X-TEL™

Telecommunications Software for Use with the Traveling Software BOOSTER PAK

TRAVELING SOFTWARE®

Telecommunications Software for Use with the Traveling Software BOOSTER PAK

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XTEL-H87

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TRADEMARKS

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Introduction to X-TEL

Welcome to X-TEL, the program that can add an exciting new dimension to telecommunications with your Tandy 100 or 102 computer.

Instead of replacing the TELCOM telecommunications software built into your computer's ROM, X-TEL augments it. By taking advantage of what already is available to you, we have been able to hold X-TEL's memory requirements to less than 3300 bytes.

Here's what X-TEL offers you:

- Real XMODEM protocol file transfer, with the ability to handle machine-language (CO), BASIC (BA), and data (DO) files: both Checksum and CRC versions of XMODEM are supported, for improved error checking and compatibility with other programs.
- The ability to directly upload or download data (text) files in the BOOSTER PAK RAM disk or on cassette, without copying to or from RAM (workspace).
- On-line access to the TEXT editor: how many times have you wanted to answer your mail without having to disconnect?
- On-line file management: examine your directory of files in Terminal Mode; delete old files to make room for new ones.
- The ability to add a line feed after each carriage return when uploading files: mainframe computers often require a line feed (ASCII 10) after a carriage return (ASCII 13).
- Compatibility with other machine-language programs: you can relocate X-TEL to any address in RAM to make room for other programs.

About This Manual

Next in this manual you will find a description of the 3 X-TEL files and their functions.

Then, on page 4, you will learn how to relocate the X-TEL program, if necessary.

Beginning on page 6 you will find a discussion of file transfer; if you are not conversant with file transfer, please refer to the appendix (page 18) for a general overview.

On-Line Features (page 14) describes the various keys available while you are telecommunicating. Finally, on page 17 you will find a summary of product specifications.

Good luck with X-TEL! If you need help, or if you have a difficult application, feel free to call Traveling Software at (206) 483-8088.

The X-TEL Files

Three X-TEL files are created automatically in the ROOT directory of the RAM disk when you initialize the BOOSTER PAK. These are the files and their functions:

X-TEL.CO	operates X-TEL
X-TEL.BA	starts X-TEL after performing a CLEAR statement to reserve space in high memory in which to run the X-TEL program; unless altered, this file will place X-TEL immediately below MAXRAM
X-TEL.DO	runs a program that allows you to alter the CLEAR statement performed by X-TEL.BA and place X-TEL somewhere in high memory that does not conflict with other programs you may be using

If you have no BASIC (BA) or machine-language (CO) programs or any ROM-based programs that would conflict with X-TEL while it is operating directly below MAXRAM, you need only the X-TEL.CO and X-TEL.BA files; you are free to delete X-TEL.DO. You now are ready to start X-TEL. Turn to page 6.

If, however, you want X-TEL to operate at some other address in high memory, you must relocate the X-TEL program. Turn to the next page.

Restoring the X-TEL Files

If you ever delete any of the 3 X-TEL files and then want to load them back into the RAM disk, follow this procedure: move to the directory of the RAM disk in which you want to store the files; then hold down SHIFT-GRPH and press L.

Relocating X-TEL

Relocating X-TEL to accord with other programs that also use the high memory of your Tandy computer means specifying an address for X-TEL which does not conflict with those programs.

If you are unsure about the right address for X-TEL, load and install in high memory the BASIC, machine-language, or ROM-based program or programs you intend to have in the workspace of your computer with X-TEL. You can then direct that X-TEL be installed appropriately—that is, just below those other programs.

To relocate X-TEL follow these steps:

1. Unless you know exactly the address you want to specify for X-TEL be sure that whatever BASIC, machine-language, or ROM-based program or programs you intend to use with X-TEL are loaded into the workspace and installed in high memory.

2. Log onto the directory of the BOOSTER PAK RAM Disk Menu in which the 3 X-TEL files are stored. (Unless you have moved them, they are stored in the ROOT directory.)

3. With the bar cursor over BASIC, press [ENTER]. When the Ok prompt appears, type—

   RUN "R:X-TEL.DO" [ENTER]

   You'll have to wait several seconds while the data file is converted to a BASIC program.

4. Then you will see this question:

   Specify X-TEL load address (Y/N)?

   Press [N] [ENTER] if you want the address to be specified for you, according to whatever else is currently loaded into high memory; then move to the next step.

Press [Y] [ENTER] if you want to specify an address yourself. You will then see this message:

```
Load X-TEL below address?
```

Enter a decimal number which gives the address in RAM below which X-TEL is to be loaded. This address must be less than or equal to the value of the BASIC constant MAXRAM.

5. The BASIC program will now load and verify X-TEL.CO. This will normally take one or two minutes, during which you will see a Loading... message.

   If verification or relocation fails, repeat the steps outlined above.

   If loading is successful, X-TEL will run and you will see a screen like this:

```
X-TEL/100RP    v(ersion)...
(C) Copyright 1986 Sigea Systems Inc.
All Rights Reserved.

M7I1E, 10 pps
Telcom:
```

   If you see this message—

```
Not enough memory to run X-TEL!
```

   there is not enough free memory available to perform the conversion. Remove some files from your workspace and start over.

Once you exit X-TEL and return to the RAM disk, you will notice that the X-TEL.DO file has been deleted. If you ever want to change the location of X-TEL, you will have to restore this file: move to the directory of the RAM disk where you want the file; then hold down [SHIFT]-[GRPH] and press [L]. Repeat the procedures explained above.

XMODEM File Transfer

This section assumes a general understanding of the XMODEM file transfer protocol. If you lack that understanding, please refer to the appendix to find a short description of protocol file transfer.

Starting the X-TEL Program

To start X-TEL you must be at the RAM Disk Menu of the BOOSTER PAK. Log onto the ROOT directory if the X-TEL files are still where they were when you initialized the BOOSTER PAK or log onto whichever directory you may have moved the files to.

Place the bar cursor over X-TEL.BA and press [ENTER].

Note: Instead of X-TEL.BA you could select X-TEL.CO; before doing so, however, you must go into BASIC and enter an appropriate CLEAR statement. You will not have to repeat the CLEAR statement in the future unless you have used another program in the meantime which issues its own CLEAR statement.

When you start X-TEL, the screen will clear, and you'll see a display like this:

```
X-TEL/100BP    v(ersion)...
(C) Copyright 1986 Sigea Systems Inc.
All Rights Reserved.

M7I1E, 10 pps
Telcom:
```

Using X-TEL for Ordinary Communications

X-TEL is a program that works in addition to TELCOM. Normal TELCOM functions are unchanged from what you

are used to. But when you move to X-TEL Terminal Mode, you'll see new prompts for [F6] and [F7].

Once connected, the Terminal Mode on-line functions—Prev, Down, Up, Full/Half, Echo, and Bye—work normally.

Dialing through the Built-in Modem. When you use the modem built into your Tandy computer, you can place a call just as you normally would. X-TEL does not change the TELCOM Entry Mode. There is no difference in the treatment of the ADRS.DO file or autologon sequences.

Dialing through the BOOSTER PAK Modem. If you have purchased the optional 1200-baud modem for your BOOSTER PAK, follow these steps to dial a number:

1. Press [F3]. Then set the baud rate by entering the appropriate communication parameters:

   5$$$$ [ENTER] *[for 1200 baud]*
   3$$$$ [ENTER] *[for 300 baud]*

   For $$$$ substitute the parameters that match those of the other computer. Very often these will be 57I1E for 1200 baud or 37I1E for 300 baud. In any case begin the parameters with 5 for 1200 baud or 3 for 300 baud.

2. Press [F4] to enter Terminal Mode.

3. Now type the telephone number *prefaced by the command appropriate for your telephone:*

   ATDTnumber [ENTER] *[for tone dialing]*
   ATDPnumber [ENTER] *[for pulse dialing]*

   where number is the telephone number you are dialing. Do not include any spaces between the characters.

4. You will now hear the modem dial the number and then the sound of the number ringing. When a Connect message appears, press [ENTER].

XMODEM Protocol File Transfers

In X-TEL the function key [F6] is assigned to XMODEM Download, while [F7] is assigned to XMODEM Upload. The new Terminal Mode prompts are—

X-Dn for [F6]
X-Up for [F7]

These key assignments are analogous to TELCOM Terminal Mode Down and Up, respectively.

X-Dn is an abbreviation for XMODEM-Download. It is used to transfer files from a remote computer to the Tandy 100 or 102 with one of two XMODEM error-checking methods: Checksum or CRC (see the appendix for an explanation of these terms).

Press [SHIFT]-[F6] to select which error-checking method will be used when downloading files with XMODEM. You will see the prompt change between Cks and CRC as you press this key combination.

X-Up is an abbreviation for XMODEM-Upload. It is used to transfer files from the Tandy 100 or 102 to a remote computer with XMODEM error checking. (When uploading, X-TEL will automatically use the method of error checking requested by the host computer.)

How to Perform an XMODEM Download

Here is the step-by-step procedure for downloading a file.

You must first issue whatever commands are necessary to tell the remote computer to download a file to you using XMODEM protocol. These instructions will vary from one system to another; so be careful to find out what the remote system expects from you.

After you have issued the appropriate command, the

remote computer will display a message indicating that it's ready to send the file you asked for.

When you see the message from the remote computer, press [F6] (X-Dn). You will see this prompt:

```
File to Download?
```

You may type any legal Tandy 100 or 102 file name with a two letter extension to indicate the type of file to be downloaded. The usual extensions are DO for data (text) files, BA for BASIC programs, or CO for machine-language programs. X-TEL will assign DO as the default if you do not supply an extension.

When designating the file name, you also designate its destination. You can download directly to any of these destinations: RAM (workspace), RAM disk, cassette, or the printer of your portable computer. To download to—

RAM (workspace)	type only the file name
RAM disk	type R:filename
cassette	type CAS:filename
printer	type LPT: (without a file name)

Note: When downloading directly to RAM disk or cassette, you can transfer only DO files.

For RAM (workspace) and RAM disk files, X-TEL will check to see if the file you named already exists. If it does, the program will ask—

```
Replace existing file?
```

If you wish to replace the contents of this file with the downloaded file, press [Y] [ENTER].

Otherwise, press [CTRL]-[C] to abort the transfer at the Tandy 100 or 102. You can then press [F6] (X-Dn) and specify a different file name. Or press [CTRL]-[X] to tell the remote computer to abort the transfer.

When the transfer begins, you will see the X-Dn prompt change to white on black. You will also see the message Waiting for start..., which indicates that you are waiting for the other computer to begin sending the file. This message will appear every 10 seconds until the remote computer begins to send information.

Once the file transfer begins, the message Blocks received: N will be displayed. The number N counts the 128-character blocks that have been received without error.

The transfer may be aborted at any time by pressing [CTRL]-[C] or [SHIFT]-[BREAK] on your computer. If a DO file was being transferred, the portion transferred prior to the abort will be saved. X-TEL always deletes partial BA or CO files after an aborted transfer, because you'd probably crash your computer if you tried to run an incomplete program file.

When the transfer is complete, you will see the message Done, the X-Dn prompt will return to its usual appearance, and you'll hear a beep to indicate that the transfer is over.

Make sure the file name extension used on your portable computer always corresponds to the type of file being downloaded from the remote computer. For example, if you save a BASIC program as a CO file, the results could cause your computer to do unpredictable things. Be very careful with file names.

The Invalid file format message indicates that the contents of the received file did not correspond to the Tandy 100 or 102 requirements for the particular file type (DO, BA, or CO). X-TEL checks for this correspondence because a file with the incorrect format can easily crash your computer.

How to Perform an XMODEM Upload

You must first issue whatever commands are necessary to

tell the remote computer to receive a file using XMODEM protocol. These instructions will vary from one system to another; so be careful to find out what the remote system expects from you.

In addition to starting the transfer on the remote computer, you may have a choice between Checksum and CRC error checking. If a choice is available, CRC is the more reliable method although it is slightly slower. (X-TEL will automatically upload using the method you choose on the remote computer.)

When the remote computer indicates that it is ready to receive your file, press F7 (X-Up). You will then see the prompt File to Upload? on the screen.

You may type any legal Tandy 100 or 102 file name with a two-letter extension to indicate the type of the file to be uploaded. The usual extensions are DO for data (text) files, BA for BASIC programs, or CO for machine-language programs. X-TEL will assign DO as the default if you do not supply an extension.

When designating the file name, you also designate its source. You can upload directly from any of these sources: from RAM (workspace), from RAM disk, or from cassette. To upload from—

RAM (workspace)	type only the file name
RAM disk	type R:filename
cassette	type CAS:filename

Note: When uploading directly from RAM disk or cassette, you can transfer only DO files.

X-TEL will check to see if the file you named exists. If it does not, the transfer will be aborted.

When the transfer has begun, the X-Up prompt will be highlighted and you will see the message Waiting for start.... This message indicates that X-TEL is waiting for the receiving computer to begin the file transfer.

Up to one minute may elapse, during which the remote computer will send repeated requests to your portable computer to start the transfer. Once the transfer begins, a message will be displayed for each block sent to the remote computer. For RAM (workspace) files, the message reads Blocks left to send: N, where N indicates the number of blocks remaining to be sent. For RAM disk and cassette files, the message reads Blocks sent: N, where N is the number of blocks sent so far.

You can abort the transfer at any time by pressing CTRL-C or SHIFT-BREAK. When the transfer is complete, you'll see the Done message, the X-Up prompt will return to its usual appearance, and you'll hear a beep.

Note: Before starting an XMODEM file transfer at the Tandy 100 or 102, be sure you have first initiated the transfer at the remote computer. Once you have instructed the Tandy 100 or 102 to begin an XMODEM file transfer, your computer will no longer send what you type to the remote system. You must, therefore, inform the remote system of the transfer before enabling an XMODEM transfer at the Tandy 100 or 102.

What Kinds of Files Can Be Transferred?

X-TEL allows you to transfer DO (data), BA (BASIC) and CO (command or machine-language) files to and from the Tandy 100 or 102. You may also transfer spreadsheet files and other special data files. In general, these data files are equivalent to CO files, although the two-letter extension may be different.

File names for X-TEL transfer can be different from those used with regular TELCOM. You can transfer DO (data) files that reside on cassette or in the RAM disk, as well as those in RAM (workspace). To reference a file on a cassette or in the RAM disk, use the device names CAS: or R: in front of the file name. (Consult the user manual for your portable computer or the BOOSTER PAK for more information.)

To transfer BA (BASIC) files, CO (command or machine-language) files, or special data files (CA for example) you must specify the correct extension. If you don't provide a two letter extension, X-TEL will assume that you are transferring a DO file.

If you use the file name DONKEY, without an extension, for example, X-TEL will assume you have a *data* (text) file named DONKEY.DO. To transfer a *BASIC* program called DONKEY, use the file name DONKEY.BA. The file name DONKEY.CO tells X-TEL that you wish to transfer a machine-language program named DONKEY.

It's very important to use the file name that corresponds to the type of information being received from the other computer. The Tandy 100 or 102 operating system makes certain assumptions about the contents of a file based on the file name extension.

For example, the computer uses the extension to determine the size of a file. The computer has one method to determine how long a data (text) file is and another to determine the length of a BASIC program. If the computer uses the wrong method to determine the size of a file, it will create a serious error.

The usual result of this error is the erasure of all files in your workspace—a cold start. X-TEL does as much checking as possible to avoid such a disaster, but you have to do your part, too. It's vital that you assign the correct file name extension to a downloaded file.

Recovering Memory

X-TEL reserves 3300 bytes of RAM in addition to the space occupied by the two program files. This memory is needed only during program execution. If you wish to recover this space in memory after running X-TEL, go to BASIC and type—

```
CLEAR 256,MAXRAM [ENTER]
```

On-Line Features

Pressing the [CODE] key while in X-TEL Terminal Mode gives you two useful commands. The key prompts used by X-TEL will change to File for [F6] and Kill for [F7].

Pressing the [CODE]-[SHIFT] keys while in X-TEL Terminal Mode gives you two more commands. The X-TEL key prompts will change to TEXT for [F6] and BASI for [F7].

Viewing the Directory While on Line

X-TEL allows you to view the names and sizes of files in RAM (workspace) while you are in Terminal Mode. Simply hold down [CODE] and press [F6] (File). This command will also show you the amount of free space in RAM (workspace). Note that invisible files will not be shown.

Deleting a File While on Line

X-TEL allows you to delete files while in Terminal Mode. Hold down [CODE] and press [F7] (Kill). You'll see the Delete file? prompt on the screen. Type the name of the file you wish to delete and press [ENTER].

If the named file exists, it will be deleted and its memory made available for use by other files.

Editing a File While on Line

X-TEL allows you to access the TEXT editor while on line in Terminal Mode. Hold down [CODE]-[SHIFT] and press [F6] (TEXT). The program will take you directly to the TEXT editor, as if you had chosen this application from the main system menu of your computer or the RAM Disk Menu of the BOOSTER PAK.

When you press [F8] (Term) to leave TEXT, you'll return to Terminal Mode instead of the RAM Disk Menu. X-TEL saves the Terminal Mode screen while you are in TEXT and restores it on your return.

If you receive characters from a remote computer while you are in TEXT, the computer will buffer up to 64 characters. You'll see these characters on your return to Terminal Mode.

The Tandy 100 or 102 will issue an XOFF—[CTRL]-[S]— after receiving the first 40 characters. If the remote system uses XON/XOFF data flow control, you won't lose data while in TEXT.

To determine whether you are using TEXT while on line or via the RAM Disk Menu, press [LABEL]. The prompt for [F8] will be Term if you are on line, and Menu if you are using TEXT in the normal manner.

Using BASIC While on Line

Press [CODE]-[SHIFT]-[F7] to go into BASIC to run programs and perform maintenance on RAM disk files while on line.

To return to X-TEL press [F8]. Do *not* type MENU, or you will find yourself disconnected!

Linefeed Insertion When Uploading Data Files

The Tandy 100 or 102 normally transmits a single carriage return (ASCII 13 decimal) at the end of each line when uploading a data (text) file. X-TEL allows the user to terminate each line with two characters, a carriage return *and* a line feed (ASCII 10 decimal).

Many mainframe computers require a carriage return/line

feed pair to recognize the end of a line. An unmodified Tandy 100 or 102 is unable to access these computers properly.

To enable this feature, hold down [SHIFT] and press [F7] (NoLF). This prompt will change to UpLF while line feed after carriage return is enabled.

Once this option is changed, it will remain in effect each time X-TEL or normal TELCOM is used. You can think of this setting as part of the current STAT, for it's saved in the same way. Be careful when using this option: you can easily send extra line feed characters without realizing it.

Downloading Text to RAM Disk

X-TEL lets you capture or append new text to an existing file while in Terminal Mode. Press [CTRL]-[F6]. This key combination works just like the DOWN command, except that it also captures text to a device or RAM disk file. Press [CTRL]-[F6] again to terminate this command.

This command can be combined with a conventional download text to RAM (workspace) memory.

Product Specifications

Runs on computer:	TRS-80 Model 100 or Tandy 102
Protocol:	XMODEM (Checksum and CRC versions)
Program size (bytes):	3.2K machine-language (CO) + 0.1K BASIC (BA) loader CO portion is high memory, and is completely relocatable
Memory requirement:	16K minimum
Software compatibility:	Can be used in conjunction with the Traveling Software BOOSTER PAK and other machine-language programs.

Appendix:
Protocol File Transfer

XMODEM file transfer is an important X-TEL feature. It allows you to upload (send) and download (receive) data and program files using a reliable file transfer procedure known as an error-checking protocol. To understand what this is, let's consider a simple analogy that also involves an exchange of information.

Suppose that you need to make an airline reservation. When you call the reservations office or your travel agent, you tell the clerk your destination and when you wish to leave. After checking price and available seating, the clerk gives you the flight number and departure time.

But what if there was a loud burst of noise on the phone line just as you were saying the date of your flight? Suppose the clerk thought you said "April 16" instead of "April 15"? This could put a real kink in your plans!

This doesn't often happen because the clerks always repeat the date back to you to make sure that they have understood correctly. This is the basic idea of error-checking file transfer protocols.

When two computers transfer information over a telephone line or a cable, random electrical noises can corrupt the information. Without some sort of error checking, you can't really be sure whether information will be received intact.

When using a protocol file transfer, the *sending* computer includes a kind of summary of the received data along with the block of data itself. The *receiving* computer then checks this summary against the block of data. If the two summaries agree, fine! If they disagree, the receiving computer tells the sending computer to transmit another copy of the information which is again checked for accuracy by

the receiver. If the two computers still disagree, yet a third copy must be sent, and so on.

The term *protocol* refers to the procedures that both computers must follow in order to verify transferred data. Both sender and receiver must agree on the exact method of error checking to be used, and on the signals that they will use to indicate agreement and disagreement. Both computers must use the same protocol.

X-TEL uses the XMODEM protocol, widely accepted as the industry standard for portable computers, microcomputers, information services, and computer bulletin boards. To use X-TEL's XMODEM protocol file transfer, the other computer must also use XMODEM.

There are two versions of the XMODEM protocol and they differ in the exact method used to compute the summary of the transmitted data used for error checking. These two methods are called Checksum and CRC. X-TEL can make use of either method, which ensures compatibility with any other computer's implementation of XMODEM.

On the Tandy 100 or 102 protocol file transfer has other powerful advantages over conventional file transfer. You can transfer BASIC and machine-language programs (BA and CO files) between computers without first converting them to ASCII data (DO) files.

If you use a spreadsheet program on your portable computer, you can transfer spreadsheet data files, too. With a desktop computer running Traveling Software's Desk-Link software, you can keep your whole portable computer library of program and data files on an MS-DOS hard disk or floppy diskette instead of tape cassettes. You can move files back and forth as needed over a null modem cable.

CRC and Checksum Error Checking

As mentioned above, there are two versions of the XMODEM protocol, called Checksum and CRC. The two versions differ in the exact method used by the sending and receiving computers to verify the accuracy of incoming data. The Checksum method is the more widely supported of the two; the CRC method was designed later and is still not available in all implementations.

To check for errors with the Checksum method, the sending computer adds all of the data bytes in each XMODEM block before sending it. The least significant byte of this sum is called the Checksum and is sent as part of the block, along with the data bytes. The receiving computer must then calculate its own Checksum from each block as it is received, to make sure that it matches the one packaged along with the data. If they don't match, the receiver asks the sender to re-transmit the block.

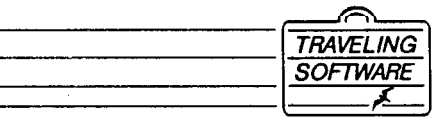
The CRC method is identical except that the sender calculates a different type of number from the data bytes in each block. A special mathematical formula is used, which is known as a Cyclic Redundancy Check—hence the abbreviation CRC. Without going into details, the number resulting from this formula is a 16-bit number that is sent along as part of the block. The receiver then runs each block's data bytes through the same formula to see if the resulting number is the same as the one contained in the block.

The reliability of any error-checking method is measured by the probability that one or more errors introduced into an XMODEM block will not alter the result of the error-checking calculation used to verify the block. If a corrupted stream of data produces the same Checksum or CRC number as the original data, the receiver cannot tell that an error has occurred. The higher this probability is, the lower the reliability.

The Checksum method is very reliable (and far better than no error checking at all). However, there remains a small but measurable chance that certain combinations of errors will leave the Checksum unchanged and thus go undetected. On the other hand, the CRC method is much more sensitive to data errors: virtually any change in the data will alter the CRC result. This makes the CRC method error-free for all practical purposes.

A single XMODEM file transfer can use only one error-checking method for the duration of the transfer. There is a convention that the *receiving* computer always determines which error-checking method is to be used. Therefore, if a choice between Checksum and CRC is available, it must be made on the computer which is receiving, not the one which is sending. Some computers (for example, CompuServe) address the problem by attempting to start a CRC transfer first, and then trying the Checksum signal if the sending computer does not respond.

Just about every implementation of XMODEM supports the Checksum method, and many now support CRC as well. Given a choice, CRC takes better advantage of your computer's ability to perform error-free file transfer.



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