

Creating a Master Disk 1

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Introduction

The TANDOS MASTER disk contains 12 TANDOS disk and file management programs and two disk utilities. A copy of the disk and file management programs needs to be held on disk called the SYSTEM disk (normally in Drive 0:) to enable the user access to the TANDOS operating system. This presents a chicken and egg situation when attempting to create a MASTER disk from scratch. This document describes a procedure that achieves this. It also provides a useful insight into how the TANDOS system works and how data is stored and managed on the disks.

Requirements

As a minimum, the Microtan system needs to comprise MT65 CPU, TANEX and TANDOS boards. Also a 5.25" Floppy Disk Drive (40 or 80 Tracks) or a 3.5" 720K capacity Floppy Disk Drive (80 Tracks) with power supply and connecting 34 way ribbon data cable to the Microtan system. The Floppy Disk Drive must be configured as Drive 0:. For a 5.25" drive this is normally achieved by placing its drive selection jumper on the DS0 pins. For a 3.5" drive, a special 34 way cable needs to be used – refer to this [document](#). Not least, a Double Density Floppy Disk is required. (If using a 3.5" drive, a High Density (HD) Floppy Disk may also work).

A PC/Laptop connected to the internet is required to download the MASTER disk programs and play the audio WAV files via a headphone output socket. A suitable application to play the audio file is Audacity. An audio cable is required from the PC/Laptop to the Microtan Audio Tape input on the TANEX board.

Two references that will assist and help the understanding of the procedure are the [TANDOS Commands](#) and the [Disk Anatomy](#) documents.

Procedure

Download the MASTER Disk Files

The TANDOS MASTER disk files are listed on this [web-page](#):

Right-click on each file and 'Save' at a suitable location on the PC/Laptop.

Set-up Microtan System

Connect the Microtan to the Floppy Disk Drive using the 34 way data cable.

Connect the audio cable from PC/Laptop headphone socket to the Microtan Tanex Tape input.

Power up PC/Laptop, Microtan and Floppy Disk Drive. Press Reset on the Microtan.

Format the Disk

The first task is to format and initialise the floppy disk. This is done using the CREATE program which combines two previous programs; FORMAT and INIT. FORMAT formatted the disk in the single density IBM3740 format as described in the MB8877 [datasheet](#). INIT identifies the system and directory sectors and the start of the free-space sectors which are daisy-chain linked together, copies the system definition and page definition from the system disk into the system sector and captures the disk name.

Under normal circumstances, a System disk containing CREATE is inserted into the disk drive, and a command such as CREATE 0: is entered. The program will be downloaded from the disk into the Transient Program Area in the RAM located on the TANDOS board. The program is run from there beginning at the Transfer address (ie the address that is transferred to the program counter). The user is then instructed to insert the disk needing to be formatted into drive 0: and then to enter the required disk name. The program formats the disk. It will know how many tracks Drive 0: has because it looks up this information from the System Definition located in the first 16 bytes of the System sector (first sector on Track 0) of every system disk. If an existing system disk is not available, then this is not possible – an alternative method of providing the system information is required. This is described below.

Step 1 – Fetch CREATE

On the Microtan:

Enter **F** to set 'Fast' tape speed

Enter **F,CREATE** to fetch the file named CREATE

On the PC/Laptop:

Run Audacity, open the file CREATE.WAV, play the file

The cursor will reappear on the Microtan screen when the transfer has been completed. Provided there were no errors, the CREATE program will have been downloaded into RAM starting at location \$400 and ending at location \$7E6.

Step 2 – Provide System Definition Data

When the CREATE program is run at the transfer address \$5A0, it will first go back to the System Disk and copy the 16 bytes of the System and Page Definitions into TANDOS RAM commencing at \$B815. Because this information is not held on the blank disk in the drive, the essential information (ie the number of tracks for Drive 0: and the amount of Page 0 memory is available) has to be entered manually. The TANDOS system will not run without this information.

On the Microtan:

Enter **MB815** The Microtan screen will display 00 next to this command

Enter **28** (hex equivalent of 40) for a 40 track drive, or Enter **50** for an 80 track drive

Enter **MB81D** The Microtan screen will display 00 next to this command

Enter **8** representing 8KBytes of memory available on Page 0 (ie Tanex memory up to \$1FFF)

Note: these values and the rest of the System Definition information can be updated later using the TANDOS SYS Command.

Step 3 – Run CREATE

The CREATE program is normally run at the transfer address \$5A0, but as already mentioned, the first part needs to be skipped. The program is run instead from address \$5D1.

On the Microtan:

Enter **G5D1** User is prompted to 'Load disc 0 and press RETURN'. Load new disk.

Press RETURN. User is prompted to enter Disc name:

Enter **MASTER**

The program will proceed to format the disk. The track being formatted is displayed on the screen. When finished, provided there have been no errors, the program will display 'Disc now ready for use'.

If errors are encountered, they could be due to Disk Drive hardware or cable problems. If persistent, try if possible with alternative drives or cables.

Save TANDOS Commands

To save the TANDOS commands and any other files onto the disk, one of two TANDOS commands are used. These are DSAVE or S and are described in the TANDOS Commands [document](#). The preferred program is S as this includes a facility to relocate the code. However, DSAVE is needed first to store the program S on the disk.

Step 4 – Fetch DSAVE

On the Microtan:

Enter **F** to set 'Fast' tape speed

Enter **F,DSAVE** to fetch the file named DSAVE

On the PC/Laptop:

Run Audacity, open the file DSAVE.WAV, play the file

The cursor will reappear on the Microtan screen when the transfer has been completed. Provided there were no errors, the DSAVE program will have been downloaded into the Transient Program Area starting at location \$B960 and ending at location \$BB8C.

Step 5 - Save DSAVE

When DSAVE is normally run, 4 data items are required: the start and end address of file to be saved, the Filename and optionally, the program transfer address if it is to be started automatically after loading it from disk. The user is prompted for the start and end addresses. The Filename and Transfer address are provided in the command line as follows:

DSAVE FILNAM.EXT Tnnnn

where FILNAM.EXT is the Filename (with or without an extension) and nnnn is the transfer address.

The program is loaded from disk into the Transient Program Area and executed at address \$B9AF. The program fetches the Filename and Transfer address from the screen and prompts the user for start/end addresses. When the program is run using the monitor G command at \$B9AF, the Filename and Transfer address will not be available. These will have to be provided later.

On the Microtan:

Enter **GB9AF** User is prompted to enter Start Address

Enter **B960** User is prompted to enter End Address

Enter **BB8C**

The program will save the DSAVE program to disk. It will have the Filename GB9AF and the program transfer address will be blank. Unfortunately it is not possible to run this program from disk because when filename GB8AF is entered, it will be treated as a monitor (TANBUG/TUGBUG) command and run whatever code is at \$B8AF. Therefore the Filename on the disk needs to be changed to DSAVE and, at the same time, the Transfer address field updated. This is achieved using the TANDOS disk utility program DZAP.

Step 6 – Fetch DZAP

On the Microtan:

Enter **F** to set 'Fast' tape speed

Enter **F,DZAP** to fetch the file named DZAP

On the PC/Laptop:

Run Audacity, open the file DZAP.WAV, play the file

The cursor will reappear on the Microtan screen when the transfer has been completed. Provided there were no errors, the DZAP program will have been downloaded into the Transient Program Area starting at location \$B960 and ending at location \$BB89.

DZAP is a utility for reading and updating individual sectors of data held on a disk. It operates with a split screen. The top half is the command screen and has a 'block' cursor. The lower half displays the contents of the selected sector; the ASCII symbols of the 256 bytes are displayed. The lower screen cursor is the Underline character. It obliterates the ASCII symbol and can be moved around using Control U, Control D, Control L and Control R commands. Entering Control O will display in the top screen, the Hex value of the character beneath the cursor in the lower screen and then move the cursor to the right. Other commands entered are shown in the top screen. They must be entered on a fresh line.

Step 7 – Update DSAVE on Disk

On the Microtan:

Enter **GB960** to run DZAP program. The DZAP screens are displayed.

Enter **R1,0** to show the contents of Track 0, Sector 1.

The first 16 bytes of the first row is the System Definition. The next 2 bytes point to the Sector/Track of the first Free Space. The next 2 bytes point to the Sector/Track of the first Directory. This is the one required.

Move the lower cursor to the right (Control R) until it sits on top of the first of these 2 bytes (ie 1st Row, 2nd Column labelled 2).

Enter **Control O** twice. In the top screen, the hex values of these two bytes will be displayed (eg 04,00)

Press RETURN

Enter **R4,0** to display the contents of the first directory sector.

The first 2 bytes will be 00 indicating there are no other directories after this one ie it is the last Directory sector. The next byte shows 1 indicating there is one entry in this directory sector. The next 16 bytes contain details of the first entry. The first 9 bytes are the filename / extension; the next 2 the file length (number of sectors); the next 2 the first sector (sector/track); the next 2 the last sector (sector/track); and the last byte is the file Attribute.

Move the lower cursor right until it sits on top of the first filename character G (ie 1st Row, 1st Column labelled 3).

Press RETURN

Enter **EDSAVE** to change the filename.

Enter **W** to save this updated sector back to disk.

Move the cursor right until it sits on top of the first part of the file's first sector/track (ie 1st Row, 1st Column labelled E).

Enter **Control O** twice. In the top screen, the hex values of these two bytes will be displayed (eg 07,00)

Press RETURN

Enter **R7,0** to display the contents of DSAVE's first file sector.

The first 2 bytes show the Track/Sector of the next sector in the chain. The next 8 bytes are the Address record which is only held in the first of the file's sectors. The first byte of the Address record is the Record length (always FF). The next byte is the Tanram page number (0). The next 2 bytes are the Start address (60, B9) followed by the 2 End address bytes (8C, BB). The final 2 bytes are the Transfer address (00,00). It is these last bytes that need to be updated.

Move the lower cursor right until it sits on top of the first byte of the Transfer address (ie 1st Row, 1st Column labelled 8).

Press RETURN

Enter **HAF,B9** to update the Transfer address to B9AF.

Enter **W** to save this updated sector back to disk.

Enter **X** to exit the DZAP program.

To test the presence of the program DSAVE on the disk,

Enter **DLOAD DSAVE DN**

The display should show B960 BB8C B9AF indicating its start, end and transfer addresses.

Step 8 – Fetch S

On the Microtan:

Enter **F** to set 'Fast' tape speed

Enter **F,S** to fetch the file named S

On the PC/Laptop:

Run Audacity, open the file S.WAV, play the file

The cursor will reappear on the Microtan screen when the transfer has been completed. Provided there were no errors, the S program will have been downloaded into the Transient Program Area starting at location \$B960 and ending at location \$BBFC.

Step 9 – Save S

The S program code needs to be relocated from the Transient Program Area into User RAM to free the area for the DSAVE program when that is run.

On the Microtan:

Enter **CB960,BBFC,1960**

To save the relocated code to disk

Enter **DSAVE S TB9A7** User is prompted to enter Start Address

Enter **1960** User is prompted to enter End Address

Enter **1BFC**

The program will save the S program to disk.

Step 10 – Update S on Disk

Repeat Step 6 above to fetch DZAP.

On the Microtan:

Enter **GB960** to run DZAP program. The DZAP screens are displayed.
Enter **R4,0** to show the contents of the first directory sector.

This time there will be 2 entries, DSAVE and S.

Move the cursor right until it sits on top of the first part of the file S's first sector/track (ie 1st Row, 2nd Column labelled E).

Enter **Control O** twice. In the top screen, the hex values of two bytes will be displayed (eg 06,00)
Press RETURN

Enter **R6,0** to display the contents of the S program's first sector.

Move the lower cursor right until it sits on top of the S program's start address MSB byte (ie 1st Row, 1st Column labelled 5).

Press RETURN

Enter **HB9** to update the Start address to B960.

Move the lower cursor right until it sits on top of the S program's end address MSB byte (ie 1st Row, 1st Column labelled 7).

Press RETURN

Enter **HBB** to update the End address to BBFC.

Enter **W** to save this updated sector back to disk.

Enter **X** to exit the DZAP program.

To test the presence of the program S on the disk,

Enter **DLOAD S DN**

The display should show B960 BBFC B9A7 indicating its start, end and transfer addresses.

Step 11 – Save Remaining TANDOS Command Programs

The procedure for the remaining programs is as follows:

Fetch the command file as described in Step 8.

Relocate the file from the Transient Program Area into User RAM (see RELOCATION instruction in the table below).

Save the relocated file to disk (see the SAVE instruction in the table below).

File	RELOCATION	SAVE
BACKUP	CB960, BB9B, 1960	S BACKUP 1960 1B9B TB960 RB960
COPY	Not required	S COPY 400 B10 T530
DBASIC	CB960, BA38, 1960	S DBASIC 1960 1A38 TB960 RB960
DEL	CB960, BBDC, 1960	S DEL 1960 1BDC TB980 RB960
DIR	CB960, BB9A, 1960	S DIR 1960 1B9A TB988 RB960
FORMAT	Not required	S FORMAT 400 697 T542
INIT	CB960, BB46, 1960	S INIT 1960 1B46 TB9CB RB960
KILL	CB960, BBAE, 1960	S KILL 1960 1BAE TB970 RB960

REN	CB960,BA69,1960	S REN 1960 1A69 TB985 RB960
SYS	CB960,BB7F,1960	S SYS 1960 1B7F TB9A1 RB960

Conclusion

If the above procedure has been completed without error, then a TANDOS MASTER disk has been created.

Optionally the individual files may be protected using the REN command. Refer to the TANDOS Commands [document](#) for instructions.

Optionally a second copy of the MASTER disk may be made on side 2 of the disk (provided both the drive and disk are double-sided) using the BACKUP command. Refer to the TANDOS Commands [document](#) for instructions.

The whole disk should then be Write-Protected by sticking a label over the notch on the right hand side of the 5.25" Floppy Disk or moving the plastic tile in the write protect cutout of the 3.5" Floppy Disk.

The disk should be identified as the MASTER disk on a label. It should also show the number of tracks it has been formatted with (ie 40T or 80T).

Note that the system definition on this disk defines a minimum configuration Microtan system ie one single-sided 40 Track (or 80 Track) disk drive, 8K of User Ram and no Tanram paged memory available. Any system disks created using this MASTER disk will have this same system definition. If the actual system in use is different, the system definition on those disks should be updated using the SYS command.