

ST-2900 OS-9 CONVERSION PACKAGE

User's Manual

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CREDITS

Special thanks go to John C., Will W., and Greg M. -- many of the improvements in this release are due to their suggestions.

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This manual last revised August 5, 1985.

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1.0 Introduction

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Welcome to the exciting world of OS-9! This sophisticated operating system offers many of the features of UNIX, yet is relatively simple to use and runs on very economical hardware such as the ST-2900.

The ST-2900 OS-9 Conversion Package lets you easily create an OS-9 system disk, fully configured for the ST-2900, directly bootable by ST-MON. The whole process only takes a few minutes, with the Conversion package doing most of the work for you.

Why, you might ask, does Sardis Technologies offer a conversion package to be used with another manufacturer's version of OS-9, instead of selling a complete, pre-configured implementation? To save you a bundle of money!! The Radio Shack Color Computer (CoCo) version of OS-9 is priced so attractively, that even after adding the cost of the ST-2900 OS-9 Conversion Package, OS-9 on the ST-2900 costs you less than half of Microware's suggested list price of (\$US) \$250.

No programming is involved -- merely follow the simple instructions in the next several pages. The task of replacing the CoCo "device drivers" with new ST-2900 drivers is done automatically by the Conversion Package.

Many of the limitations of OS-9 on the CoCo have been eliminated by means of the new ST-2900 device drivers in conjunction with the ST-2900's DUART and different disk controller design.

OS-9 on the ST-2900 system gives you more free memory for user programs than many other OS-9 Level I systems. Memory is especially tight on Radio Shack CoCo's with 24x51 high resolution displays. But running MFREE on the ST-2900 (immediately after booting up) typically indicates 172 pages (43K) of contiguous free memory.

Another feature of OS-9 on the ST-2900 is its ability to read and write disks in a variety of formats:

- a) standard OS-9, single or double density
- b) CoCo OS-9
- c) MIZAR OS-9/68K
- d) FLEX (using SouthEast Media's O-F package)
- e) MS-DOS (using D.P. Johnson's PC-XFER utilities)
- f) Radio Shack CoCo Disk BASIC (using D.P. Johnson's PC-XFER utilities)

2.0 What you need to run OS-9 on the ST-2900

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- 2.1) The "ST-2900 OS-9 Conversion Package" from Sardis Technologies. A diskette labelled "ST-2900 OS-9 Conversion Boot Disk" is included in this package, and will be referred to as the "Conversion/Boot" disk throughout this manual. Appendix C lists the contents of the disk.
- 2.2) A copy of OS-9 Level I, including a system disk and manuals. Your local Radio Shack Computer Center or other Radio Shack stores (found in 80 countries worldwide) are the best source. The versions of OS-9 that have so far been verified to be compatible with the ST-2900 Conversion package are:
- a) Radio Shack Color Computer OS-9 Version 01.00.00
 - b) Radio Shack Color Computer OS-9 Version 01.01.00

Some other versions might also run without changes. If your version of OS-9 has problems running on the ST-2900 system, contact us and we will try to help (but no guarantees). The important points are that the OS-9 disk used in the booting process must be in CoCo format, single-sided, and have the OS-9 kernel (OS9, OS9P2, INIT, BOOT) on track 34, sectors 1-15.

The ST-2900 OS-9 Conversion package supplies its own console, printer, clock, and disk driver routines, so it doesn't matter if the OS-9 version you choose didn't originally support the disk configuration you need.

The CoCo OS-9 package includes a disk labelled "Radio Shack Color Computer OS-9 System Master" which will be referred to as the "CoCo/System" disk throughout this manual.

- 2.3) ST-MON version 2.04, or later, installed on the CPU board. The number of data bits (7 or 8) that serial port A is set to must match that of your terminal, otherwise OS-9 will either hang up or you will get lots of "ERROR #244" messages. Refer to the ST-MON manual for more details.
- 2.4) At least one floppy disk drive. Although OS-9 will run on a one drive system, a two drive configuration is recommended, with a maximum of four drives allowed on the ST-2900. Running commands such as BACKUP is awkward and slow on a one drive system.

Disk drives may be single or double sided, 5 1/4" or 3 1/2", 35 or 40 or 80 track, 48 or 96 or 135 tpi, in any mix. NOTE -- because both the Conversion/Boot and CoCo/System disks are supplied on 5 1/4" media, you must have at least one 5 1/4" drive connected, even if only temporarily. The system will run fine with only 3 1/2" drives, once a configured 3 1/2" bootable system disk has been created.

- 2.5) The ST-2900 CPU board must have 64K RAM installed, and crystals Y1 and Y2 must be 3.6864 MHz and 16 MHz, respectively. The ST-2900 FDC board must be connected to the CPU board. The 6522 VIA does not need to be installed on the FDC board unless you will be using the VIA device driver.

3.0 Before you get started

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- 3.1) Before attempting to use the ST-2900 OS-9 Conversion Package you should read the red "OS-9 COMMANDS" manual supplied with the Radio Shack version of OS-9 to familiarize yourself with the terminology and basic features of OS-9. ALSO READ THIS ENTIRE ST-2900 MANUAL THROUGH ONCE OR TWICE BEFORE BEGINNING ANY OF THE PROCEDURES GIVEN.

The next 6 or 7 pages contain the detailed instructions on booting OS-9 on the ST-2900, making backups of the original Sardis Technologies and Radio Shack disks, and creating a configured bootable system disk. Here is a brief overview of those instructions:

- a) use ST-MON to set flags to indicated the drive number and track density of the boot drive, if these are different from the defaults
- b) use ST-MON's "D OC" command to load the conversion package from disk
- c) use the program loaded in (b) to load the Radio Shack CoCo version of the OS-9 operating system from disk
- d) modify the disk drive descriptors with OS-9's DEBUG command
- e) modify the terminal and printer device descriptors with OS-9's XMODE command
- f) adjust the trimpots on the FDC board, using the ST-2900 DSPEED program
- g) use the SFORMAT command to prepare several disks to save the results of steps a-e
- h) use OS-9's BACKUP command to make working copies of the originals of the Radio Shack OS-9 and Sardis Technologies' conversion disks
- i) use the ST-2900 KERNLSAVE and KERNLFIX commands and OS-9's SAVE and OS9GEN commands to make a bootable system disk configured for your system

Note that until step (i) has been done, all the modifications made in steps d-e are only in memory and so are extremely volatile. Any error may require the whole process to be repeated, so be very careful. We strongly urge that you follow the instructions in sections 4.0 through 7.9 in the sequence that they are presented.

- 3.2) In this manual, and throughout the Radio Shack OS-9 manuals, you will see commands and module names appearing in lower case, upper case, or even a mixture of lower and upper case. OS-9 command lines are case insensitive -- "ABC", "abc", and "Abc" are all considered to be the same name.
- 3.3) NOTE - although this package allows you to read, write, and format both CoCo and standard OS-9 disk formats with equal ease, you will probably want to use the CoCo format for most of your disks, and use the standard format only when exchanging disks with other people. When comparing 40 track double-sided, double-density disks, the CoCo format stores almost 42K bytes more data per disk. Also, as supplied, this package uses /D0 as the device name for CoCo format disks in drive 0. Some software packages (such as Screditor III) must be run from a drive named /D0, not /SD0, unless you patch them. And the "CHD" and "CHX CMDS" commands automatically issued by SysGo at boot time will not successfully execute if you boot up from a standard OS-9 format disk, unless you either rename the "SD0" device descriptor to "D0", or modify the "INIT" module to point to SDO instead of D0.

- 3.4) REMEMBER - it can be very dangerous to your data to change disks in the middle of a session (ie. if you are not at the OS-9 command level, seeing the "OS9:" prompt), especially if any files are open for update or write. Of course, due to the multi-user/multi-tasking (mu/mt) capabilities of OS-9, even seeing the "OS9:" prompt on your terminal doesn't guarantee it is safe to change disks. If you use the mu/mt features by specifying an "&" in your command lines, or by having two users simultaneously logged onto the system, you should acquire the habit of running the "PROCS E" command before changing a disk, to see if any processes are running that may be using the disk.

Also, as a general rule, whenever you change disks that contained either the current data directory or current execution directory (as set by the CHD and CHX commands), you should execute the CHD and/or CHX commands after the new disk is inserted. Failure to do so will result in a lot of "ERROR #214 - no permission" or "ERROR #216 - path name not found" messages, or any number of unpredictable results, most just a nuisance, a few downright disastrous.

4.0 Booting Up OS-9 With The Conversion Boot Disk (or a backup copy of it)

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- 4.1) After powering up or pressing the system reset switch, respond to ST-MON's "CW?" prompt with "C", after which you should get the ST-MON signon message and a "=" prompt.
- 4.2) If you have a 5 1/4" disk drive (either 48 or 96 tpi) connected as drive #0, you will use it as the drive to boot from, so skip the rest of this step and continue at step 4.3. If drive #0 is a 3 1/2" unit, but you will boot from backup copies (on 3 1/2" disks) of the Conversion/Boot and CoCo/System disks, you should also use drive #0 as the boot drive, skip the rest of this step, and continue at step 4.3.
- If neither of the above describes your situation, you need to have a 5 1/4" drive (either 48 or 96 tpi) connected, even if only temporarily, as drive #1, 2 or 3 because the original Conversion/Boot and CoCo/System disks are only supplied on 5 1/4" media. The system now needs to be told to boot from the 5 1/4" drive, and not from the 3 1/2" unit that is drive #0. Use ST-MON's "M" command to set memory location BDRIVE (\$FEA1) to the drive number of the 5 1/4" drive you wish to boot from (01, 02, 03).
- 4.3) If the Conversion/Boot and CoCo/System disks you will be booting from are recorded at the same tracks per inch as that of the boot drive, skip the rest of this step. To tell ST-MON to "double-step" a 96 tpi boot drive to read 48 tpi disks, use ST-MON's "M" command to set memory location DBLSTP (\$FEA2) to any non-zero value (such as \$FF).
- 4.4) Double check to make sure the disk labelled "ST-2900 OS-9 Conversion Boot Disk" (use the backup copy, if you already have one) is write protected, then insert it into the boot drive. Type "D 0C". If you get a "BT ERR" or other error messages, press the system reset switch, then start again at step 4.1.
- 4.5) When prompted to do so, remove the Conversion/Boot disk, then insert the disk labelled "Radio Shack Color Computer OS-9 System Master" (use the backup copy, if you already have one) into the boot drive (first making absolutely sure the disk is write protected) and press the [Return] key.
- 4.6) The system will now take half a minute, or so, to complete the boot process. A series of asterisks will be displayed to let you know the system is working and hasn't "died".
- If you used drive #0 as the boot drive, you will eventually see the "Time?" prompt. Key in the date and time (refer to the description of the SETIME command in the Radio Shack "OS-9 Commands" manual), press the [Return] key, and you will be greeted with the "OS9:" prompt.
 - If you used a different drive as the boot drive, the system will at one point attempt to access drive #0. Ten seconds to one minute later it will give up, then display the "OS9:" prompt. In the meantime, the system was forced to skip several important steps, so you now need to key the following three commands, where "/Dn" is the name of the boot drive:


```
CHX /Dn/CMDS
CHD /Dn
SETIME
```

- 4.7) Follow the instructions in Appendix A (but omit step 11.5 for now) to change the stepping rates and other parameters to match your current disk drive configuration. DO NOT BYPASS THIS STEP.
- 4.8) At this point you should use the XMODE command (refer to the Radio Shack "OS-9 Commands" manual) to set the baud rates and other attributes of the device descriptors for the printer ("P") and modem or second terminal ("T1") to match your requirements. Also refer to the write-up on the "DUART" device driver in section 10.4.
- 4.9) The DSPEED command (described in section 10.3) must be run to help you adjust the two trimpots on the FDC board. No test instruments are required -- only a screwdriver. It is especially important to run the "D" and "S" sub-commands and make the appropriate adjustments BEFORE you go on to any other step that writes to a disk.
- 4.10) Before you do much else, follow the instructions in sections 5.0 to 7.0 to create backups of the original Sardis Technologies and Radio Shack distribution disks and create a directly bootable OS-9 system disk custom tailored to your system.

5.0 Backing Up The ST-2900 OS-9 Conversion Boot Disk

=====

- 5.1) If you haven't already carefully studied the SFORMAT command (explained in section 10.9 of this manual), and the LOAD, MDIR and BACKUP commands (explained in the Radio Shack "OS-9 Commands" manual), do so first.
- 5.2) With the CoCo/System disk still in the boot drive, type:

```
LOAD LOAD
LOAD MDIR
LOAD BACKUP
```

- 5.3) Use the MDIR command to see if module "Sformat" is in memory. If yes, skip the rest of this step and go on to step 5.4. If not, put the Conversion/Boot disk into the boot drive and type (where "/Dn" is the name of the boot drive):

```
LOAD /Dn/CMDS/SFORMAT
```

- 5.4) Insert a blank disk into drive 0 and type:

```
SFORMAT /D0 1 S '35'
```

If SFORMAT indicates other than 630 "good sectors", you should format the disk again, or format another disk, until you get one with 630 sectors. This is because the BACKUP command requires that both the source and destination disks have identical formats, with no defective sectors.

