The ZCPR3 INSTALLATION WORKBOOK

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About this Workbook

This workbook takes you through the eight steps of ZCPR3 installation. You should have a copy of the Installation Manual (or SAMPLER) handy as you work through it. This workbook will serve to direct your reading of the Installation Manual and provide a place for you to write down information required during the installation process. There are blanks to fill in and scratch areas in which you may perform computations and make notes; it is recommended that you make all of your computations and notes here. This workbook can serve as a document on how you set up your ZCPR3 system, so you can refer back to it later if you want to make a change.

Each step of the installation process is detailed in the following pages and is presented with the following format:

    Objective:
        The goal to be achieved
    Required Files:
        The programs and other files required to perform
        this step
    References:
        The chapters and sections in the Installation
        Manual and in ZCPR3:_The_Manual associated
        with this step; the indicated sections of the
        Installation Manual are required reading, while
        those sections in ZCPR3:_The_Manual contain
        supplementary information
    Instructions:
        Step-by-step details on what to do; places are
        also provided for you to write down important
        information

Overview of ZCPR3 Installation

Objective To summarize the goals of the installation
          process

Required Files None

References
       Installation Manual -- Chapter 1
       ZCPR3: The Manual   -- Chapters 1, 2, 9-16

Instructions
1. Review chapter 1 of the Installation Manual and (optionally)
review the indicated chapters of ZCPR3: The Manual.

2. In summary, the following items are going to be created for
your microcomputer system.

    A. A new SYSGEN image containing the ZCPR3 Command
Processor in place of the CP/M Console Command Processor (CCP). The
BIOS may also be modified. Figure 1-1 (page 6) of the Installation
Manual shows the SYSGEN images of a conventional CP/M system and a
ZCPR3 system. The modified BIOS is required in order to initialize
the ZCPR3 buffers for your system.

    B. The System Segments required for your choice of ZCPR3
configuration. Section 1.3 of the Installation Manual (page 7) and
chapters 2, 10, and 16 of ZCPR3: The Manual discuss the topic of the
System Segments. The ZCPR3 System Segments are:

            o Environment Descriptor
            o TCAP File for your terminal
            o Flow Command Packages
            o Input/Output Packages
            o Resident Command Packages
            o Named Directory Files

    C. The ZCPR3 Utilities installed for your ZCPR3
configuration. Section 1.4 of the Installation Manual (page 7) and
chapters 3-8, 15, and 16 of ZCPR3: The Manual discuss the utilities.

3. The installation process for a ZCPR3 system consists of these steps:

     1) Select the features of the target ZCPR3 system
     2) Plan the memory structure of the target ZCPR3 system (create Z3BASE.LIB)
     3) Modify the cold boot routine in the BIOS to initialize buffers as required
     4) Select the features of the ZCPR3 Command Processor (create Z3HDR.LIB)
     5) Overlay the CP/M CCP with the ZCPR3 Command Processor and overlay the old BIOS with the new BIOS; create the new SYSGEN image for your ZCPR3 System
     6) Place the new SYSGEN image for your ZCPR3 System onto the Operating System tracks of a disk
     7) Select the features of your System Segments and create the System Segments
     8) Install the ZCPR3 utilities

Read chapter 1 of the Installation Manual now.

Step 1: Selecting the Features

Objective Select the features your ZCPR3 System will
have

Required Files None

References
Installation Manual -- Chapter 2
ZCPR3: The Manual   -- Chapters 2, 9-11, and 17

Instructions
A. Read Chapter 2 of the Installation Manual.

B. Make the following decisions:

1. Are you going to include the standard   YES   NO 1K
overhead in your ZCPR3 System? It is recommended that you answer
YES to this question.   If YES, go to decision 3; if NO, go to
question 2.

2. You are NOT going to include the standard 1K overhead
in your ZCPR3 System. Which parts of the standard overhead are you
going to include?

2a. External Stack	YES NO
2b. Command Line Buffer	YES NO
2c. Memory-Based Named Directory	YES NO
2d. External File Control Block	YES NO
2e. Message Buffers	YES NO
2f. Shell Stack	YES NO
2g. Environment Descriptor	YES NO

3. Which of the following packages are you going to
implement in your ZCPR3 System? It is suggested that Flow Command
Packages are most important, Resident Command Packages are second,
and Input/Output Packages are third.

3a. Flow Command Packages	YES NO
3b. Resident Command Packages	YES NO
3c. Input/Output Packages	YES NO

4. Which of the other buffers are you going to provide? The External Path is highly recommended.

4a. External Path   YES   NO

4b. Wheel Byte   YES   NO

-- Blank Space for Comments --

Step 2: ZCPR3 Memory Structure

> <u>Objective</u> To plan the memory structure of your ZCPR3
>   System and to create your Z3BASE.LIB file
>
> <u>Required Files</u> Z3BASE.LIB (ZCPR3 File)
>   Z3LOC.COM (ZCPR3 File)
>   MOVCPM.COM or equiv
>   DDT.COM or equiv (ZDM and DSD)
>   your favorite editor
>
> <u>References</u>
>   Installation Manual -- Chapter 3
>   ZCPR3: The Manual   -- Chapters 2 and 18
>
> <u>Instructions</u>
> A. Read Chapter 3 of the Installation Manual.

   B. You are now going to figure out how much space your ZCPR3 System is going to take. Fill out the following table based on your answers in Step 1.

   1. If you answered YES to question 1, enter 1K and go on to the bottom of the page. If you answered NO to question 1, enter 0 and go on to question 2. _____

   2. For each of the YES answers under question 2, enter the indicated value. For each of the NO answers, enter 0. Items 2b, 2c, and 2f may be adjusted if you want more or less space.

         2a. External Stack = 48   _____

         2b. Command Line Buffer = 208
             (allows for 200 chars/line)   _____

         2c. Named Directory Buffer = 256
             (allows for 14 18-byte entries)   _____

         2d. External FCB = 48

                                                          _____

         2e. Message Buffers = 80

                                                          _____

         2f. Shell Stack = 128
             (allows for 4 32-byte shells)   _____

         2g. Environment Descriptor = 256

                                                          _____

   Compute the total of all values you have entered in on this page.   =========

2h. Enter the total from the bottom of the previous page here.

$$==========$$

3. Enter the following values for each of the packages you selected in question 3 in step 1. If you wish to modify these values to provide more or less space for each of these packages, feel free to do so. The indicated sizes are the recommended values.

3a. Flow Command Package = 0.5K   _____

3b. Resident Command Package = 2K

_____

3c. Input/Output Package = 1.5K

_____

3d. Total of 3a-3c   =========

4.   Items 4a and 4b in step 1 require virtually no additional space (on the order of 10-16 bytes total), and space for these entries can usually be found somewhere in fixed memory (down in the first 256 bytes or up in the BIOS). No space entry will be made for these selections.

Compute the total of the entries on this page and round the number up to the next 1K if there is any fraction. Enter the total of 2h and 3d.   =========

C. Figure out the size of your BIOS. The program Z3LOC will give you the starting address of your BIOS if you run it on your current system. As an alternative, the address at memory locations 1 and 2 can be examined with DDT to determine where your BIOS starts.   Write down the size of your BIOS here. _____

        D.   Determine where you can place the ZCPR3 Command Processor
(ZCPR3 CP).   This hinges on where your MOVCPM (or equivalent)
program places the system when told to move it.   MOVCPM relocates
the BDOS for you, and this is the one part of your old CP/M system
which we are retaining, so we will have to plan the memory map of
your system based on where you can place the BDOS.   If you are going
to use ZRDOS1 or ZRDOS2 from Echelon, this becomes much less of a
problem since you have absolute control of where you can place the
ZRDOS.   Since the installation manual is geared for those who will
continue to use the CP/M BDOS, we will direct the discussion to the
BDOS and not cover installation with ZRDOS at this time.

        To assist you further in determining the addresses for the
components of your ZCPR3 System, the following table shows the
addresses of the ZCPR3 Command Processor, BDOS, and BIOS for various
sizes of TPA (by "TPA", I am referring to the area of memory below
the ZCPR3 Command Processor which does NOT include the ZCPR3 Command
Processor itself).

                        ------------ Locations ----------
TPA Size   ZCPR3 CP   BDOS   BIOS

    44K   0B000   0B800   0C600
    45K   0B400   0BC00   0CA00
    46K   0B800   0C000   0CE00
    47K   0BC00   0C400   0D200
    48K   0C000   0C800   0D600
    49K   0C400   0CC00   0DA00
    50K   0C800   0D000   0DE00
    51K   0CC00   0D400   0E200
    52K   0D000   0D800   0E600
    53K   0D400   0DC00   0EA00
    54K   0D800   0E000   0EE00
    55K   0DC00   0E400   0F200
    56K   0E000   0E800   0F600

        For example, if the amount of additional overhead, as indicated
by your answer to question B4 on the previous page, is 1K, and your
BDOS currently resides at E400, then you need to move the BDOS down
by 1K (1K = 400H) to E000.   Hence, you need to run MOVCPM with the
correct value to place your BDOS at a starting address no higher
than E000.

        Find this value now.   Record the following values:

            ZCPR3 CP Address   _____

            BDOS Address   _____

            BIOS Address   _____

E. Using the memory map in Figure 3-1 (page 22) of the Installation Manual and the examples on the following two pages as a guide, fill out the following table as a memory map for the system you are planning. Use the data from Step 1 and the questions in this step (A-D) to help you. The answers from question D (previous page) should be copied directly into this table as they are (starting addresses of the ZCPR3 CP, BDOS, and BIOS). Leave blank the elements you did not select. If your ROM is at an odd location, adjust your memory usage accordingly (you may want to place some of the buffers AFTER the ROM).

		ADDRESS	
FUNCTION	SIZE	STARTING	ENDING
ZCPR3 Command Processor	2 K	_____	_____
BDOS	3.5 K	_____	_____
Your BIOS	_____	_____	_____
ROM (if not at top of memory)	_____	_____	_____
Resident Command Package	_____	_____	_____
ROM (if not at top of memory)	_____	_____	_____
Input/Output Package	_____	_____	_____
ROM (if not at top of memory)	_____	_____	_____
Flow Command Package	_____	_____	_____
ROM (if not at top of memory)	_____	_____	_____
Environment Descriptor	_____	_____	_____
Shell Stack	_____	_____	_____
Message Buffers	_____	_____	_____
External FCB	_____	_____	_____
Named Directory Buffer	_____	_____	_____
Command Line Buffer	_____	_____	_____
External Stack	_____	_____	_____
ROM (if at top of memory)	_____	_____	_____

See the following two pages for examples of how to fill in this table. Refer also to page 22 of the Installation Manual.

Example 1: No ROM in memory and no Input/Output Package. All other features selected.

FUNCTION	SIZE	ADDRESS STARTING	ENDING
ZCPR3 Command Processor	2 K	_ D600 _	_ DDFF _
BDOS	3.5 K	_ DE00 _	_ EBFF _
Your BIOS	__ 1.5 K	_ EC00 _	_ F1FF _
ROM (if not at top of memory)	_____	_____	_____
Resident Command Package	__ 2.0 K	_ F200 _	_ F9FF _
ROM (if not at top of memory)	_____	_____	_____
Input/Output Package	_____	_____	_____
ROM (if not at top of memory)	_____	_____	_____
Flow Command Package	__ 0.5 K	_ FA00 _	_ FBFF _
ROM (if not at top of memory)	_____	_____	_____
Environment Descriptor	_ 256 _	_ FC00 _	_ FCFF _
Shell Stack	_ 128 _	_ FD00 _	_ FD7F _
Message Buffers	_ 80 _	_ FD80 _	_ FDCF _
External FCB	_ 48 _	_ FDD0 _	_ FDFF _
Named Directory Buffer	_ 256 _	_ FE00 _	_ FEFF _
Command Line Buffer	_ 208 _	_ FF00 _	_ FFCF _
External Stack	_ 48 _	_ FFD0 _	_ FFFF _
ROM (if at top of memory)	_____	_____	_____

Example 2: 1K ROM from F800-FBFF and no Input/Output Package. All other features selected.

FUNCTION	SIZE	STARTING	ENDING
		ADDRESS	
ZCPR3 Command Processor	2 K	_ D200 _	_ D9FF _
BDOS	3.5 K	_ DA00 _	_ E7FF _
Your BIOS	__ 1.5 K	_ E800 _	_ EDFF _
ROM (if not at top of memory)	_____	_____	_____
Resident Command Package	__ 2.0 K	_ EE00 _	_ F5FF _
ROM (if not at top of memory)	_____	_____	_____
Input/Output Package	_____	_____	_____
ROM (if not at top of memory)	_____	_____	_____
Flow Command Package	__ 0.5 K	_ F600 _	_ F7FF _
ROM (if not at top of memory)	__ 1.0 K	_ F800 _	_ FBFF _
Environment Descriptor	_ 256 _	_ FC00 _	_ FCFF _
Shell Stack	_ 128 _	_ FD00 _	_ FD7F _
Message Buffers	_ 80 _	_ FD80 _	_ FDCF _
External FCB	_ 48 _	_ FDD0 _	_ FDFF _
Named Directory Buffer	_ 256 _	_ FE00 _	_ FEFF _
Command Line Buffer	_ 208 _	_ FF00 _	_ FFCF _
External Stack	_ 48 _	_ FFD0 _	_ FFFF _
ROM (if at top of memory)	_____	_____	_____

F. You now have all the data required to edit Z3BASE.LIB. Run your favorite editor on Z3BASE.LIB:

1. Edit the comment header and fill in the values for your system as presented in the table you just filled in above. You will find this to be a tedious process which really pays off in the long run.

2. Set all of the equates in Z3BASE.LIB to contain the proper values as you planned on the table above. Follow through section 3.3 of the Installation Manual as you do this.

-- Blank Space for Calculations and Notes --

Step 3: Modify the BIOS Cold Boot Routine

Objective   Modify the Cold Boot routine in your BIOS to
            initialize the buffers you selected above.

Required Files   source to your BIOS
                 your favorite editor
                 an assembler that will assemble your
                    BIOS and generate a HEX file

References
        Installation Manual -- Chapter 4, Section 4.1
        ZCPR3: The Manual   -- Chapter 19

Instructions
A. Study section 4.1 of Chapter 4 of the Installation Manual.
Refer to the sample session in section 4.5.

B. Write code into the Cold Boot routine to initialize the
buffers you included in your ZCPR3 System. You may want to use the
code in section 4.1 after the label CBOOT: as a model for your code.

The following buffers must be initialized to zero:

        1. Resident Command Package
        2. Flow Command Package
        3. Environment Descriptor
        4. Shell Stack
        5. Message Buffers
        6. Named Directory Buffer

The following buffers must be initialized with data:

        1. External Path
            Initialize the path
        2. Wheel Byte
            Clear it or set it
        3. Input/Output Package
            Place initial set of drivers
        4. Command Line Buffer
            Initialize size and startup command

The following buffers do not need to be initialized:

        1. External Stack
        2. External File Control Block

C. Assemble your BIOS and make sure it assembles without error.
Also make sure that it is small enough to fit on the System Tracks
for your microcomputer. You now have a HEX file of your new BIOS.

Step 4: Editing Z3HDR.LIB

Objective To select the features of the ZCPR3
            Command Processor

Required Files Z3HDR.LIB (ZCPR3 File)
                Z3BASE.LIB (ZCPR3 File)
                ZCPR3.ASM (ZCPR3 File)
                your favorite editor
                Digital Research MAC, Echelon ZAS,
                    or equivalent assembler

References
        Installation Manual -- Chapter 4, Section 4.2
        ZCPR3: The Manual   -- Chapters 2, 9, and 19

Instructions
    A. Read section 4.2 of the Installation Manual. Refer to the
sample session in section 4.5.

    B. Edit Z3HDR.LIB and set the equates as you desire. Follow
along in section 4.2 of the Installation Manual since it provides a
running dialog of your basic tradeoffs.

    C. Assemble ZCPR3 and make sure it assembles without error.
This automatically checks to ensure that the ZCPR3 Command Processor
is 2K or less in size (an error is raised if it is over 2K in size).
You have to use an assembler like Echelon's ZAS because of the use
of macros. You now have a HEX file of your ZCPR3 Command Processor.

Step 5: Overlaying the old BIOS and the CCP

Objective Replace the CP/M CCP with ZCPR3 and your old
           BIOS with the modified BIOS created above.

Required Files MOVCPM.COM
                SYSGEN.COM
                DDT.COM, SID.COM, or equivalent
                ZCPR3.HEX (from previous assembly)
                BIOS.HEX (from previous assembly)

References
     Installation Manual -- Chapter 4, Section 4.3
     ZCPR3: The Manual   -- Chapter 19

Instructions
A. Read section 4.3 of the Installation Manual. Refer to the
sample session in section 4.5.

B. You may want to build a conventional CP/M system which
contains your new BIOS and runs at the address of your new ZCPR3
system.   This is an additional step which is not detailed in the
Installation Manual at this point, and it may save you a lot of
frustration later.   Among other things, it assures you that your
BIOS is correct and that your BOOT is also working properly.   To do
this:

          1. Run MOVCPM with the proper value
          2. SAVE the memory image to a disk file (CPM.BIN)
          3. Run DDT on CPM.BIN to load it
          4. Load the BIOS (section 4.5.11 shows the procedure)
          5. Correct the BOOT if necessary
          6. Exit DDT and SAVE the result to disk
          7. Run SYSGEN on the new image, place it on the
               system tracks, and make sure it boots and runs
               correctly

     If you do this part of Step 5, you now have a working CP/M
system which runs where your ZCPR3 will run, and you have confirmed
that your BIOS is OK. You are also in a good place to follow the
Installation Manual at step 4.5.10.

     C. If you did not do B above, run MOVCPM on your current CP/M
System to locate the BDOS at the proper location.   Save the
resultant system image on disk as a file via the SAVE command. If
you did B above, the image generated is ready for you.

     D. Use DDT to read in the system image saved in B or C.
Examine the area occupied by the CCP and BDOS to make sure they are
where they should be.

        E. Still in DDT: Zero out the area occupied by the CCP. Use
the I and R commands to read in the HEX file of the ZCPR3 Command
Processor.   Follow along in section 4.5.11 of the Installation
Manual if you need to.

        F.   Still in DDT: Zero out the area occupied by the BIOS. Use
the I and R commands to read in the HEX file of the BIOS. Follow
along in section 4.5.11 of the Installation Manual if you need to.

        G.   Exit DDT and save this new system image on disk as a file.
I will refer to this file as ZCPR3.BIN.

                -- Blank Space for Calculations --

Step 6: Implanting the Operating System Image

<u>Objective</u> Place the image created above on the
operating system tracks of a scratch disk.

<u>Required Files</u> DDT.COM
SYSGEN.COM
ZCPR3.BIN

<u>References</u>
Installation Manual -- Chapter 4, Section 4.4
ZCPR3: The Manual   -- Chapter 19

<u>Instructions</u>
A. Read section 4.4 of the Installation Manual. Refer to the
sample session in section 4.5.

B. Use DDT (I and R commands) to load the system image file
(ZCPR3.BIN) into memory. Check it to make sure that all is well.
As a minimum, make sure the following is true:

1. The ZCPR3 Command Processor is in place and the
   addresses within it are correct.

2. The BIOS is in place and the addresses within it
   are correct.

3. The BOOT is correct for loading the operating
   system at the correct memory location.

C. Use SYSGEN to place this memory image onto the operating
system tracks of a scratch disk. Section 4.5.12 in the Installation
Manual gives you an example of this step.

D. Remove all disks from your system. Place the scratch disk
in your A drive and try to boot it.

If all went well, ZCPR3 should have come up and presented you
with a prompt. Since your scratch disk is blank, if you loaded the
Command Line Buffer with a STARTUP command, ZCPR3 should have echoed
this command followed by a question mark to indicate that it was not
found.

Step 7: System Segment Installation

Objective Install the System Segments your selected.

Required Files LIB and ASM files for the System Segments:
SYSRCP.LIB and SYSRCP.ASM
SYSFCP.LIB and SYSFCP.ASM
SYSIOP.LIB and SYSIOP.ASM
SYSNDR.LIB and SYSNDR.ASM
SYSENV.LIB and SYSENV.ASM
your favorite editor
MAC.COM or equivalent
MLOAD.COM or equivalent

References
Installation Manual -- Chapter 5
ZCPR3: The Manual   -- Chapter 20

Instructions
A. Read Chapter 5 of the Installation Manual.

B. Edit the LIB files to select the features for your System Segments. Chapter 5 provides a running commentary of your options, and you may find it useful to follow along in the appropriate section of Chapter 5 as you edit each LIB file. The following sections of Chapter 5 cover the indicated segments:

5.1 – Resident Command Packages
5.2 – Flow Command Packages
5.3 – Input/Output Packages
5.4 – Named Directory Files
5.5 – TCAP Files
5.6 – the Environment Descriptor

C. Assemble your System Segments. Make sure they assemble without error. Give the assembled object files the proper file types. Sections 4.5.1 to 4.5.7 provide overviews of this process and may prove useful.

Chapter 7 of the Installation Manual goes into some detail on the TCAP and how to create your own if one is not already available via the TCSELECT program.

Also note that you may later want to run some of the ZCPR3 utilities to edit and create new named directory files.

Step 8: Utility Installation

Objective Install the ZCPR3 Utilities for your system

Required Files Z3INS.COM
                an INS file naming the utilities
                your favorite editor
                the utilities (COM files) you want to install

References
    Installation Manual -- Chapter 6
    ZCPR3: The Manual   -- Chapter 21

Instructions
A. Read Chapter 6 of the Installation Manual.

B. Use your favorite editor to create an INS file if you do not already have one. Place the names of the files to be installed in this file, one file per line.

C. Place all files to be installed, Z3INS.COM, your Environment Descriptor file, and your INS file in the same directory on disk. Run Z3INS on your INS file and your Environment Descriptor file.

D. Optionally create a TCAP file if you have not already done so (see Chapter 7 of the Installation Manual).

E. Place all of your system files in the root directory, create the STARTUP alias if you need one, and boot your new ZCPR3 System.

CONGRATULATIONS!