North American Response Center

HP 3000 APPLICATION NOTE #32

Configuring Terminal Buffers

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RESPONSE CENTER APPLICATION NOTES

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Configuring Terminal Buffers

Introduction

Terminal Buffers (TBUFs) are used to buffer all input from and output to terminals and all output to serial printers. The number of buffers needed on each system depends on the number of concurrent terminal users. A larger number of TBUFs must also be allocated if users are working in block mode using VPLUS/3000, since this requires a larger amount of data to be transferred to and from the terminal.

A popular recommendation for configuring terminal buffers (especially if using block mode applications) is to "max them out". However, if you've encountered an ATP or ADCC message when bringing up your system, you know it's not obvious what the maximum is. Formulas for calculating TBUFs are published in the *Data Communications Handbook* (Part No. 5957-4633) but the values are inaccurate. The new version of the *Point-to-Point Workstation I/O Reference Manual* (Part No. 30000-90250) contains the correct information. This note explains the correct values and will help you avoid configuring terminal buffers per port by trial and error.

The first section of this Application Note addresses over configuration of TBUFs per port and includes sample messages, formulas for ADCC only systems, formulas for ATP only systems, and instructions for systems with a mixture of port types. The second section covers the under configuration of TBUFs, gives some sample messages and gives the minimum requirements for proper operation of both types of ports. The final section is a glossary of terms.

The information in this note pertains to release G.00.00 (MPE V/E) and later; all numbers are in decimal.

Over-configured TBUFs

The following messages may appear when you start up your system. They indicate that the value configured for TBUFs per port is too large for the system to handle. The formulas in this note will show you how to calculate the maximum value you can enter to eliminate these messages:

> ATP MESSAGE (1) The data segment size needed for DRT *nn* is *mm* words too large. The number of terminal buffers and/or the number of units must be reduced for the DRT
>
> ADCC MESSAGE (7) The ADCC terminal data segment needed is larger than the maximum allowable data segment. The total number of TBUFs has been reduced from *nn* to *mm*. The ADCC devices may not operate correctly

This note explains the correct values and will help you avoid configuring terminal buffers per port by trial and error.

Calculating TBUFs for ADCC Ports

One Terminal Data Segment (TDS) is built to contain the TBUFs for all ADCC ports on the system (the maximum number supported is 60). The MAXIMUM EXTRA DATA SEGMENT SIZE configured via SYSDUMP is *not* a restriction on the size of this data segment.

The ADCC software will build a data segment up to a maximum size of 32,760 words.

In the TDS, there are 1,776 words of fixed overhead, 214 words of overhead per device and 69 words per TBUF. Hence, the formula:

$$\{32760 - [1776 + (\#ports * 214)]\} / 69$$

will yield the maximum number of TBUFs that will fit in the TDS. Dividing this result by the number of ports will give the maximum number of TBUFs per port that can be configured without causing the ADCC MESSAGE (7).

For example, your HP 3000 Series 48 has 32 ADCC ports configured. If you fill in the formula

$$\{32760 - [1776 + (32 * 214)]\} / 69 = 349$$

you will notice that a maximum of 349 TBUFs will fit into your data segment. Note the result is rounded *down* to the nearest whole number. Therefore,

$$349 / 32 \text{ ports} = 10.$$

Ten is the maximum number you can enter as a response to TERMINAL BUFFERS PER PORT? and still avoid the ADCC message (again, rounded down to the nearest whole number).

Calculating TBUFs for ATP Ports

ATP terminal buffers are a bit more complicated. The terminal buffers are in the Terminal Data Segment (TDS) but there may be more than one data segment used. One data segment is built for units 0 through 47 and another for units 48 through 95 on each Device Reference Table (DRT). As with ADCCs, the configured MAXIMUM EXTRA DATA SEGMENT SIZE is not a limitation; you can still build a data segment up to 32,760 words.

In each ATP TDS, there are 2,032 words of fixed overhead, 184 words of overhead per port and the buffers are 69 words long. Therefore, the formula

$$\{32760 - [2032 + (\#ports * 184)]\} / 69$$

will provide the maximum number of terminal buffers per data segment. Dividing this result by the number of ports will give you the maximum value for "terminal buffers per port" without getting the ATP MESSAGE (1). Remember that each data segment has to service a maximum of 48 ATP ports.

For example, your HP 3000 Series 68 has 64 ATP ports configured (DRT 8, Units 0 through 63). The first TDS will serve units 0 to 47, so we fill in the formula as follows:

$$\{32760 - [2032 + (48 * 184)]\} / 69 = 317.$$

From this we see that 317 TBUFs will fit into this data segment, which works out to 6 per port (317 / 48 = 6). The second data segment will serve units 48 to 63, therefore, you should fill in the formula like this:

$$\{32760 - [2032 + (16 * 184)]\} / 69 = 402.$$

Note that 402 TBUFs will fit into this data segment, which works out to 25 per port (402 / 16 = 25; still rounding down to the nearest whole number). Since you can only configure *one* value for TBUFs per port, you must use the *lower* of the two results to have the most TBUFs possible and still avoid the ATP MESSAGE. Therefore, you use the value 6 TBUFs per port.

This process will need to be repeated for each DRT configured on the system.

Calculating TBUFs with a mixture of port types

If your system has a mixture of ATPs and ADCCs, each must be calculated individually, using the appropriate formula described above. The *lowest* of the values derived is the highest value you can use and still avoid the ATP/ADCC messages when starting your system. With a mixture of port types, it is possible to get an ATP MESSAGE or an ADCC MESSAGE or both.

These ATP and ADCC messages are *informational only.* If you have over configured, you will see the messages displayed on the console each time your system is booted, but the operating system will adjust automatically to give you as many TBUFs as will fit. If you ignore these messages, nothing will happen and your ports will work just as well as if you had "maxed-out" the TBUFs.

Under-configured TBUFs

On the opposite end of the spectrum, if your TBUFs are under configured, you may receive the following message(s):

> ATP MESSAGE (24) The number of terminal buffers for DRT *nn* has been increased to the minimum number *mm* allowed for the *pp* unit.
>
> ADCC MESSAGE (8) The number of ADCC terminal buffers has been increased to the minimum *n* per ADCC device.

The system requires a minimum amount of terminal buffers in order to function. This is calculated based on your I/O configuration. If your configured number of terminal buffers per port is inadequate, you will see the appropriate error message listed above and the system will adjust up to its calculated minimum. In this case, you may see negative results. For example, terminal I/O may be slowed, depending on the system load. This is usually noticed in block mode VPLUS/3000 applications when the cursor pauses periodically while painting the screen.

The following table shows the minimum number of terminal buffers needed in each case, based on the number of ports configured:

with ADCC ports

```
 1 to 36 - 7  TBUFs/port
37 to 44 - 6  TBUFs/port
45 to 52 - 5  TBUFs/port
53 to 60 - 4  TBUFs/port
61 to 64 - 3  TBUFs/port
```

with ATP ports

```
1 to 96 ports - 5 TBUFs/port
```

On systems with a mixture of ADCCs and ATPs, it is possible to get into a Catch-22 situation. For instance, your HP 3000 Series 58 has 48 ATP ports and 36 ADCC ports. If you configure 6 TBUFs per port, you will get ADCC MESSAGE (8) indicating TBUFs are under configured (the system will adjust upward to 7 per port for the ADCCs). If you change the TBUFs per port to 7, you will get ATP MESSAGE (1) indicating you have over configured (now the system will adjust the TBUFs down to fit into the TDS). As you see, nothing can be done unless you want to de-configure some ports.

As a general rule, for system performance, it is better to over configure than to under configure . If you decide to take the defaults when configuring your system, you may still encounter some of these errors. The default number of terminal buffers per port for the ADCC TDS is 7 and for the ATP TDS is 10.

Glossary

ADCC - Asynchronous Data Communications Channel: an I/O controller for low and medium speed bit-serial asynchronous devices; supports speeds up to 9600 baud. ADCC ports are commonly used on the HP 3000 Series 4X and 5X systems.

ATP - Advanced Terminal Processor: an I/O controller for low, medium, and high speed bit-serial asynchronous devices; supports speeds up to 19.2K baud. ATP ports are the only ports supported on the HP 3000 Series 68 and 70. They may also be installed on the 4X and 5X systems.

DRT - Device Reference Table: this table has one four-word entry for each device on the system, containing the addresses of the driver and the interrupt handler for the device. The DRT number used in SYSDUMP is an index into this table.

PORT - Port is a generic term used to describe the connections used to attach peripherals (for example, terminals and printers) to the system. Some port types used on the HP 3000 are ADCCs and ATPs.

TDS - Terminal Data Segment: an area of memory set aside to contain the terminal buffers used for input and output and other information that is needed for accessing the terminal and serial printer devices on the system. There may be one or many terminal data segments built, depending on the type and number of ports configured on the system.

TBUF - Terminal BUFfer: TBUFs are contained in the TDS and are used to hold the data that is to be written to a terminal or serial printer device. Since each TBUF is only 69 words long, (138 characters) it may take several TBUFs to complete one read or write (VPLUS/3000 uses many TBUFs because it has to write forms information in addition to data). TBUFs also hold the data transmitted from the terminal to the HP 3000 until the system can process it.

BACK ISSUE INFORMATION

Following is a list of the Application Notes published to date. If you would like to order single copies of back issues please use the *Reader Comment Sheet* attached and indicate the number(s) of the note(s) you need.

Note #	Published	Topic
1	2/21/85	*Printer Configuration Guide (superseded by note #4)*
2	10/15/85	*Terminal types for HP 3000 HPIB Computers (superseded by note #13)*
3	4/01/86	*Plotter Configuration Guide*
4	4/15/86	*Printer Configuration Guide - Revised*
5	5/01/86	*MPE System Logfile Record Formats*
6	5/15/86	*Stack Operation*
7	6/01/86	*COBOL II/3000 Programs: Tracing Illegal Data*
8	6/15/86	*KSAM Topics: COBOL's Index I/O; File Data Integrity*
9	7/01/86	*Port Failures, Terminal Hangs, TERMDSM*
10	7/15/86	*Serial Printers - Configuration, Cabling, Muxes*
11	8/01/86	*System Configuration or System Table Related Errors*
12	8/15/86	*Pascal/3000 - Using Dynamic Variables*
13	9/01/86	*Terminal Types for HP 3000 HPIB Computers - Revised*
14	9/15/86	*Laser Printers - A Software and Hardware Overview*
15	10/01/86	*FORTRAN Language Considerations - A Guide to Common Problems*
16	10/15/86	*IMAGE: Updating to TurboIMAGE & Improving Data Base Loads*
17	11/01/86	*Optimizing VPLUS Utilization*
18	11/15/86	*The Case of the Suspect Track for 792X Disc Drives*
19	12/01/86	*Stack Overflows: Causes & Cures for COBOL II Programs*
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26	4/15/87	*HP 2680A, 2688A Error Trailers*
27	5/01/87	*HPTrend: An Installation and Problem Solving Guide*
28	5/15/87	*The Startup State Configurator*
29	6/01/87	*A Programmer's Guide to VPLUS/3000*
30	6/15/87	*Disc Cache*
31	7/01/87	*Calling the CREATEPROCESS Intrinsic*

READER COMMENT SHEET

North American Response Centers
HP 3000 Application Note #32: Configuring ATP/ADCC Ports
RC Questions & Answers (July 15, 1987)

We welcome your evaluation of this Application Note and attached RC Questions & Answers Sheet. Your comments and suggestions help us to improve our publications. Please explain your answers under Comments, below.

	AppNote	RC Q&A
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HEWLETT PACKARD RESPONSE CENTER QUESTIONS & ANSWERS

HP 3000 Questions Commonly Received by the North American Response Centers

Q. In the *MPE/iX Reference Manual* (Part No. 30249-90001) there are examples of FORM NAMES that are greater than four characters in length but my IBM system will not except a form name greater than four characters. Can I still make use of a form name containing more than four characters?

A. Yes if a standard rather than a special form is specified in the IBM JCL, you can make use of the PU= and PR= parameters in the MRJE SUBMIT command. Either PU or PR can specify a form name of up to eight characters. The form name must be included in MRJETABL. The PU and PR parameters, rather than the JCL entry, will be used to route the output.

Q. Why do Hewlett Packard's 6250 CPI tape drives encounter more errors on my tapes than other vendor's drives?

A. Other 6250 CPI tape units allow writing to a tape which contains a single track error (STE). This is due to the 2 track error correction capabilities of 6250 CPI tapes. Writing one bad track can be tolerated and still allow for read data recovery.

However a tape written under this condition has already eliminated 50% of the error correction capabilities in the read. The capability still exists in the read, but because the tape was written with a STE, the read electronics have to begin error correcting immediately. Thus for this tape, only one additional track is allowed to fail, during a read, before the complete error correction capability is eliminated.

To minimize HP does write retries if a STE is encountered during a write. The retry algorithm is a user selectable parameter level in the HP tape unit. The logic for the retries is as follows:

1. The data written on tape should be as error free as possible. Due to the high bit density, approximately 55 microinches of head to tape separation while reading can cause loss of data. Thus a minute particle can cause data loss. The full 2 track error correction can improve data recovery and minimize data loss.

2. If the data can not be written to tape with 10 retries (approximately 50 inches of tape) something other than media may be at fault. Note: Some non-HP drives will continue to write data with a track completely missing.

As implied in the beginning, nothing is obtained without sacrifice. HP gave up the ability to write on error tape for the full benefit of the 6250 CPI read error correction capabilities.

more...

Q. I have received several of the following CS IO Errors:

```
INVALID INTERRUPT ON LDEVxxx INP SHUT
INP RAM DUMPED IN INPLOGnn

DATA COMM ERROR DETECTED ON LDEVxxx
INP RAM DUMPED IN INPLOGnn
```

Is my INP broken?

A. Receiving an INP RAM DUMP does not always indicate your INP is broken. To determine the nature of the problem the dump needs to be formatted and read. To format the INP RAM DUMP follow the procedure below:

```
:FILE INPDUMP= INPLOGnn.PUB.SYS    (nn is the logfile number    )

:FILE INPLIST;DEV=LP,1             (defers the output listing   )

:RUN INPDPAN.PUB.SYS,FULLDUMP      (formats INP RAM DUMP        )

:RUN SPOOK5.PUB.SYS                (to read the dump            )

     >SHOW                         (shows the file number       )
                                   ( #ONNN XXXXXXXXXXXXXXXXXX )

     >TEXT NNN                     (NNN is the file number      )

     >FIND @"LAST CS ERROR"        (this will print the last cs)
                                   (error code                  )

     >LIST 140/LAST                (this will print the failure)
                                   (code                        )
```

If the FAILURE CODE is non-zero (for example, 0004) a software interrupt occurred. This could be caused by noise on the line. You should check your equipment, modem(s), cable(s), or the phone line.

If the FAILURE CODE is zero (0000), additional tests need to be made to determine the cause of the failure. You should call the Response Center with the formatted dump information for assistance in resolving the problem.