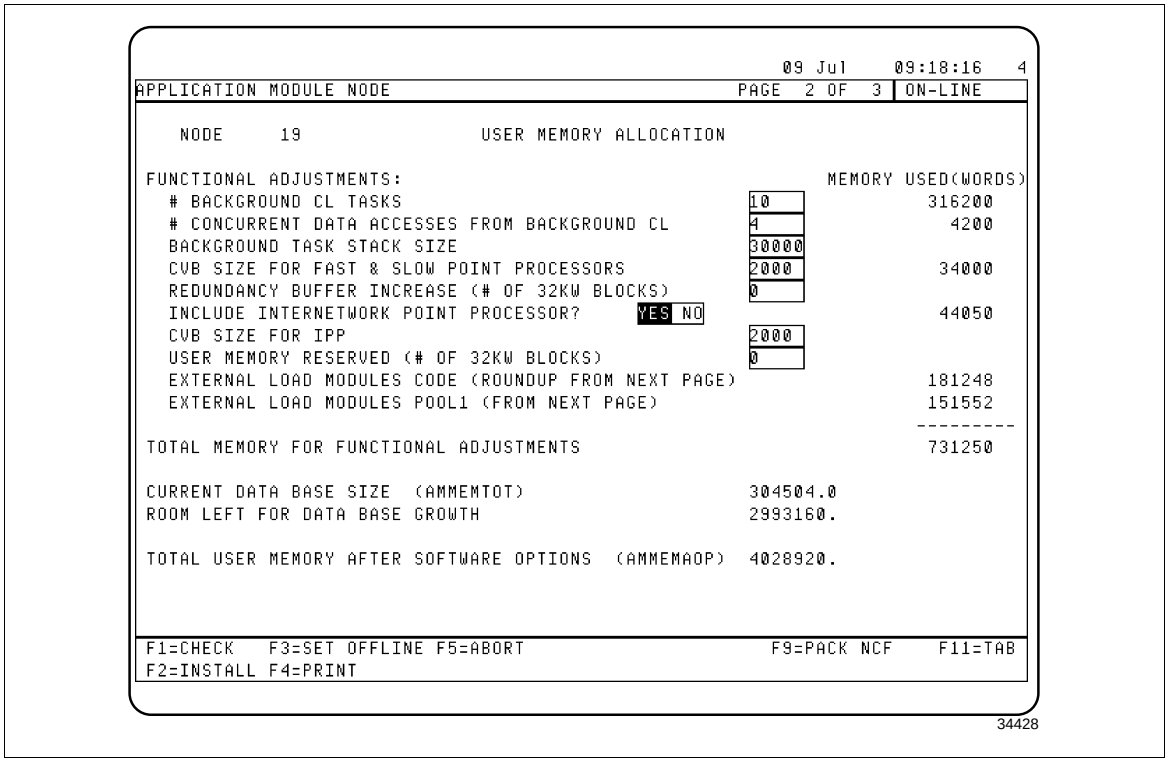


Figure 1 - User Memory Allocation Display—NCF Page 2

External Load Module Display

Another major AM configuration task is to specify the optional software (called EXTERNAL LOAD MODULES) that you can load into an AM. Figure 2 is an example of that NCF page.

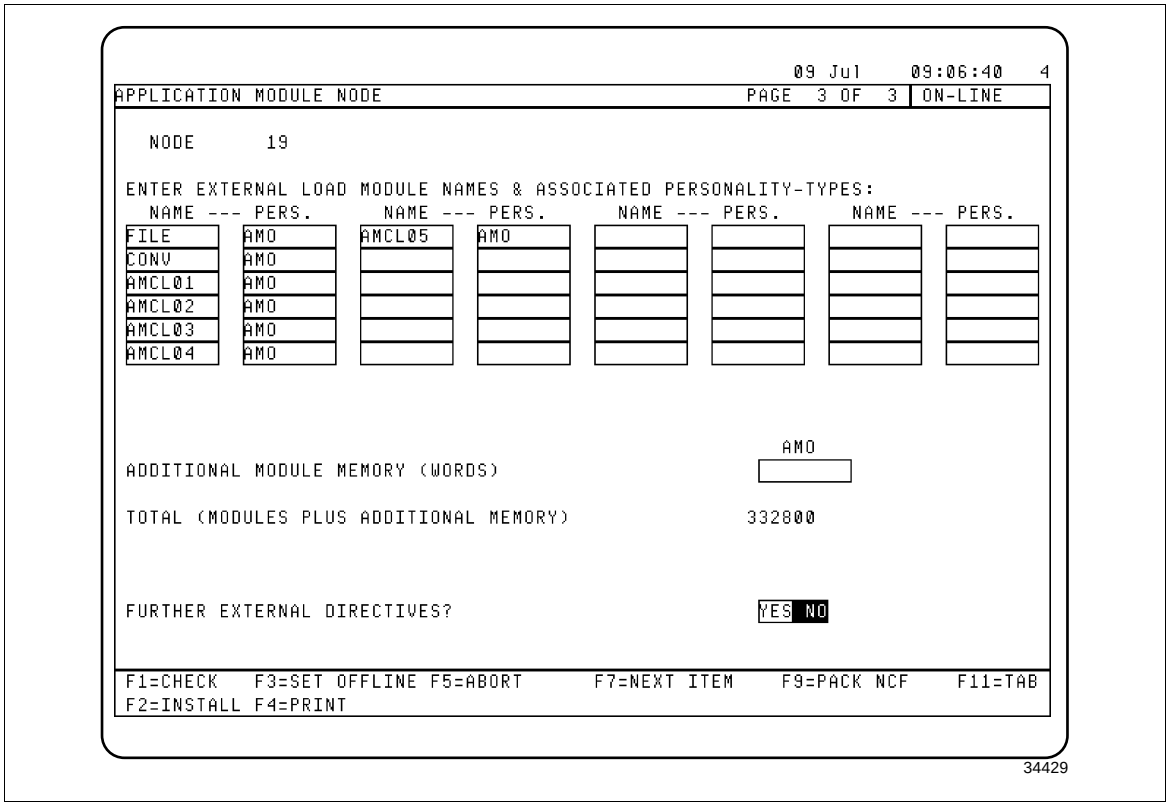


Figure 2 - External Load Module Display—NCF Page 3

Note:

With R600, on-line NCF changes can now be made to the AM's node configuration from Page 1 of the Node Configuration Display.

How the AM user memory is organized

Available User Memory

The amount of **user** memory available in an AM (PSDP parameter AMMEMAOP) is a function of the total AM memory size. Table 1 relates available AM user memory to maximum (total) AM memory size.

Table 1 – Available User Memory for Each Size of AM

Total AM Memory Size	Available AM User Memory ± (R5xx and later)
3.0 Mw	1,016,358 words
4.0 Mw	2,020,545 words 2,009,435 (68040)
5.0 Mw	3,024,731 words
6.0 Mw	4,028,918 words
7.0 Mw	5,033,105 words (HPK2/HMPU max.)
7.75	5,786,245 words (K4LCN max.)
8.0 Mw***	6,037,291 words 6,020,211 (68040)
16.0 Mw***	14,070,784 words 14,045,430 (68040)
± - All numbers apply to 68020 processors unless otherwise noted. *** The K4LCN processor exists in 4Mw, 8Mw, 16Mw only. (NOTE: Memory mapping is different for an $A^{X}M$.)	

Sections of AM Memory

To make intelligent decisions on the AM's NCF configuration displays, it is helpful to first understand how the AM's user memory is organized. For purposes of this course module, we will divide the AM user memory into the four sections described in Table 2.

Table 2 – Sections of AM User Memory

Section	Description
1. Total Memory for Functional Adjustments	Configured on upper part of NCF page 2 (see Figure 1). These entries can be changed from the display while the AM is online. For the changes to take effect, the NCF must then be installed and the AM (or redundant AM pair) restarted.
2. Memory for Software Options	K4LCN Processor Option that affects software memory allocation. If the AM uses the K4LCN processor, then space for memory management will be required depending on the amount of memory present on the board. The following K4LCN memory sizes are available: • 4 meg K4LCN requires ≈12,000 words • 8 meg K4LCN requires ≈18,000 words • 16 meg K4LCN requires ≈26,000 words Set up by the Options Key File on a removable media disk from Honeywell. Viewable from the Software Options page of the NCF System Wide Values display. Key File Options include • AM Redundancy—Requires the following memory in redundant AMs: 157,000 words (fast/slow processor buffers), plus an additional 22,000 words if using the AM redundancy Internetwork Point Processor (IPP) option.
3. Current Database Size	Memory required for AM points, CL programs, custom data segments, and checkpoint buffers. This memory is allocated through the DEB and CL compiler while the AM is online.
4. Available Unused Memory	Memory that remains unused after the other three sections are allocated—user memory that is available and not allocated. This memory is described in some displays as "room left for database growth.

Structure of Available User Memory

Conceptual Diagram

Figure 3 is a conceptual representation of the AM user memory. The actual memory structure is not shown, nor is it required. Figure 3 illustrates the following concept:

- Any AM user memory that is not allocated to the four sections (described in Table 2), falls into “available unused memory” and is available for additional database or adjustments ("room left for database growth").

Monitoring AM Memory Use

PSDP Parameters

Processor Status Data Point parameters are available on each node and give you valuable information and status that you can use to optimize your device’s performance.
The PSDP point name is:

$PRSTSnn

where nn = the LCN node number of the Application Module

Table 3 describes the Processor Status Data Point (PSDP) parameters that allow you to monitor AM memory use. Refer to Figure 3 for the NCF display of the same parameters.

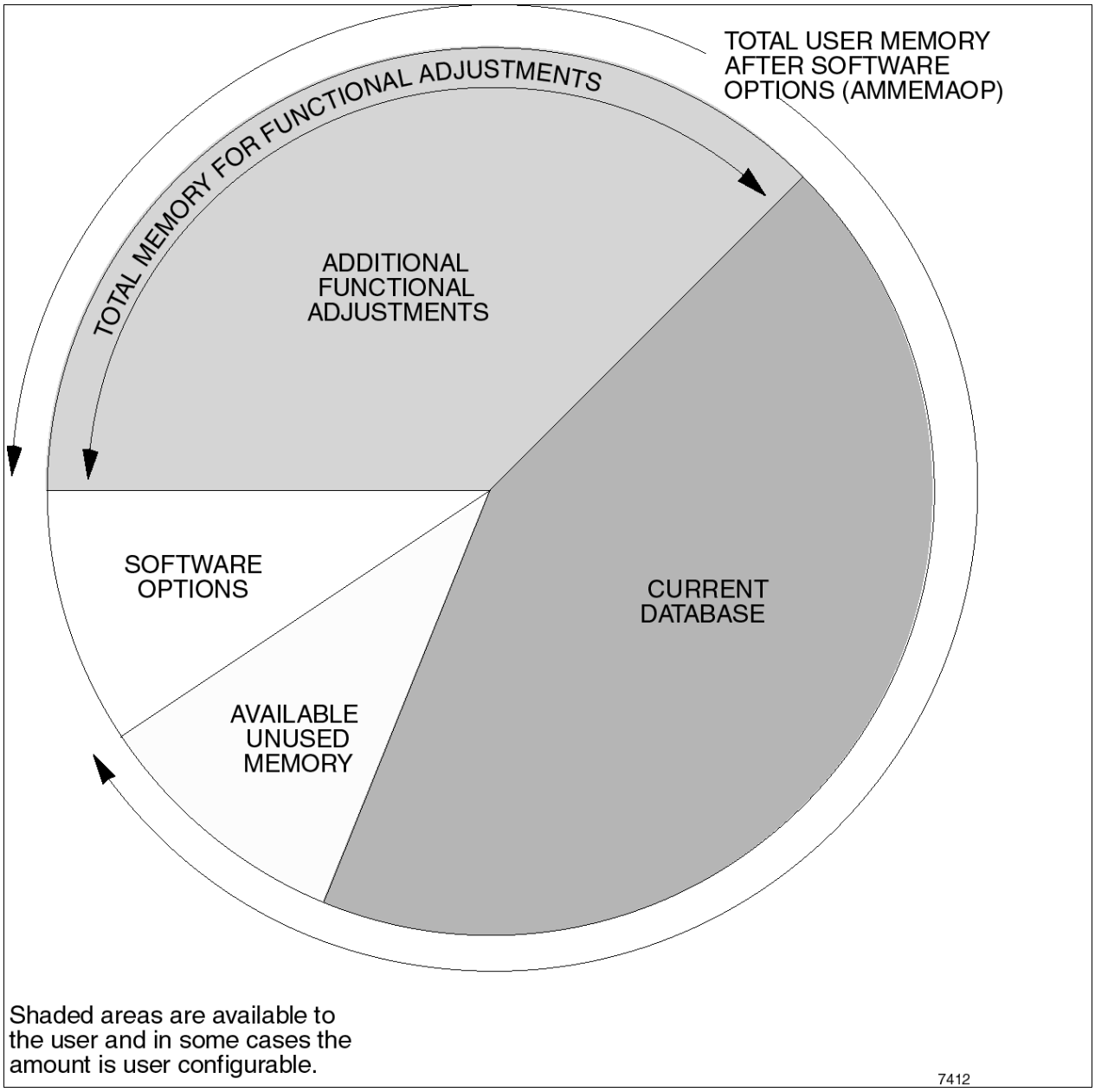


Figure 3 - Conceptual Diagram of AM User Memory

Table 3 – AM PSDP Parameters for Memory User

Parameter	Description
AMMEMAOP	Total User Memory After Software Options (based on memory size [see Table 1] and software options)
AMMEMADJ	Total Memory For Functional Adjustments
AMMEMTOT	Current Database Size—the sum of the following: • point data (TMEMPTS) • largest checkpoint buffer (MEMCKPT) • CL blocks (TMEMCL) • custom data descriptors (TMEMCDPN) • custom system data (TMEMCS) • adjustment for next AM restart (MEMADJNX) • a variable (without a PSDP parameter) for alarm buffers, buffers for fast custom parameters, and the optional extension for fast external CDS fetch (AMCL04). The number is approximately 46,000 words plus the memory impact of the optional AMCL04.
MEMFREE	Room left for database growth. (MEMFREE=AMMEMAOP - AMMEMADJ - AMMEMTOT)

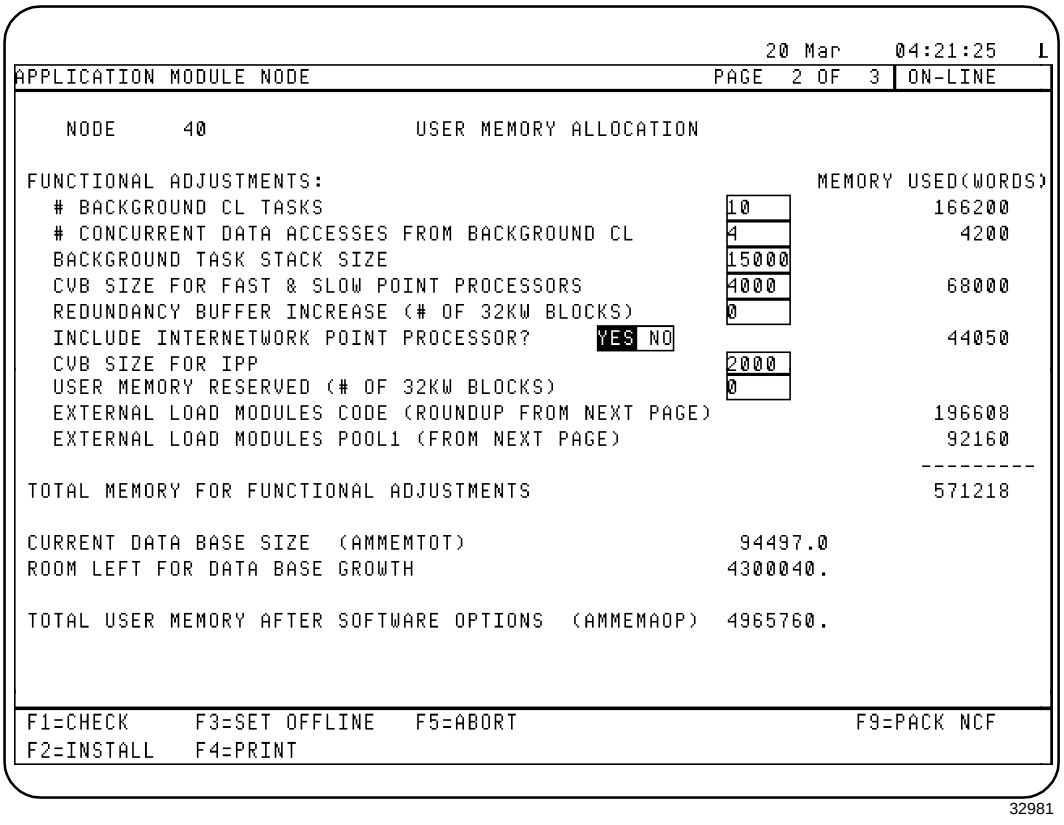


Figure 4 - User Memory Allocation Display—NCF Page 2

Correlation of NCF Parameters to Memory Structure

Figure 5 correlates the conceptual diagram of AM user memory with the parameters available on the NCF User Memory Allocation display. The parameters shown in Figure 5 are used to access the user memory. The Total User Memory After Software Options (AMMEMAOP) is the sum of Total Memory For Functional Adjustment (AMMEMADJ) and Current Database Size (AMMEMTOT) and Room Left For Database Growth (MEMFREE).

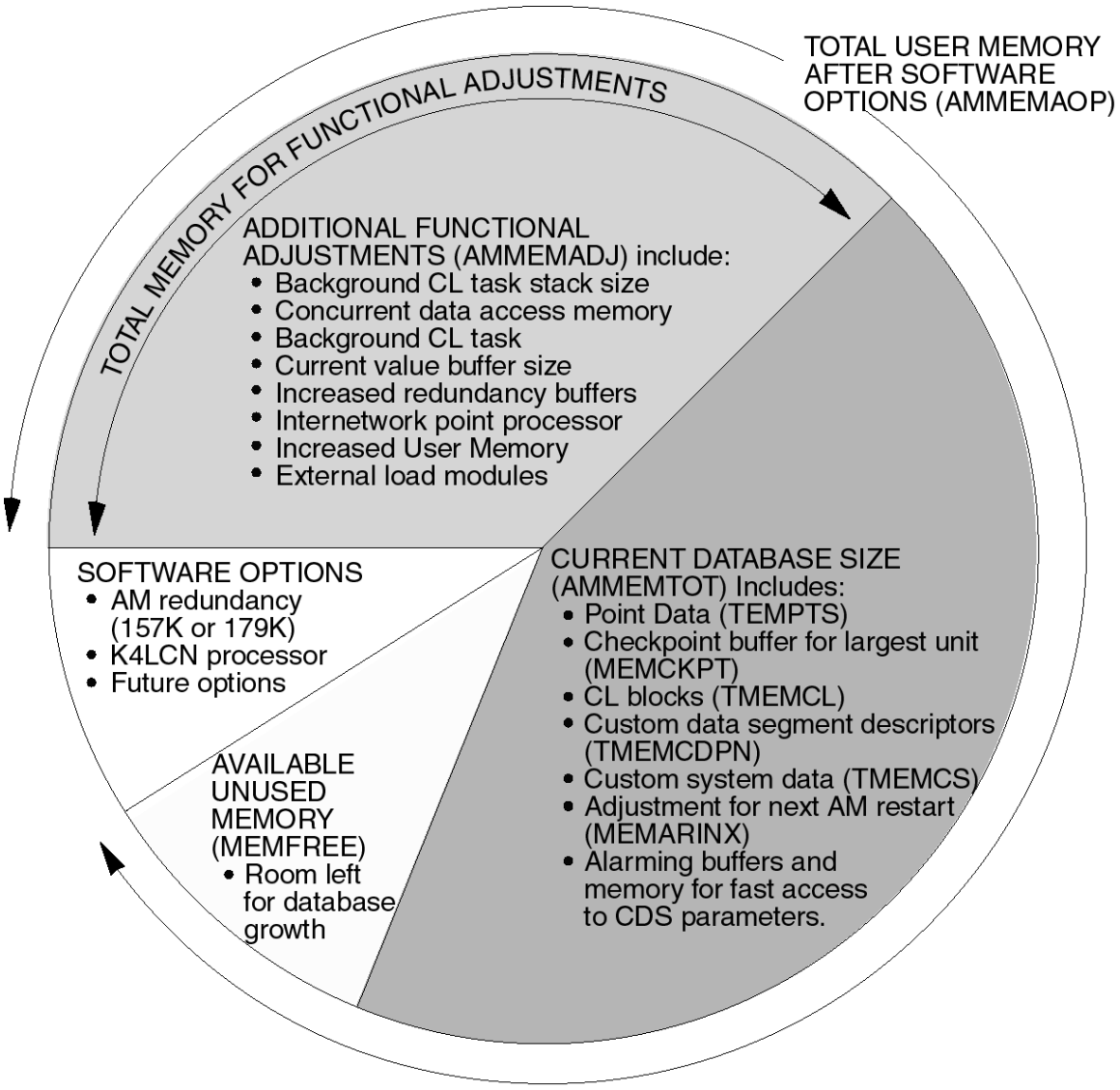


Figure 5 - Diagram Correlating AM Memory to NCF Parameters

Interpreting the User Memory Allocation NCF Page

For your convenience, the User Memory Allocation NCF page is reprinted in Figure 6. Highlighted in Figure 6 are the user memory totals, indicating how much memory you currently have allocated:

Total Memory for Functional Adjustments	731250
+ Current Database Size (AMMEMTOT)	304504
+ Room Left for Database Growth	2993160
Total User Memory After Software Options	4028920

The lower part of the display summarizes how you have used the memory available to you. (The AMMEMAOP value shown on the display differs slightly from the above calculation, because of rounding. The difference is not of any great concern.)

As you have probably observed in Figure 6, you can make entries that affect the total for functional adjustments.

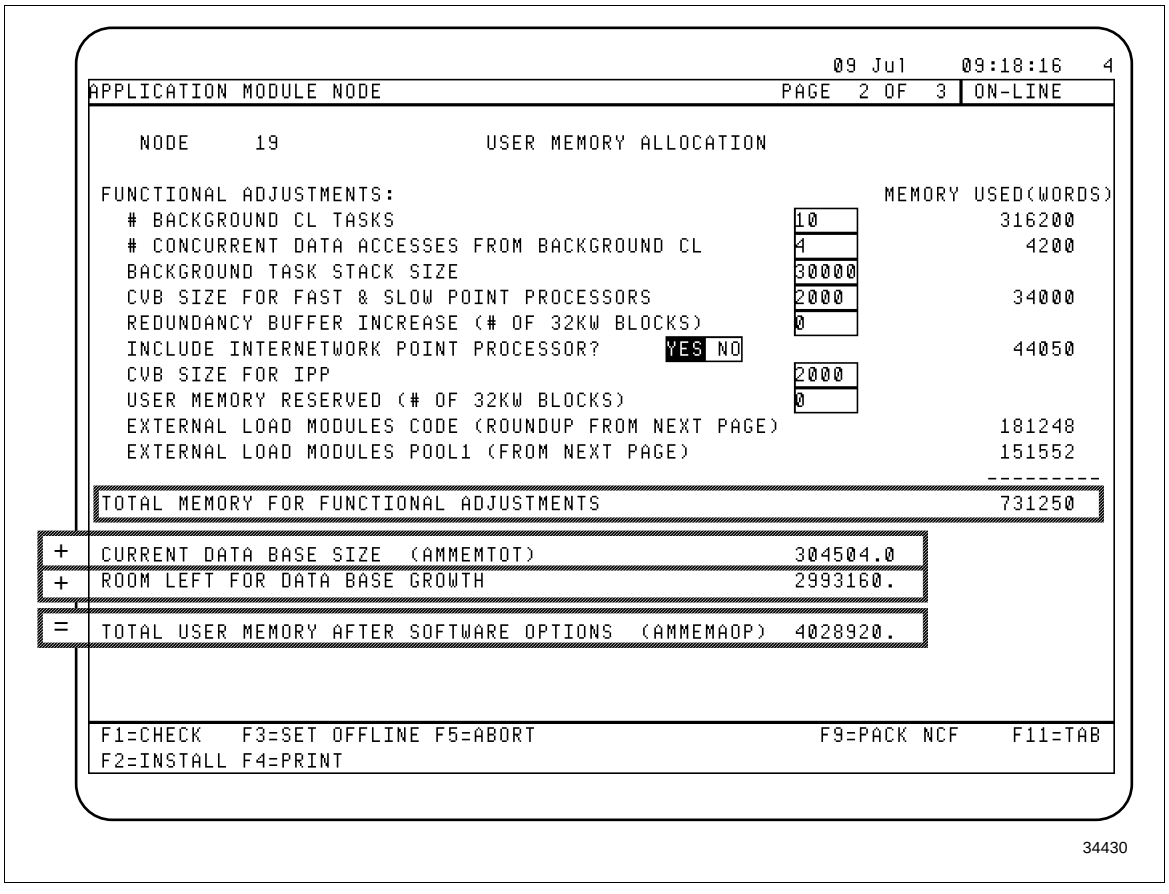


Figure 6 - User Memory Allocation Display With Highlighted Areas

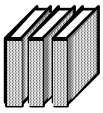
NOTE

Before R320, the TOTAL MEMORY FOR FUNCTIONAL ADJUSTMENTS on NCF page 2 did not include the value of ROUNDUP FROM NEXT PAGE.

ATTENTION

If NCF configuration is performed on-line with an AM in the "OK" processing state, the memory allocation of your AM is checked dynamically to ensure that your allocation does not exceed the memory available in your AM. A warning message appears if available memory is exceeded.

If the configuration is performed offline, the configurator does not "know" what your available memory is. During off-line configuration it is possible for you to incorrectly allocate user memory. You would then not be able to start your AM because the amount of total user memory has been exceeded. Refer to Table 1 if you configure your AM offline.



REFERENCE—

The following manual provides values and related calculations for AMMEMADJ:
AM Implementation Guidelines.
Binder TPS 3035-2

The following manual describes the memory impact of the optional AM software AMCL04:
Appendix G, *CL/AM Reference Manual*
Binder TPS 3035-3

The following manual lists the AM PSDP parameters:
Engineer's Reference Manual
Section 22
Binder TPS 3030-2

FUNCTIONAL ADJUSTMENT ENTRIES

When you make any functional adjustment entries, you are allocating or “using up” the remaining available user memory. The larger the value configured for any particular functional adjustment entry, the less memory is available for other functional adjustment entries.

Background CL Functional Adjustments

The background CL function is part of the standard AM product. The first three entries for the functional adjustments column (see Figure 9) relate to the background CL capability in your AM.

The entries default to zero in the NCF, implying that you must make an entry if you plan to use background CL programs. If you accept the entries of zero, that means you do not plan to use background CL.

If you plan to use background CL, review Figure 7 and Figure 8 for a few moments, then proceed with the next section.

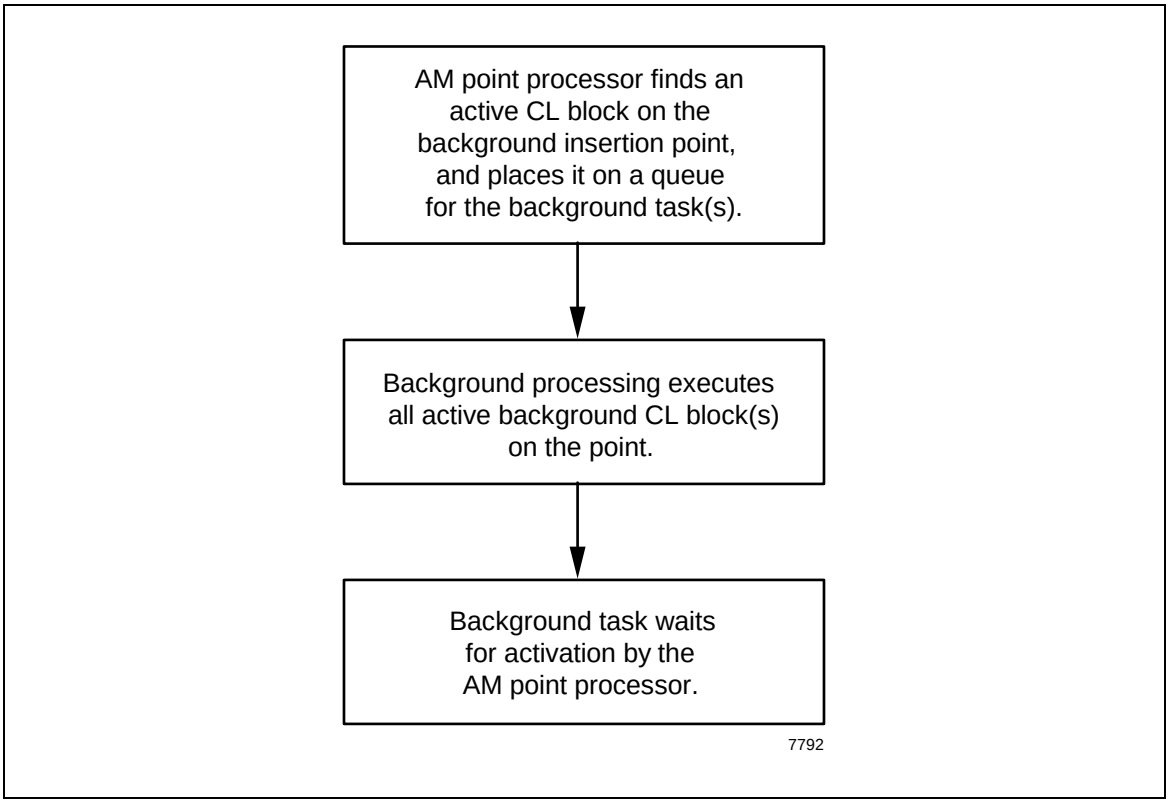


Figure 7 - Overview of Background CL

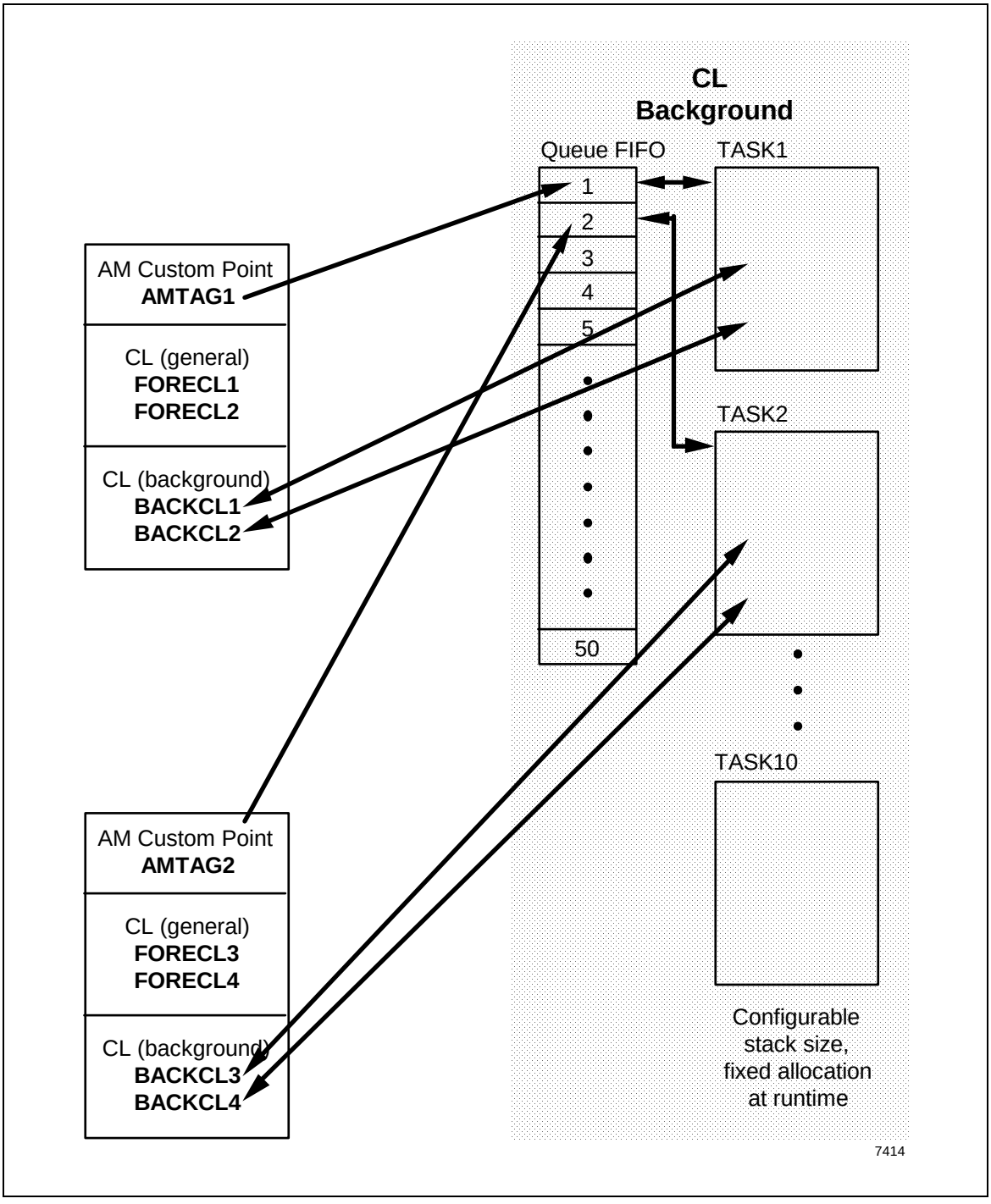


Figure 8 - Conceptual View of Background CL

Background CL Tasks

Definition

A background task consists of all of the CL blocks attached to a point's BACKGRND insertion point. There can be as many as 10 background tasks in memory at any particular point in time (you configure this option).

When the BACKGRND CL insertion point of an AM point is processed, the CL blocks attached to the point are queued for execution. There can be 50 tasks in this queue.

Background Task Scheduler

The background task scheduler (part of the operating system) does the following:

- Examines the background queue and the currently running tasks to determine if a new task is to be initiated.
- If a CL block from the queued task is already an established task, the existing task is granted 50 milliseconds of CPU time to execute, otherwise a new task is established.
- When a background task is established, it remains a task until it has completed execution.

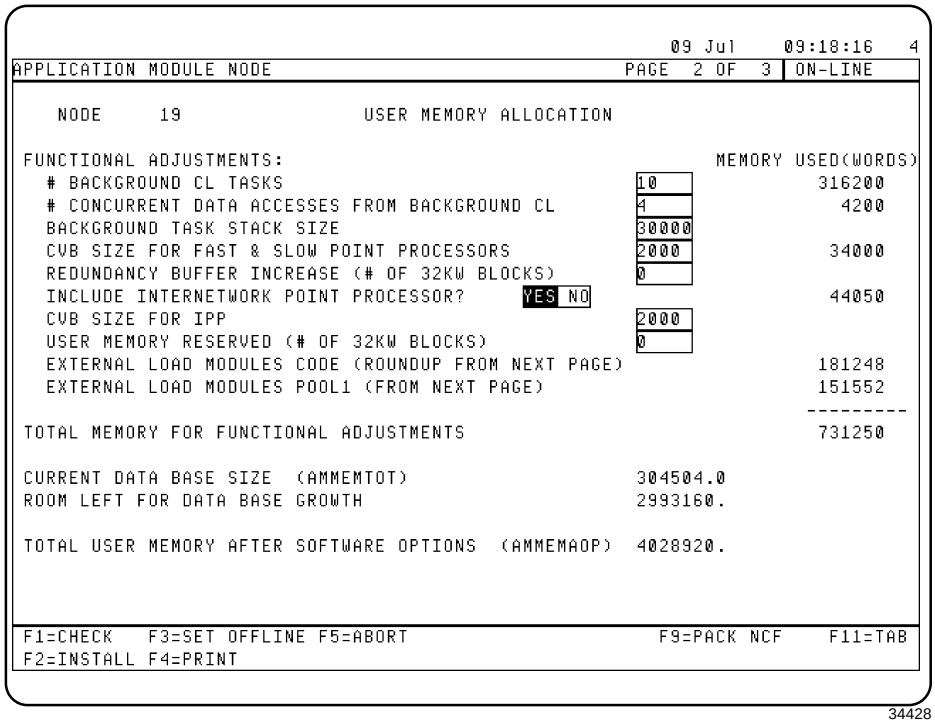


Figure 9 - User Memory Allocation Display—NCF Page 2

Considerations When Determining Number of Background Tasks

Because a task may be delayed because of a request from data in another module (for example, SET A = TIC21243.PV, where TIC21243 is a tag in a Process Manager) and because the task still gets only 50 milliseconds to execute, it is possible that the task will not run to completion. For other points to execute their background tasks, more than one background CL task should be configured.

The actual number of background tasks to configure is a tradeoff between memory and whether your CL blocks get executed. If the number is too small, the task queue will fill up and your background CL may not execute as quickly as desired; if the number is too large, you may not have sufficient memory for your other functions.

To use the background CL function, you must enter a minimum of 1. To determine if you need a larger number, consider the following:

- The amount of AM memory available.
- The number of background programs you are writing.
- Whether any packages require background CL.

Calculation Used To Determine Background CL Memory

The memory calculation for background CL is as follows:

background CL tasks[BKGTASKS] * background task stack size[BKGSTACK] + 16200

For R4xx, R5xx, and R6xx, 16200 is the AM internal memory it takes to support the background tasks (2000) plus memory support for CDS read/write (14200).

ATTENTION

Software packages, such as SPQCII. require a minimum number of background tasks. Be sure to include the amount specified for your packages in your calculations.

Concurrent Data Accesses From Background CL

Definition

After determining how many background tasks are needed, you then determine the entry for concurrent data accesses from background CL. This entry specifies the total number of off-node data access requests or tasks that can be used.

The following calculation determines how much internal AM memory it will take to support additional programs to fetch/store points and parameters (data access):

concurrent data accesses from background CL[BKGDAREA] * 1050

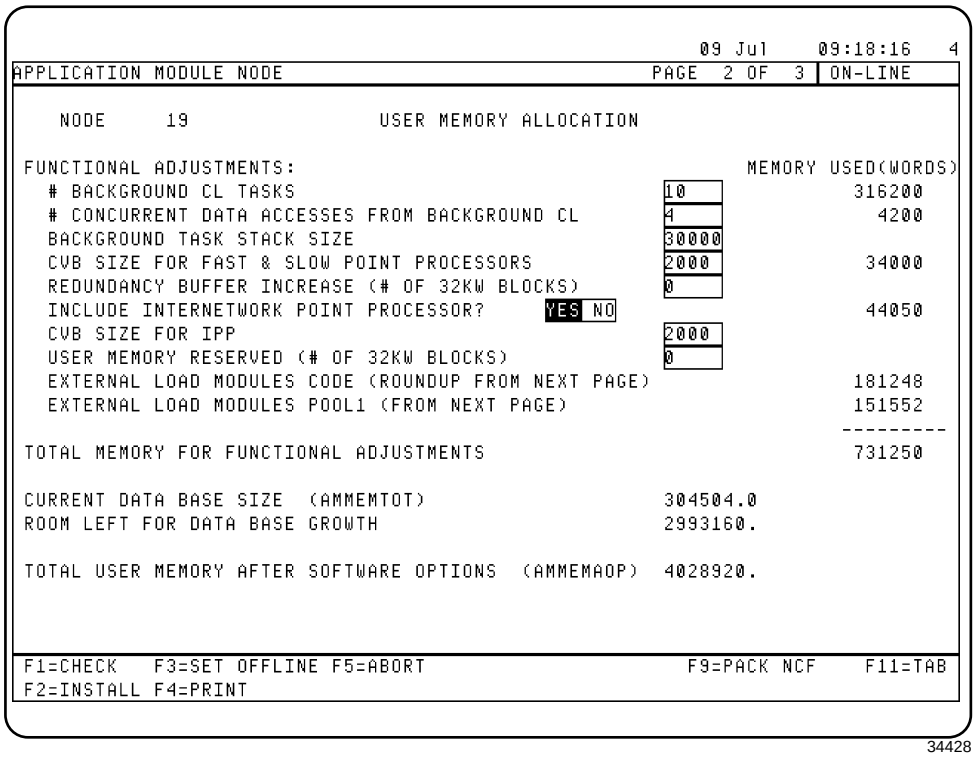


Figure 10 - User Memory Allocation Display—NCF Page 2

Off-Node Requests

An “off-node request” refers to a request to a node other than the AM in which the program is running. The following CL code illustrates an off-node request. In this example, assume the code is in a background CL block and that TIC100 resides in a Process Manager or other type of controller control loop.

Example:

```
LOCAL A
SET A = TIC100.PV          — example of off-node read (fetch)
SET TIC100.SP = 50         — example of off-node write (store)
```

In the above example of a background CL program:

- The read (fetch) and write (store) occur at the time the statement is executed.
- An off-node data access must be performed to access the PM control loop data.

Because there is no prefetch or poststore activity in background CL as in foreground CL, the above example is not the best utilization of your AM.

Using Custom Data Segments

In order to minimize the background CL off-node accessing, it is better to have data fetched by the AM point to which the program is linked and store the values to a custom data segment (CDS) structure.

If the background CL program required the values, it could access them from the AM point’s CDS structure. Accessing data from the AM point’s CDS is a fast access and does not require an off-node access when the background CL program is executed. This type of data accessing is often referred to as “on-point CDS access.

RULE

On-point CDS access is a fast data access and is preferable to use in background CL programs. This method minimizes your off-node data accessing and is a more efficient way of fetching and storing data. While you can minimize off-node data accessing, you still need to enter a value for concurrent data accesses under functional adjustments.

Avoiding CL Abort

The previous example adds some possibility that the program would abort if the background CL program encountered a communication or configuration error. The approach used in the previous example is often referred to as an "implicit default fetch/store."

Another approach is called a "single value explicit fetch/store," which requires the use of the Move_Parameter subroutine. By moving values this way, you can check for communication or configuration errors to avoid a CL abort. Depending how you code your program, an off-node data access would still be required.

Background Task Stack Size

Definition

The Background Task Stack Size NCF entry specifies the size of the runtime stack for all the background CL tasks:

Range = 700 to 32000 words (32 kW)

Default = 25000

Typical Entry = 25000

Changing the background stack size requires an online NCF change, then an AM restart for it to take effect.

With foreground CL programs, the stack size is fixed at 15 kW, but dynamically allocated. In background CL, the stack size is adjustable by you through the NCF, but during runtime it becomes a fixed allocation.

Determining Adequate Stack Size

The Processor Status Data Point parameter BKGSTACK returns the background stack size. The value, however, is the value you configured in the NCF display. To determine whether your stack size is adequate you need to monitor whether any stack overflows occur.

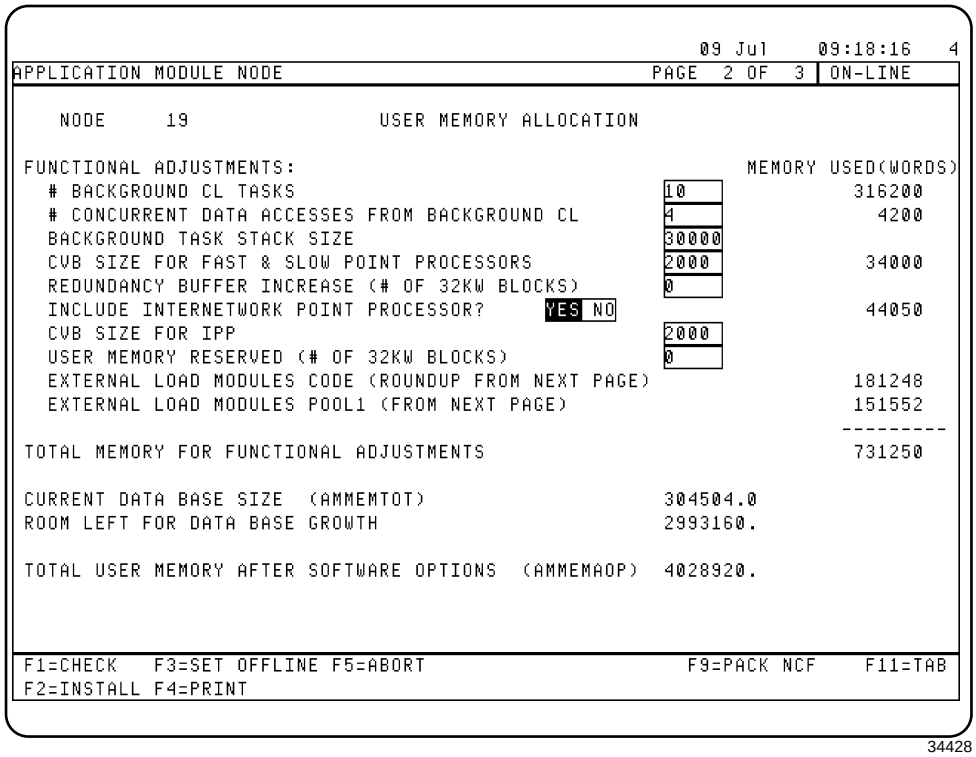


Figure 11 - User Memory Allocation Display—NCF Page 2

CVB Size for Fast and Slow Point Processors

Definition

The entry in the NCF display for Current Value Buffer (CVB) size for fast and slow point processors is the next functional adjustment you make.

Prefetched and poststored data is held in CVBs, which are the dynamic portion of heap memory. Users can change the size of the CVBs, based on an estimate of the prefetched and poststored data that is required on any processing cycle. If the CVBs are bigger, the dynamic area is bigger and less room is left for static data.

Figure 12 provides a conceptual view of the entire AM memory, including the heap.

The "system" portion of heap is reserved for the system and is not available to users. The remainder of heap is configuration-dependent, and consists of an area for storage of dynamic data and an area for static data. The dynamic portion of heap is used by the system when points or CL blocks fetch or store values from or to another node.

A point that is scheduled to run on the current processing cycle and that requires data from another node causes the fast point-processor to prefetch the data one cycle earlier. If the same point is to store data in another node, the data is poststored by the fast point-processor on the next cycle.

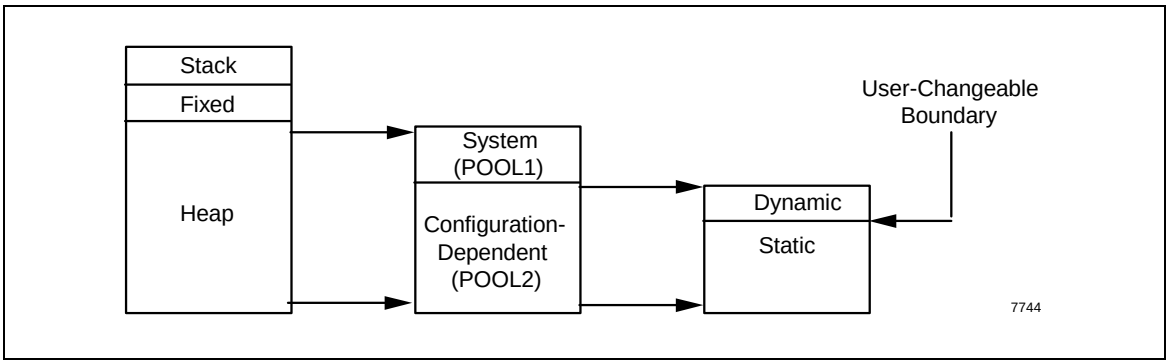


Figure 12 - Conceptual Overview of AM Memory Including Heap

Estimating CVB Size

There are various ways to estimate how many points you can build and the current value buffer size needed.

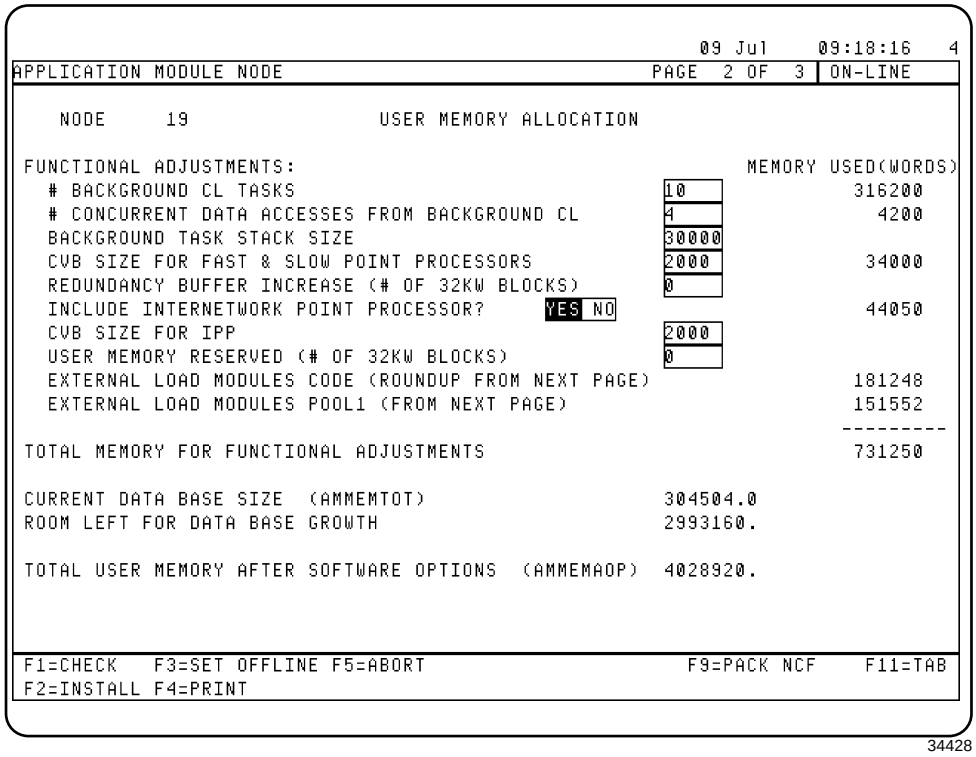
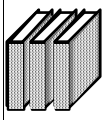


Figure 13 - User Memory Allocation Display—NCF Page 2



REFERENCE—You can learn about CVB size by referring to the following manual:
Application Module Implementation Guidelines
Section 2, AM Memory Allocation
Binder TPS 3035-2

Redundancy Buffer

Definition

In an AM redundant pair, the data from the primary AM is transferred to the secondary AM through a buffer called the redundancy buffer.

This buffer size has a base value of 122880 words. Unless an buffer overload occurs, the size of this buffer does not need to be increased.

The following PSDP parameter for the primary AM returns the redundancy buffer size:

`$PRSTSnn.REDBFZ` (where nn is the AM node number)

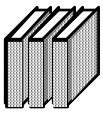
AM Redundancy

AM Redundancy is a purchased option for AMs with 68020 HMPU or 68040 K4LCN microprocessors, only. AM Redundancy includes hardware and software that allow a secondary AM to back up the operation of the primary AM. To do this, all of the application data in the primary AM is transferred to the secondary AM, where an exact copy of the data is maintained to be used if the primary AM should become inoperative.

Estimating Buffer Size Increase

In the event of a redundancy buffer overload, an AM crash or resynchronization (copying the primary AM's database to the secondary) may occur.

You need to determine whether the redundancy buffer size specified in the NCF should be increased to prevent an overload of the buffer.



REFERENCE—At a future time you can review the AM redundancy scenarios described in
Application Module Implementation Guidelines
Section 7, AM Redundancy Option
Binder TPS 3035-2

Internetwork Point Processor

The AM can access data from one LCN to another through the Network Gateway. If internetwork access is desired with foreground programs,

- The AM must be configured with the internetwork capability. Selecting YES for the internetwork point processor (IPP) configuration choice permits internetwork data access from assigned points.
- In addition, some amount of user memory must be allocated for the IPP current value buffer.

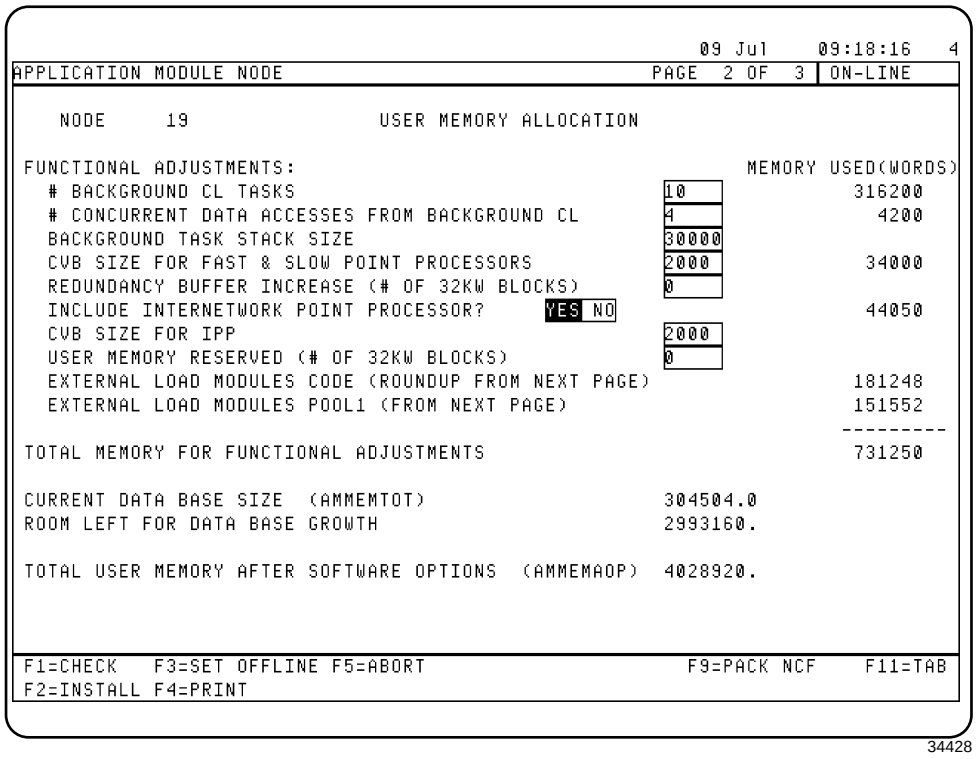
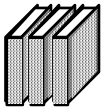


Figure 14 - User Memory Allocation Display—NCF Page 2

User Memory Reserved

You can reserve memory for future software options with this NCF entry.



REFERENCE—This manual shows you how to reserve AM memory:
Application Module Implementation Guidelines
Section 6.2.1, “How to Reserve User Memory for Future Options
Binder TPS 3035-2

External Load Modules Memory Use

Definition

The next two lines in the User Memory Allocation NCF page are entered by the system.

The sum of just the External Load Modules code entries equal the `ADDITIONAL MODULE MEMORY` entry from page 3 of the NCF (in Figure 15 this value is 332800).

```
                                                    09 Jul    09:06:40   4
APPLICATION MODULE NODE                                PAGE  3 OF  3  ON-LINE

  NODE      19

ENTER EXTERNAL LOAD MODULE NAMES & ASSOCIATED PERSONALITY-TYPES:
  NAME --- PERS.      NAME --- PERS.      NAME --- PERS.      NAME --- PERS.
FILE      AMO       AMCL05    AMO
CONV      AMO
AMCL01    AMO
AMCL02    AMO
AMCL03    AMO
AMCL04    AMO

                                                          AMO
ADDITIONAL MODULE MEMORY (WORDS)

TOTAL (MODULES PLUS ADDITIONAL MEMORY)                    332800


FURTHER EXTERNAL DIRECTIVES?                              YES NO

F1=CHECK   F3=SET OFFLINE F5=ABORT      F7=NEXT ITEM    F9=PACK NCF    F11=TAB
F2=INSTALL F4=PRINT
```

34429

Figure 15 - External Load Module Display—NCF Page 3

What are External Load Modules?

External Load Modules are software options defined by you on page 3 of the NCF display. When you load them into the system, they become part of the loaded AM personality.

There are values related to External Load Modules on the page 2 of the NCF display.

In referring to the AM memory layout, you could say that External Load Modules become part of the configuration-dependent portion of heap (POOL2). This is indicated by the following entry on page 2:

EXTERNAL LOAD MODULES CODE (ROUNDUP FROM NEXT PAGE)

The next line on page 2 is part of your total memory for functional adjustments:

EXTERNAL LOAD MODULES POOL1(FROM NEXT PAGE)

The above line means that part of your available user memory is going to be used by the system portion of the heap (POOL1). The value is automatically calculated by the system, and is done to have enough memory to run your External Load Module software options.

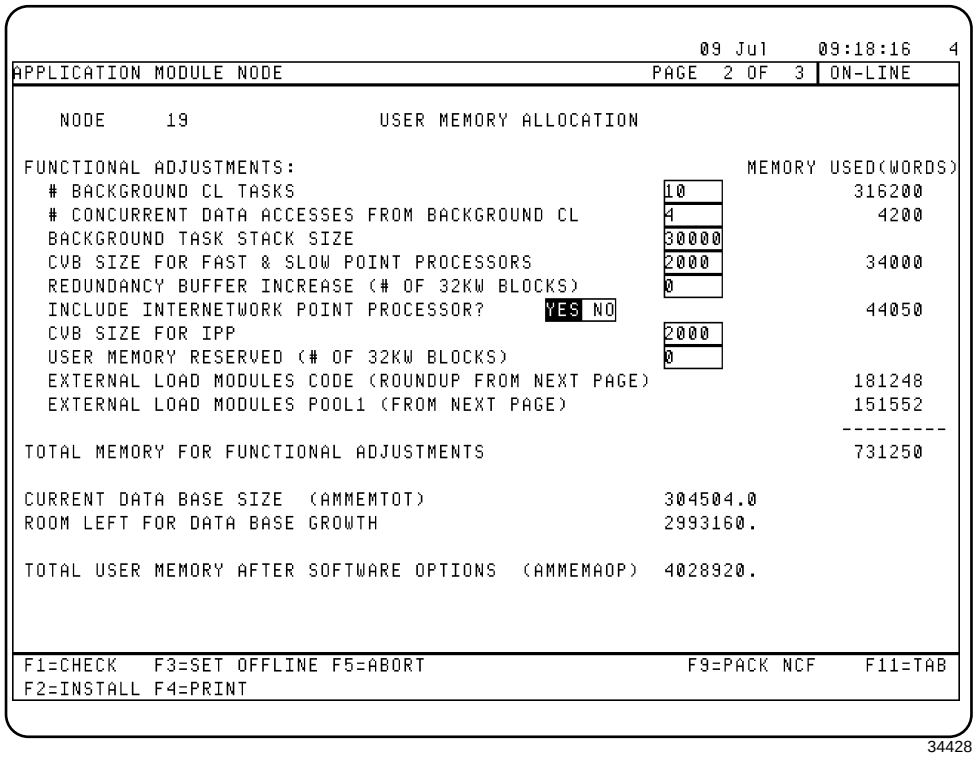


Figure 16 - User Memory Allocation Display—NCF Page 2

Total Memory for Functional Adjustments

The total for functional adjustments is entered by the system on the next line of the User Memory Allocation page. If you add up all the numbers in the right-hand column of this display, you will notice that they equal the total for functional adjustments. For example, the numbers shown in the example in Figure 16 are

`# Background CL tasks`	316200
`# Concurrent Data Accesses From Background CL`	4200
`CVB size for Fast or Slow Point Processors`	34000
`Internetwork Point Processor`	44050
`External Load Modules Code(Roundup From Next Page)`	181248
`External Load Module POOL1 (From Next Page)`	151552
Total:	731250

External Load Modules

When you configure External Load Modules on page 3 of the NCF display, you are specifying what you want to be loaded in the AM as part of its online personality. This information creates a Loader Directive Record in the NCF file for the Application Module. Table 4 describes the entries of NCF page 3.

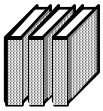
Table 4 – Descriptions of External Load Module Entries—NCF Page 3

Entry	Description
Name	This is the name of the external load module (that is, custom software option) to be loaded or that uses this node. The load module instructions will come with the custom software option you have purchased. This load module is often called a "set." It is a set of callable CL subroutines.
Additional Module Memory (words)	This allows the user to reserve more memory above and beyond what is required to simply support the external load module requirements for this node. If left at zero, the *Total (Modules plus additional memory)* number indicates the amount of memory required to support only the external load modules configured in this software release. Typically, one would configure 10 to 15% additional memory in the *Additional Memory* port above and beyond this number to allow for increases in external load module file sizes when migrating to new software releases.
Total (Modules plus additional memory)	This number is the summation of the amount of memory required to support the external load modules in this software release and any additional memory configured under the *Additional Module Memory* entry.
Further External Directives	Select NO unless otherwise instructed by documentation provided with your custom software. YES means a special external load directive file located in a special directory must be accessed when the node is loaded with this personality.

ATTENTION

The value TOTAL (MODULES PLUS ADDITIONAL MEMORY) is automatically calculated for you. It is the total memory required for custom software plus any additional memory you enter in the “Additional Module Memory” port.

Note that value TOTAL (MODULES PLUS ADDITIONAL MEMORY) also appears on page 2. It is shown as two values: EXTERNAL LOAD MODULES CODE and EXTERNAL LOAD MODULES POOL 1. The sum of these two values equals the TOTAL on page 3.



REFERENCE—An overview of External Load Module configuration is provided in
Application Module Implementation Guidelines
Section 8, Custom Software, CL Extensions, and Background CL
Binder TPS 3035-2

WRITTEN EXERCISE

Before you read the next section, complete the following exercises to reinforce your understanding and progress.

This exercise helps you understand the meaning of various parameters in the displays.

1. Enter the answer(s) in the left column by selecting the correct choice from the right column.

1. _____	Loader Directive Record	A. MEMFREE
2. _____	Set definition file	B. A loadable object file consisting of executable program code.
3. _____	Current database size	C. AMMEMTOT
4. _____	Total user memory after software options	D. AMMEMAOP
5. _____	Heap	E. POOL1 and POOL2
6. _____	User memory still available	F. Page 3 of node configuration for the AM.
7. _____	Load Module	G. File written by Honeywell to define calling sequences in a load module or set.

2. The following exercise helps you to become familiar with the memory allocation of the AM.

   Given the displays on the next page in Figure 17, calculate the following:

   Total Memory for functional adjustments _____

   Room left for database growth _____

   External Load Modules POOL1 _____

   Use the space below for your calculations.

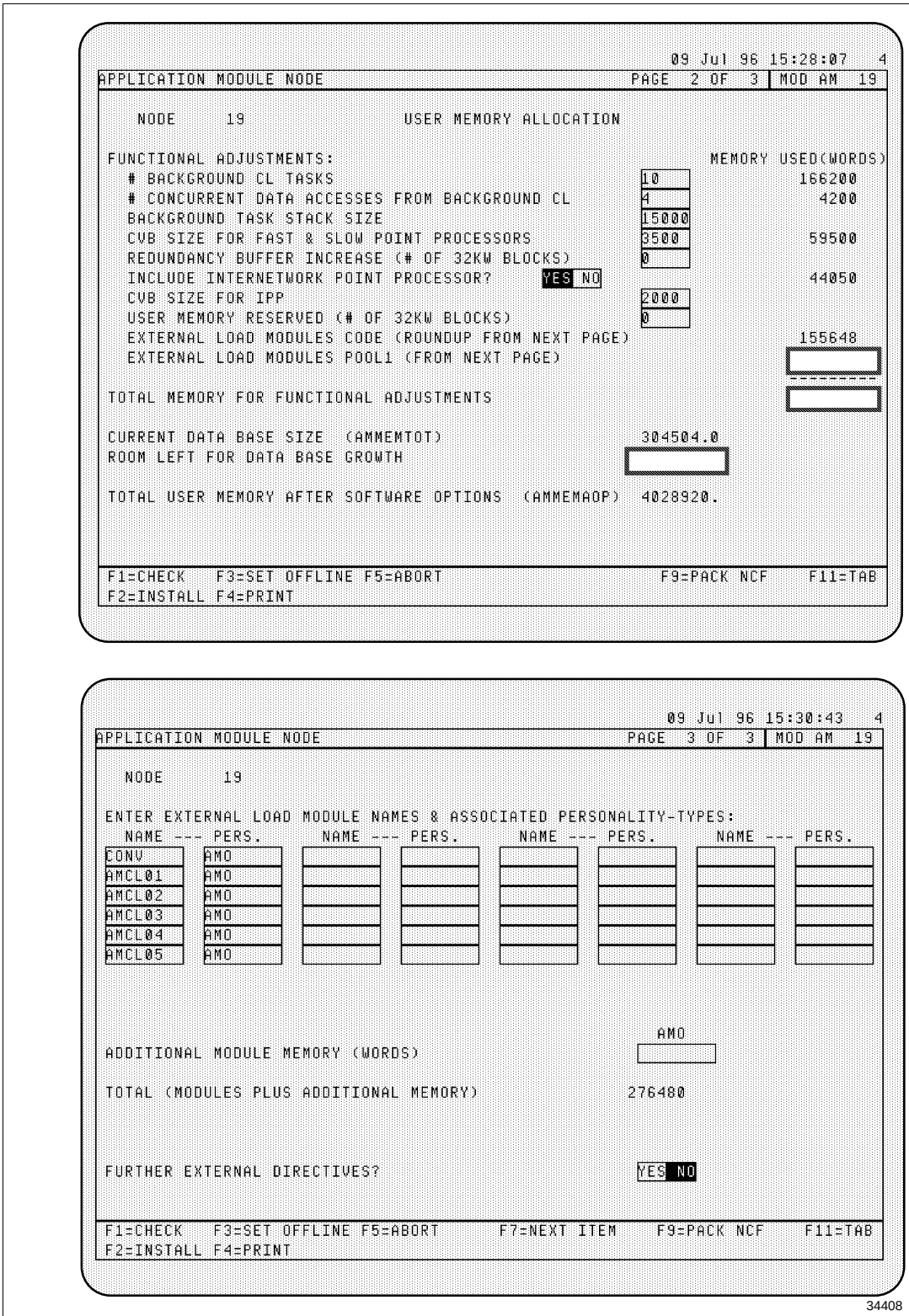


Figure 17 - Written Exercise—NCF Pages 2 and 3

SOLUTIONS

The following solutions apply to the preceding exercises.

This exercise helps you understand the meaning of various parameters in the displays.

1. Enter the answer(s) in the left column by selecting the correct choice from the right column.

1. F	Loader Directive Record	A. MEMFREE
2. G	Set definition file	B. A loadable object file consisting of executable program code.
3. C	Current database size	C. AMMEMTOT
4. D	Total user memory after software options	D. AMMEMAOP
5. E	Heap	E. POOL1 and POOL2
6. A	User memory still available	F. Page 3 of node configuration for the AM.
7. B	Load Module	G. File written by Honeywell to define calling sequences in a load module or set.

2. The following exercise helps you to become familiar with the memory allocation of the AM.

   Given the displays on the next page in Figure 17, calculate the following:

Total Memory for functional adjustments	*550430*
Room left for database growth	*3173986*
External Load Modules POOL1	*120832*

   Solutions to the exercises are:

   First, calculate the External Load Modules POOL1 amount:

   ```
      276480   From Page 3, Total (Modules plus additional memory)
   -  155648   From Page 2, External Load Modules — Roundup amount
      120832   Result (see Page 2) is External Load Modules POOL1
   ```

   Then calculate the Total Memory for Functional Adjustments:

   ```
      166200   From Page 2, BACKGROUND CL TASKS
   +    4200   From Page 2, CONCURRENT DATA ACCESSES FROM BACKGROUND CL
   +   59500   From Page 2, CVB SIZE FOR FAST & SLOW POINT PROCESSORS
   +   44050   From Page 2, INTERNETWORK POINT PROCESSOR
   +  155648   EXTERNAL LOAD MODULES CODE
   +  120832   Above & Page 2, EXTERNAL LOAD MODULES POOL1
      550430   See Page 2, TOTAL MEMORY FOR FUNCTIONAL ADJUSTMENTS
   ```

   Then calculate the Room Left for Database Growth:

   ```
     4028920   From Page 2, TOTAL USER MEMORY AFTER SOFTWARE OPTIONS
   -  304504   From Page 2, CURRENT DATABASE SIZE
   -  550430   Above & Page 2, TOTAL MEMORY FOR FUNCTIONAL ADJUSTMENTS
     3173986   See Page 2, ROOM LEFT FOR DATABASE GROWTH
   ```

```
                                                    09 Jul 96 15:29:36   4
APPLICATION MODULE NODE                          PAGE  2 OF  3 | MOD AM  19

   NODE     19                USER MEMORY ALLOCATION

FUNCTIONAL ADJUSTMENTS:                                      MEMORY USED(WORDS)
  # BACKGROUND CL TASKS                              10              166200
  # CONCURRENT DATA ACCESSES FROM BACKGROUND CL      4                 4200
  BACKGROUND TASK STACK SIZE                        15000
  CVB SIZE FOR FAST & SLOW POINT PROCESSORS         3500             59500
  REDUNDANCY BUFFER INCREASE (# OF 32KW BLOCKS)     0
  INCLUDE INTERNETWORK POINT PROCESSOR?     YES NO                  44050
  CVB SIZE FOR IPP                                  2000
  USER MEMORY RESERVED (# OF 32KW BLOCKS)           0
  EXTERNAL LOAD MODULES CODE (ROUNDUP FROM NEXT PAGE)              155648
  EXTERNAL LOAD MODULES POOL1 (FROM NEXT PAGE)                     120832
                                                                   -------
TOTAL MEMORY FOR FUNCTIONAL ADJUSTMENTS                            550430

CURRENT DATA BASE SIZE  (AMMEMTOT)                 304504.0
ROOM LEFT FOR DATA BASE GROWTH                     3173980.

TOTAL USER MEMORY AFTER SOFTWARE OPTIONS  (AMMEMAOP)  4028920.

F1=CHECK   F3=SET OFFLINE F5=ABORT                    F9=PACK NCF    F11=TAB
F2=INSTALL F4=PRINT
```

```
                                                    09 Jul 96 15:31:37   4
APPLICATION MODULE NODE                          PAGE  3 OF  3 | MOD AM  19

  NODE      19

ENTER EXTERNAL LOAD MODULE NAMES & ASSOCIATED PERSONALITY-TYPES:
  NAME --- PERS.     NAME --- PERS.     NAME --- PERS.     NAME --- PERS.
CONV    AMO
AMCL01  AMO
AMCL02  AMO
AMCL03  AMO
AMCL04  AMO
AMCL05  AMO

                                                    AMO
ADDITIONAL MODULE MEMORY (WORDS)

TOTAL (MODULES PLUS ADDITIONAL MEMORY)             276480


FURTHER EXTERNAL DIRECTIVES?                       YES NO

F1=CHECK   F3=SET OFFLINE F5=ABORT     F7=NEXT ITEM    F9=PACK NCF    F11=TAB
F2=INSTALL F4=PRINT
```

34409

Figure 18 - Solutions—NCF Pages 2 and 3

LAB TIME

≈45 Minutes

Use your assigned US/GUS.

Take with you:
- This module

LAB EXERCISE

The lab exercise helps you become familiar with the node configuration for the AM. You will modify an NCF, then observe the changes you have entered. The entries of Page 1 of this display were covered in an earlier course module and will not be reviewed here.

ATTENTION

DO NOT INSTALL THESE CHANGES IN THE SYSTEM

Each Training Center has procedures in place to safeguard the integrity of their NCF. Some Training Centers may require this lab to be performed on separate course manager approved equipment. Before beginning, be sure to check with your course manager to verify that you are following local procedures.

1. Copy the Training Center's NCF.CF in Volume &ASY to removable media or emulated disk (GUS only). If you do not have removable media, ask your course manager for assistance.

2. From the Engineering Main Menu, select the SUPPORT UTILITIES target.

   Select the MODIFY VOLUME PATHS target and modify your NCF pathname. Your pathname should point to removable media or emulated disk and could look like this:

   ```
   NETWORK CONFIG
   $Fn>&ASY
   ```

   Have your course manager initial that it is OK to proceed with the rest of the lab.

   _____

3. Return to the Engineering Main Menu and select the target [LCN NODES] .

4. Select an AM node that has been defined.

5. Select the target [MODIFY NODE] . Although the page may show page 2 of the NCF display, press [ENTER] to modify the node. A temporary NCF workfile will be modified by you.

6. You will notice in the upper right-left corner of the screen that MOD AM ## appears, where ## is the AM node number. If it does not, ask your course manager for assistance.

7. In the next steps you will change entries on pages 2 and 3 and see how they affect total memory. Because each Training Center's database may vary, some initial values will be entered here.

   On page 2, set the number of background CL tasks and the number of concurrent data accesses to zero (0). Press the [ENTER] key.

   On page 3, delete the following items in the NAME and PERSonality column:

NAME	PERS
FILE	AMO
AMCL05	AMO

   Press the [ENTER] key.

8. Write down the values listed under the “Memory Used (Words)” column, so that you can see how they change as you change the functional adjustment values.

Functional Adjustments:	Memory Used (Words) Initial Values
#Background CL Tasks	_____
#Concurrent Data Accesses from Background CL	_____
CVB Size for Fast & Slow Point Processors	_____
Include Internetwork Point Processor?	_____

9. Change # Background CL Tasks from zero to a number from 1 - 10.

   Did the number of concurrent data accesses change to one? _____

   This occurs automatically when the number of CL tasks is changed from zero to a number 1 - 10.

   Note that as you change any functional adjustment, the room left for database growth changes.

10. Change the background task stack size. Note that this also affects the total for functional adjustments, but that the total is rolled up in the # Background CL task column.

11. Make changes on this display until you feel comfortable with it, then page forward to page 3.

12. Type in the Load Module names FILE and AMCL05 in the NAME column, and AMO in the PERSonality column.

13. Press [ENTER].

14. Observe that an amount appears in the total (modules plus additional memory) port.

    Write that amount here _____

15. Page back to page 2 of this display. Observe on page 2 that memory amounts now appear for the external load modules. Enter those amounts here:

    External Load Modules Code _____

    External Load Modules POOL1 _____

    If you add these two numbers, they should equal the amount you entered in Step 14.

16. Observe that the amounts in Step 15 are part of your total adjustments.

17. Practice making entries on this display.

18. When you are satisfied with this exercise, do not install the NCF. You can end this lab by "aborting" your changes. (Press [CTL], [F5] then [ENTER] to abort.) Proceed with the Criterion Test.

19. Change the &ASY volume pathname back to NET>&ASY.

End of Lab Exercise

SOLUTIONS

9. Change # Background CL tasks from zero to a number 1 - 10.

   Did the number of concurrent data accesses change to one? *YES*

   This occurs automatically when the number of CL tasks is changed from zero to a number 1 - 10.

   Note that as you change any functional adjustment, the room left for database growth changes.

14. Observe that an amount appears in the total (modules plus additional memory) port.

    Write that amount here *Values from screen may vary, but should equal the sum of values in Step 15*

15. Page back to page 2 of this display. Observe on page 2 that memory amounts now appear for the external load modules. Enter those amounts here:

    External Load Modules Code *Values from screen may vary*

    External Load Modules POOL1 *Values from screen may vary*

    If you add these two numbers, they should equal the amount you entered in Step 14.

DIRECTIONS

This is the end of the study material for this module. Discuss questions concerning the study material or the lab activities with a colleague or a course manager.

If you are satisfied that you have achieved the objectives of this module, proceed with the following Criterion Test.

Criterion Test

1. Describe, to your course manager, the overall meaning of each of the Application Module's Network Configuration displays.

2. In general terms, describe what affects the total amount of memory available for users.

Self–Evaluation

1. Describe, to your course manager, the overall meaning of each of the Application Module's Network Configuration displays.

   One of the major decisions you will make in configuring the AM is to allocate AM memory. This is the overall purpose of the second page that appears during AM node configuration. Display 1 is an example of that page.

   Another major decision you will make in configuring the AM is to specify the optional software called "External Load Modules" that you can load into an Application Module. Display 2 is an example of that page.

2. In general terms, describe what affects the total amount of memory available for users.

   The total amount of user memory available in AMs is a function of the total AM size.

   The memory could be divided by you into four sections:

   1. *Memory for functional adjustments*
   2. *Memory for software options*
   3. *Spare memory*
   4. *Memory for database*

DIRECTIONS

This is the end of this module. Choose another module (for which you are eligible) from the course map and begin working on it, or check with your course manager.

LAST PAGE