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## Macintosh Family: Serial Port Cable Length Specifications

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### TOPIC -----

The Macintosh Portable serial ports don't seem to have the same capacity as other Macintosh systems.

My Macintosh Portable won't establish an asynchronous session to a mainframe using VT240 emulation from White Pine, version 3.0.1, through the serial ports. I've tried three different Macintosh Portables with no luck. When using the same line with a Macintosh SE, all is well; sessions run without any problem. The cable, connected to Ethernet and to the VAX, is approximately 20 meters long.

White Pine Tech Support told me that version 3.01 works okay on the Macintosh Portable; they are running that configuration, but they use a "limited distance" modem with serial port.

### DISCUSSION -----

The first and most obvious problem is the cable length. Twenty meters is nearly 60 feet (over 31 percent) longer than the EIA RS-232-C specification of 50 feet. This could cause the communications difficulties. The Macintosh Portable is designed to the RS-422 specification with the ability to meet the RS-423 specification.

This means it can be used to communicate with most RS-232-C devices over distances up to approximately 50 feet. Shortening the cable to within specification or adding the "limited distance" modem (known as a "short-haul modem" in the U.S.) should resolve the connection problem.

Occasionally, computers can go beyond the RS-232 specification; however, if a machine works at lengths greater than 50 feet, it is considered the exception.

The output power of all Macintosh models, including the Macintosh Portable, is completely within the EIA RS-423 specification. The RS-423 specification is designed to accommodate RS-232-C devices in a RS-422 environment. The RS-422 design is the Macintosh standard for serial ports

and was chosen for its ability to carry serial signals over greater distances than the RS-232-C design. The RS-423 specification also encompasses the RS-232-C specification. This means that a device that conforms to RS-423 also conforms to RS-232-C.

The output power of most serial devices is determined by the line driver integrated circuits. The Macintosh systems in question all use the 23LS30 line driver IC, which is designed to meet the RS-422, RS-423, and RS-232-C specifications.

The RS-232-C specification states that a line driver output value more positive than +3 volts is considered ON (or SPACE or 0). The Macintosh serial ports provide a positive voltage level of +3.6 volts. The specification states that a line driver output level value more negative than -3 volts is considered OFF (or MARK or 1). The Macintosh serial ports provide a negative voltage of -3.6 volts. The output impedance specification is stated as greater than 300 ohms; the Macintosh serial ports provide 450 ohms.

Why does a Macintosh SE work when the Macintosh Portable doesn't? Because 65.62 feet (20 meters) falls outside the maximum distance stated in the RS-232-C specification of 50 feet (15.14 meters), performance will be erratic and unpredictable. Because of slight design differences, part variances, and environmental changes, one model of Macintosh (or even different units of the same model, or even the same unit at different times) may work at distances greater than 50 feet, while another may not. Once the specification has been exceeded, these results most likely will be inconsistent.

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