CC CorComp Inc.

9900 MICRO-EXPANSION SYSTEM

POWER — RS232 — 32K RAM — DISK SYS

9900 Micro-Expansion System
TECHNICAL REFERENCE MANUAL

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RS232 INTERFACE

INTRODUCTION

Your Cor Comp 9900 Micro-Expansion System plugs directly into the side of your computer. This system is like the transmission in your car. Your car transmission takes the power from the engine and converts it into power to the rear wheels. Your Micro-Expansion System takes the power from your Home Computer and converts it into power that is sent to the outside world. The car transmission is an interface from the engine to the rear wheels of the car. And, the Micro-Expansion System is an interface from the computer to the outside world.

Inter means "in-between", face is what the outside world sees. So, interface is the view the outside world has of your computer. When your computer talks through the RS232 Interface to the outside world, the RS232 Interface has the job of making sure the "view" the outside world gets is correct. This "view" is the EIA RS232C Standard. Remember, when your computer talks to the outside world, the RS232 Interface makes sure the world will understand what is being said.

Serial transmission means information flows in Indian File or one-character-after-the-other. A channel is like a storm drain or pipe. A serial channel lets information flow one character after the other. The serial channels can be connected to a printer, modem or a serial channel on an RS232 device. Or, you may also connect them to plotters, video display terminals, etc.

Parallel means two or more things moving or happening side by side at the same time. For example, two people walking side-by-side are moving in parallel. The information that flows through a parallel channel is like eight (8) people walking side-by-side. This group of eight people are similar to a data character. A data character is made up of eight "bits" (remember the eight "bits" are in parallel). Each person is carrying a green flag. If they hold the flag down, that means that bit is "off". If the green flag is up then that bit is "on". The combination of up and down flags (bits on or off) of each group of 8 people (a characater) tells the printer, etc. which character has been sent by the computer. The parallel channel on your RS232 card will connect (through an optional cable) to a printer that will accept information that flows in parallel.

Note: A bit that is "on" is just like a light switch in the up or "on" position. When the same bit is "off", then that is similar to the light switch being in the down or off position.

Option: Your CorComp Micro-Expansion System may be purchased or expanded at a later time with the following options:

CorComp
Product
Code

UK-001   • Optional 2nd serial channel for the RS232. This option plugs into the RS232 board in your Micro-Expansion System and adds RS232/2.

UK-002   • Option Board - This board plugs inside your Micro-Expansion System. It adds 32K of memory expansion ram, a double-sided double-density floppy disk controller and some powerful new commands for BASIC & Extended BASIC. Also included are the Disk Manager Diskette and the Option Board User's Guide.

*Each option can be purchased from your local CorComp dealer.

QUICK REFERENCE GUIDE TO THE CorComp RS232 INTERFACE

SERIAL SOFTWARE SWITCH OPTIONS

Option	Choices	Enter As	Default Settings OPEN/LIST	Default Settings OLD/SAVE
BAUD RATE 110, 300, 600,	.BA=1200 1200, 2400, 4800, or 9600	.BA=300 (or desired rate)	.BA=300	
DATE BITS	7 or 8	.DA=7 (or 8)	.DA=7	not allowed
PARITY	ODD, EVEN or NONE	.PA=O (or E or N)	.PA=O	not allowed
STOP BITS	1 or 2 STOP BITS	.TW (for 2 STOP BITS)	1 STOP BIT	1 STOP BIT
NULLS	none or 6 NULLS	.NU (for 6 NULLS)	no NULLS	not allowed
CHECK PARITY	check or do not check parity	.CH (to check parity)	do not check	not allowed
ECHO OFF	ECHO off or on	.EC (for ECHO off)	ECHO is on	not allowed
CR/LF OFF	CR/LF off or on	.CR (for CR/LF off)	CR/LF is on	not allowed
LF OFF	LF off or on	.LF (for LF off)	LF is on	not allowed

EXAMPLES: OPEN #1:"RS232.BA=1200"
OPEN #3:"RS232/1.BA=9600.NU.EC",VARIABLE 132
LIST "RS232.BA=4800"
SAVE "RS232.BA=1200"

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PARALLEL SOFTWARE SWITCH OPTIONS

Option	Choices	Enter As	Default Settings OPEN/LIST	OLD/SAVE
NULLS	none or 6 NULLS	.NU (for 6 NULLS)	no NULLS	not allowed
ECHO OFF	ECHO off or on	.EC (for ECHO off)	ECHO is on	not allowed
CR/LF OFF	CR/LF off or on	.CR (for CR/LF off)	CR/LF is on	not allowed
LF OFF	LF off or on	.LF (for LF off)	LF is on	not allowed

EXAMPLES: OPEN #1:"PIO"
OPEN #7:"PIO.LF",VARIABLE 28
LIST "PIO.NU"
SAVE "PIO"

Note: **CR/LF** = Carriage Returns and Line Feeds

INSTALLATION

Plug-in Instructions

The steps that you need to follow to plug your CorComp Micro-Expansion System into the Home Computer are on the pages that follow. **Remember to please read all the steps before going ahead.**

Note: The Micro-Expansion System has a power supply which plugs into the wall power plug. The power supply cable has a five (5) pin DIN power plug. This cable plugs into the back of the Micro-Expansion System. Also at the back is a twenty-five pin plug which talks via an optional cable to a serial printer. And a sixteen (16) pin plug connects through an optional cable to any printer that accepts parallel information.

```
************************************************************
*                                                          *
*                        WARNING                           *
*  Electronic components can be damaged by                 *
*  static electricity. Do not touch any of the             *
*  connector contacts in order to avoid damage to          *
*  any of the parts.                                       *
************************************************************
```

After unpacking the CorComp Micro-Expansion System (save the packing material for later use), you are now ready to plug-in the Micro-Expansion System.

Plugging in the Micro-Expansion System

- Turn off the computer and everything connected to the computer.

- TO AVOID DAMAGE TO ANY OF THE PARTS, WAIT AT LEAST TWO (2) MINUTES AFTER TURNING POWER OFF. BEFORE PLUGGING THE MICRO-EXPANSION SYSTEM INTO THE COMPUTER, OR PLUGGING ANYTHING INTO YOUR COMPUTER SYSTEM. WAIT AT LEAST TWO (2) MINUTES AFTER TURNING THE POWER OFF BEFORE UNPLUGGING THE MICRO-EXPANSION SYSTEM FROM YOUR COMPUTER, OR, UNPLUGGING ANYTHING FROM YOUR COMPUTER SYSTEM.
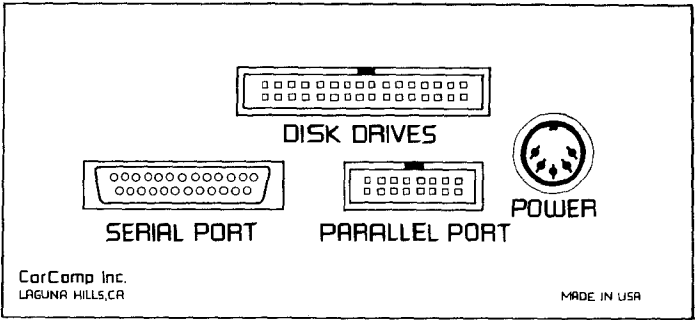
(Acting sooner could be harmful to your CorComp Micro-Expansion System and void the Warranty).

- Plug the CorComp Micro-Expansion System into the side of your computer as shown below.
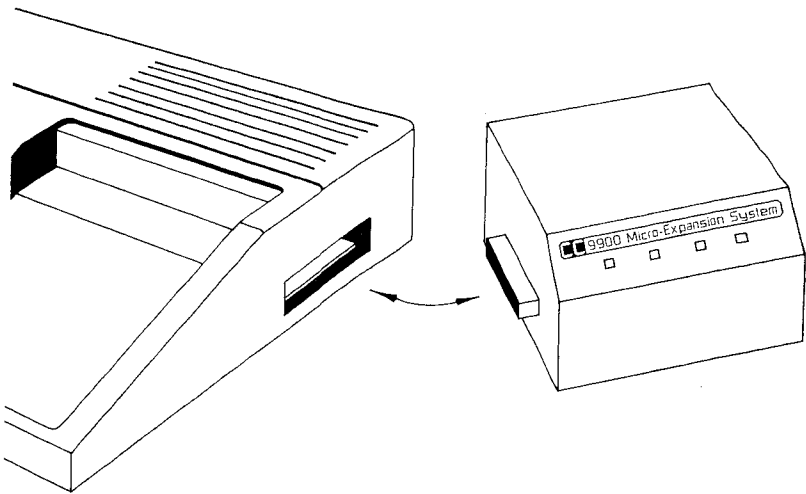
Note: If you have a speech synthesizer attached to your computer, remember it must be plugged into the computer first and then plug the Micro-Expansion System into the side of the speech synthesizer.

- Plug the power supply (that comes with your Micro-Expansion System) into the wall or power outlet strip. Connect the five (5) pin DIN connector on the end of the cable, (from the power supply), into the back of the Micro-Expansion System.

- Connect your printer with the optional cables to either a printer with parallel input or a printer with serial input.

```
                    DISK DRIVES
                    ┌──────────────┐    ╭───╮
                    │ ▫▫▫▫▫▫▫▫▫▫▫▫ │   ( ⊙⊙⊙ )
                    │ ▫▫▫▫▫▫▫▫▫▫▫▫ │    ╰───╯
                    └──────────────┘
     ┌───────────────┐   ┌──────────┐
     │ ○○○○○○○○○○○○ /  │ ▫▫▫▫▫▫▫ │
     │ ○○○○○○○○○○○○   │ ▫▫▫▫▫▫▫ │  POWER
     └───────────────┘   └──────────┘
       SERIAL PORT      PARALLEL PORT

   CorComp Inc.
   LAGUNA HILLS,CA                    MADE IN USA
```

- Turn power on the Micro-Expansion System and lastly the computer.

```
*****************************************************
*                                                   *
*                     WARNING                       *
*   Be sure to unplug the Micro-Expansion System    *
*   before moving your computer. In order to avoid  *
*   any damage to your equipment, always turn off   *
*   all power before moving any part of your        *
*   computer system.                                *
*                                                   *
*****************************************************
```

TESTING THE RS232 INTERFACE

Testing the RS232 Function

● An optional power outlet strip (with an ON/OFF switch) is recommended for turning your computer system on and off. Plug the power strip into the wall outlet. Make sure the power strip is turned OFF. Plug the CorComp Micro-Expansion System power supply, and all the other power cords for your computer system into the power strip outlets. When you turn on the power strip, your computer system will power up in the proper order.

● The RS232 indicator light on the front of the system should come on briefly as the computer is turned on. When the computer talks to the RS232 interface the activity light will come on. The amount of time the light is on and the brightness of the light will depend on the "talking" between the computer and the RS232 function.

● If the RS232 activity light does not come on, the Micro-Expansion System may not be plugged into the computer in the right way.

If the RS232 light does not come on, then repeat the "Plugging in the Micro-Expansion System" instructions on page 6. If it still does not work, then check "When Things Go Wrong" on page 32.

Removing Micro-Expansion System

1. Turn OFF the power for the printer. Micro-Expansion System, monitor/TV, any attached accessories, and the computer console.

2. Wait at least two (2) minutes, then remove the Micro-Expansion System from the side of the computer.

3. Remove any optional cables attached to the Micro-Expansion System.

4. Remove the power cable from the Micro-Expansion System.

5. Remove the Micro-Expansion System from the side of the computer, or speech synthesizer if it is attached.

Plugging in Accessory Devices

Note: If you have both serial RS232 channels, then the first channel is called RS232 or RS232/1 and the second channel is called RS232/2. When your Micro-Expansion System has been correctly plugged into the computer, then other devices can be plugged into the serial channel connector and/or the parallel channel connector.

An optional Y-cable (sold separately) can be plugged into the RS232 (25 pin) connector which will allow you to use two different serial devices. Remember, that you must have purchased your Micro-Expansion System with the optional 2nd RS232 serial channel or later have purchased this option before you can use the 2nd serial channel.

*Please read the Appendices. They will tell you about optional cables and about optional cable pin diameters.

ACCESSORY DEVICE CONVERSATION

Talking to Accessory Devices

When you want to talk to accessory devices, such as a printer, etc. the information flows through channels. There are two serial channels along with a parallel channel in the RS232 interface. An optional Y-cable will allow you to plug the 2nd serial channel into an accessory device.

USING TI BASIC

Once you have plugged an accessory device into the serial or parallel function of your system, TI BASIC may be used to control that device by writing or reading to/from the device. The OPEN statement tells the computer that you want to talk to that device. Remember, the OPEN statement tells the computer that you want to use a channel, such as RS232 or PIO. A list of these TI BASIC statements are:

- OPEN - Tells the computer to use a serial or parallel channel.

- INPUT - The computer will read information **IN** from a serial or parallel channel.

- PRINT - The computer will send information **OUT** to a serial or parallel channel.

- CLOSE -Tells the computer to stop using the serial or parallel channel.

- LIST - Prints or displays a copy of a program through a serial or parallel channel.

- OLD - Reads a program **IN** from a serial or parallel channel. This is usually sent by another computer.

- SAVE - Sends a copy of a program **OUT** through a serial or parallel channel. This is usually sent to another computer.

When the computer talks to the RS232 interface, TI BASIC understands five channel (device) names. These are: RS232, RS232/1, RS232/2, PIO and PIO/1. The first two names are what the first serial channel is called. The third name is what the second serial channel is called, and, the fourth and fifth names are used for the parallel channel.

When you use SAVE, LIST or PRINT, the information flows **OUT** through the selected serial or parallel channel. An OLD or INPUT statement causes information to flow **IN** the serial or parallel channel.

*__Note:__ the second serial channel (RS232/2) is optional on the CorComp Micro-Expansion System.

RS232 SOFTWARE SWITCH MENU

Software Switch Options

Optional devices such as printers, etc. need to be talked to in special ways. For example, some of the information that a printer or other device will understand is pre-setup by tiny switches inside the device. These switches are called DIP switches.

When the switch is set to "ON", the device understands information one way. If the switch is set to "OFF", then the device understands the information another way. However, in your RS232 function these "switches" are set by your command. These are called software switch options. This information is included in the OPEN statement. Remember, the OPEN statement tells the computer that you want to use a channel, such as RS232 or PIO. What may be included in the OPEN statement are the following software switch options. These "switches" tell the RS232 or Parallel function how to send or read the information that will flow **OUT** or **IN** through that channel.

The next four items are used by the serial channels when sending data **OUT** or reading data **IN**.

- BAUD RATE - The rate (speed) at which the serial information is read **IN** or **OUT** of the serial channel. This speed is set as "bits per second".

- DATA BITS - The number of bits (the bits are arranged in Indian File or one-after-the-other) in each character.

- PARITY - This bit is added to each character. It is used at the receiving end to check for errors after information is received.

- STOP BITS - The number of bits (1 or 2) added at the end of each character before it is sent out. This tells the RS232 where one character ends and the next character begins.

The next item is used by the serial channels only after receiving data.

- CHECK PARITY - Tells the computer to make sure each character received is "good" data.

The next four items are used only by the serial channels and the
parallel channel when sending data.

- NULLS - Sends six null (do nothing) characters after each
  carriage return is sent. This is for the timing of some printer
  carriage return mechanisms.

- ECHO OFF - Tells the channel: do not send back a copy of
  each character received from the sender.

- CARRIAGE RETURN and LINE FEED OFF - Tells the
  channel do not add a carriage return and line feed at the
  end of each DISPLAY type record.

- LINE FEED OFF - The channel will not add a line feed to the
  end of each DISPLAY type record sent out. (Carriage return
  is still added).

These options may be used in the OPEN, LIST, OLD, and SAVE
statements. Default options are set by the channel unless you
change them in your statements. See the "Software Switch Options"
section.

TI BASIC STATEMENTS AND COMMANDS

TI BASIC Statements and Commands

These statements and commands may be used with your RS232 serial channels and parallel channel as discussed in this section. For other uses of TI BASIC read the BASIC Reference Section of your User's Reference Guide.

The OPEN Statement

The OPEN statement used with the RS232 interface looks like this...

OPEN #file-number:"file-name"[,file-organization]
    [,software-switch-options]
    [,file-type][,open-mode][,record-type]

Note: The file information inside of brackets→[ ] is optional information, but it may be required by certain files.

The file-number and file-name must be filled out in every OPEN statement. The information in the brackets is optional and may be in any order or omitted. For each item which is left out, the RS232 function will assume certain defaults, as described below.

• File-number - The file-number (which is a number from 1 to 255, or a numeric expression) is assigned to a file by the OPEN statement. File numbers may be assigned as you wish. But, remember that file 0 is always the keyboard and screen. It is always OPEN.

• File-name - The File-name is "RS232", "RS232/1", "RS232/2", "PIO" and "PIO/1". These are the names used with the RS232 interface. The file-name may be followed by any software switch options. Or, you may use the "default" options provided by the RS232 interface. See the "Software Switch Options" section.

Some examples of how to OPEN the RS232 serial channel are:

        OPEN #1:"RS232"
        OPEN #3:"RS232.BA=1200",VARIABLE 132

Some examples of how to OPEN the RS232 parallel channel are:
        OPEN #1:"PIO"
        OPEN #3:"PIO.LF",VARIABLE 132

        *Note: The second serial channel (RS232/2) is optional on
        the CorComp Micro-Expansion System.

TI BASIC STATEMENTS AND COMMANDS

- File-organization - Files are composed of pieces called records. Records can be accessed (read from or written to) in an Indian File (Sequentially) or Pick and Choose (Random) manner. Records accessed Randomly may be read or written in any order. Records accessed Sequentially must be read or written one after the other.

By entering SEQUENTIAL accessing (one record after the other), you then indicate to the RS232 interface the access method you wish to use. If no file-organization is set, the RS232 selects the default of SEQUENTIAL.

Remember that RELATIVE files cannot be used with the RS232 interface.

- File-type - Files may be made up of human readable ASCII characters or in machine-readable BINARY characters. The ASCII format is the better choice if the file is to be printed or displayed on a screen. However, BINARY format is read and written much faster by the computer and takes up less space.

To select ASCII format, enter DISPLAY as the file-type. To select BINARY format, enter INTERNAL as the file-type. If no file-type is entered, then the RS232 selects DISPLAY for the file-type.

- Open-mode - This information in this field tells the RS232 interface.
  - INPUT, read the file   - OUTPUT, write to the file
  - APPEND, to end of the   - UPDATE, read or write the file
  -APPEND, to end of the file

If the open-mode is not entered then the RS232 function sets the open-mode as UPDATE. The APPEND mode can only be set for files which have VARIABLE length records.

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• Record-type - File records may be different lengths (VARIABLE) or the same length (FIXED).

The maximum record length may be set after the record-type. Be sure there is a space character between the end of the record-type and the length. The length is a number or numeric-expression. The biggest length of a FIXED file record is 255 characters, the largest VARIABLE file record is 254 charcters long. If you do not set the record length, then the RS232 interface sets record-length to 80 characters, i.e. OPEN #1:"PIO",VARIABLE 80.

SEQUENTIAL files may have either FIXED or VARIABLE length records. The SEQUENTIAL file Default sets the record-type as VARIABLE.

*Note: The second serial channel (RS232/2) is optional on the CorComp Micro-Expansion System.

OPENING THE CHANNELS

OPEN STATEMENTS

OPEN #1:"RS232"

OPENS or creates a serial read and write channel. The RS232 Interface will set the following default options:

file-organization = SEQUENTIAL
file-type   = DISPLAY
open-mode   = UPDATE
record-type   = VARIABLE 80

OPEN #3:"RS232.BA=9600. EC.CH", INTERNAL,OUTPUT, FIXED 80

OPENS or creates a serial channel with the following options:

file-organization = SEQUENTIAL
file-type   = INTERNAL
open-mode   = OUTPUT
record-type   = FIXED 80

OPEN #A:Z$,INTERNAL

OPENS or creates a parallel channel if A is a value between 1 and 255, and Z$ equals "PIO" or "PIO/1". The following options will be set:

file-organization = SEQUENTIAL
file-type   = INTERNAL
open-mode   = UPDATE
record-type   = VARIABLE 80

CLOSING THE CHANNELS

CLOSE STATEMENT

CLOSE - this statement is like putting a channel on the shelf, and closing the door. It tells your computer that the program is not going to talk to the RS232 until further notice. In order to use the RS232 again, you must tell the computer by using the OPEN statement.

If a channel (file) is not closed, then you may lose the data it contains. Programs which stop because of a BREAK statement, or if you press FCTN (CLEAR), or because of some error, usually will not be closed. The following actions will properly close a file:

- Use CLOSE #file-number i.e.: CLOSE #3
        or
- Type: NEW
        or
- Type: BYE
        or
- Entering the Edit mode (Automatically closes all files)

Warning:

Pressing QUIT while in TI BASIC, may cause data loss if the RS232 interface is not closed. If you are doing file processing in TI BASIC, then exit BASIC and return to the master title screen by typing BYE.

BRINGING IN DATA

INPUT - The INPUT statement is used to read data **IN** from the RS232 interface. In order to use this statement, the channel it is to be used with must have it's open-mode as INPUT or UPDATE. An example is shown below:

INPUT #file-number:variable-list
$\uparrow$ $\uparrow$ $\uparrow$
Required   Required   Required

- File-number - This is the number assigned to a file by a previous OPEN statement. A file-number is typed in as a # (pound sign), followed by a numeric expression or a number. The number must be between 1 and 255, and be a number of a channel (file) which was previously opened.

- Variable-list - The variable-list is like a row of boxes, one after the other. There is a comma between each box. The box corresponds to a space to hold a variable. As each variable is read **IN** from the channel, it is put into the "box" you specify. Note that each "box" has a name. This name stands for or represents the items that you put into that "box".

Examples of INPUT statements are shown below:

INPUT #1:Z$

       ↓   ↓↓↓↙
       ↓   ↓↓↓
Action   ↓↓↓
        ↓↓↓
File # ← ←↓↓
Separator ←↓↓
String ← ← ←↓

The RS232 reads a variable **IN** from the serial channel and puts it into the "box" called Z$. Remember that a string may be from 1 to 255 characters long.

INPUT #3:W,B,M$ The RS232 reads 3 variables **IN** from the serial
  ↓   ↓ ↓ ↓↓ ↓ ↙   channel and puts them into the "boxes" called
  ↓   ↓ ↓ ↓↓ ↓   W,B, and M$. Remember that W and B are
Action ↓ ↓ ↓   ↓   numbers and M$ is a string of alpha, numeric or
File # ←↓ ↓ ↓ ↓   alpha-numeric characters.
       ↓ ↓
Separator← ↓ ↓
         ↓ ↓
Names of ↓ ↓
Variable   ↓ ↓
Containers,↓ ↓
"Boxes" ← ← ↓
String ← ← ← ←

The number of characters read **IN** by the INPUT statement, is keyed to the record-type in the OPEN statement. Data is read **IN** until FCTN (CLEAR) is pressed on your keyboard. For VARIABLE records, data is read **IN** until a carriage return or ENTER is pressed or data in = the record-length (of the OPEN statement). For FIXED length or INTERNAL data type records, data is read **IN** until data in = the record-length as set up in the record-type.

PRINT THROUGH A CHANNEL

PRINT - The use of the PRINT statement lets you write data to a channel. Only channels which have been opened with the OUTPUT, UPDATE, or APPEND mode will allow you to write data to them with the PRINT statement. An example is below:

PRINT #file-number:print-list
↑ ↑ ↑
Required Required Required

- File-number - This is the number assigned to a channel by a previous OPEN statement. A file-number is typed in as a # (pound sign), fillowed by a numeric expression or a number. The number must be between 1 and 255, and be a number of a channel which was previously opened.

- Print-list - The print-list is like a row of boxes, one after the other. There is a comma between each box. The box corresponds to a space which holds a variable. As each variable is written to the channel, it is taken from the place you specify.

Examples of PRINT statements are shown below:

PRINT #1:Z$ The computer sends the contents of string Z$
  OUT through the channel that was opened as #1.

Action

File #

Separator

String

PRINT #3:W,B,M$ The computer sends the contents of the 3 variables, W, B and M$, **OUT** through channel #3. Remember that W and B contain numbers and M$ is a string.

Action

File #

Separator

Numbers

String

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The number of characters written **OUT** by the PRINT statement, is (
keyed to the record-type in the OPEN statement. Data is sent **OUT**
until FCTN (CLEAR) is pressed on your keyboard. For VARIABLE
records, data is sent **OUT** until a carriage return or ENTER is pressed
or data out = the record-length (of the OPEN statement). For FIXED
length or INTERNAL data type records, data is sent out until data out
= record-length as set up in the record-type.

(

(

LIST THROUGH A CHANNEL

LIST - The use of the LIST statement lets you write a copy of a program, or portions of a program to a channel. The channel may be connected to a printer, monitor/TV, etc. An example is shone below:

LIST "file-name[.software switch options]"[:line-list]
   ↑   ↑   ↑   ↑
Required   Required   Optional   Optional

- File-name - This is the name assigned to a channel. It must be RS232, RS232/1, RS232/2, or PIO.

- Software switch options - These are listed in the Software Switch Options section.

- Line-list - The line-list is like a row of boxes, one after the other. The box corresponds to a space which holds a program. The program lines that you specify in the line list will be written out to the channel OPENED in your file-name statement.

   Note: If you do not enter a line-list, then the entire program is LISTED.

Examples of LIST statements are shown below:

LIST "RS232":100   The computer prints the contents of
↓   ↘ ↓ ∕ ↓ ↓   program line 100 to the channel that
↓   ↓ ↓ ↓   was opened as "RS232".
↓   ↓ ↓ ↓
Action   ↓ ↓ ↓
Channel Name ↓ ↓
Separator ← ← ↓
Line Number ← ← ↓

```
LIST "RS232/1":20-90          The computer writes program lines 20
  ↓      ↘ ↓ ↗  ↓↘ ↓ ↗        through 90 to the channel opened as
  ↓        ↓   ↓  ↓           "RS232/1".
Action      ↓   ↓  ↓
            ↓   ↓  ↓
Channel Name    ↓  ↓
Separator ← ← ← ↓  ↓
                   ↓
Line Numbers ← ← ←
```

*Note: The second serial channel (RS232/2) is optional on the CorComp Micro-Expansion System.

SAVE THROUGH A CHANNEL

Sending Programs Out to the World

Programs may be sent from one TI Home Computer to another one. Their RS232 channel must be connected to a modem, at each end. Each modem must be plugged into a telephone network. Another way is to directly plug the RS232 channel of one Home Computer into the RS232 channel of another Home Computer (using an optional cable).

SAVE - The use of the SAVE statement lets you write a copy of a program, via a channel. The channel may be connected to a modem or another Home Computer, etc. An example is shown below:

SAVE #file-name[.software switch options]"
   ↑   ↑   ↑
Required   Required   Optional

- File-name - This is the name assigned to a channel. It must be RS232, RS232/1, RS232/2, PIO or PIO/1.

- Software switch options - The only ones allowed are the transfer speed (baud rate (.BA=)) and the number of stop bits (.TW). The number of bits in a character is 8. If you SAVE using the parallel channel no options are allowed. The other Home Computer must have same baud rate, and number of stop bits in the corresponding OLD statement to read IN the program.

Examples of SAVE statements are shown below:

SAVE "RS232.BA=300.TW"   The computer sends the contents of the program **OUT** to the channel.

Action

Channel Name

Separator

Baud Rate

Separator

Stop Bits

Note: The other Home Computer must open it's channel as:
OLD "RS232.BA=300.TW"
in order to transfer the program properly.

SAVE "RS232/1.BA=110.TW"   The computer sends the program
                           OUT to the channel.

Action

Channel Name   **Note:** The other Home Computer
                          must open it's channel as:
Separator   OLD "RS232.BA=110.TW"
                          in order to transfer the
Baud Rate   program properly.

Separator

Stop Bits

*Note: The second serial channel (RS232/2) is optional on the CorComp Micro-Expansion System.

READ IN FROM A CHANNEL

Reading Programs In From the World

Programs may be received by one TI Home Computer from another one. Their RS232 channel must be connected to a modem, at each end. Each modem must be plugged into a telephone network. Another way is to directly plug the RS232 channel of one Home Computer into the RS232 channel of another Home Computer (using an optional cable).

OLD - The use of the OLD statement lets you read a copy of a program, via a channel. The channel may be connected to a modem, or another Home Computer. An example is shown below:

OLD #file-name[.software switch options]"

Required	Required	Optional

- File-name - This is the name assigned to a channel. It must be RS232, RS232/1, RS232/2, PIO or PIO/1.

- Software switch options - The only ones allowed are the transfer speed (baud rate (.BA=)) and the number of stop bits (.TW). The number of bits in a character is 8. If you read (OLD) using the parallel channel no options are allowed or needed.

The other Home Computer must have the same baud rate, and number of stop bits in the SAVE statement used to write **OUT** the program.

Examples of OLD statements are shown below:

OLD "RS232.BA=300.TW"   The computer reads the contents of the program **IN** from the channel.

Action

Channel Name

Note: The other Home Computer must open it's channel as:
SAVE "RS232.BA=300.TW"
in order to transfer the program properly.

Separator

Baud Rate

Separator

Stop Bits

```
 OLD "PIO"
   ↓     ↓
   ↓     ↓
Action   ↓
Channel Name
```

The computer reads the program
IN from the channel.

Note: The other Home Computer
must open it's channel as:
SAVE "PIO" or SAVE "PIO/1"
in order to transfer the
program properly.

TWO COMPUTERS COMMUNICATING

USEFUL APPLICATION

Your CorComp RS232 interface may be used to talk to another Home Computer. The example shows how messages may be sent between Home Computers. Remember, both computers must have RS232 interfaces that are connected by an optional cable. The same program will work when each RS232 interface is connected to a modem, and, the modems are plugged into a telephone network.

Talking between Home Computers

In the program below, two Home Computers are writing **OUT** and reading **IN** messages. The messages are flowing through the RS232 channel through an optional cable to the RS232 channel of the other computer. The program listings below are for Talker 1 and Talker 2.

Talker 1 types in the program on the left into computer 1. Talker 2 types in the program on the right into computer 2. Talker 2 then RUNS his program first, then Talker 1 RUNS his program. After the programs are running, Talker 1 types in a message and presses the ENTER key. The message flows through the RS232 channels and is displayed on Talker 2's screen. Talker 2 may then type in a message and press the ENTER key, to send a message to Talker 1. This back and forth message sending may continue until FCTN (CLEAR) is pressed on both computers.

```
100 REM TALKER 1          100 REM TALKER 2
110 REM TALKS TO          110 REM TALKS TO
120 REM A COMPUTER        120 REM A COMPUTER
```

Line 130 opens the serial channel with the ECHO and line feeds turned off.

```
130 OPEN #1:"RS232.EC.LF",    130 OPEN #1:"RS232.EC.LF",
VARIABLE 255                  VARIABLE 255
140 INPUT TO-2$               140 INPUT #1:FROM-1$
150 PRINT #1:TO-2$            150 PRINT FROM-1$
160 INPUT #1:FROM-2$          160 INPUT TO-1$
170 PRINT FROM-2$            170 PRINT #1:TO-1$
180 GOTO 140                  180 GOTO 140
190 END                       190 END
```

To use the parallel channel, change the name in line 130 from RS232 to PIO or PIO/1.

OLD & SAVE

SAVE and the OLD Program Exchange

A program may be sent from one Home Computer to another, through the CorComp RS232 interface. After the other computer reads **IN** the program, it may be used. Remember, a "keystroke in time saves nine".

In order to **exchange a program** over the telephone line, dial up the other end. If you are using an acoustic modem, place the handset in the modem cradle (see modem user's guide). If you have the direct connect modem then press or slide the "data" switch.

1. The sender types: SAVE "RS232", SAVE "RS232/1" or SAVE "RS232/2" and presses the ENTER key.

2. The receiver types: OLD "RS232", OLD "RS232/1", or OLD "RS232/2" and presses the ENTER key.

3. In the top center of each screen is displayed the number 255. After the link is setup, then this number is changed to the number of 256 character records yet to be sent and received. As each record is sent and received, this number is reduced by 1. When the number reaches zero, the entire program has been transferred.

4. If the number 255 in the top center of the screen does not change within a 10 second period, then the person at the receiving end must press FCTN (CLEAR) and re-enter the OLD statement.

Note: When the two RS232 interfaces are connected by an optional cable through the parallel channels, then the statements in steps 1 and 2 are SAVE "PIO" and OLD "PIO".

*Note: The second serial channel (RS232/2) is optional on the CorComp Micro-Expansion System.

WHEN THINGS GO WRONG

If any portion of your CorComp 9900 Micro-Expansion System does not work right, check some or all of the following items:

- Power - Check that the Micro-Expansion System is plugged correctly into your Home Computer. Then make sure that the Micro-Expansion System power supply is plugged into a power socket (either the wall plug, or an optional power strip), and the five pin DIN cable is plugged into the back of the System.

- Home Computer - With all accessories unplugged, make sure the Home Computer works correctly.

- System Position   Turn the power OFF to the computer, Micro-Expansion System, and any attached devices. Wait **two (2)** minutes, make sure the System and all cables are plugged in correctly, and then turn power ON again.

- Cables - Appendix B shows the connections (from one end of the cable to the other) that are required in order to connect another home computer and modems. These devices are called Data Communications Equipment (DCE*). Also, in Appendix B are the cable connections required for devices such as terminals and printers. These are called Data Terminal Equipment (DTE*) devices. Make sure the right cable is being used. Remember, that all cables are optional If you wish to use the first serial channel and the optional 2nd serial channel at the same time, then an optional Y-cable is available.

- Software Switch Selection - Although the hardware is working correctly, the RS232 interface could seem to be bad if the right software switch settings were not made. Check that the terminal, modem or home computer plugged into the RS232 are expecting the right information. Make sure that what they expect is the same as the options you have set in the SAVE, OLD, OPEN, or LIST statements.

For example: A printer that expects to receive information at a speed of 300 baud does not like it when the RS232 channel is OPENED at 2400 baud. If you do not want to specify all those "Defaults" in your TI BASIC statements, then set the DIP switches to expect the default values talked about in the "Software Switch Options" section.

If two Home Computers are setup to talk to each other, then leaving (
out the ECHO OFF (.EC) or the LINEFEED OFF (.LF) will confuse
them.

- Device Test Mode - If your printer, modem, etc. have a self test
  function, then disconnect the device from the RS232 channel and
  use the device self test mode to make sure it is working correctly.

    * = According to the EIA RS232 Standard

APPENDIX A -- ERROR CODES

Listed below are the error codes related to the operation of TI BASIC programs that use the RS232 Card.

OPEN:

CODE 00 --Device named in the statement or command cannot be opened.

CODE 02 --The software switch option entry is in error, such as incorrect first two characters of an option, invalid BAUD rate, or incorrect number of data bits, as well as RELATIVE record type specified in the OPEN statement.

CODE 06 --A hardware error occurred and the device cannot be opened.

INPUT:

CODE 24 --INTERNAL data type record is too large to be read into the buffer space allocated.

CODE 26 --Some type of hardware error occurred. Also caused by pressing CLEAR to stop the reception of a pending or in progress operation.

PRINT:

CODE 36 --See INPUT code 26.

OLD:

CODE 50 --Program cannot be loaded from the specified device.

CODE 52 --Attempting to use .EC, .CR, .LF, .NU, or .DA switch with OLD statement. Also see OPEN code 02.

CODE 54 --The program is too large to be loaded.

CODE 56 --See INPUT code 26.

SAVE:

CODE 60 --Program cannot be saved to the specified device.

CODE 62 --Attempting to use .EC, .CR, .LF, .NU, or .DA switch with SAVE statement. Also see OPEN code 02.

CODE 66 --See INPUT code 26.

MISC ERROR CODES:

CODE 43, 73, 83, 93 -- Executing an illegal command.

APPENDIX B - SERIAL PIN OUT DIAGRAM

Cables used to connect other computers, modems or terminals to the RS232 Interface card via the serial port must use EIA RS232-C 25-pin male connectors.

Serial Port Female Connector Pin Definitions

PIN No.	Input/ Output	Mnemonic	EIA	Function
1	Ground		AA	Chassis or Protective Ground
2	Input	RXD/1	BB/1	Data in to RS232/1
3	Output	TXD/1	BA/1	Data out from RS232/1
5	Output	CTS/1	CB/1	Clear To Send - CRU out RS232/1
6	Output	DSR	CC	Data Set Ready - 1.8 Kilohm pull-up resistor to +12V
7	Ground		AB	Logic or Signal Ground
8	Output	DCD/1	CF/1	Data Carrier Detect RS232/1
12	Output	DCD/2	CF/2	Data Carrier Detect RS232/2
13	Output	CTS/2	CB/2	Clear To Send - CRU out RS232/2
14	Input	RXD/2	BB/2	Data in to RS232/2
16	Output	TXD/2	BA/2	Data out from RS232/2
19	Input	DTR/2	CD/2	Data Terminal Ready RS232/2
20	Input	DTR/1	CD/1	Data Terminal Ready RS232/1

Note: The second Serial Channel (RS232/2) is optional on the CorComp 9900 Micro-Expansion System.

Required Pin Wiring for Connecting Two Home Computers by Direct Cables or Modems via the Serial Port

For RS232 or RS232/1

RS232 Card		Computer/ Modem
1 Ground	---	1 Ground
2 RXD/1	←	3 TXD/1
3 TXD/1	→	2 RXD/1
6 DSR	→	20 DTR/1
7 Ground	---	7 Ground
20 DTR/1	←	6 DSR

For RS232/2

RS232 Card		Computer
1 Ground	---	1 Ground
6 DSR	←	19 DTR/2
7 Ground	---	7 Ground
14 RXD/2	←	16 TXD/2
16 TXD/2	→	14 RXD/2
19 DTR/2	←	6 DSR

GENERAL Pin Wiring for Printers and Terminals

For RS232 or RS232/1

RS232 Card		Printer/ Terminal
1 Ground	---	1 Ground
2 RXD/1	←	2 TXD or BA
3 TXD/1	→	3 RXD or BB
* 5 CTS/1	→	5 CTS or CB
* 6 DSR	→	6 DSR or CC
7 Ground	---	7 Ground
* 8 DCD/1	→	8 DCD or CF
20 DTR/1	←	20 DTR or CD

For RS232

| RS232 Card		Printer/ Terminal
1 Ground	---	1 Ground
* 6 DSR	→	6 DSR or CC
7 Ground	---	7 Ground
* 12 DCD/2	→	8 DCD or CF
* 13 CTS/2	→	5 CTS or CB
14 RXD/2	←	2 TXD or BA
16 TXD/2	→	3 RXD or BB
19 DTR/2	←	20 DTR or CD

*Not required for proper operation of the RS232 Card, but may be required by some printers or terminals for their proper operation.

Note: The second Serial Channel (RS232/2) is optional on the CorComp 9900 Micro-Expansion System.

SERIAL Y Cable Configuration

RS232 Card		RS232 or RS232/1	
1 Ground	---	1 Ground	
2 RXD/1	←	2 RXD or	BB
3 TXD/1	→	3 TXD or	BA
5 CTS/1	→	5 CTS or	CB
6 DSR	→	6 DSR or	CC
7 Ground	---	7 Ground	
8 DCD/1	→	8 DCD or	CF
20 DTR/1	←	20 DTR or	CD

RS232 Card		RS232/2	
1 Ground	---	1 Ground	
14 RXD/2	←	2 RXD or	BB
16 TXD/2	→	3 TXD or	BA
13 CTS/2	→	5 CTS or	CB
6 DSR	→	6 DSR or	CC
7 Ground	---	7 Ground	
12 DCD/2	→	8 DCD or	CF
19 DTR/2	←	20 DTR or	CD
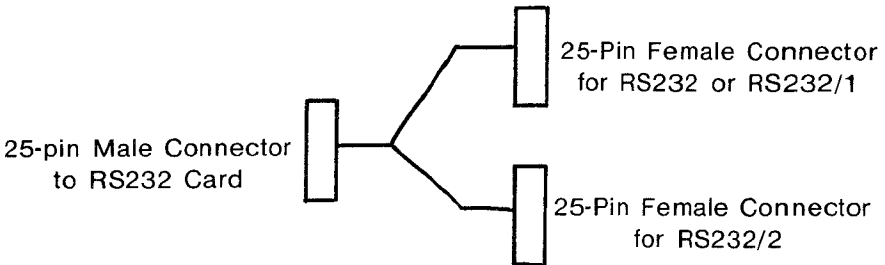
25-Pin Female Connector
for RS232 or RS232/1

25-pin Male Connector
to RS232 Card

25-Pin Female Connector
for RS232/2

Note: The second Serial Channel (RS232/2) is optional on the CorComp 9900 Micro-Expansion System.

APPENDIX C -
PARALLEL PIN OUT DIAGRAMS

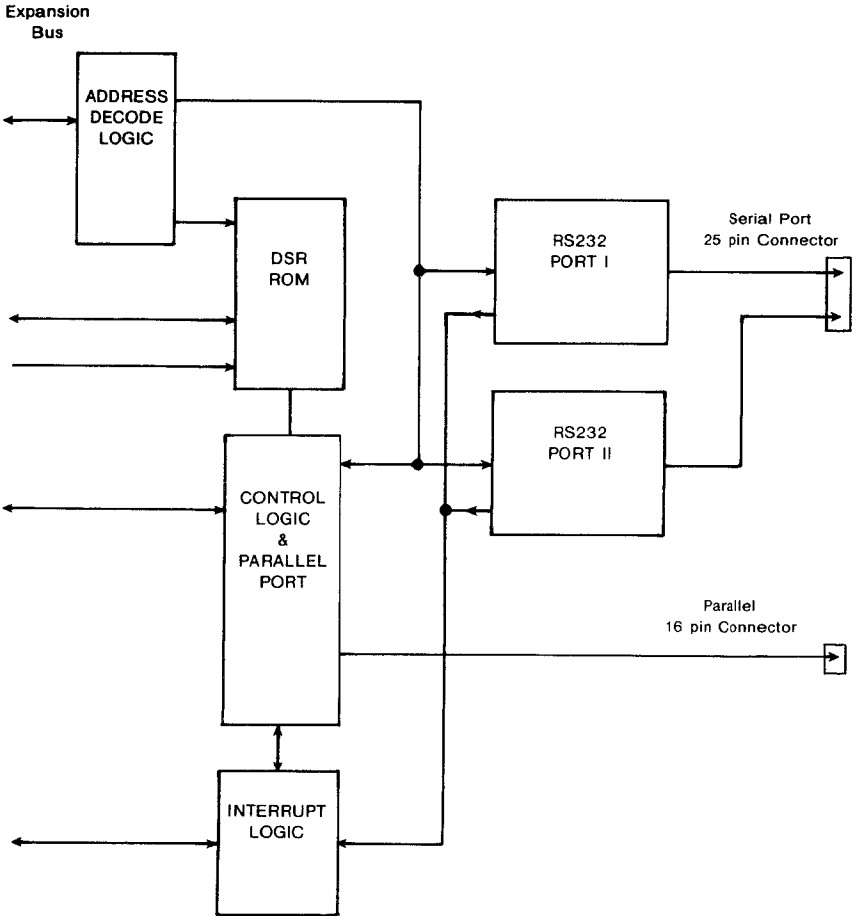## Parallel Port Female Connector Pin Definitions

PIN #	Function
1	Handshake or Data Strobe OUT
2	Data Bit 1 - LSB
3	Data Bit 2
4	Data Bit 3
5	Data Bit 4
6	Data Bit 5
7	Data Bit 6
8	Data Bit 7
9	Data Bit 8 - MSB
10	Handshake or Acknowledge IN
11	Ground
12	10 Ohm pull-up resister to +5V
13	Spare Input Bit
14	Spare Output Bit
15	1 Kilohm pull-up resister to +5V
16	Ground

GENERALLY connected as follows:

Parallel Port			Printer Connector
1	- -	1	Data Strobe
2	- -	2	Data Bit 1 - LSB
3	- -	3	Data Bit 2
4	- -	4	Data Bit 3
5	- -	5	Data Bit 4
6	- -	6	Data Bit 5
7	- -	7	Data Bit 6
8	- -	8	Data Bit 7
9	- -	9	Data Bit 8 - MSB
10	- -	11	(or Printer's BUSY line)
11	- -	?	To Printer's Chassis Ground
16	- -	?	To Printer's Logic Ground

APPENDIX D - BLOCK DIAGRAM

RS232 CARD

Expansion
Bus

```
ADDRESS
DECODE
LOGIC

DSR
ROM

RS232
PORT I                    Serial Port
                          25 pin Connector

RS232
PORT II

CONTROL
LOGIC
&
PARALLEL
PORT
                          Parallel
                          16 pin Connector

INTERRUPT
LOGIC
```

CORCOMP, INCORPORATED

LIMITED WARRANTY

CorComp warrants the 9900 Micro-Expansion System which it manufactures to be free from defects in materials and workmanship for a period of 120 days from the date of purchase.

During the 120 days warranty period CorComp will repair or replace, at its option, any defective products or parts at no additional charge, provided the product is returned, shipping pre-paid to CorComp. The Purchaser is responsible for insuring any product so returned and assumes the risk of loss during shipping, all replaced parts and products become the property of CorComp.

SHIP TO:
23461 RIDGE ROUTE DRIVE, SUITE H
LAGUNA HILLS, CA 92653

WARRANTY COVERAGE

This 9900 Micro-Expansion System is warranted against defective materials or workmanship. THIS WARRANTY IS VOID IF PRODUCT HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLECT, IMPROPER SERVICE OR OTHER CAUSES NOT ARISING OUT OF DEFECTS IN MATERIALS OR WORKMANSHIP.

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Some states do not allow the exclusion or limitation of implied warranties or consequential damages, so the above limitations or exclusin may not apply to you in those states.

LEGAL REMEDIES

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

NOTES

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