

## a. CONNECTIONS

It is impossible to present "universal" RS-232-C cabling. The reason is that RS-232-C, while a "standard" serial-interface specification, is also a fairly broad one, with a number of options the equipment designer may or may not choose to employ. For electrical and mechanical characteristics of the interface, see the latest *EIA Standard*, published by the *Electronics Industries Association*, Washington, D.C.

THE PRECISE SETTING OF RS-232-C "PROTOCOL" VARIABLES IS ESSENTIAL FOR PROPER DATA TRANSFER. The available selection methods are explained in the following section.

RS-232-C allows the provision of special "handshake" functions. These are designed to prevent data transmitters from going too fast for their receivers. The kind of handshake you employ, if any, will depend in part on the equipment participating in the data interchange.

If you did not order a specific Daytronic *RS-232-C Interface Cable* with your DataPAC, then you will have to provide your own connection. Fig. 2.B.1(a), below, shows suggested cabling between a DataPAC and a computer, terminal, buffered printer, etc., that uses a *25-Pin RS-232-C Connector*, or between a DataPAC and a Daytronic OPERATOR CONSOLE (see Section 2.O)—for "full handshake," "incoming handshake only," and "no handshake" situations, respectively. Following RS-232-C conventions, the device at each end of the interface is seen as "DATA TERMINAL EQUIPMENT (DTE)." Fig. 2.B.1(b) shows "full-handshake" cabling between a DataPAC and a computer, terminal, printer, etc., that uses a *9-Pin D-Subminiature Connector* for its RS-232-C interface (such as an IBM PC/AT).

FOR MAXIMUM DATA-TRANSFER SPEED AND ACCURACY, A "FULL HANDSHAKE" IS GENERALLY RECOMMENDED. Relevant standard RS-232-C line functions for both connector types are described in the following table:

Table 2.B.1

## Selected RS-232-C Pin Connections

(Each function is defined with respect *either to the DataPAC or to the connected RS-232-C device*, both of which are assumed to be "DTE.")

Pin No. (25-Pin Conn.)	Pin No. (9-Pin Conn.)	Mnemonic or Other Designation	Description
1	—	GND, EARTH GROUND, SHIELD	<b>Protective Ground.</b> Electrical equipment frame and AC power ground.
2	3	TDATA, TxD, RS232 XMIT	<b>Transmitted</b> Serial-ASCII Data.
3	2	RDATA, RxD, RS232 RECEIVE	<b>Received</b> Serial-ASCII Data.
4	7	RTS	<b>Request To Send.</b> A logic <i>output</i> signal which, when asserted, indicates a readiness to <i>transmit</i> data. RTS and CTS of the data transmitter or receiver may be tied, unless "full handshake" is required (see Fig. 2.B.1(a)).
5	8	CTS	<b>Clear To Send.</b> A logic <i>input</i> signal interpreted to mean that the connected device is ready to <i>receive</i> data. CTS and RTS of the data transmitter or receiver may be tied, unless "full handshake" is required (see Fig. 2.B.1(a)).
7	5	SGND, LOGIC GROUND	<b>Signal Ground.</b> Establishes common reference between the DataPAC and the connected RS-232-C device.
20	4	DTR	<b>Data Terminal Ready.</b> A logic <i>output</i> signal which, when asserted, indicates a readiness to <i>receive</i> data.
—	6	DSR	<b>Data Set Ready.</b> A logic <i>input</i> which, when asserted, indicates a readiness to communicate on the part of the connected device.

# 2.B.2.

## RS-232-C INTERFACING

Fig. 2.B.1(a) Suggested RS-232-C Interface Connections, 25-Pin RS-232-C Connector

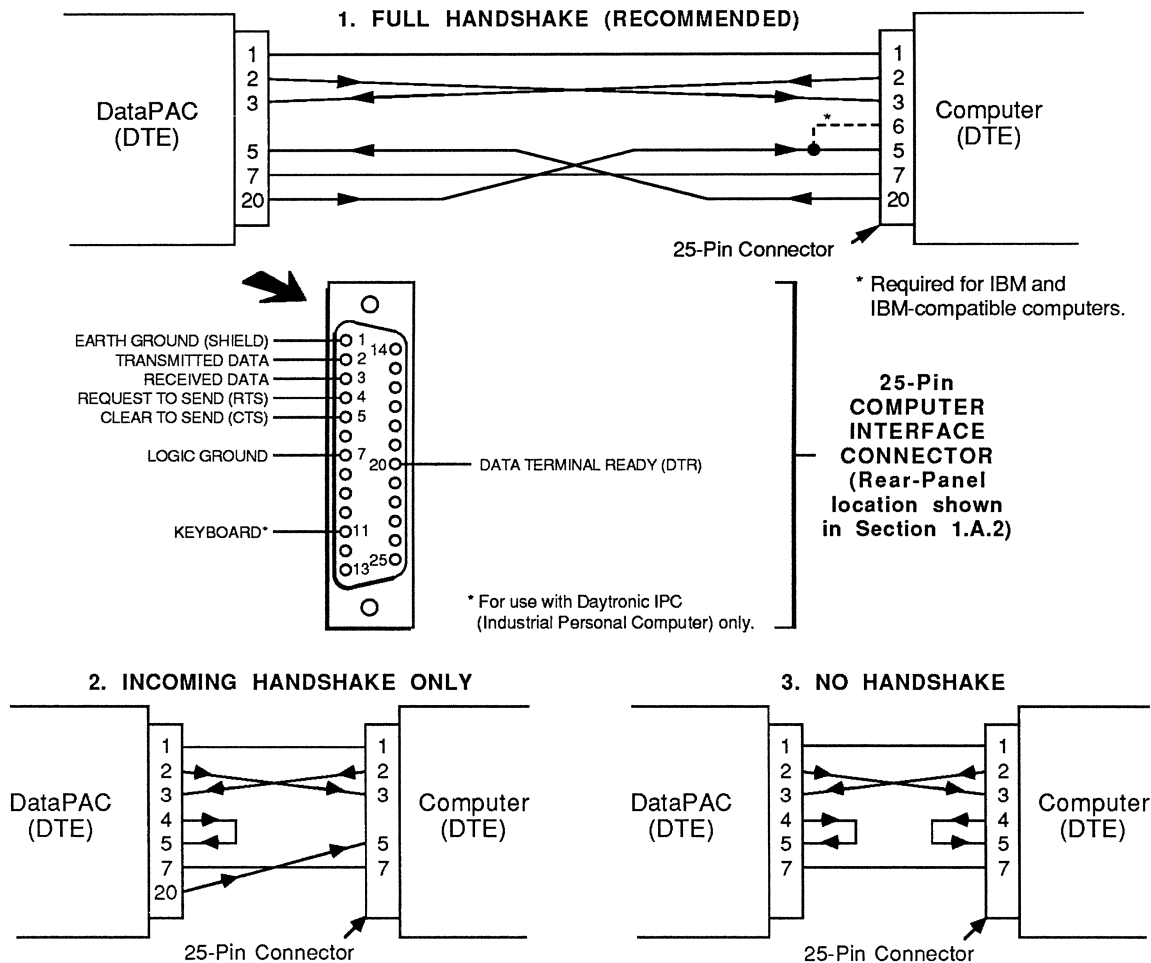
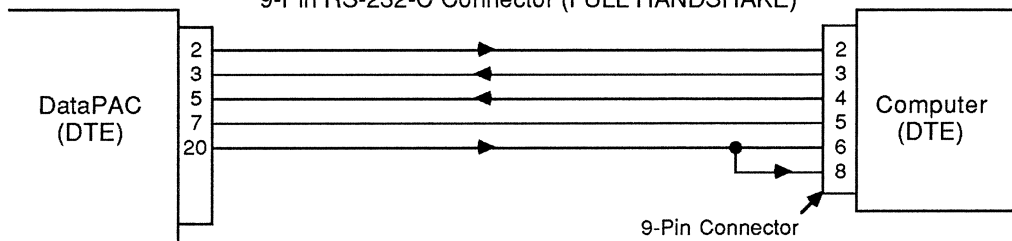


Fig. 2.B.1(b) Suggested RS-232-C Interface Connections, 9-Pin RS-232-C Connector (FULL HANDSHAKE)



Please note that the cabling in Fig. 2.B.1 is by no means "definitive." In all cases, *you should carefully study the literature accompanying the specific RS-232-C device you wish to connect to your DataPAC*, along with the definitions in the above table, to determine the cable arrangement that will create the "handshake" you need (if any).

Indeed, the idiosyncracies of your particular RS-232-C device may demand some variation of the cabling shown above. You should be aware, for instance, that the **DATA TERMINAL READY** signal issued by your device may have a different name (such as **NOT BUSY**) and may even appear on a pin other than No. 20 or No. 4. When this signal is not supplied, Pins 4 and 5 of the DataPAC's COMPUTER INTERFACE CONNECTOR *must* be jumpered together.

If you are in any doubt as to the suitability of a particular cable configuration for *your* application, feel free to contact the Daytronic SERVICE DEPARTMENT or SALES STAFF for assistance.\*

----- CAUTION! -----

TO PREVENT EQUIPMENT DAMAGE, THE "OPEN CIRCUIT" VOLTAGE ACROSS THE "DATA SOURCE" END OF THE INTERFACE (WITH RESPECT TO SIGNAL GROUND) **MUST NOT EXCEED 25 VOLTS.**

## b. SETTING RS-232-C INTERFACE PROTOCOL

The "protocol" applying to an RS-232-C link normally involves four basic data-transfer characteristics:

1. **BAUD RATE** (number of data bits transmitted per second).
2. **NUMBER OF DATA BITS** transmitted *per data character* (not including STOP BIT(S) and optional PARITY bit).
3. **PARITY** check: an optional feature that allows a data receiver to detect transmission errors. The transmitter may assign to an additional data-bit position either a "1" or a "0," in order to make the total number of "1's" in the transmitted character either **EVEN** or **ODD**, whichever convention has been chosen.
4. **NUMBER OF STOP BITS (1 or 2)**: allows the data receiver time to prepare for the next character transmission.

----- IMPORTANT -----

FOR PROPER DATA INTERCHANGE BETWEEN A DATAPAC AND A CONNECTED RS-232-C DEVICE TO OCCUR, THE DATAPAC'S COMPUTER INTERFACE PORT MUST BE SET TO CONFORM EXACTLY WITH THE PROTOCOL STIPULATED BY THE CONNECTED DEVICE.

You should set RS-232-C protocol characteristics in one of several ways, depending on the nature of your DataPAC. Each method is discussed in detail below.

- **IF YOUR DATAPAC HAS CRT "VIDEO CAPABILITY,"** you should set the initial interface protocol through simple keyboard responses to a built-in setup **MENU** that appears on the display.
- **IF YOUR DATAPAC DOES NOT HAVE CRT "VIDEO CAPABILITY,"** you will have to set the interface protocol by means of the DataPAC's *Protocol Switches*.

For a DataPAC *with* CRT "video capability," you may use the Protocol Switches as an alternative method to the **MENU** setup procedure, and to designate the *default* protocol to be effective on powerup. After powerup, one or more protocol characteristics for such a DataPAC may be altered at any time by a **BAUD RATE (BAU)** command, or by a subsequent **MENU** procedure—if the *DataPAC's Protocol Switches have been disabled*, as explained below.

THE **BAUD RATE (BAU)** COMMAND IS ONLY RECOGNIZED BY DATAPACS WITH CRT "VIDEO CAPABILITY."

\* Small unwanted pulses on the DTR line can sometimes trigger "interrupt" routines for certain high-speed computers. If your computer experiences intermittent interruptions which you suspect to be caused by such "DTR rattle," you should install a 0.001-microfarad capacitor between Pin 7 (LOGIC GROUND) and Pin 20 (DATA TERMINAL READY) of the DataPAC's COMPUTER INTERFACE CONNECTOR.