NORTHSHARE

TIME-SHARE
DISC BASIC
SYSTEM

FOR

THE

NORTH STAR
FLOPPY DISK
SYSTEM

WRITTEN BY

THE

BYTE SHOP

of

WESTMINSTER, CA

14300 BEACH BLVD.

92683

INTRODUCTION

Please note that the I/O configuration of the NORTHSHARE system requires that the documentation be thoroughly read thru several times to avoid confusion and errors.

The NORTHSHARE system and associated support programs have been developed to run only with the standard address sets of the NorthStar software and hardware. No other prom or software addresses are supported. Also, the software will not timeshare on a SOL computer due to the serial port configuration, nor will it operate with memory mapped video I/O drivers such as the Merlin, VDM-1, VTI-64, Matrox, Flashwriter and others.

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THE BYTE SHOP
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NORTHSHARE SYSTEM

If you are like most North Star disk owners, your system probably spends an incredible amount of time waiting on your terminal to print out, or for you to enter the next input.

THE BYTE SHOP of WESTMINSTER NORTHSHARE system allows you to make much better use of your 8080 or Z-80 CPU by allowing you to connect two to four terminals to your system and running NORTH STAR BASIC in a timesharing mode.

Each terminal will use (share) the same copy of BASIC, but will have its own program and data areas. This way more than one user can run BASIC simultaneously; but independent of the other user(s).

How is this accomplished? NO ADDITIONAL HARDWARE beyond the terminals and interface cards you decide to include in your system is needed. A task supervisor which consists of I/O drivers for your terminals and a task dispatcher are provided in software. All bookkeeping is done by the supervisor. CPU time is divided up as needed among the various BASIC users.

CAPABILITIES

1. All North-Star Basic functions except:
a. Assembly language subroutines which do not meet certain requirements.
b. PRINT #n, etc.
   INPUT #n, etc.

i.e., INPUT or PRINT from other than the users own terminal (-Unless supervisor compatible modifications are made by the user).

2. All North-Star DOS commands except:
a. DT
b. IN
c. Any other command which would destroy the resident copy of BASIC.

3. Task-task communication. Two or more users programs can communicate through any unused memory with EXAM and FILL.

4. Fast return to BASIC from the DOS through:
a. BA - return to BASIC, previous program is still intact.
b. BI - return to BASIC, reinitialize data and program

areas.

ADDITIONAL FEATURES

1. Software buffering of terminal output. This can improve throughput at one terminal over non-timesharing if a slow I/O device is involved.

2. Buffer for terminal output is automatically purged on "control-C" for fast program abort.

3. Several user-settable parameters for performance optimization.

WHAT IT DOES NOT DO

1. Provide or support memory protection. Each user has access to the others memory space through EXAM and FILL. It is possible to "clobber" another users program or data.

2. Utilize hardware vectored or clock interrupts. All I/O is done on a periodic status sense basis.

3. Support virtual memory or memory management.

4. Provide simultaneous disk I/O and CPU processing. This means that any disk access made by one user will "halt" all other users during the brief time that the transfer of data is going on. Processing will resume after completion. This is inherent in the design of the North Star disk controller access software - and currently no departure from this scheme has been made for NORTHSHARE.

DESCRIPTION OF RELEASE DISK

Your diskette was delivered to you with the standard 24K byte system. This means you need at least 24K bytes of RAM (memory) beginning at 2000 hex (through 7FFF hex). Your disk controller must be located at the standard E900 hex address. NORTHSHARE will not run properly if your system does not meet these minimum requirements. Using the LI command from your old DOS, you will discover that the diskette contains four files. The first file on the diskette (identified as

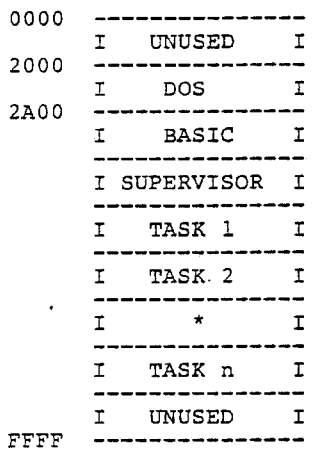
NORTHSHARE) actually consists of three parts:

1. NORTH STAR DOS (Modified)
2. NORTH STAR BASIC (Unmodified)
3. NORTHSHARE Supervisor

They have been combined into a single file to provide simple start-up operation at boot time. All terminals included in your system will print out "READY" and accept basic statements immediately after boot, but this will happen only after the system has been "generated" to meet your specific configuration. (see Personalization section)

Any terminal may use the BYE command to exit to the DOS to create, list directory, etc., and can return to BASIC through the BA command; or the BI command if it is desired that the work area be reinitialized. Note that only one terminal can be "in the DOS" at a time. Any attempt by a user to exit to the DOS from BASIC with the BYE command while the DOS is in use will result in a message, followed by return to BASIC with the program area still intact.

The standard version of NORTHSHARE resides in memory as follows:



Although the number of tasks (users) is set to one initially, the allocation of the memory above the NORTHSHARE supervisor can be modified to accomodate a combination of various Basic application program sizes. This can be done through the use of the BASIC programs NORTHGEN and NORTHMOD

provided on the release diskette. NORTHMOD will change the allocation in the memory resident copy of NORTHSHARE, whereas NORTHGEN will change the "default" system values by changing the copy of NORTHSHARE on diskette, hence the change made will not have an effect until you reboot.

As released, the standard 24K version requires 5K taken by the supervisor and about 14K by DOS & BASIC. This leaves about 5K to be divided up among the number of terminals (users) supported for program/data areas. The system can be expanded to utilize up to 48K bytes RAM between 2000 & DFFF.

On an 8080 running at 2 Mhz, 3 is probably the maximum number of terminals you would likely get reasonable response with, but this depends on what you are running and the baud rate of the terminals you have on your system. A Z-80 CPU at 4 Mhz will provide better response. Remember the amount of memory available quickly limits the number of users you can have, especially if the program and data areas for each must be large.

PERSONALIZING YOUR NORTHSHARE SYSTEM

Just as it was necessary for you to "personalize" the DOS for your system I/O when you first received your NORTHSTAR MDS system, it is necessary to "personalize" NORTHSHARE. The procedure has been somewhat simplified because a program has been written to help you. The following outlines the procedure you should follow:

1. Enter one of your old diskettes into the drive and "boot" your existing DOS.

2. Remove your old diskette and insert the NORTHSHARE release diskette. It contains the BASIC program NORTHGEN which will assist you in personalizing your system.

3. Type: GO BASIC
This copy of BASIC, the very same one used when you are timesharing, is NORTHSTAR version 6 release 3. It contains features necessary for the execution of the NORTHGEN program. Contact NORTH STAR if you do not already have release 3 BASIC and desire information on its additional features.

4. Type: LOAD NORTHGEN
RUN

5. The NORTHGEN program will now prompt you to enter a command or function.

6. There are six functions available from NORTHGEN. All six are described below, and a sample run of NORTHGEN has been included in this documentation for your reference.

a. MEM - permits selection of memory allocation for each of the enabled terminals (tasks). If you wish to change the assignment as released, simply enter the highest RAM address you wish to utilize in hex. Then apportion the memory among the four possible tasks. If you don't want all four tasks, enter a zero. The value entered for each task should be a decimal (base 10) value.

b. EXC - permits selection of the maximum number of BASIC statements executed for any task before the CPU is turned over to another ready task. (See performance section)

c. BUF - permits the selection of minimum amount of space necessary for resumption of any task which is attempting to fill the output buffer, i.e. the task is doing PRINT statements. (See performance section)

d. TSK - this parameter allows the enabling of any number of terminals from 1 to 4. If you do not need more than "n" terminals in operation, set this value to "n".

e. IOV - this function will prompt you to enter the I/O port, and status information necessary to communicate with your terminals. The different parameters requested for each terminal (task) are as follows:

i. IDP - input data port number. Enter two hex digits to define the 8080 port number to be used for the INput instruction.

ii. ISP - input status port number. Two hex digits define the 8080 port number to get "input charactor ready signal".

iii. ISM - input status mask. Enter two hex digits to select which single bit indicates when a character is ready to input.

iv. ISC - input status complemented. Enter a 1 if the status bit selected by the mask ISM above will be a 0 or low when the character is ready. Otherwise enter a 0 (zero).

v. ODP - output data port number. Enter two hex digits to

define the 8080 port number to be used for the OUTput instruction.

vi. OSP - output status port number. Two hex digits define the 8080 port number to get "output character ready signal".

vii. OSM - output status mask. Enter two hex digits to select which single bit indicates when the terminal is ready to accept another character.

viii. OSC - output status complemented. Enter a 1 if the status bit selected by the mask OSM above will be a 0 or low when the terminal is ready. Otherwise enter a 0 (zero).

f. INI - this function permits the coding of a short machine language program to be executed on NORTHSHARE startup. Its purpose is to initialize any terminal interface devices (serial I/O cards) which require some initialization before normal operation can be expected. The Intel 8251 chip is an example of an interface device with such a requirement. It is used in the IMSAI SIO interface, among others. Enter pairs of hexadecimal digits to define the initialization routine, the entry of "C9" (RETurn instruction) will terminate the input mode.

7. The NORTHSHARE system is now configured. Reboot your system while the NORTHSHARE diskette is in the drive. NORTHSHARE should come right up.

8. If you have trouble, you probably did not correctly enter the necessary information to commands I0V and INI as explained above.

9. If you wish to change your system configuration simply run NORTHGEN again.

10. Temporary changes to the currently-running in-core copy of NORTHSHARE can be made by running NORTHMOD. It's commands are similar to those of NORTHGEN, but do not affect your diskette copy.

PROGRAMMING TO GET BEST RESULTS

The best overall performance will be obtained when I/O and CPU time are overlapped as much as possible. This can be achieved by writing your programs with as short and simple statements as feasible. Input & Output can be initiated only after completion of a computational statement - hence the

breaking up of involved expressions will maximize the amount of I/O possible. Overly involved calculations or excessively nested functions can cause noticable timesharing degradation or undesirable delays at the other tasks (terminals). Some parameters can be adjusted to optimize your system - See performance section. Execution of a CALL statement can severly degrade or "crash" the system if it uses too much CPU time or does not return quickly or properly to BASIC. The user is cautioned to thoroughly test a machine language routine while there are no other users on the system before calling it while important activity is going on at other terminals.

THE DOS - NORTHSHARE INTERFACE

All I/O is routed through the North Star DOS transfer jump instructions to the NORTHSHARE I/O handling routines. The NORTHSHARE routines currently support only the user terminals. This means that INPUT #n, or PRINT #n, where n is non-zero will reference the users terminal anyway, even though multi-deviced I/O capability is supported by North Star BASIC. This can be overcome by changing the DOS transfer jump instructions and using the A-register values to "intercept" I/O requests. It is suggested that this be attempted only if you are familiar with machine language for 8080 or Z80 systems. The intercepting routine must pass the associated registers to NORTHSHARE if terminal I/O is requested, and in any case must not "hang" in a status sense loop as is frequently done in small system I/O routines. Excessive delays will degrade overall performance.

PERFORMANCE

The ability to "tune" your system to optimize the performance and response characteristics has been provided. The task dispatcher receives control to decide what to do next at the following times:

1. The currently running program executes an INPUT statement. No more computation can be done for this terminal until user input is received.

2. The current statement execution has completed.

3. The buffer for the users print output is full - no more can be done until space is available in the buffer.

Number 1 above cannot be controlled. The computer must wait for the user to enter the data before the program can resume.

Number 2 above, can be controlled through the statement execution count - the maximum number of statements executed before going to another task ready to execute. Set EXCCNT to the desired value 1-255 (use the EXC function of NORTHGEN or NORTHMOD to set default or temporary values of this parameter).

Number 3 above, can be controlled for each terminal by setting the number of characters that must be available in the 256 byte circular output buffer provided for each terminal. Use the BUF function of NORTHMOD or NORTHGEN.

Selection of the proper or "best" values for you depend on the speed of your terminals, the number of user terminals in the system and the nature of the application programs run at each. Excessively large values of the execution count EXCCNT can cause noticeable delays at the keyboard. Small values of either of the parameters can cause excessive "thrashing" - degraded performance will result.

INTERTASK COMMUNICATION

It is possible to communicate between two or more programs (tasks) via EXAM and FILL. This is desirable when more than one user would like to write to the same data file. Without some communication between them to prevent simultaneous accessing of the file, loss of data integrity would be possible because each user has file I/O buffers in his own data area.

Should one program need to wait for another to complete an operation or give a go-ahead signal, it is possible for this program to relinquish control of the CPU to other tasks. This is acheived by calling (via CALL) the dispatcher from the BASIC program. Control will be returned to the task when all other ready tasks have had a chance to execute. After regaining control the program can test the desired location used for communication via EXAM. The location that should be CALLED is provided by the NORTHMOD program. (Dispatcher entry) Run NORTHMOD, and use the dispatcher address displayed in your BASIC program.

CONCLUSION

Although you cannot hope to have the processing of an IBM 370 or a CDC 6600, NORTHSHARE should provide a means to get more out of your Z-80 or 8080 processor, and for some applications reduce the per/terminal cost of using microcomputers.

```
*go basic
READY
load northgen
READY
run

NORTH-SHARE GENERATION

YOUR SYSTEM WILL SUPPORT  4 TERMINALS
ENTER FUNCTION (MEM/EXC/BUF/TSK/IOV/INI) - mem
CURRENT MEMORY ALLOCATION (BASIC PROGRAMS SPACE)
    TASK(USER)  1   5747
    TASK(USER)  2   0
    TASK(USER)  3   0
    TASK(USER)  4   0
TOTAL USER SPACE    5747 BYTES (DECIMAL)
RESET THE MEMORY TABLE (YES/NO) ? yes
ENTER HIGHEST MEMORY ADDRESS (HEX) - 8fff
ENTER DECIMAL ALLOCATION FOR:
    TASK(USER)  1 ? 5747
    TASK(USER)  2 ? 4096
    TASK(USER)  3 ? 0
    TASK(USER)  4   0
TOTAL USER SPACE    9843 BYTES (DECIMAL)
DO YOU WISH TO UPDATE DISK (YES/NO) ? yes
MEMORY ALLOCATION SET AS REQUESTED.
ENTER FUNCTION (MEM/EXC/BUF/TSK/IOV/INI) - exc
PRESENT STATEMENT EXECUTION COUNT MAXIMUM:  5
DESIRED STATEMENT EXECUTION COUNT MAXIMUM ? 8
ENTER FUNCTION (MEM/EXC/BUF/TSK/IOV/INI) - buf
TASK  1 OUTPUT BUFFER RESTART COUNT:  30
DESIRED OUTPUT BUFFER RESTART COUNT ? 20
TASK  2 OUTPUT BUFFER RESTART COUNT:  30
```

```
DESIRED OUTPUT BUFFER RESTART COUNT ? 20

TASK  3 OUTPUT BUFFER RESTART COUNT:  30

DESIRED OUTPUT BUFFER RESTART COUNT ? 20

TASK  4 OUTPUT BUFFER RESTART COUNT:  30

DESIRED OUTPUT BUFFER RESTART COUNT ? 20

ENTER FUNCTION (MEM/EXC/BUF/TSK/IOV/INI) - tsk

TOTAL ENABLED TASKS (USERS) -  1

DESIRED ENABLED TASKS (USERS) - 2

ENTER FUNCTION (MEM/EXC/BUF/TSK/IOV/INI) - iov

I/O DRIVER INITIALIZATION. ENTER VALUES REQUESTED.

TASK= 1 IDP=02 ISP=03 ISM=02 ISC=00 ODP=02 OSP=03 OSM=01 OSC=00
TASK= 2 IDP=04 ISP=05 ISM=02 ISC=00 ODP=04 OSP=05 OSM=01 OSC=00
TASK= 3 IDP=00 ISP=00 ISM=00 ISC=00 ODP=00 OSP=00 OSM=00 OSC=00
TASK= 4 IDP=00 ISP=00 ISM=00 ISC=00 ODP=00 OSP=00 OSM=00 OSC=00

IS I/O PARAMETER SELECTION COMPLETE (YES/NO) ? yes

DO YOU WISH TO UPDATE DISK ? yes

ENTER FUNCTION (MEM/EXC/BUF/TSK/IOV/INI) - ini

ENTER TERMINAL INIT ROUTINE IN HEX

ADDRESS  CURRENT  NEW

 2900       00     3e
 2901       00     ff
 2902       00     d3
 2903       00     ff
 2904       00     3e
 2905       00     30
 2906       00     d3
 2907       00     3e
 2908       00     af
 2909       00     d3
 290A       00     07
 290B       00     d3
 290C       00     07
 290D       00     d3
 290E       00     07
 290F       00     3e
 2910       00     40
 2911       00     d3
 2912       00     07
 2913       00     3e
 2914       00     8e
```

```
2915        00      d3
2916        00      07
2917        00      3e
2918        00      37
2919        00      d3
291A        00      07
291B        00      db
291C        00      02
291D        00      db
291E        00      04
291F        00      db
2920        00      02
2921        00      db
2922        00      04
2923        00      c9

ENTER FUNCTION (MEM/EXC/BUF/TSK/IOV/INI) -
```

This completed the sample NORTH SHARE system generation. Your generation listing will almost certainly differ from this one due to different I/O devices, memory requirements, etc.