

ALCC
MICROTAPE
FUNCTIONAL SPECIFICATION

CONSUMER PRODUCTS GROUP
CALCULATOR DIVISION

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REVISION 1.0

SECTION 1

INTRODUCTION

1.1 Purpose of This Document

The microtape peripheral provides the ALC with mass storage. With it, the user can access data files, as well as saving, loading, and executing programs. This document is meant to provide a functional overview of the microtape.

1.2 Scope of This Document

This document covers the functions of the microtape software. It discusses how BASIC and assembly language access the peripheral, and how it responds to IOS commands.

1.3 Terminology

IOS - Input/Output Subsystem

IPB - Intelligent Peripheral Bus

BOT - Beginning Of Tape

EOT - End Of Tape

1.4 Related Documents

The following documents are referenced in the text or may contain other material of interest to the reader of this document. Copies of any of these may be obtained by contacting Tom Ferrio at TI Lubbock, Phone: 741-3362, MSG ALCC.

Intelligent Peripheral Bus - Structure, Timing, and Protocol Specification

Microtape Software Design Specification

Lonestar: Advanced Language Calculator Software Design Specification

SECTION 2

Overview of the Microtape

2.1 The Microtape Concept

The microtape peripheral is a magnetic tape drive which uses a small (1/8 inch) endless loop magnetic tape. The tapes come in various lengths from 5 to 75 feet and travel at about 10 inches per second when the motor is running. Data capacity amounts to about 1K bytes per foot, so the maximum access time and the amount of data storage can be adjusted by choosing tapes of a certain length. Each tape has a reflective Beginning Of Tape marker which forms a reference point on the tape.

2.2 Option Summary for the Microtape

1. File Types:

- a. INTERNAL - This type of file is used for saved binary information such as data or programs.
- b. DISPLAY - This file type is used for displayable information such as listings.

2. File Names:

- a. File names of up to 15 characters are supported. There is no limitation on the characters that make up a file name.

SECTION 3

Operating the Microtape

3.1 Saving a Second Drive from Premature Uselessness

So you just purchased your second microtape drive and decided that you don't want two drives with device number one. What do you do? Throwing the surplus drive away could be a bit rash. But fear not! There may be hope:

Picture of the switch goes here
Pictures of how to change the switch setting go here
Switch setting table also goes here

Figure 3-1 Changing Device Numbers

By setting the switch to one of the eight settings in Figure 3-1, you can select any of device numbers listed for use as the device number of the microtape drive.

SECTION 4

Format of a Microtape Open

OPEN #n; "DN.FILENAME"[, option list]

Opens file number 'n' to the device number (DN) and file name specified in the open. DN must be an integer in the range 1-8 to access the microtape, and the options list can be any combination of valid options except APPEND.

SECTION 5

General Operation

The programmer can communicate with the microtape in two ways: in assembly language, and thru BASIC commands and statements.

5.1 Use From Assembly Language

Communicating with devices using the Intelligent Peripheral Bus is explained in depth in the Lonestar Intelligent Peripheral Bus Structure, Timing, and Protocol Specification. The device numbers for the microtape will range from 1 to 8.

5.2 Use From BASIC

COMMANDS WHICH CAN BE USED WITH THE MICROTAPE

COMMAND	

LIST	YES
OLD	YES
SAVE	YES
OPEN	YES
PRINT	YES *
INPUT	YES *
LINPUT	YES *
CLOSE	YES *
CALL I/O	YES
FORMAT	YES
DIR	YES
VERIFY	YES

* AFTER AN OPEN	

An Example of Using the Microtape in BASIC

```
100 OPEN #10, "2. SAMPLES", INTERNAL, OUTPUT
110 OPEN #11, "1. DATA", INTERNAL, INPUT
120 PRINT "Delete Sample # "
130 IF EOF(11) THEN 200
140 INPUT #11, SAMPLE_NUMBER, INFO
150 DISPLAY AT(16) USING "### ? N"; SAMPLE_NUMBER
160 ACCEPT AT(22) SIZE(1) BEEP VALIDATE("YyNn") NULL("N"), A$
170 IF A$="Y" OR A$="y" THEN 130
180 PRINT #10, SAMPLE_NUMBER, INFO
190 GOTO 130
200 CLOSE #11
210 CLOSE #10
220 END
```

The above program opens an input file ('1.DATA') and an output file ('2.SAMPLES'). It then allows the user to selectively delete records from the input file, storing the new copy in the output file.

5.3 Notes on the OPEN Statement

The microtape, being essentially a sequential media, is not accessed in the same way as a floppy disk. Certain rules govern accessing files:

1. Only the last file on a tape can be accessed in update mode. This protects the user from accidentally erasing subsequent files stored on the tape.
2. Opening a file in output mode causes all previous information in the file to be erased. If the file was not the last file on the tape, then the position in the directory of the old file is marked as inactive, with a new version of the file being put at the end of the tape. The old information can sometimes be recovered (See Special Features section).

SECTION 6

Response to IOS Commands

Refer to the I/O bus specification for a better clarification of each of the command codes. This section will deal with what commands are supported and which errors they generate.

00 - Open

Not supported: Relative files

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
1	- File name too long	- Shorten file name
2	- Display file opened as internal file	- Correct file name
	- Internal file opened as display file	- Correct file type in open
3	- Wrong tape inserted in drive	- Correct file name
	- File opened for input and not previously created	- Correct file type in open
5	- Attempt was made to open two files on the same drive concurrently	- Insert correct tape
6	- An error occurred while searching for the file	- Create file
	- The tape has been partially erased	- Don't have the files open at the same time
9	- No tape in drive	- Use two drives
	- Tape is write protected	- Try again
11	- No more files can be added to the tape's directory	- Re-create tape
12	- The buffer supplied in the open command was too small for returning the required data	- Insert tape in drive
	- A bus error occurred	- Replace write enable tab
		- Use another tape
		- Fix the open command
		- Try again
		- Reset the microtape drive and try again

- | | | |
|----|---|------------------------------|
| 19 | - append mode not supported | - correct the open statement |
| 26 | - The tape is not formatted | - Format the tape |
| 32 | - No more data can be stored on the tape | - Compress the tape |
| | | - Use a different tape |
| | | - Re-format the tape |
| 80 | - An attempt was made to open a file for update or append which was not the last file on the tape | - Copy file to another tape |

01 - Close

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
4	- File not open	- Open file
6	- an error occurred while writing the directory	- Changes to file have been lost, try again
9	- Tape not in drive	- Put tape back in drive
	- Tape write protected	- Replace write enable tab

02 - Delete open file - Not Supported

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
13	- Command not supported	- Correct device number

03 - Read record

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
4	- File not open	- Open file
6	- An error occurred while positioning to the record	- Try again
7	- An attempt was made to read past the end of file	- Use EOF function to check for end of file
12	- An attempt was made to read a record larger than the supplied buffer	- Fix the open command
	- A bus error occurred	- Try again
15	- File not opened for reading	- Open file in INPUT or UPDATE modes
16	- Data was read incorrectly from the tape	- Try again
		- Re-write record to tape

04 - Write record

Errors:		
<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
4	- File not open	- Open file
6	- An error occurred while positioning to the record	- Try again
9	- Tape not in drive - Tape write protected	- Put tape back in drive - Replace write enable tab
14	- File not opened for writing	- Open the file in APPEND, UPDATE, or OUTPUT mode
32	- No more data can be stored on the tape	- Compress the tape - Copy the file to another tape and try again

05 - Restore file

Errors:		
<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
4	- File not open	- Open file
6	- An error occurred while restoring the file	- Try again

06 - Delete file - Not Supported

Errors:

Error Code	Possible Causes	Possible Fixes
13	- Command not supported	- Correct device number used with command

07 - Return status

Errors: None Possible

08 - You may request service - Not Supported

Errors:

Error Code	Possible Causes	Possible Fixes
13	- Command not supported	- Correct device number used with command

09 - You may not request service - Not Supported

Errors:

Error Code	Possible Causes	Possible Fixes
13	- Command not supported	- Correct device number used with command

10 - Was it you?

Errors:

Error Code	Possible Causes	Possible Fixes
10	- Wrong device number in SRPAB	- Correct device number

11 - You are the master - Not Supported

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
13	- Command not supported	- Correct device number used with command

12 - Verify read/write operation

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
4	- File not open	- Open file
6	- An error occurred while positioning to the record	- Try again
7	- An attempt was made to verify a record not in the file	- Correct the record number
24	- The record checked did not verify	- Correct the record number - Try again - You got a real failure

13 - Format media

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
9	- Tape not in drive - Tape write protected	- Put tape back in drive - Replace write enable tab

14 - Read catalog

Errors:

<u>Error Code</u>	<u>Possible Causes</u>	<u>Possible Fixes</u>
3	- The file asked for does not exist	- Correct file number
5	- A file is open on the drive	- Close the file
6	- An error occurred while searching for the file	- Try again
12	- Not enough buffer space was included to return catalog information	- Correct buffer size

15 - Set characteristics - Not Supported

Errors:

Error Code	Possible Causes	Possible Fixes
13	- Command not supported	- Correct device number

254 - Null Operation

Errors:

Error Code	Possible Causes	Possible Fixes
255	- Time out error	- The drive does not respond to this operation. No fix is needed.

255 - Bus Reset

Errors:

Error Code	Possible Causes	Possible Fixes
255	- Time out error	- The drive does not respond to this operation. No fix is needed.

SECTION 7

I/O ERROR CODES

<u>CODE</u>	<u>MEANING</u>
0	Everything is ok
1	Device/file characteristics error
2	Error in attributes byte
3	File not found
4	File/device not open
5	File/device already open
6 !	Device error
7	EOF error
8	Data/file too long error
9	Write protect error
10	It wasn't me
11	Directory full error
12 !	Buffer size error
13	Unsupported command error
14	File not open for write
15	File not open for read
16	Data error
17	Relative file not supported
18 *	Sequential file not supported
19 *	Append mode not supported
20 *	Output mode not supported
21 *	Input mode not supported
22 *	Update mode not supported
23 *	Internal or display type file not supported
24	Verify error
25 !	Low batteries in peripheral
26	Uninitialized wafer error
32	Wafer full error
80 \$	Not last file on tape error
254 *	Call to bus master from slave application error
255 !	Bus time out error
a * indicates that this error is not used in the microtape	
a \$ indicates that this error is specific to the microtape	
a ! indicates that this error is common to all commands	

SECTION 8

Special Capabilities of the Microtape

The microtape has certain features that are available to the more experienced programmer.

1. If the file name is one character with a value of less than a binary 16 (decimal), the microtape accesses the file by file number. For this option to be used, the file must have been previously created. Opening a file by file number will open both active and inactive files, allowing access to files erroneously deleted.