PHILIPS

P2511

BASIC INTERPRETER
OPERATOR MANUAL

5103 993 21121

Preface

Preface

This manual is intended for programmers with some experience in BASIC. It serves as an introduction to the use of BASIC on the P2000C Microcomputer System, and provides instructions on how to operate the BASIC Interpreter Development System, an environment for developing and running BASIC programs. Chapters 1 to 5 cover the fundamental aspects of the system, and it is recommended that these chapters be read before using the supplied disk. It is assumed in these Chapters that the user has a working knowledge of BASIC and is familiar with the P2000C microcomputer. Users who are not familiar with the P2000C should first read the P2000C Operator Manual and the CP/M User Guide. Chapters 6 to 8 of this manual deal with more advanced techniques, and demand that the user has an advanced knowledge of programming and the way the system works.

The BASIC Interpreter Development System contains many features in addition to the Interpreter for BASIC. Utilities for disk organisation, file organisation and other programming aids are also provided; these are all covered by this manual.

Programs developed on this system can also be run on the BASIC Run-Time System (RTS). This is a companion system designed for complete ease of use; it can only be used for running programs.

Other manuals which provide useful information are:

BASIC Interpreter Development System Reference Manual (5103 993 10921)

P2000C System Reference Manual (5103 993 30421)

CP/M User Guide (5103 993 21921)

CP/M Reference Guide (5103 993 11921)

BASIC RTS Operator Manual (5103 993 20621)

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Introduction

1 INTRODUCTION

The BASIC Interpreter Development System is an interpreter which enables you to develop and run programs in BASIC on your Philips P2000C. Whereas most high-level languages must be compiled before execution, BASIC can be executed directly without compilation. The job of the BASIC Interpreter is to examine each BASIC statement and then execute it before going on to the next statement.

Programs developed on this system can also be run on the BASIC Interpreter Run-Time System (P2506); this is the companion system to the development system, and is an easy-to-use environment for running BASIC programs.

The Philips BASIC Interpreter Development System is supplied on a disk which also contains a number of special Philips utilities. These will help you in developing programs and running the system; along with the other elements of the system, they are introduced in the following section.

Follow the steps set out in chapter 2 to create a 'BASIC System Disk' from which the BASIC Interpreter will be loaded and run automatically.

Introduction

1.1 ELEMENTS OF THE SYSTEM

The system consists of the following elements:

- The Microsoft BASIC Interpreter (Revision 5.22)
- VOLORG: the disk organisation utility
- CONFIG: the system configuration program loader
- KSAM80: the keyed sequential file access routine
- KSAMUT: a utility for handling KSAM 80 files
- The Screen Handler for handling screen input/output

Note - The Microsoft BASIC Interpreter (Revision 5.22) supports only single precision function results, for example, for SIN and COS (refer to the note on page 3-2 of the BASIC Interpreter Reference Manual). If you wish to write BASIC programs requiring double precision function results, the Advanced BASIC Interpreter (P2509) can be used. All three systems require the CP/M operating system, which is supplied with the machine.

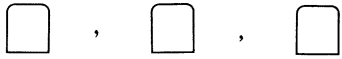
1.2 KEY REPRESENTATION

Sometimes in this manual, it will be necessary to describe a sequence of keys that you have to press. This will be represented as follows:

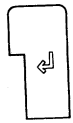
- You should press just one key:

- You should press two (or more) keys simultaneously:

- You should press several keys, one after the other:



- This is the carriage return key. Sometimes within the text it is abbreviated to (CR) or in screen displays to <CR>.



Starting Up BASIC on the P2000C

2 STARTING UP BASIC ON THE P2000C

2.1 PREPARING A BASIC SYSTEM DISK (640K)

1 First of all; please note that this section applies only to the 640K machine. For the 160K machine, start at section 2.1.1 overleaf. With either machine, you will only need to go through this procedure once. The chapter explains how to create a 'BASIC system disk' from the BASIC product disk and the CP/M operating system disk supplied with the machine.

2 To begin, start up CP/M. Slot the system disk carefully into the left-hand drive, (labelled drive'1'), press down the lever, and press the 'reset' button on the front panel of the computer. (If you have not yet made a backup copy of the CP/M disk you should do so by following the steps in chapter 2 of the CP/M User Guide), before going on.

3 The first screen display will appear after a few moments. It gives information about the keyboard, video, disks and printer. The operating system will halt at the standard CP/M prompt 'A>'.

4 Put a new disk in the right-hand drive and press down the lever. Press:

5 When you see the normal prompt 'A>', type in the name 'SYSGEN' and press the carriage return key.

6 SYSGEN is a CP/M program and it has its own prompts, (printed in green below), to which you must respond with the letters printed in black or with carriage return, when it is indicated.

```
A>SYSGEN
SYSGEN VER 2.2
SOURCE DRIVE NAME (OR RETURN TO SKIP) A
SOURCE ON A, THEN TYPE RETURN
FUNCTION COMPLETE
```


```
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)B
DESTINATION ON B, THEN TYPE RETURN
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)
A)
```

7 You must now run the PIP program. Type 'PIP' and press carriage return.

8 You will be prompted with an asterisk. Type these characters inside the quotation marks: 'B:=A:C*.*[V]' and then press carriage return. The program is now copying the necessary files - you will see their names appearing on the screen.

9 Wait until the copying process has finished and the asterisk is displayed again. Then remove the original CP/M disk from the left-hand drive and replace it with your BASIC product disk.

10 Type 'B:=A:*.*[V]' and press carriage return. The BASIC files will now be copied. When this process is complete the asterisk will be re-displayed. Do not press carriage return. You now have your new BASIC system disk in the right-hand drive. Remove the product disk from the left-hand drive and replace it with the BASIC system disk. Press the 'reset' button to restart the operating system.

2.1.1 Preparing a BASIC System Disk (160K)

Follow steps 1 to 4 above, and then step 7. Once the 'PIP' program has been started, remove the CP/M system disk and replace it with the BASIC product disk. Type these characters inside the quotation marks: 'B:=A:*.*[V]' and then press carriage return. This copies all the BASIC files onto the new disk.

When copying has finished and the asterisk prompt reappears, replace the product disk in the left drive with the CP/M system disk. Leave the new 'BASIC system disk' in the right-hand drive. Go to step 2 on page 2.3 and continue from there with the configuration program.

2.2 STARTING UP BASIC ON THE P2000C

1 You are now using a disk that has both the CP/M operating system and BASIC on it, and you are at this point in CP/M. In order to complete the process of starting up BASIC you must instruct CP/M to automatically load and run the BASIC program each time that this disk is started up. To do this you must run the configuration program.

2 Since we are concerned, in this section, only with starting BASIC, the following steps show the prompts displayed by the configuration program and provide suggested responses that will satisfy the requirements of the program. Type them in exactly.

3 To Start the configuration program, type the name of the program after the CP/M prompt: A) CONFIG

Program Section	Prompt	Operator Response
Language Selection	Select or (CR)	Carriage return
Main Menu	Select:	1
System	Select, cursor left, right etc	Carriage return
Capslock	Set capslock on startup (y/n)	y
Timeout	Enter printer timeout	65 then (CR)
Autostart	Enter Autostart string	MBASIC /S:256(CR) (see next page)
Message	Enter welcome message or (CR)	your choice then (CR)
Write System	Enter floppy drive number on which..	1 (if 640K) 2 (if 160K)
Confirm	Check disk etc	y
Reset System	Press RESET etc	Press 'reset'

Starting Up BASIC on the P2000C

The complete list of parameters that may be entered as the autostart string is as follows:

MBASIC [<filename>] [/F:<#files>] [/M:<high mem>] [/S: < max rec lngth>] and carriage return

The options:

<filename> = if <filename> is present, the BASIC Interpreter proceeds as if a RUN filename command were typed. A default extension of .BAS is used if none is supplied, no "." appears in the filename and the filename is less than 9 characters long.

/F:<#files> = maximum number of disk data files that may be open during the execution of a BASIC program. If this is omitted, the default of 3 files takes effect. For each specified data disk file is allocated 306 bytes of memory for reading information from the disk (when max rec lngth =128). The range for <#files> is 0-15.

/M:<high mem> = highest possible memory address accessible by the BASIC Interpreter (usually used for memory allocation for machine code subroutines). If this option is omitted, high memory is set to the beginning of CP/M.

/S:<max rec lngth> : maximum record length in bytes which can be specified in an OPEN statement. If this option is omitted, the default of 128 bytes takes effect.

Starting Up BASIC on the P2000C

examples:

```
MBASIC
     <#files>          = 3
     <high mem>        = (start of CP/M).1
     <max rec lngth>   = 128 bytes

MBASIC /F:5 /S:256
     <#files>          = 5
     <high mem>        = (start of CP/M).1
     <max rec lngth>   = 256 bytes

MBASIC PAYROLL /F:5 /M:&HCBFF /S:256
      The program PAYROLL.BAS will be automatically executed.
     <#files>          = 5
     <high mem>        = CBFF Hex
     <max rec lngth>   = 256
```

2.3 BASIC INTERPRETER DISPLAY

The BASIC Interpreter will now be automatically loaded and run, and will also be run on any subsequent startup. The following lines will be displayed under the CP/M messages, and the system will halt at the standard BASIC prompt 'Ok'.

```
BASIC - 80 Rev. 5.22
[CP/M Version]
Copyright 1977-1982 (C) by Microsoft
xxxxx bytes free
Ok
```

Note - The number of bytes free depends on your current configuration

The VOLORG Utility

3 THE VOLORG UTILITY

The VOLORG (Volume Organisation) utility is a program which gives you an easy means of organising disk space. Like any other BASIC program, it is executed by the RUN command:

```
RUN "VOLORG"
```

When VOLORG is run, the following menu is displayed:

```
P2000C          DISK UTILITY

  0 = LOAD AND RUN PROGRAM
  1 = Disk directory and free space
  2 = COPY file
  3 = COPY disk
  4 = DELETE file
  5 = DELETE disk
  6 = RENAME file
  7 = File size
  8 = Compare disks
  E = EXIT to command mode
  R = RESET after disk change or error

select
```

If this menu is not displayed, check that the system disk is correctly inserted in the left-hand drive (drive A), then type in the command again.

The various options on the menu are explained in the rest of this Chapter. The first time you use VOLORG will be to make a back-up copy of your system disk; use option number 3 to do this.

Note - Use the VOLORG functions 2, 3, 4, 5, and 6 with care, since they will physically change the contents of a disk. Make sure at all times that the correct disk(s) is in the correct drive(s).

3.1 REPLYING TO VOLORG MENU PROMPTS

To choose one of the VOLORG options, enter the appropriate number, without pressing carriage return. The next display appears immediately, and will, naturally, differ according to the option chosen.

Once you have chosen an option, you will then be given one or more prompts for further information. If you press carriage return alone to answer to any of these prompts, you will be taken back to the previous prompt, or to the VOLORG main menu if the prompt you replied to was the first in the option.

Prompts within VOLORG usually require you to enter disk-drive names or file names. Valid disk-drive names depend on your configuration.

Warning - Take great care when specifying a disk-drive in response to a VOLORG prompt. If you specify a drive which is not in your configuration or if the disk is not correctly inserted in the drive you specify, the system will not be able to read from or write to that drive. The result will be a Bdos error, after which you will have to reboot the system by pressing reset. Refer to Appendix A for a description of System error messages.

A file name can be specified in one of two ways. You can supply the simple file name of up to eight characters or the full file name; this consists of up to eight characters plus a three-character extension, these two parts being separated by a full stop. On some occasions, you must supply the full file name in response to a prompt; this manual will say when that is required.

The following are examples of valid file names:

```
DATA
PROGRAM.BAS
FILE.DAT
```

The following is an example of an invalid file name:

```
MUCHTOOLONG.BAS
```

A full explanation of file name formats is given in the BASIC Reference Manual, and in the CP/M User Guide.

When each option has carried out its task, the message:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

appears in the bottom right-hand corner of the screen. Pressing "C" in reply to this prompt will return you to the opening prompt of the option you are in; pressing any other key on the alphanumeric keypad will return you to the VOLORG main menu.

3.1.1 Option 0: Load and Run Program

This option has the same effect as typing "E" (EXIT to command mode) followed by the BASIC command Run. The 0 option displays the following prompt:

```
L O A D  A N D  R U N  P R O G R A M
```

```
Which drive:
```

Reply to this by entering a disk-drive name, followed by carriage return. The system will search this drive for the program that you wish to run. When you enter a valid drive name followed by carriage return, the next prompt appears underneath:

```
Filename:
```

Reply to this by entering the file name of the program that you wish to run, followed by carriage return. The named program is then executed. If the named file is not found, the message:

```
FILE NOT FOUND
```

is displayed, before you are returned to the drive name prompt

3.1.2 Option 1: Disk Directory and Free Space

This option displays the directory of a disk, and the free space left on that disk in kilobytes.

Typing 1 in response to the VOLORG main menu causes the following prompt to be displayed:

```
D I R E C T O R Y  A N D  F R E E  S P A C E

Which drive:
```

Reply to this prompt by typing the name of a valid disk drive, followed by carriage return. The first 64 entries on the directory of the disk in the nominated disk drive will then be displayed, along with a message above telling you how much free space is left on the disk. The following prompt appears below the displayed directory:

```
turn page = 1  print screen = P
```

If there are more than 64 entries on the directory, the rest can be displayed in turn by pressing "1". If you want a print-out of that page of the directory, press "P", but you must make sure that the printer is switched on and properly connected before you do so.

When you have finished looking at or printing the directory, press any key except 1, and the prompt:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

is displayed.

3.1.3 Option 2: Copy File

This option copies a file from a disk on one specified drive to another specified drive. The copy may have either the same file name as the original or a different one.

Typing in 2 in response to the VOLORG main menu causes the following display:

```
COPY FILE
```

(SOURCE) Which drive:

Insert the disks you wish to use in the drives, and make sure that the write-protect tab is removed from the disk to which the file will be copied. Reply to the prompt by typing in the name of the disk-drive, followed by carriage return. This must be the drive in which the disk with the file to be copied is inserted. The next prompt appears underneath.

Filename:

Enter the name of the file that you wish to be copied, followed by carriage return. The next prompt appears underneath.

(DESTINATION) Which drive:

Type in the name of the drive, followed by carriage return. This must be the drive which contains the disk to which the file will be copied. The next prompt appears underneath.

Filename:

Type in a file name, followed by carriage return. This will be the file name of the file once it has been copied to the other disk; it can be either the same name as the original, or a different one.

Once you have typed in the last prompt, the system will copy the file. When the copy is complete, you are returned to the prompt:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

3.1.4 Option 3: Copy Disk

This option copies the contents of a disk on one specified drive to another specified drive. This is the first option in VOLORG that you will use when you make the original back-up copy of your system disk. If the recommended normal back-up procedures are followed, this will be the VOLORG option that you use the most.

When you type 3 in response to the VOLORG main menu, the following prompt is displayed:

```
C O P Y  D I S K

(SOURCE) Which drive:
```

Enter the appropriate number. The following prompt then appears:

```
(DESTINATION)  Which drive:

put source disk into drive A
```

Enter the number of the drive that is to receive the copy. A third prompt will be displayed:

```
put target disk into drive B

press SPACE - key if ready, any other key to exit
```

In this prompt, "A" and "B" represent the names of the drives containing the disks to be copied, as specified in the previous prompt. Place the disks in the drives, as indicated in the prompt, remembering to remove the write-protect tab from the disk to which the copy will be written. Check that the disks are correctly loaded in the drives before pressing the space bar; the system will then copy one disk to the other. Once the copy has been made successfully, the following prompt appears:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

3.1.5 Option 4: Delete File

This option deletes a specified file from the directory.

When you type 4 in response to the VOLORG main menu, the following prompt is displayed:

```
DELETE FILE
```

```
Which drive:
```

Reply to this by typing in the name of a valid disk drive, followed by carriage return. The next prompt then appears underneath:

```
Filename:
```

Type in the full file name of the file that you wish to be deleted, followed by carriage return. The system will then delete the file you have specified. If the file cannot be found, the message:

```
FILE NOT FOUND
```

will appear flashing in the bottom right-hand corner. Pressing any key on the alphanumeric pad will return you to the first prompt.

If the deletion is successful, you are returned to the prompt:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

3.1.6 Option 5: Delete Disk

This option deletes all the entries on the directory of a specified disk.

When you type 5 in response to the VOLORG main menu, the following prompt is displayed:

```
D E L E T E  D I S K

Which drive:
```

If you wish to return to the main menu, type carriage return. Otherwise, reply to this prompt by typing the name of a valid disk drive, followed by carriage return. The disk on that drive will then have the contents of its directory removed.

A successful deletion of the disk will return you to the prompt:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

3.1.7 Option 6: Rename File

When you type 6 in reply to the VOLORG main menu, the following prompt is displayed:

```
RENAME FILE
```

```
Which drive:
```

Reply to this prompt by typing a valid disk drive name, followed by carriage return. This must be the drive containing the disk with the file you wish to rename. When you have done this, the next prompt appears underneath.

```
Filename old:
```

Type in the full file name of the file whose name you wish to change, followed by carriage return. The next prompt appears underneath.

```
Filename new:
```

Type in the file name that you wish your file to be changed to, followed by carriage return.

Once both prompts have been answered, the renaming is carried out by the system. If the old file name is not found (either because the full file name has not been specified or because the file is not present on the specified disk), the message:

```
FILE NOT FOUND
```

appears flashing in the bottom right-hand corner of the screen. Typing carriage return at this stage will return you to the first prompt so that you can try again.

If the change of name is successful, the message:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

appears in the bottom right-hand corner of the screen.

3.1.8 Option 7: File Size

This option displays the size of a file in sectors (1 sector = 256 bytes).

When you type 7 in reply to the VOLORG main menu, the following prompt is displayed:

```
F I L E   S I Z E

Which drive:
```

Reply to this prompt by typing a valid disk drive name, followed by carriage return. This must be the drive containing the disk with the file whose size you wish to know. When you have done this, the next prompt appears underneath.

```
Filename:
```

Type in the full file name of the file whose size you wish to know, followed by carriage return. The file size in sectors is now printed underneath. At the same time, the following prompt appears at the bottom of the screen:

```
FUNCTION COMPLETED: C = CONTINUE, ELSE EXIT
```

3.1.9 Option 8: Compare Disks

This option compares the disks in drives A and B and reports if their contents are the same or not.

When you type 8 in reply to the VOLORG main menu, the following prompt is displayed:

```
C O M P A R E  D I S K S

1 = Compare 5-inch disks

First drive  Which drive:
```

Enter the appropriate letter. The following prompt then appears.

```
insert disk into drives A and B and press SPACE - key if
ready, any other key to exit.
```

In this prompt, the "A" and "B" will be the names of the drives, as selected from the previous prompt. When you press the Space bar on the keyboard, the disks will be compared by the system.

If the disks are not equal, the following prompt appears flashing in the bottom right-hand corner of the screen:

```
DISKS NOT EQUAL
```

Press any key on the alphanumeric pad to reach the Continue prompt.

If the contents of each disk are the same, the system will spend a short time checking them before the Continue prompt is displayed.

3.1.10 Option E: Exit to Command Mode

This option causes the VOLORG utility to finish.

When you type "E" in response to the VOLORG main menu, the menu disappears. You are returned to BASIC command mode, and the Ok prompt appears at the top of the screen.

3.1.11 Option R: Reset After Disk Change or Error

After you have placed a different disk in a disk drive, you should press "R". The system will then read the directory of the new disk into memory. If you do not do this, the system will still consider that you have the old disk in the drive.

After pressing "R", you are returned directly to the VOLORG main menu.

4 USING CONFIG.BAS

Since the configuration program is described in the CP/M User Guide, and this is supplied with the machine, we will here add only a few notes on its use. On the BASIC product disk the program appears as 'CONFIG.BAS' and can be called, within the BASIC environment, by typing:

```
Ok
RUN "CONFIG
```

The message 'working on disk, please wait' will be displayed for a few seconds before the program goes directly into language selection.

From the program's main menu you can select a number of options that enable you to edit and store tables for the codes generated by the keyboard, printer and video display, as well as a table for disk specifications.

5 DISK INFORMATION

5.1 FIVE-INCH DISKS

Five-inch disks, as supported by the P2000C, may be either single sided, single density (48 tpi) - 160K - or double sided, double density (96 tpi) - 640K.

5.1.1 Single Sided

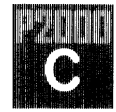
The characteristics of the single sided disk are as follows, (as displayed by the CP/M STAT command):

```
   A: Drive Characteristics
1216: 128 Byte Record Capacity
 152: Kilobyte Drive Capacity
  64: 32 Byte Directory Entries
  64: Checked Directory Entries
 128: Records/ Extent
   8: Records/ Block
  32: Sectors/ Track
   2: Reserved Tracks
```

5.1.2 Double Sided

The characteristics of the double sided disk are as shown below:

```
   A: Drive Characteristics
5056: 128 Byte Record Capacity
 632: Kilobyte Drive Capacity
 128: 32 Byte Directory Entries
 128: Checked Directory Entries
 512: Records/ Extent
  32: Records/ Block
  32: Sectors/ Track
   2: Reserved Tracks
```



5.2 HARD DISK

The characteristics of a 10 megabyte hard disk are as follows:

When the disk is partitioned into 2 volumes, each of 5MB:

5MB lower

```
    A: Drive Characteristics
39104: 128 Byte Record Capacity
 4888: Kilobyte Drive Capacity
  256: 32 Byte Directory Entries
    0: Checked Directory Entries
  256: Records/ Extent
   32: Records/ Block
   32: Sectors/ Track
    2: Reserved Tracks
```

5mb upper

```
    B: Drive Characteristics
39168: 128 Byte Record Capacity
 4896: Kilobyte Drive Capacity
  256: 32 Byte Directory Entries
    0: Checked Directory Entries
  256: Records/ Extent
   32: Records/ Block
   32: Sectors/ Track
 1224: Reserved Tracks
```

Disk Information

When the disk is partitioned into 2 volumes, the lower of 2 MB and the upper of 8MB:

2MB lower

```
    A: Drive Characteristics
15616: 128 Byte Record Capacity
 1952: Kilobyte Drive Capacity
  256: 32 Byte Directory Entries
    0: Checked Directory Entries
  256: Records/ Extent
   32: Records/ Block
   32: Sectors/ Track
    2: Reserved Tracks
```

8MB upper

```
    B: Drive Characteristics
62656: 128 Byte Record Capacity
 7832: Kilobyte Drive Capacity
  256: 32 Byte Directory Entries
    0: Checked Directory Entries
  256: Records/ Extent
   32: Records/ Block
   32: Sectors/ Track
  490: Reserved Tracks
```

The Screen Handler

6 THE SCREEN HANDLER

The Screen Handler is a machine-code program which supports professional screen input and output programming. There are three versions of the Screen Handler on the product disk:

SH.L61 - for the 61 K configuration
SH.L62 - for the 62 K configuration
SH.L63 - for the 63 K configuration

A demonstration program is also provided on the system disk; this shows you how to use the routines within the Screen Handler. The name of this program is SHACT.BAS. It displays helpful information on the screen and prompts you to use the routines. The best way of familiarising yourself with the Screen Handler and the Activator is to look at this program.

First of all, make sure that the system disk is loaded in drive A, and enter the command:

```
LOAD "SHACT"
```

Then turn on your printer and enter the command:

```
LLIST
```

The program listing of the Screen Handler Activator will then be printed out, giving you a useful reference. After the program has been printed, you are returned to BASIC at command level; you can then execute the program with the command:

```
RUN
```

The Screen Handler

When you run SHACT, the following menu is displayed:

```
Select:  0  Exit to Command Mode
         1  Screen Handler Activator
         2  Clear Screen Routine
         3  Print Screen Routine
```

Type one of the numbers between 1 and 3 to reach the demonstrations of the various parts of the Screen Handler Activator. Once you have done this, the program is completely self-documenting; information screens are provided to guide you through the various screen-handling routines.

In summary, a careful analysis of the program will contribute greatly to your understanding of the use of BASIC and the Screen Handler on the P2000C.