How to use a ready to run NOS/BE Level 712 system

A Step-by-Step Guide to Running a ready to run NOS/BE 1.5 Level 712 system.

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<tbody>
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1. Introduction

This guide shows how to set up and run a NOS/BE L712 system with the DtCyber emulator. The emulated hardware is a Cyber 170-865 with one processor, 20PPU's, 262 KWords memory, 768 KWords extended semiconductor memory and the following peripherals:

- 2 type 885 disk drives
- 4 MT679 9 track magnetic tapes (EST ORD 20-23)
- Line printer (EST ORD 31)
- Card reader (EST ORD 32)
- Card punch (EST ORD 33)

The emulated NOS/BE operating system provides batch processing and interactive access for one terminal.

There are two versions for the NOS/BE L712 system. One version without EM and another version with EM enabled. They come with a comprehensive set of software:

- COMPASS
- SYMPL
- FTN4, FTN5 with PMD and Interactive Debug, Fortran 4/5 conversion utility
- BASIC
- COBOL5
- BAM, AAM, CCL
- 8-Bit Library
- FORM
- SORT5
- DDL3, CDCS2, QU3, FDBF, DCL2
- Intercom 5
- UMN MNF, M77 and Interval Arithmetic Library
- Algo60, Algol68
- PL/1

The Algo60, Algol68, MNF and PL/1 compilers were extracted as binaries from an existing deadstart tape. All other products were rebuilt from sources.
There are a number of JavaScript files (suffix: js) in the NOSBE712 directory. These scripts are called in Linux/mac OS and Windows in different ways.

Linux, mac OS:

```
./scriptname.js <parameters>
```

Windows:

```
node scriptname <parameters>
```

In this document, the Linux/mac OS calling style is consistently used.

## 2. What you need

1. The **DtCyber emulator**. At least version 5.7.24 is required.
2. A current software version of **Node.js**.
3. The **NOS/BE 1.5 Level 712 Build Environment**. Press the green “Code” button and download the zip file NOSBE712-main.zip.
4. Either the nosbe712prod.zip
   or the nosbe712prod_em.zip
   archive
5. A C-Compiler, if you would like to use the NOS/BE print postprocessor (see below).
6. A recent Linux, mac OS or Windows system.

## 3. NOS/BE Documentation

There is much documentation about CDC Cyber machines, operating systems and software that runs on them on the [Bitsavers archive](https://www.bitsavers.org). Concerning NOS/BE the following manuals are essential:

- **NOS/BE Reference Manual**. This is the most important manual. It provides general information about files, job flow and execution and a detailed description of all control statements. Note: the
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introductory NOS/BE Batch Users Guide is not available as PDF file.

- **NOS/BE Operators Guide**. You have to be familiar to this guide to a certain degree. The chapters “Operator/System Communication Principles”, “Displays under DSD”, “Equipment Operation and Control” and some aspects of “Job Control” and “Utility Routines” are important.
- **Intercom 5 Command Summary**. This is the only Intercom 5 documentation which is available as PDF. Use the Intercom teach command if you would like to have more detailed information.
- **NOS/BE Diagnostics Handbook**. This manual explains all system messages, their significance and the required actions to be taken.

Further NOS/BE manuals:

- NOS/BE System Programmers Reference Manual, Volume 1
- NOS/BE Installation Handbook

### 4. Prepare the DtCyber Emulator

The DtCyber emulator in this GitHub repository is actively maintained and enhanced. Unfortunately, there is no binary distribution. Therefore, carefully read and follow the instructions how to download and build the software.

### 5. Prepare the runtime environment

1. Unzip the file *NOSBE712-main.zip* either in the root directory of the DtCyber software or at another location. In the latter case, you must define the environment variable *DTCYBER* pointing to the root directory of the DtCyber software. Rename the directory name *NOSBE712-main* to *NOSBE712*.
2. Unzip either the *nosbe712prod.zip* or the *nosbe712prod_em.zip* archive in the *NOSBE712* directory.
3. If you would like to use the NOS/BE print postprocessor, go to the subdirectory *NOSBE712/lpt2pdf* and build the *lpt2pdf* executable:

   (shell) gcc -o lpt2pdf lpt2pdf.c (Linux)
   or
   (shell) cl lpt2pdf (Windows)

Note: If you would not like to use the print post processor, you should disable the *helpers* entries in the *cyber.ini* file.

### 6. DtCyber Basic Use

Open two terminal windows and change to the *NOS712* subdirectory. Start the *DtCyber* emulator in one of these windows:

(shell>./dtcyber nosbe
This example starts the NOSBE712 system without EM. A series of preconfigured commands runs the whole deadstart process automatically. Now you have three windows:

- DtCyber command window. This is the window where the DtCyber emulator was started. You see the DtCyber command prompt: 15:43:49 [DtCyber Console] Operator>. In this window, you can issue commands to the DtCyber emulator to control devices or shut down the emulator. Usually, you do not need that in the NOSBE712 environment because DtCyber is controlled by external helper scripts.
- Auxiliary window. This is the second terminal window you opened before starting the emulator. In this window, you start the helper scripts to control the DtCyber emulator.
- The DtCyber console. This is a high fidelity emulation of the famous dual screen operator console of the CYBER machines.

The keyboard of the dual screen operator console has two special keys which are emulated as follows:

- left blank: [ 
- right blank: ]

See the NOS/BE Operators Guide how to operate the system at the DtCyber console.

7. System Deadstart

7.1 System without Extended Memory

(shell) ./dtcyber nosbe
The system performs a level 3 deadstart. No operator action is required. JANUS and RDF are started. After deadstart completion, the system is ready for batch processing or Intercom access.

### 7.2 System with Extended Memory

```shell
./dtcyber nosbe-em
```

The system performs an automatic level 1 deadstart, because a warmstart is not possible with extended memory. After completion, which takes considerably longer as a warmstart, the system is ready for batch processing and Intercom access.

If you would like to free additional core memory, you can submit a batch job that moves additional parts of the operating system to extended memory. Since this requires a system editlib, RDF has to be dropped first:

```shell
=RDF, DROP. (CR)=
RDF,DROP.(CR)=                   Drop RDF
(shell) submit cards/moves.txt   Submit batch job in the auxiliary window
=20.GO.(CR)=
(shell) submit cards/moves.txt   Submit batch job in the auxiliary window
=20.GO.(CR)=
(shell) submit cards/moves.txt   Submit batch job in the auxiliary window
=RDF, R, P, 0, (CR)=             Restart RDF
```

### 8. System Shutdown

You must always shut down the system. Otherwise, the file system might get corrupted. To shut down the system gracefully, issue the following command from the auxiliary window:

```shell
./shutdown.js
```

### 9. Batch Processing

You can submit a batch job card deck to the virtual card reader with the `submit.js` command in the auxiliary window:

```shell
./submit.js cards/audit.txt
```

This NOS/BE system does not have an accounting. Therefore, no ACCOUNT card is needed, and all batch jobs run with full privileges. After completion, the output of the batch job is sent to the line printer.

There are some sample batch jobs in the `cards` subdirectory:

<table>
<thead>
<tr>
<th>Filename</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>audit.txt</td>
<td>Generates a listing of all permanent files with the AUDIT utility</td>
</tr>
<tr>
<td>moves.txt</td>
<td>see 8.2</td>
</tr>
<tr>
<td>stotrt2.txt</td>
<td>stores an UPDATE source code library for the program TRT2</td>
</tr>
</tbody>
</table>

Retro1.org - https://codex.retro1.org/
### Filename | Description
--- | ---
runtrt2.txt | runs TRT2 and sends an image file to the card punch. See [this document](https://codex.retro1.org/cdc:nosbe:use_a_ready_to_run_nos_be_l_712_system) how to visualize the result
spss_compile.txt | builds the SPSS (Statistical Package for the Social Sciences). You have to provide the necessary distribution tape for version 8.3 or 9.0
spss_test.txt | runs tests for the SPSS program

### 10. Intercom

You can use Intercom with the following user names:

<table>
<thead>
<tr>
<th>Username</th>
<th>Password</th>
<th>Access Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSTALL</td>
<td>INSTALL</td>
<td>3777</td>
</tr>
<tr>
<td>USER</td>
<td>USER</td>
<td>7</td>
</tr>
</tbody>
</table>

In normal operation, INTERCOM 5 requires CDC 2550 front-end processors running the CCI control program. As of now, no emulation of 2550/CCI is available in DtCyber for NOS/BE. But Ned Deily found out, that the TPM driver (1RM) of Remote Diagnostic Facility (RDF) is capable of driving serial ports on 6671/6676 multiplexors as an undocumented feature. Thus, Intercom access is only possible using RDF. At the moment, only one 1RM port can be activated.

telnet localhost 5000
Trying ::1...
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.

CONTROL DATA INTERCOM 5.1 ON CYBER 865 (RDF)
DATE  01/01/91
TIME  00.00.16.

PLEASE LOGIN
login,install,install

01/01/91 LOGGED IN AT 00.00.27.
WITH USER-ID XX
EQUIP/PORT 30/000

YOU ARE SIGNED ON THE NOSBE SOFTWARE SYSTEM

COPYRIGHT CONTROL DATA 1976
If you would like to modify the Intercom accounts, then modify and run the job deck `postinstjobs/01_tdfgen.txt`. See the NOS/BE Installation Handbook, page II-28-30 how to configure the PASSWRD utility. Note that running the job requires operator confirmations.

Sending files to the printer from an Intercom session does not work with ROUTE or DISPOSE for unknown reasons. Use the BATCH command instead.

### 11. Operating Peripheral Devices

#### 11.1 Line Printer

NOS/BE creates printer files with ANSI printer control. Form feed and line spacing are controlled by characters in column 1 of the printer file. The print post processor reads continuously the output of the printer file `LP5xx_C12_E5`, interprets form feed and line spacing controls, separates the output into single print jobs and calls the program `lpt2pdf` (Author: Tim Litt) to create a nice high-fidelity fan fold paper PDF file for each job. The PDF files are stored in the `printfiles` directory with time-stamped file names.

#### 11.2 Card Punch

A file can be sent to the virtual card punch with the ROUTE command. You find an example in the `cards/runtrt2.txt` job deck. Take care, that the lines in the file do not exceed 80 characters.

To obtain the file of the punched card deck, watch the system dayfile or the JANUS status display if the file had been punched. Then remove it from the card punch:

```
(shell)./rc.js
```

This stores the punched card deck in a separate time stamped file.

#### 11.3 Magnetic Tape Drives

There are three helper scripts to manage the DtCyber emulator tape drives which can be started in the auxiliary window.
To attach a TAP image file to an emulators tape drive for reading (noring):

(shell)./mtr.js Est-Ordinal Path_to_TAP_image_file

To attach a TAP image file to an emulators tape drive for writing (ring):

(shell)./mtw.js Est-Ordinal Path_to_TAP_image_file

To remove a TAP image file from an emulators tape drive:

(shell)./mtu.js Est-Ordinal

You can use the filename autocompletion support of the shell when entering the name of the TAP image file. For tape processing, you have to provide the necessary job control statements and to do the required operator actions at the DtCyber console. You find information about tape processing in the NOS/BE Operators Guide, page 4-5ff and the NOS/BE Reference Manual, page 3-28ff and in the job control statements reference section.

12. System Maintenance

12.1 Backup/Restore

There is a file ‘DUM,ID=PUBLIC’ catalogued in the file system, which is needed for backup and restore with the DUMPF/LOADPF utilities. All passwords of that file are set to “XYZ”. The permanent file utilities are documented in chapter 6 of the NOS/BE Operators Guide and NOS/BE System Programmers Reference Manual, Volume 1, page 6-5ff.

12.2 System Bulletin File

There is a system bulletin file set up in the system. It provides a short welcome message for Intercom login. A batch system bulletin information is disabled. See chapter 9 of the NOS/BE System Programmers Reference Manual, Volume 1, how to manage the system bulletin file.

12.3. System Dayfile

From time to time, you should print or dump the system dayfile so it doesn't get too big. See the NOS/BE Operators Guide, Page 6-12 for further information.
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