TurboDOS / PC
MANUAL

InterContinental Micro

Guide to

TurboDOS/PC 1.0

March 1985

Copyright 1985

Guide to

TurboDOS/PC 1.0

March 1985

Copyright Notice

Copyright 1985 by Software 2000, Inc. All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual or otherwise, without the prior written permission of Software 2000, Inc., 1127 Hetrick Avenue, Arroyo Grande, California 93420, U.S.A.

Trademark Notice

TurboDOS is a registered trademark of Software 2000, Inc., and has been registered in the United States and in most major countries of the free world.

IBM is a trademark of International Business Machines Corporation.

Disclaimer

Software 2000, Inc., makes no representations or warranties with respect to the contents of this publication, and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose. Software 2000, Inc., shall under no circumstances be liable for consequential damages or related expenses, even if it has been notified of the possibility of such damages.

Software 2000, Inc., reserves the right to revise this publication from time to time without obligation to notify any person of such revision.

First Edition: March 1985

ABOUT THIS GUIDE

Purpose

We've designed this Guide to provide the information you need to use TurboDOS/PC. This document tells you what TurboDOS/PC does, how to load it into your computer, and how to use its various facilities. It describes the various TurboDOS/PC commands. It explains the use of the TurboDOS/PC program interface, and discusses various limitations. Finally, it gives details about how to implement the network drivers required to install TurboDOS/PC on a new hardware configuration.

Organization

This guide is organized into four sections. The first section explains some of the fundamentals: what TurboDOS/PC is, what it does, how to start it running, and how to use its basic facilities. The second section describes the various TurboDOS/PC commands in detail. Both are of interest to all users.

The third section is intended for assembly-language programmers writing application programs, and explains the TurboDOS/PC program interface in detail. The fourth section is intended for OEMs and other implementors, and provides information about how to implement hardware-dependent network drivers and bootstrap ROMs.

Assumptions

In writing this guide, we've assumed that you are thoroughly familiar with the use of the MS-DOS or PC-DOS operating system provided with your computer. The last two sections (program interface and driver implementation) also assume you are an experienced assembly-language programmer with in-depth familiarity with the TurboDOS operating system. There has been no attempt to duplicate material covered in the MS-DOS or TurboDOS manuals.

(Intentionally left blank.)

Guide to
TurboDOS/PC 1.0

USER'S GUIDE	In this section, you will learn everything you need to know to start using TurboDOS/PC: what it is, what it does, how to start it running, how to use its basic facilities, and what to do in case of errors.

Overview of TurboDOS/PC	TurboDOS/PC is a software product that interfaces MS-DOS machines with a TurboDOS network. It runs on an IBM Personal Computer or any other 8086-family microcomputer system that uses MS-DOS or PC-DOS. TurboDOS/PC allows your PC to become a TurboDOS network client, and to access the resources of Turbo-DOS file and print servers in the network.
	Your PC continues to operate normally under control of its native MS-DOS operating system with full access to its local disks and other peripheral devices. The only effect of the network connection provided by TurboDOS/PC is that the PC has access to more disks and printers than before.

Remote Disks	For example, your PC might have two local disk drives that you access as A: and B:. Once TurboDOS/PC has been loaded, you will also be able to access additional disks C:, D:, etc. These will actually refer to remote disk drives attached to one or more TurboDOS file servers. However, you can use them just as if they were extra local disk drives.
	All the usual file- and directory-oriented commands of MS-DOS (like COPY, DEL, REN, DIR, CHDIR, MKDIR, RMDIR, etc.) work exactly the same with remote disks as with local ones. MS-DOS application programs, overlays and data files may be copied to and executed from remote disks (except for packages that use copy-protection schemes to prevent this).

Remote Printing

Similarly, TurboDOS/PC allows you to route printed output either to the local printer attached to your PC or to remote printers attached to TurboDOS print servers. A new command named PRINT (part of TurboDOS/PC) lets you control where print output should be routed. The same command lets you specify whether you want your remote printing to be "direct" or "spooled".

In direct printing, your print output is sent directly to the selected remote printer and printed immediately. In spooled printing, however, your print output is first saved in a print file on a remote disk, then printed afterwards as a background activity. Spooled printing frees your PC to work on another task without having to wait for the printing to finish. It also makes it possible for many users to share one printer without interfering with one another.

Mostly Invisible

As you can see, there's not a great deal to learn about using TurboDOS/PC. For the most part, it is an invisible extension to the native MS-DOS operating system that comes with your PC. It makes your PC act as if it had more disks and more printers (although these devices really belong to other machines in the network). There are a few new commands to learn (like PRINT) but you probably won't need to use them very often. Mostly, you can ignore TurboDOS/PC and just enjoy the added disks and printers at your disposal!

Hardware Required

TurboDOS/PC works with an IBM Personal Computer or any other machine that uses MS-DOS. Your PC must be equipped with a suitable high-speed network port (usually an accessory board) that connects to the TurboDOS network.

Getting Started

In most cases, you should load TurboDOS/PC right after MS-DOS boots up. TurboDOS/PC consists of several MS-DOS transient programs (.COM files). Each program can be installed simply by typing its name as an MS-DOS command. Which ones you should install depends on the MS-DOS version you are using:

Name	Description
TURBOPC1	TurboDOS/PC for MS-DOS or PC-DOS version 1.xx only.
TURBOPC2	TurboDOS/PC for MS-DOS or PC-DOS versions 2.xx or 3.0x.
TURBOPC3	Additional program to permit execution of programs from remote disks, needed only with MS-DOS or PC-DOS version 3.0x.
TURBOPRN	Additional program required for remote printing with all versions of MS-DOS or PC-DOS.

In the examples on the following page (and throughout the remainder of this document), underlines are used to indicate the items you need to key in. The rest is displayed by the computer.

MS-DOS 1.xx Startup

```
The IBM Personal Computer DOS
Version 1.xx (C)Copyright IBM Corp. 19xx
A>TURBOPC1
TurboDOS/PC 1.0x (#)
Copyright 1985, Software 2000, Inc.
Local drives:    A-B
Remote drives:   C-F
Remote printers: A-B
Remote queues:   A-P
A>TURBOPRN
A>
```

MS-DOS 2.xx Startup

```
The IBM Personal Computer DOS
Version 2.xx (C)Copyright IBM Corp. 19xx
A>TURBOPC2
TurboDOS/PC 1.0x (#)
Copyright 1985, Software 2000, Inc.
Local drives:    A-B
Remote drives:   C-F
Remote printers: A-B
Remote queues:   A-P
A>TURBOPRN
A>
```

MS-DOS 3.0x Startup

```
The IBM Personal Computer DOS
Version 3.0x (C)Copyright IBM Corp. 19xx
A>TURBOPC2
TurboDOS/PC 1.0x (#)
Copyright 1985, Software 2000, Inc.
Local drives:    A-B
Remote drives:   C-F
Remote printers: A-B
Remote queues:   A-P
A>TURBOPC3
A>TURBOPRN
A>
```

Automatic Startup | You can arrange for TurboDOS/PC to be loaded automatically each time you boot up your PC. This method is strongly recommended. For automatic startup, you must create a file named AUTOEXEC.BAT containing the appropriate TurboDOS/PC commands. (See your MS-DOS or PC-DOS manual for details of how to do this. Look under "Batch Processing".)

Startup Errors | If an error occurs during the startup phase, TurboDOS/PC will display one of the following error messages after its copyright notice:

<u>Already installed</u>
You are trying to install TurboDOS/PC twice. Your second attempt is ignored.

<u>Insufficent memory</u>
There is not enough memory to accomodate TurboDOS/PC.

<u><filename> not present</u>
The network driver file <filename> is not present.

<u><filename> load error</u>
The network driver file <filename> was located but could not be read successfully.

In each case, TurboDOS/PC is not installed.

Drives and Files

TurboDOS/PC expands the disk capacity of your PC by giving you access to remote drives belonging to TurboDOS file servers attached to your network.

Drive Letters

In order to enable you to access the various disk drives attached to your PC, MS-DOS assigns a unique letter to each drive. Thus, "A:" denotes the first drive on your system, "B:" denotes the second drive, and so on. The number of local disk drives varies from machine to machine, and may even be zero (for a diskless workstation). Most commonly, PCs are equipped with two local disk drives (either two flexible disk drives or one fixed and one flexible).

Using TurboDOS/PC, drive letters beyond the last local drive are used to denote remote drives belonging to TurboDOS file servers. Up to 16 remote drives may be accessible. The actual number of remote drives and the specific assignment of drive letters depends your particular network configuration.

Note that the early drive letters (starting with "A:") are reserved for local drives, and the later letters are used for remote drives. If this proves inconvenient, TurboDOS/PC provides a REASSIGN command that lets you change the drive letter assignments around. For example:

```
A>REASSIGN A=D D=A
```

temporarily switches the letters assigned to drives A: and D:. (Using REASSIGN can get rather confusing, however, so we don't recommend it unless you have a compelling reason.)

Remote Drives
vs. Local Drives

You can use remote drives to do just about anything that is allowed on local drives. All of the usual file- and directory-oriented MS-DOS commands work equally well on local and remote drives. However, there are a few differences:

1. Physical disk operations that bypass the MS-DOS file system are not allowed on remote drives. Don't try to use commands like CHKDSK, DISKCOMP, DISKCOPY or FORMAT on remote drives. If you do, you will get an error message like "invalid drive specification" (no harm will be done).

2. Files on remote drives are not "stamped" with the date and time of creation. If you use the DIR command to look at the directory of a remote drive, you will see that the date and time fields of the directory display will be blank.

3. Files on remote drives may be shared by other MS-DOS and TurboDOS computers connected to your network. This can be a great advantage because common programs and data may be accessed several users at the same time. On the other hand, you may wish to keep private files on your local drives to prevent others from accessing them.

Sub-Directories

Starting with version 2.00, MS-DOS allows you to segregate the files on a disk into several "sub-directories". This allows grouping of files by owner, application, or other convenient category. Each such sub-directory is identified by a "pathname". (See your MS-DOS manual for more details.)

TurboDOS has a similar mechanism whereby disk files may be segregated into 32 different sub-directories identified by "user numbers" from 0 to 31. In order to allow MS-DOS users to access remote drives belonging to TurboDOS file servers, TurboDOS/PC maintains a mapping between each MS-DOS sub-directory pathname and the corresponding TurboDOS user number.

One particular user number (commonly, zero) corresponds to the MS-DOS root directory. For MS-DOS version 1.xx (which does not support sub-directories), this is the only user number that may be accessed. For MS-DOS version 2.00 and beoynd, however, the remaining 31 user numbers may be mapped into any desired tree of MS-DOS sub-directories.

The usual MS-DOS commands MKDIR and RMDIR are used to create and delete sub-directories on remote drives. For example:

```
A>MKDIR D:FRANCIS
A>MKDIR D:FRANCIS\INVEST
A>MKDIR D:FRANCIS\GAMES
```

creates three new sub-directories on remote drive D:. Normally, each newly-created sub-directory is automatically assigned by Turbo-DOS/PC to the next available user number. You don't need to be concerned about user numbers unless you need to access the same files from a TurboDOS machine.

Sub-Directories
(Continued)

However, it is possible for you to explicitly assign a sub-directory to a particular user number. To do this, you must prefix the sub-directory name in the MKDIR command by "nn#". A couple of examples should make this clear:

```
A>MKDIR D:FRANCIS\9#USERNINE
A>MKDIR D:20#TWENTY
```

Not more than one sub-directory may be assigned to a particular user number on a remote drive.

Remote Disk Changes

If any remote drives in your network are floppy disks or other removable media, you must take special care before removing or changing them. First, you should check to make sure that no other user is using the disk you want to change. Then use the CHANGE command to let the file-server know you want to change disks:

```
A>CHANGE
Enter drive(s) to be changed: DEF
Change drive(s) DEF
Enter <CR> when change complete
```

Wait until the CHANGE command tells you it's okay to change the disks (as above). Then remove and replace disks as required. Finally, press RETURN to advise you are done with the change. Remember, never remove a remote disk without first entering a CHANGE command.

Since your local disk drives are not shared, these precautions do not apply to them. Don't use CHANGE when changing local disks.

Disk Errors

If you hear a "beep" and see a diagnostic
message on your console such as:

```
Read Error, Drive D, Track 0, Sector 2
(Retry, Ignore, Abort)

Write Error, Drive F, Track 5, Sector 16
(Retry, Ignore, Abort)
```

it means that the file-server could not read
or write the specified disk sector even
after a number of retries. When you see such
a message, you must choose one of three
recovery options (Retry, Ignore, Abort) by
keying the letter R, I, or A.

If you key R (retry), TurboDOS/PC will try
the read or write operation several more
times. If it is still unsuccessful, you will
get another message.

If you key I (ignore), processing will con-
tinue as if the error had not occurred. This
option is not recommended in most situations
because it causes processing of invalid data
and may lead to other errors.

If you key A (abort), TurboDOS/PC terminates
the program you were running when the error
occurred.

NOTE: If you use REASSIGN to re-assign drive
letters, the drive letters reported in these
error messages will be the original ones
prior to re-assignment.

**Disk Errors
(Continued)**

If you hear a "beep" and see this message on
your console:

```
Not Ready Error, Drive C (Retry, Abort)
```

it means the file-server could not access the
selected drive for one of the following
reasons:

- there's no such drive on your network
- the drive isn't ready to operate
- the drive's door was left open
- no disk is mounted in the drive
- the disk hasn't been formatted
- the disk format is unrecognizable

Again, you must select the desired recovery
option by keying R or A.

Printing

TurboDOS/PC allows you to route printed output either to the local printer attached to your PC or to remote printers attached to TurboDOS print servers on the network.

Your network may be equipped with several remote printers (up to 16 of them), all of which may be in use simultaneously. Each remote printer is assigned a letter (A, B, C, etc.) You can select which printer to use, and can change your selection at any time.

For remote printing, you also have the choice of two different methods: direct and spooled.

Local Printing

To route print output to the local printer attached to your PC, use this command:

```
A>PRINT LOCAL
Printing is to LOCAL
A>
```

Direct Printing

You can route print output directly to any remote printer on a character-by-character basis. This is the simplest method of printing, and is useful for very long print jobs (e.g. overnight) and for certain special situations such as single-sheet printing.

To select direct printing mode, you need to specify which remote printer you wish to use:

```
A>PRINT PRINTER=B
Printing is to PRINTER B
A>
```

Direct Printing
(Continued)

Direct printing has some drawbacks, however. For one thing, when you use direct printing, your PC is tied up until the print job has finished. Printers are generally the slowest components of any computer system, and you will find they are are often a bottleneck limiting how much work you can get done.

Another drawback of direct printing is that it is very awkward to use in a multi-user environment. If two users attempt to print directly to the same printer at the same time, the result is a merged printout that is not likely to be of much use to either user. Thus, direct printing requires that users carefully coordinate among themselves to avoid such conflicts.

You can avoid both of these problems by using spooled printing.

Spooled Printing

When you select spooled printing, TurboDOS/PC automatically intercepts your print output and saves it in a print file on a remote disk. This process is called "spooling".

When the print job is done, TurboDOS/PC automatically causes the contents of the print file to be printed. This process is called "de-spooling", and is performed by a print server in the background independent of your PC. You can go ahead and run your next program without waiting for the printing to finish. When the printing is complete, the print file is deleted automatically.

In a multi-user environment, several users may be generating spooled print output at the same time without any interference. As their jobs finish, the print files are queued automatically for de-spooling on a first-come first-served basis.

**Spooled Printing
(Continued)**

To select spooled printing mode, you need to specify the print queue on which you want your print job placed (more about print queues shortly). .You may also specify the remote disk drive onto which you want the print file to be written:

```
A>PRINT DRIVE=C QUEUE=A
Printing is to SPOOLER on DRIVE C
             to QUEUE A
A>PRINT QUEUE=B
Printing is to SPOOLER on DRIVE C
             to QUEUE B
A>
```

If you specify the spool drive (first example above), it must be a remote drive. If you don't specify the spool drive (second example above), it will remain the same as before.

Print Jobs

When a program generates its first character of print output, a new "print job" begins. If spooled printing is in effect, TurboDOS/PC automatically creates a new print file at this point. Subsequent print output is spooled to this print file until the print job ends, whereupon TurboDOS/PC closes the print file and queues it for de-spooling.

In most cases, the print job ends automatically at the conclusion of the program. However, the print job may also be ended by an explicit "signal end-of-print" request from the program, or by the presence of a reserved end-of-print character in the print output stream (if one is defined for your system).

Print Queues

TurboDOS/PC supports up to 16 print queues. A print queue is simply a list of print jobs awaiting de-spooled printing. Each queue has a letter (A, B, C, etc.). You can assign a particular remote printer to de-spool from a particular print queue. Jobs are always printed from a queue on a first-come first-served basis.

The simplest way to use these queues is to assign each remote printer to a different queue -- for example, printer A to queue A, printer B to queue B, and so on. However, queues may be used in more imaginitive ways.

Even if your network has only one remote printer, you may want to make use of several print queues to group together print jobs with similar forms requirements and/or priorities. For example, you could use queue A for jobs requiring wide paper, queue B for jobs to be printed on narrow paper, queue C for jobs to be printed on pre-printed invoice forms, queue D for computer-printed checks, and so forth. Whenever the printer is done printing all jobs from one queue, you can reassign the printer to a different queue after changing to the appropriate kind of paper.

If your network has multiple remote printers, you can assign two or more printers to the same print queue. In this case, the workload is automatically shared among the printers. This technique is fine if you don't care which printer is used to print which job.

Queue Assignment

To assign a particular printer to de-spool from a particular queue, use the command:

```
A>PRINTER A QUEUE=C
PRINTER A assigned to QUEUE C
A>
```

If the printer is currently printing, the new assignment takes effect at the end of the current print job.

To display the current queue assignment of a particular printer:

```
A>PRINTER A
PRINTER A assigned to QUEUE C
A>
```

To take a particular printer off-line at the end of the current print job:

```
A>PRINTER A OFFLINE
PRINTER A assigned to OFFLINE
A>
```

The purpose of taking a printer off-line is to prevent subsequent de-spooling to that printer. This is useful when you want to change paper or ribbons, or when you want to reserve the printer for direct printing.

Print Job Control

De-spooling is an automatic background activity which generally requires no human attention. If something goes wrong, however, you can exercise manual control. To temporarily suspend de-spooling to a particular remote printer (if the paper jams, for example):

```
OA}PRINTER A STOP
PRINTER A assigned to QUEUE C (Stopped)
OA}
```

To resume de-spooling from the point it was stopped:

```
OA}PRINTER A GO
PRINTER A assigned to QUEUE C
OA}
```

To stop de-spooling to a specified printer and restart the current print job from the beginning when de-spooling is resumed:

```
OA}PRINTER A BEGIN
PRINTER A assigned to QUEUE C (Stopped)
OA}
```

To terminate the current print job on a specified printer, and continue with the next queued job:

```
OA}PRINTER A TERMINATE
PRINTER A assigned to QUEUE C
OA}
```

The terminated print file is not deleted.

Spooler Errors

If you hear a "beep" and see the following diagnostic message on your console:

```
┌──────────────────────────────────────────┐
│                                            │
│      Spooler Error (Ignore, Abort)         │
│                                            │
└──────────────────────────────────────────┘
```

it means that the disk to which you were spooling has run out of space in the middle of your print job. TurboDOS/PC has closed your print file (prematurely), but has <u>not</u> queued it for de-spooling.

When you see this message, you must choose one of the two recovery options (Ignore or Abort) by keying the letter I or A.

If you key I (ignore), your print routing is set to "off-line", and your program will continue with any further print output discarded. Remember to reset your print routing when the program is finished.

If you key A (abort), your program will be terminated.

COMMAND REFERENCE   This section describes each TurboDOS/PC com-
mand in detail. For ease of reference, the
commands are presented in alphabetical order.

Presentation   This section uses the following notation:

- Keywords are shown in capital letters,
  and must be entered as shown. (You can
  use either upper- or lower-case.)

- Parameters are shown in lower-case, and
  are described in the following text.

- Items shown in braces {} are optional.
  If you want to include such an optional
  item, do not type the braces, but only
  the information inside.

- An ellipsis ... indicates that the pre-
  ceding item may be repeated as many
  times as you like.

- Spaces and punctuation characters must
  be entered as shown (except for braces
  {} and elipses ...).

CHANGE Command

You must use CHANGE before removing a disk from any remote drive.

Syntax

```
CHANGE {drivelist} {;N}
```

Explanation

The command tail consists of a list of drive letters corresponding to the remote disks that you want to change, or an asterisk * if you want to change all remote disks. If you omit the drive list, CHANGE will prompt you for it. Before shutting down a file-server, it is a good idea to enter the command "CHANGE *".

If any of the drives you request are in use by another user, your request will be denied. Otherwise, you will be prompted to change the requested disk(s), and to enter RETURN when you are done. Until you have pressed RETURN, no other user will be allowed to access the disk(s) that you are changing.

Options

Option	Explanation
;N	Pause for RETURN is bypassed.

Examples

```
A>CHANGE CDE
Change drive(s) CDE
Enter <CR> when change complete [RETURN]
A>CHANGE * ;N
Change drive(s) ABCDEFGHIJKLMNOP
A>
```

Error Messages

```
Invalid drive(s) requested
Following drive(s) in use: a...
Unable to free drive(s): d...
```

MASTER Command	The MASTER command lets you temporarily attach your PC as a file-server console.
Syntax	``` MASTER ```
Explanation	If you need to run a program in the file-server (the TurboDOS BACKUP, BOOT, FORMAT or VERIFY commands, for example), you can use the MASTER command to attach your PC as a file-server console temporarily. To detach from the file-server (and resume normal PC operation), key in the abort character (normally CTRL-A, but may be patched at CS+4 to another character).
	Do not attempt to run MASTER from more than one console at a time. If you do, console output from the master will be randomly distributed across two or more consoles, and be undecipherable. If this should occur by mistake, simply detach all but one of the consoles.
	The MASTER command can be used only if the file-server's TurboDOS operating system is configured with a special remote console driver module CONREM. Refer to the _TurboDOS Implementor's Guide_ for details.
Example	``` A>MASTER Console attached to master processor OA}FORMAT B: : : OA}[CTRL-A] Console detached from master processor A> ```

Error Messages

```
Console already attached to master
Remote console driver not present
```

PRINT Command

The PRINT command lets you control routing of your print output.

Syntax

```
PRINT {option}...
```

Explanation

The PRINT command may include one or more of the options described below. A PRINT command with no option arguments causes your current print routing to be displayed on the console. Each user controls his own print routing independently.

Options

Option	Explanation
DRIVE=d D=d	Drive "d" is used for spooling, where "d" is the drive letter of a remote disk drive.
FILE F	Print output is spooled to disk, but not automatically queued for printing.
LOCAL L	Print output is routed to the local printer attached to the PC.
OFF O	Print output is discarded.
PRINTER=p P=p	Print output is routed direct to printer "p" without spooling to disk, where "p" is a printer letter in the range A through P.
QUEUE=q Q=q	Print output is spooled to disk, and then automatically queued on queue "q" for printing, where "q" is a queue letter in the range A through P.

Examples

```
A>PRINT DRIVE=C QUEUE=A
Printing is to SPOOLER on DRIVE C
                to QUEUE A
A>PRINT P=B
Printing is to PRINTER B
A>PRINT L
Printing is to LOCAL
A>PRINT O
Printing is to OFFLINE
A>
```

Error Messages

```
Invalid request
```

WARNING: Some versions of MS-DOS included a
background print utility called PRINT.COM.
To resolve the conflict with the TurboDOS/PC
command that has the same name, one of the
two commands must be renamed.

PRINTER Command

The PRINTER command lets you control de-spooling on any selected printer.

Syntax

```
PRINTER p {option}...
```

Explanation

The "p" argument is a printer letter in the range A through P, and identifies the printer to be controlled. The PRINTER command may include one or more of the options described below. A PRINT command with no option arguments causes the current status of printer "p" to be displayed on the console. Any remote printer may be controlled from any PC.

Options

Option	Explanation
BEGIN B	Stop de-spooling to printer, and reposition current print job to start at the beginning again when de-spooling is resumed.
GO G	Resume de-spooling to printer after STOP or BEGIN.
OFFLINE O	Take printer offline at the end of current print job. No further de-spooled printing will be done, but printer is available for direct printing.
QUEUE=q Q=q	De-spool to printer from print queue "q", where "q" is a queue letter in the range A through P. If printer is currently printing from another queue, the new assignment takes effect at the end of the current print job.

Options
(Continued)

Option	Explanation
STOP S	Stop de-spooling to printer, pending subsequent GO or TERMI-NATE.
TERMINATE T	Terminate the current print job, and continue with the next job in the queue. The terminated print file is not deleted.

Examples

```
A>PRINTER B QUEUE=A
Printer B Assigned to QUEUE A
A>PRINTER B STOP
Printer B Assigned to QUEUE A (Stopped)
A>
```

Error Messages

```
Invalid request
```

REASSIGN Command

The REASSIGN command lets you temporarily reassign the correspondence between logical drive letters and physical drives.

Syntax

```
REASSIGN  {x1=y1 x2=y2 ... xN=yN}
```

Explanation

The REASSIGN command may include one or more arguments of the form "x=y", where x and y are drive letters in the range A-Z. The first letter (x) represents a logical drive that will be mapped to the physical drive given by the second letter (y). An argument of the form "x=y=z" is equivalent to the pair "x=y y=z". A REASSIGN command with no arguments restores the original meaning to all drive letters (A=A, B=B, C=C, etc.).

The REASSIGN command is useful when an application has been designed to perform disk operations on specific drives and you want to redirect these operations to other drives. This command should be used only when necessary. It may not work properly with certain programs error messages.

The REASSIGN command should always be used instead of the ASSIGN command provided with MS-DOS. REASSIGN fixes some problems present in the original ASSIGN command. In addition, the REASSIGN command maps TurboDOS C-functions and T-functions.

Examples

```
A>REASSIGN A=D B=E D=A E=B
A>REASSIGN A=D=A B=E=B
A>REASSIGN
A>
```

Error Messages

```
Invalid drive specified
```

RESET Command

The RESET command closes all files that may have been left open by MS-DOS.

Syntax

```
RESET
```

Explanation

MS-DOS internal commands (the ones built into COMMAND.COM) have the habit of leaving files open. Sometimes this may make it difficult to change disks or shut down a file-server. In this situation, RESET may be used to close all files. If no files were open, RESET does nothing.

Example

```
A>RESET
A>
```

TURBOPC Command

The TURBOPC command installs TurboDOS/PC and allows you to access remote disk drives and do remote printing over the network.

Syntax

```
TURBOPC1 {filename}
TURBOPC2 {filename}
TURBOPC3
```

Explanation

This is actually a series of three commands, and which ones you should use depends upon which version of MS-DOS or PC-DOS is used on your PC.

If your PC uses MS-DOS/PC-DOS version 1.xx, then you should use the command TURBOPC1 to install TurboDOS/PC. If your PC uses MS-DOS/PC-DOS version 2.xx, then you should use the command TURBOPC2. If your PC uses MS-DOS/PC-DOS version 3.0x, then you should use two commands to install TurboDOS/PC: first TURBOPC2, then TURBOPC3.

Both TURBOPC1 and TURBOPC2 allow you to give the filename of a network driver file. If none is given, they expect to find the driver under the default filename "TURBOPC.DRV".

Example

```
A>TURBOPC2
A>
```

Error Messages

```
Already installed
Insufficient memory
<filename> not present
<filename> load error
```

TURBOPRN Command	The TURBOPRN command installs the TurboDOS/PC "print filter" which is required if you want to use remote printing.

Syntax

```
TURBOPRN
```

Explanation

You should use the TURBOPRN command immediately after you install TurboDOS/PC if you plan to use remote printing. Its function is to intercept all print output requests to the PC's ROM BIOS and to redirect them to TurboDOS/PC if you have selected a print routing other than "local". If you forget to install TURBOPRN, all printing will be local regardless of the print routing you select.

For PC's other than IBM, this command may have a different name.

Example

```
A>TURBOPRN
A>
```

(Intentionally left blank.)

PROGRAMMER'S GUIDE This section is intended for the assembly-language programmer interested in writing PC applications to be used with TurboDOS/PC. It describes the TurboDOS/PC program interface, the implementation of sub-directories on remote disks, and certain limitations that may be important to programmers.

Program Interface For the most part, TurboDOS/PC is invisible to applications, and supports all MS-DOS operating system calls in a fully transparent fashion. However, it does provide the additional capability for application programs to invoke most disk- and print-oriented TurboDOS C-functions and T-functions.

TurboDOS functions are invoked by executing an INT 0x21 instruction with register AX set to 0xFF00 (for C-functions) or 0xFF01 (for T-functions). The function number is passed in register CL and the function arguments are passed in other registers, following normal TurboDOS register conventions.

Disk-oriented TurboDOS functions apply only to remote drives, and return an error code (AL=0xFF) if an attempt is made to use them for local drives. Don't forget to set up current disk, current user number, and current DMA segment and offset; under TurboDOS/PC these values all default to zero.

In T-function 27 (Get/Set Print Mode), print mode 2 means "local" (instead of "console"). C-function 5 (List Output) and T-functions 28 (Signal End-of-Print) and 31 (Flush List Buffer) perform no operation if the current print mode is "local" or "offline".

The following tables list all C-functions and T-functions supported by TurboDOS/PC. For more detail, see TurboDOS Programmer's Guide.

C-Function Summary   The following C-functions are supported by
TurboDOS/PC. Call via INT 0x21 with register
AX set to 0xFF00.

CL=	C-Function Name	Arguments Passed	Values Returned
5	List Output	DL = char	–
14	Select Disk	DL = drive (0=A)	–
15	Open File	DS:DX = &FCB	AL = (-1 if err)
16	Close File	DS:DX = &FCB	AL = (-1 if err)
17	Search for First	DS:DX = &FCB	AL = (-1 if err)
18	Search for Next	–	AL = (-1 if err)
19	Delete File	DS:DX = &FCB	AL = (-1 if err)
20	Read Sequential	DS:DX = &FCB	AL = (NZ if err)
21	Write Sequential	DS:DX = &FCB	AL = (NZ if err)
22	Make File	DS:DX = &FCB	AL = (-1 if err)
23	Rename File	DS:DX = &FCB	AL = (-1 if err)
25	Return Current Disk	–	AL = drive (0=A)
26	Set DMA Address	DS:DX = &DMA	–
30	Set File Attributes	DS:DX = &FCB	AL = (-1 if err)
32	Get/Set User Number	DL = -1	AL = user number
		DL = user number	–
33	Read Random	DS:DX = &FCB	AL = (NZ if err)
34	Write Random	DS:DX = &FCB	AL = (NZ if err)
35	Compute File Size	DS:DX = &FCB	AL = (-1 if err)
36	Set Random Record	DS:DX = &FCB	–
42	Lock Record	DS:DX = &FCB	AL = (NZ if err)
43	Unlock Record	DS:DX = &FCB	AL = (NZ if err)
51	Set DMA Base	DX = DMA base para	–
52	Get DMA Address	–	ES:BX = DMA addr

T-Function Summary   The following T-functions are supported by
                     TurboDOS/PC. Call via INT 0x21 with register
                     AX set to 0xFF01.

CL=	T-Function Name	Arguments Passed	Values Returned
0	Reset O/S	–	–
9	Set Date and Time	BX = Julian date	–
		DH = hours	
		DL = minutes	
		CH = seconds	
10	Get Date and Time	–	BX = Julian Date
			DH = hours
			DL = minutes
			CH = seconds
			CL = tick count
11	Rebuild Disk Map	DL = drive (A=0)	AL = 0/-1
19	Get Alloc Info	DL = drive (0=A)	AL = block size
			CL = dir blocks
			DX = free blocks
			BX = tot. blocks
20	Get Physical Info	DL = drive (0=A)	AL = sector size
			CX = res. tracks
			DX = tot. tracks
			BX = sectors/trk
21	Get/Set Drv Status	DL = drive (0=A)	AL = 0/-1
		DH = 0 (set R/W)	
		DH = 1 (set R/O)	
		DH = -1 (get)	BL = -1 if ready
			BH = -1 if R/O
23	Set Buffer Params	DH = # of buffers	–
		DL = buffer size	
24	Get Buffer Params	–	AL = mem. size
			BH = # buffers
			BL = buffer size
25	Lock/Unlock Drive	DL = drive (0=A)	AL = 0/-1
		DH = 0 (unlock)	
		DH = -1 (lock)	
26	Flush/Free Buffers	DL = drive (0=A)	–
		DH = subfunctions	

CL=	T-Function Name	Arguments Passed	Values Returned
27	Get/Set Print Mode	DL = print mode DH = printer/queue CH = spool drive	AL = spool drive BH = prntr/queue BL = print mode
28	Signal End-of-Print	-	-
29	Get/Set Despool Mod	DL = despool mode DH = queue assgnmt CH = printer	AL = 0/-1
30	Queue a Print File	DS:DX = &FCB BH = print queue BL = user#/delete	AL = 0/-1
31	Flush List Buffer	-	-
33	Remote Console I/O	DL = 0/char DH = -1 to attach	AL = 0/1/-1
41	User-Defined Fcn	CH = net routing BX & DX userdef	AL,BX-DX userdef
42	Reorg Disk Dir	DL = drive (0=A)	AL = 0/-1

Implementation of Sub-Directories

Starting with version 2.00, MS-DOS supports UNIX-type sub-directories. When the user creates a new sub-directory by means of the MKDIR command or the corresponding MS-DOS function call, MS-DOS creates three new directory entries:

1.   An entry in the parent directory under the name of the new sub-directory and pointing to the new sub-directory.

2.   An entry in the new sub-directory under the name "." pointing to the new sub-directory itself.

3.   An entry in the new sub-directory under the name ".." pointing to the parent directory.

When the user creates a new sub-directory on a remote disk, TurboDOS/PC emulates the action of MS-DOS by creating three new directory entries as above. These entries appear in the TurboDOS disk directory as empty read-only files flagged with a special attribute (f2) to indicate that they represent MS-DOS sub-directories. The spec1 byte (offset 13) of the directory entry specifies the user number to which the entry "points".

Known Limitations   The following limitations of TurboDOS/PC
should be carefully noted by programmers and
implementors:

1.   TurboDOS/PC has been tested extensively
on the IBM Personal Computer under DOS
versions 1.10, 2.00, 2.11, and 3.00 as
supplied by IBM. It should work
properly with any MS-DOS version 1.xx,
2.xx, or 3.0x (except possibly for very
early 1.0x versions that were plagued
with problems).

2.   TurboDOS/PC interfaces with the TurboDOS
network stricly on a request-only basis.
It provides no capability for the PC to
be a network file- or print-server.

3.   Remote files are not date/time stamped.
Applicable MS-DOS functions return file
date/time fields zero-filled. When used
on a remote drive, the DIR command
displays the date/time fields as blank.

4.   MS-DOS versions 2.00 and beyond allow
console I/O to be redirected to a file.
If console I/O is redirected to a remote
disk file, however, only UNIX-style
(handle-oriented) I/O functions are re-
directed properly by TurboDOS/PC; CP/M-
style console I/O functions (1-12) are
not redirected. Consequently, redirec-
tion to a remote file works properly for
all internal MS-DOS commands, but may
not work for some external commands and
transient programs that use CP/M-style
console I/O.

5.   TurboDOS/PC interfaces with TurboDOS
version 1.40 and later. It does not
work with earlier versions of TurboDOS
because the format of network messages
changed starting with version 1.40.

Known Limitations (Continued)

6.   TurboDOS/PC allows a maximum of 20 file handles and 32 remote files to be open concurrently in each PC. If 32 remote files are open, a request to open or create an additional remote file causes the least recently used remote file not attached to an active file handle to be closed automatically. Program termination causes all remote files to be closed automatically.

7.   The MS-DOS file attributes "hidden" and "system" are not supported for remote files. The other MS-DOS file attributes ("read-only", "volume-id", "directory", and "archive") are all supported.

8.   It is not possible to move a remote file to a different sub-directory using MS-DOS function 86.

9.   MS-DOS makes use of "wildcard" directory searches much more often than TurboDOS. Such searches must be performed linearly and cannot be optimized by hashing. Consequently, TurboDOS/PC tends to perform poorly with remote disks that have very large directory areas. In the case of a large fixed disk, it may be advantageous to use multiple partitions rather than one large directory area.

(Intentionally left blank.)

IMPLEMENTOR'S GUIDE This section is intended for OEMs and other implementors, and provides information about how to implement TurobDOS/PC on specific hardware. In particular, it explains how to implement hardware-dependent network drivers, print filters, and bootstrap ROMs. It also describes the contents of the TurboDOS/PC distribution disks in detail. This section is followed by an Appendix containing sample source listings.

Network Driver TurboDOS/PC requires a network driver module appropriate to the particular networking interface hardware being used. The network driver is packaged as a binary load-image file. The default name for this file is TURBOPC.DRV (although a different name may be used if it is specified in the command tail of the TURBOPC command). TurboDOS/PC loads the contents of this network driver file into memory during its initialization phase.

Source code for a sample network driver is included in the Appendix to this document, and also in a file on the distribution disk.

Driver Calling Conventions | The network driver is always loaded so that it starts on a paragraph boundary. The driver is invoked by means of a "far call" to the entrypoint at offset zero (in other words, CS = driver segment and IP = 0), and should return using a "far return". On entry, TurboDOS/PC passes an operation code to the driver in register CL:

CL=	Function
0xFF	Initialize driver, return info
0	Receive message into buffer @ DS:DX
1	Send message from buffer @ DS:DX

Driver Calling
Conventions
(Continued)

If CL=0xFF, the driver has an opportunity to perform any initialization that may be necessary. (This function is called only once during the initialization phase.) On return, register AX must contain the overall length of the driver module (in bytes), and register BX must contain the offset of the network parameter block (described below).

If CL=0, the driver is asked to receive the next incoming network message into the RAM message buffer whose address is passed in registers DS:DX. The maximum allowable message size (i.e. the buffer length) is passed in the first byte of the buffer. The driver should wait for an incoming message to arrive. If a message is received successfully, the driver must return AL=0. If an unrecoverable malfunction is detected, the driver must return AL=0xFF.

If CL=1, the driver is asked to send a network message from the message buffer whose address is passed in registers DS:DX. The actual length of the message is passed as the first byte of the buffer. If the message is sent successfully, the driver must return AL=0. If an unrecoverable malfunction is detected, the driver must return AL=0xFF.

For both receive and send functions, the message buffer address is passed to the driver in registers DS:DX. Note that DS is not set to the driver segment on entry.

Network Parameter
Block

The driver module must include a network parameter block, and must return its address in register BX at the end of driver initialization. The structure of the network parameter block is:

Offset	Contents
0	User number of root directory
1	MKDIR/RMDIR flag (0=not allowed)
2	TurboDOS compatibility flags
3	Print mode (0=dir/1=spool/2=lcl)
4	Queue/printer assignment
5	Spool drive
6	End-of-print character (0=none)
7-8	Network address of this PC
9-10	Network address of default dest.
11	Number of local drives (FF=auto)
12	Number of remote drives
13-14	Pointer to drive assignment tbl
15	Number of remote printers
16-17	Pointer to print assignment tbl
18	Number of remote print queues
19-20	Pointer to queue assignment tbl

The MKDIR/RMDIR flag (offset 1) specifies whether or not the user is allowed to create and delete sub-directories on remote drives.

If the number of local drives (offset 11) is set to 0xFF, TurboDOS/PC uses the number of valid drives returned by MS-DOS function 14. (NOTE: PC-DOS version 3.00 always returns the number of valid drives as 5 unless you use "LASTDRIVE=d" in the CONFIG.SYS file. Other versions of MS-DOS may have similar anomalies.)

Network Parameter
Block (Continued)

The drive assignment table consists of a three-byte entry for each remote drive. The first byte of each entry specifies a drive id (0=A, 1=B, etc.), and the following word specifies the network address of the server to which the drive belongs.

The printer and queue assignment tables have identical formats, except that the first byte of each entry specifies a printer or queue id.

Message Structure

The structure of each network message is:

Offset	Contents
0	length of message (184 maximum)
1-2	network address of destination
3	process id of source or dest.
4-5	network address of source
6-7	network address of originator
8	process id of originator
9	forwarding level
10	message format code (see below)
11+	variable-length message body

The message format code field of the message header contains bit-encoded flags that define the format and context of each message:

Bit	Meaning
0	first message of session
1	last message of session
2	continuation message follows
3	request includes FCB data
4	request includes record data
5	reply includes FCB data
6	reply includes record data
7	this is a reply message

Print Filter

Many MS-DOS applications produce print output by means of direct calls on BIOS, bypassing the operating system. (WordStar, Lotus 1-2-3 and even Microsoft BASIC work this way.) In order to support remote printing in a useful fashion, therefore, TurboDOS/PC must intercept print requests at the BIOS level.

Rather than build such BIOS dependencies into TurboDOS/PC, a separate "print filter" is used to intercept print requests and pass them to TurboDOS/PC for remote redirection. The TURBOPRN command is a standard print filter for the IBM Personal Computer and BIOS-compatible work-alikes. TURBOPRN is furnished both in object and source form, allowing easy implementor modification.

The print filter is a transient program that terminates but stays resident. Its primary job is to intercept print output requests (INT 0x17 in the case of the IBM PC) and pass them to TurboDOS/PC via C-function 5. The filter should check the current print mode (via T-function 27) so that it can allow print output requests to proceed normally if the print mode is local.

A second function of the print filter is to flush the TurboDOS/PC print buffer (via T-function 31) whenever there has been no print output for awhile. TURBOPRN uses the timer interrupt (INT 0x1C in the IBM PC) to do this. If no timer is available, the same function might be performed by trapping console input and status calls and using them to trigger flushing of the print buffer.

For more details, consult the source code of TURBOPRN in the Appendix.

Bootstrap ROM

TurboDOS/PC is normally loaded from a local disk immediately following the normal MS-DOS boot procedure. However, some implementors may wish to load MS-DOS and TurboDOS/PC over the network instead. Diskless workstations are an obvious case where this is desirable.

Source code for a sample bootstrap ROM is furnished in the Appendix and on the TurboDOS/PC distribution disk. The sample ROM code is very dependent upon both the MS-DOS BIOS and the networking interface hardware being used. Therefore, modifications will most likely be needed for machines that differ from the IBM PC in any significant way.

Here is the basic strategy used by the sample ROM to implement network downloading for the IBM PC:

1. A normal DOS system diskette must be prepared. It must contain a boot sector, the DOS system files (IBMBIO.COM, IBMDOS.COM, and COMMAND.COM), and the TurboDOS/PC files (TURBOPC2.COM and TURBOPC.DRV).

2. This system diskette is converted to a disk-image boot file using a special utility program BOOTFILE.COM (provided), and stored on the remote disk where the boot ROM expects to find it.

3. The boot ROM is given control by the ROM BIOS during BIOS initialization. It alters INT 0x18 (ROM BASIC entrypoint) and/or INT 0x19 (floppy disk bootstrap entrypoint). When the BIOS is done with its initialization phase, it executes INT 0x19 (if a diskette is available) or INT 0x18 (otherwise). Since these interrupt vectors have been altered, the boot ROM gets control at this point.

Bootstrap ROM
(Continued)

4.   The boot ROM sends a network request to
open the download boot file. It then
alters INT 0x13 (BIOS physical disk I/O
entrypoint) to point to a substitute
disk I/O routine in the boot ROM that
converts physical disk I/O requests into
corresponding network rquests accessing
the download boot file. The original
contents of the INT 0x13 vector is saved
in an unused RAM location so that the
original function of INT 0x13 may be
restored afterwards by the transient
program LOCAL.COM (provided).

5.   Using the altered INT 0x13, the boot ROM
reads the normal DOS boot sector into
memory at 0000:7C00 and jumps to it
(just as the ROM BIOS would have done).

6.   Booting of DOS now proceeds in the
normal fashion except that all physical
disk I/O operations are redirected over
the network.

For more details, consult the source code of
BOOTFILE, BOOTROM, and LOCAL in the Appendix.

Distribution Disks   TurboDOS/PC is distributed on one PC-DOS formated 5.25-inch diskette. This disk is formatted as two-sided with eight sectors per side (320K total) so that it may be read on any PC under any IBM-compatible version of MS-DOS with double sided drives. You can copy the files to a higher-density diskette format or to fixed disk.

The distribution diskette contains the executable TurboDOS/PC command files, the driver configuration program for ICM's MicroLAN driver, source code to the sample network driver module, print filter, and boot ROM:

File Name	Description
CHANGE.COM	CHANGE command
MASTER.COM	MASTER command
PRINT.COM	PRINT command
PRINTER.COM	PRINTER command
REASSIGN.COM	REASSIGN command
RESET.COM	RESET command
TURBOPC1.COM	TurboDOS/PC for MS-DOS 1.xx
TURBOPC2.COM	TurboDOS/PC for MS-DOS 2&3
TURBOPC3.COM	Exec filter for MS-DOS 3.0x
TURBOPRN.COM	Print filter for IBM PC
CFGTPC.COM	Driver configuration program
CFGTPC.MSG	Driver configuration help
LANTPC.DRV	MicroLAN driver
BOOTARC.A	Sample boot ROM for ARCnet
BOOTFILE.A	BOOTFILE utility source
BOOTFILE.COM	BOOTFILE utility object
BOOTROM.A	Sample boot ROM skeleton
LOCAL.A	LOCAL utility source
LOCAL.COM	LOCAL utility object
TURBOARC.A	Sample ARCnet netwrk driver
TURBOPRN.A	Sample print filter source

#MAIN

HELP   Main options   Page 1

GENERAL: Main options provide an entry into each of the five (5)
           categories for configuration of the TurboDOS/PC network
           driver on your machine. The arrangement of this menu
           is in the most likely order of necessary changes when
           configuring a new machine. Each category will display
           a sub-menu of configuration options or assignments
           along with the current settings. Further help is
           available under each category by entering a '?'
           (similar to help selected here).

           The TurboDOS/PC configuration utility operates by first
           loading a compatible network driver file into memory
           when the program begins, and displaying and changing
           the network configuration options located in the copy
           of the driver in memory. After all changes are made,
           the modified driver is then saved back into the file on
           disk to make the changes permanent.

           The current driver file under configuration is always
           displayed directly after the main options menu.

@ -> Change all options. This will start you through each
     sub-category in the order described below. When each
     category is finished and <ret> is typed, the next one
     is selected until category "E" is completed. The five
     (5) categories for configurations are as follows:

A -> LAN assignments should be configured before proceeding
     into disk, printer, or queue assignments. Options
     under this category set the number of local disks,
     remote disks, remote printer, and remote queues. These
     numbers are used when the time comes to assign remote
     devices. Other options set the LAN-PC hardware related
     I/O and memory base addresses, and TurboDOS logical
     network source and destination information.

B -> Miscellaneous options are set next. These are TurboDOS
     related options for the operation of TurboDOS/PC on
     your particular file server(s). Options include
     initial user area for root directory, privileged user
     flag, compatibility flags, initial print mode, initial
     spool drive, and end of print character.

C -> Disk assignment allows you to "point" to remote disks on your PC to disks located on TurboDOS server(s). The number of remote disks configured here is based upon the number of remote disks set under LAN assignments.

D -> Printer assignments allow you to "point" to remote printers on your PC to printers located on TurboDOS server(s). The number of remote printers configured here is based upon the number of remote printers set under LAN assignments.

E -> Queue assignments allow you to "point" to remote queues on your PC to queues located on TurboDOS server(s). The number of remote queues configured here is based upon the number of remote queues set under LAN assignments.

ITEM   When the options or assignments are to be changed. The
ENTRY: first step is to enter the desired category and select
            The item to change from the sub-menu. You'll then be
            prompted to enter the item's new value. Input is
            always expected in the same form as it is displayed
            with a few exceptions. The following is a list of
            possible display formats:

            nn .... Decimal number (0-255)
            nn hex ..... Hexadecimal number (0-FFH)
            Yes or No .. Logical boolean expression
            d .... TurboDOS device name (A-P)
            'a' .... ASCII character (^L=control-L)
            text .... Explanatory text

            Decimal numbers may be alternatively entered in
            hexadecimal by entering an "H" after the number (i.e.
            33 = 21H, 100 = 64H).

END
SESSION: Special care should be used when ending a configuration
            session to insure that what you want is accomplished.
            Ending a session does not display a sub-menu as per the
            other categories. Instead, a prompt is issued asking
            whether you wish to save the modified driver back into
            the file on disk.

            A yes reply will update the driver file that was loaded
            with the changes made during the session. A no reply
            ignores the changes. Both replies will exit back to
            the operating system. Typing <ret> without a reply
            will place you back into the main menu to make further
            changes.

NOTE   This prompt is only issued when some change had been
            made to the original driver loaded. If no changed had
            been made, end session will simply exit back to the
            operating system.

A -> Number of local disks. This parameter should be set
     according to the number of local disk drives located on
     your PC. PC disk devices usually begin with device A
     (floppy disk drive 0), an optional device B (floppy
     disk drive 1), and optional hard disk devices C-?
     following this. For example, a standard IBM PC/XT has
     one floppy disk device A and hard disk device C, or
     three (3) local disks (A-C). Remote disk devices will
     begin as local device D on your PC. The maximum
     allowed local disks is 32.

B -> Number of remote disks. This parameter should be set
     to the number of desired remote disk devices on your
     TurboDOS server(s) you wish to support. When disk
     assignments are made (main options menu), this number
     of disk may be assigned network addresses. The maximum
     allowed remote disks is 16.

NOTE   The combined total of both local and remote disks may
         not be greater than 32, governed by DOS limits.

C -> Number of remote printers. This parameter should be
     set to the number of desired remote print devices on
     your TurboDOS server(s) that you wish to support. When
     printer assignments are made (main options menu), this
     number of printers may be assigned network addresses.
     The maximum allowed remote printers is 16.

D -> Number of remote queues. This parameter should be set
     to the number of desired remote spool queues on your
     TurboDOS server(s) that you wish to support. When
     queue assignments are made (main options menu), this
     number of queues may be assigned network addresses.
     The maximum allowed remote queues is 16.

NOTE   The TurboDOS/PC commands, PRINT and PRINTER, allow the
          altering of the current print output to direct printers
          or queues, both of which are always remote.

E -> LAN I/O base address. This hexadecimal number
     represents the physical I/O base address as selected on
     your LAN network controller board. I/O bases are
     modulo 16 (i.e. 0 hex, 10 hex,..., 2E0 hex, 2F0 hex).
     See below for common LAN assignments for different
     systems.

F -> LAN memory base address. This hexadecimal number
     represents the physical memory segment as selected on
     your LAN network controller board. Memory segment
     bases are modulo 64k (i.e. 2000 hex, 3000 hex,..., E000
     hex, F000 hex). See below for common LAN assignments
     for different systems.

SYSTEM	I/O base	Memory base
IBM-PC(XT)	0200	E000
IBM-PCjr	0100	C000
Zenith Z100	0068	CF80

G -> LAN source network address. This parameter represents
     the TurboDOS network assignment for your PC. This
     assignment is governed by which circuit number has been
     set in your system for the LAN and the physical LAN
     controller node setting (LANC ID). This must be set to
     the LAN circuit number and the PC controller's node
     setting. See circuit and node network address entry in
     the main options help area.

H -> LAN destination network address. This parameter sets
     your default destination network address for TurboDOS
     functions that do not specifically reference a circuit
     and node (i.e. MASTER command, date/time functions).
     See circuit and node network address entry in the main
     options help area.

NOTE   The circuit number specified with all network addresses
            is a logical TurboDOS assignment only. In general, all
            circuit numbers will be the same, and node numbers need
            only be altered. Possible exceptions to this rule are
            in network forwarding cases.

A -> Initial user area for root. This assigns a user number
     on the remote disk for the DOS root directory. Further
     sub-directories will begin assignments with higher user
     numbers ending with user 31. The maximum allowed value
     here is 31.

B -> Privileged user flag. This boolean flag determines the
     TurboDOS/PC support for remote disks. If you are set
     privileged, the MKDIR and RMDIR local commands in DOS
     can create and remove sub-directories on remote disks.

C -> Compatibility flags. This hexadecimal byte parameter
     sets file manipulation techniques on remote disks.
     Supported identical to a normal TurboDOS operating
     system, the bit definition is as follows:

     bit 7 = permissive flag   bit 4 = mixed-mode flag
     bit 6 = suspend flag   bit 3 = logical flag·
     bit 5 = global-write flag   (bits 2-0 not defined)

     (consult TurboDOS User's Guide for explanations)

D -> Initial print mode. This text oriented parameter
     determines the default print mode when TurboDOS/PC is
     initially loaded into the PC. The possible modes are
     as follows:

    Local   Print output handled locally.

    Offline   Print output is discarded.

    Direct to Printer p   Print output is routed
                                       directly to remote printer p
                                       (where p=A-P).

NOTE   To change to direct print mode, use P=p (where p=A-P).
            Examples: P=A, P=B,..., P=O, P=P

    Spooled to Queue q   Print output is routed to
                                         remote queue q (where q=A-P).

NOTE   To change to spooled print mode, use Q=q (where q=A-P).
            Examples: Q=A, Q=B,..., Q=O, Q=P

E -> Initial spool drive. This disk device parameter sets
     the default routing of print spool files until
     explicitly changed with the PRINT command.

F -> End of print character. This ASCII value should be set
     to the desired end of print character, or 0 (ASCII '^@'
     to disable end of print detection through print stream.

HELP   Disk assignments   Page 1

GENERAL: Remote disk assignments are displayed and changed in
            this category. The number of remote disks are shown
            beginning with the next drive name after local disks.
            The number of local and remote disks are displayed here
            because they affect the display, but may only be
            changed through the LAN assignments category. Drive
            assignments are displayed as follows:

            Local drive d -> remote drive d network address (c,n)

            where "Local drive d" will be the default drive name
            that your PC will know, "remote drive d" will be the
            drive name on the TurboDOS server, and "c,n" will be
            the remote drives network address.

            To change a disk assignment, type in the local drive
            name of the disk. First you'll be prompted for the
            remote drive name, followed by a prompt for the network
            address of the drive. Typing <ret> to either prompt
            will leave the current assignment unaltered.

GENERAL: Remote printer assignments are displayed and changed in
           this category. The number of remote printers are shown
           beginning with printer A. The number of remote printers
           may be changed through the LAN assignments category.
           Printer assignments are displayed as follows:

           Local printer p -> remote drive p network address (c,n)

           where "Local printer p" will be the printer name that
           your PC will know, "remote printer p" will be the
           printer name on the TurboDOS server, and "c,n" will be
           the remote printer's network address.

           To change a printer assignment, type in the local
           printer name. First you'll be prompted for the remote
           printer name, followed by a prompt for the network
           address of the printer. Typing <ret> to either prompt
           will leave the current assignment unaltered.

GENERAL: Remote queue assignments are displayed and changed in
           this category. The number of remote queues are shown
           beginning with queue A. The number of remote queues may
           be changed through the LAN assignments category. Queue
           assignments are displayed as follows:

           Local queue q -> remote drive q network address (c,n)

           where "Local queue q" will be the queue name that your
           PC will know, "remote queue q" will be the printer name
           on the TurboDOS server, and "c,n" will be the remote
           queue's network address.

           To change a queue assignment, type in the local queue
           name. First you'll be prompted for the remote queue
           name, followed by a prompt for the network address of
           the queue. Typing <ret> to either prompt will leave
           the current assignment unaltered.