1 INTRODUCTION

The C300 Series of controllers is extended by the addition of a serial data communication option which allows addressing and reprogramming via a computer terminal or host computer.

The RS422/485 communication standard is used with the following logic levels:

a) for logic '1' (MARK condition or IDLE state) the 'A' terminal of the transmitter is negative (0V) with respect to the 'B' terminal (+5V)

b) for logic '0' (SPACE condition or ACTIVE state) the 'A' terminal of the transmitter is positive (+5V) with respect to the 'B' terminal (0V).

Parity is used for simple error checking. The parity bit is a one-bit code which is transmitted in addition to the ASCII character. It can detect only one error per character, since two errors may cancel out. Parity is calculated by finding the sum of logic '1's in the character and either:

a) setting the parity bit to logic '1' if the sum is odd, or logic '0' if the sum is even, when using even parity
   or
b) setting the parity bit to logic '0' if the sum is odd, or logic '1' if the sum is even, when using odd parity.

The block check character (BCC) is an additional form of checking and is the arithmetic sum of all the characters in a complete message (excluding parity bits) – see Appendix A3 on page 28. Error detection is achieved by comparison of the BCC's of the transmitted and received messages.
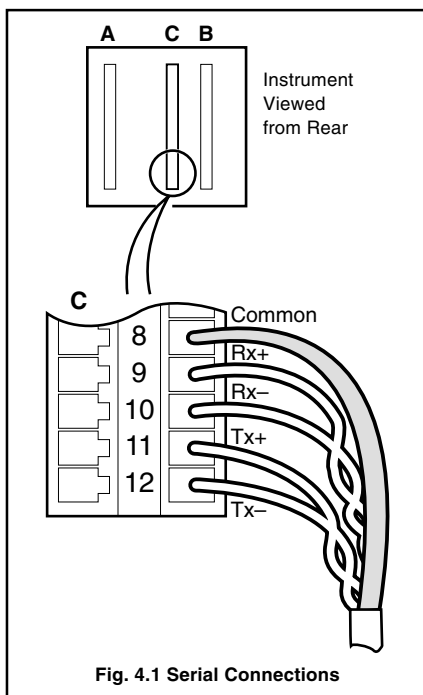
2 PREPARATION

The procedure is similar to that described in the Operating Instructions (IM/C300) with additions as detailed in this section.

2.1 Company Standard Settings

Only those parameters detailed on the customer order are programmed at the factory. If any parameters are unsuitable for the application they can be reprogrammed – see Section 7 of the Operating Instructions (IM/C300). Serial data programming details are to be found in Section 7 of this manual.

Standard parameter settings for the serial data programme are as follows:

Instrument Identity	01
Parity	odd parity
Block Check Character (BCC)	BCC on
Transmission Rate	9600 baud.

Fig. 4.1 Serial Connections

3 INSTALLATION

Observe the limitations outlined in the Operating Instructions (IM/C300). The maximum serial data transmission line length for both RS422 and RS485 systems is 1200m.

3.1 Serial Communication Adaptors for Personal Computers

An RS422/485 communications adaptor board is required for serial links. It is strongly recommended that the card used has galvanic isolation to protect the computer from lightning damage and increase immunity from noise pick-up from cables. The following OPTO22 boards are recommended for use with the C300 serial instruments.

Part No.	Computer Type
AC24	XT Bus IBM PC compatible
AC24 AT	AT Bus IBM PC compatible
AC34	Microchannel IBM PC.

The following 'Jumper' selections are required on OPTO22 boards (usually supplied as the default configuration):

RX & TX	install line termination jumper
	Install pull-up and pull-down jumpers
CTS & RTS	disable jumper installed.

Select board address and interrupts as described in the OPTO22 manual.

4 ELECTRICAL CONNECTIONS

All connections, apart from those for serial data communication, are made as shown in Table 4.2 in the Operating Instructions (IM/C300).

4.1 Serial Connections – Figs. 4.1 and 4.2

The controllers must be connected in parallel as shown in the schematic diagram – Fig. 4.2. The RS485 standard quotes connection of thirty two slaves (C300 Controllers) maximum to any single driver (computer terminal or host computer); the RS422 standard quotes connection of up to ten slaves. However, these numbers can be increased if the driver's serial port permits.

Make serial data connections as shown in Fig. 4.1. The type of cable used is dependent on the transmission speed and cable length:

Up to 6m (all speeds) – standard screened or twisted pair cable.

Up to 300m – twin twisted pair with overall foil screen and an integral drain wire, e.g. Belden 9502 or equivalent

Up to 1200m – twin twisted pair with separate foil screens and integral drain wires for each pair, e.g. Belden 9729 or equivalent.
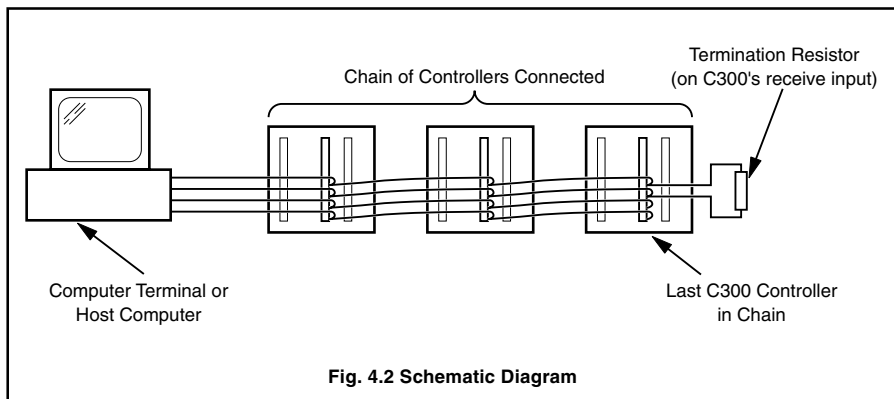

Fig. 4.2 Schematic Diagram

5 SETTING UP

For all aspects other than serial data transmission the controller is set up as shown in the Operating Instructions (IM/C300). Unless otherwise requested, the instrument is despatched with a transmission rate of 9600 baud and transmission line termination resistors linked-out. If the resistors are to be linked-in (see Fig. 4.2) carry out the following section.

5.1 Termination Resistors – Fig. 5.1

For long transmission lines, termination resistors are required on the last C300 Controller in the chain and at the host computer/computer terminal – see Fig. 4.2. Under normal operating conditions the resistors are required at the receive inputs only. The controller's resistors are selected using plug-in links – see Fig. 5.1.

Switch off the supply and remove the controller from its case (Fig. 2.1 in the Operating Instructions, IM/C300). Set the termination resistor links as shown in Fig. 5.1.

6 PROTOCOL

The protocol used is based on ANSI-X3.28-1976-2.5-A4 and is used for master (host computer) to slave (C300 Controller) systems. This is the **recommended protocol for use with supervisory systems** such as ABB Kent-Taylor PC30. The Protocol is:

> Start transmission (STX) – Command – Identification … End transmission (ETX) – see Figs. 8.1 to 8.6 on pages 7 and 8.

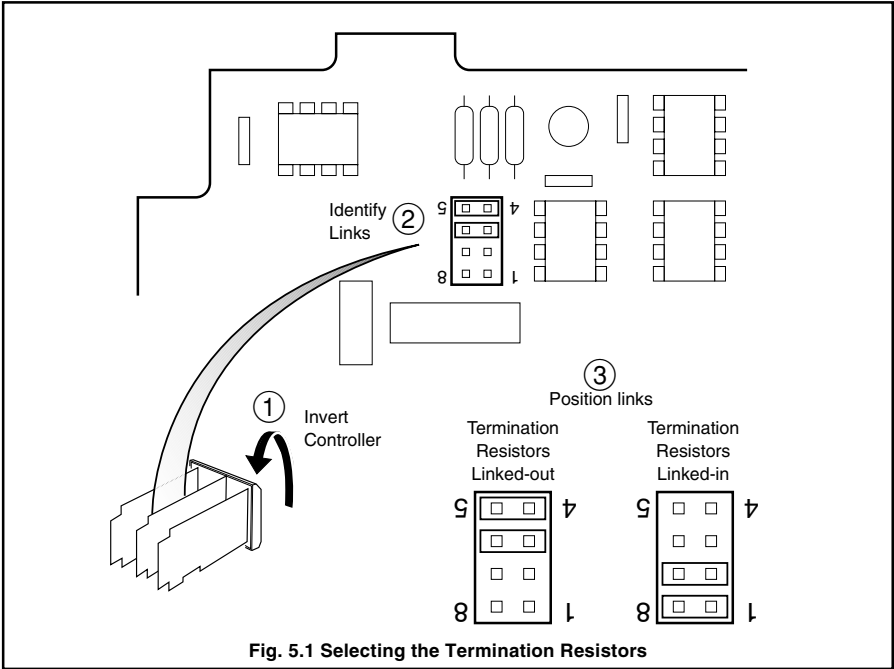Transmission of commands and processing of the subsequent replies must be incorporated into the host computer programme.

Fig. 5.1 Selecting the Termination Resistors