RM/COS™

COS68000 OPERATOR GUIDE

for

TANDY MODEL 16 COMPUTERS

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PREFACE

RM/COS is an operating system family designed for the business environment. In less than 80K bytes, COS68000 for the Tandy Model 16 provides both multiuser and multitasking capability. The operating system and runtime support are engineered specifically for RM/COBOL application programs. Application program development is supported with the inclusion of two text editors and an ANSI X3.23-1974 COBOL compiler in the system. In addition, RM/COS software provides the typical commercial program support and utilities available on most minicomputer systems, such as record level locking, file data integrity across power failures, automatic data file compression, sort/merge, and IBM 2780/3780 data communications.

This manual describes the following:

- System installation procedure on a Tandy Model 16.
- System configuration parameters for Tandy Model 16 devices.
- Initial Program Load (IPL) procedures for a Tandy Model 16 computer.
- Log-in procedure on a Tandy Model 16.
- Serial and parallel interface cabling for a Tandy Model 16.

SUPPORTED HARDWARE

The RM/COS system supports the following Tandy Model 16 hardware components:

- CPU board
- Memory boards
- Winchester (Hard) disk controller
- Floppy disk controller
- Serial communications ports A and B
- Multiterminal interface (3 additional serial ports)
- 8, 12 or 15 MB hard disks
- 8 inch floppy disk
- Various terminals and line printers

RELATED MANUALS

The following manuals provide additional information needed by an RM/COS user:

RM/COS User Guide (MAN903) - describes RM/COS system concepts, Job Description Language (JDL), text editors, data communications systems, system configuration, and error messages.

Terminal Guide (MAN951) - provides specific details on various terminals supported by RM/COS.

RM/COS Cobol Language Manual (MAN902) - describes the syntax and semantics of the RM/COBOL language supported by RM/COS.

Tandy Model 16 Operator's Read Me First Manual - documents the power-on and "boot" procedures for the Model 16. It also documents boot errors.

CHAPTER 1

LOADING THE SYSTEM

INTRODUCTION

COS68000 for a Tandy Model 16 computer is shipped on an eight inch double sided double density floppy diskette. The system may be installed on a Winchester disk for improved performance. The following steps describe the procedure for installing the delivered system onto the Winchester (hard) disk.

NOTE

The installation procedure described below reinitializes the Winchester disk, DESTROYING ALL EXISTING FILES. If the user wishes to preserve files or another system already existing on the Winchester disk, he must first backup the Winchester disk by whatever means are appropriate.

If an existing COS68000 system is to be updated, do not use the following procedure which is for initial installation. Use instead the update procedure described in the following section on Updating an Existing COS68000 System.

SYSTEM INSTALLATION

1) Turn on the Winchester disk. If there are two or more Winchester disks, turn on Drive 4 (the primary drive) first, then the others. The disk on the Model 16B is internal, it will be powered on when the computer is powered on.

2) Turn the computer on. On models other than the 16B, the POWER switch is the upper toggle switch on the front of the display console. On the Model 16B, the power switch is located on the lower left side.

3) Flip up the RESET switch. The RESET switch is the toggle switch below the POWER switch. Immediately press REPEAT and BREAK (simultaneously) to select loading from the floppy.

4) Within a few seconds the message INSERT DISKETTE should appear. If a BOOT ERROR message appears, look up the boot error in the Tandy Model 16 Operator's Read Me First Manual. Insert the system floppy diskette in floppy drive 0 (the left drive), with the label facing the latch or door. Close the drive latch or door.

5) The following messages should be displayed:

```
Booting...
RM/COS Loader
```

When the Z80 software has been read from disk and loaded into the Z80, the screen will be erased and the following messages will be displayed:

```
Z80 Boot Complete.
RM/COS Loaded.

Processing SYSDEFIL.
Loading terminal definitions.
Building JDL directory.
System startup complete.
```

If other messages are displayed, an error has probably occurred. Verify that that the above steps have been followed correctly. If not, start again with step 3. See the section on Initial Program Load (IPL) later in this chapter for a description of error messages.

6) The system, as delivered on the floppy, is configured to automatically log-in the system manager (see Chapter 2, System Configuration, in the RM/COS User Guide). Therefore, shortly after displaying the last message shown in step 5, the COS68000 News File will be displayed and the system will prompt the user to enter the date and time. The user should enter the current date and time as described in the section Initial Log-in found later in this chapter.

7) After successfully entering the date and time, the date and time will be displayed on the screen and the command prompt [] will be displayed at the lower left of the screen. If the date and time are not correct, enter a TIME command to reset them (see the RM/COS User Guide).

8) At this point, the COS68000 system is running and the system disk is the floppy diskette. If the system is to be installed on the Winchester disk the following sequence must be followed. If this sequence has been performed proceed to step 9.

   i) Use the Screen Editor to edit the delivered System Definition File to configure the Winchester disk. Enter a BATCH command as indicated below:

```
[] B.
NAME: .SEDIT
Name to edit: .SYSDEFIL
```

Refer to Chapter 4, Screen Editor, in the RM/COS User Guide for editing information. Refer to the section on Sample System Definition Files in Chapter 2 of this manual for a listing of the delivered .SYSDEFIL. Be extremely careful while editing .SYSDEFIL. If the file becomes badly corrupted, the system may never successfully IPL again. Sample records are included in .SYSDEFIL for a Winchester disk but are commented out with "**". Replacing the "**" with "U " will configure an 8MB Winchester disk as DS04. See Chapter 2, System Configuration, in this manual for specifics regarding configuration on a Tandy Model 16 computer. Also see Chapter 2, System Configuration, in the RM/COS User Guide for general information about COS68000 system configuration.

ii) Enter a SYSTEM-SHUTDOWN command (see the section on System Termination later in this chapter).

iii) Return to step 3.

9) To move a copy of the system to the Winchester disk, enter a BATCH command as indicated below:

```
[ ] B.
NAME: .SYSBATCH.INSTALL
```

10) The following prompts will be displayed:

```
Source volume name:
Destination volume name:
Destination device:
```

where,

Source volume name: - the prompt for the user to enter the volume name of the volume containing the delivered system. A default volume name is provided which is the name of the delivered floppy diskette, so the user need only press the Return Key (see the Terminal Guide).

Destination volume name: - the prompt for the user to enter the volume name to be established for the Winchester disk, e.g., WIN. This volume name cannot be the same as the source volume name.

Destination device: - the prompt for the user to enter the disk device name of the Winchester disk, e.g., DS04.

11) After the user responds to the above prompts, the Winchester disk will be initialized. After the disk is initialized, bad track information will be requested. The cylinder number and head number of any bad tracks (flaws) should be entered at this time. If any bad tracks are entered, a list of the flaws will be displayed. After the bad track information is entered, system files will be created, and then the system files will be copied from the floppy to the Winchester disk. When the copying begins, FCOPY messages will be displayed on the screen. If the screen is filled, press the Acknowledge Key (which is the HOLD key on the Tandy Model 16 keyboard) to allow the messages to continue.

12) When the copies have completed successfully, the message "Installation complete" will appear on the screen. If any of the copies have failed, the message "Installation FAILED" will appear. Press the Return Key to continue.

13) The command prompt [] should then appear. The system has been copied and installed onto the Winchester disk. However, the current system disk is still the floppy diskette. To begin using the Winchester disk as the system disk:

    i) Enter a SYSTEM-SHUTDOWN command (see the section on System Termination later in this chapter).

    ii) Remove the floppy diskette and store it in a safe place.

    iii) To load the system from the Winchester disk, flip the reset switch and do <u>not</u> press any other key. The system will now load from the Winchester disk (see steps 5, 6, and 7 above).

    iv) The system disk is now the Winchester disk. The user may configure the system on the Winchester disk as desired. See Chapter 2, System Configuration, in this manual for specifics regarding configuration on a Tandy Model 16 computer. Also see Chapter 2, System Configuration, in the RM/COS User Guide for general information about COS68000 system configuration.

After configuring the system on the Winchester disk, a floppy diskette backup should be made by following steps 9-12 to copy the system to a new floppy diskette. The values entered for the prompts described in step 10 must be changed to indicate the Winchester disk as the source volume and the floppy as the destination volume.

UPDATING AN EXISTING COS68000 SYSTEM

If you are presently operating a COS68000 system on a Tandy Model 16 system and there are files on the Winchester disk that you wish preserved, the following procedure should be performed in order to update the system to the level of the delivered floppy diskette.

Note that this procedure will delete and re-create the system and JDL image files, and will overwrite any system files on the disk, including the System Definition File.

COS68000 Release 2.4 has added parameters on almost all "U" records. In a System Definition File valid under Release 2.3, U records for most devices must be changed for correct operation under the new release.

1) Perform steps 1 through 8 as described in the previous section on System Installation.

2) At this point, the COS68000 system is running and the system disk is the floppy diskette. To update the system and associated system files on the Winchester disk, enter a BATCH command as indicated below:

```
[ ] B.
NAME: .SYSBATCH.UPDATE
```

3) The following prompts will be displayed:

```
Source volume name:
Destination volume name:
Destination device:
```

where,

Source volume name: - the prompt for the user to enter the volume name of the volume containing the delivered system. A default volume name is provided which is the name of the delivered floppy diskette, so the user need only press the Return Key.

Destination volume name: - the prompt for the user to enter the volume name of the Winchester disk to be updated, e.g., WIN.

Destination device: - the prompt for the user to enter the disk device name of the Winchester disk, e.g., DS04.

4) After the user responds to the above prompts, the system residing on the specified Winchester disk will be updated to the level of the delivered floppy diskette. FCOPY messages will be displayed on the screen. If the screen is filled, press the Acknowledge Key (see the Terminal Guide) to allow the messages to continue. The system configuration file will be changed to match that of the delivered diskette.

5) The command prompt [ ] should then appear. The system has been updated on the Winchester disk. However, the current system disk is still the floppy diskette. To resume using the Winchester disk as the system disk, the instructions for step 13 in the previous section on System Installation should be followed.

INITIAL PROGRAM LOAD (IPL)

Loading an operating system into a computer is called the Initial Program Load (IPL). It consists of mounting a system disk in the system disk drive (if the system disk drive has a removable volume), and executing the built-in loader program (ROM loader). The loader program is executed whenever the computer is reset. The computer is reset when power is first turned on or whenever the reset switch on the computer is flipped.

If the message

CANNOT LOAD SYSTEM

is displayed, the system disk drive does not contain a system disk or the system disk is not readable. Substitute a different disk volume in the system drive, or, if booting from the Winchester disk, use the technique below to cause booting from the floppy drive. See the previous section, System Installation, for how to install a system on the Winchester disk.

The system disk device is defaulted to Winchester disk drive 4 (the main Winchester disk). The floppy disk may be selected as the system disk by simultaneously pressing the REPEAT and BREAK keys immediately after flipping the RESET switch. Ensure that the proper diskette is inserted in floppy drive 0.

If IPL is successful the following messages will be displayed:

```
Booting...
RM/COS Loader

Z80 Boot Complete.
RM/COS Loaded.

Processing SYSDEFIL.
Loading terminal definitions.
Building JDL directory.
System startup complete.
```

After successful IPL, users may log-in at terminals configured in the system. The built-in terminal may automatically initiate log-in and any terminal may automatically log-in the system manager if the system is configured to do so.

Errors may occur during IPL which may either terminate IPL or allow IPL to continue with default actions. If the loader program is unable to read the index sector the following messages will be displayed:

```
Z80 Boot Complete.
Error reading index sector:  nn
```

If the loader is unable to read the system image from the disk the following messages will be displayed:

```
Z80 Boot Complete.
Error reading system:  nn
```

In such cases, substitute a good system disk volume for the bad system disk volume and repeat the IPL procedure.

If IPL detects an error in the System Definition File, the following will be displayed on the built-in terminal:

```
System error nnnn detected on or after the following SYSDEFIL record:
                <SYSDEFIL record image>
```

where nnnn is an error in the range A000-AFFF documented in the RM/COS User Guide, or an error in the range C000-DFFF documented in Chapter 2 of this manual. After approximately 10 seconds, IPL will continue with a default action if it is able to do so. If IPL cannot continue, a different system disk must be substituted. After an IPL which completes with errors, the System Definition File should be edited to correct the error.

INITIAL LOG-IN

The system as delivered is configured to automatically log-in the system manager. The system manager is a user ID with the following initial description:

```
User ID = SYSTEM MANAGER
Passcode = RM/COS
Privilege Level = 65535
Initial Batch Name = .TIME
System Synonym = Yes
User Synonym Table Size = 100
Synonym File Name = <blank>
```

After the system is installed, the user may change the System Definition File so that log-in is required. The User Definition File may also be changed to add user IDs and to change the passcode of the system manager. See Chapter 2, System Configuration, in the RM/COS User Guide for a description of the procedures used to change the User Defintion File.

If the system configuration is changed to require log-in, the system manager would log-in according to the instructions given in the following text.

Press the Log-in Key (see the Terminal Guide) to begin the log-in process. If your terminal type is configured as "?" to allow you to select the proper terminal type at log-in, enter one of the supported terminal types in response to the prompt (see the list of supported terminal types in the section on Station Device Parameters in Chapter 2 of this manual):

```
RM/COS VERSION 2.4.03  Select terminal type:
```

COS68000 then displays the following request:

```
RM/COS VERSION 2.4.03  Please log in:
```

Enter a valid user ID, initially SYSTEM MANAGER. Press the Return Key following each entry. If a mistake is made during any entry before the Return Key is pressed, one or more of the System Edit keys described in Appendix I of the RM/COS User Guide may be used to correct the entry. After entry of a valid user ID, COS68000 displays the following request:

```
Passcode:
```

Enter the passcode that has been assigned to the user ID, initially RM/COS, followed by the Return Key. Notice that the characters entered are not displayed. The log-in process may be terminated by pressing the Command Key or the Interrupt Key (see the Terminal Guide). After the correct passcode has been entered, the TIME batch stream is initiated. The TIME batch stream requests the date and time, starting with the year:

```
YEAR:
```

Enter the last two or all four digits of the year; 84, for example. The next request is:

```
MONTH:
```

Enter a number in the range of 1 through 12; 5, for example to set May as the current month. The next request is:

```
DAY:
```

Enter a number in the range of 1 through 31; 31, for example. The next request is:

```
HOUR:
```

Enter a number in the range of 0 through 23; 13 (one o'clock in the afternoon) for example. The next request is:

```
MINUTE:
```

Enter a number in the range of 0 through 59; 23, for example. This example initializes the time and date to 1:23:00 P.M., May 31, 1984. After the date and time are initialized the system will display the date and time and the command prompt:

```
[]
```

NOTE

On international keyboards that do not support the square brackets, the initial prompt will consist of those international characters used to replace the square brackets. The command prompt may be changed. Refer to Chapter 2, System Configuration, in the RM/COS User Guide for details.

The system is now ready to execute any of the commands described in Chapter 3 of the RM/COS User Guide. Other users may log-in at other terminals.

If a mistake is made during entry of the date and time which results in an invalid date or time, an error is displayed and must be acknowledged by pressing the Acknowledge Key (see the Terminal Guide). The prompts for year through minute will then be displayed for initialization of the current date and time.

If the date and time entered are valid but incorrect, they may be reset by entering the TIME command in response to the command prompt as described in Chapter 3 of the RM/COS User Guide.

Note that COS68000 allows only the following commands until the date and time have been successfully entered:

BATCH
CONTINUE
LOGOUT
LOOP
QUIT
REPEAT
SETCOND
SYSTEM-SHUTDOWN
TIME

SYSTEM TERMINATION

The SYSTEM-SHUTDOWN command should be used to stop the RM/COS operating system in order to re-IPL or to power the machine off. The SYSTEM-SHUTDOWN command simulates a QUIT command, unloads all loaded disk volumes (including the system disk volume) and terminates the RM/COS operating system.

If other partitions are active when the SYSTEM-SHUTDOWN command is entered, a message, stating that the system is shutting down in 30 seconds, will be broadcast to all terminals. After 30 seconds any partitions still active will be aborted. When no partitions remain active, the shutdown process will proceed.

CHAPTER 2

SYSTEM CONFIGURATION

INTRODUCTION

This chapter provides information specific to the configuration of a Tandy Model 16 computer. The reader should first be familiar with the material provided in the RM/COS User Guide, Chapter 2, System Configuration.

SAMPLE SYSTEM DEFINITION FILE

The System Definition File on the delivered system disk for version 2.4.03 contains the following records:

```
*         1         2         3         4         5         6
*23456789012345678901234567890123456789012345678901234567890
S  AL  [ ]  1984  0051         02048
***
C Z >404                    ; Z80 board
U STO1      SERIAL/0/0      TRSM16                          ; Console
U BL01      SERIAL/1/0      60/10/15, 9600                  ; BISYNC
U STO2      SERIAL/2/0      ?/Local, 9600/EVEN/7/1          ; Station
U LP01      PARALLEL/0/0    60/132/CR=NL/66                 ; Printer
U DS00      FLOPPY/0/0      24/1/Verify,      DSDD          ; Disk 0
**DS01      FLOPPY/0/1      24/1/Verify,      DSDD          ; Disk 1
**DS04      HARD/0/0        24/1/No-verify,   8MB           ; Disk 4
***
P   30000       1           ; Partition   1 -- Terminal STO1
P   20000       1           ; Partition   2 -- Terminal STO2
P       0      99           ; Partition 101 -- Nonterminal
P       0      99           ; Partition 102 -- Nonterminal
P    2000      99           ; Partition 999 -- Shared File
*         1         2         3         4         5         6
*23456789012345678901234567890123456789012345678901234567890
```

The SERIAL/0/0 port is permanently connected to the built-in console terminal (STO1). The console terminal will be used to select the system disk device (see the section on Initial Program Load in Chapter 1) and to display system stop messages.

Notice that some disk U records are commented out. This is done to configure the system in its minimum configuration. Devices that are configured but not connected will cause system problems. If these devices are connected the U records can be reinstalled as necessary to match the actual configuration.

The parameters which are specific to the Tandy Model 16 appear only on the controller specification (C) and unit specification (U) records. These records allow specification of devices attached to the computer. Devices are attached by cables from the device to the connectors on the back panel of the computer.

The following System Definition File is provided as an example of a possible configuration of additional hardware:

```
*         1         2         3         4         5         6
*234567890123456789012345678901234567890123456789012345678901234567890
S  ML  [ ]  1984  0051          04096
***
C Z >404                    ; Z80 board
U ST01      SERIAL/0/0      TRSM16                          ; Console
U BL01      SERIAL/1/0      60/10/15, Synchronous           ; BISYNC
U ST02      SERIAL/2/0      ?/Remote, 9600/EVEN/7/1         ; Station
U ST03      SERIAL/3/0      TVI950,   9600/EVEN/7/1         ; Station
U LP01      SERIAL/4/0      30/150,   9600/EVEN/7/1,XON     ; Printer
U UL02      SERIAL/5/0      99/99,    9600                  ; User Link
U LP02      PARALLEL/0/0    60/132/CR=NL/66                 ; Printer
U DS00      FLOPPY/0/0      24/1/Verify,      DSDD          ; Disk 0
U DS01      FLOPPY/0/1      24/1/Verify,      DSDD          ; Disk 1
U DS04      HARD/0/0        24/1/No-verify,   12MB          ; Disk 4
U DS05      HARD/0/1        24/1/No-verify,   12MB          ; Disk 5
***
C V                         ; Pass-thru Printer
U LP99      PASS-THRU/0/0   30/150,  ST03                   ; Printer
***
P   60000       1           ; Partition   1 -- Terminal ST01
P   40000       1           ; Partition   2 -- Terminal ST02
P   40000       1           ; Partition   3 -- Terminal ST03
P   40000       2           ; Partition 101 -- Nonterminal
P   40000       2           ; Partition 102 -- Nonterminal
P   20000       2           ; Partition 103 -- Nonterminal
P   20000       2           ; Partition 104 -- Nonterminal
P   10000      99           ; Partition 999 -- Shared File
*         1         2         3         4         5         6
*234567890123456789012345678901234567890123456789012345678901234567890
```

SYSTEM DEFINITION FILE: CONTROLLERS

The controller specification (C) and unit specification (U) records allow specification of devices attached to the computer. Each C record is of the form:

C t device-address

where t is the board type and device-address is the controller device address.

Z80 Board

A controller specification (C) record must be included for the Z80 board. The board is designated as board type Z. This is normally the only C record (except perhaps for a pass-through printer C record) in the configuration since this is the only real controller in the current Model 16 hardware configuration. All peripheral devices are connected to the Z80 board. The device address is >404.

A typical C record for the Z80 board is:

C Z >404

The C record for the type Z board may have associated unit specification (U) records for disk devices, serial devices, or parallel printers. The controller types for U records associated with the type Z board are as follows:

SERIAL - Tandy serial controller (six controllers numbered 0-5, one unit each, numbered 0). Note that the Multiterminal interface (Tandy part number 26-6013) is required for controllers numbered 3-5. Computers without this interface have only 3 serial ports. The SERIAL ports may be used for any serial device (station, line printer, BISYNC link, or user link). The SERIAL/0/0 port is permanently connected to the console terminal. The SERIAL/1/0 (A) port may be used for synchronous communications if the jumpers have been set properly.

PARALLEL - Centronics-type parallel printer controller (one controller numbered 0, one unit numbered 0).

HARD - Tandy 8, 12, or 15 megabyte Winchester (hard) disk drive controller (one controller numbered 0, four units numbered 0-3).

FLOPPY - Tandy 8 inch floppy disk drive controller (one controller numbered 0, four units numbered 0-3).

Pass-Through Printer Board

A controller specification (C) record may be included to allow configuration of pass-through printers. These are printers connected to the printer port of a terminal. Currently, pass-through printing is supported for ADDS Viewpoint, Altos II, CIE CIT-80, TeleVideo 925, TeleVideo 950, TeleVideo 970, Wyse WY-50, and Wyse WY-100 terminals. See the Terminal Guide for additional information about pass-through printing on these terminals.

The pass-through printer board is designated as board type V. No other parameters are required. Thus, the following C record specifies a pass-through printer board:

```
C V
```

The controller type for U records associated with the type V board is as follows:

PASS-THRU - Pass-through printer (one controller numbered 0, ninety-nine units numbered 0-98).

SYSTEM DEFINITION FILE: DEVICES

A unit specification (U) record must be included for each device. The U record must follow the corresponding controller (C) record for the board with which the unit is associated. Each U record is of the form:

```
U xxnn      cont/cont-no/unit-no      device-parameters
```

where xxnn is the device name, cont is the controller type, cont-no is the controller number, unit-no is the unit number, and device-parameters is the list of device-specific parameters.

Device-specific parameters occur in groups; groups are separated by commas. Within groups, parameters are separated by slashes (/). Defaults are defined for most parameters. The following sections describe the device-specific parameters that apply to each type of device.

Winchester Disk Device Parameters

time-out/retry-limit/verify-option, disk-type

A Winchester (hard) disk (device name DSnn), if present, is normally the system disk and is usually named DS04.

time-out - the number of seconds to elapse before a time-out error occurs on the disk specified as a decimal integer. The timer is started whenever a disk operation is attempted. If omitted, 5 seconds is assumed. If an error is detected in this parameter, the IPL error D10F will be displayed and the default value will be used.

retry-limit - the maximum number of times to retry a disk operation after an error specified as a decimal integer. If omitted, 5 retries is assumed. If an error is detected in this parameter, the IPL error D10E will be displayed and the default value will be used.

verify-option - indicates whether writes should be verified by reading and comparing the data written. The value may be specified as "Verify" or "No-verify". If omitted, "Verify" is assumed.

disk-type - the disk type name from the list:

8MB - 8 megabyte Winchester disk
12MB - 12 megabyte Winchester disk
15MB - 15 megabyte Winchester disk

If omitted, 8MB is assumed.

A typical U record for a Winchester disk is:

```
U DS04      HARD/0/0       24/1/No-verify, 12MB
```

The IPL error D10D will be displayed if hardware or internal system errors are encountered during initialization of the disk.

Floppy Disk Device Parameters

time-out/retry-limit/verify-option, disk-type

One or two double-density floppy disks (device name DSnn) are built into the chassis of the Model 16. The drives are usually named DS00 and DS01.

time-out - the number of seconds to elapse before a time-out error occurs on the disk specified as a decimal integer. The timer is started whenever a disk operation (positioning or data transfer) is attempted. If omitted, 5 seconds is assumed. If an error is detected in this parameter, the IPL error D10F will be displayed and the default value will be used.

retry-limit - the maximum number of times to retry a disk operation (positioning or data transfer) after an error specified as a decimal integer. If omitted, 5 retries is assumed. The Z80 controller performs additional retries which are not included in this count. If an error is detected in this parameter, the IPL error D10E will be displayed and the default value will be used.

verify-option - indicates whether writes should be verified by reading and comparing the data written. The value may be specified as "Verify" or "No-verify". If omitted, "Verify" is assumed.

disk-type - the disk type name from the list:

SSDD - single-sided double density drive
DSDD - double-sided double density drive
SLOW-SSDD - single-sided double density drive
SLOW-DSDD - double-sided double density drive

SSDD and DSDD drives are stepped at 3 ms (milleseconds) per track. SLOW-SSDD and SLOW-DSDD drives are stepped at 15 ms per track. The floppy on a Model II requires SLOW-SSDD. If omitted, SSDD is assumed.

A typical U record for a floppy disk is:

```
U DS00      FLOPPY/0/0     24/1/Verify,      DSDD
```

The IPL error D10D will be displayed if hardware or internal system errors are encountered during initialization of the disk.

Station Device Parameters

terminal-type/location, baud-rate/parity/word-length/stop-bits

A station device (device name STnn) may be attached to a serial port.

terminal-type - the terminal type name from the list:

```
?       - Prompt user for terminal-type on log-in
ADDSVP  - ADDS Viewpoint
ADM3CS  - Datamedia Colorscan-30 (ADM-3A emulation)
ALTOS2  - Altos II
CIT80   - CIE CIT-80
CIT101  - CIE CIT-101
DM-5    - NCR Decision Mate V
F100    - Freedom 100
N7900   - NCR 7900 Model 1
N7901   - NCR 7901
N7910   - NCR 7910
T7000   - Wicat T7000
T910EM  - Tandy DT-1 (TeleVideo 910 emulation)
TRSM16  - Tandy Model 16 built-in terminal
TTY     - General line-oriented terminal
TV1950  - TeleVideo Model 950
TV1925  - TeleVideo Model 925
TVS970  - TeleVideo Model 970
WY-50   - Wyse WY-50
WY-100  - Wyse WY-100
ZEPHYR  - Zentec Zephyr / Zms-35
```

If omitted, "?" is assumed. Utilities such as MODUSER and SEDIT, which expect a full-sized video screen, will not work properly with TTY as the terminal type.

location - the location of the terminal specified as either the word "Local" or "Remote". RM/COS will disconnect the line 30 seconds after logging out a remote terminal, unless a new log-in has been started. If omitted, "Local" is assumed.

baud-rate - the bit rate to be used to communicate with the terminal specified as a decimal integer. This baud rate value must match the baud rate established for the terminal (normally switch selectable, see the manual supplied with the terminal). If omitted, 9600 is assumed.

parity - the parity to be used to communicate with the terminal specified as one of the words EVEN, ODD or NONE. If omitted, EVEN parity will be assumed.

word-length - the number of bits per character, not including framing bits. This is normally "7" if EVEN or ODD parity is selected and "8" if the parity is NONE. The only acceptable values are "7" and "8". If omitted, "7" is assumed if the parity is EVEN, ODD, or omitted; "8" is assumed if the parity is NONE. If an error is detected in this parameter, the IPL error D301 will be displayed and the default value will be used.

stop-bits - the number of "one" bits which terminate each character. Must be "1" or "2". "1" is assumed for baud rates greater than 300; "2" is assumed for baud rates of 300 and below. If an error is detected in this parameter, the IPL error D302 will be displayed and the default value will be used.

A typical U record for a station is:

```
U ST03      SERIAL/3/0     TVI950,    9600/EVEN/7/1
```

The IPL error D300 will be displayed if hardware or internal system errors are encountered during initialization of the station.

Serial Line Printer Device Parameters

time-out/max-length, baud-rate/parity/word-length/stop-bits, flow-control-list

A serial line printer device (device name LPnn) may be attached to a serial port.

time-out - the number of seconds to elapse before a time-out error occurs on the printer specified as a decimal integer. The timer is started anytime the printer returns a busy indication when the system attempts to send characters to the printer. If omitted, 30 seconds is assumed.

max-length - the maximum number of characters which may be written in a single WRITE statement to the printer specified as a decimal integer. Records longer than the maximum will be truncated. If omitted, there is no maximum.

baud-rate - the bit rate to be used to communicate with the printer specified as a decimal integer. This baud rate value must match the baud rate established for the printer (normally switch selectable, see the manual supplied with the printer). If omitted, 9600 is assumed.

parity - the parity to be used to communicate with the printer specified as one of the words EVEN, ODD or NONE. If omitted, EVEN parity will be assumed.

word-length - the number of bits per character, not including framing bits. This is normally "7" if EVEN or ODD parity is selected and "8" if the parity is NONE. The only acceptable values are "7" and "8". If omitted, "7" is assumed if the parity is EVEN, ODD, or omitted; "8" is assumed if the parity is NONE. If an error is detected in this parameter, the IPL error D011 will be displayed and the default value will be used.

stop-bits - the number of "one" bits which terminate each character. Must be "1" or "2". "1" is assumed for baud rates greater than 300; "2" is assumed for baud rates of 300 and below. If an error is detected in this parameter, the IPL error D012 will be displayed and the default value will be used.

flow-control-list - a series of zero or more of the following flow control options separated by slash characters. Each option indicates a flow control technique that may be used. The presence of the option directs the system to obey the named flow control indication. The absence of the option directs the system to ignore the named flow control indication. If an option is not a valid flow control name, the IPL error D013 will be displayed.

CTS - if specified, indicates that the system should not print when the Clear to Send input (circuit CB) of the serial port is low. The A and B serial ports and the expansion ports on the Multiterminal interface board will stop transmitting immediately if the Clear to Send input is low, even if this option is omitted. See Chapter 4, Cabling, in this manual for more information about serial printer cables.

DSR - if specified, indicates that the system should not print when the Data Set Ready input (circuit CC) of the serial port is low. The A and B serial ports and the expansion ports will stop transmitting as soon as possible after the Data Set Ready input drops, provided this option is specified. Characters may be lost if there are an insufficient number of characters available in the printer buffer when the printer drops ready.

XON - if specified, indicates that the system should stop printing after receiving an X-OFF (DC3) character, and should resume printing after receiving an X-ON (DC1) character. Characters may be lost if there are an insufficient number of characters available in the printer buffer when the printer drops ready.

A typical U record for a serial printer is:

```
U LP01      SERIAL/4/0     30/150,    9600/EVEN/7/1,XON
```

The IPL error D010 will be displayed if hardware or internal system errors are encountered during initialization of the printer.

Parallel Line Printer Device Parameters

time-out/max-length/carriage-return/page-length

A Centronics parallel line printer device (device name LPnn) may be attached to the parallel printer port.

time-out - the number of seconds to elapse before a time-out error occurs on the printer specified as a decimal integer. The timer is started anytime the printer returns a busy indication when the system attempts to send characters to the printer. If omitted, 30 seconds is assumed.

max-length - the maximum number of characters which may be written in a single WRITE statement to the printer. Records longer than the maximum will be truncated. If omitted, there is no maximum.

carriage-return - used to compensate for parallel printers which advance the paper when a carriage-return is sent. If set to CR=NL, a line feed is not sent and printing continues on a new line. If set to CR=CR, one line feed will be performed at the end of the line. If omitted, the default will be CR=NL.

page-length - the number of lines on a single page. Used to determine the number of line feeds (LF) needed to reach the top of form. If this parameter is omitted, then a form feed (FF) is used to position the printer to top of form. The paper must be positioned at top of form before first use if a page-length is specified.

A typical U record for a parallel printer is:

```
U LP01      PARALLEL/0/0  60/132/CR=NL/66
```

The IPL error D000 will be displayed if hardware or internal system errors are encountered during initialization of the printer.

Pass-through Line Printer Device Parameters

time-out/max-length, station-device

A serial line printer device (device name LPnn) may be attached to the printer port on a terminal.

time-out - provided only for compatibility with U records for other types of printers, the time-out is not used for pass-through printers.

max-length - the maximum number of characters which may be written in a single WRITE statement to the printer specified as a decimal integer. Records longer than the maximum will be truncated. If omitted, there is no maximum.

station-device - the device name of the station to which the printer is connected, e.g., ST03. The station must have been defined by a prior U record. Currently, pass-through printing is supported for ADDS Viewpoint, Altos II, CIE CIT-80, TeleVideo 925, TeleVideo 950, TeleVideo 970, Wyse WY-50, and Wyse WY-100 terminals. See the Terminal Guide for additional information about pass-through printing on these terminals. If the station-device specification is incorrect or more than one printer is specified for a terminal, the IPL error D030 will be displayed.

Typical records defining a station with a pass-through printer are:

```
U ST03      SERIAL/3/0     TVI950,   9600/EVEN/7/1

C V                        ; Pass-thru Printer
U LP99      PASS-THRU/0/0 30/150,  ST03
```

where the U record defining ST03 occurs following the C record for the Z80 board.

BISYNC Link Device Parameters

disconnect-time-out/response-time-out/retry-limit, baud-rate,
received-block-threshold-limit/
retransmitted-block-threshold-limit/
poll-time-out-threshold-limit/
response-time-out-threshold-limit

A BISYNC link device (device name BLnn) may be attached to a serial port. Both synchronous and asynchronous communications are supported, but, synchronous communications is only possible on a SERIAL/1/O (A) port for which the jumpers have been changed to provide transmit and receive clock signals. Contact Tandy if the jumpers must be changed.

disconnect-time-out - the time-out value to be used to disconnect the line when no useful activity has been performed over the link. The value is specified in seconds as a decimal integer. If omitted, 60 seconds is assumed.

response-time-out - the time-out value to be used when no data block is received from the remote end of the link. The value is specified in seconds as a decimal integer. If omitted, the value of the disconnect time-out is assumed.

retry-limit - the ENQ/NAK retry limit value specified as a decimal integer. If omitted, 5 retries is assumed.

baud-rate - the bit rate to be used on the communications link specified as a decimal integer. This baud rate value must match the baud rate expected at the remote end of the link. If omitted, 9600 is assumed.

Instead of a numeric baud rate, the word "Synchronous" may be used to indicate that a synchronous modem will be used. A synchronous modem may be used only on a SERIAL/1/O (A) port for which the jumpers have been changed to provide transmit and receive clock signals. If "Synchronous" is specified on any other port, a 3044 error will be returned to a CONNECT command. If the jumpers are set for synchronous communications and a baud rate is specified, or if the jumpers are set for asynchronous communications and "Synchronous" is specified, then no successful communication can occur. Contact Tandy if the jumpers must be changed.

received-block-threshold-limit - a communications threshold error log entry is made when the number of blocks received in error exceeds the received block threshold limit. The value is specified as a decimal integer. If unspecified, no number of blocks in error will cause a threshold error log entry to be made.

retransmitted-block-threshold-limit - a communications threshold error log entry is made when the number of blocks retransmitted exceeds the retransmitted block threshold limit. The value is specified as a decimal integer. If unspecified, the value defaults to the received block threshold limit.

poll-time-out-threshold-limit - a communications threshold error log entry is made when the number of poll time-outs exceeds the poll time-out threshold limit. A poll time-out occurs when the local station attempts to bid for the line and receives no response to its ENQ message within 3 seconds. The value is specified as a decimal integer. If unspecified, no number of time-outs will cause a threshold error log entry to be made.

response-time-out-threshold-limit - a communications threshold error log entry is made when the number of response time-outs exceeds the response time-out threshold limit. A response time-out occurs when the local sending station fails to get a response from the remote receiving station within 3 seconds. The value is specified as a decimal integer. If unspecified, the value defaults to the poll time-out threshold limit.

Typical U records for a BISYNC device are:

```
U BL01      SERIAL/1/0    60/10/15, 9600
U BL01      SERIAL/1/0    60/10/15, Synchronous
```

The IPL error D410 will be displayed if a hardware or internal system error is encountered while initializing the link.

Additional information on the disconnect time-out, response time-out, and retry limit may be found in Chapter 6, Data Communications, in the RM/COS User Guide.

User Link Device Parameters

receive-buffer/transmit-buffer, baud-rate

A user link device (device name ULnn) may be attached to a serial port. Both synchronous and asynchronous communications are supported, but, synchronous communications is only possible on a SERIAL/1/O (A) port for which the jumpers have been changed to provide transmit and receive clock signals. Contact Tandy if the jumpers must be changed. See Chapter 6, Data Communications, and Appendix B, COBOL Subroutine Library Package (C$COMM specifically), in the RM/COS User Guide for additional information on user link.

recieve-buffer - the number of character positions in the user link receive buffer specified as a decimal integer. This number determines the number of characters that can be received over the link but not yet read by the COBOL program without loss of data. If omitted, the default is 99.

transmit-buffer - the number of character positions in the user link transmit buffer specified as a decimal integer. This number determines the number of characters the COBOL program can write that have not been transmitted over the interface without the program waiting. If omitted, the default is 99.

baud-rate - the default baud rate to be used on the communications link specified as a decimal integer. This baud rate value must match the baud rate expected at the remote end of the link unless overridden at execution time. If omitted, 9600 is assumed.

Instead of a numeric baud rate, the word "Synchronous" may be used to indicate that a synchronous modem will be used. A synchronous modem may be used only on a SERIAL/1/O (A) port for which the jumpers have been changed to provide transmit and receive clock signals. If "Synchronous" is specified on any other port, any attempt to preset the user link device will result in an error status of 05. If the jumpers are set for synchronous communications and a baud rate is specified, or if the jumpers are set for asynchronous communications and "Synchronous" is specified, then no successful communication can occur. Contact Tandy if the jumpers must be changed.

Typical U records for a user link device are:

```
U ULO2      SERIAL/5/0     99/99,     9600
U ULO2      SERIAL/1/0     99/99,     Synchronous
```

SYSTEM DEFINITION FILE: ERRORS

D000	Hardware or internal system error (Parallel Printer)
D010	Hardware or internal system error (Serial Printer)
D011	Word-length specification error (Serial Printer)
D012	Stop-bits specification error (Serial Printer)
D013	Flow-control specification error (Serial Printer)
D030	Station-device specification error (Pass-thru Printer)
D10D	Hardware or internal system error (Disk)
D10E	Retry-limit specification error (Disk)
D10F	Time-out specification error (Disk)
D300	Hardware or internal system error (Station)
D301	Word-length specication error (Station)
D302	Stop-bits specication error (Station)
D410	Hardware or internal system error (BISYNC)

CHAPTER 3

JDL PARAMETERS

INTRODUCTION

For those parameters defined as system dependent in the RM/COS User Guide, using the default value will result in operation that is reasonable for the Tandy Model 16 being used. The complete range of system dependent values that may be used on the Tandy Model 16 is described in this section.

INITIALIZE

The FORMAT, BYTES PER SECTOR, and INTERLEAVE FACTOR parameters are system dependent for this JDL command. The following values are permitted:

FORMAT

MIXED is the only allowable parameter for both the Winchester and the floppy disks. This parameter need not be specified. MIXED initializes a floppy diskette as a double-density diskette with track zero formatted as single-density.

BYTES PER SECTOR

For Winchester disks, this parameter must be 512. If not specified, 512 is assumed.

For floppy diskettes, the allowed values for this parameter are 128, 256, and 512. If not specified, 256 is assumed. To create a single-density diskette, use 128 bytes per sector. The data capacity of a floppy with 512 byte sectors is about 25% greater than that of a 256 byte sector floppy.

INTERLEAVE FACTOR

For both Winchester disks and floppy diskettes, this parameter must be 1. If omitted, 1 will be assumed.

A single sided diskette created on a Tandy Model 16 may be read on Altos ACS 68000 computers (as well as other Tandy Model 16 computers) running RM/COS if it is INITIALIZEd correctly. Such a diskette should be INITIALIZEd with FORMAT=MIXED and BYTES PER SECTOR=256. Track zero will be initialized as single density, with 26 sectors of 128 bytes each. The remaining tracks will be initialized as double density, with 26 sectors of 256 bytes each.

INSTALL-SYSTEM

Only the BOOT NAME parameter is system dependent for this JDL command, and it must be specified as "BOOT".

I-BOOT

Function:

The I-BOOT command installs the boot code on track 0 of the specified disk. This command must be performed after a VCOPY. Neglecting to do this command will result in an unbootable disk.

Format:

```
VOLUME:  name
DEVICE:  name
BOOT FILE NAME:  acnm  ! .SYSFILE
BOOT MEMBER NAME:  name ! BOOT
```

Where:

VOLUME
: The volume name of the disk volume on which the boot is to be installed. The volume need not be loaded.

DEVICE
: The device name of the disk drive on which the volume is mounted or will be mounted.

BOOT FILE NAME
: The pathname of the System Image File. The pathname should begin with a period, not a device name or volume name, since the file is assumed to be on the volume specified by the VOLUME and DEVICE parameters. This is the MDS file which contains the system and boot images. The file must already exist on the volume.

BOOT MEMBER NAME
: The member name of the boot image in the System Image File. It must be specified "BOOT".

Example:

```
[] I-BOOT
VOLUME:  WIN
DEVICE:  DS04
BOOT FILE NAME:  .SYSFILE
BOOT MEMBER NAME:  BOOT
```

CHAPTER 4

CABLING

INTRODUCTION

This chapter provides general information about serial interface cabling, and information specific to the interfaces of this computer.

The serial interface is described in several sections. First is a summary of the signals used between a serial interface device and a modem. Second are several model templates illustrating the signals used to connect a serial device to a modem or another serial device. By associating the pin number for a particular device with each signal of the appropriate model connection, a cable to connect two serial interfaces can be derived. The third section documents the signal to pin number correspondence for this computer. The fourth section contains suggested cables for connecting devices to this computer.

The use of remote terminals over switched (dial-up) telephone circuits IS supported in this release of RM/COS.

RS-232-C DESCRIPTION

The Electronic Industries Association standard called RS-232-C specifies the electrical and functional characteristics of a serial interface between Data Terminal Equipment (DTE), such as peripherals and computers, and Data Communication Equipment (DCE), such as modems. Not all manufacturers interpret this standard identically, especially regarding whether a computer interface is a DTE or a DCE. The following RS-232-C interchange circuits are used in the cable descriptions:

Protective Ground (Circuit AA, Pin 1) - Connection of this circuit may protect equipment users from electrical malfunction, and may be required by local building codes. However, with some equipment, connection of this circuit can cause erratic behavior due to "ground loop" problems.

Transmitted Data (Circuit BA, Pin 2) - Signals on this circuit communicate character data from the DTE to the DCE.

Received Data (Circuit BB, Pin 3) - Signals on this circuit communicate character data from the DCE to the DTE.

Request to Send (Circuit CA, Pin 4) - This circuit from the DTE to the DCE is used to condition the DCE for data transmission over the communications channel. On a half-duplex channel, assertion of this signal causes the DCE to enter a transmit mode. A DCE may require this signal be on in order to transmit.

Clear to Send (Circuit CB, Pin 5) - This circuit from the DCE to the DTE indicates that the DCE is ready to transmit data over the communications channel. In full-duplex modems with the "CB-CF Common" option, this signal indicates that a carrier is being received from the remote modem. In half-duplex modems, or full-duplex modems with the "CB-CF Separate" option, this signal is a delayed version of Request to Send. When using a full-duplex modem for half-duplex communication, such as a BISYNC link, the "CB-CF Separate" option must be chosen. When using a full-duplex modem with a terminal or printer, the "CB-CF Common" option is recommended. A DTE may require this signal be on in order to transmit.

Data Set Ready (Circuit CC, Pin 6) - This circuit from the DCE to the DTE indicates that the local DCE is connected to a communications channel, and that the switching system has completed call establishment. It does not indicate the status of the remote DCE. A DTE may require this signal be on in order to communicate.

Signal Ground (Circuit AB, Pin 7) - This circuit provides the electrical return path for all other signals, and is required.

Received Line Signal Detector (Circuit CF, Pin 8) - This circuit from the DCE to the DTE indicates that the DCE is receiving a signal suitable for demodulation from the communications channel. A DTE may require this signal be on in order to receive data. (This circuit is also called Data Carrier Detect.)

Secondary Request to Send (Circuit SCA, Pin 11 or 19) - This circuit from the DTE to the DCE indicates that the DTE wishes to assert the carrier on the secondary (reverse) channel. This circuit is available on Bell 202-series modems, and is used by the printers of some vendors to indicate their readiness to receive data.

Secondary Received Line Signal Detector (Circuit SCF, Pin 12) - This circuit from the DCE to the DTE indicates that the DCE is receiving a carrier on the secondary (reverse) channel.

Transmitter Signal Element Timing (DCE Source) (Circuit DB, Pin 15) - This circuit from a synchronous DCE to the DTE commands when the DTE will present data on Transmitted Data (Circuit BA).

Receiver Signal Element Timing (DCE Source) (Circuit DD, Pin 17) - This circuit from a synchronous DCE to the DTE identifies when the DTE should examine data made available on Received Data (Circuit BB).

Data Terminal Ready (Circuit CD, Pin 20) - This circuit from the DTE to the DCE indicates that the terminal equipment is powered on and is available to accept a call and transmit or receive data. A DCE may require this signal be on in order to communicate.

Ring Indicator (Circuit CE, Pin 22) - This circuit from the DCE to the DTE indicates that a ringing signal is being received on the communication channel.

Transmitter Signal Element Timing (DTE Source) (Circuit DA, Pin 24) - This circuit from a synchronous DTE to the DCE identifies when the DTE presents data on Transmitted Data (Circuit BA).

MODEL CABLES

The following cable templates illustrate the signals used to connect a serial device to a modem or another serial device. By associating the pin number for a particular device with each signal of the appropriate model connection, a cable to connect two serial interfaces can be derived.

Asynchronous DTE to Modem Connection

The following model cable illustrates which circuits should be connected between a computer or peripheral (DTE) and a modem (DCE) for asynchronous operation. A modem would be used to connect a computer to a remote terminal, a remote printer using XON/XOFF flow control, or a remote computer. To use this model, associate the correct pin numbers of the computer or peripheral port with the DTE circuits. The pin numbers for this computer are described in a later section.

DTE Circuit	Direction	Modem (DCE) Circuit	Pin
BA	----->	BA	2
BB	<-----	BB	3
CA	----->	CA	4
CB	<-----	CB	5
CC	<-----	CC	6
AB	------	AB	7
CF	<-----	CF	8
CD	----->	CD	20

AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CA	Request to Send
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CF	Data Carrier Detect

Synchronous DTE to Modem Connection

The following model cable illustrates which circuits should be connected between a computer or peripheral (DTE) and a modem (DCE) for synchronous BISYNC or user link operation. To use this model, associate the correct pin numbers of the computer or peripheral port with the DTE circuits. The pin numbers for this computer are described in a later section.

DTE Circuit	Direction	Modem (DCE) Circuit	Pin
BA	------>	BA	2
BB	<------	BB	3
CA	------>	CA	4
CB	<------	CB	5
CC	<------	CC	6
AB	------	AB	7
CF	<------	CF	8
DB	<------	DB	15
DD	<------	DD	17
CD	------>	CD	20

AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CA	Request to Send
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CF	Data Carrier Detect
DB	Transmit Data Clock
DD	Receive Data Clock

DTE to DTE Connection

The following model cable connects a DTE port with a DTE peripheral by emulating a connection through a full-duplex modem with the CB-CF Separate option, or through a half-duplex modem with zero Clear to Send delay. This cable can be used to connect a terminal or printer to a computer port, or to connect the ports of two computers for BISYNC communication. To use this model, associate the correct pin numbers of the computer or peripheral port with the DTE circuits. The pin numbers for this computer are described in a later section.

DTE Circuit	Direction	DTE Circuit
BA	----->	BB
BB	<-----	BA
CA	--+-->	CF
CB	<-+	
CF	<--+--	CA
	+->	CB
CC	<-----	CD
AB	------	AB
CD	----->	CC

AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CA	Request to Send
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CF	Data Carrier Detect

DTE to DTE Connection (CB-CF Common)

The following model cable connects a DTE port with a DTE peripheral by emulating a connection through a full-duplex modem with the CB-CF Common option. This cable can be used to connect a terminal to a computer port. This cable must NOT be used for half-duplex communication such as a BISYNC link or a printer using DTR flow control. To use this model, associate the correct pin numbers of the computer or peripheral port with the DTE circuits. The pin numbers for this computer are described in a later section.

DTE Circuit	Direction	DTE Circuit
BA	------>	BB
BB	<------	BA
CA	---+->	CF
	+->	CB
CF	<-+---	CA
CB	<-+	
CC	<------	CD
AB	-------	AB
CD	------>	CC

AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CA	Request to Send
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CF	Data Carrier Detect

DTE to Printer Connection (CTS Flow Control)

The following model cable connects a DTE port with a printer whose printer ready signal is to be connected to the Clear to Send input (circuit CB) on the DTE port to provide for flow control. This is called CTS flow control. The printer ready signal may be any of those listed below. For additional information, see the flow-control-list parameter in the section on Serial Line Printer Device Parameters in Chapter 2 of this manual. To use this model, associate the correct pin numbers of the computer or peripheral port with the DTE circuits. The pin numbers for this computer are described in a later section.

DTE Circuit	Direction	Printer (DTE) Circuit	Pin
BA	----->	BB	3
CA	----->	CF	8
CB	<-----	Printer Ready	
CC	<-----	CD	20
AB	------	AB	7
CD	----->	CC	6

AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CA	Request to Send
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CF	Data Carrier Detect

The printer ready signal may be any of the following:

Circuit	DTE Pin	Name
CA	4	Request to Send
CB	5	Clear to Send
CD	20	Data Terminal Ready
SCA	11 or 19	Secondary Request to Send

DTE to Printer Connection (DSR Flow Control)

The following model cable connects a DTE port with a printer whose printer ready signal is to be connected to the Data Set Ready input (circuit CC) on the DTE port to provide for flow control. This is called DSR flow control. The printer ready signal may be any of those listed below. For additional information, see the flow-control-list parameter in the section on Serial Line Printer Device Parameters in Chapter 2 of this manual. To use this model, associate the correct pin numbers of the computer or peripheral port with the DTE circuits. The pin numbers for this computer are described in a later section.

DTE Circuit	Direction	Printer (DTE) Circuit	Pin
BA	------>	BB	3
CA	--+-->	CF	8
CB	<-+		
CC	<------	Printer Ready	
AB	------	AB	7
CD	------>	CC	6

AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CA	Request to Send
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CF	Data Carrier Detect

The printer ready signal may be any of the following:

Circuit	DTE Pin	Name
CA	4	Request to Send
CB	5	Clear to Send
CD	20	Data Terminal Ready
SCA	11 or 19	Secondary Request to Send

DTE to Printer Connection (XON/XOFF Flow Control)

The following model cable connects a DTE port with a printer using XON/XOFF flow control or a printer using DSR flow control provided the printer ready signal is Data Terminal Ready (circuit CD). For additional information, see the flow-control-list parameter in the section on Serial Line Printer Device Parameters in Chapter 2 of this manual. To use this model, associate the correct pin numbers of the computer or peripheral port with the DTE circuits. The pin numbers for this computer are described in a later section.

DTE Circuit	Direction	Printer (DTE) Circuit	Pin
BA	----->	BB	3
BB	<-----	BA	2
CA	--+-->	CF	8
CB	<-+		
CF	<--+--	CA	4
	+->	CB	5
CC	<-----	CD	20
AB	------	AB	7
CD	----->	CC	6

AB	Signal Ground
BA	Transmitted Data
BB	Received Data
CA	Request to Send
CB	Clear to Send
CC	Data Set Ready
CD	Data Terminal Ready
CF	Data Carrier Detect

TANDY MODEL 16 PORT PIN CONFIGURATION

Serial devices may be connected to the serial ports on the back of the Tandy Model 16. The two serial ports A (SERIAL/1/0) and B (SERIAL/2/0) use DTE pin assignments. Three additional serial ports may also be present if the computer has the Multiterminal interface (Tandy part number 26-6013). These serial ports (SERIAL/3/0, SERIAL/4/0, and SERIAL/5/0) use DCE pin assignments.

The following table documents the pins used for each DTE signal on the A and B serial ports. No other pins should be connected, since many EIA terminals and peripherals have current loop signals on other pins which can damage the integrated circuits in the computer.

DTE Signal Name	Circuit	Tandy Pin	Direction
Protective Ground	AA	1	
Transmitted Data	BA	2	Output
Received Data	BB	3	Input
Request to Send	CA	4	Output
Clear to Send	CB	5	Input
Data Set Ready	CC	6	Input
Signal Ground	AB	7	
Data Carrier Detect	CF	8	Input
Data Terminal Ready	CD	20	Output

By changing jumpers, port A (SERIAL/1/0) may be configured for synchronous operation. Contact Tandy if these jumpers need to be changed. The following table documents the pins used for each DTE signal on the synchronous A port:

DTE Signal Name	Circuit	Tandy Pin	Direction
Protective Ground	AA	1	
Transmitted Data	BA	2	Output
Received Data	BB	3	Input
Request to Send	CA	4	Output
Clear to Send	CB	5	Input
Data Set Ready	CC	6	Input
Signal Ground	AB	7	
Data Carrier Detect	CF	8	Input
Transmit Clock	DB	15	Input
Receive Clock	DD	17	Input
Data Terminal Ready	CD	20	Output

The following table documents the pins used for each DTE signal on the three expansion ports:

DTE Signal Name	Circuit	Tandy Pin	Direction
Protective Ground	AA	1	
Received Data	BB	2	Input
Transmitted Data	BA	3	Output
Clear to Send	CB	4	Input
Request to Send	CA	5	Output
Data Terminal Ready	CD	6	Output
Signal Ground	AB	7	
+12 volts		8	Output
Data Set Ready	CC	20	Input

TANDY MODEL 16 SERIAL INTERFACE CABLING

The following cables have been derived from the model cables by associating the appropriate Tandy pins with the DTE signal names. Refer to the specific serial device Operators Manual for additional cabling information.

Terminal Cable (A or B Port)

The following 7-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect either the A or B serial port to a terminal, to an XON-XOFF flow control printer, to a DSR flow control printer (whose printer ready signal is Data Terminal Ready, circuit CD), or to another computer for BISYNC communications, provided the device or computer uses standard DTE pin assignments. This cable is derived from the model DTE to DTE Connection. You may purchase an RS-232 cable (Tandy part number 26-4403) and a null modem adapter (Tandy part number 26-1496) to serve the same functions as the cable below.

Tandy A or B Port Pin	Tandy A or B Port Circuit	Direction	DTE Circuit	DTE Pin
2	BA	------>	BB	3
3	BB	<------	BA	2
4	CA	--+-->	CF	8
5	CB	<-+		
8	CF	<--+--	CA	4
		+->	CB	5
6	CC	<------	CD	20
7	AB	------	AB	7
20	CD	------>	CC	6

Terminal Cable (Expansion Port)

The following 6-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect an expansion port on the Multiterminal interface to a terminal, to an XON-XOFF flow control printer, to a DSR flow control printer (whose printer ready signal is Data Terminal Ready, circuit CD), or to another computer for BISYNC communications, provided the device or computer uses standard DTE pin assignments. This cable is derived from the model DTE to DTE Connection.

Tandy Expansion Port Pin	Tandy Expansion Port Circuit	Direction	DTE Circuit	DTE Pin
3	BA	----->	BB	3
2	BB	<-----	BA	2
5	CA	--+-->	CF	8
4	CB	<-+		
		+--	CA	4
		+->	CB	5
20	CC	<-----	CD	20
7	AB	------	AB	7
6	CD	----->	CC	6

In order to ease connection of terminals, the following 8-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect an expansion port on the Multiterminal interface to a terminal or to an XON-XOFF flow control printer, provided the device uses standard DTE pin assignments. This cable must NOT be used for half-duplex communication such as a BISYNC link. You may purchase an RS-232 cable (Tandy part number 26-4403) to serve the same functions as the cable below.

Tandy Expansion Port Pin	Circuit	Direction	DTE Circuit	Pin
2	BB	<-----	BA	2
3	BA	----->	BB	3
4	CB	<-----	CA	4
5	CA	----->	CB	5
6	CD	----->	CC	6
7	AB	------	AB	7
8	+12	----->	CF	8
20	CC	<-----	CD	20

Serial Printer Cable (A or B Port)

Printers which use XON-XOFF flow control or DSR flow control (provided the printer ready signal is Data Terminal Ready, circuit CD) may use the appropriate cable from the previous section on Terminal Cables.

The following 6-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect either the A or B serial port to a CTS flow control printer whose printer ready signal is Request to Send (circuit CA), provided the printer uses standard DTE pin assignments. This cable is derived from the model DTE to Printer Connection (CTS Flow Control).

Tandy A or B Port Pin	Tandy A or B Port Circuit	Direction	Printer (DTE) Circuit	Printer (DTE) Pin
2	BA	----->	BB	3
4	CA	----->	CF	8
5	CB	<-----	CA	4
6	CC	<-----	CD	20
7	AB	------	AB	7
20	CD	----->	CC	6

Serial Printer Cable (Expansion Port)

The following 6-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect an expansion port on the Multiterminal interface to a CTS flow control printer whose printer ready signal is Request to Send (circuit CA), provided the printer uses standard DTE pin assignments. This cable is derived from the model DTE to Printer Connection (CTS Flow Control).

Tandy Expansion Port Pin	Tandy Expansion Port Circuit	Direction	Printer (DTE) Circuit	Printer (DTE) Pin
3	BA	----->	BB	3
5	CA	----->	CF	8
4	CB	<-----	CA	4
20	CC	<-----	CD	20
7	AB	------	AB	7
6	CD	----->	CC	6

Asynchronous Modem Cable (A or B Port)

The following 8-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect either the A or B serial port to an asynchronous modem. This cable is derived from the model Asynchronous DTE to Modem Connection.

Tandy A or B Port Pin	Tandy A or B Port Circuit	Direction	Modem (DCE) Circuit	Modem (DCE) Pin
2	BA	----->	BA	2
3	BB	<-----	BB	3
4	CA	----->	CA	4
5	CB	<-----	CB	5
6	CC	<-----	CC	6
7	AB	------	AB	7
8	CF	<-----	CF	8
20	CD	----->	CD	20

Asynchronous Modem Cable (Expansion Port)

The following 7-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect an expansion port on the Multiterminal interface to an asynchronous modem. This cable is derived from the model Asynchronous DTE to Modem Connection. Because the expansion port does not have a Data Carrier Detect (circuit CF) input, the modem option, sometimes called Received Data Clamp, to hold the Received Data line in a marking state in the absence of carrier should be enabled.

Tandy Expansion Port Pin	Circuit	Direction	Modem (DCE) Circuit	Pin
3	BA	----->	BA	2
2	BB	<-----	BB	3
5	CA	----->	CA	4
4	CB	<-----	CB	5
20	CC	<-----	CC	6
7	AB	------	AB	7
6	CD	----->	CD	20

Synchronous Modem Cable

The following 10-wire cable with 25-pin EIA (DB25) connectors on both ends may be used to connect a synchronous modem to port A (SERIAL/1/O). This cable is derived from the model Synchronous DTE to Modem Connection. Note that the jumpers must be changed to provide the synchronous clock signals.

Tandy A Port			Modem (DCE)	
Pin	Circuit	Direction	Circuit	Pin
2	BA	----->	BA	2
3	BB	<-----	BB	3
4	CA	----->	CA	4
5	CB	<-----	CB	5
6	CC	<-----	CC	6
7	AB	------	AB	7
8	CF	<-----	CF	8
15	DB	<-----	DB	15
17	DD	<-----	DD	17
20	CD	----->	CD	20

TANDY MODEL 16 PARALLEL PRINTER CABLING

A parallel printer may be attached to the printer connector on the back of the Tandy Model 16. The cable may be a 34-wire flat (ribbon) cable with a female dual 17-pin connector on the Tandy end and a male Centronics printer connector (Amphenol type 57-30360) on the printer end. This cable is available from Tandy as cable number 26-4401.

Printer Pin	Tandy Pin	Printer Pin	Tandy Pin
1	1	19	2
2	3	20	4
3	5	21	6
4	7	22	8
5	9	23	10
6	11	24	12
7	13	25	14
8	15	26	16
9	17	27	18
10	19	28	20
11	21	29	22
12	23	30	24
13	25	31	26
14	27	32	28
15	29	33	30
16	31	34	32
17	33	35	34

CHAPTER 5

TRSDOS RM/COS CONVERSION UTILITY

INTRODUCTION

The TRSDOS to RM/COS conversion utility is a COBOL program used to convert TRSDOS 4.x formatted diskettes to RM/COS compatible files. The program allows the user to select the files to be copied from TRSDOS to RM/COS.

A batch stream with the name .TRS2COS is provided. This batch stream prompts for the name of the RM/COS directory to which the files are to be copied, assigns the required files, initiates the utility, allows the user to select the TRSDOS files to be copied, creates and copies the RM/COS files, and releases the files upon completion of the program. The utility also uses COBOL switches for control and user selectable options.

TRS2COS PROMPTING

The TRSDOS to RM/COS conversion utility will prompt under three circumstances: command prompting, file name prompting, and interactive response prompting.

Command prompts appear on the left side of the screen next to the file that is currently selected. Invalid responses are ignored. See the following section on TRS2COS Commands for additional information about commands.

RM/COS file name prompts appear on line 3 of the screen. This type of prompting is used to obtain the destination file names when switch 4 is ON. These file names are NOT checked for validity. It is the user's responsibility to check for typographical errors and proper RM/COS file name structure.

Interactive response prompts appear on the bottom of the screen. Invalid responses are ignored.

TRS2COS COMMANDS

The TRSDOS to RM/COS conversion utility accepts four single character commands. These single character commands are used to display files on the TRSDOS disk, to select a file to be copied, to display a menu of commands and functions keys, and to terminate the session and continue.

Command	Action
C	COPY - Selects file to be copied from TRSDOS to RM/COS, generates RM/COS path name.
H	HELP _ Displays a brief explanation of the command and function keys.
S	SHOW - Display the contents of the currently selected file. For variable record length files, the display will stop on the first line which contains more than 80 characters.
Q	QUIT - Terminate session and continue.

TRS2COS FUNCTION KEYS

The TRSDOS to RM/COS conversion utility makes use of several function keys for display and control entry purposes. See the Terminal Guide for your terminal to determine the keycap which corresponds to the RM/COS functions.

The following function keys may be used to position the cursor to the desired TRSDOS file so the operator can select or display the file.

RM/COS Function	Action
Function 1	Scroll window up (i.e., move toward end-of-file).
Function 2	Scroll window down (i.e., move toward beginning-of-file).
Function 3	Positions the window to the beginning of the file list.
Function 4	Positions the window to the end of the file list.
Function 5	Prints the directory list on the listing file.
Function 6	Selects all files to be copied.
Up Arrow	Move cursor up one line. If on top line of window, scroll screen down one line. If on first line of directory, no action.
Down Arrow	Move cursor down one line. If on bottom line of window, scroll screen up one line. If on last line of directory, no action.
Return	Move cursor to next line, moving window up one line if necessary.

TRS2COS SWITCHES

The TRSDOS to RM/COS conversion utility uses four switches (see the SWITCH JDL command in the RM/COS User Guide). Of these, three are user selectable. Any combination of switches 2, 3, and 4 can be set via the SWITCH JDL command prior to the execution of the TRSDOS to RM/COS utility. The default mode for all three user selectable switches is OFF.

Switch Number	Function
1	Used for program control. Set ON and OFF by the utility program.
2	Used to select the Primary or Alternate Sector Description Pointer on the TRSDOS disk. OFF selects Primary. ON selects Alternate.
3	Used to control the logical record length of the RM/COS files corresponding to variable record length TRSDOS files. OFF forces the utility to inspect each such file for record lengths and create the RM/COS file with the appropriate record length. ON selects a record length of 256.
4	Used to select utility generated RM/COS file names or user generated RM/COS file names. OFF causes the utility to generate the file names for the files to be copied. ON requires the user to enter the file name for each selected file. When the Select All key (F6) is used and switch 4 is ON the user will be prompted for each file.

TRS2COS ERROR MESSAGES

Error messages are displayed on the bottom line of the screen. The user may acknowledge error messages by entering the response and pressing the Return Key.

TRS2COS EXAMPLE

Insert the diskette into the desired floppy drive.

Enter the BATCH JDL command with the name .TRS2COS. The following prompt will appear:

```
Destination Directory Name? WIN
```

to which the user responds with a valid directory name to which all files are to be copied. This directory must exist or the utility will terminate abnormally.

After the directory name has been entered the batch stream will assign the required files. Then the following prompt will appear:

```
Listing file: LP01
```

to which the user responds with a valid device or file name. The utility will prompt for the disk drive name:

```
Enter Disk---------> DS00
```

to which the operator responds with a valid disk drive (e.g. DS00, DS01, DS02, DS03). If the drive does not exist, an error message is displayed on the bottom line of the screen and the following prompt will appear:

```
Disk Error 51 Disk Not Present! Retry? (Y/N)
```

A response of "Y" will cause the previously described prompt to be displayed again. A response of "N" will cause the program to terminate.

After a valid disk is entered, the utility will begin to read the TRSDOS disk. The actual disk name will be displayed in the top left hand corner of the screen followed by the directory name. The number at the left on line 5 is the number of the file on which the cursor is positioned. On the top right side of the screen is the number of files in the directory and the maximum number of files allowed in the directory. The number of files is usually less than the actual number of files in the directory because Program files can not be copied, and so are not included in the count. The following is a typical screen:

```
Disk Name:CTESTBED USER001/DIR                    Files=  28 Max= 180
Single File Commands: Show, Copy, Help, Quit.

 Copy       File Name      SD        File    Record    Record   File-Size
 Flag  0001                Pointer   Type    Type      Length   (Bytes)
       CONFIG16/SYS         780       V       D           4         43
       CALCXMPL/CBL        1916       V       D          20       6912
       COPYIN1/CBL         1790       V       D           2      24320
       COPYIN2/CBL         1337       V       D          21      17152
       TESTALL/CBL         1985       V       D          20      53226
       TABTEST/CBL         2010       V       D          20        908
       ISMTST/CBL          2037       V       D          30      17226
       COBOL20             2060       F       D         256       6400
       RUNCBL20/68K        2100       F       D         256      25088
       RMCBL120/68K        2200       F       D         256      18176
       RMCBL220/68K        2273       F       D         256       5022
       RMCBL320/68K        2294       F       D         256       5376
       RMCBL420/68K        2305       F       D         256       4864
       RMCBL520/68K        2329       F       D         256       2102
       RMCBLM20/68K        2443       F       D         256      45982
       FORLIB/REL          3051       F       D           1      25983
       EXAMPL/OBJ          3332       V       D          12         38
F1=Up, F2=Down, F3=Top, F4=Bottom, F5=Print Directory, F6=Include Al
```

At this point, the utility is ready to accept commands. Commands are entered as one-character abbreviations as explained in the section on TRS2COS Commands (e.g., S displays the file selected).

A valid command will result in immediate action or further prompting, depending on the command. Invalid commands are ignored.

If the user wishes to review the contents of a particular file he positions the cursor to the desired file and enters an "S". This causes the file to be displayed on the screen. Fixed data files with record lengths of 256 will not be displayed. When the screen has filled the following prompt will appear on the bottom line:

```
Continue (Y/N)?
```

If a "Y" is entered the file will continue to be displayed. If an "N" is entered the screen will be erased and the directory display will return.

When the user decides that a particular file is to be copied, a "C" is entered. This causes the utility to generate an RM/COS file name that is similar to the TRSDOS file name. If SWITCH 4 is ON the user is prompted for the RM/COS file name. When all the functions related to this operation have completed, a "C" will appear on the left side of the screen. This is to show the user that this file has

been selected to be copied. If the user enters another "C" where a "C" currently exists, no action is taken.

Once the user has selected all the files he wishes to copy to RM/COS, a "Q" is entered. This command will exit the utility and create files for all the files that the user selected. A message will appear on the bottom of the screen:

Creating Directory CTESTBED Files.

When all the files have been created, the utility is re-entered. The utility displays all the file names the user selected previously and displays the current file being copied. A typical screen follows.

T R S D O S T O R M / C O S

CALCXMPL/CBL
COPYIN1/CBL
COPYIN2/CBL
TESTALL/CBL
COBOL20
RUNCBL20/SYS
RMCBL120/68K
RMCBL220/68K
RMCBL320/68K
RMCBL420/68K
RMCBL520/68K
RMCBLM20/68K
FORLIB/REL
EXAMPL/OBJ

Copying CALCXMPL/CBL

As each file is being copied, the TRSDOS file name will appear at the bottom of the screen. When all the files have been copied to the RM/COS disk, the following message will appear at the bottom of the screen:

Run Complete.

Now the files are on the RM/COS disk in RM/COS format.

The pathnames that the program would generate for the example shown above if all defaults were taken are as follows:

```
WIN.CTESTBED.CALCXMPL
WIN.CTESTBED.COPYIN1$
WIN.CTESTBED.COPYIN2$
WIN.CTESTBED.TESTALL$
WIN.CTESTBED.COBOL20
WIN.CTESTBED.RUNCBL20
WIN.CTESTBED.RMCBL120
WIN.CTESTBED.RMCBL220
WIN.CTESTBED.RMCBL320
WIN.CTESTBED.RMCBL420
WIN.CTESTBED.RMCBL520
WIN.CTESTBED.RMCBLM20
WIN.CTESTBED.FORLIB$R
WIN.CTESTBED.EXAMPL$0
```

The file structures for the first four files and the last file are 80 character sequential source files, FORLIB$R is an 80 character sequential data file, and the remaining files are 256 byte sequential data files.