

**NS**  
**BASIC**  
**PROGRAM**  
**INTERFACE**

Rev. 00.02 7/79  
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FOR IMMEDIATE RELEASE

Northstar Basic on CP/M™

(CDOS and TSA/OS too)

Northstar revolutionized the industry with the introduction of the mini-floppy. Lifeboat made it possible to run CP/M™ on Northstar disk systems.

TSA SOFTWARE now takes you a step beyond:

Run Northstar Basic under CP/M™

The NSBASIC on CP/M™ interface is "self installing" and fully documented. It converts NSBASIC Release 4 (Release 3, too) to a form that is directly executable under CP/M™ (or OS\*m - CDOS or TSA/OS).

There is no longer any need to write an application to run under CP/M™ when you already did it in NSBASIC!

The package includes programs to:

- Transfer files to NSDOS disks from OS\*m disks
- Convert "packed" NSBASIC "SAVE" files to source files for use with OS\*m editors, and back again
- Convert Release 3 programs to run under NSBASIC Release 4

The price of this package is \$ 49.95 in either 5¼" or 8" format.

The NSBASIC on CP/M™ interface is available through retail computer outlets. If your store doesn't stock it, have them contact:

TSA SOFTWARE  
39 Williams Drive  
Monroe, CT 06468

CP/M™ is a registered trademark of Digital Research,  
Pacific Grove, CA

\*\*\*\* NOTE \*\*\*\*

Effective August 1, 1979:

MINIMUM DEALER PURCHASE - 10 COPIES

ADDITIONAL NOTES ABOUT NORTHSTAR BASIC (REV 4) ON CPM (REV 01.00)

Program: NSENER

Files: NSOPS, NSOPS3, NSOPS4

Command: NSENER <file name> [/3 or /4]

eg: NSENER ACCT

Reverses effect of NSLIST. Converts .BAS source file to .NBP BASIC packed file. NSENER uses NSOPS similiar to NSLIST. Input or output pipes are allowed.

USING BASIC

The interface kit allows running NS BASIC programs on an OS\*M system. This is done by converting the user's BASIC from running at 2A00H using Northstar DOS; to running at 100H using OS\*M system. The program PATCHNS actually does the conversion.

Only a standard release 4, non-floating point hardware, 8 digit precision BASIC can be converted, however any starting address eg. 2A00H or 4A00H may be used.

The programs NSDIR, NSLOAD and NSDOS are provided so the user may recover programs and data from NSDOS disks to OS\*M disks.

The programs NSLIST, NSENER allow using special editors or other BASICS on the same programs.

PATCHNS4:

Requires 6k(PATCHNS4) + 16k(BASIC) + 8k(OS\*M) or at least a 32k system.

All programs and data files in this package are copyright Tsa Software (c 1978,1979. The programs are designed to run under the Tsa operating system (Tsa/os). They carry no warrantee of any sort.

These programs are designed to work with software provided to purchasers of Northstar Disk systems.

These programs have been also tested to run under CP/M (tm - Digital Research of Cal.\* and CDOS (tm - Cromemco of Mt View Ca.\*. This in no way indicates approval of this product by any of these firms.

OS\*m is a generic (common\* term used to describe all these operating systems

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To valdiate the programs on this diskette run the checksum validation program which has the following format :

CKSUMF CKF

If any of the programs fail the checksum , please contact your dealer.

## File list:

READER.COM            Documentation reader program

READ.ME              Documentation text file

NSDIR.COM            Program to list Northstar Dos directory from OS\*m

NSLOAD.COM          Program to load a file from a N.S. DOS disk to an OS\*m disk

NSLIST.COM          Program to create BASIC source file on disk from BASIC internal format file

NSOPS                Translation Op codes used for NSLIST  
                      (initially the same as NSOPS3)

NSOPS3.             Translation Op codes for NS BASIC rev 3

NSOPS4.             Translation Op codes for NS BASIC rev 4

PATCHNS3.COM        Program to patch NBASIC3 to run under OS\*m

NS3PAT.DAT          Control file for PATCHNS3.com

PATCHNS4.COM        Program to patch NBASIC4 to run under OS\*m

NS4PAT.DAT          Control file for PATCHNS4.com

NSDOS.COM           Northstar Extended DOS to run OS\*m

CKSUMF.COM          Checksum validation program

CKF.CTL             Checksum control file

>>> File Transfers for Northstar disks to OS\*m disks

Programs: NSDIR.COM, NSLOAD.COM and NSDOS.COM

> NSDIR [<disk number 1..3>]

eg: NSDIR  
NSDIR 1

- Lists the directory of a NS disk, to the console.
- The disk number is optional. If absent, then '1' is assumed.

> NSLOAD <OS\*m file name>=<NS DOS filename>[,<disk number 1..3>]

eg: NSLOAD NBASIC3=BASIC,2  
NSLOAD B:GAME.NBP=GAME,3

- Loads a file from a NS DOS disk to an OS\*m disk.
- The disk number is optional. If absent, then '1' is assumed. If present the disk number is preceeded by a comma.
- NSLOAD will display the NS DOS directory entry, if the file is found
- The OS\*m filename is a full filename. Disk or file type specifiers are allowed.

> NSDOS.COM [\*]

- Allows running a normal Northstar Dos with extra commands to allow copying to OS\*m disks.
- A dual NS or a NS/3" system is required.
- All extra commands use control-Z as a starting character, it echos as '>'.  
>
- Commands use standard OS\*m file names with leading A:, B: disk specifier, or Northstar file name with trailing ,1 or ,2.
- Extra commands may be corrected by using the line cancel character '@'
- Filenames containing \* are not meaningful in OS\*m and are translated to '\$' when using copy.

Commands:

(ctrl-z\*S                   -Saves NSDOS image to OS\*m disk file 'NSDOS.ABS'

(ctrl-z\*C<OS disk>=<NS disk>  
                          -Moves all NS Dos files to  
                          correspondingly named OS\*m files.

(ctrl-z\*X<OS file>=<NS file>  
                          -Move one NS Dos file to OS\*m file.

(ctrl-z\*Q                   -Quit back to OS\*m

(ctrl-z\*R<OS disk>  
                          -Reset OS disk (to allow exchanging disks\*  
                          without disk specifier just relogs current  
                          disk. ( like control-C from A> or A.\*

NOTE: (a) This program requires a bootable, configured NS Dos.

(b) This will only work using a standard 2000H/E900H single density Northstar.

## STARTING UP NSDOS.COM

- (1) Boot the OS\*m system (TSA/OS or CP/M)
- (2) Enter 'NSDOS \*', and press return, then put a configured Northstar Dos disk in NS drive 1, and press return.
- (3) Enter NS command 'JP100 (return'
- (4) Have an OS\*m disk in the current OS disk, (can't be same as NS disk) have the NS disk to copy from the NS drive 2.
- (5) Enter '(control-z\*S (return', this will save a copy of NSDOS.ABS (absolute copy of NSDOS\* to the current OS\*m disk.
- (6) Use NSDOS cmmands to move files to OS\*m disk.

## TO USE NSDOS ONCE SETUP

- (1) Have NSDOS.COM and NSDOS.ABS on current OS disk
- (2) Enter 'NSDOS' and use NSDOS commands as required

\*\*\* WARNING \*\*\*\* about Using File transfer programs on DUAL or NON-standard Northstar systems \*\*\*

The programs NSLOAD and NSDIR contain built-in Northstar disk drivers, and NSDOS uses the standard N.S. DOS drivers. If used on a Dual or triple Northstar system, where the OS\*m disk is a Northstar drive; always make the OS\*m disk the 'A:' drive and the NS DOS disk as the 2 or 3 drive. Otherwise the two drivers will confuse each other (the one in the program and the one in the OS\*m system.\*

When the OS\*m disks are not Northstar, then better performance may be obtained by disabling the head unload function in the three programs. This consists of a 'LDA 0EB18H' instruction at 103H. This forces the Northstar controller to stop the motors so the two disk drivers, in NS DOS and OS\*m, do not get confused. It is disabled by putting 3 NOP'S (0\* at 103h,104h,105h. It must be left enabled if copying is being done from a NS DOS northstar disk to a OS\*m Northstar disk.

For the unload in NSDOS to work correctly on NSDOS for a non-E900h northstar system, the instruction must be changed to address Start of controller plus 0318h.

As the program drivers have the Disk address built-in, special



versions of NSLOAD and NSDIR, are required for non-standard Northstar Prom sets.

If using CP/M , use SYSGEN to put your CP/M on the copy of the Ns package that is to go in the A: disk before running NSDOS, NSLOAD OR NSDIR.

Converting Northstar programs into source form.

Program: NSLIST.COM

Files: NSOPS, NSOP3, NSOP4

Command: NSLIST <file name> [/3 or /4]

Eg: NSLIST ACCT

The program takes <File>.NBP (a NS Basic packed file) and produces <File>.BAS (a NS Basic source file).

Northstar Basic 'SAVE's files on the disk in an internally packed form. The NSLIST program unpacks the format and writes the resulting source file to a disk file or device. The internal file, if saved under the OS\*m version of NS BASIC, will have type .NBP. The output file will have the type .BAS ; or an output pipe file may be specified by using '>' Filename on the command line . For example ' NSLIST ACCT > CON: ' will send the source listing to the console (File CON:).

The NSLIST program uses the file NSOPS, to decode the internal format. This file must be different to account for the differences in NS BASIC rev 3 or rev 4. These two versions are supplied as NSOPS3 or NSOPS4. NSOPS must be a copy of one of these two, NSOPS4 is normally used. ( By changing the opcode set, Poly 88 BASIC's may also be handled. The /3 or /4 option will force using NSOPS3 or NSOPS4.

>> Patching NS Basic to run under OS\*m

program: PATCHNS3.COM or PATCHNS4.COM

file: NS3PAT.DAT or NS4PAT.DAT

command: PATCHNS3 or PATCHNS4

Example sequence:

< using NSLOAD >	or	< using NSDOS >
A.NSLOAD A:NBASIC4=BASIC,2		- A.NSDOS
A.PATCHNS4		- *(ctrl-z X A:NBASIC4=BASIC,2
A.PATCHNS4		- A.PATCHNS4

The PATCHNS4 program will patch a standard (2A00H) Ns basic rev 4 to run under OS\*m. The BASIC should be transferred to the same disk containing both PATCHNS4.COM and NS4PAT.DAT. It should be named: NBASIC4. Upon running PATCHNS4, a executable file 'NS4BAS.COM' will be created. This can be run as a normal OS\*m command file and contains a relocated, patched version of the original Northstar basic.

The PATCHNS3 program works identically to PATCHNS4 but on the revision 3 BASIC files.

Operating notes about NS BASIC under OS\*m

These notes assume understanding of OS\*m and Northstar BASIC in their standard forms.

Underline or Backspace may be used for character deleting.

CONTROL-P: Sends all console output to printer also. The printer must be online or the console will lock up waiting for it. This is a toggle, each press reverses the state. Since the printer generally runs slower than the console, the console will run slower when the console printer link is on.

CONTROL-S: Causes console output to pause until any key is struck to continue.

Once started, BASIC determines available memory and uses as much as it can, at least 32k is required.

BASIC is invoked by:

A.NS3BAS (CR) or NS4BAS (CR)

"BYE" is used to return to OS\*m.

## CHANGING DISKS

DISKS SHOULD NEVER BE CHANGED WITHOUT LOGGING IN THE NEW DISK by pressing CONTROL-C at console level (A> or A.). OTHERWISE IT IS POSSIBLE TO OVERWRITE THE NEW DISK.

This login can also be done by '!CALL(5)' or RESET (in rev 4). The CALL(5) or RESET command also allows selecting a new current disk by CALL(5 [,disk #]), or RESET [disk letter]:.

eg. CALL(5) or RESET  
CALL(5,1) or RESET A:  
CALL(5,2) or RESET B:

## &lt;DEVICES&gt;

The Northstar devices are pre-assigned to the standard OS\*m devices:

0- CONSOLE (in/out\*  
 1- Printer (out\*  
 2- Reader(in\* / Punch (out\*

## &lt;BASIC FILES&gt;

Within BASIC, a standard OS\*m 8 character name, with optional disk specifier, is used to refer to programs or data files.

EG. SAVE TPROGM  
 LOAD B:GRAPH  
 OPEN #0,"A:PLOT"

File type is not allowed in revision 3, version 4 will allow types as shown bellow.

## FILE TYPES

Outside BASIC, from OS\*m proper, 4 STANDARD FILE TYPES are assigned to NORTHSTAR files:

NS type	OS*m type	
0	.NDT	- Northstar data file
1	.ABS	- Go file, executable code
2	.NBP	- Northstar Basic program
4	.NDT	- Northstar data file

## LISTING THE DIRECTORY

The OS\*m command 'DIR \*.N\*' will list all programs and data files.

**- CAT (command)**

**Format:** CAT<disk specifier and/or filename>  
allows ambiguous filenames

eg. CAT	- catalog of current drive
CAT B:*. *	- complete catalog of B:
CAT *.N*	- all BASIC related files
CAT *.NBP	- all BASIC programs
CAT *.NDT	- all BASIC data files

Displays - <filename> <file length in kilobytes>K

**- CREATE (statement)**

**Format:** CREATE <filename>,<dummy length>,[type]

Filename must be string variable or string enclosed in quotes. Filename may contain disk specifier of OS\*m type. If NS type is specified it overrides all previous types.

eg. - CREATE "TEST",0,2 or CREATE "TEST.NBP"  
- would both create NS Basic program files.

**- DESTROY (command)**

**Format:** DESTROY <filename>  
allows ambiguous or general filenames.

Filename must be either string variable or string enclosed by quotes.

eg. DESTROY "TEST.\*" - Destroys all files with name TEST.

- FILE (function)

Format: X=FILE(<filename>  
allows ambiguous or general filenames.

Name must be string variable or string enclosed in quotes.

eg. X=FILE("TEST")

Returns 0 if file exists, -1 if it doesn't. If no type is specified then default type is NS 3 or OS\*m .NDT.

If a general name is given, then 0 indicates at least one file of like name was found.

- LOAD (command)

Similar to SAVE

- OPEN (statement)

Same as standard NS format

- SAVE (command)

Same as standard NS format but creates file if it doesn't exist. The function NSAVE is thus no longer necessary and is no longer part of Basic. A file type of .NBP is assumed.

The OS\*m version of BASIC will automatically create a program file on a "SAVE" or a data file on an "OPEN" if the file does not exist. A "LOAD" file must exist or an error is returned.

<< USER SUBROUTINES >>

An extension to the Northstar BASIC provides a safer user subroutine call.

RETURNED VALUE = CALL(SUBROUTINE NUMBER,  
PARAMETER 1,PARAMETER 2)

The 2 parameters are optional: none, one or two are allowed; all must be 0 or positive and <65536. The subroutine number is required, and is >= 0. The maximum value is defined by the user subroutines built into the BASIC. An illegal number returns a bounds error. However any value >128 reverts to a standard call, if the extended call is enabled.

The user may add routines or may activate a normal address type CALL function.



## STANDARD SUBROUTINES:

- 1 - RETURN CONSOLE CHARACTER, OR IF NO CHARACTER WAS INPUT, THEN RETURN 0. no parameters.

EG. Z = CALL(1\*           Get a character  
       Z = CALL(1,0\*       Get a character  
       Z = CALL(1,1\*       Read status (0-not rdy,255-rdy\*

A\* At the start of each line, the system looks for a CONTROL-C and so characters will be "lost".

B\* This is a good way to initialize the random number generator:  
 10 PRINT "PRESS ANY KEY UNTIL OK PRINTED"  
 20 A=RND(0\* / IF CALL(1\* =0 THEN 20 / PRINT "OK"

- 2 - INPUT CHARACTER FROM READER, no parameters

EG. C = CALL(2\*  
 A\* 8 bits of data are returned.  
 B\* The routine waits until a character is input, so tape must be ready and the program must do its own end of file processing.  
 C\* OS\*m standard end of file character (on ASCII tapes is CONTROL-Z or 26 decimal.

- 3 - OUTPUT CHARACTER TO PUNCH

Eg. C=CALL(3,C\*

- 4 - OUTPUT CHARACTER TO LIST/PRINTER

Eg. Z=CALL(3,65\*+CALL(4,65\*

OUTPUT "A" TO PUNCH & PRINTER

A\* To output the string A\$ to punch:

```
FOR I=1 TO LEN(A$*
Z=CALL(3,ASC(A$(I,I**
NEXT
```

B\* On output to punch or printer, the program will hang till output is completed - the device must be ready. Out of paper or tape will cause ready condition.

- 5 - Login a new or different disk

Eg. Z=CALL(5\*    re-login current disk (if changed\*  
       Z=CALL(5,X\* Login disk X  
           where X=0..8 (0-current, 1-'A', 2-'B', 3-'C' ...\*

A\* Must be used whenever disks are changed to prevent improper writing on a disk.

## 6 - Terminal controls (only rev 4 with TSA/OS\*)

CALL(6\* - Clears screen

or

CALL(6,R,C\* where R and C can have the following values.

If R>0 then function is set cursor and R is row, C is column.

If R=0 then function depends on C:

0 Clear	1 Home	2 Backspace
3 Forespace	4 Up	5 Down
6 Clear eol	7 Clr eos	8 Highlight
9 Low light	10 Normal light	11 Keyboard on
12 Keyboard off	13 Cur. pad on	14 Cur. pad off
15 Protect on	16 Protect off	17 Blink on
18 Blink off	19 Line send	20 Page send
21 Aux send	22 Del char	23 Insert char
24 Del line	25 Insert line	

<< USER DEFINED USER SUB ROUTINES >>

\*\* Function DEF FNA1(X#=EXAM(X#+EXAM(X+1#\*256  
is used to find address \*\*

The user can add more user subroutines by patching them directly or by building them into the .COM file. The address at 106H..107H (FNA1(262## points to the start of the basic program. Normally this is 3E00H (15728D#. The revised subroutine scheme works with a table that defines how many routines are legal and then has jumps to each routine. The normal location of this table is 3D00H (15472D#. But the exact location can be determined by FNA1(CALL(0##.

The table use allows user routines 1 thru 127 only. If a option is allowed than any first parameter>127 is a normal address, else a bounds error will occur.

Address option:

To allow the address option of calling a true machine address using the user subroutine call, put this at the start of a program. Any CALL with a value of >127 will be considered as an direct machine call.

```
X=CALL(0#+2  
FOR I=X TO X+2 \ FILL I,0 \ NEXT I
```

On entering a user routine, the registers will be as follows:

```
Z=CALL(X*      A=0 , DE=0 HL=0
Z=CALL(X,Y*    A=1 , DE=Y HL=0
Z=CALL(X,Y,Z*  A=2 , DE=Y HL=Z
```

On return, the value should be that left in HL.

```
eg.; Standard User subroutines
      ORG      USERSB ; determined by FNA1(CALL(0**
      DB      6
      JMP     TCON   ; TEST CONSOLE
      JMP     RIN    ; READER IN
      JMP     POUT   ; PUNCH OUT
      JMP     LOUT   ; LIST OUT
      JMP     LOGIN  ; DISK LOGIN
      JMP     CRTCTL ; CRT CONTROL
;
; USER FREE SPACE STARTS HERE
; normally (3D13H or 15635D*
;
```